

# 1 CCPP variables provided by model SCM vs requested by pool of physics

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## 1.2 Description of variables

### FV3-GFS\_Cldprop\_type

long_name	derived type GFS_cldprop_type in FV3
units	DDT
rank	0
type	GFS_cldprop_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Cldprop(i)
requested	GFS_initialize_scm_run GFS_phys_time_vary_2_run GFS_rrtmg_pre_run

### FV3-GFS\_Control\_type

long_name	derived type GFS_control_type in FV3
units	DDT
rank	0
type	GFS_control_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_PBL_generic_post_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run GFS_initialize_scm_run GFS_phys_time_vary_1_run GFS_phys_time_vary_2_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_3_run GFS_suite_update_stateout_run GFS_surface_generic_post_run GFS_surface_generic_pre_run rrtmg_lw_post_run rrtmg_lw_pre_run rrtmg_sw_post_run rrtmg_sw_pre_run sasas_shal_post_run

### FV3-GFS\_Coupling\_type

long_name	derived type GFS_coupling_type in FV3
units	DDT
rank	0
type	GFS_coupling_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Coupling(i)
requested	GFS_initialize_scm_run GFS_rrtmg_post_run rrtmg_lw_post_run rrtmg_sw_post_run

### FV3-GFS\_Diag\_type

long_name	derived type GFS_diag_type in FV3
units	DDT
rank	0
type	GFS_diag_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)
requested	GFS_DCNV_generic_post_run GFS_PBL_generic_post_run GFS_SCNV_generic_post_run GFS_initialize_scm_run GFS_phys_time_vary_2_run GFS_rrtmg_post_run GFS_suite_interstitial_1_run GFS_suite_interstitial_2_run GFS_surface_generic_post_run GFS_surface_generic_pre_run dcyc2t3_post_run ozphys_post_run rrtmg_sw_post_run sasas_shal_post_run

### FV3-GFS\_Grid\_type

long_name	derived type GFS_grid_type in FV3
units	DDT
rank	0
type	GFS_grid_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Grid(i)
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_PBL_generic_post_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run GFS_initialize_scm_run GFS_phys_time_vary_2_run GFS_rrtmg_post_run GFS_rrtmg_pre_run GFS_suite_interstitial_1_run GFS_suite_interstitial_2_run GFS_suite_interstitial_3_run GFS_suite_update_stateout_run GFS_surface_generic_post_run GFS_surface_generic_pre_run rrtmg_lw_post_run rrtmg_lw_pre_run rrtmg_sw_post_run rrtmg_sw_pre_run sasas_shal_post_run

### FV3-GFS\_Init\_type

long_name	derived type GFS_init_type in FV3
units	DDT
rank	0
type	GFS_init_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Init_parm(i)
requested	GFS_initialize_scm_run

### FV3-GFS\_Interstitial\_type

long_name	derived type GFS_interstitial_type in FV3
units	DDT
rank	0
type	GFS_interstitial_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)
requested	GFS_initialize_scm_run GFS_suite_interstitial_phys_reset_run GFS_suite_interstitial_rad_reset_run

#### FV3-GFS\_Radtend\_type

long_name	derived type GFS_radtend_type in FV3
units	DDT
rank	0
type	GFS_radtend_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Radtend(i)
requested	GFS_PBL_generic_post_run GFS_initialize_scm_run GFS_rrtmg_post_run GFS_rrtmg_pre_run GFS_suite_interstitial_2_run GFS_surface_generic_pre_run rrtmg_lw_post_run rrtmg_lw_pre_run rrtmg_sw_post_run rrtmg_sw_pre_run

#### FV3-GFS\_Sfccycle\_type

long_name	derived type GFS_sfccycle_type in FV3
units	DDT
rank	0
type	GFS_sfccycle_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfccycle(i)
requested	GFS_initialize_scm_run GFS_phys_time_vary_2_run

#### FV3-GFS\_Sfcprop\_type

long_name	derived type GFS_sfcprop_type in FV3
units	DDT
rank	0
type	GFS_sfcprop_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)
requested	GFS_initialize_scm_run GFS_phys_time_vary_2_run GFS_rrtmg_pre_run GFS_suite_interstitial_1_run GFS_surface_generic_post_run GFS_surface_generic_pre_run rrtmg_lw_pre_run rrtmg_sw_pre_run

#### FV3-GFS\_Statein\_type

long_name	derived type GFS_statein_type in FV3
units	DDT
rank	0
type	GFS_statein_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)
requested	GFS_initialize_scm_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_3_run GFS_suite_update_stateout_run GFS_surface_generic_pre_run

#### FV3-GFS\_Stateout\_type

long_name	derived type GFS_stateout_type in FV3
units	DDT
rank	0
type	GFS_stateout_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Stateout(i)
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run GFS_initialize_scm_run GFS_suite_update_stateout_run

#### FV3-GFS\_Tbd\_type

long_name	derived type GFS_tbd_type in FV3
units	DDT
rank	0
type	GFS_tbd_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)
requested	GFS_DCNV_generic_post_run GFS_initialize_scm_run GFS_phys_time_vary_1_run GFS_phys_time_vary_2_run GFS_rad_time_vary_run GFS_rrtmg_pre_run sasas_shal_post_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%ffhh
requested	edmf_run sfc_diag_run sfc_ex_coef_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%fh2
requested	sfc_diag_run sfc_ex_coef_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%ffmm
requested	edmf_run sfc_diag_run sfc_ex_coef_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%fm10
requested	sfc_diag_run sfc_ex_coef_run

**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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%acv
requested	cnvc90_run

**accumulated\_lwe\_thickness\_of\_precipitation\_amount**

long_name	accumulated total precipitation
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%totprcp
requested	GFS_MP_generic_post_run

**adjusted\_vertical\_layer\_dimension\_for\_radiation**

long_name	adjusted number of vertical layers for radiation
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%lmk
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run

**adjusted\_vertical\_level\_dimension\_for\_radiation**

long_name	adjusted number of vertical levels for radiation
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%lmp
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run

**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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%faerlw(:, :, :, 3)
requested	GFS_rrtmg_pre_run



#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%faersw(:,:,:,3)  
requested GFS\_rrtmg\_pre\_run  
rrtmg\_sw\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%faerlw(:,:,:,1)  
requested GFS\_rrtmg\_pre\_run  
rrtmg\_lw\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%faersw(:,:,:,1)  
requested GFS\_rrtmg\_pre\_run  
rrtmg\_sw\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%faerlw(:,:,:,2)  
requested GFS\_rrtmg\_pre\_run  
rrtmg\_lw\_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%faersw(:,:,:,2)
requested	GFS_rrtmg_pre_run rrtmg_sw_run

#### air\_pressure

long_name	mean layer pressure
units	Pa
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%prsl
requested	GFS_calpreciptype_run edmf_run gwdc_run gwdps_run ozphys_run rayleigh_damp_run sasas_deep_run sasas_shal_run zhaocarr_gscond_run zhaocarr_precpd_run

#### air\_pressure\_at\_interface

long_name	air pressure at model layer interfaces
units	Pa
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%prsi
requested	GFS_calpreciptype_run cnvc90_run edmf_run get_prs_fv3_run gwdc_run gwdps_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%plvl
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%plyr
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%prsl(:,1)
requested	lsm_noah_run sfc_ex_coef_run sfc_nst_run sfc_sice_run

#### air\_pressure\_difference\_between\_midlayers

long_name	air pressure difference between midlayers
units	Pa
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%del
requested	GFS_MP_generic_post_run edmf_run get_prs_fv3_run gwdc_pre_run gwdc_run gwdps_run ozphys_run sasas_deep_run sasas_shal_run zhaocarr_precpd_run

#### air\_temperature

long_name	model layer mean temperature
units	K
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%tgrs
requested	edmf_run get_prs_fv3_run gwdc_run gwdps_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%tlvl
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%tlyr
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%tgrs(:,1)
requested	dcyc2t3_run lsm_noah_run sfc_diag_run sfc_ex_coef_run sfc_nst_run sfc_sice_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%phy_f3d(:, :, 3)
requested	GFS_calpreciptype_run zhaocarr_gscond_run

#### air\_temperature\_save

long_name	air temperature before entering a physics scheme
units	K
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%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

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%phy_f3d(:, :, 1)
requested	zhaocarr_gscond_run

#### air\_temperature\_updated\_by\_physics

long_name	temperature updated by physics
units	K
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Stateout(i)%gt0
requested	GFS_MP_generic_post_run GFS_MP_generic_pre_run GFS_calpreciptype_run get_phi_fv3_run gwdc_post_run gwdc_pre_run ozphys_run sasas_deep_run sasas_shal_run zhaocarr_gscond_run zhaocarr_precpd_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%theta
requested	gwdps_pre_run gwdps_run

