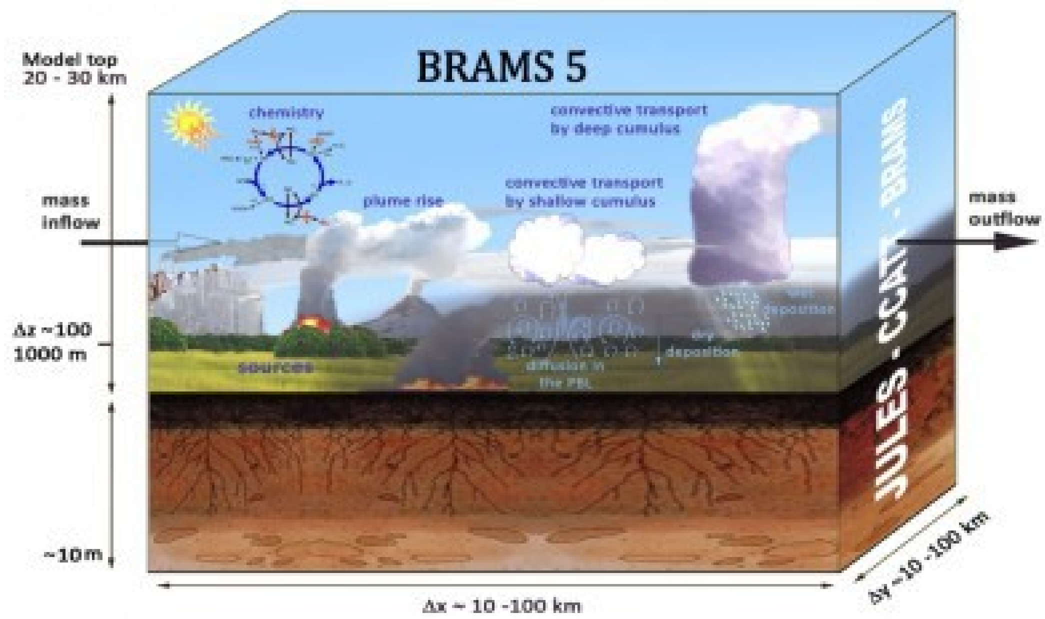

RAMSPOST

User's Guide for version 6.0
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1. Introduction

RAMSPOST (RAMS-POST processing) is a package for reformatting the output of BRAMS in order to generate graphs of environmental variables. The BRAMS is a regional model derived from RAMS (http://brams.cptec.inpe.br/) and your output files have different atmospheric information (such as the components of the vector wind speed, atmospheric pressure and temperature), geographic information (as topography) and others.

Once the BRAMS finishes a round, a set of files called "analysis" is generated in a file format called vfm. The vfm is a file format used to generate the input and output files of BRAMS where, in the case of analysis, are information of all output variables returned by the model. The RAMSPOST uses the file vfm analysis as input to produce output files corresponding to the software input format GrADS (Grid Analysis and Display System) for subsequent graphical display. GrADS is a tool that enables access, manipulation and data visualization of Earth sciences (http://cola.gmu.edu/grads/).

2. Structure

RAMSPOST is comprised of the main files

- Makefile
- include_ramspost.mk
- ramspost.inp
- objects.mk
- src/anheader.f90
- src/ramspost_A.f90
- src/ramspost_B.f90
- src/ramspost_C.f90
- src/ramspost_D.f90

and directories:

- include
- src/LIB
- src/util

3. RAMSPOST Installation

a) PHASE I – unzip

- Open the linux terminal
- Unzip the file

```
→ tar -xzvf ramspost60.tar.gz
```

b) PHASE II – Compile RAMSPOST

- Make modifications on the file include_ramspost_lib.mk, changing the options below to use the desired compilers and their compilation options. In this example, fortran compilers “gfortran” and the C compiler “gcc” are used. Save the file.

```
→ gedit include_ramspost_lib.mk
```

```
F_COMP=gfortran
F_OPTS=-O2 -g -fbacktrace -ffree-form -ffree-line-length-none
C_COMP=gcc
C_OPTS=-O2 -g
LOADER=gfortran
LOADER_OPTS=-O2 -g -fbacktrace
```

