

1 CCPP variables provided by model FV3 vs requested by pool of physics

1.1 List of variables

CCPP_Interstitial_type
FV3-GFS_Cldprop_type
FV3-GFS_Cldprop_type_all_blocks
FV3-GFS_Control_type
FV3-GFS_Coupling_type
FV3-GFS_Coupling_type_all_blocks
FV3-GFS_Data_type
FV3-GFS_Data_type_all_blocks
FV3-GFS_Diag_type
FV3-GFS_Diag_type_all_blocks
FV3-GFS_Grid_type
FV3-GFS_Grid_type_all_blocks
FV3-GFS_Interstitial_type
FV3-GFS_Interstitial_type_all_threads
FV3-GFS_Radtend_type
FV3-GFS_Sfcprop_type
FV3-GFS_Sfcprop_type_all_blocks
FV3-GFS_Statein_type
FV3-GFS_Statein_type_all_blocks
FV3-GFS_Stateout_type
FV3-GFS_Tbd_type
FV3-GFS_Tbd_type_all_blocks
Monin-Obukhov_similarity_function_for_heat
Monin-Obukhov_similarity_function_for_heat_at_2m
Monin-Obukhov_similarity_function_for_momentum
Monin-Obukhov_similarity_function_for_momentum_at_10m

accumulated_lwe_thickness_of_convective_precipitation_amount_cnvc90
accumulated_lwe_thickness_of_graupel_amount
accumulated_lwe_thickness_of_graupel_amount_in_bucket
accumulated_lwe_thickness_of_ice_amount
accumulated_lwe_thickness_of_ice_amount_in_bucket
accumulated_lwe_thickness_of_precipitation_amount
accumulated_lwe_thickness_of_precipitation_amount_in_bucket
accumulated_lwe_thickness_of_snow_amount
accumulated_lwe_thickness_of_snow_amount_in_bucket
adjusted_vertical_layer_dimension_for_radiation
adjusted_vertical_level_dimension_for_radiation
aerosol_asymmetry_parameter_for_longwave_bands_01-16
aerosol_asymmetry_parameter_for_shortwave_bands_01-16
aerosol_aware_parameter_deep_convection
aerosol_aware_parameter_shallow_convection
aerosol_optical_depth_for_longwave_bands_01-16
aerosol_optical_depth_for_shortwave_bands_01-16
aerosol_optical_properties_for_longwave_bands_01-16
aerosol_optical_properties_for_shortwave_bands_01-16
aerosol_single_scattering_albedo_for_longwave_bands_01-16
aerosol_single_scattering_albedo_for_shortwave_bands_01-16
air_pressure
air_pressure_at_interface
air_pressure_at_interface_for_radiation_in_hPa
air_pressure_at_layer_for_radiation_in_hPa
air_pressure_at_lowest_model_layer
air_pressure_difference_between_midlayers
air_temperature
air_temperature_at_interface_for_radiation
air_temperature_at_layer_for_radiation
air_temperature_at_lowest_model_layer

air_temperature_at_lowest_model_layer_for_diag
air_temperature_at_lowest_model_layer_updated_by_physics
air_temperature_at_previous_time_step
air_temperature_save
air_temperature_two_time_steps_back
air_temperature_updated_by_physics
angle_from_east_of_maximum_subgrid_orographic_variations
anisotropy_of_subgrid_orography
array_dimension_of_2d_arrays_for_microphysics
array_dimension_of_3d_arrays_for_microphysics
array_dimension_of_random_number
asymmetry_of_subgrid_orography
atmosphere_boundary_layer_thickness
atmosphere_diffusivity_coefficient_factor
atmosphere_energy_content_at_Lagrangian_surface
atmosphere_energy_content_in_column
atmosphere_heat_diffusivity
atmosphere_heat_diffusivity_background
atmosphere_heat_diffusivity_background_maximum
atmosphere_momentum_diffusivity_background
atmosphere_optical_thickness_due_to_ambient_aerosol_particles
block_number
bounded_vegetation_area_fraction
bulk_richardson_number_at_lowest_model_level
canopy_upward_latent_heat_flux
canopy_water_amount
cappa_moist_gas_constant_at_Lagrangian_surface
ccpp_error_flag
ccpp_error_message
ccpp_loop_counter
cell_area

cell_area_for_fast_physics
cell_size
change_in_ozone_concentration
characteristic_grid_length_scale
cloud_area_fraction
cloud_area_fraction_for_radiation
cloud_condensed_water_conversion_threshold
cloud_condensed_water_mixing_ratio
cloud_condensed_water_mixing_ratio_at_lowest_model_layer
cloud_condensed_water_mixing_ratio_at_surface
cloud_condensed_water_mixing_ratio_updated_by_physics
cloud_condensed_water_specific_humidity_at_Lagrangian_surface
cloud_droplet_number_concentration
cloud_droplet_number_concentration_updated_by_physics
cloud_fraction_at_Lagrangian_surface
cloud_fraction_updated_by_physics
cloud_graupel_specific_humidity_at_Lagrangian_surface
cloud_ice_mixing_ratio
cloud_ice_specific_humidity_at_Lagrangian_surface
cloud_ice_water_mixing_ratio_save
cloud_ice_water_path
cloud_liquid_water_mixing_ratio
cloud_liquid_water_mixing_ratio_save
cloud_liquid_water_path
cloud_liquid_water_specific_humidity_at_Lagrangian_surface
cloud_optical_depth_layers_678
cloud_optical_depth_weighted
cloud_rain_specific_humidity_at_Lagrangian_surface
cloud_rain_water_path
cloud_snow_specific_humidity_at_Lagrangian_surface
cloud_snow_water_path

cloud_work_function
coefficient_c_0
coefficient_c_d
coefficient_for_evaporation_of_rainfall
coefficient_from_cloud_ice_to_snow
coefficient_from_cloud_water_to_rain
coefficient_w_0
coefficient_w_d
column_precipitable_water
components_of_surface_downward_shortwave_fluxes
convective_cloud_cover
convective_cloud_cover_in_phy_f3d
convective_cloud_switch
convective_cloud_water_mixing_ratio
convective_cloud_water_mixing_ratio_in_phy_f3d
convective_transportable_tracers
convexity_of_subgrid_orography
cosine_of_latitude
cosine_of_solar_declination_angle
cosine_of_zenith_angle
countergradient_mixing_term_for_temperature
countergradient_mixing_term_for_water_vapor
critical_relative_humidity
critical_relative_humidity_at_PBL_top
critical_relative_humidity_at_surface
critical_relative_humidity_at_top_of_atmosphere
cumulative_atmosphere_detrainment_convective_mass_flux
cumulative_atmosphere_downdraft_convective_mass_flux
cumulative_atmosphere_updraft_convective_mass_flux
cumulative_canopy_upward_latent_heat_flu_multiplied_by_timestep
cumulative_change_in_ozone_mixing_ratio_due_to_PBL

cumulative_change_in_temperature_due_to_PBL
cumulative_change_in_temperature_due_to_deep_convection
cumulative_change_in_temperature_due_to_longwave_radiation
cumulative_change_in_temperature_due_to_microphysics
cumulative_change_in_temperature_due_to_shal_convection
cumulative_change_in_temperature_due_to_shortwave_radiation_and_orographic_gravity_wave_drag
cumulative_change_in_water_vapor_specific_humidity_due_to_PBL
cumulative_change_in_water_vapor_specific_humidity_due_to_deep_convection
cumulative_change_in_water_vapor_specific_humidity_due_to_microphysics
cumulative_change_in_water_vapor_specific_humidity_due_to_physics
cumulative_change_in_water_vapor_specific_humidity_due_to_shal_convection
cumulative_change_in_x_wind_due_to_PBL
cumulative_change_in_x_wind_due_to_convective_gravity_wave_drag
cumulative_change_in_x_wind_due_to_deep_convection
cumulative_change_in_x_wind_due_to_orographic_gravity_wave_drag
cumulative_change_in_y_wind_due_to_PBL
cumulative_change_in_y_wind_due_to_convective_gravity_wave_drag
cumulative_change_in_y_wind_due_to_deep_convection
cumulative_change_in_y_wind_due_to_orographic_gravity_wave_drag
cumulative_cloud_work_function
cumulative_lwe_thickness_of_convective_precipitation_amount
cumulative_lwe_thickness_of_convective_precipitation_amount_in_bucket
cumulative_snow_deposition_sublimation_upward_latent_heat_flux_multiplied_by_timestep
cumulative_snow_freezing_rain_upward_latent_heat_flux_multiplied_by_timestep
cumulative_soil_upward_latent_heat_flux_multiplied_by_timestep
cumulative_surface_downwelling_diffuse_near_infrared_shortwave_flux_for_coupling_multiplied_by_timestep
cumulative_surface_downwelling_diffuse_ultraviolet_and_visible_shortwave_flux_for_coupling_multiplied_by_timestep
cumulative_surface_downwelling_direct_near_infrared_shortwave_flux_for_coupling_multiplied_by_timestep
cumulative_surface_downwelling_direct_ultraviolet_and_visible_shortwave_flux_for_coupling_multiplied_by_timestep
cumulative_surface_downwelling_longwave_flux_for_coupling_multiplied_by_timestep
cumulative_surface_downwelling_shortwave_flux_for_coupling_multiplied_by_timestep

cumulative_surface_ground_heat_flux_multiplied_by_timestep
cumulative_surface_net_downward_diffuse_near_infrared_shortwave_flux_for_coupling_multiplied_by_timestep
cumulative_surface_net_downward_diffuse_ultraviolet_and_visible_shortwave_flux_for_coupling_multiplied_by_timestep
cumulative_surface_net_downward_direct_near_infrared_shortwave_flux_for_coupling_multiplied_by_timestep
cumulative_surface_net_downward_direct_ultraviolet_and_visible_shortwave_flux_for_coupling_multiplied_by_timestep
cumulative_surface_net_downward_longwave_flux_for_coupling_multiplied_by_timestep
cumulative_surface_net_downward_shortwave_flux_for_coupling_multiplied_by_timestep
cumulative_surface_snow_area_fraction_multiplied_by_timestep
cumulative_surface_upward_latent_heat_flux_for_coupling_multiplied_by_timestep
cumulative_surface_upward_latent_heat_flux_for_diag_multiplied_by_timestep
cumulative_surface_upward_potential_latent_heat_flux_multiplied_by_timestep
cumulative_surface_upward_sensible_heat_flux_for_coupling_multiplied_by_timestep
cumulative_surface_upward_sensible_heat_flux_for_diag_multiplied_by_timestep
cumulative_surface_x_momentum_flux_for_coupling_multiplied_by_timestep
cumulative_surface_x_momentum_flux_for_diag_multiplied_by_timestep
cumulative_surface_y_momentum_flux_for_coupling_multiplied_by_timestep
cumulative_surface_y_momentum_flux_for_diag_multiplied_by_timestep
cumulative_transpiration_flux_multiplied_by_timestep
date_and_time_at_model_initialization
date_and_time_at_model_initialization_reordered
daytime_points
daytime_points_dimension
deep_soil_temperature
density_of_frozen_precipitation
depth_of_soil_levels_for_land_surface_model
detrainment_conversion_parameter_deep_convection
detrainment_conversion_parameter_shallow_convection
dewpoint_temperature_at_2m
diffusivity_background_sigma_level
dimensionless_exner_function_at_lowest_model_interface
dimensionless_exner_function_at_lowest_model_layer

dimensionless_exner_function_at_model_interfaces
dimensionless_exner_function_at_model_layers
dissipation_estimate_of_air_temperature_at_model_layers
diurnal_thermocline_layer_heat_content
diurnal_thermocline_layer_thickness
diurnal_thermocline_layer_x_current
diurnal_thermocline_layer_y_current
dominant_freezing_rain_type
dominant_rain_type
dominant_sleet_type
dominant_snow_type
downdraft_fraction_reaching_surface_over_land_deep_convection
downdraft_fraction_reaching_surface_over_ocean_deep_convection
dynamics_to_physics_timestep_ratio
ending_x_direction_index
ending_x_direction_index_domain
ending_y_direction_index
ending_y_direction_index_domain
entrainment_rate_coefficient_deep_convection
entrainment_rate_coefficient_shallow_convection
equation_of_time
extra_top_layer
finite-volume_mean_edge_pressure_raised_to_the_power_of_kappa
flag_TKE_dissipation_heating
flag_convective_gravity_wave_drag
flag_deep_convection
flag_diagnostics
flag_diagnostics_3D
flag_for_Arakawa_Wu_adjustment
flag_for_CRICK-proof_cloud_water
flag_for_Chikira_Sugiyama_deep_convection

flag_for_aerosol_physics
flag_for_chemistry_coupling
flag_for_cloud_condensate_normalized_by_cloud_cover
flag_for_convective_transport_of_tracers
flag_for_default_aerosol_effect_in_shortwave_radiation
flag_for_fast_microphysics_energy_conservation
flag_for_flux_coupling
flag_for_frozen_soil_physics
flag_for_gfdl_microphysics_scheme
flag_for_guess_run
flag_for_hedmf
flag_for_hydrostatic_heating_from_physics
flag_for_hydrostatic_solver
flag_for_initial_time-date_control
flag_for_inline_cloud_fraction_calculation
flag_for_iteration
flag_for_land_surface_scheme
flag_for_lw_clouds_without_sub-grid_approximation
flag_for_mass_flux_deep_convection_scheme
flag_for_mass_flux_shallow_convection_scheme
flag_for_max-random_overlap_clouds_for_longwave_radiation
flag_for_max-random_overlap_clouds_for_shortwave_radiation
flag_for_microphysics_scheme
flag_for_mom4_coupling
flag_for_morrison_gettelman_microphysics_scheme
flag_for_mountain_blocking
flag_for_nsstm_run
flag_for_output_of_longwave_heating_rate
flag_for_output_of_shortwave_heating_rate
flag_for_precipitation_effect_on_radiation
flag_for_precipitation_type

flag_for_precipitation_type_algorithm
flag_for_radar_reflectivity
flag_for_reduced_drag_coefficient_over_sea
flag_for_ruc_land_surface_scheme
flag_for_scale_aware_TKE_moist_EDMF_PBL
flag_for_shoc
flag_for_solar_constant
flag_for_stochastic_shum_option
flag_for_stochastic_skeb_option
flag_for_stochastic_surface_perturbations
flag_for_stochastic_surface_physics_perturbations
flag_for_surface_emissivity_control
flag_for_sw_clouds_without_sub-grid_approximation
flag_for_tendency_of_air_temperature_at_Lagrangian_surface
flag_for_the_last_step_of_k_split_remapping
flag_for_thompson_microphysics_scheme
flag_for_using_climatology_albedo
flag_for_using_prescribed_global_mean_co2_value
flag_for_vertical_index_direction_control
flag_for_wsm6_microphysics_scheme
flag_for_zhao_carr_microphysics_scheme
flag_for_zhao_carr_pdf_microphysics_scheme
flag_gocart
flag_idealized_physics
flag_mg3_as_mg2
flag_print
flag_shallow_convective_cloud
flag_skip_macro
flag_to_calc_lw
flag_to_calc_sw
forecast_date_and_time

forecast_hour
forecast_time
fraction_of_convective_cloud
fraction_of_grid_box_with_subgrid_orography_higher_than_critical_height
free_convection_layer_thickness
frequency_for_longwave_radiation
frequency_for_shortwave_radiation
gas_constant_dry_air
gas_constant_water_vapor
geopotential
geopotential_at_interface
geopotential_difference_between_midlayers_divided_by_midlayer_virtual_temperature
graupel_mixing_ratio
graupel_mixing_ratio_updated_by_physics
graupel_number_concentration
graupel_number_concentration_updated_by_physics
gravitational_acceleration
grid_size_related_coefficient_used_in_scale-sensitive_schemes
grid_size_related_coefficient_used_in_scale-sensitive_schemes_complement
h2o_forcing
height_above_ground_at_lowest_model_layer
horizontal_block_size
horizontal_dimension
horizontal_index_of_printed_column
horizontal_loop_extent
ice_friendly_aerosol_number_concentration
ice_friendly_aerosol_number_concentration_updated_by_physics
ice_number_concentration
ice_number_concentration_updated_by_physics
ice_water_mixing_ratio
ice_water_mixing_ratio_updated_by_physics

index_for_cloud_amount
index_for_graupel
index_for_graupel_number_concentration
index_for_ice_cloud_condensate
index_for_ice_cloud_number_concentration
index_for_liquid_cloud_condensate
index_for_liquid_cloud_number_concentration
index_for_ozone
index_for_rain_number_concentration
index_for_rain_water
index_for_snow_number_concentration
index_for_snow_water
index_of_TKE_convective_transport_tracer
index_of_dt1m_start
index_of_highest_temperature_inversion
index_of_time_step
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instantaneous_atmosphere_detrainment_convective_mass_flux_on_dynamics_timestep
instantaneous_atmosphere_downdraft_convective_mass_flux
instantaneous_atmosphere_downdraft_convective_mass_flux_on_dynamics_timestep
instantaneous_atmosphere_heat_diffusivity
instantaneous_atmosphere_updraft_convective_mass_flux
instantaneous_atmosphere_updraft_convective_mass_flux_on_dynamics_timestep
instantaneous_cosine_of_zenith_angle
instantaneous_deep_convective_cloud_condensate_mixing_ratio_on_dynamics_time_step
instantaneous_specific_humidity_at_2m_for_coupling
instantaneous_surface_air_pressure_for_coupling
instantaneous_surface_downwelling_diffuse_near_infrared_shortwave_flux_for_coupling
instantaneous_surface_downwelling_diffuse_ultraviolet_and_visible_shortwave_flux_for_coupling
instantaneous_surface_downwelling_direct_near_infrared_shortwave_flux_for_coupling
instantaneous_surface_downwelling_direct_ultraviolet_and_visible_shortwave_flux_for_coupling

instantaneous_surface_downwelling_longwave_flux_for_coupling
instantaneous_surface_downwelling_shortwave_flux_for_coupling
instantaneous_surface_ground_heat_flux
instantaneous_surface_net_downward_diffuse_near_infrared_shortwave_flux_for_coupling
instantaneous_surface_net_downward_diffuse_ultraviolet_and_visible_shortwave_flux_for_coupling
instantaneous_surface_net_downward_direct_near_infrared_shortwave_flux_for_coupling
instantaneous_surface_net_downward_direct_ultraviolet_and_visible_shortwave_flux_for_coupling
instantaneous_surface_net_downward_longwave_flux_for_coupling
instantaneous_surface_net_downward_shortwave_flux_for_coupling
instantaneous_surface_potential_evaporation
instantaneous_surface_skin_temperature_for_coupling
instantaneous_surface_upward_latent_heat_flux
instantaneous_surface_upward_latent_heat_flux_for_coupling
instantaneous_surface_upward_latent_heat_flux_for_diag
instantaneous_surface_upward_sensible_heat_flux
instantaneous_surface_upward_sensible_heat_flux_for_coupling
instantaneous_surface_upward_sensible_heat_flux_for_diag
instantaneous_surface_x_momentum_flux
instantaneous_surface_x_momentum_flux_for_coupling
instantaneous_surface_x_momentum_flux_for_diag
instantaneous_surface_y_momentum_flux
instantaneous_surface_y_momentum_flux_for_coupling
instantaneous_surface_y_momentum_flux_for_diag
instantaneous_temperature_at_2m_for_coupling
instantaneous_upward_sensible_heat_flux
instantaneous_water_vapor_specific_humidity_tendency_due_to_convection
instantaneous_x_stress_due_to_gravity_wave_drag
instantaneous_x_wind_at_10m_for_coupling
instantaneous_y_stress_due_to_gravity_wave_drag
instantaneous_y_wind_at_10m_for_coupling
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iounit_namelist
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kappa_dry_for_fast_physics
kinematic_surface_upward_latent_heat_flux
kinematic_surface_upward_sensible_heat_flux
lake_mask_real
land_area_fraction
largest_cloud_top_vertical_index_encountered_thus_far
latent_heat_of_vaporization_of_water_at_0C
latitude
latitude_index_in_debug_printouts
level_of_dividing_streamline
log_pressure_at_Lagrangian_surface
longitude
lw_fluxes_sfc
lw_fluxes_top_atmosphere
lwe_thickness_of_convective_precipitation_amount_for_coupling
lwe_thickness_of_convective_precipitation_amount_on_dynamics_timestep
lwe_thickness_of_deep_convective_precipitation_amount
lwe_thickness_of_explicit_precipitation_amount
lwe_thickness_of_explicit_rain_amount
lwe_thickness_of_graupel_amount
lwe_thickness_of_graupel_amount_on_dynamics_timestep
lwe_thickness_of_ice_amount
lwe_thickness_of_ice_amount_on_dynamics_timestep
lwe_thickness_of_moist_convective_adj_precipitation_amount
lwe_thickness_of_precipitation_amount_for_coupling
lwe_thickness_of_precipitation_amount_on_dynamics_timestep
lwe_thickness_of_shallow_convective_precipitation_amount
lwe_thickness_of_snow_amount

lwe_thickness_of_snow_amount_for_coupling
lwe_thickness_of_snow_amount_on_dynamics_timestep
magnitude_of_perturbation_of_heat_to_momentum_roughness_length_ratio
magnitude_of_perturbation_of_leaf_area_index
magnitude_of_perturbation_of_momentum_roughness_length
magnitude_of_perturbation_of_soil_type_b_parameter
magnitude_of_perturbation_of_vegetation_fraction
magnitude_of_surface_albedo_perturbation
maximum_column_heating_rate
maximum_critical_relative_humidity
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maximum_specific_humidity_at_2m
maximum_subgrid_orography
maximum_temperature_at_2m
maximum_vegetation_area_fraction
maximum_wind_at_10m
maximum_x_wind_at_10m
maximum_y_wind_at_10m
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mean_effective_radius_for_liquid_cloud
mean_effective_radius_for_rain_drop
mean_effective_radius_for_snow_flake
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momentum_transport_reduction_factor_pgf_deep_convection
momentum_transport_reduction_factor_pgf_shallow_convection

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mpi_rank
mpi_root
mpi_size
multiplication_factors_for_convective_gravity_wave_drag
multiplication_factors_for_mountain_blocking_and_orographic_gravity_wave_drag
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natural_log_of_h2o_forcing_data_pressure_levels
natural_log_of_ozone_forcing_data_pressure_levels
nonnegative_lwe_thickness_of_precipitation_amount_on_dynamics_timestep
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number_of_3d_arrays_associated_with_pdf-based_clouds
number_of_cloud_condensate_types
number_of_coefficients_in_h2o_forcing_data
number_of_coefficients_in_ozone_forcing_data
number_of_convective_3d_cloud_fields
number_of_equatorial_longitude_points
number_of_ghost_zones
number_of_hydrometeors
number_of_statistical_measures_of_subgrid_orography
number_of_surface_perturbations
number_of_total_tracers
number_of_tracers
number_of_tracers_for_CS
number_of_tracers_for_cloud_condensate
number_of_tracers_for_convective_transport
number_of_tracers_for_samf
number_of_vertical_diffusion_tracers
number_of_vertical_layers_for_radiation_calculations
number_of_water_tracers