#### anisotropy\_of\_subgrid\_orography

long_name	anisotropy of subgrid orography
units	none
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%gamma
requested	gwdps_pre_run gwdps_run

#### array\_dimension\_of\_microphysics

long_name	number of 3D arrays needed for microphysics
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%num_p3d
requested	GFS_MP_generic_pre_run GFS_calpreciptype_run

#### array\_dimension\_of\_random\_number

long_name	second dimension of random number stream for RAS
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%nrcm
requested	GFS_calpreciptype_run

#### asymmetry\_of\_subgrid\_orography

long_name	asymmetry of subgrid orography
units	none
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%oa4
requested	gwdps_pre_run gwdps_run

#### atmosphere\_boundary\_layer\_thickness

long\_name pbl height  
units m  
rank 1  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Diag(i)%hpbl  
requested edmf\_run  
sasas\_shal\_run

#### atmosphere\_heat\_diffusivity

long\_name diffusivity for heat  
units m2 s-1  
rank 2  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%dkt  
requested edmf\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Model(i)%xkzm\_h  
requested edmf\_run

#### atmosphere\_momentum\_diffusivity\_background

long\_name background vertical diffusion for momentum  
units m2 s-1  
rank 0  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Model(i)%xkzm\_m  
requested edmf\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%aerodp  
requested GFS\_rrtmg\_post\_run  
GFS\_rrtmg\_pre\_run



#### block\_number

long_name	for explicit data blocking: block number of this block
units	index
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%blkno
requested	NOT REQUESTED

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%rb
requested	edmf_run sfc_ex_coef_run

#### canopy\_upward\_latent\_heat\_flux

long_name	canopy upward latent heat flux
units	W m <sup>-2</sup>
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%evcw
requested	GFS_surface_generic_post_run lsm_noah_pre_run lsm_noah_run

#### canopy\_water\_amount

long_name	canopy water amount
units	kg m <sup>-2</sup>
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%canopy
requested	lsm_noah_run

#### cell\_area

long_name	area of the grid cell
units	m <sup>2</sup>
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Grid(i)%area
requested	sasas_deep_run sasas_shal_run

#### cell\_size

long_name	size of the grid cell
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Grid(i)%dx
requested	gwdc_pre_run

#### cell\_soil\_type

long_name	soil type at each grid cell
units	index
rank	1
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%soiltype
requested	GFS_surface_generic_pre_run lsm_noah_run

#### cell\_vegetation\_type

long_name	vegetation type at each grid cell
units	index
rank	1
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%vegtype
requested	GFS_surface_generic_pre_run lsm_noah_run sfc_ex_coef_run

#### change\_in\_ozone\_concentration

long_name	change in ozone concentration
units	kg kg-1
rank	3
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%dq3dt_loc(:, :, 6:6+physics%Interstitial(i)%oz_coef
requested	ozphys_post_run ozphys_run

#### characteristic\_grid\_length\_scale

long_name	representative horizontal length scale of grid box
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%dlength
requested	gwdc_pre_run gwdc_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%cldf
requested	gwdc_pre_run gwdc_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%cldsa
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%wminco
requested	zhaocarr_precpd_run

#### cloud\_condensed\_water\_specific\_humidity\_save

long_name	cloud condensed water specific humidity before entering a physics scheme
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%save_qcw
requested	GFS_DCNV_generic_pre_run GFS_MP_generic_pre_run

#### cloud\_condensed\_water\_specific\_humidity\_updated\_by\_physics

long_name	cloud condensed water specific humidity updated by physics
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Stateout(i)%gq0(:, :, scm_state%cloud_water_index)
requested	GFS_MP_generic_post_run GFS_zhao_carr_pre_run zhaocarr_gscond_run zhaocarr_precpd_run

#### cloud\_ice\_specific\_humidity

long_name	cloud ice specific humidity
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clw(:, :, 1)
requested	GFS_MP_generic_pre_run GFS_zhao_carr_pre_run sasas_deep_run sasas_shal_run zhaocarr_gscond_run

#### cloud\_ice\_water\_path

long_name	layer cloud ice water path
units	g m-2
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clouds(:, :, 4)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run

#### cloud\_liquid\_water\_path

long_name	layer cloud liquid water path
units	g m-2
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clouds(:, :, 2)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run

#### cloud\_liquid\_water\_specific\_humidity

long_name	cloud water specific humidity
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clw(:, :, 2)
requested	GFS_MP_generic_pre_run sasas_deep_run sasas_shal_run zhaocarr_gscond_run

#### cloud\_rain\_water\_path

long_name	cloud rain water path
units	g m-2
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clouds(:, :, 6)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run

#### cloud\_snow\_water\_path

long_name	cloud snow water path
units	g m-2
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clouds(:, :, 8)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run

#### cloud\_work\_function

long_name	cloud work function
units	m2 s-2
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%cld1d
requested	GFS_DCNV_generic_post_run sasas_deep_run

**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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%c_0
requested	sfc_nst_run

**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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%c_d
requested	sfc_nst_run

**coefficient\_for\_evaporation\_of\_rainfall**

long_name	coeff for evaporation of largescale rain
units	none
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%evpc0
requested	zhaocarr_precpd_run

**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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%psautco
requested	zhaocarr_precpd_run

**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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%prautco
requested	zhaocarr_precpd_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Sfcprop(i)%w\_0  
requested sfc\_nst\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Sfcprop(i)%w\_d  
requested sfc\_nst\_run

#### column\_precipitable\_water

long\_name precipitable water  
units  $\text{kg m}^{-2}$   
rank 1  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Diag(i)%pwat  
requested GFS\_MP\_generic\_post\_run

#### components\_of\_surface\_downward\_shortwave\_fluxes

long\_name derived type for special components of surface downward shortwave fluxes  
units  $\text{W m}^{-2}$   
rank 1  
type cmpfsw\_type  
kind  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%scmpsw  
requested GFS\_rrtmg\_post\_run  
rrtmg\_sw\_post\_run  
rrtmg\_sw\_run

#### convective\_cloud\_cover

long_name	convective cloud cover
units	frac
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%cnvc
requested	GFS_DCNV_generic_post_run GFS_suite_interstitial_3_run sasas_deep_run sasas_shal_post_run sasas_shal_run

#### convective\_cloud\_switch

long_name	index used by cnvc90 (for convective clouds)
units	none
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%clstp
requested	cnvc90_run

#### convective\_cloud\_water\_specific\_humidity

long_name	convective cloud water specific humidity
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%cnvw
requested	GFS_DCNV_generic_post_run GFS_suite_interstitial_3_run sasas_deep_run sasas_shal_post_run sasas_shal_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clw
requested	GFS_SCNV_generic_post_run GFS_suite_interstitial_3_run



#### convexity\_of\_subgrid\_orography

long_name	convexity of subgrid orography
units	none
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%oc
requested	gwdps_pre_run gwdps_run

#### cosine\_of\_latitude

long_name	cosine of the grid latitude
units	none
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Grid(i)%coslat
requested	dcyc2t3_run

#### cosine\_of\_solar\_declination\_angle

long_name	cos of the solar declination angle
units	none
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%cdec
requested	dcyc2t3_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Radtend(i)%coszen
requested	dcyc2t3_run rrtmg_sw_run

#### countergradient\_mixing\_term\_for\_temperature

long_name	countergradient mixing term for temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%gamt
requested	edmf_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%gamq  
requested edmf\_run

#### critical\_relative\_humidity

long\_name critical relative humidity  
units frac  
rank 2  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%rhc  
requested GFS\_suite\_interstitial\_3\_run  
zhaocarr\_gscond\_run  
zhaocarr\_precpd\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%rhcpbl  
requested GFS\_suite\_interstitial\_1\_run

#### critical\_relative\_humidity\_at\_surface

long\_name critical relative humidity at the surface  
units frac  
rank 0  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%rhcbot  
requested GFS\_suite\_interstitial\_1\_run  
GFS\_suite\_interstitial\_3\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%rhctop  
requested GFS\_suite\_interstitial\_1\_run  
GFS\_suite\_interstitial\_3\_run

#### cumulative\_change\_in\_temperature\_due\_to\_surface\_processes

long\_name cumulative change in temperature due to surface processes  
units K  
rank 2  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Diag(i)%dt3dt(:, :, 2)  
requested gwdps\_post\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Diag(i)%du3dt(:, :, 4)  
requested gwdc\_post\_run