- Compile it

```
→ make
```

c) PHASE III – Checking and running RAMSPOST

- check the ramspost60 directory files:

```
→ ls
```

NOTE: observe 2 files in particular:

- **ramspost.inp** – RAMSPOST input file with the input parameters
- **ramspost_60** – RAMPOST executable file generated by PHASE II

- Change the ramspost.inp input file:

```
FPREFIX='/brams/dataout/ANL/OPQUE'
GPREFIX='outfile'
```

NOTE : In this file you can choose the variables that will be displayed as well as define the geographical area of interest. Check out the variables descriptor file. For now, watch yourself in FPREFIX and GPREFIX variables that define the BRAMS output files and the RAMSPOST output files, respectively. Save the file ramspost.inp. See item 4 to understand how to configure ramspost.inp

- Run the executable:

```
→ ./ramspost_60
```

a) PHASE IV – GrADS visualization

- Open the generated file “*outfile_g1.ctl*”. This is the GrADS descriptor file. The file name is composed by the GPREFIX + “_g1.ctl ”

- Run GrADS (Press y on the landscape mode question, then press enter):

  ```
  → grads
  ```

- Open the outfil_g1.ctl:

  ```
  → open outfil_g1.ctl
  ```

- Check the variables and visualize one variable of your interest (e.g. CO):

  ```
  → q file
  → set gxout shaded
  → display co
  ```

4. RAMSPOST (ramspost.inp) input file description

The ramspost.inp file has the name of the variables responsible for the post-processing of vfm analysis files, controlling the round of RAMSPOST to generate the input files for Grads. This section presents the key variables of this file.

The FPREFIX variable defines the location and the prefix of the analysis files (BRAMS outputs) :

```
FPREFIX = ' ./ANL/anl '
```

With this setting, the RAMSPOST will work with the files that have the prefix “anl” and are stored in the directory “ANL”. If the analysis files have another name or are stored in another directory, change the value of FPREFIX. If only one file will be displayed type your full name. If the BRAMS rounds have different configurations and analysis files are being generated in the same directory, it is important to change the prefix of the analysis files for each round. This prevents the RAMSPOST interpolate the results of various simulations

NOTE: change the prefix of the analysis files in ramspost.inp to match the RAMSIN of BRAMS.

```
AFILOUT = ‘./ANL/anl’      (RAMSIN)
FPREFIX = ‘./ANL/anl’      (RAMSPOST)
```

The NVP and VP variables indicate, respectively, the amount and which variables will be displayed. The following shows one example:

```
NVP = 54,
    VP ='t2mJ'   ,
    'td2mJ'      ,
    'slp_metar'  ,
```

```
'sfc_press'  ,
'vtype'      ,
'tempc2m'    ,
'tempc'      ,
'rh'         ,
'rv'         ,
'theta'      ,
'lai'        ,
'ndvi'       ,
'w'          ,
'ue_avg'     ,
've_avg'     ,
'smoist'     ,
'conpcp'     ,
'acccon'     ,
'totpcp'     ,
'tke'        ,
'h           ,
'le'         ,
'rshort'     ,
'rlong'      ,
'rlongup'    ,
'albedt'     ,
'cape'       ,
'cine'       ,
'cloud'      ,
'liquid'     ,
'ice'        ,
'cuthdp'     ,
'curtdp'     ,
'slp'        ,
'khh'        ,
'khv'        ,
'sea_press'  ,
'tempc5m'    ,
'speed10m'   ,
'ssc_seas'   ,
'ssa_seas'   ,
'bc1_bcar'   ,
'boc_bcarSRC',
'boc_bcar'   ,
'occ_ocar'   ,
'CO'         ,
'O3'         ,
'CO_src'     ,
'NO'         ,
'nakk'       ,
'nacc'       ,
'nboc'       ,
'nocc'       ,
'nmxx'       ,
```