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omp_threads
orography
orography_unfiltered
ozone_concentration_at_layer_for_radiation
ozone_concentration_updated_by_physics
ozone_forcing
ozone_mixing_ratio
perturbation_of_heat_to_momentum_roughness_length_ratio
perturbation_of_leaf_area_index
perturbation_of_momentum_roughness_length
perturbation_of_soil_type_b_parameter
perturbation_of_vegetation_fraction
pi
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pressure_at_top_of_convective_cloud
pressure_cutoff_for_rayleigh_damping
pressure_thickness_at_Lagrangian_surface
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rain_conversion_parameter_deep_convection
rain_conversion_parameter_shallow_convection
rain_evaporation_coefficient_deep_convection
rain_evaporation_coefficient_over_land_deep_convection
rain_number_concentration
rain_number_concentration_updated_by_physics
rain_water_mixing_ratio
rain_water_mixing_ratio_updated_by_physics
random_number_array
ratio_of_dry_air_to_water_vapor_gas_constants
ratio_of_dry_air_to_water_vapor_gas_constants_minus_one

ratio_of_exner_function_between_midlayer_and_interface_at_lowest_model_layer
ratio_of_snowfall_to_rainfall
ratio_of_vapor_to_dry_air_gas_constants_minus_one
ratio_of_vapor_to_dry_air_gas_constants_minus_one_default_kind
ratio_of_wind_at_lowest_model_layer_and_wind_at_10m
sea_ice_concentration
sea_ice_temperature
sea_ice_thickness
sea_land_ice_mask
sea_land_ice_mask_real
sea_surface_reference_temperature
sea_water_salinity
seconds_elapsed_since_model_initialization
seed_random_numbers_lw
seed_random_numbers_sw
sensible_heat_flux_due_to_rainfall
sensitivity_of_dtl_heat_content_to_surface_temperature
sensitivity_of_dtl_thickness_to_surface_temperature
sine_of_latitude
sine_of_solar_declination_angle
slope_of_subgrid_orography
smallest_cloud_base_vertical_index_encountered_thus_far
snow_deposition_sublimation_upward_latent_heat_flux
snow_freezing_rain_upward_latent_heat_flux
snow_number_concentration
snow_number_concentration_updated_by_physics
snow_temperature_bottom_first_layer
snow_water_mixing_ratio
snow_water_mixing_ratio_updated_by_physics
soil_moisture_content
soil_temperature

soil_temperature_for_land_surface_model
soil_type_classification
soil_type_classification_real
soil_type_dataset_choice
soil_upward_latent_heat_flux
soil_vertical_dimension
soil_vertical_dimension_for_land_surface_model
solar_constant
specific_heat_of_dry_air_at_constant_pressure
specific_heat_of_liquid_water_at_constant_pressure
specific_heat_of_water_vapor_at_constant_pressure
specific_humidity_at_2m
standard_deviation_of_subgrid_orography
start_index_of_other_tracers
starting_x_direction_index
starting_x_direction_index_domain
starting_y_direction_index
starting_y_direction_index_domain
statistical_measures_of_subgrid_orography
sub-layer_cooling_amount
sub-layer_cooling_thickness
subsurface_runoff_flux
surface_air_pressure
surface_air_pressure_at_previous_time_step
surface_air_pressure_two_time_steps_back
surface_air_temperature_for_radiation
surface_albedo_due_to_UV_and_VIS_diffused
surface_albedo_due_to_UV_and_VIS_direct
surface_albedo_due_to_near_IR_diffused
surface_albedo_due_to_near_IR_direct
surface_albedo_perturbation

surface_condensation_mass
surface_diffused_shortwave_albedo
surface_downwelling_diffuse_near_infrared_shortwave_flux
surface_downwelling_diffuse_near_infrared_shortwave_flux_on_radiation_time_step
surface_downwelling_diffuse_ultraviolet_and_visible_shortwave_flux
surface_downwelling_diffuse_ultraviolet_and_visible_shortwave_flux_on_radiation_time_step
surface_downwelling_direct_near_infrared_shortwave_flux
surface_downwelling_direct_near_infrared_shortwave_flux_on_radiation_time_step
surface_downwelling_direct_ultraviolet_and_visible_shortwave_flux
surface_downwelling_direct_ultraviolet_and_visible_shortwave_flux_on_radiation_time_step
surface_downwelling_longwave_flux
surface_downwelling_longwave_flux_absorbed_by_ground
surface_downwelling_longwave_flux_on_radiation_time_step
surface_downwelling_shortwave_flux
surface_downwelling_shortwave_flux_on_radiation_time_step
surface_drag_coefficient_for_heat_and_moisture_in_air
surface_drag_coefficient_for_momentum_in_air
surface_drag_mass_flux_for_heat_and_moisture_in_air
surface_drag_wind_speed_for_momentum_in_air
surface_friction_velocity
surface_geopotential_at_Lagrangian_surface
surface_ground_temperature_for_radiation
surface_longwave_emissivity
surface_midlayer_air_temperature_in_longwave_radiation
surface_net_downwelling_shortwave_flux
surface_net_downwelling_shortwave_flux_on_radiation_time_step
surface_roughness_length
surface_runoff
surface_runoff_flux
surface_skin_temperature
surface_skin_temperature_after_iteration

surface_skin_temperature_for_nsst
surface_slope_classification
surface_slope_classification_real
surface_snow_area_fraction
surface_snow_area_fraction_for_diagnostics
surface_snow_melt
surface_snow_thickness_water_equivalent
surface_specific_humidity
surface_upward_potential_latent_heat_flux
surface_upwelling_diffuse_near_infrared_shortwave_flux
surface_upwelling_diffuse_near_infrared_shortwave_flux_on_radiation_time_step
surface_upwelling_diffuse_ultraviolet_and_visible_shortwave_flux
surface_upwelling_diffuse_ultraviolet_and_visible_shortwave_flux_on_radiation_time_step
surface_upwelling_direct_near_infrared_shortwave_flux
surface_upwelling_direct_near_infrared_shortwave_flux_on_radiation_time_step
surface_upwelling_direct_ultraviolet_and_visible_shortwave_flux
surface_upwelling_direct_ultraviolet_and_visible_shortwave_flux_on_radiation_time_step
surface_upwelling_longwave_flux
surface_upwelling_shortwave_flux
surface_wind_enhancement_due_to_convection
surface_wind_stress
sw_fluxes_sfc
sw_fluxes_top_atmosphere
temperature_at_2m
temperature_at_zero_celsius
tendency_of_air_temperature_at_Lagrangian_surface
tendency_of_air_temperature_due_to_longwave_heating_assuming_clear_sky_on_radiation_time_step
tendency_of_air_temperature_due_to_longwave_heating_assuming_clear_sky_on_radiation_timestep
tendency_of_air_temperature_due_to_longwave_heating_on_radiation_time_step
tendency_of_air_temperature_due_to_longwave_heating_on_radiation_timestep
tendency_of_air_temperature_due_to_model_physics

tendency_of_air_temperature_due_to_radiative_heating_assuming_clear_sky
tendency_of_air_temperature_due_to_radiative_heating_on_physics_time_step
tendency_of_air_temperature_due_to_shortwave_heating_assuming_clear_sky_on_radiation_time_step
tendency_of_air_temperature_due_to_shortwave_heating_assuming_clear_sky_on_radiation_timestep
tendency_of_air_temperature_due_to_shortwave_heating_on_radiation_time_step
tendency_of_air_temperature_due_to_shortwave_heating_on_radiation_timestep
tendency_of_cloud_droplet_number_concentration_due_to_model_physics
tendency_of_graupel_mixing_ratio_due_to_model_physics
tendency_of_ice_cloud_water_mixing_ratio_due_to_model_physics
tendency_of_ice_friendly_aerosol_number_concentration_due_to_model_physics
tendency_of_ice_number_concentration_due_to_model_physics
tendency_of_liquid_cloud_water_mixing_ratio_due_to_model_physics
tendency_of_lwe_thickness_of_precipitation_amount_for_coupling
tendency_of_lwe_thickness_of_snow_amount_for_coupling
tendency_of_ozone_mixing_ratio_due_to_model_physics
tendency_of_rain_water_mixing_ratio_due_to_microphysics
tendency_of_rain_water_mixing_ratio_due_to_model_physics
tendency_of_snow_water_mixing_ratio_due_to_model_physics
tendency_of_tracers_due_to_model_physics
tendency_of_vertically_diffused_tracer_concentration
tendency_of_water_friendly_aerosol_number_concentration_due_to_model_physics
tendency_of_water_friendly_surface_aerosols_at_surface
tendency_of_water_vapor_specific_humidity_due_to_model_physics
tendency_of_x_wind_due_to_convective_gravity_wave_drag
tendency_of_x_wind_due_to_model_physics
tendency_of_y_wind_due_to_convective_gravity_wave_drag
tendency_of_y_wind_due_to_model_physics
thickness_at_Lagrangian_surface
threshold_volume_fraction_of_condensed_water_in_soil
time_integral_of_x_stress_due_to_gravity_wave_drag
time_integral_of_y_stress_due_to_gravity_wave_drag

time_scale_for_rayleigh_damping
time_step_for_dynamics
time_step_for_physics
time_step_for_radiation
time_step_for_remapping_for_fast_physics
top_layer_index_for_fast_physics
total_cloud_fraction
total_runoff
tracer_concentration
tracer_concentration_save
tracer_concentration_updated_by_physics
transpiration_flux
upper_bound_on_max_albedo_over_deep_snow
upward_heat_flux_in_soil
vegetation_area_fraction
vegetation_type_classification
vegetation_type_classification_real
vegetation_type_dataset_choice
vertical_dimension
vertical_dimension_for_fast_physics
vertical_dimension_for_thickness_at_Lagrangian_surface
vertical_dimension_of_h2o_forcing_data
vertical_dimension_of_ozone_forcing_data
vertical_index_at_cloud_base
vertical_index_at_cloud_top
vertical_index_at_top_of_atmosphere_boundary_layer
vertical_index_difference_between_inout_and_local
vertical_index_difference_between_layer_and_lower_bound
vertical_index_difference_between_layer_and_upper_bound
vertical_interface_dimension
vertical_layer_dimension_for_radiation

vertical_sigma_coordinate_for_radiation_initialization
vertical_temperature_average_range_lower_bound
vertical_temperature_average_range_upper_bound
vertically_diffused_tracer_concentration
virtual_temperature_at_Lagrangian_surface
volume_fraction_of_condensed_water_in_soil_at_wilting_point
volume_fraction_of_soil_moisture
volume_fraction_of_soil_moisture_for_land_surface_model
volume_fraction_of_unfrozen_soil_moisture
volume_fraction_of_unfrozen_soil_moisture_for_land_surface_model
volume_mixing_ratio_ccl4
volume_mixing_ratio_cfc11
volume_mixing_ratio_cfc113
volume_mixing_ratio_cfc12
volume_mixing_ratio_cfc22
volume_mixing_ratio_ch4
volume_mixing_ratio_co
volume_mixing_ratio_co2
volume_mixing_ratio_n2o
volume_mixing_ratio_o2
water_equivalent_accumulated_snow_depth
water_friendly_aerosol_number_concentration
water_friendly_aerosol_number_concentration_updated_by_physics
water_vapor_specific_humidity
water_vapor_specific_humidity_at_Lagrangian_surface
water_vapor_specific_humidity_at_layer_for_radiation
water_vapor_specific_humidity_at_lowest_model_layer
water_vapor_specific_humidity_at_lowest_model_layer_for_diag
water_vapor_specific_humidity_at_lowest_model_layer_updated_by_physics
water_vapor_specific_humidity_at_previous_time_step
water_vapor_specific_humidity_save

water_vapor_specific_humidity_two_time_steps_back
water_vapor_specific_humidity_updated_by_physics
weights_for_stochastic_shum_perturbation
weights_for_stochastic_shum_perturbation_flipped
weights_for_stochastic_skeb_perturbation_of_x_wind
weights_for_stochastic_skeb_perturbation_of_x_wind_flipped
weights_for_stochastic_skeb_perturbation_of_y_wind
weights_for_stochastic_skeb_perturbation_of_y_wind_flipped
weights_for_stochastic_sppt_perturbation
weights_for_stochastic_sppt_perturbation_flipped
weights_for_stochastic_surface_physics_perturbation
wind_speed_at_lowest_model_layer
x_wind
x_wind_at_10m
x_wind_at_lowest_model_layer
x_wind_at_lowest_model_layer_for_diag
x_wind_at_lowest_model_layer_updated_by_physics
x_wind_save
x_wind_updated_by_physics
y_wind
y_wind_at_10m
y_wind_at_lowest_model_layer
y_wind_at_lowest_model_layer_for_diag
y_wind_at_lowest_model_layer_updated_by_physics
y_wind_save
y_wind_updated_by_physics
zenith_angle_temporal_adjustment_factor_for_shortwave_fluxes

1.2 Description of variables

CCPP_Interstitial_type

long_name	derived type CCPP_interstitial_type
units	DDT
rank	0
type	CCPP_interstitial_type
kind	
source	MODULE CCPP_typedefs
local_name	CCPP_interstitial
requested	fv_sat_adj_pre_run
physics set	fast_physics

FV3-GFS_Cldprop_type

long_name	derived type GFS_cldprop_type in FV3
units	DDT
rank	0
type	GFS_cldprop_type
kind	
source	MODULE GFS_typedefs
local_name	IPD_Data(nb)%Cldprop
requested	GFS_diagtoscreen_run GFS_interstitialtoscreen_run GFS_rrtmg_pre_run
physics set	slow_physics

FV3-GFS_Cldprop_type_all_blocks

long_name	derived type GFS_cldprop_type in FV3
units	DDT
rank	1
type	GFS_cldprop_type
kind	
source	MODULE GFS_typedefs
local_name	IPD_Data(:)%Cldprop
requested	NOT REQUESTED
physics set	

FV3-GFS_Control_type

long_name	derived type GFS_control_type in FV3
units	DDT
rank	0
type	GFS_control_type
kind	
source	MODULE GFS_typedefs
local_name	IPD_Control
requested	GFS_diagtoscreen_run GFS_interstitialtoscreen_run GFS_phys_time_vary_init GFS_phys_time_vary_run GFS_rad_time_vary_run GFS_rrtmg_post_run GFS_rrtmg_pre_run GFS_suite_interstitial_1_run GFS_suite_interstitial_2_run GFS_suite_interstitial_phys_reset_run GFS_time_vary_pre_run rrtmg_lw_post_run rrtmg_lw_pre_run rrtmg_sw_post_run rrtmg_sw_pre_run stochastic_physics_init stochastic_physics_run stochastic_physics_sfc_init
physics set	slow_physics

FV3-GFS_Coupling_type

long_name	derived type GFS_coupling_type in FV3
units	DDT
rank	0
type	GFS_coupling_type
kind	
source	MODULE GFS_typedefs
local_name	IPD_Data(nb)%Coupling
requested	GFS_diagtoscreen_run GFS_interstitialtoscreen_run GFS_rrtmg_post_run GFS_rrtmg_pre_run rrtmg_lw_post_run rrtmg_sw_post_run
physics set	slow_physics

FV3-GFS_Coupling_type_all_blocks

long_name	derived type GFS_coupling_type in FV3
units	DDT
rank	1
type	GFS_coupling_type
kind	
source	MODULE GFS_typedefs
local_name	IPD_Data(:)%Coupling
requested	NOT REQUESTED
physics set	

FV3-GFS_Data_type

long_name	derived type GFS_data_type in FV3
units	DDT
rank	0
type	GFS_data_type
kind	
source	MODULE GFS_typedefs
local_name	IPD_Data(nb)
requested	NOT REQUESTED
physics set	

FV3-GFS_Data_type_all_blocks

long_name	derived type GFS_data_type in FV3
units	DDT
rank	1
type	GFS_data_type
kind	
source	MODULE GFS_typedefs
local_name	IPD_Data(:)
requested	GFS_phys_time_vary_init GFS_phys_time_vary_run GFS_rad_time_vary_run stochastic_physics_run stochastic_physics_sfc_init
physics set	slow_physics

FV3-GFS_Diag_type

long_name	derived type GFS_diag_type in FV3
units	DDT
rank	0
type	GFS_diag_type
kind	
source	MODULE GFS_typedefs
local_name	IPD_Data(nb)%Intdiag
requested	GFS_diagtoscreen_run GFS_interstitialtoscreen_run GFS_rrtmg_post_run GFS_suite_interstitial_1_run GFS_suite_interstitial_2_run rrtmg_sw_post_run
physics set	slow_physics

FV3-GFS_Diag_type_all_blocks

long_name	derived type GFS_diag_type in FV3
units	DDT
rank	1
type	GFS_diag_type
kind	
source	MODULE GFS_typedefs
local_name	IPD_Data(:)%Intdiag
requested	NOT REQUESTED
physics set	

FV3-GFS_Grid_type

long_name	derived type GFS_grid_type in FV3
units	DDT
rank	0
type	GFS_grid_type
kind	
source	MODULE GFS_typedefs
local_name	IPD_Data(nb)%Grid
requested	GFS_diagtoscreen_run GFS_interstitialtoscreen_run GFS_rrtmg_post_run GFS_rrtmg_pre_run GFS_suite_interstitial_1_run GFS_suite_interstitial_2_run rrtmg_lw_post_run rrtmg_lw_pre_run rrtmg_sw_post_run rrtmg_sw_pre_run
physics set	slow_physics

FV3-GFS_Grid_type_all_blocks

long_name	derived type GFS_grid_type in FV3
units	DDT
rank	1
type	GFS_grid_type
kind	
source	MODULE GFS_typedefs
local_name	IPD_Data(:)%Grid
requested	NOT REQUESTED
physics set	

FV3-GFS_Interstitial_type

```
long_name    derived type GFS_interstitial_type in FV3
units        DDT
rank         0
type         GFS_interstitial_type
kind
source       MODULE GFS_typedefs
local_name   IPD_Interstitial(nt)
requested    GFS_diagtoscreen_run
             GFS_interstitialtoscreen_run
             GFS_suite_interstitial_phys_reset_run
             GFS_suite_interstitial_rad_reset_run
physics set  slow_physics
```

FV3-GFS_Interstitial_type_all_threads

```
long_name    derived type GFS_interstitial_type in FV3
units        DDT
rank         1
type         GFS_interstitial_type
kind
source       MODULE GFS_typedefs
local_name   IPD_Interstitial(:)
requested    GFS_phys_time_vary_init
physics set  slow_physics
```

FV3-GFS_Radtend_type

long_name	derived type GFS_radtend_type in FV3
units	DDT
rank	0
type	GFS_radtend_type
kind	
source	MODULE GFS_typedefs
local_name	IPD_Data(nb)%Radtend
requested	GFS_diagtoscreen_run GFS_interstitialtoscreen_run GFS_rrtmg_post_run GFS_rrtmg_pre_run GFS_suite_interstitial_2_run rrtmg_lw_post_run rrtmg_lw_pre_run rrtmg_sw_post_run rrtmg_sw_pre_run
physics set	slow_physics

FV3-GFS_Sfcprop_type

long_name	derived type GFS_sfcprop_type in FV3
units	DDT
rank	0
type	GFS_sfcprop_type
kind	
source	MODULE GFS_typedefs
local_name	IPD_Data(nb)%Sfcprop
requested	GFS_diagtoscreen_run GFS_interstitialtoscreen_run GFS_rrtmg_pre_run GFS_suite_interstitial_1_run rrtmg_lw_pre_run rrtmg_sw_pre_run
physics set	slow_physics

FV3-GFS_Sfcprop_type_all_blocks

long_name	derived type GFS_sfcprop_type in FV3
units	DDT
rank	1
type	GFS_sfcprop_type
kind	
source	MODULE GFS_typedefs
local_name	IPD_Data(:)%Sfcprop
requested	NOT REQUESTED
physics set	

FV3-GFS_Statein_type

long_name	derived type GFS_statein_type in FV3
units	DDT
rank	0
type	GFS_statein_type
kind	
source	MODULE GFS_typedefs
local_name	IPD_Data(nb)%Statein
requested	GFS_diagtoscreen_run GFS_interstitialtoscreen_run GFS_rrtmg_post_run GFS_rrtmg_pre_run GFS_suite_interstitial_1_run GFS_suite_interstitial_2_run
physics set	slow_physics

FV3-GFS_Statein_type_all_blocks

long_name	derived type GFS_statein_type in FV3
units	DDT
rank	1
type	GFS_statein_type
kind	
source	MODULE GFS_typedefs
local_name	IPD_Data(:)%Statein
requested	NOT REQUESTED
physics set	

FV3-GFS_Stateout_type

long_name	derived type GFS_stateout_type in FV3
units	DDT
rank	0
type	GFS_stateout_type
kind	
source	MODULE GFS_typedefs
local_name	IPD_Data(nb)%Stateout
requested	GFS_diagtoscreen_run GFS_interstitialtoscreen_run
physics set	slow_physics

FV3-GFS_Tbd_type

long_name	derived type GFS_tbd_type in FV3
units	DDT
rank	0
type	GFS_tbd_type
kind	
source	MODULE GFS_typedefs
local_name	IPD_Data(nb)%Tbd
requested	GFS_diagtoscreen_run GFS_interstitialtoscreen_run GFS_rrtmg_pre_run
physics set	slow_physics

FV3-GFS_Tbd_type_all_blocks

long_name	derived type GFS_tbd_type in FV3
units	DDT
rank	1
type	GFS_tbd_type
kind	
source	MODULE GFS_typedefs
local_name	IPD_Data(:)%Tbd
requested	NOT REQUESTED
physics set	

Monin-Obukhov_similarity_function_for_heat

long_name	Monin-Obukhov similarity function for heat
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%ffhh
requested	hedmf_run sfc_diag_run sfc_ex_coef_run
physics set	slow_physics

Monin-Obukhov_similarity_function_for_heat_at_2m

long_name	Monin-Obukhov similarity parameter for heat at 2m
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%fh2
requested	sfc_diag_run
	sfc_ex_coef_run
physics set	slow_physics

Monin-Obukhov_similarity_function_for_momentum

long_name	Monin-Obukhov similarity function for momentum
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%ffmm
requested	hedmf_run
	sfc_diag_run
	sfc_ex_coef_run
physics set	slow_physics

Monin-Obukhov_similarity_function_for_momentum_at_10m

long_name Monin-Obukhov similarity parameter for momentum at 10m
units none
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%fm10
requested sfc_diag_run
sfc_ex_coef_run
physics set slow_physics

accumulated_lwe_thickness_of_convective_precipitation_amount_cnvc90

long_name accumulated convective rainfall amount for cnvc90 only
units m
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name IPD_Data(nb)%Tbd%acv
requested cnvc90_run
physics set slow_physics

accumulated_lwe_thickness_of_graupel_amount

long_name accumulated graupel precipitation
units kg m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%totgrp
requested GFS_MP_generic_post_run
physics set slow_physics

accumulated_lwe_thickness_of_graupel_amount_in_bucket

long_name	accumulated graupel precipitation in bucket
units	kg m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%totgrpb
requested	GFS_MP_generic_post_run
physics set	slow_physics

accumulated_lwe_thickness_of_ice_amount

long_name	accumulated ice precipitation
units	kg m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%totice
requested	GFS_MP_generic_post_run
physics set	slow_physics

accumulated_lwe_thickness_of_ice_amount_in_bucket

long_name	accumulated ice precipitation in bucket
units	kg m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%toticeb
requested	GFS_MP_generic_post_run
physics set	slow_physics

accumulated_lwe_thickness_of_precipitation_amount

long_name	accumulated total precipitation
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%totprcp
requested	GFS_MP_generic_post_run
	GFS_stochastics_run
physics set	slow_physics

accumulated_lwe_thickness_of_precipitation_amount_in_bucket

long_name	accumulated total precipitation in bucket
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%totprcpb
requested	GFS_MP_generic_post_run
	GFS_stochastics_run
physics set	slow_physics

accumulated_lwe_thickness_of_snow_amount

long_name	accumulated snow precipitation
units	kg m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%totsnw
requested	GFS_MP_generic_post_run
physics set	slow_physics

accumulated_lwe_thickness_of_snow_amount_in_bucket

long_name	accumulated snow precipitation in bucket
units	kg m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%totsnwb
requested	GFS_MP_generic_post_run
physics set	slow_physics

adjusted_vertical_layer_dimension_for_radiation

long_name	adjusted number of vertical layers for radiation
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%lmk
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

adjusted_vertical_level_dimension_for_radiation

long_name	adjusted number of vertical levels for radiation
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%lmp
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

aerosol_asymmetry_parameter_for_longwave_bands_01-16

long_name	aerosol asymmetry parameter for longwave bands 01-16
units	none
rank	3
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%faerlw(:, :, :, 3)
requested	GFS_rrtmg_pre_run
physics set	slow_physics

aerosol_asymmetry_parameter_for_shortwave_bands_01-16

long_name aerosol asymmetry parameter for shortwave bands 01-16
units none
rank 3
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%faersw(:, :, :, 3)
requested GFS_rrtmg_pre_run
rrtmg_sw_run
physics set slow_physics

aerosol_aware_parameter_deep_convection

long_name aerosol-aware parameter inversely proportional to CCN number concentraion from Lim (2011) for deep conv.
units none
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%asolfac_deep
requested samfdeepcnv_run
physics set slow_physics

aerosol_aware_parameter_shallow_convection

long_name aerosol-aware parameter inversely proportional to CCN number concentraion from Lim (2011) for shal conv.
units none
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%asolfac_shal
requested samfshalcnv_run
physics set slow_physics

aerosol_optical_depth_for_longwave_bands_01-16

long_name aerosol optical depth for longwave bands 01-16
units none
rank 3
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%faerlw(:, :, :, 1)
requested GFS_rrtmg_pre_run
rrtmg_lw_run
physics set slow_physics

aerosol_optical_depth_for_shortwave_bands_01-16

long_name aerosol optical depth for shortwave bands 01-16
units none
rank 3
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%faersw(:, :, :, 1)
requested GFS_rrtmg_pre_run
rrtmg_sw_run
physics set slow_physics

aerosol_optical_properties_for_longwave_bands_01-16

long_name aerosol optical properties for longwave bands 01-16
units various
rank 4
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%faerlw
requested GFS_rrtmg_setup_init
physics set slow_physics

aerosol_optical_properties_for_shortwave_bands_01-16

long_name aerosol optical properties for shortwave bands 01-16
units various
rank 4
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%faersw
requested GFS_rrtmg_setup_init
physics set slow_physics

aerosol_single_scattering_albedo_for_longwave_bands_01-16

long_name aerosol single scattering albedo for longwave bands 01-16
units frac
rank 3
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%faerlw(:, :, :, 2)
requested GFS_rrtmg_pre_run
rrtmg_lw_run
physics set slow_physics

aerosol_single_scattering_albedo_for_shortwave_bands_01-16

long_name aerosol single scattering albedo for shortwave bands 01-16
units frac
rank 3
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%faersw(:, :, :, 2)
requested GFS_rrtmg_pre_run
rrtmg_sw_run
physics set slow_physics

air_pressure

long_name	mean layer pressure
units	Pa
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	IPD_Data(nb)%Statein%prsl
requested	GFS_MP_generic_post_run GFS_suite_interstitial_3_run gfdl_cloud_microphys_run gwdc_run gwdps_run h2ophys_run hedmf_run ozphys_run rayleigh_damp_run samfdeepcnv_run samfshalcnv_run zhaocarr_gscond_run zhaocarr_precpd_run
physics set	slow_physics

air_pressure_at_interface

long_name air pressure at model layer interfaces
units Pa
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name IPD_Data(nb)%Statein%prsi
requested GFS_MP_generic_post_run
 GFS_suite_interstitial_3_run
 cnvc90_run
 get_prs_fv3_run
 gwdc_run
 gwdps_run
 hedmf_run
physics set slow_physics

air_pressure_at_interface_for_radiation_in_hPa

long_name air pressure at vertical interface for radiation calculation
units hPa
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%plvl
requested GFS_rrtmg_pre_run
 rrtmg_lw_run
 rrtmg_sw_run
physics set slow_physics

air_pressure_at_layer_for_radiation_in_hPa

long_name	air pressure at vertical layer for radiation calculation
units	hPa
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%plyr
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

air_pressure_at_lowest_model_layer

long_name	mean pressure at lowest model layer
units	Pa
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	IPD_Data(nb)%Statein%prsl(:,1)
requested	lsm_noah_run sfc_ex_coef_run sfc_nst_run sfc_sice_run
physics set	slow_physics

air_pressure_difference_between_midlayers

long_name	air pressure difference between midlayers
units	Pa
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%del
requested	GFS_MP_generic_post_run get_prs_fv3_run gfdl_cloud_microphys_run gwdc_pre_run gwdc_run gwdps_run hedmf_run ozphys_run samfdeepcnv_run samfshalcnv_run zhaocarr_precpd_run
physics set	slow_physics

air_temperature

long_name	model layer mean temperature
units	K
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	IPD_Data(nb)%Statein%tgrs
requested	GFS_stochastics_run GFS_suite_stateout_reset_run GFS_suite_stateout_update_run get_prs_fv3_run gwdc_run gwdps_run hedmf_run
physics set	slow_physics

air_temperature_at_interface_for_radiation

long_name	air temperature at vertical interface for radiation calculation
units	K
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%tlvl
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

air_temperature_at_layer_for_radiation

long_name air temperature at vertical layer for radiation calculation
units K
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%tlyr
requested GFS_rrtmg_pre_run
 rrtmg_lw_run
 rrtmg_sw_run
physics set slow_physics