#### cumulative\_change\_in\_x\_wind\_due\_to\_surface\_processes

long\_name cumulative change in x wind due to surface processes  
units m s-1  
rank 2  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Diag(i)%du3dt(:, :, 2)  
requested gwdps\_post\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Diag(i)%dv3dt(:, :, 4)  
requested gwdc\_post\_run

#### cumulative\_change\_in\_y\_wind\_due\_to\_surface\_processes

long\_name cumulative change in y wind due to surface processes  
units m s-1  
rank 2  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Diag(i)%dv3dt(:, :, 2)  
requested gwdps\_post\_run

#### daytime\_points

long_name	daytime points
units	index
rank	1
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%idxday
requested	rrtmg_sw_pre_run rrtmg_sw_run

#### daytime\_points\_dimension

long_name	daytime points dimension
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%nday
requested	rrtmg_sw_post_run rrtmg_sw_pre_run rrtmg_sw_run

#### deep\_soil\_temperature

long_name	deep soil temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%tg3
requested	lsm_noah_run

#### diffusivity\_background\_sigma\_level

long_name	sigma threshold for background mom. diffusion
units	none
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%xkzm_s
requested	edmf_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%prsik(:,1)
requested	edmf_run sfc_sice_pre_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name   physics%Statein(i)%prslk(:,1)  
requested    sfc\_sice\_pre\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name   physics%Statein(i)%prsik  
requested    NOT REQUESTED

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name   physics%Statein(i)%prslk  
requested    edmf\_run  
             gwdps\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name   physics%Sfcprop(i)%xt  
requested    sfc\_nst\_post\_run  
             sfc\_nst\_run

#### diurnal\_thermocline\_layer\_thickness

long\_name    diurnal thermocline layer thickness  
units        m  
rank        1  
type        real  
kind        kind\_phys  
source       MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name   physics%Sfcprop(i)%xz  
requested    sfc\_nst\_post\_run  
             sfc\_nst\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Sfcprop(i)%xu  
requested sfc\_nst\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Sfcprop(i)%xv  
requested sfc\_nst\_run

#### dominant\_freezing\_rain\_type

long\_name dominant freezing rain type  
units none  
rank 1  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%domzr  
requested GFS\_calpreciptype\_run

#### dominant\_rain\_type

long\_name dominant rain type  
units none  
rank 1  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%domr  
requested GFS\_calpreciptype\_run

#### dominant\_sleet\_type

long\_name dominant sleet type  
units none  
rank 1  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%domip  
requested GFS\_calpreciptype\_run

#### dominant\_snow\_type

long_name	dominant snow type
units	none
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%doms
requested	GFS_calpreciptype_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%frain
requested	GFS_DCNV_generic_post_run GFS_MP_generic_post_run GFS_SCNV_generic_post_run GFS_calpreciptype_run GFS_suite_interstitial_1_run sasas_shal_post_run

#### equation\_of\_time

long_name	equation of time (radian)
units	radians
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%slag
requested	dcyc2t3_run

## error\_flag

long_name	error flag for error handling in CCpp
units	flag
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%errflg
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_calpreciptype_run GFS_initialize_scm_run GFS_phys_time_vary_1_run GFS_phys_time_vary_2_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_3_run GFS_suite_interstitial_phys_reset_run GFS_suite_interstitial_rad_reset_run GFS_suite_update_stateout_run GFS_surface_generic_post_run GFS_surface_generic_pre_run GFS_surface_loop_control_part0_run GFS_surface_loop_control_part1_run GFS_surface_loop_control_part2_run GFS_zhao_carr_pre_run cnvc90_run dcyc2t3_post_run dcyc2t3_run edmf_run get_phi_fv3_run get_prs_fv3_run gwdc_post_run gwdc_pre_run gwdc_run gwdps_post_run gwdps_pre_run gwdps_run lsm_noah_post_run lsm_noah_pre_run lsm_noah_run ozphys_post_run ozphys_run rayleigh_damp_run 40 rrtmg_lw_post_run rrtmg_lw_pre_run rrtmg_lw_run rrtmg_sw post run





## error\_message

long_name	error message for error handling in CCpp
units	none
rank	0
type	character
kind	len=512
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%errmsg
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_calpreciptype_run GFS_initialize_scm_run GFS_phys_time_vary_1_run GFS_phys_time_vary_2_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_3_run GFS_suite_interstitial_phys_reset_run GFS_suite_interstitial_rad_reset_run GFS_suite_update_stateout_run GFS_surface_generic_post_run GFS_surface_generic_pre_run GFS_surface_loop_control_part0_run GFS_surface_loop_control_part1_run GFS_surface_loop_control_part2_run GFS_zhao_carr_pre_run cnvc90_run dcyc2t3_post_run dcyc2t3_run edmf_run get_phi_fv3_run get_prs_fv3_run gwdc_post_run gwdc_pre_run gwdc_run gwdps_post_run gwdps_pre_run gwdps_run lsm_noah_post_run lsm_noah_pre_run lsm_noah_run ozphys_post_run ozphys_run rayleigh_damp_run 42 rrtmg_lw_post_run rrtmg_lw_pre_run rrtmg_lw_run rrtmg_sw post run

#### extra\_top\_layer

long_name	extra top layer for radiation
units	none
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%LTP
requested	GFS_rrtmg_post_run rrtmg_lw_post_run rrtmg_sw_post_run

#### flag\_TKE\_dissipation\_heating

long_name	flag for tke dissipative heating
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%dspheat
requested	edmf_run

#### flag\_deep\_convection

long_name	flag indicating whether convection occurs in column (0 or 1)
units	flag
rank	1
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%kcnv
requested	GFS_suite_interstitial_2_run gwdc_run sasas_deep_run sasas_shal_run

#### flag\_diagnostics

long_name	logical flag for storing diagnostics
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%lssav
requested	GFS_MP_generic_post_run gwdc_post_run gwdps_post_run lsm_noah_post_run

#### flag\_diagnostics\_3D

long_name	flag for 3d diagnostic fields
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%ldiag3d
requested	GFS_MP_generic_post_run GFS_MP_generic_pre_run gwdc_post_run gwdps_post_run ozphys_post_run ozphys_run

#### flag\_for\_guess\_run

long_name	flag for guess run
units	flag
rank	1
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%flag_guess
requested	GFS_surface_generic_pre_run GFS_surface_loop_control_part1_run GFS_surface_loop_control_part2_run lsm_noah_run sfc_nst_run

#### flag\_for\_initial\_time-date\_control

long_name	flag for initial conditions and forcing
units	flag
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%ictm
requested	NOT REQUESTED

#### flag\_for\_iteration

long_name	flag for iteration
units	flag
rank	1
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%flag_iter
requested	GFS_surface_generic_pre_run GFS_surface_loop_control_part2_run lsm_noah_run sfc_ex_coef_run sfc_nst_run sfc_sice_run

#### flag\_for\_land\_surface\_scheme

long_name	flag for land surface model lsm=1 for noah lsm
units	flag
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%lsm
requested	sfc_sice_run

#### flag\_for\_mom4\_coupling

long_name	flag controls mom4 sea ice
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%mom4ice
requested	sfc_sice_run

#### flag\_for\_nsstm\_run

long_name	NSSTM flag: off/uncoupled/coupled=0/1/2
units	flag
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%nstf_name(1)
requested	GFS_surface_loop_control_part2_run sfc_nst_post_run sfc_nst_run

#### flag\_for\_precipitation\_type

long_name	snow/rain flag for precipitation
units	flag
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%srflag
requested	GFS_calpreciptype_run lsm_noah_run sfc_sice_run

#### flag\_for\_precipitation\_type\_algorithm

long_name	flag controls precip type algorithm
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%cal_pre
requested	GFS_calpreciptype_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%redrag
requested	sfc_ex_coef_run

#### flag\_for\_solar\_constant

long_name	use prescribed solar constant
units	flag
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%isol
requested	NOT REQUESTED

#### flag\_idealized\_physics

long_name	flag for idealized physics
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%lsidea
requested	rayleigh_damp_run

#### flag\_print

long_name	control flag for diagnostic print out
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%lprnt
requested	edmf_run gwdc_run gwdps_run rrtmg_lw_run rrtmg_sw_run sfc_nst_run sfc_sice_run zhaocarr_gscond_run zhaocarr_precpd_run

#### flag\_skip\_macro

long_name	flag to skip cloud macrophysics in Morrison scheme
units	flag
rank	1
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%skip_macro
requested	NOT REQUESTED

#### flag\_to\_calc\_lw

long_name	logical flags for lw radiation calls
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%lslwr
requested	rrtmg_lw_run

#### flag\_to\_calc\_sw

long_name	logical flags for sw radiation calls
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%lsswr
requested	rrtmg_sw_run