In the other case below, 29 variables were defined for viewing. Each variable has a physical meaning and it is possible to know the meaning of each one with the help of the output file produced by RAMSPOST (.ctl extension) as seen below:

```
CO           20 99    - RAMS : CO Concentration                   [ppbv    ]
CO_src       20 99    - RAMS : CO src                             [kg/kg/da]
NO_src       20 99    - RAMS : NO src                             [kg/kg/da]
NO2          20 99    - RAMS : NO2 mixing ratio                   [ppbv    ]
O3           20 99    - RAMS : O3 Concentration                   [ppbv    ]
NO           20 99    - RAMS : NO Concentration                   [ppbv    ]
NMVOCm       20 99    - RAMS : Non methane VOCs mixing ratio RACM [ppbm    ]
OH           20 99    - RAMS : OH mixing ratio                    [ppbv    ]
PMINT         0 99    - RAMS : PM25 vert int                      [mg/m2   ]
PM25         20 99    - RAMS : PM25 Concentration                 [ug/m3   ]
aot550        0 99    - RAMS : AOT 550nm                          [        ]
aot500        0 99    - RAMS : AOT 500nm                          [        ]
vtype1        0 99    - RAMS : vegetation class: patch # 1        [#       ]
vtype2        0 99    - RAMS : vegetation class: patch # 2        [#       ]
clear_frac    0 99    - RAMS : clear sky                          [frac    ]
pwv           0 99    - RAMS : precipitable water vapor           [cm      ]
tempc2m       0 99    - RAMS : temp - 2m AGL;                     [C       ]
tempc        20 99    - RAMS : temperature                        [C       ]
tke          20 99    - RAMS : turb kinetic energy                [m2/s2   ]
h             0 99    - RAMS : sfc sens heat flx                  [W/m2    ]
le            0 99    - RAMS : sfc lat heat flx                   [W/m2    ]
rshort        0 99    - RAMS : rshort                             [W/m2    ]
rlong         0 99    - RAMS : rlong                              [W/m2    ]
rlongup       0 99    - RAMS : rlongup                            [W/m2    ]
albedt        0 99    - RAMS : albedt                             [        ]
ue_avg       20 99    - RAMS : ue_avg                             [m/s     ]
ve_avg       20 99    - RAMS : ve_avg                             [m/s     ]
rv           20 99    - RAMS : vapor mix ratio                    [g/kg    ]
rh           20 99    - RAMS : relative humidity                  [pct     ]
smoist1       7 99    - RAMS : soil moisture: patch # 1           [m3/m3   ]
smoist2       7 99    - RAMS : soil moisture: patch # 2           [m3/m3   ]
```

Note that some variables as vtype and smoist generate more than one field to be displayed. This is the reason RAMSPOST change the amount of 29 variables (the ramspost.inp) to 31 (in .ctl files). If the NVP indicated value is less than the number of variables included in VP, only the nth NVP variables are displayed.

NOTE: The list of all the variables that can be seen at Appendix A.

The GPREFIX variable works the same way FPREFIX, but it defines the prefix and where RAMSPOST output files will be stored.

```
GPREFIX = './POS/pos'
```

The ANL2GRA variable specifies whether will be produced one GrADS file for each analysis time (option 'ONE') or all analyzes will generate a single GrADS file (option 'ALL')

```
ANL2GRA = 'ONE'
```

The following variables define the grid display range. Note that BRAMS works over a limited area grid as defined in their Ramsin. With RAMSPOST you can define a viewing area provided it is within the area defined in BRAMS. Thus, LATI variables LATF define the initial and final latitude and LONI, LONF define the initial and final length of view. Typically, these variables are defined with values covering the whole world, as shown below. Thus, the RAMSPOST will work in any BRAMS simulation area.

By definition, the display limits that are in ramspost.inp are:

LATI = -90.,

LATF = +90.,

LONI = -180.,

LONF = +180.,

In the example below, note that there are three values for each variable. This is done for simulations with nested grids in BRAMS. The RAMSPOST considers the same order of simulations in BRAMS for nested grids. The number of in Ramsin file is set by NGRIDS parameter.

LATI = -90., -90., -90.,

LATF = +90., +90., +90.,

LONI = -180., -180., -180.,

LONF = +180., +180., +180.,

NOTE: BRAMS versions 5.x only admits one grid! If only one grid was used in the Ramsin file, or you want to use only one grid on the RAMSPOST, ensure that only one value is set for each parameter below, otherwise the execution will crash!