air_temperature_at_lowest_model_layer

long_name mean temperature at lowest model layer
units K
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name IPD_Data(nb)%Statein%tgrs(:,1)
requested GFS_surface_generic_post_run
 dcyc2t3_run
 lsm_noah_run
 sfc_ex_coef_run
 sfc_nst_run
 sfc_sice_run
physics set slow_physics

air_temperature_at_lowest_model_layer_for_diag

long_name	layer 1 temperature for diag
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%t1
requested	GFS_surface_generic_post_run
physics set	slow_physics

air_temperature_at_lowest_model_layer_updated_by_physics

long_name	temperature at lowest model layer updated by physics
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_stateout_type
local_name	IPD_Data(nb)%Stateout%gt0(:,1)
requested	sfc_diag_run
physics set	slow_physics

air_temperature_at_previous_time_step

long_name	air temperature at previous time step
units	K
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	IPD_Data(nb)%Tbd%phy_f3d(:, :, 3)
requested	zhaocarr_gscond_run
physics set	slow_physics

air_temperature_save

long_name	air temperature before entering a physics scheme
units	K
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%save_t
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_MP_generic_post_run GFS_MP_generic_pre_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run gwdc_pre_run
physics set	slow_physics

air_temperature_two_time_steps_back

long_name	air temperature two time steps back
units	K
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	IPD_Data(nb)%Tbd%phy_f3d(:, :, 1)
requested	zhaocarr_gscond_run
physics set	slow_physics

air_temperature_updated_by_physics

long_name	temperature updated by physics
units	K
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_stateout_type
local_name	IPD_Data(nb)%Stateout%gt0
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_MP_generic_post_run GFS_MP_generic_pre_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run GFS_stochastics_run GFS_suite_stateout_reset_run GFS_suite_stateout_update_run get_phi_fv3_run gfdl_cloud_microphys_run gwdc_post_run gwdc_pre_run ozphys_run samfdeepcnv_run samfshalcnv_run zhaocarr_gscond_run zhaocarr_precpd_run
physics set	slow_physics

angle_from_east_of_maximum_subgrid_orographic_variations

long_name	angle with_respect to east of maximum subgrid orographic variations
units	degrees
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%theta
requested	gwdps_pre_run gwdps_run
physics set	slow_physics

anisotropy_of_subgrid_orography

long_name	anisotropy of subgrid orography
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%gamma
requested	gwdps_pre_run gwdps_run
physics set	slow_physics

array_dimension_of_2d_arrays_for_microphysics

long_name	number of 2D arrays needed for microphysics
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%num_p2d
requested	GFS_rrtmg_setup_init
physics set	slow_physics

array_dimension_of_3d_arrays_for_microphysics

long_name	number of 3D arrays needed for microphysics
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%num_p3d
requested	GFS_DCNV_generic_post_run GFS_rrtmg_setup_init samfshalcnv_post_run
physics set	slow_physics

array_dimension_of_random_number

long_name	second dimension of random number stream for RAS
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%nrcm
requested	GFS_MP_generic_post_run
physics set	slow_physics

asymmetry_of_subgrid_orography

long_name asymmetry of subgrid orography
units none
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%oa4
requested gwdps_pre_run
gwdps_run
physics set slow_physics

atmosphere_boundary_layer_thickness

long_name pbl height
units m
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%hpbl
requested hedmf_run
samfshalcnv_run
physics set slow_physics

atmosphere_diffusivity_coefficient_factor

long_name multiplicative constant for atmospheric diffusivities
units none
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%moninq_fac
requested hedmf_run
physics set slow_physics

atmosphere_energy_content_at_Lagrangian_surface

long_name atmosphere total energy at Lagrangian surface
units J m-2
rank 3
type real
kind
source MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name CCPP_interstitial%te0
requested fv_sat_adj_run
physics set fast_physics

atmosphere_energy_content_in_column

long_name atmosphere total energy in columns
units J m-2
rank 2
type real
kind
source MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name CCPP_interstitial%te0_2d
requested fv_sat_adj_run
physics set fast_physics

atmosphere_heat_diffusivity

long_name diffusivity for heat
units m2 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%dkt
requested hedmf_run
physics set slow_physics

atmosphere_heat_diffusivity_background

long_name background vertical diffusion for heat q
units m2 s-1
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%*xkzm_h*
requested hedmf_run
physics set slow_physics

atmosphere_heat_diffusivity_background_maximum

long_name maximum background value of heat diffusivity
units m2 s-1
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%*xkzminv*
requested hedmf_run
physics set slow_physics

atmosphere_momentum_diffusivity_background

long_name background vertical diffusion for momentum
units m2 s-1
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%*xkzm_m*
requested hedmf_run
physics set slow_physics

atmosphere_optical_thickness_due_to_ambient_aerosol_particles

long_name	vertical integrated optical depth for various aerosol species
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%aerodp
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run GFS_rrtmg_setup_init
physics set	slow_physics

block_number

long_name	for explicit data blocking: block number of this block
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	IPD_Data(nb)%Tbd%blkno
requested	NOT REQUESTED
physics set	

bounded_vegetation_area_fraction

long_name	areal fractional cover of green vegetation bounded on the bottom
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%sigmaf
requested	GFS_surface_generic_pre_run lsm_noah_run sfc_ex_coef_run
physics set	slow_physics

bulk_richardson_number_at_lowest_model_level

long_name	bulk Richardson number at the surface
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%rb
requested	hedmf_run sfc_ex_coef_run
physics set	slow_physics

canopy_upward_latent_heat_flux

long_name canopy upward latent heat flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%evcw
requested GFS_surface_generic_post_run
lsu_noah_pre_run
lsu_noah_run
physics set slow_physics

canopy_water_amount

long_name canopy water amount
units kg m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name IPD_Data(nb)%Sfcprop%canopy
requested lsu_noah_run
physics set slow_physics

cappa_moist_gas_constant_at_Lagrangian_surface

long_name $cappa(i,j,k) = rdgas / (rdgas + cvm(i)/(1.+r_{vir}*q(i,j,k,sphum)))$
units none
rank 3
type real
kind
source MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name CCPP_interstitial%cappa
requested fv_sat_adj_run
physics set fast_physics

ccpp_error_flag

long_name	error flag for error handling in CCpp
units	flag
rank	0
type	integer
kind	
source	MODULE ccpp_types
local_name	cdata%errflg (local_name not used)
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_MP_generic_post_run GFS_MP_generic_pre_run GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run GFS_diagtoscreen_run GFS_interstitialtoscreen_run GFS_phys_time_vary_finalize GFS_phys_time_vary_init GFS_phys_time_vary_run GFS_rad_time_vary_run GFS_rrtmg_post_run GFS_rrtmg_pre_run GFS_rrtmg_setup_finalize GFS_rrtmg_setup_init GFS_rrtmg_setup_run GFS_stochastics_run GFS_suite_interstitial_1_run GFS_suite_interstitial_2_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run GFS_suite_interstitial_phys_reset_run GFS_suite_interstitial_rad_reset_run GFS_suite_stateout_reset_run GFS_suite_stateout_update_run GFS_surface_generic_post_run GFS_surface_generic_pre_run GFS_surface_loop_control_part1_run

ccpp_error_message

long_name	error message for error handling in CCpp
units	none
rank	0
type	character
kind	len=512
source	MODULE ccpp_types
local_name	cdata%errmsg (local_name not used)
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_MP_generic_post_run GFS_MP_generic_pre_run GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run GFS_diagtoscreen_run GFS_interstitialtoscreen_run GFS_phys_time_vary_finalize GFS_phys_time_vary_init GFS_phys_time_vary_run GFS_rad_time_vary_run GFS_rrtmg_post_run GFS_rrtmg_pre_run GFS_rrtmg_setup_finalize GFS_rrtmg_setup_init GFS_rrtmg_setup_run GFS_stochastics_run GFS_suite_interstitial_1_run GFS_suite_interstitial_2_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run GFS_suite_interstitial_phys_reset_run GFS_suite_interstitial_rad_reset_run GFS_suite_stateout_reset_run GFS_suite_stateout_update_run GFS_surface_generic_post_run GFS_surface_generic_pre_run GFS_surface_loop_control_part1_run

ccpp_loop_counter

long_name	loop counter for subcyclng loops in CCpp
units	index
rank	0
type	integer
kind	
source	MODULE ccpp_types
local_name	cdata%loop_cnt (local_name not used)
requested	GFS_surface_loop_control_part1_run GFS_surface_loop_control_part2_run
physics set	slow_physics

cell_area

long_name	area of the grid cell
units	m2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_grid_type
local_name	IPD_Data(nb)%Grid%area
requested	gfdl_cloud_microphys_run samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

cell_area_for_fast_physics

long_name area of the grid cell for fast physics
units m2
rank 2
type real
kind kind_grid
source MODULE fv_arrays_mod TYPE fv_atmos_type
local_name Atm(mytile)%gridstruct%area_64
requested fv_sat_adj_run
physics set fast_physics

cell_size

long_name relative dx for the grid cell
units m
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_grid_type
local_name IPD_Data(nb)%Grid%dx
requested gwdc_pre_run
physics set slow_physics

change_in_ozone_concentration

long_name change in ozone concentration
units kg kg-1
rank 3
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%dq3dt(:, :, 6:6+IPD_Interstitial(nt)%oz_coeff-1)
requested ozphys_run
physics set slow_physics

characteristic_grid_length_scale

long_name	representative horizontal length scale of grid box
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%dlength
requested	gwdc_pre_run gwdc_run
physics set	slow_physics

cloud_area_fraction

long_name	fraction of grid box area in which updrafts occur
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%cldf
requested	gwdc_pre_run gwdc_run
physics set	slow_physics

cloud_area_fraction_for_radiation

long_name fraction of clouds for low, middle, high, total and BL
units frac
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%cldsa
requested GFS_rrtmg_post_run
 GFS_rrtmg_pre_run
physics set slow_physics

cloud_condensed_water_conversion_threshold

long_name water and ice minimum threshold for Zhao
units none
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%wminco
requested zhaocarr_precpd_run
physics set slow_physics

cloud_condensed_water_mixing_ratio

long_name moist (dry+vapor, no condensates) mixing ratio of cloud water (condensate)
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name IPD_Data(nb)%Statein%qgrs(:, :, IPD_Control%ntcw)
requested GFS_PBL_generic_pre_run
physics set slow_physics

cloud_condensed_water_mixing_ratio_at_lowest_model_layer

long_name moist (dry+vapor, no condensates) mixing ratio of cloud water at lowest model layer
units kg kg-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name IPD_Data(nb)%Statein%qgrs(:,1,IPD_Control%ntcw)
requested NOT REQUESTED
physics set

cloud_condensed_water_mixing_ratio_at_surface

long_name moist cloud water mixing ratio at surface
units kg kg-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name IPD_Data(nb)%Sfcprop%clw_surf
requested NOT REQUESTED
physics set

cloud_condensed_water_mixing_ratio_updated_by_physics

long_name moist (dry+vapor, no condensates) mixing ratio of cloud condensed water updated by physics
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name IPD_Data(nb)%Stateout%gq0(:, :, IPD_Control%ntcw)
requested gfdl_cloud_microphys_run
zhaocarr_gscond_run
zhaocarr_precpd_run
physics set slow_physics

cloud_condensed_water_specific_humidity_at_Lagrangian_surface

long_name cloud condensed water specific humidity updated by fast physics at Lagrangian surface
units kg kg-1
rank 3
type real
kind
source MODULE fv_arrays_mod TYPE fv_atmos_type
local_name Atm(mytile)%q_con
requested fv_sat_adj_run
physics set fast_physics

cloud_droplet_number_concentration

long_name number concentration of cloud droplets (liquid)
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name IPD_Data(nb)%Statein%qgrs(:, :, IPD_Control%ntlnc)
requested GFS_PBL_generic_pre_run
physics set slow_physics

cloud_droplet_number_concentration_updated_by_physics

long_name number concentration of cloud droplets updated by physics
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name IPD_Data(nb)%Stateout%gq0(:, :, IPD_Control%ntlnc)
requested NOT REQUESTED
physics set

cloud_fraction_at_Lagrangian_surface

long_name cloud fraction at Lagrangian surface
units none
rank 3
type real
kind kind
source MODULE fv_arrays_mod TYPE fv_atmos_type
local_name Atm(mytile)%q(:, :, :, cld_amt)
requested fv_sat_adj_run
physics set fast_physics

cloud_fraction_updated_by_physics

long_name cloud fraction updated by physics
units frac
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name IPD_Data(nb)%Stateout%gq0(:, :, IPD_Control%ntclamt)
requested gfdl_cloud_microphys_run
physics set slow_physics

cloud_graupel_specific_humidity_at_Lagrangian_surface

long_name cloud graupel specific humidity updated by fast physics at Lagrangian surface
units kg kg-1
rank 3
type real
kind
source MODULE fv_arrays_mod TYPE fv_atmos_type
local_name Atm(mytile)%q(:, :, :, graupel)
requested fv_sat_adj_run
physics set fast_physics

cloud_ice_mixing_ratio

long_name moist cloud ice mixing ratio
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%clw(:, :, 1)
requested GFS_DCNV_generic_post_run
zhaocarr_gscond_run
physics set slow_physics

cloud_ice_specific_humidity_at_Lagrangian_surface

long_name cloud ice specific humidity updated by fast physics at Lagrangian surface
units kg kg-1
rank 3
type real
kind
source MODULE fv_arrays_mod TYPE fv_atmos_type
local_name Atm(mytile)%q(:,:,:,ice_wat)
requested fv_sat_adj_run
physics set fast_physics

cloud_ice_water_mixing_ratio_save

long_name cloud ice water mixing ratio before entering a physics scheme
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%save_q(:,:,IPD_Control%ntiw)
requested GFS_suite_interstitial_3_run
GFS_suite_interstitial_4_run
physics set slow_physics

cloud_ice_water_path

long_name layer cloud ice water path
units g m-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%clouds(:, :, 4)
requested GFS_rrtmg_pre_run
rrtmg_lw_run
rrtmg_sw_run
physics set slow_physics

cloud_liquid_water_mixing_ratio

long_name moist cloud water mixing ratio
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%clw(:, :, 2)
requested GFS_DCNV_generic_post_run
zhaocarr_gscond_run
physics set slow_physics

cloud_liquid_water_mixing_ratio_save

long_name cloud liquid water mixing ratio before entering a physics scheme
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%save_q(:, :, IPD_Control%ntcw)
requested GFS_suite_interstitial_3_run
 GFS_suite_interstitial_4_run
physics set slow_physics

cloud_liquid_water_path

long_name layer cloud liquid water path
units g m-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%clouds(:, :, 2)
requested GFS_rrtmg_pre_run
 rrtmg_lw_run
 rrtmg_sw_run
physics set slow_physics

cloud_liquid_water_specific_humidity_at_Lagrangian_surface

long_name	cloud liquid water specific humidity updated by fast physics at Lagrangian surface
units	kg kg-1
rank	3
type	real
kind	
source	MODULE fv_arrays_mod TYPE fv_atmos_type
local_name	Atm(mytile)%q(:, :, :, liq_wat)
requested	fv_sat_adj_run
physics set	fast_physics

cloud_optical_depth_layers_678

long_name	cloud optical depth from bands 6,7,8
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%clouds(:, :, 11)
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

cloud_optical_depth_weighted

long_name cloud optical depth, weighted
units none
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%clouds(:, :, 10)
requested GFS_rrtmg_post_run
GFS_rrtmg_pre_run
rrtmg_lw_run
rrtmg_sw_run
physics set slow_physics

cloud_rain_specific_humidity_at_Lagrangian_surface

long_name cloud rain specific humidity updated by fast physics at Lagrangian surface
units kg kg-1
rank 3
type real
kind
source MODULE fv_arrays_mod TYPE fv_atmos_type
local_name Atm(mytile)%q(:, :, :, rainwat)
requested fv_sat_adj_run
physics set fast_physics

cloud_rain_water_path

long_name cloud rain water path
units g m-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%clouds(:, :, 6)
requested GFS_rrtmg_pre_run
rrtmg_lw_run
rrtmg_sw_run
physics set slow_physics

cloud_snow_specific_humidity_at_Lagrangian_surface

long_name cloud snow specific humidity updated by fast physics at Lagrangian surface
units kg kg-1
rank 3
type real
kind
source MODULE fv_arrays_mod TYPE fv_atmos_type
local_name Atm(mytile)%q(:, :, :, snowwat)
requested fv_sat_adj_run
physics set fast_physics

cloud_snow_water_path

long_name	cloud snow water path
units	g m-2
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%clouds(:, :, 8)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

cloud_work_function

long_name	cloud work function
units	m2 s-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%cld1d
requested	GFS_DCNV_generic_post_run samfdeepcnv_run
physics set	slow_physics

coefficient_c_0

long_name	coefficient 1 to calculate $d(T_z)/d(T_s)$
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%c_0
requested	sfc_nst_run
physics set	slow_physics

coefficient_c_d

long_name	coefficient 2 to calculate $d(T_z)/d(T_s)$
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%c_d
requested	sfc_nst_run
physics set	slow_physics

coefficient_for_evaporation_of_rainfall

long_name	coeff for evaporation of largescale rain
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%evpc0
requested	zhaocarr_precpd_run
physics set	slow_physics

coefficient_from_cloud_ice_to_snow

long_name auto conversion coeff from ice to snow
units none
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%psautco
requested zhaocarr_precpd_run
physics set slow_physics

coefficient_from_cloud_water_to_rain

long_name auto conversion coeff from cloud to rain
units none
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%prautco
requested zhaocarr_precpd_run
physics set slow_physics

coefficient_w_0

long_name coefficient 3 to calculate $d(T_z)/d(T_s)$
units none
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name IPD_Data(nb)%Sfcprop%w_0
requested sfc_nst_run
physics set slow_physics

coefficient_w_d

long_name	coefficient 4 to calculate $d(T_z)/d(T_s)$
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%w_d
requested	sfc_nst_run
physics set	slow_physics

column_precipitable_water

long_name	precipitable water
units	kg m ⁻²
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%pwat
requested	GFS_MP_generic_post_run
physics set	slow_physics

components_of_surface_downward_shortwave_fluxes

long_name	derived type for special components of surface downward shortwave fluxes
units	W m ⁻²
rank	1
type	cmpfsw_type
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%scmpsw
requested	GFS_rrtmg_post_run rrtmg_sw_post_run rrtmg_sw_run
physics set	slow_physics

convective_cloud_cover

long_name convective cloud cover
units frac
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%cnvc
requested GFS_DCNV_generic_post_run
samfdeepcnv_run
samfshalcnv_post_run
samfshalcnv_run
physics set slow_physics

convective_cloud_cover_in_phy_f3d

long_name convective cloud cover in the phy_f3d array
units frac
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name IPD_Data(nb)%Tbd%phy_f3d(:, :, IPD_Control%ncnvw+1)
requested GFS_DCNV_generic_post_run
samfshalcnv_post_run
physics set slow_physics

convective_cloud_switch

long_name	index used by cnvc90 (for convective clouds)
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%clstp
requested	cnvc90_run
physics set	slow_physics

convective_cloud_water_mixing_ratio

long_name	moist convective cloud water mixing ratio
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%cnvw
requested	GFS_DCNV_generic_post_run samfdeepcnv_run samfshalcnv_post_run samfshalcnv_run
physics set	slow_physics

convective_cloud_water_mixing_ratio_in_phy_f3d

long_name convective cloud water mixing ratio in the phy_f3d array
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name IPD_Data(nb)%Tbd%phy_f3d(:, :, IPD_Control%ncnvw)
requested GFS_DCNV_generic_post_run
samfshalcnv_post_run
physics set slow_physics

convective_transportable_tracers

long_name array to contain cloud water and other convective trans. tracers
units kg kg-1
rank 3
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%clw
requested GFS_SCNV_generic_post_run
GFS_suite_interstitial_3_run
GFS_suite_interstitial_4_run
samfdeepcnv_run
samfshalcnv_run
physics set slow_physics

convexity_of_subgrid_orography

long_name	convexity of subgrid orography
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%oc
requested	gwdps_pre_run gwdps_run
physics set	slow_physics

cosine_of_latitude

long_name	cosine of latitude
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_grid_type
local_name	IPD_Data(nb)%Grid%coslat
requested	dcyc2t3_run
physics set	slow_physics

cosine_of_solar_declination_angle

long_name	cos of the solar declination angle
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%cdec
requested	GFS_rrtmg_setup_run dcyc2t3_run
physics set	slow_physics

cosine_of_zenith_angle

long_name	mean cos of zenith angle over rad call period
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_radtend_type
local_name	IPD_Data(nb)%Radtend%coszen
requested	dcyc2t3_run
	rrtmg_sw_run
physics set	slow_physics

countergradient_mixing_term_for_temperature

long_name	countergradient mixing term for temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%gamt
requested	hedmf_run
physics set	slow_physics

countergradient_mixing_term_for_water_vapor

long_name	countergradient mixing term for water vapor
units	kg kg-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%gamq
requested	hedmf_run
physics set	slow_physics

critical_relative_humidity

long_name	critical relative humidity
units	frac
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%rhc
requested	GFS_suite_interstitial_3_run zhaocarr_gscond_run zhaocarr_precpd_run
physics set	slow_physics

critical_relative_humidity_at_PBL_top

long_name	critical relative humidity at the PBL top
units	frac
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%rhcpbl
requested	GFS_suite_interstitial_1_run GFS_suite_interstitial_3_run
physics set	slow_physics

critical_relative_humidity_at_surface

long_name critical relative humidity at the surface
units frac
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%rhcbot
requested GFS_suite_interstitial_1_run
GFS_suite_interstitial_3_run
physics set slow_physics

critical_relative_humidity_at_top_of_atmosphere

long_name critical relative humidity at the top of atmosphere
units frac
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%rhctop
requested GFS_suite_interstitial_1_run
GFS_suite_interstitial_3_run
physics set slow_physics

cumulative_atmosphere_detrainment_convective_mass_flux

long_name cumulative detrainment mass flux
units Pa
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%det_mf
requested GFS_DCNV_generic_post_run
physics set slow_physics

`cumulative_atmosphere_downdraft_convective_mass_flux`

long_name cumulative downdraft mass flux
units Pa
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%dwn_mf
requested GFS_DCNV_generic_post_run
physics set slow_physics

`cumulative_atmosphere_updraft_convective_mass_flux`

long_name cumulative updraft mass flux
units Pa
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%upd_mf
requested GFS_DCNV_generic_post_run
physics set slow_physics

`cumulative_canopy_upward_latent_heat_flu_multiplied_by_timestep`

long_name cumulative canopy upward latent heat flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%evcwa
requested GFS_surface_generic_post_run
physics set slow_physics

`cumulative_change_in_ozone_mixing_ratio_due_to_PBL`

<code>long_name</code>	cumulative change in ozone mixing ratio due to PBL
<code>units</code>	kg kg-1
<code>rank</code>	2
<code>type</code>	real
<code>kind</code>	kind_phys
<code>source</code>	MODULE GFS_typedefs TYPE GFS_diag_type
<code>local_name</code>	IPD_Data(nb)%Intdiag%dq3dt(:, :, 5)
<code>requested</code>	GFS_PBL_generic_post_run
<code>physics set</code>	slow_physics

`cumulative_change_in_temperature_due_to_PBL`

<code>long_name</code>	cumulative change in temperature due to PBL
<code>units</code>	K
<code>rank</code>	2
<code>type</code>	real
<code>kind</code>	kind_phys
<code>source</code>	MODULE GFS_typedefs TYPE GFS_diag_type
<code>local_name</code>	IPD_Data(nb)%Intdiag%dt3dt(:, :, 3)
<code>requested</code>	GFS_PBL_generic_post_run
<code>physics set</code>	slow_physics

`cumulative_change_in_temperature_due_to_deep_convection`

<code>long_name</code>	cumulative change in temperature due to deep conv.
<code>units</code>	K
<code>rank</code>	2
<code>type</code>	real
<code>kind</code>	kind_phys
<code>source</code>	MODULE GFS_typedefs TYPE GFS_diag_type
<code>local_name</code>	IPD_Data(nb)%Intdiag%dt3dt(:, :, 4)
<code>requested</code>	GFS_DCNV_generic_post_run
<code>physics set</code>	slow_physics

`cumulative_change_in_temperature_due_to_longwave_radiation`

long_name cumulative change in temperature due to longwave radiation
units K
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%dt3dt(:, :, 1)
requested NOT REQUESTED
physics set

`cumulative_change_in_temperature_due_to_microphysics`

long_name cumulative change in temperature due to microphysics
units K
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%dt3dt(:, :, 6)
requested GFS_MP_generic_post_run
physics set slow_physics

`cumulative_change_in_temperature_due_to_shal_convection`

long_name cumulative change in temperature due to shal conv.
units K
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%dt3dt(:, :, 5)
requested GFS_SCNV_generic_post_run
physics set slow_physics

`cumulative_change_in_temperature_due_to_shortwave_radiation_and_orographic_gravity_wave_drag`

long_name cumulative change in temperature due to SW rad and oro. GWD
units K
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%dt3dt(:, :, 2)
requested gwdps_post_run
physics set slow_physics

`cumulative_change_in_water_vapor_specific_humidity_due_to_PBL`

long_name cumulative change in water vapor specific humidity due to PBL
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%dq3dt(:, :, 1)
requested GFS_PBL_generic_post_run
physics set slow_physics

`cumulative_change_in_water_vapor_specific_humidity_due_to_deep_convection`

long_name cumulative change in water vapor specific humidity due to deep conv.
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%dq3dt(:, :, 2)
requested GFS_DCNV_generic_post_run
physics set slow_physics

`cumulative_change_in_water_vapor_specific_humidity_due_to_microphysics`

long_name cumulative change in water vapor specific humidity due to microphysics
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%dq3dt(:, :, 4)
requested GFS_MP_generic_post_run
physics set slow_physics

`cumulative_change_in_water_vapor_specific_humidity_due_to_physics`

long_name cumulative change in water vapor specific humidity due to physics
units kg kg-1
rank 3
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%dq3dt
requested NOT REQUESTED
physics set

`cumulative_change_in_water_vapor_specific_humidity_due_to_shal_convection`

long_name cumulative change in water vapor specific humidity due to shal conv.
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%dq3dt(:, :, 3)
requested GFS_SCNV_generic_post_run
physics set slow_physics