#### forecast\_hour

long_name	hour time after 00z at the t-step
units	h
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%solhr
requested	dcyc2t3_run sfc_nst_run

#### forecast\_time

long_name	curent forecast time
units	h
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%fhour
requested	gwdc_run

#### fraction\_of\_convective\_cloud

long_name	fraction of convective cloud
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Clprop(i)%cv
requested	cnvc90_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clx
requested	gwdps_pre_run gwdps_run

#### free\_convection\_layer\_thickness

long_name	thickness of free convection layer (FCL)
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%d_conv
requested	sfc_nst_run



#### gas\_constant\_dry\_air

long\_name ideal gas constant for dry air  
units J kg<sup>-1</sup> K<sup>-1</sup>  
rank 0  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_physical\_constants  
local\_name con\_rd  
requested gwdc\_run  
gwdps\_run

#### gas\_constant\_water\_vapor

long\_name ideal gas constant for water vapor  
units J kg<sup>-1</sup> K<sup>-1</sup>  
rank 0  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_physical\_constants  
local\_name con\_rv  
requested gwdps\_run

#### geopotential

long\_name geopotential at model layer centers  
units m<sup>2</sup> s<sup>-2</sup>  
rank 2  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Statein(i)%phil  
requested edmf\_run  
get\_phi\_fv3\_run  
gwdps\_run  
sasas\_deep\_run  
sasas\_shal\_run

#### geopotential\_at\_interface

long\_name geopotential at model layer interfaces  
units m<sup>2</sup> s<sup>-2</sup>  
rank 2  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Statein(i)%phii  
requested GFS\_calpreciptype\_run  
edmf\_run  
get\_phi\_fv3\_run  
get\_prs\_fv3\_run  
gwdps\_run

#### geopotential\_difference\_between\_midlayers\_divided\_by\_midlayer\_virtual\_temperature

long_name	difference between mid-layer geopotentials divided by mid-layer virtual temperature
units	m <sup>2</sup> s <sup>-2</sup> K <sup>-1</sup>
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%del_gz
requested	get_phi_fv3_run get_prs_fv3_run

#### gravitational\_acceleration

long_name	gravitational acceleration
units	m s <sup>-2</sup>
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_physical_constants
local_name	con_g
requested	gwdc_run gwdps_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%work1
requested	GFS_suite_interstitial_1_run GFS_suite_interstitial_3_run gwdc_pre_run zhaocarr_precpd_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%work2
requested	GFS_suite_interstitial_1_run GFS_suite_interstitial_3_run gwdc_pre_run

#### height\_above\_mean\_sea\_level\_at\_lowest\_model\_layer

long_name	layer 1 height
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%zlvl
requested	lsm_noah_run sfc_ex_coef_run

#### horizontal\_block\_size

long_name	for explicit data blocking: block sizes of all blocks
units	count
rank	1
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%blksz
requested	NOT REQUESTED

#### horizontal\_dimension

long_name	horizontal dimension
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%ix
requested	GFS_MP_generic_post_run GFS_MP_generic_pre_run GFS_calpreciptype_run GFS_zhao_carr_pre_run cnvc90_run dcyc2t3_run edmf_run get_phi_fv3_run get_prs_fv3_run gwdc_run gwdps_run ozphys_post_run ozphys_run rayleigh_damp_run sasas_deep_run sasas_shal_run zhaocarr_gscond_run zhaocarr_precpd_run

#### horizontal\_index\_of\_printed\_column

long_name	horizontal index of printed column
units	index
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%ipr
requested	edmf_run gwdc_run gwdps_run sfc_nst_run sfc_sice_run zhaocarr_gscond_run zhaocarr_precpd_run

#### horizontal\_loop\_extent

long_name	horizontal loop extent
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%im
requested	GFS_MP_generic_post_run GFS_MP_generic_pre_run GFS_PBL_generic_pre_run GFS_calpreciptype_run GFS_rrtmg_post_run GFS_rrtmg_pre_run GFS_surface_loop_control_part1_run GFS_surface_loop_control_part2_run GFS_zhao_carr_pre_run cnvc90_run dcyc2t3_post_run dcyc2t3_run edmf_run gwdc_post_run gwdc_pre_run gwdc_run gwdps_pre_run gwdps_run lsm_noah_post_run lsm_noah_pre_run lsm_noah_run ozphys_run rayleigh_damp_run rrtmg_lw_pre_run rrtmg_lw_run rrtmg_sw_pre_run rrtmg_sw_run sasas_deep_run sasas_shal_run sfc_diag_run sfc_ex_coef_run sfc_nst_post_run sfc_nst_pre_run sfc_nst_run sfc_sice_post_run sfc_sice_pre_run sfc_sice_run zhaocarr_gscond_run zhaocarr_precpd_run

#### index\_for\_liquid\_cloud\_condensate

long_name	tracer index for cloud condensate (or liquid water)
units	index
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%ntcw
requested	GFS_MP_generic_post_run GFS_MP_generic_pre_run edmf_run

#### index\_of\_TKE

long_name	index of TKE in the tracer array
units	index
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%ntk
requested	NOT REQUESTED

#### index\_of\_dtlm\_start

long_name	index to start dtlm run or not
units	index
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%ifd
requested	sfc_nst_run

#### index\_of\_highest\_temperature\_inversion

long_name	index of highest temperature inversion
units	index
rank	1
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%kinver
requested	GFS_PBL_generic_pre_run edmf_run

#### index\_of\_time\_step

long_name	current forecast iteration
units	index
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%kdt
requested	GFS_calpreciptype_run gwdps_run sfc_nst_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%dt_mf
requested	GFS_DCNV_generic_post_run sasas_deep_run sasas_shal_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%dd_mf
requested	GFS_DCNV_generic_post_run sasas_deep_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%ud_mf
requested	GFS_DCNV_generic_post_run sasas_deep_run sasas_shal_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%xcosz  
requested GFS\_suite\_interstitial\_2\_run  
dcyc2t3\_run  
sfc\_nst\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%dqsfc1  
requested GFS\_PBL\_generic\_post\_run  
edmf\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%dtsfc1  
requested GFS\_PBL\_generic\_post\_run  
edmf\_run

#### instantaneous\_surface\_x\_momentum\_flux

long\_name x momentum flux  
units Pa  
rank 1  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%dusfc1  
requested GFS\_PBL\_generic\_post\_run  
edmf\_run



#### instantaneous\_surface\_y\_momentum\_flux

long_name	y momentum flux
units	Pa
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%dvsfc1
requested	GFS_PBL_generic_post_run edmf_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%dusfcg
requested	gwdc_post_run gwdc_run gwdps_post_run gwdps_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%dvsfcg
requested	gwdc_post_run gwdc_run gwdps_post_run gwdps_run

#### iteration\_number

long_name	number of iteration
units	index
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%iter
requested	GFS_surface_loop_control_part0_run GFS_surface_loop_control_part1_run GFS_surface_loop_control_part2_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%evap
requested	GFS_suite_interstitial_2_run edmf_run lsm_noah_run sfc_diag_run sfc_nst_run sfc_sice_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%hflx
requested	GFS_suite_interstitial_2_run edmf_run lsm_noah_run sfc_nst_run sfc_sice_run

#### large\_scale\_condensate\_heating\_rate\_at\_model\_layers

long_name	large scale condensate heating rate at model layers
units	K s-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%dt3dt(:, :, 6)
requested	GFS_MP_generic_post_run

#### large\_scale\_condensate\_moistening\_rate\_at\_model\_layers

long_name	large scale condensate moistening rate at model layers
units	kg kg-1 s-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%dq3dt(:, :, 4)
requested	GFS_MP_generic_post_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%acvt
requested	cnvc90_run

#### latitude

long_name	grid latitude in radians
units	radians
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Grid(i)%xlat
requested	NOT REQUESTED

#### latitude\_index\_in\_debug\_printouts

long_name	latitude index in debug printouts
units	index
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%latidxprnt
requested	gwdc_run

#### latitude\_of\_ozone\_forcing\_data\_from\_host

long_name	latitude value of the ozone forcing data coming from host
units	degree
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%ozone_lat
requested	GFS_initialize_scm_run

#### longitude

long_name	grid longitude in radians
units	radians
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Grid(i)%xlon
requested	dcyc2t3_run sfc_nst_post_run sfc_nst_run

#### lw\_fluxes\_sfc

long\_name lw radiation fluxes at sfc  
units W m-2  
rank 1  
type sfcflw\_type  
kind  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Radrend(i)%sfcflw  
requested rrtmg\_lw\_run