`cumulative_change_in_x_wind_due_to_PBL`

long_name cumulative change in x wind due to PBL
units m s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%du3dt(:, :, 1)
requested GFS_PBL_generic_post_run
physics set slow_physics

`cumulative_change_in_x_wind_due_to_convective_gravity_wave_drag`

long_name cumulative change in x wind due to convective gravity wave drag
units m s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%du3dt(:, :, 4)
requested gwdc_post_run
physics set slow_physics

`cumulative_change_in_x_wind_due_to_deep_convection`

long_name cumulative change in x wind due to deep convection
units m s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%du3dt(:, :, 3)
requested GFS_DCNV_generic_post_run
physics set slow_physics

`cumulative_change_in_x_wind_due_to_orographic_gravity_wave_drag`

long_name cumulative change in x wind due to orographic gravity wave drag
units m s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%du3dt(:, :, 2)
requested GFS_PBL_generic_post_run
gwdps_post_run
physics set slow_physics

`cumulative_change_in_y_wind_due_to_PBL`

long_name cumulative change in y wind due to PBL
units m s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%dv3dt(:, :, 1)
requested GFS_PBL_generic_post_run
physics set slow_physics

`cumulative_change_in_y_wind_due_to_convective_gravity_wave_drag`

long_name cumulative change in y wind due to convective gravity wave drag
units m s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%dv3dt(:, :, 4)
requested gwdc_post_run
physics set slow_physics

`cumulative_change_in_y_wind_due_to_deep_convection`

long_name cumulative change in y wind due to deep convection
units m s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%dv3dt(:, :, 3)
requested GFS_DCNV_generic_post_run
physics set slow_physics

`cumulative_change_in_y_wind_due_to_orographic_gravity_wave_drag`

long_name cumulative change in y wind due to orographic gravity wave drag
units m s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%dv3dt(:, :, 2)
requested GFS_PBL_generic_post_run
gwdps_post_run
physics set slow_physics

`cumulative_cloud_work_function`

long_name cumulative cloud work function (valid only with sas)
units m2 s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%cldwrk
requested GFS_DCNV_generic_post_run
physics set slow_physics

`cumulative_lwe_thickness_of_convective_precipitation_amount`

long_name	cumulative convective precipitation
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%cnvprcp
requested	GFS_DCNV_generic_post_run GFS_stochastics_run samfshalcnv_post_run
physics set	slow_physics

`cumulative_lwe_thickness_of_convective_precipitation_amount_in_bucket`

long_name	cumulative convective precipitation in bucket
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%cnvprcpb
requested	GFS_DCNV_generic_post_run GFS_stochastics_run samfshalcnv_post_run
physics set	slow_physics

`cumulative_snow_deposition_sublimation_upward_latent_heat_flux_multiplied_by_timestep`

long_name cumulative latent heat flux from snow depo/subl multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%sbsnoa
requested GFS_surface_generic_post_run
physics set slow_physics

`cumulative_snow_freezing_rain_upward_latent_heat_flux_multiplied_by_timestep`

long_name cumulative latent heat flux due to snow and frz rain multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%snohfa
requested GFS_surface_generic_post_run
physics set slow_physics

`cumulative_soil_upward_latent_heat_flux_multiplied_by_timestep`

long_name cumulative soil upward latent heat flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%evbsa
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_surface_downwelling_diffuse_near_infrared_shortwave_flux_for_coupling_multiplied_by_timestep

long_name cumulative sfc nir diff downward sw flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%dnirdf_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_surface_downwelling_diffuse_ultraviolet_and_visible_shortwave_flux_for_coupling_multiplied_by_timestep

long_name cumulative sfc uv+vis diff dnwd sw flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%dvisdf_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_surface_downwelling_direct_near_infrared_shortwave_flux_for_coupling_multiplied_by_timestep

long_name cumulative sfc nir beam downward sw flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%dnirbm_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_surface_downwelling_direct_ultraviolet_and_visible_shortwave_flux_for_coupling_multiplied_by_timestep

long_name cumulative sfc uv+vis beam dnwd sw flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%dvisbm_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_surface_downwelling_longwave_flux_for_coupling_multiplied_by_timestep

long_name cumulative sfc downward lw flux mulitplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%dlwsfc_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_surface_downwelling_shortwave_flux_for_coupling_multiplied_by_timestep

long_name cumulative sfc downward sw flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%dswsfc_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_surface_ground_heat_flux_multiplied_by_timestep

long_name cumulative ground conductive heat flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%gflux
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_surface_net_downward_diffuse_near_infrared_shortwave_flux_for_coupling_multiplied_by_timestep

long_name cumulative net nir diff downward sw flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%nnirdf_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_surface_net_downward_diffuse_ultraviolet_and_visible_shortwave_flux_for_coupling_multiplied_by_timestep

long_name cumulative net uv+vis diff downward sw rad flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%nvisdf_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_surface_net_downward_direct_near_infrared_shortwave_flux_for_coupling_multiplied_by_timestep

long_name cumulative net nir beam downward sw flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%nnirbm_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_surface_net_downward_direct_ultraviolet_and_visible_shortwave_flux_for_coupling_multiplied_by_timestep

long_name cumulative net uv+vis beam downward sw rad flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%nvisbm_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_surface_net_downward_longwave_flux_for_coupling_multiplied_by_timestep

long_name cumulative net downward lw flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%nlwsfc_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

`cumulative_surface_net_downward_shortwave_flux_for_coupling_multiplied_by_timestep`

long_name cumulative net downward sw flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%nswsfc_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

`cumulative_surface_snow_area_fraction_multiplied_by_timestep`

long_name cumulative surface snow area fraction multiplied by timestep
units s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%snowca
requested GFS_surface_generic_post_run
physics set slow_physics

`cumulative_surface_upward_latent_heat_flux_for_coupling_multiplied_by_timestep`

long_name cumulative sfc latent heat flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%dqsfc_cpl
requested GFS_PBL_generic_post_run
physics set slow_physics

`cumulative_surface_upward_latent_heat_flux_for_diag_multiplied_by_timestep`

long_name cumulative sfc latent heat flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%dqsfc
requested GFS_PBL_generic_post_run
physics set slow_physics

`cumulative_surface_upward_potential_latent_heat_flux_multiplied_by_timestep`

long_name cumulative surface upward potential latent heat flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%ep
requested GFS_surface_generic_post_run
physics set slow_physics

`cumulative_surface_upward_sensible_heat_flux_for_coupling_multiplied_by_timestep`

long_name cumulative sfc sensible heat flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%dtsfc_cpl
requested GFS_PBL_generic_post_run
physics set slow_physics

`cumulative_surface_upward_sensible_heat_flux_for_diag_multiplied_by_timestep`

long_name cumulative sfc sensible heat flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%dtsfc
requested GFS_PBL_generic_post_run
physics set slow_physics

`cumulative_surface_x_momentum_flux_for_coupling_multiplied_by_timestep`

long_name cumulative sfc x momentum flux multiplied by timestep
units Pa s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%dusfc_cpl
requested GFS_PBL_generic_post_run
physics set slow_physics

`cumulative_surface_x_momentum_flux_for_diag_multiplied_by_timestep`

long_name cumulative sfc x momentum flux multiplied by timestep
units Pa s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%dusfc
requested GFS_PBL_generic_post_run
physics set slow_physics

`cumulative_surface_y_momentum_flux_for_coupling_multiplied_by_timestep`

long_name cumulative sfc y momentum flux multiplied by timestep
units Pa s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%dvsfc_cpl
requested GFS_PBL_generic_post_run
physics set slow_physics

`cumulative_surface_y_momentum_flux_for_diag_multiplied_by_timestep`

long_name cumulative sfc y momentum flux multiplied by timestep
units Pa s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%dvsfc
requested GFS_PBL_generic_post_run
physics set slow_physics

`cumulative_transpiration_flux_multiplied_by_timestep`

long_name cumulative total plant transpiration rate multiplied by timestep
units kg m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%transa
requested GFS_surface_generic_post_run
physics set slow_physics

date_and_time_at_model_initialization

long_name	initialization date and time
units	none
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%idat
requested	GFS_rrtmg_setup_run
physics set	slow_physics

date_and_time_at_model_initialization_reordered

long_name	initial date with different size and ordering
units	none
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%idate
requested	GFS_rrtmg_setup_init
physics set	slow_physics

daytime_points

long_name	daytime points
units	index
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%idxday
requested	rrtmg_sw_pre_run rrtmg_sw_run
physics set	slow_physics

daytime_points_dimension

long_name	daytime points dimension
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%nday
requested	rrtmg_sw_post_run rrtmg_sw_pre_run rrtmg_sw_run
physics set	slow_physics

deep_soil_temperature

long_name	deep soil temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%tg3
requested	lsm_noah_run
physics set	slow_physics

density_of_frozen_precipitation

long_name	density of frozen precipitation
units	kg m-3
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%rhofr
requested	NOT REQUESTED
physics set	

depth_of_soil_levels_for_land_surface_model

long_name	depth of soil levels for land surface model
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%zs
requested	NOT REQUESTED
physics set	

detrainment_conversion_parameter_deep_convection

long_name	convective detrainment conversion parameter for deep conv.
units	m-1
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%c1_deep
requested	samfdeepcnv_run
physics set	slow_physics

detrainment_conversion_parameter_shallow_convection

long_name	convective detrainment conversion parameter for shal conv.
units	m-1
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%c1_shal
requested	samfshalcnv_run
physics set	slow_physics

dewpoint_temperature_at_2m

long_name	2 meter dewpoint temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%dpt2m
requested	sfc_diag_post_run
physics set	slow_physics

diffusivity_background_sigma_level

long_name	sigma threshold for background mom. diffusion
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control% <i>xkzm</i> _s
requested	hedmf_run
physics set	slow_physics

dimensionless_exner_function_at_lowest_model_interface

long_name dimensionless Exner function at lowest model interface
units none
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name IPD_Data(nb)%Statein%prsik(:,1)
requested GFS_surface_generic_pre_run
 hedmf_run
physics set slow_physics

dimensionless_exner_function_at_lowest_model_layer

long_name dimensionless Exner function at lowest model layer
units none
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name IPD_Data(nb)%Statein%prslk(:,1)
requested GFS_surface_generic_pre_run
physics set slow_physics

dimensionless_exner_function_at_model_interfaces

long_name dimensionless Exner function at model layer interfaces
units none
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name IPD_Data(nb)%Statein%prsik
requested NOT REQUESTED
physics set

dimensionless_exner_function_at_model_layers

long_name	dimensionless Exner function at model layer centers
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	IPD_Data(nb)%Statein%prslk
requested	GFS_suite_interstitial_3_run
	gwdps_run
	hedmf_run
physics set	slow_physics

dissipation_estimate_of_air_temperature_at_model_layers

long_name	dissipation estimate model layer mean temperature
units	K
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	IPD_Data(nb)%Statein%diss_est
requested	GFS_stochastics_run
physics set	slow_physics

diurnal_thermocline_layer_heat_content

long_name heat content in diurnal thermocline layer
units K m
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name IPD_Data(nb)%Sfcprop%xt
requested sfc_nst_post_run
 sfc_nst_run
physics set slow_physics

diurnal_thermocline_layer_thickness

long_name diurnal thermocline layer thickness
units m
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name IPD_Data(nb)%Sfcprop%xz
requested sfc_nst_post_run
 sfc_nst_run
physics set slow_physics

diurnal_thermocline_layer_x_current

long_name u-current content in diurnal thermocline layer
units m2 s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name IPD_Data(nb)%Sfcprop%xu
requested sfc_nst_run
physics set slow_physics

diurnal_thermocline_layer_y_current

long_name v-current content in diurnal thermocline layer
units m2 s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name IPD_Data(nb)%Sfcprop%xv
requested sfc_nst_run
physics set slow_physics

dominant_freezing_rain_type

long_name dominant freezing rain type
units none
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%tdomzr
requested GFS_MP_generic_post_run
physics set slow_physics

dominant_rain_type

long_name dominant rain type
units none
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%tdomr
requested GFS_MP_generic_post_run
physics set slow_physics

dominant_sleet_type

long_name	dominant sleet type
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%tdomip
requested	GFS_MP_generic_post_run
physics set	slow_physics

dominant_snow_type

long_name	dominant snow type
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%tdoms
requested	GFS_MP_generic_post_run
physics set	slow_physics

downdraft_fraction_reaching_surface_over_land_deep_convection

long_name	downdraft fraction reaching surface over land for deep conv.
units	frac
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%betal_deep
requested	samfdeepcnv_run
physics set	slow_physics

downdraft_fraction_reaching_surface_over_ocean_deep_convection

long_name	downdraft fraction reaching surface over ocean for deep conv.
units	frac
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%betas_deep
requested	samfdeepcnv_run
physics set	slow_physics

dynamics_to_physics_timestep_ratio

long_name	ratio of dynamics timestep to physics timestep
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%frain
requested	GFS_DCNV_generic_post_run GFS_MP_generic_post_run GFS_SCNV_generic_post_run GFS_suite_interstitial_1_run samfshalcnv_post_run
physics set	slow_physics

ending_x_direction_index

long_name	ending X direction index
units	count
rank	0
type	integer
kind	
source	MODULE fv_arrays_mod TYPE fv_atmos_type
local_name	Atm(mytile)%bd%ie
requested	fv_sat_adj_run
physics set	fast_physics

ending_x_direction_index_domain

long_name	ending X direction index for domain
units	count
rank	0
type	integer
kind	
source	MODULE fv_arrays_mod TYPE fv_atmos_type
local_name	Atm(mytile)%bd%ied
requested	fv_sat_adj_run
physics set	fast_physics

ending_y_direction_index

long_name	ending Y direction index
units	count
rank	0
type	integer
kind	
source	MODULE fv_arrays_mod TYPE fv_atmos_type
local_name	Atm(mytile)%bd%je
requested	fv_sat_adj_run
physics set	fast_physics

ending_y_direction_index_domain

long_name	ending X direction index for domain
units	count
rank	0
type	integer
kind	
source	MODULE fv_arrays_mod TYPE fv_atmos_type
local_name	Atm(mytile)%bd%jed
requested	fv_sat_adj_run
physics set	fast_physics

entrainment_rate_coefficient_deep_convection

long_name	entrainment rate coefficient for deep conv.
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%clam_deep
requested	samfdeepcnv_run
physics set	slow_physics

entrainment_rate_coefficient_shallow_convection

long_name	entrainment rate coefficient for shal conv.
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%clam_shal
requested	samfshalcnv_run
physics set	slow_physics

equation_of_time

long_name	equation of time (radian)
units	radians
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%slag
requested	GFS_rrtmg_setup_run dcyc2t3_run
physics set	slow_physics

extra_top_layer

long_name	extra top layer for radiation
units	none
rank	0
type	integer
kind	
source	MODULE GFS_typedefs
local_name	LTP
requested	GFS_rrtmg_post_run rrtmg_lw_post_run rrtmg_sw_post_run
physics set	slow_physics

finite-volume_mean_edge_pressure_raised_to_the_power_of_kappa

long_name finite-volume mean edge pressure raised to the power of kappa
units Pa**kappa
rank 3
type real
kind
source MODULE fv_arrays_mod TYPE fv_atmos_type
local_name Atm(mytile)%pkz
requested fv_sat_adj_run
physics set fast_physics

flag_TKE_dissipation_heating

long_name flag for tke dissipative heating
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%dspheat
requested hedmf_run
physics set slow_physics

flag_convective_gravity_wave_drag

long_name flag for conv gravity wave drag
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%cnvgwd
requested GFS_DCNV_generic_pre_run
physics set slow_physics

flag_deep_convection

long_name	flag indicating whether convection occurs in column (0 or 1)
units	flag
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%kcnv
requested	gwdc_run samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

flag_diagnostics

long_name	logical flag for storing diagnostics
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%lssav
requested	GFS_DCNV_generic_post_run GFS_MP_generic_post_run GFS_PBL_generic_post_run GFS_SCNV_generic_post_run GFS_surface_generic_post_run gwdc_post_run gwdps_post_run lsm_noah_post_run samfshalcnv_post_run sfc_diag_post_run
physics set	slow_physics

flag_diagnostics_3D

long_name	flag for 3d diagnostic fields
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%ldiag3d
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_MP_generic_post_run GFS_MP_generic_pre_run GFS_PBL_generic_post_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run gwdc_post_run gwdps_post_run h2ophys_run ozphys_run
physics set	slow_physics

flag_for_Arakawa_Wu_adjustment

long_name	flag for Arakawa Wu scale-aware adjustment
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%do_aw
requested	GFS_MP_generic_pre_run
physics set	slow_physics

flag_for_CRICK-proof_cloud_water

long_name	flag for CRICK-Proof cloud water
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%crick_proof
requested	GFS_rrtmg_setup_init
physics set	slow_physics

flag_for_Chikira_Sugiyama_deep_convection

long_name	flag for Chikira-Sugiyama convection
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%cscnv
requested	GFS_suite_interstitial_3_run
physics set	slow_physics

flag_for_aerosol_physics

long_name	flag for aerosol physics
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%ltaerosol
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run
physics set	slow_physics

flag_for_chemistry_coupling

long_name	flag controlling cplchm collection (default off)
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%cplchm
requested	GFS_MP_generic_post_run
physics set	slow_physics

flag_for_cloud_condensate_normalized_by_cloud_cover

long_name flag for cloud condensate normalized by cloud cover
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%ccnorm
requested GFS_rrtmg_setup_init
physics set slow_physics

flag_for_convective_transport_of_tracers

long_name flag for convective transport of tracers
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%trans_trac
requested GFS_suite_interstitial_3_run
physics set slow_physics

flag_for_default_aerosol_effect_in_shortwave_radiation

long_name default aerosol effect in sw only
units flag
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%iaer
requested GFS_rrtmg_setup_init
physics set slow_physics

flag_for_fast_microphysics_energy_conservation

long_name	flag for fast microphysics energy conservation
units	flag
rank	0
type	logical
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%fast_mp_consv
requested	fv_sat_adj_run
physics set	fast_physics

flag_for_flux_coupling

long_name	flag controlling cplflx collection (default off)
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%cplflx
requested	GFS_MP_generic_post_run GFS_PBL_generic_post_run GFS_stochastics_run GFS_surface_generic_post_run
physics set	slow_physics

flag_for_frozen_soil_physics

long_name	flag for frozen soil physics (RUC)
units	flag
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%flag_frsoil
requested	NOT REQUESTED
physics set	

flag_for_gfdl_microphysics_scheme

long_name	choice of GFDL microphysics scheme
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%imp_physics_gfdl
requested	GFS_MP_generic_post_run GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run gfdl_cloud_microphys_init
physics set	slow_physics

flag_for_guess_run

long_name	flag for guess run
units	flag
rank	1
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%flag_guess
requested	GFS_surface_loop_control_part1_run GFS_surface_loop_control_part2_run lsm_noah_run sfc_nst_run
physics set	slow_physics

flag_for_hedmf

long_name	flag for hybrid edmf pbl scheme (moninedmf)
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%hybedmf
requested	GFS_PBL_generic_post_run
physics set	slow_physics

flag_for_hydrostatic_heating_from_physics

long_name	flag for use of hydrostatic heating in physics
units	flag
rank	0
type	logical
kind	
source	MODULE CCPP_typedefs TYPE CCPP_shared_type
local_name	CCPP_shared(nt)%phys_hydrostatic
requested	gfdl_cloud_microphys_run
physics set	slow_physics

flag_for_hydrostatic_solver

long_name	flag for use the hydrostatic or nonhydrostatic solver
units	flag
rank	0
type	logical
kind	
source	MODULE CCPP_typedefs TYPE CCPP_shared_type
local_name	CCPP_shared(nt)%hydrostatic
requested	fv_sat_adj_run gfdl_cloud_microphys_run
physics set	fast_physics slow_physics

flag_for_initial_time-date_control

long_name	flag for initial conditions and forcing
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%ictm
requested	GFS_rrtmg_setup_init
physics set	slow_physics

flag_for_inline_cloud_fraction_calculation

long_name	flag for the inline cloud fraction calculation
units	flag
rank	0
type	logical
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%do_qa
requested	fv_sat_adj_run
physics set	fast_physics

flag_for_iteration

long_name	flag for iteration
units	flag
rank	1
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%flag_iter
requested	GFS_surface_loop_control_part2_run lsm_noah_run sfc_ex_coef_run sfc_nst_run sfc_sice_run
physics set	slow_physics

flag_for_land_surface_scheme

long_name	flag for land surface model
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%lsm
requested	sfc_sice_run
physics set	slow_physics

flag_for_lw_clouds_without_sub-grid_approximation

long_name	flag for lw clouds without sub-grid approximation
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%isubc_lw
requested	GFS_rrtmg_setup_init
physics set	slow_physics

flag_for_mass_flux_deep_convection_scheme

long_name	flag for mass-flux deep convection scheme
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%imfdeepcnv
requested	NOT REQUESTED
physics set	

flag_for_mass_flux_shallow_convection_scheme

long_name flag for mass-flux shallow convection scheme
units flag
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%imfshalcnv
requested NOT REQUESTED
physics set

flag_for_max-random_overlap_clouds_for_longwave_radiation

long_name lw: max-random overlap clouds
units flag
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%iovr_lw
requested GFS_rrtmg_setup_init
physics set slow_physics

flag_for_max-random_overlap_clouds_for_shortwave_radiation

long_name sw: max-random overlap clouds
units flag
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%iovr_sw
requested GFS_rrtmg_setup_init
physics set slow_physics

flag_for_microphysics_scheme

long_name	choice of microphysics scheme
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%imp_physics
requested	GFS_MP_generic_post_run GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_rrtmg_setup_init GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run gfdl_cloud_microphys_init
physics set	slow_physics

flag_for_mom4_coupling

long_name	flag controls mom4 sea ice
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%mom4ice
requested	sfc_sice_run
physics set	slow_physics

flag_for_morrison_gettelman_microphysics_scheme

long_name choice of Morrison-Gettelman rmicrophysics scheme
units flag
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%imp_physics_mg
requested GFS_suite_interstitial_3_run
physics set slow_physics

flag_for_mountain_blocking

long_name flag for mountain blocking
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%use_zmtnbck
requested GFS_stochastics_run
physics set slow_physics

flag_for_nsstm_run

long_name NSSTM flag: off/uncoupled/coupled=0/1/2
units flag
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%nstf_name(1)
requested GFS_surface_loop_control_part2_run
sfc_nst_post_run
sfc_nst_run
physics set slow_physics

flag_for_output_of_longwave_heating_rate

long_name flag to output lw heating rate (Radtend%lwhe)
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%lwhe
requested NOT REQUESTED
physics set

flag_for_output_of_shortwave_heating_rate

long_name flag to output sw heating rate (Radtend%swhe)
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%swhe
requested NOT REQUESTED
physics set

flag_for_precipitation_effect_on_radiation

long_name radiation precip flag for Ferrier/Moorthi
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%norad_precip
requested GFS_rrtmg_setup_init
physics set slow_physics

flag_for_precipitation_type

long_name	snow/rain flag for precipitation
units	flag
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%srflag
requested	GFS_MP_generic_post_run
	lsm_noah_run
	sfc_sice_run
physics set	slow_physics

flag_for_precipitation_type_algorithm

long_name	flag controls precip type algorithm
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%cal_pre
requested	GFS_MP_generic_post_run
physics set	slow_physics

flag_for_radar_reflectivity

long_name	flag for radar reflectivity
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%lradar
requested	NOT REQUESTED
physics set	

flag_for_reduced_drag_coefficient_over_sea

long_name flag for reduced drag coeff. over sea
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%redrag
requested sfc_ex_coef_run
physics set slow_physics

flag_for_ruc_land_surface_scheme

long_name flag for RUC land surface model
units flag
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%lsm_ruc
requested NOT REQUESTED
physics set

flag_for_scale_aware_TKE_moist_EDMF_PBL

long_name flag for scale-aware TKE moist EDMF PBL scheme
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%satmedmf
requested GFS_suite_interstitial_3_run
physics set slow_physics

flag_for_shoc

long_name	flag for SHOC
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%do_shoc
requested	GFS_suite_interstitial_3_run
	gfdl_cloud_microphys_init
physics set	slow_physics

flag_for_solar_constant

long_name	use prescribed solar constant
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%isol
requested	GFS_rrtmg_setup_init
physics set	slow_physics

flag_for_stochastic_shum_option

long_name	flag for stochastic shum option
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%do_shum
requested	GFS_stochastics_run
physics set	slow_physics

flag_for_stochastic_skeb_option

long_name	flag for stochastic skeb option
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%do_skeb
requested	GFS_stochastics_run
physics set	slow_physics

flag_for_stochastic_surface_perturbations

long_name	flag for stochastic surface perturbations option
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%do_sfcperfs
requested	GFS_surface_generic_pre_run
physics set	slow_physics

flag_for_stochastic_surface_physics_perturbations

long_name	flag for stochastic surface physics perturbations
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%do_sppt
requested	GFS_MP_generic_post_run GFS_stochastics_run GFS_surface_generic_pre_run
physics set	slow_physics

flag_for_surface_emissivity_control

long_name	surface emissivity control flag, use fixed value of 1
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%iems
requested	GFS_rrtmg_setup_init
physics set	slow_physics

flag_for_sw_clouds_without_sub-grid_approximation

long_name	flag for sw clouds without sub-grid approximation
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%isubc_sw
requested	GFS_rrtmg_setup_init
physics set	slow_physics

flag_for_tendency_of_air_temperature_at_Lagrangian_surface

long_name	flag for calculating tendency of air temperature due to fast physics
units	flag
rank	0
type	logical
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%out_dt
requested	fv_sat_adj_run
physics set	fast_physics

flag_for_the_last_step_of_k_split_remapping

long_name	flag for the last step of k-split remapping
units	flag
rank	0
type	logical
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%last_step
requested	fv_sat_adj_run
physics set	fast_physics

flag_for_thompson_microphysics_scheme

long_name	choice of Thompson microphysics scheme
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%imp_physics_thompson
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run
physics set	slow_physics

flag_for_using_climatology_albedo

long_name	flag for using climatology alb, based on sfc type
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%ialb
requested	GFS_rrtmg_setup_init
physics set	slow_physics