#### lw\_fluxes\_top\_atmosphere

long\_name lw radiation fluxes at top  
units W m-2  
rank 1  
type topflw\_type  
kind  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Diag(i)%topflw  
requested rrtmg\_lw\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Diag(i)%rainc  
requested GFS\_calpreciptype\_run  
cnvc90\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%raincd  
requested GFS\_DCNV\_generic\_post\_run  
sasas\_deep\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%rainmcadj  
requested NOT REQUESTED

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%rain
requested	GFS_MP_generic_post_run GFS_calpreciptype_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%raincs
requested	sasas_shal_post_run sasas_shal_run

#### lwe\_thickness\_of\_stratiform\_precipitation\_amount

long_name	stratiform rainfall amount on physics timestep
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%rainst
requested	GFS_calpreciptype_run zhaocarr_precpd_run

#### maximum\_column\_heating\_rate

long_name	maximum heating rate in column
units	K s-1
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%cumabs
requested	gwdc_pre_run gwdc_run

#### maximum\_subgrid\_orography

long_name	maximum of subgrid orography
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%elvmax
requested	gwdps_pre_run gwdps_run

#### maximum\_vegetation\_area\_fraction

long_name	max fractional coverage of green vegetation
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%shdmax
requested	lsm_noah_run sfc_ex_coef_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%dtzm
requested	sfc_nst_post_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clouds(:, :, 5)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clouds(:,:,3)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clouds(:,:,7)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clouds(:,:,9)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run

#### minimum\_vegetation\_area\_fraction

long_name	min fractional coverage of green vegetation
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%shdmin
requested	lsm_noah_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%mbota
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%mtopa
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run

#### mpi\_rank

long_name	current MPI-rank
units	index
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%me
requested	gwdps_run ozphys_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%cgwf
requested	gwdc_pre_run

#### multiplication\_factors\_for\_mountain\_blocking\_and\_orographic\_gravity\_wave\_drag

long_name	multiplication factors for cdmdb and gwd
units	none
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%cdmbgwd
requested	gwdps_run



#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%oz_pres
requested	ozphys_run

#### natural\_log\_of\_ozone\_forcing\_data\_pressure\_levels\_from\_host

long_name	natural logarithm of the pressure levels of the ozone forcing data
units	Pa
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%ozone_pres
requested	GFS_initialize_scm_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%tprcp
requested	GFS_calpreciptype_run lsm_noah_run sfc_nst_run sfc_sice_run

#### normalized\_soil\_wetness

long_name	normalized soil wetness
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%wet1
requested	lsm_noah_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%oz_coeff
requested	ozphys_post_run ozphys_run

#### number\_of\_coefficients\_in\_ozone\_forcing\_data\_from\_host

long_name	number of coefficients in ozone forcing data coming from host
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%n_ozone_coefficients
requested	GFS_initialize_scm_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%lonr
requested	gwdps_run

#### number\_of\_hydrometeors

long_name	choice of cloud scheme / number of hydrometeors
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%ncld
requested	GFS_MP_generic_post_run GFS_MP_generic_pre_run sasas_deep_run sasas_shal_run

#### number\_of\_latitude\_points\_in\_ozone\_forcing\_data\_from\_host

long_name	number of latitude points in ozone forcing data coming from host
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%n_ozone_lats
requested	GFS_initialize_scm_run

#### number\_of\_statistical\_measures\_of\_subgrid\_orography

long_name	number of topographic variables in GWD
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%nmtvr
requested	gwdps_pre_run gwdps_run

#### number\_of\_time\_levels\_in\_ozone\_forcing\_data\_from\_host

long_name	number of time levels in ozone forcing data coming from host
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%n_ozone_times
requested	GFS_initialize_scm_run

#### number\_of\_total\_tracers

long_name	total number of tracers
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%tracers_total
requested	NOT REQUESTED

#### number\_of\_vertical\_diffusion\_tracers

long_name	number of tracers to diffuse vertically
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%nvdiff
requested	edmf_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%levr
requested	rayleigh_damp_run

#### number\_of\_water\_tracers

long_name	number of water-related tracers
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%tracers_water
requested	NOT REQUESTED

#### **ocean\_mixed\_layer\_thickness**

long_name	mixed layer thickness
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%zm
requested	sfc_nst_run

#### **omega**

long_name	layer mean vertical velocity
units	Pa s-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%vvl
requested	sasas_deep_run sasas_shal_run

#### **orography**

long_name	orography
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%oro
requested	sfc_nst_post_run sfc_nst_pre_run

#### **orography\_unfiltered**

long_name	unfiltered orography
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%oro_uf
requested	sfc_nst_post_run sfc_nst_pre_run

#### ozone\_concentration\_at\_layer\_for\_radiation

long_name	ozone concentration layer
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%olyr
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Stateout(i)%gq0(:, :, scm_state%ozone_index)
requested	ozphys_run

#### ozone\_forcing

long_name	ozone forcing data
units	various
rank	3
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%ozpl
requested	ozphys_run

#### ozone\_forcing\_from\_host

long_name	ozone forcing data from host
units	various
rank	4
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%ozone_forcing_in
requested	GFS_initialize_scm_run

#### pi

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

#### pressure\_at\_bottom\_of\_convective\_cloud

long_name	convective cloud bottom pressure
units	Pa
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Clprop(i)%cvb
requested	cnvc90_run

#### pressure\_at\_top\_of\_convective\_cloud

long_name	convective cloud top pressure
units	Pa
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Clprop(i)%cvt
requested	cnvc90_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%prslrd0
requested	rayleigh_damp_run

#### random\_number\_array

long_name	random number array (0-1)
units	none
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%rann
requested	GFS_calpreciptype_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%work3
requested	GFS_surface_generic_pre_run lsm_noah_run sfc_diag_run sfc_ex_coef_run sfc_nst_run sfc_sice_pre_run sfc_sice_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%sr
requested	GFS_calpreciptype_run zhaocarr_precpd_run

#### 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 gmtb_scm_physical_constants
local_name	con_fvirt
requested	gwdc_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%f10m
requested	sfc_diag_run

#### sea\_ice\_concentration

long_name	ice fraction over open water
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%fice
requested	sfc_sice_post_run sfc_sice_pre_run

#### sea\_ice\_concentration\_for\_physics

long_name	sea-ice concentration [0,1]
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%cice
requested	sfc_sice_post_run sfc_sice_pre_run sfc_sice_run

#### sea\_ice\_temperature

long_name	sea ice surface skin temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%tisfc
requested	sfc_sice_post_run sfc_sice_pre_run

#### sea\_ice\_temperature\_for\_physics

long_name	sea-ice surface temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%tice
requested	sfc_sice_post_run sfc_sice_pre_run sfc_sice_run



#### sea\_ice\_thickness

long_name	sea ice thickness
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%hice
requested	sfc_sice_post_run sfc_sice_pre_run

#### sea\_ice\_thickness\_for\_physics

long_name	sea-ice thickness
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%zice
requested	sfc_sice_post_run sfc_sice_pre_run sfc_sice_run

#### sea\_land\_ice\_mask

long_name	sea/land/ice mask (=0/1/2)
units	flag
rank	1
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%islmsk
requested	GFS_suite_interstitial_1_run GFS_surface_generic_pre_run GFS_surface_loop_control_part2_run lsm_noah_run sasas_deep_run sasas_shal_run sfc_ex_coef_run sfc_nst_post_run sfc_nst_pre_run sfc_nst_run sfc_sice_post_run sfc_sice_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%slmsk
requested	sfc_nst_post_run

#### sea\_surface\_reference\_temperature

long_name	sea surface reference temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%tref
requested	sfc_nst_post_run sfc_nst_run

#### sea\_water\_salinity

long_name	salinity content in diurnal thermocline layer
units	ppt m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%xs
requested	sfc_nst_run

#### seconds\_elapsed\_since\_model\_initialization

long_name	seconds elapsed since model initialization
units	s
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%sec
requested	NOT REQUESTED

#### seed\_random\_numbers\_lw

long_name	random seeds for sub-column cloud generators lw
units	none
rank	1
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%icsdlw
requested	rrtmg_lw_run

#### seed\_random\_numbers\_sw

long_name	random seeds for sub-column cloud generators sw
units	none
rank	1
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%icsdsw
requested	rrtmg_sw_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name    physics%Sfcprop(i)%qrain  
requested     sfc\_nst\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name    physics%Sfcprop(i)%xtts  
requested     sfc\_nst\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name    physics%Sfcprop(i)%xzts  
requested     sfc\_nst\_run

#### sine\_of\_latitude

long\_name     sine of the grid latitude  
units         none  
rank          1  
type          real  
kind          kind\_phys  
source        MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name    physics%Grid(i)%sinlat  
requested     dcyc2t3\_run  
              sfc\_nst\_run

#### sine\_of\_solar\_declination\_angle

long\_name     sin of the solar declination angle  
units         none  
rank          0  
type          real  
kind          kind\_phys  
source        MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name    physics%Model(i)%sdec  
requested     dcyc2t3\_run

#### slope\_of\_subgrid\_orography

long_name	slope of subgrid orography
units	none
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%sigma
requested	gwdps_pre_run gwdps_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%acvb
requested	cnvc90_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%sbsno
requested	GFS_surface_generic_post_run lsm_noah_pre_run lsm_noah_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%snohf
requested	GFS_surface_generic_post_run lsm_noah_pre_run lsm_noah_run

#### soil\_moisture\_content

long_name	soil moisture
units	kg m-2
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%soilm
requested	lsm_noah_run

#### soil\_temperature

long_name	soil temperature
units	K
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%stc
requested	lsm_noah_run sfc_sice_run

#### soil\_type

long_name	soil type classification
units	index
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%isot
requested	lsm_noah_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%evbs
requested	GFS_surface_generic_post_run lsm_noah_pre_run lsm_noah_run

#### soil\_vertical\_dimension

long_name	number of soil layers
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%lsoil
requested	lsm_noah_post_run lsm_noah_pre_run lsm_noah_run sfc_nst_run sfc_sice_run

#### solar\_constant

long_name	solar constant (sun-earth distant adjusted)
units	W m <sup>-2</sup>
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%solcon
requested	rrtmg_sw_run

#### specific\_heat\_of\_dry\_air\_at\_constant\_pressure

long_name	specific heat of dry air at constant pressure
units	J kg <sup>-1</sup> K <sup>-1</sup>
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_physical_constants
local_name	con_cp
requested	gwdc_post_run gwdc_run gwdps_run rayleigh_damp_run

#### specific\_humidity\_at\_2m

long_name	2 meter specific humidity
units	kg kg <sup>-1</sup>
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%q2m
requested	sfc_diag_run

#### specific\_humidity\_at\_lowest\_model\_layer

long_name	specific humidity at lowest model layer
units	kg kg-1
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%qgrs(:,1,scm_state%water_vapor_index)
requested	lsm_noah_run sfc_diag_run sfc_ex_coef_run sfc_nst_run sfc_sice_run

#### standard\_deviation\_of\_subgrid\_orography

long_name	standard deviation of subgrid orography
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%hprime1
requested	gwdps_pre_run gwdps_run

#### start\_index\_of\_other\_tracers

long_name	beginning index of the non-water tracer species
units	index
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%tracers_start_index
requested	NOT REQUESTED

#### statistical\_measures\_of\_subgrid\_orography

long_name	orographic metrics
units	various
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%hprime
requested	gwdps_pre_run

#### sub-layer\_cooling\_amount

long_name	sub-layer cooling amount
units	K
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%dt_cool
requested	sfc_nst_post_run sfc_nst_run

#### sub-layer\_cooling\_thickness

long_name	sub-layer cooling thickness
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%z_c
requested	sfc_nst_post_run sfc_nst_run

#### subsurface\_runoff\_flux

long_name	subsurface runoff flux
units	g m <sup>-2</sup> s <sup>-1</sup>
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%drain
requested	lsm_noah_post_run lsm_noah_pre_run lsm_noah_run

#### surface\_air\_pressure

long_name	surface pressure
units	Pa
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%pgr
requested	lsm_noah_run rayleigh_damp_run sasas_deep_run sasas_shal_run sfc_diag_run sfc_ex_coef_run sfc_nst_run sfc_sice_run zhaocarr_gscond_run



#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%phy_f2d(:,2)
requested	zhaocarr_gscond_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%phy_f2d(:,1)
requested	zhaocarr_gscond_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%tsfa
requested	GFS_rrtmg_pre_run rrtmg_lw_post_run rrtmg_lw_pre_run rrtmg_sw_pre_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%sfcalb(:,4)
requested	rrtmg_sw_post_run rrtmg_sw_pre_run rrtmg_sw_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%sfcalb(:,3)
requested	rrtmg_sw_post_run rrtmg_sw_pre_run rrtmg_sw_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%sfcalb(:,2)
requested	rrtmg_sw_post_run rrtmg_sw_pre_run rrtmg_sw_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%sfcalb(:,1)
requested	rrtmg_sw_post_run rrtmg_sw_pre_run rrtmg_sw_run

#### surface\_diffused\_shortwave\_albedo

long_name	mean surface diffused sw albedo
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Radrend(i)%sfalb
requested	lsm_noah_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%adjnirdfd  
requested dcyc2t3\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Coupling(i)%nirdfdi  
requested dcyc2t3\_run

#### surface\_downwelling\_diffuse\_ultraviolet\_and\_visible\_shortwave\_flux

long\_name surface downwelling diffuse ultraviolet plus visible shortwave flux at cu  
units W m-2  
rank 1  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%adjvisdfd  
requested dcyc2t3\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Coupling(i)%visdfdi  
requested dcyc2t3\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%adjnirbmd  
requested dcyc2t3\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Coupling(i)%nirbmdi  
requested dcyc2t3\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%adjvisbmd  
requested dcyc2t3\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Coupling(i)%visbmdi  
requested dcyc2t3\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%adjsfcdlw  
requested GFS\_suite\_interstitial\_2\_run  
GFS\_surface\_generic\_pre\_run  
dcyc2t3\_post\_run  
dcyc2t3\_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%gabsbdlw
requested	GFS_surface_generic_pre_run lsm_noah_run sfc_nst_run sfc_sice_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Coupling(i)%sfcdlw
requested	dcyc2t3_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%adjsfcdsw
requested	GFS_suite_interstitial_2_run dcyc2t3_post_run dcyc2t3_run lsm_noah_run sfc_sice_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Coupling(i)%sfcdsw
requested	dcyc2t3_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%cdq
requested	lsm_noah_run sfc_ex_coef_run sfc_nst_run sfc_sice_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%cd
requested	lsm_noah_run sfc_ex_coef_run sfc_nst_run sfc_sice_run

#### surface\_drag\_mass\_flux\_for\_heat\_and\_moisture\_in\_air

long_name	thermal exchange coefficient
units	kg m <sup>-2</sup> s <sup>-1</sup>
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%chh
requested	lsm_noah_run sfc_nst_run sfc_sice_run

#### surface\_drag\_wind\_speed\_for\_momentum\_in\_air

long_name	momentum exchange coefficient
units	m s <sup>-1</sup>
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%cmm
requested	lsm_noah_run sfc_nst_run sfc_sice_run

#### surface\_friction\_velocity

long\_name boundary layer parameter  
units m s-1  
rank 1  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Sfcprop(i)%uustar  
requested sfc\_ex\_coef\_run

#### surface\_ground\_temperature\_for\_radiation

long\_name surface ground temperature for radiation  
units K  
rank 1  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%tsfg  
requested GFS\_rrtmg\_pre\_run  
rrtmg\_lw\_pre\_run  
rrtmg\_lw\_run  
rrtmg\_sw\_pre\_run

#### surface\_longwave\_emissivity

long\_name surface lw emissivity in fraction  
units frac  
rank 1  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Radrend(i)%semis  
requested dcyc2t3\_run  
lsm\_noah\_run  
rrtmg\_lw\_run  
sfc\_nst\_run  
sfc\_sice\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Radrend(i)%tsflw  
requested dcyc2t3\_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%adjsfcns
requested	dcyc2t3_post_run dcyc2t3_run lsm_noah_run sfc_nst_run sfc_sice_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Coupling(i)%sfcns
requested	dcyc2t3_run

#### surface\_roughness\_length

long_name	surface roughness length
units	cm
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%zorl
requested	edmf_run lsm_noah_run sfc_ex_coef_run

#### surface\_runoff

long_name	surface water runoff (from lsm)
units	kg m-2
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%srunoff
requested	lsm_noah_post_run



#### surface\_runoff\_flux

long_name	surface runoff flux
units	g m <sup>-2</sup> s <sup>-1</sup>
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%runoff
requested	lsm_noah_post_run lsm_noah_pre_run lsm_noah_run

#### surface\_skin\_temperature

long_name	ocean surface skin temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%tsfc
requested	GFS_calpreciptype_run dcyc2t3_run edmf_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

#### surface\_skin\_temperature\_after\_iteration

long_name	surface skin temperature after iteration
units	K
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%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

#### surface\_skin\_temperature\_for\_nsst

long_name	ocean surface skin temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%tseal
requested	sfc_nst_pre_run sfc_nst_run