flag_for_using_prescribed_global_mean_co2_value

long_name prescribed global mean value (old opernl)
units flag
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%ico2
requested GFS_rrtmg_setup_init
physics set slow_physics

flag_for_vertical_index_direction_control

long_name iflip - is not the same as flipv
units flag
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%iflip
requested GFS_rrtmg_setup_init
physics set slow_physics

flag_for_wsm6_microphysics_scheme

long_name choice of WSM6 microphysics scheme
units flag
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%imp_physics_wsm6
requested GFS_PBL_generic_post_run
 GFS_PBL_generic_pre_run
 GFS_suite_interstitial_3_run
physics set slow_physics

flag_for_zhao_carr_microphysics_scheme

long_name	choice of Zhao-Carr microphysics scheme
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%imp_physics_zhao_carr
requested	GFS_suite_interstitial_3_run
	GFS_suite_interstitial_4_run
physics set	slow_physics

flag_for_zhao_carr_pdf_microphysics_scheme

long_name	choice of Zhao-Carr microphysics scheme with PDF clouds
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%imp_physics_zhao_carr_pdf
requested	GFS_suite_interstitial_3_run
	GFS_suite_interstitial_4_run
physics set	slow_physics

flag_gocart

long_name	flag for 3d diagnostic fields for gocart 1
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%lgocart
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run GFS_suite_interstitial_4_run
physics set	slow_physics

flag_idealized_physics

long_name	flag for idealized physics
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%lsidea
requested	GFS_PBL_generic_post_run rayleigh_damp_run
physics set	slow_physics

flag_mg3_as_mg2

long_name	flag for controlling prep for Morrison-Gettelman microphysics
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%mg3_as_mg2
requested	NOT REQUESTED
physics set	

flag_print

long_name	control flag for diagnostic print out
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%lprnt
requested	gwdc_run gwdps_run hedmf_run rrtmg_lw_run rrtmg_sw_run sfc_nst_run sfc_sice_run zhaocarr_gscond_run zhaocarr_precpd_run
physics set	slow_physics

flag_shallow_convective_cloud

long_name	flag for shallow convective cloud
units	
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%shcnvcw
requested	samfshalcnv_post_run
physics set	slow_physics

flag_skip_macro

long_name	flag to skip cloud macrophysics in Morrison scheme
units	flag
rank	1
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%skip_macro
requested	NOT REQUESTED
physics set	

flag_to_calc_lw

long_name	logical flags for lw radiation calls
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%lslwr
requested	rrtmg_lw_run
physics set	slow_physics

flag_to_calc_sw

long_name	logical flags for sw radiation calls
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%lsswr
requested	GFS_rrtmg_setup_run rrtmg_sw_run
physics set	slow_physics

forecast_date_and_time

long_name	current forecast date and time
units	none
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%jdat
requested	GFS_rrtmg_setup_run
physics set	slow_physics

forecast_hour

long_name	hour time after 00z at the t-step
units	h
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%solhr
requested	dcyc2t3_run sfc_nst_run
physics set	slow_physics

forecast_time

long_name	curent forecast time
units	h
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%fhour
requested	gwdc_run
physics set	slow_physics

fraction_of_convective_cloud

long_name	fraction of convective cloud
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_cldprop_type
local_name	IPD_Data(nb)%Cldprop%cv
requested	cnvc90_run
physics set	slow_physics

fraction_of_grid_box_with_subgrid_orography_higher_than_critical_height

long_name	frac. of grid box with by subgrid orography higher than critical height
units	frac
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%clx
requested	gwdps_pre_run
	gwdps_run
physics set	slow_physics

free_convection_layer_thickness

long_name	thickness of free convection layer (FCL)
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%d_conv
requested	sfc_nst_run
physics set	slow_physics

frequency_for_longwave_radiation

long_name	frequency for longwave radiation
units	s
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%fhlwr
requested	NOT REQUESTED
physics set	

frequency_for_shortwave_radiation

long_name	frequency for shortwave radiation
units	s
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%fhsr
requested	GFS_rrtmg_setup_run
physics set	slow_physics

gas_constant_dry_air

long_name	ideal gas constant for dry air
units	J kg ⁻¹ K ⁻¹
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_rd
requested	gfdl_cloud_microphys_run gwdc_run gwdps_run samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

gas_constant_water_vapor

long_name	ideal gas constant for water vapor
units	J kg ⁻¹ K ⁻¹
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_rv
requested	gwdps_run samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

geopotential

long_name	geopotential at model layer centers
units	m2 s-2
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	IPD_Data(nb)%Statein%phil
requested	GFS_surface_generic_pre_run get_phi_fv3_run gwdps_run hedmf_run samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

geopotential_at_interface

long_name	geopotential at model layer interfaces
units	m2 s-2
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	IPD_Data(nb)%Statein%phii
requested	GFS_MP_generic_post_run get_phi_fv3_run get_prs_fv3_run gfdl_cloud_microphys_run gwdps_run hedmf_run
physics set	slow_physics

geopotential_difference_between_midlayers_divided_by_midlayer_virtual_temperature

long_name difference between mid-layer geopotentials divided by mid-layer virtual temperature
units m2 s-2 K-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%del_gz
requested get_phi_fv3_run
get_prs_fv3_run
physics set slow_physics

graupel_mixing_ratio

long_name moist (dry+vapor, no condensates) mixing ratio of graupel
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name IPD_Data(nb)%Statein%qgrs(:, :, IPD_Control%ntgl)
requested GFS_PBL_generic_pre_run
physics set slow_physics

graupel_mixing_ratio_updated_by_physics

long_name moist (dry+vapor, no condensates) mixing ratio of graupel updated by physics
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name IPD_Data(nb)%Stateout%gq0(:, :, IPD_Control%ntgl)
requested gfdl_cloud_microphys_run
physics set slow_physics

graupel_number_concentration

long_name number concentration of graupel
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name IPD_Data(nb)%Statein%qgrs(:, :, IPD_Control%ntgnc)
requested NOT REQUESTED
physics set

graupel_number_concentration_updated_by_physics

long_name number concentration of graupel updated by physics
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name IPD_Data(nb)%Stateout%gq0(:, :, IPD_Control%ntgnc)
requested NOT REQUESTED
physics set

gravitational_acceleration

long_name	gravitational acceleration
units	m s-2
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_g
requested	GFS_DCNV_generic_post_run GFS_MP_generic_post_run GFS_surface_generic_pre_run gfdl_cloud_microphys_run gwdc_run gwdps_run samfdeepcnv_run samfshalcnv_run sfc_diag_run
physics set	slow_physics

grid_size_related_coefficient_used_in_scale-sensitive_schemes

long_name	grid size related coefficient used in scale-sensitive schemes
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%work1
requested	GFS_suite_interstitial_1_run GFS_suite_interstitial_3_run gwdc_pre_run zhaocarr_precpd_run
physics set	slow_physics

grid_size_related_coefficient_used_in_scale-sensitive_schemes_complement

long_name	complement to work1
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%work2
requested	GFS_suite_interstitial_1_run GFS_suite_interstitial_3_run gwdc_pre_run
physics set	slow_physics

h2o_forcing

long_name	water forcing data
units	various
rank	3
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	IPD_Data(nb)%Tbd%h2op1
requested	h2ophys_run
physics set	slow_physics

height_above_ground_at_lowest_model_layer

long_name	layer 1 height above ground (not MSL)
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%zlvl
requested	GFS_surface_generic_pre_run lsm_noah_run sfc_ex_coef_run
physics set	slow_physics

horizontal_block_size

long_name	for explicit data blocking: block sizes of all blocks
units	count
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%blksz
requested	NOT REQUESTED
physics set	

horizontal_dimension

long_name	horizontal dimension
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%ix
requested	GFS_MP_generic_post_run cnvc90_run dcyc2t3_run get_phi_fv3_run get_prs_fv3_run gwdc_run gwdps_run h2ophys_run hedmf_run ozphys_run rayleigh_damp_run samfdeepcnv_run samfshalcnv_run zhaocarr_gscond_run zhaocarr_precpd_run
physics set	slow_physics

horizontal_index_of_printed_column

long_name	horizontal index of printed column
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%ipr
requested	gwdc_run gwdps_run hedmf_run sfc_nst_run sfc_sice_run zhaocarr_gscond_run zhaocarr_precpd_run
physics set	slow_physics

horizontal_loop_extent

long_name	horizontal loop extent
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%im
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_MP_generic_post_run GFS_MP_generic_pre_run GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run GFS_rrtmg_post_run GFS_rrtmg_pre_run GFS_rrtmg_setup_init GFS_stochastics_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run GFS_suite_stateout_reset_run GFS_suite_stateout_update_run GFS_surface_generic_post_run GFS_surface_generic_pre_run GFS_surface_loop_control_part1_run GFS_surface_loop_control_part2_run cnvc90_run dcyc2t3_post_run dcyc2t3_run gfdl_cloud_microphys_run gwdc_post_run gwdc_pre_run gwdc_run gwdps_pre_run gwdps_run h2ophys_run h2ophys_run

ice_friendly_aerosol_number_concentration

long_name number concentration of ice-friendly aerosols
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name IPD_Data(nb)%Statein%qgrs(:, :, IPD_Control%ntia)
requested GFS_PBL_generic_pre_run
physics set slow_physics

ice_friendly_aerosol_number_concentration_updated_by_physics

long_name number concentration of ice-friendly aerosols updated by physics
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name IPD_Data(nb)%Stateout%gq0(:, :, IPD_Control%ntia)
requested NOT REQUESTED
physics set

ice_number_concentration

long_name number concentration of ice
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name IPD_Data(nb)%Statein%qgrs(:, :, IPD_Control%ntinc)
requested GFS_PBL_generic_pre_run
physics set slow_physics

ice_number_concentration_updated_by_physics

long_name number concentration of ice updated by physics
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name IPD_Data(nb)%Stateout%gq0(:, :, IPD_Control%ntinc)
requested NOT REQUESTED
physics set

ice_water_mixing_ratio

long_name moist (dry+vapor, no condensates) mixing ratio of ice water
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name IPD_Data(nb)%Statein%qgrs(:, :, IPD_Control%ntiw)
requested GFS_PBL_generic_pre_run
physics set slow_physics

ice_water_mixing_ratio_updated_by_physics

long_name moist (dry+vapor, no condensates) mixing ratio of ice water updated by physics
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name IPD_Data(nb)%Stateout%gq0(:, :, IPD_Control%ntiw)
requested gfdl_cloud_microphys_run
physics set slow_physics

`index_for_cloud_amount`

<code>long_name</code>	tracer index for cloud amount integer
<code>units</code>	index
<code>rank</code>	0
<code>type</code>	integer
<code>kind</code>	
<code>source</code>	MODULE GFS_typedefs TYPE GFS_control_type
<code>local_name</code>	IPD_Control%ntclamt
<code>requested</code>	GFS_suite_interstitial_3_run
	GFS_suite_interstitial_4_run
<code>physics set</code>	slow_physics

`index_for_graupel`

<code>long_name</code>	tracer index for graupel
<code>units</code>	index
<code>rank</code>	0
<code>type</code>	integer
<code>kind</code>	
<code>source</code>	MODULE GFS_typedefs TYPE GFS_control_type
<code>local_name</code>	IPD_Control%ntgl
<code>requested</code>	GFS_suite_interstitial_3_run
	GFS_suite_interstitial_4_run
<code>physics set</code>	slow_physics

index_for_graupel_number_concentration

long_name tracer index for graupel number concentration
units index
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%ntgnc
requested GFS_suite_interstitial_3_run
 GFS_suite_interstitial_4_run
physics set slow_physics

index_for_ice_cloud_condensate

long_name tracer index for ice water
units index
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%ntiw
requested GFS_suite_interstitial_3_run
 GFS_suite_interstitial_4_run
physics set slow_physics

index_for_ice_cloud_number_concentration

long_name tracer index for ice number concentration
units index
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%ntinc
requested GFS_suite_interstitial_4_run
physics set slow_physics

`index_for_liquid_cloud_condensate`

<code>long_name</code>	tracer index for cloud condensate (or liquid water)
<code>units</code>	index
<code>rank</code>	0
<code>type</code>	integer
<code>kind</code>	
<code>source</code>	MODULE GFS_typedefs TYPE GFS_control_type
<code>local_name</code>	IPD_Control%ntcw
<code>requested</code>	GFS_MP_generic_post_run GFS_MP_generic_pre_run GFS_rrtmg_setup_init GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run hedmf_run
<code>physics set</code>	slow_physics

`index_for_liquid_cloud_number_concentration`

<code>long_name</code>	tracer index for liquid number concentration
<code>units</code>	index
<code>rank</code>	0
<code>type</code>	integer
<code>kind</code>	
<code>source</code>	MODULE GFS_typedefs TYPE GFS_control_type
<code>local_name</code>	IPD_Control%ntlnc
<code>requested</code>	GFS_suite_interstitial_4_run
<code>physics set</code>	slow_physics

index_for_ozone

long_name	tracer index for ozone mixing ratio
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%ntoz
requested	GFS_PBL_generic_post_run
	GFS_rrtmg_setup_init
physics set	slow_physics

index_for_rain_number_concentration

long_name	tracer index for rain number concentration
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%ntrnc
requested	GFS_suite_interstitial_3_run
	GFS_suite_interstitial_4_run
physics set	slow_physics

`index_for_rain_water`

<code>long_name</code>	<code>tracer index for rain water</code>
<code>units</code>	<code>index</code>
<code>rank</code>	<code>0</code>
<code>type</code>	<code>integer</code>
<code>kind</code>	
<code>source</code>	<code>MODULE GFS_typedefs TYPE GFS_control_type</code>
<code>local_name</code>	<code>IPD_Control%ntrw</code>
<code>requested</code>	<code>GFS_suite_interstitial_3_run</code>
	<code>GFS_suite_interstitial_4_run</code>
<code>physics set</code>	<code>slow_physics</code>

`index_for_snow_number_concentration`

<code>long_name</code>	<code>tracer index for snow number concentration</code>
<code>units</code>	<code>index</code>
<code>rank</code>	<code>0</code>
<code>type</code>	<code>integer</code>
<code>kind</code>	
<code>source</code>	<code>MODULE GFS_typedefs TYPE GFS_control_type</code>
<code>local_name</code>	<code>IPD_Control%ntsnc</code>
<code>requested</code>	<code>GFS_suite_interstitial_3_run</code>
	<code>GFS_suite_interstitial_4_run</code>
<code>physics set</code>	<code>slow_physics</code>

index_for_snow_water

long_name	tracer index for snow water
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%ntsw
requested	GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run
physics set	slow_physics

index_of_TKE_convective_transport_tracer

long_name	index of TKE in the convectively transported tracer array
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%ntk
requested	samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

index_of_dtlm_start

long_name	index to start dtlm run or not
units	index
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%ifd
requested	sfc_nst_run
physics set	slow_physics

index_of_highest_temperature_inversion

long_name	index of highest temperature inversion
units	index
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%kinver
requested	hedmf_run
physics set	slow_physics

index_of_time_step

long_name	current forecast iteration
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%kdt
requested	GFS_MP_generic_post_run gwdps_run sfc_nst_run
physics set	slow_physics

instantaneous_atmosphere_detrainment_convective_mass_flux

long_name (detrainment mass flux) * delt
units kg m-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%dt_mf
requested GFS_DCNV_generic_post_run
samfdeepcnv_run
samfshalcnv_run
physics set slow_physics

instantaneous_atmosphere_detrainment_convective_mass_flux_on_dynamics_timestep

long_name (detrainment mass flux) * delt
units kg m-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%det_mfi
requested GFS_DCNV_generic_post_run
physics set slow_physics

instantaneous_atmosphere_downdraft_convective_mass_flux

long_name (downdraft mass flux) * delt
units kg m-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%dd_mf
requested GFS_DCNV_generic_post_run
samfdeepcnv_run
physics set slow_physics

instantaneous_atmosphere_downdraft_convective_mass_flux_on_dynamics_timestep

long_name (downdraft mass flux) * delt
units kg m-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%dwn_mfi
requested GFS_DCNV_generic_post_run
physics set slow_physics

instantaneous_atmosphere_heat_diffusivity

long_name instantaneous atmospheric heat diffusivity
units m2 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%dkt
requested NOT REQUESTED
physics set

instantaneous_atmosphere_updraft_convective_mass_flux

long_name (updraft mass flux) * delt
units kg m-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%ud_mf
requested GFS_DCNV_generic_post_run
samfdeepcnv_run
samfshalcnv_run
physics set slow_physics

instantaneous_atmosphere_updraft_convective_mass_flux_on_dynamics_timestep

long_name (updraft mass flux) * delt
units kg m-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%upd_mfi
requested GFS_DCNV_generic_post_run
physics set slow_physics

instantaneous_cosine_of_zenith_angle

long_name	cosine of zenith angle at current time
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%xcosz
requested	GFS_suite_interstitial_2_run GFS_surface_generic_post_run dcyc2t3_run sfc_nst_run
physics set	slow_physics

instantaneous_deep_convective_cloud_condensate_mixing_ratio_on_dynamics_time_step

long_name	instantaneous total convective condensate mixing ratio
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	IPD_Data(nb)%Coupling%cnvqci
requested	GFS_DCNV_generic_post_run
physics set	slow_physics

instantaneous_specific_humidity_at_2m_for_coupling

long_name instantaneous Q2m
units kg kg-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%q2mi_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_air_pressure_for_coupling

long_name instantaneous sfc pressure
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%psurfi_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_downwelling_diffuse_near_infrared_shortwave_flux_for_coupling

long_name instantaneous sfc nir diff downward sw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%dnirdfi_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_downwelling_diffuse_ultraviolet_and_visible_shortwave_flux_for_coupling

long_name instantaneous sfc uv+vis diff downward sw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%dvisdfi_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_downwelling_direct_near_infrared_shortwave_flux_for_coupling

long_name instantaneous sfc nir beam downward sw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%dnirbmi_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_downwelling_direct_ultraviolet_and_visible_shortwave_flux_for_coupling

long_name instantaneous sfc uv+vis beam downward sw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%dvisbmi_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_downwelling_longwave_flux_for_coupling

long_name instantaneous sfc downward lw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%dlwsfci_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_downwelling_shortwave_flux_for_coupling

long_name instantaneous sfc downward sw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%dswsfci_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_ground_heat_flux

long_name instantaneous sfc ground heat flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%gfluxi
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_net_downward_diffuse_near_infrared_shortwave_flux_for_coupling

long_name instantaneous net nir diff sfc downward sw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%nnirdfi_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_net_downward_diffuse_ultraviolet_and_visible_shortwave_flux_for_coupling

long_name instantaneous net uv+vis diff downward sw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%nvisdfi_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_net_downward_direct_near_infrared_shortwave_flux_for_coupling

long_name instantaneous net nir beam sfc downward sw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%nnirbmi_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_net_downward_direct_ultraviolet_and_visible_shortwave_flux_for_coupling

long_name instantaneous net uv+vis beam downward sw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%nvisbmi_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_net_downward_longwave_flux_for_coupling

long_name instantaneous net sfc downward lw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%nlwsfci_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_net_downward_shortwave_flux_for_coupling

long_name instantaneous net sfc downward sw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%nswsfci_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_potential_evaporation

long_name instantaneous sfc potential evaporation
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%epi
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_skin_temperature_for_coupling

long_name instantaneous sfc temperature
units K
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%tsfci_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_upward_latent_heat_flux

long_name surface upward latent heat flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%dqsfc1
requested GFS_PBL_generic_post_run
 hedmf_run
physics set slow_physics

instantaneous_surface_upward_latent_heat_flux_for_coupling

long_name instantaneous sfc latent heat flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%dqsfc1_cpl
requested GFS_PBL_generic_post_run
physics set slow_physics

instantaneous_surface_upward_latent_heat_flux_for_diag

long_name instantaneous sfc latent heat flux multiplied by timestep
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%dqsfc1
requested GFS_PBL_generic_post_run
physics set slow_physics

instantaneous_surface_upward_sensible_heat_flux

long_name surface upward sensible heat flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%dtsfc1
requested GFS_PBL_generic_post_run
 hedmf_run
physics set slow_physics

instantaneous_surface_upward_sensible_heat_flux_for_coupling

long_name instantaneous sfc sensible heat flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%dtsfci_cpl
requested GFS_PBL_generic_post_run
physics set slow_physics

instantaneous_surface_upward_sensible_heat_flux_for_diag

long_name instantaneous sfc sensible heat flux multiplied by timestep
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%dtsfci
requested GFS_PBL_generic_post_run
physics set slow_physics

instantaneous_surface_x_momentum_flux

long_name x momentum flux
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%dusfc1
requested GFS_PBL_generic_post_run
 hedmf_run
physics set slow_physics

instantaneous_surface_x_momentum_flux_for_coupling

long_name instantaneous sfc x momentum flux
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%dusfci_cpl
requested GFS_PBL_generic_post_run
physics set slow_physics

instantaneous_surface_x_momentum_flux_for_diag

long_name instantaneous sfc x momentum flux multiplied by timestep
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%dusfci
requested GFS_PBL_generic_post_run
physics set slow_physics

instantaneous_surface_y_momentum_flux

long_name y momentum flux
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%dvsfci
requested GFS_PBL_generic_post_run
 hedmf_run
physics set slow_physics

instantaneous_surface_y_momentum_flux_for_coupling

long_name instantaneous sfc y momentum flux
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%dvsfci_cpl
requested GFS_PBL_generic_post_run
physics set slow_physics

instantaneous_surface_y_momentum_flux_for_diag

long_name instantaneous sfc y momentum flux multiplied by timestep
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%dvsfci
requested GFS_PBL_generic_post_run
physics set slow_physics

instantaneous_temperature_at_2m_for_coupling

long_name instantaneous T2m
units K
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%t2mi_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_upward_sensible_heat_flux

long_name instantaneous upward sensible heat flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%ushfsfci
requested NOT REQUESTED
physics set

instantaneous_water_vapor_specific_humidity_tendency_due_to_convection

long_name instantaneous moisture tendency due to convection
units kg kg-1 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%dqdti
requested GFS_DCNV_generic_post_run
 GFS_SCNV_generic_post_run
 GFS_suite_interstitial_4_run
physics set slow_physics

instantaneous_x_stress_due_to_gravity_wave_drag

long_name	zonal surface stress due to orographic gravity wave drag
units	Pa
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%dusfcg
requested	gwdc_post_run gwdc_run gwdps_post_run gwdps_run
physics set	slow_physics

instantaneous_x_wind_at_10m_for_coupling

long_name	instantaneous U10m
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	IPD_Data(nb)%Coupling%u10mi_cpl
requested	GFS_surface_generic_post_run
physics set	slow_physics

instantaneous_y_stress_due_to_gravity_wave_drag

long_name meridional surface stress due to orographic gravity wave drag
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%dvsfcg
requested gwdc_post_run
gwdc_run
gwdps_post_run
gwdps_run
physics set slow_physics

instantaneous_y_wind_at_10m_for_coupling

long_name instantaneous V10m
units m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%v10mi_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

inverse_scaling_factor_for_critical_relative_humidity

long_name	inverse scaling factor for critical relative humidity
units	rad2 m-2
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%dxinv
requested	GFS_suite_interstitial_1_run
physics set	slow_physics

iounit_log

long_name	fortran unit number for logfile
units	none
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%logunit
requested	gfdl_cloud_microphys_init
physics set	slow_physics

iounit_namelist

long_name	fortran unit number for file opens
units	none
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%nlunit
requested	gfdl_cloud_microphys_init lsm_noah_init
physics set	slow_physics

iteration_number

long_name	number of iteration
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%iter
requested	NOT REQUESTED
physics set	

kappa_dry_for_fast_physics

long_name	modified kappa for fast physics
units	none
rank	0
type	real
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%akap
requested	fv_sat_adj_run
physics set	fast_physics

kinematic_surface_upward_latent_heat_flux

long_name kinematic surface upward latent heat flux
units kg kg-1 m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%evap
requested hedmf_run
lsm_noah_run
sfc_diag_run
sfc_nst_run
sfc_sice_run
physics set slow_physics

kinematic_surface_upward_sensible_heat_flux

long_name kinematic surface upward sensible heat flux
units K m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%hflx
requested hedmf_run
lsm_noah_run
sfc_nst_run
sfc_sice_run
physics set slow_physics

lake_mask_real

long_name lake mask: non-lake/lake=0/1
units flag
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name IPD_Data(nb)%Sfcprop%lakemsk
requested NOT REQUESTED
physics set

land_area_fraction

long_name land area fraction
units frac
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%frland
requested GFS_suite_interstitial_1_run
gfdl_cloud_microphys_run
physics set slow_physics

largest_cloud_top_vertical_index_encountered_thus_far

long_name largest cloud top vertical index encountered thus far
units index
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name IPD_Data(nb)%Tbd%acvt
requested cnvc90_run
physics set slow_physics

latent_heat_of_vaporization_of_water_at_0C

long_name	latent heat of evaporation/sublimation
units	J kg-1
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_hvap
requested	samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

latitude

long_name	latitude
units	radians
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_grid_type
local_name	IPD_Data(nb)%Grid%xlatt
requested	GFS_MP_generic_post_run
physics set	slow_physics

latitude_index_in_debug_printouts

long_name	latitude index in debug printouts
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%latidxprnt
requested	gwdc_run
physics set	slow_physics

level_of_dividing_streamline

long_name	level of the dividing streamline
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%zmtnblk
requested	GFS_stochastics_run
	gwdps_run
physics set	slow_physics

log_pressure_at_Lagrangian_surface

long_name	logarithm of pressure at Lagrangian surface
units	Pa
rank	3
type	real
kind	
source	MODULE fv_arrays_mod TYPE fv_atmos_type
local_name	Atm(mytile)%peln
requested	fv_sat_adj_run
physics set	fast_physics

longitude

long_name	longitude
units	radians
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_grid_type
local_name	IPD_Data(nb)%Grid%xlon
requested	GFS_MP_generic_post_run dcyc2t3_run sfc_nst_post_run sfc_nst_run
physics set	slow_physics

lw_fluxes_sfc

long_name	lw radiation fluxes at sfc
units	W m-2
rank	1
type	sfcflw_type
kind	
source	MODULE GFS_typedefs TYPE GFS_radtend_type
local_name	IPD_Data(nb)%Radtend%sfcflw
requested	rrtmg_lw_run
physics set	slow_physics

lw_fluxes_top_atmosphere

long_name	lw radiation fluxes at top
units	W m-2
rank	1
type	topflw_type
kind	
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%topflw
requested	rrtmg_lw_run
physics set	slow_physics

lwe_thickness_of_convective_precipitation_amount_for_coupling

long_name	total convective precipitation
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	IPD_Data(nb)%Coupling%rainc_cpl
requested	GFS_MP_generic_post_run
physics set	slow_physics

lwe_thickness_of_convective_precipitation_amount_on_dynamics_timestep

long_name	convective rain at this time step
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%rainc
requested	GFS_DCNV_generic_post_run GFS_MP_generic_post_run GFS_stochastics_run cnvc90_run samfshalcnv_post_run
physics set	slow_physics

lwe_thickness_of_deep_convective_precipitation_amount

long_name	deep convective rainfall amount on physics timestep
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%raincd
requested	GFS_DCNV_generic_post_run samfdeepcnv_run
physics set	slow_physics

lwe_thickness_of_explicit_precipitation_amount

long_name explicit precipitation (rain, ice, snow, graupel, ...) on physics timestep
units m
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%prcpmp
requested GFS_MP_generic_post_run
 gfdl_cloud_microphys_run
 zhaocarr_precpd_run
physics set slow_physics

lwe_thickness_of_explicit_rain_amount

long_name explicit rain on physics timestep
units m
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%rainmp
requested gfdl_cloud_microphys_run
physics set slow_physics

lwe_thickness_of_graupel_amount

long_name	explicit graupel fall on physics timestep
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%graupelmp
requested	GFS_MP_generic_post_run gfdl_cloud_microphys_run
physics set	slow_physics

lwe_thickness_of_graupel_amount_on_dynamics_timestep

long_name	graupel fall at this time step
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%graupel
requested	GFS_MP_generic_post_run
physics set	slow_physics

lwe_thickness_of_ice_amount

long_name	explicit ice fall on physics timestep
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%icemp
requested	GFS_MP_generic_post_run gfdl_cloud_microphys_run
physics set	slow_physics

lwe_thickness_of_ice_amount_on_dynamics_timestep

long_name ice fall at this time step
units m
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%ice
requested GFS_MP_generic_post_run
physics set slow_physics

lwe_thickness_of_moist_convective_adj_precipitation_amount

long_name adjusted moist convective rainfall amount on physics timestep
units m
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%rainmcdadj
requested NOT REQUESTED
physics set

lwe_thickness_of_precipitation_amount_for_coupling

long_name	total rain precipitation
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	IPD_Data(nb)%Coupling%rain_cpl
requested	GFS_MP_generic_post_run GFS_stochastics_run GFS_surface_generic_pre_run
physics set	slow_physics

lwe_thickness_of_precipitation_amount_on_dynamics_timestep

long_name	total rain at this time step
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%rain
requested	GFS_MP_generic_post_run GFS_stochastics_run
physics set	slow_physics

lwe_thickness_of_shallow_convective_precipitation_amount

long_name	shallow convective rainfall amount on physics timestep
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%raincs
requested	samfshalcnv_post_run samfshalcnv_run
physics set	slow_physics

lwe_thickness_of_snow_amount

long_name	explicit snow fall on physics timestep
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%snowmp
requested	GFS_MP_generic_post_run gfdl_cloud_microphys_run
physics set	slow_physics

lwe_thickness_of_snow_amount_for_coupling

long_name	total snow precipitation
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	IPD_Data(nb)%Coupling%snow_cpl
requested	GFS_MP_generic_post_run GFS_stochastics_run GFS_surface_generic_pre_run
physics set	slow_physics

lwe_thickness_of_snow_amount_on_dynamics_timestep

long_name	snow fall at this time step
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%snow
requested	GFS_MP_generic_post_run
physics set	slow_physics

`magnitude_of_perturbation_of_heat_to_momentum_roughness_length_ratio`

long_name	magnitude of perturbation of heat to momentum roughness length ratio
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%pertz
requested	GFS_surface_generic_pre_run
physics set	slow_physics

`magnitude_of_perturbation_of_leaf_area_index`

long_name	magnitude of perturbation of leaf area index
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%pertlai
requested	GFS_surface_generic_pre_run
physics set	slow_physics

`magnitude_of_perturbation_of_momentum_roughness_length`

long_name	magnitude of perturbation of momentum roughness length
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%pertz0
requested	GFS_surface_generic_pre_run
physics set	slow_physics

magnitude_of_perturbation_of_soil_type_b_parameter

long_name	magnitude of perturbation of soil type b parameter
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%pertshc
requested	GFS_surface_generic_pre_run
physics set	slow_physics

magnitude_of_perturbation_of_vegetation_fraction

long_name	magnitude of perturbation of vegetation fraction
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%pertvegf
requested	GFS_surface_generic_pre_run
	lsm_noah_run
physics set	slow_physics

magnitude_of_surface_albedo_perturbation

long_name	magnitude of surface albedo perturbation
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%pertalb
requested	NOT REQUESTED
physics set	

maximum_column_heating_rate

long_name maximum heating rate in column
units K s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%cumabs
requested gwdc_pre_run
 gwdc_run
physics set slow_physics

maximum_critical_relative_humidity

long_name maximum critical relative humidity
units frac
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%rhcmx
requested GFS_suite_interstitial_3_run
physics set slow_physics

maximum_scaling_factor_for_critical_relative_humidity

long_name maximum scaling factor for critical relative humidity
units m2 rad-2
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%dxmax
requested NOT REQUESTED
physics set

maximum_specific_humidity_at_2m

long_name	maximum specific humidity at 2m height
units	kg kg-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%spfhmax
requested	sfc_diag_post_run
physics set	slow_physics

maximum_subgrid_orography

long_name	maximum of subgrid orography
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%elvmax
requested	gwdps_pre_run gwdps_run
physics set	slow_physics

maximum_temperature_at_2m

long_name	max temperature at 2m height
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%tmpmax
requested	sfc_diag_post_run
physics set	slow_physics

maximum_vegetation_area_fraction

long_name max fractional coverage of green vegetation
units frac
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name IPD_Data(nb)%Sfcprop%shdmax
requested lsm_noah_run
 sfc_ex_coef_run
physics set slow_physics

maximum_wind_at_10m

long_name maximum wind speed at 10 m
units m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%wind10mmax
requested sfc_diag_post_run
physics set slow_physics

maximum_x_wind_at_10m

long_name maximum x wind at 10 m
units m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%u10mmax
requested sfc_diag_post_run
physics set slow_physics

maximum_y_wind_at_10m

long_name maximum y wind at 10 m
units m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%v10mmax
requested sfc_diag_post_run
physics set slow_physics

mean_change_over_depth_in_sea_water_temperature

long_name mean of dT(z) (zsea1 to zsea2)
units K
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%dtzm
requested sfc_nst_post_run
physics set slow_physics

mean_effective_radius_for_ice_cloud

long_name mean effective radius for ice cloud
units micron
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%clouds(:, :, 5)
requested GFS_rrtmg_pre_run
rrtmg_lw_run
rrtmg_sw_run
physics set slow_physics

mean_effective_radius_for_liquid_cloud

long_name	mean effective radius for liquid cloud
units	micron
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%clouds(:, :, 3)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

mean_effective_radius_for_rain_drop

long_name	mean effective radius for rain drop
units	micron
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%clouds(:, :, 7)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

mean_effective_radius_for_snow_flake

long_name	mean effective radius for snow flake
units	micron
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%clouds(:, :, 9)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

minimum_scaling_factor_for_critical_relative_humidity

long_name	minimum scaling factor for critical relative humidity
units	m2 rad-2
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%dxmin
requested	GFS_suite_interstitial_1_run
physics set	slow_physics

minimum_specific_humidity_at_2m

long_name	minimum specific humidity at 2m height
units	kg kg-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%spfhmin
requested	sfc_diag_post_run
physics set	slow_physics

minimum_temperature_at_2m

long_name	min temperature at 2m height
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%tmpmin
requested	sfc_diag_post_run
physics set	slow_physics

minimum_vegetation_area_fraction

long_name	min fractional coverage of green vegetation
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%shdmin
requested	lsm_noah_run
physics set	slow_physics

model_layer_number_at_cloud_base

long_name	vertical indices for low, middle and high cloud bases
units	index
rank	2
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%mbota
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run
physics set	slow_physics

model_layer_number_at_cloud_top

long_name vertical indices for low, middle and high cloud tops
units index
rank 2
type integer
kind
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%mtopa
requested GFS_rrtmg_post_run
 GFS_rrtmg_pre_run
physics set slow_physics

momentum_transport_reduction_factor_pgf_deep_convection

long_name reduction factor in momentum transport due to deep conv. induced pressure gradient force
units frac
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%pgcon_deep
requested samfdeepcnv_run
physics set slow_physics

momentum_transport_reduction_factor_pgf_shallow_convection

long_name reduction factor in momentum transport due to shal conv. induced pressure gradient force
units frac
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%pgcon_shal
requested samfshalcnv_run
physics set slow_physics

mpi_comm

long_name	MPI communicator
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%communicator
requested	memcheck_run
physics set	slow_physics

mpi_rank

long_name	current MPI-rank
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%me
requested	GFS_rrtmg_setup_init GFS_rrtmg_setup_run gfdl_cloud_microphys_init gwdps_run h2ophys_run lsm_noah_init memcheck_run ozphys_run
physics set	slow_physics

mpi_root

long_name	master MPI-rank
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%master
requested	gfdl_cloud_microphys_init
	memcheck_run
physics set	slow_physics

mpi_size

long_name	number of MPI tasks in communicator
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%ntasks
requested	memcheck_run
physics set	slow_physics

multiplication_factors_for_convective_gravity_wave_drag

long_name	multiplication factor for convective GWD
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%cgwf
requested	gwdc_pre_run
physics set	slow_physics

multiplication_factors_for_mountain_blocking_and_orographic_gravity_wave_drag

long_name	multiplication factors for cdmf and gwd
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%cdmbgwd
requested	gwdps_run
physics set	slow_physics

namelist_filename

long_name	namelist filename
units	none
rank	0
type	character
kind	len=64
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%fn_nml
requested	gfdl_cloud_microphys_init
physics set	slow_physics

namelist_filename_for_internal_file_reads

long_name	namelist filename for internal file reads
units	none
rank	1
type	character
kind	len=256
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%input_nml_file
requested	gfdl_cloud_microphys_init
physics set	slow_physics

natural_log_of_h2o_forcing_data_pressure_levels

long_name	natural log of h2o forcing data pressure levels
units	log(Pa)
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%h2o_pres
requested	h2ophys_run
physics set	slow_physics

natural_log_of_ozone_forcing_data_pressure_levels

long_name	natural log of ozone forcing data pressure levels
units	log(Pa)
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%oz_pres
requested	ozphys_run
physics set	slow_physics

nonnegative_lwe_thickness_of_precipitation_amount_on_dynamics_timestep

long_name	total precipitation amount in each time step
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%tprcp
requested	GFS_MP_generic_post_run GFS_stochastics_run lsm_noah_run sfc_nst_run sfc_sice_run
physics set	slow_physics

normalized_soil_wetness

long_name	normalized soil wetness
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%wet1
requested	lsm_noah_run
physics set	slow_physics

number_of_3d_arrays_associated_with_pdf-based_clouds

long_name	number of 3d arrays associated with pdf based clouds/mp
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%npdf3d
requested	GFS_DCNV_generic_post_run GFS_rrtmg_setup_init samfshalcnv_post_run
physics set	slow_physics

number_of_cloud_condensate_types

long_name	number of cloud condensate types
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%ncnd
requested	NOT REQUESTED
physics set	

number_of_coefficients_in_h2o_forcing_data

long_name	number of coefficients in h2o forcing data
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%h2o_coeff
requested	h2ophys_run
physics set	slow_physics

number_of_coefficients_in_ozone_forcing_data

long_name	number of coefficients in ozone forcing data
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%oz_coeff
requested	ozphys_run
physics set	slow_physics

number_of_convective_3d_cloud_fields

long_name	number of convective 3d clouds fields
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%ncnvcld3d
requested	GFS_DCNV_generic_post_run samfshalcnv_post_run
physics set	slow_physics

number_of_equatorial_longitude_points

long_name	number of global points in x-dir (i) along the equator
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%lonr
requested	gwdps_run
physics set	slow_physics

number_of_ghost_zones

long_name	number of ghost zones defined in fv_mp
units	count
rank	0
type	integer
kind	
source	MODULE fv_arrays_mod TYPE fv_atmos_type
local_name	Atm(mytile)%ng
requested	fv_sat_adj_run
physics set	fast_physics

number_of_hydrometeors

long_name	choice of cloud scheme / number of hydrometeors
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%ncl
requested	GFS_MP_generic_post_run samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

number_of_statistical_measures_of_subgrid_orography

long_name	number of topographic variables in GWD
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%nmtvr
requested	gwdps_pre_run gwdps_run
physics set	slow_physics

number_of_surface_perturbations

long_name	number of surface perturbations
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%nsfcpert
requested	GFS_surface_generic_pre_run
physics set	slow_physics

number_of_total_tracers

long_name	total number of tracers
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%tracers_total
requested	GFS_suite_interstitial_4_run
physics set	slow_physics

number_of_tracers

long_name	number of tracers
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%ntrac
requested	GFS_MP_generic_post_run GFS_MP_generic_pre_run GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run GFS_suite_stateout_reset_run GFS_suite_stateout_update_run
physics set	slow_physics

number_of_tracers_for_CS

long_name	number of convectively transported tracers in Chikira-Sugiyama deep conv. scheme
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%ncstrac
requested	NOT REQUESTED
physics set	

number_of_tracers_for_cloud_condensate

long_name	number of tracers for cloud condensate
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%nncl
requested	GFS_MP_generic_post_run GFS_MP_generic_pre_run
physics set	slow_physics

number_of_tracers_for_convective_transport

long_name	number of tracers for convective transport
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%nn
requested	GFS_SCNV_generic_post_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run
physics set	slow_physics

number_of_tracers_for_samf

long_name	number of tracers for scale-aware mass flux schemes
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%nsamftrac
requested	samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

number_of_vertical_diffusion_tracers

long_name	number of tracers to diffuse vertically
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%nvdiff
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run hedmf_run
physics set	slow_physics

number_of_vertical_layers_for_radiation_calculations

long_name	number of vertical levels for radiation calculations
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%levr
requested	GFS_rrtmg_setup_init
	rayleigh_damp_run
physics set	slow_physics

number_of_water_tracers

long_name	number of water-related tracers
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%tracers_water
requested	NOT REQUESTED
physics set	

ocean_mixed_layer_thickness

long_name	mixed layer thickness
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%zm
requested	sfc_nst_run
physics set	slow_physics

omega

long_name	layer mean vertical velocity
units	Pa s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	IPD_Data(nb)%Statein%vvl
requested	gfdl_cloud_microphys_run samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

omp_threads

long_name	number of OpenMP threads available for physics schemes
units	count
rank	0
type	integer
kind	
source	MODULE CCPP_typedefs TYPE CCPP_shared_type
local_name	CCPP_shared(nt)%nthreads
requested	GFS_diagtoscreen_run GFS_interstitialtoscreen_run fv_sat_adj_run memcheck_run stochastic_physics_init stochastic_physics_run
physics set	fast_physics slow_physics

orography

long_name	orography
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%oro
requested	sfc_nst_post_run sfc_nst_pre_run
physics set	slow_physics

orography_unfiltered

long_name	unfiltered orography
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%oro_uf
requested	sfc_nst_post_run sfc_nst_pre_run
physics set	slow_physics

ozone_concentration_at_layer_for_radiation

long_name	ozone concentration layer
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%olyr
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

ozone_concentration_updated_by_physics

long_name	ozone concentration updated by physics
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_stateout_type
local_name	IPD_Data(nb)%Stateout%gq0(:, :, IPD_Control%ntoz)
requested	ozphys_run
physics set	slow_physics

ozone_forcing

long_name	ozone forcing data
units	various
rank	3
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	IPD_Data(nb)%Tbd%ozpl
requested	ozphys_run
physics set	slow_physics

ozone_mixing_ratio

long_name	ozone mixing ratio
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	IPD_Data(nb)%Statein%qgrs(:, :, IPD_Control%ntoz)
requested	GFS_PBL_generic_pre_run
physics set	slow_physics

perturbation_of_heat_to_momentum_roughness_length_ratio

long_name	perturbation of heat to momentum roughness length ratio
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%zt1d
requested	GFS_surface_generic_pre_run
	sfc_ex_coef_run
physics set	slow_physics

perturbation_of_leaf_area_index

long_name	perturbation of leaf area index
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%xlai1d
requested	GFS_surface_generic_pre_run
	lsm_noah_run
physics set	slow_physics

perturbation_of_momentum_roughness_length

long_name	perturbation of momentum roughness length
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%z01d
requested	GFS_surface_generic_pre_run
	sfc_ex_coef_run
physics set	slow_physics

perturbation_of_soil_type_b_parameter

long_name	perturbation of soil type "b" parameter
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%bexp1d
requested	GFS_surface_generic_pre_run
	lsm_noah_run
physics set	slow_physics

perturbation_of_vegetation_fraction

long_name	perturbation of vegetation fraction
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%veg1d
requested	GFS_surface_generic_pre_run
	lsm_noah_run
physics set	slow_physics

pi

long_name	ratio of a circle's circumference to its diameter
units	radians
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_pi
requested	GFS_suite_interstitial_4_run
	gwdc_run
physics set	slow_physics

pressure_at_bottom_of_convective_cloud

long_name	convective cloud bottom pressure
units	Pa
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_cldprop_type
local_name	IPD_Data(nb)%Cldprop%cvb
requested	cnvc90_run
physics set	slow_physics

pressure_at_top_of_convective_cloud

long_name	convective cloud top pressure
units	Pa
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_cldprop_type
local_name	IPD_Data(nb)%Cldprop%cvt
requested	cnvc90_run
physics set	slow_physics

pressure_cutoff_for_rayleigh_damping

long_name	pressure level from which Rayleigh Damping is applied
units	Pa
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%prslrd0
requested	rayleigh_damp_run
physics set	slow_physics

pressure_thickness_at_Lagrangian_surface

long_name	pressure thickness at Lagrangian surface
units	Pa
rank	3
type	real
kind	
source	MODULE fv_arrays_mod TYPE fv_atmos_type
local_name	Atm(mytile)%delp
requested	fv_sat_adj_run
physics set	fast_physics

radar_reflectivity_10cm

long_name	instantaneous refl_10cm
units	dBZ
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%refl_10cm
requested	NOT REQUESTED
physics set	

rain_conversion_parameter_deep_convection

long_name	convective rain conversion parameter for deep conv.
units	m-1
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%c0s_deep
requested	samfdeepcnv_run
physics set	slow_physics

rain_conversion_parameter_shallow_convection

long_name	convective rain conversion parameter for shal conv.
units	m-1
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%c0s_shal
requested	samfshalcnv_run
physics set	slow_physics

rain_evaporation_coefficient_deep_convection

long_name	convective rain evaporation coefficient for deep conv.
units	frac
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%evfact_deep
requested	samfdeepcnv_run
physics set	slow_physics

rain_evaporation_coefficient_over_land_deep_convection

long_name convective rain evaporation coefficient over land for deep conv.
units frac
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name IPD_Control%evfactl_deep
requested samfdeepcnv_run
physics set slow_physics

rain_number_concentration

long_name number concentration of rain
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name IPD_Data(nb)%Statein%qgrs(:, :, IPD_Control%ntrnc)
requested NOT REQUESTED
physics set

rain_number_concentration_updated_by_physics

long_name number concentration of rain updated by physics
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name IPD_Data(nb)%Stateout%gq0(:, :, IPD_Control%ntrnc)
requested NOT REQUESTED
physics set

rain_water_mixing_ratio

long_name moist (dry+vapor, no condensates) mixing ratio of rain water
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name IPD_Data(nb)%Statein%qgrs(:, :, IPD_Control%ntrw)
requested GFS_PBL_generic_pre_run
physics set slow_physics

rain_water_mixing_ratio_updated_by_physics

long_name moist (dry+vapor, no condensates) mixing ratio of rain water updated by physics
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name IPD_Data(nb)%Stateout%gq0(:, :, IPD_Control%ntrw)
requested gfdl_cloud_microphys_run
physics set slow_physics

random_number_array

long_name random number array (0-1)
units none
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name IPD_Data(nb)%Tbd%rann
requested GFS_MP_generic_post_run
physics set slow_physics

ratio_of_dry_air_to_water_vapor_gas_constants

long_name	rd/rv
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_eps
requested	samfdeepcnv_run samfshalcnv_run sfc_diag_post_run sfc_diag_run
physics set	slow_physics

ratio_of_dry_air_to_water_vapor_gas_constants_minus_one

long_name	(rd/rv) - 1
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_epsm1
requested	samfdeepcnv_run samfshalcnv_run sfc_diag_post_run sfc_diag_run
physics set	slow_physics

ratio_of_exner_function_between_midlayer_and_interface_at_lowest_model_layer

long_name	Exner function ratio bt midlayer and interface at 1st layer
units	ratio
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%work3
requested	GFS_surface_generic_pre_run lsm_noah_run sfc_diag_run sfc_ex_coef_run sfc_nst_run sfc_sice_run
physics set	slow_physics

ratio_of_snowfall_to_rainfall

long_name	snow ratio: ratio of snow to total precipitation
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%sr
requested	gfdl_cloud_microphys_run zhaocarr_precpd_run
physics set	slow_physics

ratio_of_vapor_to_dry_air_gas_constants_minus_one

long_name	(rv/rd) - 1 (rv = ideal gas constant for water vapor)
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_fvirt
requested	gfdl_cloud_microphys_run gwdc_run samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

ratio_of_vapor_to_dry_air_gas_constants_minus_one_default_kind

long_name	zvir=rv/rd-1.0
units	none
rank	0
type	real
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%zvir
requested	fv_sat_adj_run
physics set	fast_physics

ratio_of_wind_at_lowest_model_layer_and_wind_at_10m

long_name	ratio of sigma level 1 wind and 10m wind
units	ratio
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%f10m
requested	sfc_diag_run
physics set	slow_physics

sea_ice_concentration

long_name	ice fraction over open water
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%fice
requested	sfc_sice_post_run sfc_sice_run
physics set	slow_physics

sea_ice_temperature

long_name	sea ice surface skin temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%tisfc
requested	sfc_sice_post_run sfc_sice_run
physics set	slow_physics

sea_ice_thickness

long_name	sea ice thickness
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%hice
requested	sfc_sice_post_run
	sfc_sice_run
physics set	slow_physics

sea_land_ice_mask

long_name	sea/land/ice mask (=0/1/2)
units	flag
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%islmsk
requested	GFS_suite_interstitial_1_run GFS_suite_interstitial_3_run GFS_surface_generic_post_run GFS_surface_generic_pre_run GFS_surface_loop_control_part2_run lsm_noah_run samfdeepcnv_run samfshalcnv_run sfc_ex_coef_run sfc_nst_post_run sfc_nst_pre_run sfc_nst_run sfc_sice_post_run sfc_sice_run
physics set	slow_physics

sea_land_ice_mask_real

long_name landmask: sea/land/ice=0/1/2
units flag
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name IPD_Data(nb)%Sfcprop%slmsk
requested sfc_nst_post_run
physics set slow_physics

sea_surface_reference_temperature

long_name sea surface reference temperature
units K
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name IPD_Data(nb)%Sfcprop%tref
requested sfc_nst_post_run
 sfc_nst_run
physics set slow_physics

sea_water_salinity

long_name salinity content in diurnal thermocline layer
units ppt m
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name IPD_Data(nb)%Sfcprop%xs
requested sfc_nst_run
physics set slow_physics

seconds_elapsed_since_model_initialization

long_name	seconds elapsed since model initialization
units	s
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%sec
requested	NOT REQUESTED
physics set	

seed_random_numbers_lw

long_name	random seeds for sub-column cloud generators lw
units	none
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	IPD_Data(nb)%Tbd%icsdlw
requested	rrtmg_lw_run
physics set	slow_physics

seed_random_numbers_sw

long_name	random seeds for sub-column cloud generators sw
units	none
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	IPD_Data(nb)%Tbd%icsdsw
requested	rrtmg_sw_run
physics set	slow_physics

sensible_heat_flux_due_to_rainfall

long_name	sensible heat flux due to rainfall
units	W
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%qrain
requested	sfc_nst_run
physics set	slow_physics

sensitivity_of_dtl_heat_content_to_surface_temperature

long_name	$d(xt)/d(ts)$
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%xtts
requested	sfc_nst_run
physics set	slow_physics

sensitivity_of_dtl_thickness_to_surface_temperature

long_name	$d(xz)/d(ts)$
units	m K-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%xzts
requested	sfc_nst_run
physics set	slow_physics

sine_of_latitude

long_name	sine of latitude
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_grid_type
local_name	IPD_Data(nb)%Grid%sinlat
requested	dcyc2t3_run sfc_nst_run
physics set	slow_physics

sine_of_solar_declination_angle

long_name	sin of the solar declination angle
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%sdec
requested	GFS_rrtmg_setup_run dcyc2t3_run
physics set	slow_physics

slope_of_subgrid_orography

long_name	slope of subgrid orography
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%sigma
requested	gwdps_pre_run gwdps_run
physics set	slow_physics

smallest_cloud_base_vertical_index_encountered_thus_far

long_name	smallest cloud base vertical index encountered thus far
units	index
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	IPD_Data(nb)%Tbd%acvb
requested	cnvc90_run
physics set	slow_physics

snow_deposition_sublimation_upward_latent_heat_flux

long_name	latent heat flux from snow depo/subl
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%sbsno
requested	GFS_surface_generic_post_run lsm_noah_pre_run lsm_noah_run
physics set	slow_physics

snow_freezing_rain_upward_latent_heat_flux

long_name	latent heat flux due to snow and frz rain
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%snohf
requested	GFS_surface_generic_post_run lsm_noah_pre_run lsm_noah_run
physics set	slow_physics

snow_number_concentration

long_name number concentration of snow
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name IPD_Data(nb)%Statein%qgrs(:, :, IPD_Control%ntsnc)
requested NOT REQUESTED
physics set