#### surface\_slope\_classification

long_name	class of sfc slope
units	index
rank	1
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%slopetype
requested	GFS_surface_generic_pre_run lsm_noah_run

#### surface\_snow\_area\_fraction

long_name	surface snow area fraction
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%snowc
requested	GFS_surface_generic_post_run lsm_noah_pre_run lsm_noah_run

#### surface\_snow\_area\_fraction\_for\_diagnostics

long_name	surface snow area fraction
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%sncovr
requested	lsm_noah_run

#### surface\_snow\_melt

long_name	snow melt during timestep
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%snowmt
requested	sfc_sice_run

#### surface\_snow\_thickness\_water\_equivalent

long_name	water equivalent snow depth over land
units	mm
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%snowd
requested	lsm_noah_run sfc_ex_coef_run sfc_sice_run

#### surface\_specific\_humidity

long_name	surface air saturation specific humidity
units	kg kg-1
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%qss
requested	lsm_noah_run sfc_diag_run sfc_nst_run sfc_sice_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%ep1d
requested	GFS_surface_generic_post_run GFS_surface_generic_pre_run lsm_noah_run sfc_nst_run sfc_sice_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%adjnirdfu
requested	dcyc2t3_run

**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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Coupling(i)%nirdfui  
requested dcyc2t3\_run

**surface\_upwelling\_diffuse\_ultraviolet\_and\_visible\_shortwave\_flux**

long\_name surface upwelling diffuse ultraviolet plus visible shortwave flux at curr  
units W m-2  
rank 1  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%adjvisdfu  
requested dcyc2t3\_run

**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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Coupling(i)%visdfui  
requested dcyc2t3\_run

**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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%adjnirbmu  
requested dcyc2t3\_run

**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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Coupling(i)%nirbmui  
requested dcyc2t3\_run

#### surface\_upwelling\_direct\_ultraviolet\_and\_visible\_shortwave\_flux

long\_name surface upwelling beam ultraviolet plus visible shortwave flux at current  
units W m<sup>-2</sup>  
rank 1  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%adjvisbmu  
requested dcyc2t3\_run

#### surface\_upwelling\_direct\_ultraviolet\_and\_visible\_shortwave\_flux\_on\_radiation\_time\_step

long\_name sfc uv+vis beam sw upward flux  
units W m<sup>-2</sup>  
rank 1  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Coupling(i)%visbmu  
requested dcyc2t3\_run

#### surface\_upwelling\_longwave\_flux

long\_name surface upwelling longwave flux at current time  
units W m<sup>-2</sup>  
rank 1  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%adsfculw  
requested GFS\_suite\_interstitial\_2\_run  
dcyc2t3\_post\_run  
dcyc2t3\_run

#### surface\_wind\_enhancement\_due\_to\_convection

long\_name surface wind enhancement due to convection  
units m s<sup>-1</sup>  
rank 1  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Tbd(i)%phy\_f2d(:,physics%Model(i)%num\_p2d)  
requested lsm\_noah\_run  
sfc\_ex\_coef\_run  
sfc\_nst\_run  
sfc\_sice\_run

#### surface\_wind\_stress

long_name	surface wind stress
units	m2 s-2
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%stress
requested	edmf_run sfc_ex_coef_run sfc_nst_run

#### sw\_fluxes\_sfc

long_name	sw radiation fluxes at sfc
units	W m-2
rank	1
type	sfcfsw_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Radrend(i)%sfcfsw
requested	rrtmg_sw_run

#### sw\_fluxes\_top\_atmosphere

long_name	sw radiation fluxes at toa
units	W m-2
rank	1
type	topfsw_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%topfsw
requested	rrtmg_sw_run

#### temperature\_at\_2m

long_name	2 meter temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%t2m
requested	sfc_diag_run

#### tendency\_of\_air\_temperature\_due\_to\_longwave\_heating\_assuming\_clear\_sky\_on\_radiation\_time\_s

long_name	clear sky heating rate due to longwave radiation
units	K s-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%htlw0
requested	dcyc2t3_run rrtmg_lw_post_run rrtmg_lw_run

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Radrend(i)%lwhe
requested	NOT REQUESTED

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%htlwc
requested	dcyc2t3_run
	edmf_run
	rrtmg_lw_post_run
	rrtmg_lw_run

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Radrend(i)%htlwc
requested	NOT REQUESTED

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%dtdt
requested	GFS_PBL_generic_post_run
	GFS_suite_interstitial_1_run
	GFS_suite_update_stateout_run
	dcyc2t3_run
	edmf_run
	gwdps_post_run
	gwdps_run
	rayleigh_damp_run

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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 gmtb_scm_type_defs TYPE physics_type
    local_name   physics%Interstitial(i)%dtdtc
    requested    GFS_suite_interstitial_1_run
                dcyc2t3_run

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 gmtb_scm_type_defs TYPE physics_type
    local_name   physics%Tbd(i)%htsw0
    requested    dcyc2t3_run
                rrtmg_sw_post_run
                rrtmg_sw_run

tendency_of_air_temperature_due_to_shortwave_heating_assuming_clear_sky_on_radiation_time_step
    long_name    clear sky sw heating rates
    units        K s-1
    rank         2
    type         real
    kind         kind_phys
    source       MODULE gmtb_scm_type_defs TYPE physics_type
    local_name   physics%Radrend(i)%swhc
    requested    NOT REQUESTED