snow_number_concentration_updated_by_physics

long_name number concentration of snow updated by physics
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name IPD_Data(nb)%Stateout%gq0(:, :, IPD_Control%ntsnc)
requested NOT REQUESTED
physics set

snow_temperature_bottom_first_layer

long_name snow temperature at the bottom of the first soil layer
units K
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name IPD_Data(nb)%Sfcprop%tsnow
requested NOT REQUESTED
physics set

snow_water_mixing_ratio

long_name moist (dry+vapor, no condensates) mixing ratio of snow water
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name IPD_Data(nb)%Statein%qgrs(:, :, IPD_Control%ntsw)
requested GFS_PBL_generic_pre_run
physics set slow_physics

snow_water_mixing_ratio_updated_by_physics

long_name moist (dry+vapor, no condensates) mixing ratio of snow water updated by physics
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name IPD_Data(nb)%Stateout%gq0(:, :, IPD_Control%ntsw)
requested gfdl_cloud_microphys_run
physics set slow_physics

soil_moisture_content

long_name soil moisture
units kg m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%soilm
requested lsm_noah_run
physics set slow_physics

soil_temperature

long_name soil temperature
units K
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name IPD_Data(nb)%Sfcprop%stc
requested lsm_noah_run
 sfc_sice_run
physics set slow_physics

soil_temperature_for_land_surface_model

long_name soil temperature for land surface model
units K
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name IPD_Data(nb)%Sfcprop%tslb
requested NOT REQUESTED
physics set

soil_type_classification

long_name soil type at each grid cell
units index
rank 1
type integer
kind
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%soiltype
requested GFS_surface_generic_pre_run
 lsm_noah_run
physics set slow_physics

soil_type_classification_real

long_name	soil type for lsm
units	index
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%stype
requested	GFS_surface_generic_pre_run
physics set	slow_physics

soil_type_dataset_choice

long_name	soil type dataset choice
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%isot
requested	GFS_surface_generic_pre_run
	lsm_noah_init
	lsm_noah_run
physics set	slow_physics

soil_upward_latent_heat_flux

long_name	soil upward latent heat flux
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%evbs
requested	GFS_surface_generic_post_run lsm_noah_pre_run lsm_noah_run
physics set	slow_physics

soil_vertical_dimension

long_name	number of soil layers
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%lsoil
requested	lsm_noah_post_run lsm_noah_pre_run lsm_noah_run sfc_nst_run sfc_sice_run
physics set	slow_physics

soil_vertical_dimension_for_land_surface_model

long_name	number of soil layers for land surface model
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%lsoil_lsm
requested	NOT REQUESTED
physics set	

solar_constant

long_name	solar constant (sun-earth distant adjusted)
units	W m-2
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%solcon
requested	GFS_rrtmg_setup_run
	rrtmg_sw_run
physics set	slow_physics

specific_heat_of_dry_air_at_constant_pressure

long_name	specific heat of dry air at constant pressure
units	J kg ⁻¹ K ⁻¹
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_cp
requested	gwdc_post_run gwdc_run gwdps_run rayleigh_damp_run samfdeepcnv_run samfshalcnv_run sfc_diag_run
physics set	slow_physics

specific_heat_of_liquid_water_at_constant_pressure

long_name	specific heat of liquid water at constant pressure
units	J kg ⁻¹ K ⁻¹
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_cliq
requested	samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

specific_heat_of_water_vapor_at_constant_pressure

long_name	specific heat of water vapor at constant pressure
units	J kg ⁻¹ K ⁻¹
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_cvap
requested	samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

specific_humidity_at_2m

long_name	2 meter specific humidity
units	kg kg ⁻¹
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%q2m
requested	GFS_surface_generic_post_run sfc_diag_post_run sfc_diag_run
physics set	slow_physics

standard_deviation_of_subgrid_orography

long_name	standard deviation of subgrid orography
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%hprime1
requested	gwdps_pre_run gwdps_run
physics set	slow_physics

start_index_of_other_tracers

long_name	beginning index of the non-water tracer species
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%tracers_start_index
requested	NOT REQUESTED
physics set	

starting_x_direction_index

long_name	starting X direction index
units	count
rank	0
type	integer
kind	
source	MODULE fv_arrays_mod TYPE fv_atmos_type
local_name	Atm(mytile)%bd%is
requested	fv_sat_adj_run
physics set	fast_physics

starting_x_direction_index_domain

long_name	starting X direction index for domain
units	count
rank	0
type	integer
kind	
source	MODULE fv_arrays_mod TYPE fv_atmos_type
local_name	Atm(mytile)%bd%isd
requested	fv_sat_adj_run
physics set	fast_physics

starting_y_direction_index

long_name	starting Y direction index
units	count
rank	0
type	integer
kind	
source	MODULE fv_arrays_mod TYPE fv_atmos_type
local_name	Atm(mytile)%bd%js
requested	fv_sat_adj_run
physics set	fast_physics

starting_y_direction_index_domain

long_name	starting X direction index for domain
units	count
rank	0
type	integer
kind	
source	MODULE fv_arrays_mod TYPE fv_atmos_type
local_name	Atm(mytile)%bd%jsd
requested	fv_sat_adj_run
physics set	fast_physics

statistical_measures_of_subgrid_orography

long_name	orographic metrics
units	various
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%hprime
requested	gwdps_pre_run
physics set	slow_physics

sub-layer_cooling_amount

long_name	sub-layer cooling amount
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%dt_cool
requested	sfc_nst_post_run
	sfc_nst_run
physics set	slow_physics

sub-layer_cooling_thickness

long_name	sub-layer cooling thickness
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%z_c
requested	sfc_nst_post_run
	sfc_nst_run
physics set	slow_physics

subsurface_runoff_flux

long_name	subsurface runoff flux
units	g m-2 s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%drain
requested	GFS_surface_generic_post_run lsm_noah_post_run lsm_noah_pre_run lsm_noah_run
physics set	slow_physics

surface_air_pressure

long_name	surface pressure
units	Pa
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	IPD_Data(nb)%Statein%pgr
requested	GFS_surface_generic_post_run lsm_noah_run rayleigh_damp_run samfdeepcnv_run samfshalcnv_run sfc_diag_post_run sfc_diag_run sfc_ex_coef_run sfc_nst_run sfc_sice_run zhaocarr_gscond_run
physics set	slow_physics

surface_air_pressure_at_previous_time_step

long_name	surface air pressure at previous time step
units	Pa
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	IPD_Data(nb)%Tbd%phy_f2d(:,2)
requested	zhaocarr_gscond_run
physics set	slow_physics

surface_air_pressure_two_time_steps_back

long_name	surface air pressure two time steps back
units	Pa
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	IPD_Data(nb)%Tbd%phy_f2d(:,1)
requested	zhaocarr_gscond_run
physics set	slow_physics

surface_air_temperature_for_radiation

long_name	lowest model layer air temperature for radiation
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%tsfa
requested	GFS_rrtmg_pre_run rrtmg_lw_post_run rrtmg_lw_pre_run rrtmg_sw_pre_run
physics set	slow_physics

surface_albedo_due_to_UV_and_VIS_diffused

long_name surface albedo due to UV+VIS diffused beam
units frac
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%sfcalb(:,4)
requested rrtmg_sw_post_run
 rrtmg_sw_pre_run
 rrtmg_sw_run
physics set slow_physics

surface_albedo_due_to_UV_and_VIS_direct

long_name surface albedo due to UV+VIS direct beam
units frac
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%sfcalb(:,3)
requested rrtmg_sw_post_run
 rrtmg_sw_pre_run
 rrtmg_sw_run
physics set slow_physics

surface_albedo_due_to_near_IR_diffused

long_name surface albedo due to near IR diffused beam
units frac
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%sfcalb(:,2)
requested rrtmg_sw_post_run
 rrtmg_sw_pre_run
 rrtmg_sw_run
physics set slow_physics

surface_albedo_due_to_near_IR_direct

long_name surface albedo due to near IR direct beam
units frac
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%sfcalb(:,1)
requested rrtmg_sw_post_run
 rrtmg_sw_pre_run
 rrtmg_sw_run
physics set slow_physics

surface_albedo_perturbation

long_name surface albedo perturbation
units frac
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%alb1d
requested GFS_rrtmg_pre_run
 rrtmg_sw_pre_run
physics set slow_physics

surface_condensation_mass

long_name surface condensation mass
units kg m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name IPD_Data(nb)%Sfcprop%cndm_surf
requested NOT REQUESTED
physics set

surface_diffused_shortwave_albedo

long_name mean surface diffused sw albedo
units frac
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_radtend_type
local_name IPD_Data(nb)%Radtend%sfalb
requested lsm_noah_run
physics set slow_physics

surface_downwelling_diffuse_near_infrared_shortwave_flux

long_name surface downwelling diffuse near-infrared shortwave flux at current time
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%adjnirdfd
requested GFS_surface_generic_post_run
dcyc2t3_run
physics set slow_physics

surface_downwelling_diffuse_near_infrared_shortwave_flux_on_radiation_time_step

long_name sfc nir diff sw downward flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%nirdfdi
requested dcyc2t3_run
physics set slow_physics

surface_downwelling_diffuse_ultraviolet_and_visible_shortwave_flux

long_name surface downwelling diffuse ultraviolet plus visible shortwave flux at current time
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%adjvisdfd
requested GFS_surface_generic_post_run
dcyc2t3_run
physics set slow_physics

surface_downwelling_diffuse_ultraviolet_and_visible_shortwave_flux_on_radiation_time_step

long_name sfc uv+vis diff sw downward flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%visdfdi
requested dcyc2t3_run
physics set slow_physics

surface_downwelling_direct_near_infrared_shortwave_flux

long_name surface downwelling beam near-infrared shortwave flux at current time
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%adjnirbmd
requested GFS_surface_generic_post_run
dcyc2t3_run
physics set slow_physics

surface_downwelling_direct_near_infrared_shortwave_flux_on_radiation_time_step

long_name sfc nir beam sw downward flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%nirbmdi
requested dcyc2t3_run
physics set slow_physics

surface_downwelling_direct_ultraviolet_and_visible_shortwave_flux

long_name surface downwelling beam ultraviolet plus visible shortwave flux at current time
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%adjvisbmd
requested GFS_surface_generic_post_run
 dcyc2t3_run
physics set slow_physics

surface_downwelling_direct_ultraviolet_and_visible_shortwave_flux_on_radiation_time_step

long_name sfc uv+vis beam sw downward flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%visbmdi
requested dcyc2t3_run
physics set slow_physics

surface_downwelling_longwave_flux

long_name surface downwelling longwave flux at current time
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%dlwsfci
requested GFS_suite_interstitial_2_run
 GFS_surface_generic_post_run
 GFS_surface_generic_pre_run
 dcyc2t3_run
physics set slow_physics

surface_downwelling_longwave_flux_absorbed_by_ground

long_name total sky surface downward longwave flux absorbed by the ground
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%gabsbdlw
requested GFS_surface_generic_pre_run
 lsm_noah_run
 sfc_nst_run
 sfc_sice_run
physics set slow_physics

surface_downwelling_longwave_flux_on_radiation_time_step

long_name	total sky sfc downward lw flux
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	IPD_Data(nb)%Coupling%sfcdlw
requested	dcyc2t3_run
physics set	slow_physics

surface_downwelling_shortwave_flux

long_name	surface downwelling shortwave flux at current time
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%dswsfci
requested	GFS_suite_interstitial_2_run GFS_surface_generic_post_run dcyc2t3_post_run dcyc2t3_run lsm_noah_run sfc_sice_run
physics set	slow_physics

surface_downwelling_shortwave_flux_on_radiation_time_step

long_name total sky sfc downward sw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%sfcdsw
requested dcyc2t3_run
physics set slow_physics

surface_drag_coefficient_for_heat_and_moisture_in_air

long_name surface exchange coeff heat moisture
units none
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%cdq
requested lsm_noah_run
 sfc_ex_coef_run
 sfc_nst_run
 sfc_sice_run
physics set slow_physics

surface_drag_coefficient_for_momentum_in_air

long_name	surface exchange coeff for momentum
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%cd
requested	lsm_noah_run sfc_ex_coef_run sfc_nst_run sfc_sice_run
physics set	slow_physics

surface_drag_mass_flux_for_heat_and_moisture_in_air

long_name	thermal exchange coefficient
units	kg m-2 s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%chh
requested	lsm_noah_run sfc_nst_run sfc_sice_run
physics set	slow_physics

surface_drag_wind_speed_for_momentum_in_air

long_name momentum exchange coefficient
units m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%cmm
requested lsm_noah_run
sfc_nst_run
sfc_sice_run
physics set slow_physics

surface_friction_velocity

long_name boundary layer parameter
units m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name IPD_Data(nb)%Sfcprop%uustar
requested sfc_ex_coef_run
physics set slow_physics

surface_geopotential_at_Lagrangian_surface

long_name surface geopotential at Lagrangian surface
units m² s⁻²
rank 2
type real
kind
source MODULE fv_arrays_mod TYPE fv_atmos_type
local_name Atm(mytile)%phis
requested fv_sat_adj_run
physics set fast_physics

surface_ground_temperature_for_radiation

long_name	surface ground temperature for radiation
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%tsfg
requested	GFS_rrtmg_pre_run rrtmg_lw_pre_run rrtmg_lw_run rrtmg_sw_pre_run
physics set	slow_physics

surface_longwave_emissivity

long_name	surface lw emissivity in fraction
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_radtend_type
local_name	IPD_Data(nb)%Radtend%semis
requested	GFS_surface_generic_pre_run dcyc2t3_run lsm_noah_run rrtmg_lw_run sfc_nst_run sfc_sice_run
physics set	slow_physics

surface_midlayer_air_temperature_in_longwave_radiation

long_name	surface air temp during lw calculation
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_radtend_type
local_name	IPD_Data(nb)%Radtend%tsflw
requested	dcyc2t3_run
physics set	slow_physics

surface_net_downwelling_shortwave_flux

long_name	surface net downwelling shortwave flux at current time
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%nswsfci
requested	dcyc2t3_post_run dcyc2t3_run lsm_noah_run sfc_nst_run sfc_sice_run
physics set	slow_physics

surface_net_downwelling_shortwave_flux_on_radiation_time_step

long_name	total sky sfc netsw flx into ground
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	IPD_Data(nb)%Coupling%sfcns
requested	dcyc2t3_run
physics set	slow_physics

surface_roughness_length

long_name	surface roughness length
units	cm
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%zorl
requested	hedmf_run lsm_noah_run sfc_ex_coef_run
physics set	slow_physics

surface_runoff

long_name surface water runoff (from lsm)
units kg m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%srunoff
requested GFS_surface_generic_post_run
 lsm_noah_post_run
physics set slow_physics

surface_runoff_flux

long_name surface runoff flux
units g m-2 s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%runoff
requested GFS_surface_generic_post_run
 lsm_noah_post_run
 lsm_noah_pre_run
 lsm_noah_run
physics set slow_physics

surface_skin_temperature

long_name	surface skin temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%tsfc
requested	GFS_MP_generic_post_run GFS_surface_generic_post_run GFS_surface_generic_pre_run dcyc2t3_run hedmf_run lsm_noah_run sfc_diag_run sfc_ex_coef_run sfc_nst_post_run sfc_nst_pre_run sfc_sice_post_run sfc_sice_run
physics set	slow_physics

surface_skin_temperature_after_iteration

long_name	surface skin temperature after iteration
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%tsurf
requested	GFS_surface_generic_pre_run lsm_noah_run sfc_ex_coef_run sfc_nst_post_run sfc_nst_pre_run sfc_nst_run
physics set	slow_physics

surface_skin_temperature_for_nsst

long_name	ocean surface skin temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%tseal
requested	sfc_nst_pre_run sfc_nst_run
physics set	slow_physics

surface_slope_classification

long_name	surface slope type at each grid cell
units	index
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%sloptype
requested	GFS_surface_generic_pre_run
	lsm_noah_run
physics set	slow_physics

surface_slope_classification_real

long_name	sfc slope type for lsm
units	index
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%slope
requested	GFS_surface_generic_pre_run
physics set	slow_physics

surface_snow_area_fraction

long_name	surface snow area fraction
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%snowc
requested	GFS_surface_generic_post_run lsm_noah_pre_run lsm_noah_run
physics set	slow_physics

surface_snow_area_fraction_for_diagnostics

long_name	surface snow area fraction
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%sncovr
requested	lsm_noah_run
physics set	slow_physics

surface_snow_melt

long_name	snow melt during timestep
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%snowmt
requested	sfc_sice_run
physics set	slow_physics

surface_snow_thickness_water_equivalent

long_name	water equivalent snow depth over land
units	mm
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%snowd
requested	lsm_noah_run sfc_ex_coef_run sfc_sice_run
physics set	slow_physics

surface_specific_humidity

long_name	surface air saturation specific humidity
units	kg kg-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%qss
requested	lsm_noah_run sfc_diag_run sfc_nst_run sfc_sice_run
physics set	slow_physics

surface_upward_potential_latent_heat_flux

long_name surface upward potential latent heat flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%ep1d
requested GFS_surface_generic_post_run
 lsm_noah_run
 sfc_nst_run
 sfc_sice_run
physics set slow_physics

surface_upwelling_diffuse_near_infrared_shortwave_flux

long_name surface upwelling diffuse near-infrared shortwave flux at current time
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%adjnirdfu
requested GFS_surface_generic_post_run
 dcyc2t3_run
physics set slow_physics

surface_upwelling_diffuse_near_infrared_shortwave_flux_on_radiation_time_step

long_name sfc nir diff sw upward flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%nirdfui
requested dcyc2t3_run
physics set slow_physics

surface_upwelling_diffuse_ultraviolet_and_visible_shortwave_flux

long_name surface upwelling diffuse ultraviolet plus visible shortwave flux at current time
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%adjvisdfu
requested GFS_surface_generic_post_run
dcyc2t3_run
physics set slow_physics

surface_upwelling_diffuse_ultraviolet_and_visible_shortwave_flux_on_radiation_time_step

long_name sfc uv+vis diff sw upward flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%visdfui
requested dcyc2t3_run
physics set slow_physics

surface_upwelling_direct_near_infrared_shortwave_flux

long_name surface upwelling beam near-infrared shortwave flux at current time
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%adjnirbmu
requested GFS_surface_generic_post_run
dcyc2t3_run
physics set slow_physics

surface_upwelling_direct_near_infrared_shortwave_flux_on_radiation_time_step

long_name sfc nir beam sw upward flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%nirbmui
requested dcyc2t3_run
physics set slow_physics

surface_upwelling_direct_ultraviolet_and_visible_shortwave_flux

long_name surface upwelling beam ultraviolet plus visible shortwave flux at current time
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%adjvisbmu
requested GFS_surface_generic_post_run
dcyc2t3_run
physics set slow_physics

surface_upwelling_direct_ultraviolet_and_visible_shortwave_flux_on_radiation_time_step

long_name sfc uv+vis beam sw upward flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%visbmui
requested dcyc2t3_run
physics set slow_physics

surface_upwelling_longwave_flux

long_name surface upwelling longwave flux at current time
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%ulwsfci
requested GFS_suite_interstitial_2_run
GFS_surface_generic_post_run
dcyc2t3_run
physics set slow_physics

surface_upwelling_shortwave_flux

long_name surface upwelling shortwave flux at current time
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%uswsfci
requested dcyc2t3_post_run
physics set slow_physics

surface_wind_enhancement_due_to_convection

long_name surface wind enhancement due to convection
units m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name IPD_Data(nb)%Tbd%phy_f2d(:,IPD_Control%num_p2d)
requested lsm_noah_run
sfc_ex_coef_run
sfc_nst_run
sfc_sice_run
physics set slow_physics

surface_wind_stress

long_name surface wind stress
units m2 s-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%stress
requested hedmf_run
 sfc_ex_coef_run
 sfc_nst_run
physics set slow_physics

sw_fluxes_sfc

long_name sw radiation fluxes at sfc
units W m-2
rank 1
type sfcsw_type
kind
source MODULE GFS_typedefs TYPE GFS_radtend_type
local_name IPD_Data(nb)%Radtend%sfcsw
requested rrtmg_sw_run
physics set slow_physics

sw_fluxes_top_atmosphere

long_name sw radiation fluxes at toa
units W m-2
rank 1
type topfsw_type
kind
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%topfsw
requested rrtmg_sw_run
physics set slow_physics

temperature_at_2m

long_name	2 meter temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%t2m
requested	GFS_surface_generic_post_run sfc_diag_post_run sfc_diag_run
physics set	slow_physics

temperature_at_zero_celsius

long_name	temperature at 0 degrees Celsius
units	K
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_t0c
requested	samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

tendency_of_air_temperature_at_Lagrangian_surface

long_name	air temperature tendency due to fast physics at Lagrangian surface
units	K s-1
rank	3
type	real
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%dt
requested	fv_sat_adj_run
physics set	fast_physics

tendency_of_air_temperature_due_to_longwave_heating_assuming_clear_sky_on_radiation_time_step

long_name	clear sky heating rate due to longwave radiation
units	K s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	IPD_Data(nb)%Tbd%htlw0
requested	dcyc2t3_run rrtmg_lw_post_run rrtmg_lw_run
physics set	slow_physics

tendency_of_air_temperature_due_to_longwave_heating_assuming_clear_sky_on_radiation_timestep

long_name	clear sky lw heating rates
units	K s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_radtend_type
local_name	IPD_Data(nb)%Radtend%lwlc
requested	NOT REQUESTED
physics set	

tendency_of_air_temperature_due_to_longwave_heating_on_radiation_time_step

long_name	total sky heating rate due to longwave radiation
units	K s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	IPD_Data(nb)%Tbd%htlwc
requested	dcyc2t3_run hedmf_run rrtmg_lw_post_run rrtmg_lw_run
physics set	slow_physics

tendency_of_air_temperature_due_to_longwave_heating_on_radiation_timestep

long_name total sky lw heating rate
units K s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_radtend_type
local_name IPD_Data(nb)%Radtend%htrlw
requested GFS_PBL_generic_post_run
physics set slow_physics

tendency_of_air_temperature_due_to_model_physics

long_name air temperature tendency due to model physics
units K s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%dtdt
requested GFS_PBL_generic_post_run
 GFS_suite_interstitial_1_run
 GFS_suite_stateout_update_run
 dcyc2t3_run
 gwdps_post_run
 gwdps_run
 hedmf_run
 rayleigh_damp_run
physics set slow_physics

tendency_of_air_temperature_due_to_radiative_heating_assuming_clear_sky

long_name clear sky radiative (shortwave + longwave) heating rate at current time
units K s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%dtdtc
requested GFS_MP_generic_post_run
 GFS_suite_interstitial_1_run
 dcyc2t3_run
physics set slow_physics

tendency_of_air_temperature_due_to_radiative_heating_on_physics_time_step

long_name temp. change due to radiative heating per time step
units K
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name IPD_Data(nb)%Tbd%dtdtr
requested GFS_MP_generic_post_run
 GFS_stochastics_run
 GFS_surface_generic_pre_run
physics set slow_physics

tendency_of_air_temperature_due_to_shortwave_heating_assuming_clear_sky_on_radiation_time_step

long_name clear sky heating rates due to shortwave radiation
units K s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name IPD_Data(nb)%Tbd%htsw0
requested dcyc2t3_run
 rrtmg_sw_post_run
 rrtmg_sw_run
physics set slow_physics

tendency_of_air_temperature_due_to_shortwave_heating_assuming_clear_sky_on_radiation_timestep

long_name clear sky sw heating rates
units K s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_radtend_type
local_name IPD_Data(nb)%Radtend%swhc
requested NOT REQUESTED
physics set

tendency_of_air_temperature_due_to_shortwave_heating_on_radiation_time_step

long_name	total sky heating rate due to shortwave radiation
units	K s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	IPD_Data(nb)%Tbd%htswc
requested	dcyc2t3_run
	hedmf_run
	rrtmg_sw_post_run
	rrtmg_sw_run
physics set	slow_physics

tendency_of_air_temperature_due_to_shortwave_heating_on_radiation_timestep

long_name	total sky sw heating rate
units	K s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_radtend_type
local_name	IPD_Data(nb)%Radtend%htrsw
requested	GFS_PBL_generic_post_run
physics set	slow_physics

tendency_of_cloud_droplet_number_concentration_due_to_model_physics

long_name number concentration of cloud droplets (liquid) tendency due to model physics
units kg-1 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%dqdt(:, :, IPD_Control%ntlnc)
requested GFS_PBL_generic_post_run
physics set slow_physics

tendency_of_graupel_mixing_ratio_due_to_model_physics

long_name moist (dry+vapor, no condensates) mixing ratio of graupel tendency due to model physics
units kg kg-1 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%dqdt(:, :, IPD_Control%ntgl)
requested GFS_PBL_generic_post_run
physics set slow_physics

tendency_of_ice_cloud_water_mixing_ratio_due_to_model_physics

long_name cloud condensed water mixing ratio tendency due to model physics
units kg kg-1 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%dqdt(:, :, IPD_Control%ntiw)
requested GFS_PBL_generic_post_run
physics set slow_physics

tendency_of_ice_friendly_aerosol_number_concentration_due_to_model_physics

long_name number concentration of ice-friendly aerosols tendency due to model physics
units kg-1 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%dqdt(:, :, IPD_Control%ntia)
requested GFS_PBL_generic_post_run
physics set slow_physics

tendency_of_ice_number_concentration_due_to_model_physics

long_name number concentration of ice tendency due to model physics
units kg-1 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%dqdt(:, :, IPD_Control%ntinc)
requested GFS_PBL_generic_post_run
physics set slow_physics

tendency_of_liquid_cloud_water_mixing_ratio_due_to_model_physics

long_name cloud condensed water mixing ratio tendency due to model physics
units kg kg-1 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%dqdt(:, :, IPD_Control%ntcw)
requested GFS_PBL_generic_post_run
physics set slow_physics

tendency_of_lwe_thickness_of_precipitation_amount_for_coupling

long_name	change in rain_cpl (coupling_type)
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	IPD_Data(nb)%Tbd%drain_cpl
requested	GFS_MP_generic_post_run GFS_stochastics_run GFS_surface_generic_pre_run
physics set	slow_physics

tendency_of_lwe_thickness_of_snow_amount_for_coupling

long_name	change in show_cpl (coupling_type)
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	IPD_Data(nb)%Tbd%dsnow_cpl
requested	GFS_MP_generic_post_run GFS_stochastics_run GFS_surface_generic_pre_run
physics set	slow_physics

tendency_of_ozone_mixing_ratio_due_to_model_physics

long_name ozone mixing ratio tendency due to model physics
units kg kg-1 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%dqdt(:, :, IPD_Control%ntoz)
requested GFS_PBL_generic_post_run
physics set slow_physics

tendency_of_rain_water_mixing_ratio_due_to_microphysics

long_name tendency of rain water mixing ratio due to microphysics
units kg kg-1 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%rainp
requested zhaocarr_precpd_run
physics set slow_physics

tendency_of_rain_water_mixing_ratio_due_to_model_physics

long_name moist (dry+vapor, no condensates) mixing ratio of rain water tendency due to model physics
units kg kg-1 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%dqdt(:, :, IPD_Control%ntrw)
requested GFS_PBL_generic_post_run
physics set slow_physics

tendency_of_snow_water_mixing_ratio_due_to_model_physics

long_name	moist (dry+vapor, no condensates) mixing ratio of snow water tendency due to model physics
units	kg kg-1 s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%dqdt(:, :, IPD_Control%ntsw)
requested	GFS_PBL_generic_post_run
physics set	slow_physics

tendency_of_tracers_due_to_model_physics

long_name	updated tendency of the tracers due to model physics
units	kg kg-1 s-1
rank	3
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%dqdt
requested	GFS_PBL_generic_post_run GFS_suite_interstitial_1_run GFS_suite_stateout_update_run
physics set	slow_physics

tendency_of_vertically_diffused_tracer_concentration

long_name updated tendency of the tracers due to vertical diffusion in PBL scheme
units kg kg-1 s-1
rank 3
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%dvdfttra
requested GFS_PBL_generic_post_run
 hedmf_run
physics set slow_physics

tendency_of_water_friendly_aerosol_number_concentration_due_to_model_physics

long_name number concentration of water-friendly aerosols tendency due to model physics
units kg-1 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%dqdt(:, :, IPD_Control%ntwa)
requested GFS_PBL_generic_post_run
physics set slow_physics

tendency_of_water_friendly_surface_aerosols_at_surface

long_name instantaneous sfc aerosol source
units kg-1 s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name IPD_Data(nb)%Coupling%nwfa2d
requested NOT REQUESTED
physics set

tendency_of_water_vapor_specific_humidity_due_to_model_physics

long_name water vapor specific humidity tendency due to model physics
units kg kg-1 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%dqdt(:, :, 1)
requested GFS_PBL_generic_post_run
physics set slow_physics

tendency_of_x_wind_due_to_convective_gravity_wave_drag

long_name zonal wind tendency due to convective gravity wave drag
units m s-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%gwdcu
requested gwdc_post_run
 gwdc_run
physics set slow_physics

tendency_of_x_wind_due_to_model_physics

long_name	zonal wind tendency due to model physics
units	m s-2
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%dudt
requested	GFS_PBL_generic_post_run GFS_suite_interstitial_1_run GFS_suite_stateout_update_run gwdps_post_run gwdps_run hedmf_run rayleigh_damp_run
physics set	slow_physics

tendency_of_y_wind_due_to_convective_gravity_wave_drag

long_name	meridional wind tendency due to convective gravity wave drag
units	m s-2
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%gwdcv
requested	gwdc_post_run gwdc_run
physics set	slow_physics

tendency_of_y_wind_due_to_model_physics

long_name	meridional wind tendency due to model physics
units	m s-2
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%dvdt
requested	GFS_PBL_generic_post_run GFS_suite_interstitial_1_run GFS_suite_stateout_update_run gwdps_post_run gwdps_run hedmf_run rayleigh_damp_run
physics set	slow_physics

thickness_at_Lagrangian_surface

long_name	thickness at Lagrangian_surface
units	m
rank	3
type	real
kind	
source	MODULE fv_arrays_mod TYPE fv_atmos_type
local_name	Atm(mytile)%delz
requested	fv_sat_adj_run
physics set	fast_physics

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threshold_volume_fraction_of_condensed_water_in_soil
  long_name      soil moisture threshold (volumetric)
  units          frac
  rank           1
  type           real
  kind           kind_phys
  source         MODULE GFS_typedefs TYPE GFS_diag_type
  local_name     IPD_Data(nb)%Intdiag%smcref2
  requested      lsm_noah_pre_run
                  lsm_noah_run
  physics set    slow_physics

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time_integral_of_x_stress_due_to_gravity_wave_drag
  long_name      vertically integrated u change by OGWD
  units          Pa s
  rank           1
  type           real
  kind           kind_phys
  source         MODULE GFS_typedefs TYPE GFS_diag_type
  local_name     IPD_Data(nb)%Intdiag%dugwd
  requested      gwdc_post_run
                  gwdds_post_run
  physics set    slow_physics

```

time_integral_of_y_stress_due_to_gravity_wave_drag

long_name	vertically integrated v change by OGWD
units	Pa s
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%dvgwd
requested	gwdc_post_run gwdps_post_run
physics set	slow_physics

time_scale_for_rayleigh_damping

long_name	time scale for Rayleigh damping in days
units	d
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%ral_ts
requested	rayleigh_damp_run
physics set	slow_physics

time_step_for_dynamics

long_name	dynamics timestep
units	s
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%dtf
requested	GFS_DCNV_generic_post_run GFS_MP_generic_post_run GFS_PBL_generic_post_run GFS_rrtmg_setup_run GFS_suite_interstitial_4_run GFS_surface_generic_post_run gwdc_post_run gwdps_post_run lsm_noah_post_run lsm_noah_run sfc_diag_post_run sfc_nst_run sfc_sice_run zhaocarr_gscond_run
physics set	slow_physics

time_step_for_physics

long_name	physics timestep
units	s
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%ntp
requested	GFS_suite_stateout_update_run gfdl_cloud_microphys_run gwdc_post_run gwdc_pre_run gwdc_run gwdps_run h2ophys_run hedmf_run ozphys_run rayleigh_damp_run samfdeepcnv_run samfshalcnv_run zhaocarr_gscond_run zhaocarr_precpd_run
physics set	slow_physics

time_step_for_radiation

long_name	radiation time step
units	s
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%raddt
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run
physics set	slow_physics

time_step_for_remapping_for_fast_physics

long_name	remapping time step
units	s
rank	0
type	real
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%mdt
requested	fv_sat_adj_run
physics set	fast_physics

top_layer_index_for_fast_physics

long_name	top_layer_iner_for_gfdl_mp
units	index
rank	0
type	integer
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%kmp
requested	fv_sat_adj_init fv_sat_adj_run
physics set	fast_physics

total_cloud_fraction

long_name	layer total cloud fraction
units	frac
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%clouds(:, :, 1)
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

total_runoff

long_name	total water runoff
units	kg m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%runoff
requested	GFS_surface_generic_post_run lsm_noah_post_run
physics set	slow_physics

tracer_concentration

long_name model layer mean tracer concentration
units kg kg-1
rank 3
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name IPD_Data(nb)%Statein%qgrs
requested GFS_PBL_generic_pre_run
 GFS_suite_stateout_reset_run
 GFS_suite_stateout_update_run
physics set slow_physics

tracer_concentration_save

long_name tracer concentration before entering a physics scheme
units kg kg-1
rank 3
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%save_q
requested GFS_MP_generic_pre_run
physics set slow_physics

tracer_concentration_updated_by_physics

long_name	tracer concentration updated by physics
units	kg kg-1
rank	3
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_stateout_type
local_name	IPD_Data(nb)%Stateout%gq0
requested	GFS_MP_generic_post_run GFS_MP_generic_pre_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run GFS_suite_stateout_reset_run GFS_suite_stateout_update_run
physics set	slow_physics

transpiration_flux

long_name	total plant transpiration rate
units	kg m-2 s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%trans
requested	GFS_surface_generic_post_run lsm_noah_pre_run lsm_noah_run
physics set	slow_physics

upper_bound_on_max_albedo_over_deep_snow

long_name	maximum snow albedo
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%snoalb
requested	lsm_noah_run
physics set	slow_physics

upward_heat_flux_in_soil

long_name	soil heat flux
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%gflx
requested	GFS_surface_generic_post_run
	lsm_noah_run
	sfc_nst_run
	sfc_sice_run
physics set	slow_physics

vegetation_area_fraction

long_name areal fractional cover of green vegetation
units frac
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name IPD_Data(nb)%Sfcprop%vfrac
requested GFS_surface_generic_pre_run
physics set slow_physics

vegetation_type_classification

long_name vegetation type at each grid cell
units index
rank 1
type integer
kind
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%vegtype
requested GFS_surface_generic_pre_run
lsm_noah_run
sfc_ex_coef_run
physics set slow_physics

vegetation_type_classification_real

long_name vegetation type for lsm
units index
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name IPD_Data(nb)%Sfcprop%vtype
requested GFS_surface_generic_pre_run
physics set slow_physics

vegetation_type_dataset_choice

long_name	land use dataset choice
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%ivegsr
requested	GFS_surface_generic_pre_run
	lsm_noah_init
	lsm_noah_run
	sfc_ex_coef_run
physics set	slow_physics

vertical_dimension

long_name	number of vertical levels
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%levs
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_MP_generic_post_run GFS_MP_generic_pre_run GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run GFS_stochastics_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run GFS_suite_stateout_reset_run GFS_suite_stateout_update_run GFS_surface_generic_pre_run cnvc90_run dcyc2t3_run get_phi_fv3_run get_prs_fv3_run gfdl_cloud_microphys_run gwdc_post_run gwdc_pre_run gwdc_run gwdps_run h2ophys_run hedmf_run ozphys_run rayleigh_damp_run samfdeepcnv_run samfshalcnv_post_run samfshalcnv_run zhaocarr_gscond_run

vertical_dimension_for_fast_physics

long_name	number of vertical levels for fast physics
units	count
rank	0
type	integer
kind	
source	MODULE fv_arrays_mod TYPE fv_atmos_type
local_name	Atm(mytile)%npz
requested	fv_sat_adj_run
physics set	fast_physics

vertical_dimension_for_thickness_at_Lagrangian_surface

long_name	vertical dimension for thickness at Lagrangian surface
units	count
rank	0
type	integer
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%npzdelz
requested	fv_sat_adj_run
physics set	fast_physics

vertical_dimension_of_h2o_forcing_data

long_name	number of vertical layers in h2o forcing data
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%levh2o
requested	h2ophys_run
physics set	slow_physics

vertical_dimension_of_ozone_forcing_data

long_name	number of vertical layers in ozone forcing data
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%levozp
requested	ozphys_run
physics set	slow_physics

vertical_index_at_cloud_base

long_name	vertical index at cloud base
units	index
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%kbot
requested	cnvc90_run gwdc_pre_run gwdc_run samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

vertical_index_at_cloud_top

long_name	vertical index at cloud top
units	index
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%ktop
requested	cnvc90_run gwdc_pre_run gwdc_run samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

vertical_index_at_top_of_atmosphere_boundary_layer

long_name	vertical index at top atmospheric boundary layer
units	index
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%kpbl
requested	GFS_suite_interstitial_3_run gwdps_run hedmf_run
physics set	slow_physics

vertical_index_difference_between_inout_and_local

long_name	vertical index difference between in/out and local
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%kd
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run rrtmg_lw_post_run rrtmg_sw_post_run
physics set	slow_physics

vertical_index_difference_between_layer_and_lower_bound

long_name	vertical index difference between layer and lower bound
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%kb
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run
physics set	slow_physics

vertical_index_difference_between_layer_and_upper_bound

long_name	vertical index difference between layer and upper bound
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%kt
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run
physics set	slow_physics

vertical_interface_dimension

long_name	vertical interface dimension
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%levi
requested	NOT REQUESTED
physics set	

vertical_layer_dimension_for_radiation

long_name	number of vertical layers for radiation
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%lm
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run rrtmg_lw_post_run rrtmg_sw_post_run
physics set	slow_physics

vertical_sigma_coordinate_for_radiation_initialization

long_name	vertical sigma coordinate for radiation initialization
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%si
requested	GFS_rrtmg_setup_init
physics set	slow_physics

vertical_temperature_average_range_lower_bound

long_name	zsea1 in mm
units	mm
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%nstf_name(4)
requested	sfc_nst_post_run sfc_nst_run
physics set	slow_physics

vertical_temperature_average_range_upper_bound

long_name	zsea2 in mm
units	mm
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	IPD_Control%nstf_name(5)
requested	sfc_nst_post_run sfc_nst_run
physics set	slow_physics

vertically_diffused_tracer_concentration

long_name tracer concentration diffused by PBL scheme
units kg kg-1
rank 3
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%vdftra
requested GFS_PBL_generic_pre_run
 hedmf_run
physics set slow_physics

virtual_temperature_at_Lagrangian_surface

long_name virtual temperature at Lagrangian surface
units K
rank 3
type real
kind
source MODULE fv_arrays_mod TYPE fv_atmos_type
local_name Atm(mytile)%pt
requested fv_sat_adj_run
physics set fast_physics

volume_fraction_of_condensed_water_in_soil_at_wilting_point

long_name wilting point (volumetric)
units frac
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%smcwlt2
requested lsm_noah_pre_run
 lsm_noah_run
physics set slow_physics

volume_fraction_of_soil_moisture

long_name total soil moisture
units frac
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name IPD_Data(nb)%Sfcprop%smc
requested lsm_noah_run
physics set slow_physics

volume_fraction_of_soil_moisture_for_land_surface_model

long_name volumetric fraction of soil moisture for lsm
units frac
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name IPD_Data(nb)%Sfcprop%smois
requested NOT REQUESTED
physics set

volume_fraction_of_unfrozen_soil_moisture

long_name liquid soil moisture
units frac
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name IPD_Data(nb)%Sfcprop%slc
requested lsm_noah_run
physics set slow_physics

```

volume_fraction_of_unfrozen_soil_moisture_for_land_surface_model
    long_name    volume fraction of unfrozen soil moisture for lsm
    units        frac
    rank         2
    type         real
    kind         kind_phys
    source       MODULE GFS_typedefs TYPE GFS_sfcprop_type
    local_name   IPD_Data(nb)%Sfcprop%sh2o
    requested    NOT REQUESTED
    physics set

```

```

volume_mixing_ratio_ccl4
    long_name    volume mixing ratio ccl4
    units        kg kg-1
    rank         2
    type         real
    kind         kind_phys
    source       MODULE GFS_typedefs TYPE GFS_interstitial_type
    local_name   IPD_Interstitial(nt)%gasvmr(:, :, 9)
    requested    GFS_rrtmg_pre_run
                rrtmg_lw_run
                rrtmg_sw_run
    physics set  slow_physics

```

volume_mixing_ratio_cfc11

long_name volume mixing ratio cfc11
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%gasvmr(:, :, 6)
requested GFS_rrtmg_pre_run
 rrtmg_lw_run
 rrtmg_sw_run
physics set slow_physics

volume_mixing_ratio_cfc113

long_name volume mixing ratio cfc113
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%gasvmr(:, :, 10)
requested GFS_rrtmg_pre_run
physics set slow_physics

volume_mixing_ratio_cfc12

long_name volume mixing ratio cfc12
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%gasvmr(:, :, 7)
requested GFS_rrtmg_pre_run
 rrtmg_lw_run
 rrtmg_sw_run
physics set slow_physics

volume_mixing_ratio_cfc22

long_name volume mixing ratio cfc22
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%gasvmr(:, :, 8)
requested GFS_rrtmg_pre_run
 rrtmg_lw_run
 rrtmg_sw_run
physics set slow_physics

volume_mixing_ratio_ch4

long_name volume mixing ratio ch4
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%gasvmr(:, :, 3)
requested GFS_rrtmg_pre_run
 rrtmg_lw_run
 rrtmg_sw_run
physics set slow_physics

volume_mixing_ratio_co

long_name volume mixing ratio co
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%gasvmr(:, :, 5)
requested GFS_rrtmg_pre_run
 rrtmg_lw_run
 rrtmg_sw_run
physics set slow_physics

volume_mixing_ratio_co2

long_name volume mixing ratio co2
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%gasvmr(:, :, 1)
requested GFS_rrtmg_pre_run
 rrtmg_lw_run
 rrtmg_sw_run
physics set slow_physics

volume_mixing_ratio_n2o

long_name volume mixing ratio no2
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%gasvmr(:, :, 2)
requested GFS_rrtmg_pre_run
 rrtmg_lw_run
 rrtmg_sw_run
physics set slow_physics

volume_mixing_ratio_o2

long_name	volume mixing ratio o2
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%gasvmr(:, :, 4)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

water_equivalent_accumulated_snow_depth

long_name	water equiv of acc snow depth over land and sea ice
units	mm
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	IPD_Data(nb)%Sfcprop%weasd
requested	lsm_noah_run sfc_sice_run
physics set	slow_physics

water_friendly_aerosol_number_concentration

long_name number concentration of water-friendly aerosols
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name IPD_Data(nb)%Statein%qgrs(:, :, IPD_Control%ntwa)
requested GFS_PBL_generic_pre_run
physics set slow_physics

water_friendly_aerosol_number_concentration_updated_by_physics

long_name number concentration of water-friendly aerosols updated by physics
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name IPD_Data(nb)%Stateout%gq0(:, :, IPD_Control%ntwa)
requested NOT REQUESTED
physics set

water_vapor_specific_humidity

long_name	water vapor specific humidity
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	IPD_Data(nb)%Statein%qgrs(:, :, 1)
requested	GFS_PBL_generic_pre_run GFS_stochastics_run get_prs_fv3_run gwdc_run gwdps_run
physics set	slow_physics

water_vapor_specific_humidity_at_Lagrangian_surface

long_name	water vapor specific humidity updated by fast physics at Lagrangian surface
units	kg kg-1
rank	3
type	real
kind	
source	MODULE fv_arrays_mod TYPE fv_atmos_type
local_name	Atm(mytile)%q(:, :, :, sphum)
requested	fv_sat_adj_run
physics set	fast_physics

water_vapor_specific_humidity_at_layer_for_radiation

long_name specific humidity layer
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%qlyr
requested GFS_rrtmg_pre_run
 rrtmg_lw_run
 rrtmg_sw_run
physics set slow_physics

water_vapor_specific_humidity_at_lowest_model_layer

long_name water vapor specific humidity at lowest model layer
units kg kg-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name IPD_Data(nb)%Statein%qgrs(:,1,1)
requested GFS_surface_generic_post_run
 lsm_noah_run
 sfc_ex_coef_run
 sfc_nst_run
 sfc_sice_run
physics set slow_physics

water_vapor_specific_humidity_at_lowest_model_layer_for_diag

long_name layer 1 specific humidity for diag
units kg kg-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%q1
requested GFS_surface_generic_post_run
physics set slow_physics

water_vapor_specific_humidity_at_lowest_model_layer_updated_by_physics

long_name water vapor specific humidity at lowest model layer updated by physics
units kg kg-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name IPD_Data(nb)%Stateout%gq0(:,1,1)
requested sfc_diag_run
physics set slow_physics

water_vapor_specific_humidity_at_previous_time_step

long_name water vapor specific humidity at previous time step
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name IPD_Data(nb)%Tbd%phy_f3d(:, :, 4)
requested zhaocarr_gscond_run
physics set slow_physics

water_vapor_specific_humidity_save

long_name water vapor specific humidity before entering a physics scheme
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%save_q(:, :, 1)
requested GFS_DCNV_generic_post_run
 GFS_DCNV_generic_pre_run
 GFS_MP_generic_post_run
 GFS_SCNV_generic_post_run
 GFS_SCNV_generic_pre_run
physics set slow_physics

water_vapor_specific_humidity_two_time_steps_back

long_name water vapor specific humidity two time steps back
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name IPD_Data(nb)%Tbd%phy_f3d(:, :, 2)
requested zhaocarr_gscond_run
physics set slow_physics

water_vapor_specific_humidity_updated_by_physics

long_name	water vapor specific humidity updated by physics
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_stateout_type
local_name	IPD_Data(nb)%Stateout%gq0(:, :, 1)
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run GFS_stochastics_run get_phi_fv3_run gfdl_cloud_microphys_run h2ophys_run samfdeepcnv_run samfshalcnv_run zhaocarr_gscond_run zhaocarr_precpd_run
physics set	slow_physics

weights_for_stochastic_shum_perturbation

long_name	weights for stochastic shum perturbation
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	IPD_Data(nb)%Coupling%shum_wts
requested	GFS_stochastics_run
physics set	slow_physics

weights_for_stochastic_shum_perturbation_flipped

long_name	weights for stochastic shum perturbation, flipped
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%shum_wts
requested	GFS_stochastics_run
physics set	slow_physics

weights_for_stochastic_skeb_perturbation_of_x_wind

long_name	weights for stochastic skeb perturbation of x wind
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	IPD_Data(nb)%Coupling%skebu_wts
requested	GFS_stochastics_run
physics set	slow_physics

weights_for_stochastic_skeb_perturbation_of_x_wind_flipped

long_name	weights for stochastic skeb perturbation of x wind, flipped
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%skebu_wts
requested	GFS_stochastics_run
physics set	slow_physics

weights_for_stochastic_skeb_perturbation_of_y_wind

long_name	weights for stochastic skeb perturbation of y wind
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	IPD_Data(nb)%Coupling%skebv_wts
requested	GFS_stochastics_run
physics set	slow_physics

weights_for_stochastic_skeb_perturbation_of_y_wind_flipped

long_name	weights for stochastic skeb perturbation of y wind, flipped
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%skebv_wts
requested	GFS_stochastics_run
physics set	slow_physics

weights_for_stochastic_sppt_perturbation

long_name	weights for stochastic sppt perturbation
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	IPD_Data(nb)%Coupling%sppt_wts
requested	GFS_stochastics_run
physics set	slow_physics

weights_for_stochastic_sppt_perturbation_flipped

long_name	weights for stochastic sppt perturbation, flipped
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%sppt_wts
requested	GFS_stochastics_run
physics set	slow_physics

weights_for_stochastic_surface_physics_perturbation

long_name	weights for stochastic surface physics perturbation
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	IPD_Data(nb)%Coupling%sfc_wts
requested	GFS_surface_generic_pre_run
physics set	slow_physics

wind_speed_at_lowest_model_layer

long_name	wind speed at lowest model level
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%wind
requested	GFS_surface_loop_control_part1_run GFS_surface_loop_control_part2_run hedmf_run sfc_ex_coef_run
physics set	slow_physics

x_wind

long_name	zonal wind
units	m s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	IPD_Data(nb)%Statein%ugrs
requested	GFS_stochastics_run GFS_suite_stateout_reset_run GFS_suite_stateout_update_run gwdc_run gwdps_run hedmf_run rayleigh_damp_run
physics set	slow_physics

x_wind_at_10m

long_name 10 meter u wind speed
units m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name IPD_Data(nb)%Intdiag%u10m
requested GFS_surface_generic_post_run
hedmf_run
sfc_diag_post_run
sfc_diag_run
physics set slow_physics

x_wind_at_lowest_model_layer

long_name zonal wind at lowest model layer
units m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name IPD_Data(nb)%Statein%ugrs(:,1)
requested GFS_surface_generic_post_run
lsm_noah_run
sfc_ex_coef_run
sfc_nst_run
sfc_sice_run
physics set slow_physics

`x_wind_at_lowest_model_layer_for_diag`

long_name	layer 1 x wind for diag
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%u1
requested	GFS_surface_generic_post_run
physics set	slow_physics

`x_wind_at_lowest_model_layer_updated_by_physics`

long_name	zonal wind at lowest model level updated by physics
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_stateout_type
local_name	IPD_Data(nb)%Stateout%gu0(:,1)
requested	sfc_diag_run
physics set	slow_physics

`x_wind_save`

long_name	x-wind before entering a physics scheme
units	m s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%save_u
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run
physics set	slow_physics

x_wind_updated_by_physics

long_name	zonal wind updated by physics
units	m s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_stateout_type
local_name	IPD_Data(nb)%Stateout%gu0
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_stochastics_run GFS_suite_stateout_reset_run GFS_suite_stateout_update_run gfdl_cloud_microphys_run gwdc_post_run samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

y_wind

long_name	meridional wind
units	m s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	IPD_Data(nb)%Statein%vgrs
requested	GFS_stochastics_run GFS_suite_stateout_reset_run GFS_suite_stateout_update_run gwdc_run gwdps_run hedmf_run rayleigh_damp_run
physics set	slow_physics

y_wind_at_10m

long_name	10 meter v wind speed
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%v10m
requested	GFS_surface_generic_post_run hedmf_run sfc_diag_post_run sfc_diag_run
physics set	slow_physics

y_wind_at_lowest_model_layer

long_name	meridional wind at lowest model layer
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	IPD_Data(nb)%Statein%vgrs(:,1)
requested	GFS_surface_generic_post_run
	lsm_noah_run
	sfc_ex_coef_run
	sfc_nst_run
	sfc_sice_run
physics set	slow_physics

y_wind_at_lowest_model_layer_for_diag

long_name	layer 1 y wind for diag
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	IPD_Data(nb)%Intdiag%v1
requested	GFS_surface_generic_post_run
physics set	slow_physics

y_wind_at_lowest_model_layer_updated_by_physics

long_name	meridional wind at lowest model level updated by physics
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_stateout_type
local_name	IPD_Data(nb)%Stateout%gv0(:,1)
requested	sfc_diag_run
physics set	slow_physics

y_wind_save

long_name	y-wind before entering a physics scheme
units	m s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	IPD_Interstitial(nt)%save_v
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run
physics set	slow_physics

y_wind_updated_by_physics

long_name meridional wind updated by physics
units m s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name IPD_Data(nb)%Stateout%gv0
requested GFS_DCNV_generic_post_run
GFS_DCNV_generic_pre_run
GFS_stochastics_run
GFS_suite_stateout_reset_run
GFS_suite_stateout_update_run
gfdl_cloud_microphys_run
gwdc_post_run
samfdeepcnv_run
samfshalcnv_run
physics set slow_physics

zenith_angle_temporal_adjustment_factor_for_shortwave_fluxes

long_name zenith angle temporal adjustment factor for shortwave
units none
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name IPD_Interstitial(nt)%xmu
requested GFS_PBL_generic_post_run
GFS_suite_interstitial_2_run
dcyc2t3_run
hedmf_run
physics set slow_physics