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 gmtb_scm_type_defs TYPE physics_type
    local_name   physics%Tbd(i)%htswc
    requested    dcyc2t3_run
                edmf_run
                rrtmg_sw_post_run
                rrtmg_sw_run

```



#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Radrend(i)%htrsw
requested	NOT REQUESTED

#### tendency\_of\_rain\_water\_mixing\_ratio\_due\_to\_model\_physics

long_name	tendency of rain water mixing ratio due to model physics
units	kg kg-1 s-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%rainp
requested	zhaocarr_precpd_run

#### tendency\_of\_tracers\_due\_to\_model\_physics

long_name	updated tendency of the tracers
units	kg kg-1 s-1
rank	3
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%dqdt
requested	GFS_PBL_generic_post_run GFS_suite_interstitial_1_run GFS_suite_update_stateout_run edmf_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%gwdcu
requested	gwdc_post_run gwdc_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%dudt
requested	GFS_PBL_generic_post_run GFS_suite_interstitial_1_run GFS_suite_update_stateout_run edmf_run gwdps_post_run gwdps_run rayleigh_damp_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%gwdcv
requested	gwdc_post_run gwdc_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%dvdt
requested	GFS_PBL_generic_post_run GFS_suite_interstitial_1_run GFS_suite_update_stateout_run edmf_run gwdps_post_run gwdps_run rayleigh_damp_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%smcref2
requested	lsm_noah_pre_run lsm_noah_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name   physics%Diag(i)%dugwd  
requested    gwdc\_post\_run  
             gwdps\_post\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name   physics%Diag(i)%dvgwd  
requested    gwdc\_post\_run  
             gwdps\_post\_run

#### time\_levels\_in\_ozone\_forcing\_data\_from\_host

long\_name   time values of the ozone forcing data coming from host  
units       day  
rank        1  
type        real  
kind        kind\_phys  
source       MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name   physics%ozone\_time  
requested    GFS\_initialize\_scm\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name   physics%Model(i)%ral\_ts  
requested    rayleigh\_damp\_run

#### time\_step\_for\_dynamics

long_name	dynamics timestep
units	s
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%dtf
requested	GFS_MP_generic_post_run gwdc_post_run gwdps_post_run lsm_noah_post_run lsm_noah_run sfc_nst_run sfc_sice_run zhaocarr_gscond_run

#### time\_step\_for\_physics

long_name	physics timestep
units	s
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%dtp
requested	edmf_run gwdc_post_run gwdc_pre_run gwdc_run gwdps_run ozphys_run rayleigh_damp_run sasas_deep_run sasas_shal_run zhaocarr_gscond_run zhaocarr_precpd_run

#### time\_step\_for\_radiation

long_name	radiation time step
units	s
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%raddt
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run

#### total\_cloud\_fraction

long_name	layer total cloud fraction
units	frac
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clouds(:, :, 1)
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run

#### total\_runoff

long_name	total water runoff
units	kg m-2
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%runoff
requested	lsm_noah_post_run

#### tracer\_concentration

long_name	model layer mean tracer concentration
units	kg kg-1
rank	3
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%qgrs
requested	edmf_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Stateout(i)%gq0
requested	NOT REQUESTED

#### transpiration\_flux

long_name	total plant transpiration rate
units	kg m-2 s-1
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%trans
requested	GFS_surface_generic_post_run lsm_noah_pre_run lsm_noah_run

#### upper\_bound\_on\_max\_albedo\_over\_deep\_snow

long_name	maximum snow albedo
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%snoalb
requested	lsm_noah_run

#### upward\_heat\_flux\_in\_soil

long_name	soil heat flux
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%gflx
requested	GFS_surface_generic_post_run lsm_noah_run sfc_nst_run sfc_sice_run

#### vegetation\_area\_fraction

long_name	areal fractional cover of green vegetation
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%sigmaf
requested	GFS_surface_generic_pre_run lsm_noah_run sfc_ex_coef_run

#### vegetation\_type

long_name	land use classification
units	index
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%ivegsrsc
requested	lsm_noah_run sfc_ex_coef_run

#### vertical\_dimension

long_name	number of vertical levels
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%levs
requested	GFS_MP_generic_post_run GFS_MP_generic_pre_run GFS_PBL_generic_pre_run GFS_calpreciptype_run GFS_zhao_carr_pre_run cnvc90_run dcyc2t3_run edmf_run get_phi_fv3_run get_prs_fv3_run gwdc_post_run gwdc_pre_run gwdc_run gwdps_run ozphys_post_run ozphys_run rayleigh_damp_run sasas_deep_run sasas_shal_run zhaocarr_gscond_run zhaocarr_precpd_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%levozp
requested	ozphys_run

#### vertical\_dimension\_of\_ozone\_forcing\_data\_from\_host

long_name	number of vertical layers in ozone forcing data coming from host
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%n_ozone_layers
requested	GFS_initialize_scm_run

#### vertical\_index\_at\_cloud\_base

long_name	vertical index at cloud base
units	index
rank	1
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%kbot
requested	GFS_suite_interstitial_3_run cnvc90_run gwdc_pre_run gwdc_run sasas_deep_run sasas_shal_run

#### vertical\_index\_at\_cloud\_top

long_name	vertical index at cloud top
units	index
rank	1
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%ktop
requested	GFS_suite_interstitial_3_run cnvc90_run gwdc_pre_run gwdc_run sasas_deep_run sasas_shal_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%kpbl
requested	edmf_run gwdps_run



#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%kd
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run rrtmg_lw_post_run rrtmg_sw_post_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%kb
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%kt
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run

#### vertical\_interface\_dimension

long_name	vertical interface dimension
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%levi
requested	GFS_calpreciptype_run

#### vertical\_layer\_dimension\_for\_radiation

long_name	number of vertical layers for radiation
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%lm
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run rrtmg_lw_post_run rrtmg_sw_post_run

#### vertical\_temperature\_average\_range\_lower\_bound

long_name	zseal in mm
units	mm
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%nstf_name(4)
requested	sfc_nst_post_run sfc_nst_run

#### vertical\_temperature\_average\_range\_upper\_bound

long_name	zsea2 in mm
units	mm
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%nstf_name(5)
requested	sfc_nst_post_run sfc_nst_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%smcwlt2
requested	lsm_noah_pre_run lsm_noah_run

#### volume\_fraction\_of\_soil\_moisture

long\_name    total soil moisture  
units        frac  
rank        2  
type        real  
kind        kind\_phys  
source       MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name   physics%Sfcprop(i)%smc  
requested    lsm\_noah\_run

#### volume\_fraction\_of\_unfrozen\_soil\_moisture

long\_name    liquid soil moisture  
units        frac  
rank        2  
type        real  
kind        kind\_phys  
source       MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name   physics%Sfcprop(i)%slc  
requested    lsm\_noah\_run

#### volume\_mixing\_ratio\_ccl4

long\_name    volume mixing ratio ccl4  
units        kg kg-1  
rank        2  
type        real  
kind        kind\_phys  
source       MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name   physics%Interstitial(i)%gasvmr(:, :, 9)  
requested    GFS\_rrtmg\_pre\_run  
             rrtmg\_lw\_run  
             rrtmg\_sw\_run

#### volume\_mixing\_ratio\_cfc11

long\_name    volume mixing ratio cfc11  
units        kg kg-1  
rank        2  
type        real  
kind        kind\_phys  
source       MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name   physics%Interstitial(i)%gasvmr(:, :, 6)  
requested    GFS\_rrtmg\_pre\_run  
             rrtmg\_lw\_run  
             rrtmg\_sw\_run

#### volume\_mixing\_ratio\_cfc113

long\_name    volume mixing ratio cfc113  
units        kg kg-1  
rank        2  
type        real  
kind        kind\_phys  
source       MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name   physics%Interstitial(i)%gasvmr(:, :, 10)  
requested    GFS\_rrtmg\_pre\_run

#### volume\_mixing\_ratio\_cfc12

long_name	volume mixing ratio cfc12
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%gasvmr(:, :, 7)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run

#### volume\_mixing\_ratio\_cfc22

long_name	volume mixing ratio cfc22
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%gasvmr(:, :, 8)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run

#### volume\_mixing\_ratio\_ch4

long_name	volume mixing ratio ch4
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%gasvmr(:, :, 3)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run

#### volume\_mixing\_ratio\_co

long_name	volume mixing ratio co
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%gasvmr(:, :, 5)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run

#### volume\_mixing\_ratio\_co2

long_name	volume mixing ratio co2
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%gasvmr(:, :, 1)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run

#### volume\_mixing\_ratio\_n2o

long_name	volume mixing ratio no2
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%gasvmr(:, :, 2)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run

#### volume\_mixing\_ratio\_o2

long_name	volume mixing ratio o2
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%gasvmr(:, :, 4)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%weasd
requested	lsm_noah_run sfc_sice_run

#### water\_vapor\_specific\_humidity

long_name	water vapor specific humidity
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%qgrs(:, :, scm_state%water_vapor_index)
requested	get_prs_fv3_run gwdc_run gwdps_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%qlyr
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%phy_f3d(:, :, 4)
requested	zhaocarr_gscond_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%save_qv
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

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Tbd(i)%phy\_f3d(:, :, 2)  
requested zhaocarr\_gscond\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Stateout(i)%gq0(:, :, scm\_state%water\_vapor\_index)  
requested GFS\_MP\_generic\_post\_run  
GFS\_MP\_generic\_pre\_run  
GFS\_calpreciptype\_run  
get\_phi\_fv3\_run  
sasas\_deep\_run  
sasas\_shal\_run  
zhaocarr\_gscond\_run  
zhaocarr\_precpd\_run

#### 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 gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Interstitial(i)%wind  
requested GFS\_surface\_loop\_control\_part1\_run  
GFS\_surface\_loop\_control\_part2\_run  
edmf\_run  
sfc\_ex\_coef\_run

#### x\_wind

long\_name zonal wind  
units m s-1  
rank 2  
type real  
kind kind\_phys  
source MODULE gmtb\_scm\_type\_defs TYPE physics\_type  
local\_name physics%Statein(i)%ugrs  
requested edmf\_run  
gwdc\_run  
gwdps\_run  
rayleigh\_damp\_run

```

x_wind_at_10m
  long_name  10 meter u wind speed
  units      m s-1
  rank       1
  type       real
  kind       kind_phys
  source     MODULE gmtb_scm_type_defs TYPE physics_type
  local_name physics%Diag(i)%u10m
  requested  edmf_run
             sfc_diag_run

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 gmtb_scm_type_defs TYPE physics_type
  local_name physics%Statein(i)%ugrs(:,1)
  requested  lsm_noah_run
             sfc_diag_run
             sfc_ex_coef_run
             sfc_nst_run
             sfc_sice_run

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 gmtb_scm_type_defs TYPE physics_type
  local_name physics%Interstitial(i)%save_u
  requested  GFS_DCNV_generic_post_run
             GFS_DCNV_generic_pre_run

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 gmtb_scm_type_defs TYPE physics_type
  local_name physics%Stateout(i)%gu0
  requested  gwdc_post_run
             sasas_deep_run
             sasas_shal_run

```



#### y\_wind

long_name	meridional wind
units	m s-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%vgrs
requested	edmf_run gwdc_run gwdps_run rayleigh_damp_run

#### y\_wind\_at\_10m

long_name	10 meter v wind speed
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%v10m
requested	edmf_run sfc_diag_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%vgrs(:,1)
requested	lsm_noah_run sfc_diag_run sfc_ex_coef_run sfc_nst_run sfc_sice_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%save_v
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Stateout(i)%gv0
requested	gwdc_post_run sasas_deep_run sasas_shal_run

#### 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%xmu
requested	GFS_PBL_generic_post_run GFS_suite_interstitial_2_run dcyc2t3_run edmf_run