For one grid use:

LATI = -90.,

LATF = +90.,

LONI = -180.,

LONF = +180.,

The next variable is related to the projection. The BRAMS works with horizontal bars using the polar stereographic projection. Thus, there will be major distortions in the regions near the poles. To minimize this distortion, PROJ is the variable that allows the correction of distortion effects.

```
PROJ = ' YES'
```

The next variables are related to the vertical levels of the grid. The ZLEVMAX variable sets the amount of vertical levels for each grid of BRAMS (if nested grids are used). These values must be the same as defined in Ramsin. In the example below, 3 grids are used:

```
ZLEVMAX = 33,33,1,
```

ZLEVMAX defines the number of vertical levels to three nested crates. The following values for each grid is the same as defined in Ramsin. If the amount of vertical levels in RAMSPOST is less than the amount of vertical levels defined in Ramsin, the number of levels defined in RAMSPOST is displayed. Otherwise, the RAMSPOST consider the number of levels defined in Ramsin.

For one grid use:

```
ZLEVMAX = 33,
```

The IPRESSLEV variable defines the type of vertical level that will be used in the display. Three values are possible for this variable:

- Zero (0) indicates the vertical level as defined in the original grid BRAMS (Ramsin)
- One (1) indicates the vertical levels based on constant values of atmospheric pressure.
- Two (2) indicates the vertical levels based on constant altitude values.

If the variable is set to IPRESSLEV 1 or 2, the INPLEVS variable defines the number of vertical levels to be used for display. Remember that IPRESSLEV is set to 0, the original vertical levels are used.

Since INPLEVS variable was defined, the next step is to define the constant values for the atmospheric pressure (or altitude). These values are defined in IPLEV variable. This variable is defined as a sequence of values that indicate a level of atmospheric pressure (IPRESSLEV = 1) or altitude values (IPRESSLEV = 2) for displaying the vertical levels. Cases the levels chosen are not in accordance with the levels of the original vertical grid, RAMSPOST interpolates the original values to agree with the levels chosen in RAMSPOST.

```
IPRESSLEV = 1,
INPLEVS = 8,
IPLEV = 1000, 925, 850, 700, 500, 300, 200, 100,
```

In the above example, the vertical levels defined as constant levels of air pressure (IPRESSLEV = 1). 8 indicates that INPLEVS levels are used and sets the IPLEV atmospheric pressure (millibar) for determining the vertical levels. In the next example, the vertical levels were defined in terms of altitude.

```
IPRESSLEV = 2,
INPLEVS = 8,
IPLEV = 100, 800, 1500, 3000, 5500, 9000, 12000, 16000,
```

APPENDIX A – AVAILABLE VARIABLES FOR VISUALIZATION

3D Atmospheric Variables:

The following variables are defined on the 3D-atmospheric grid and may be plotted in either horizontal or vertical cross section. Obviously, many of these variables are dependent on which options were activated for a particular run.

3D Velocity and Vorticity Variables

Field Name	*Description[units]*	*Model Variables*
U	x-direction wind component [m/s]	UP
V	y-direction wind component [m/s]	VP
u_avg	eastward wind component averaged to T point [m/s]	UP, VP
v_avg	northward wind component averaged to T point [m/s]	UP, VP
Zitheta	Height PBL [m -sigmaz]	THETA, RCP
Eu	earth rotated eastward wind component [m/s]	UP, VP
Ve	earth rotated northward wind component [m/s]	UP, VP
ue_avg	eastward wind component earth rotated and averaged to T point [m/s]	UP, VP
ve_avg	northward wind component earth rotated averaged to T point [m/s]	UP, VP
w	z-direction wind component [m/s]	WP
wcms	z-direction wind component [cm/s]	WP
w_avg	z-direction wind component averaged to T point [m/s]	WP
speed	horizontal wind speed averaged to T point [m/s]	UP, VP
speed_mph	horizontal wind speed averaged to T point [mph]	UP, VP
direction	horizontal wind direction averaged to T point [deg]	UP, VP
relvortx	x-component of relative vorticity [rad/s]	UP, VP, TOPT
relvorty	y-component of relative vorticity [rad/s]	UP, VP, TOPT
relvortz	z-component of relative vorticity [rad/s]	UP, VP, TOPT
absvortz	z-component of absolute vorticity [rad/s]	UP, VP, TOPT
potvortz	z-component of potential vorticity [rad/s]	UP, VP, TOPT, THETA
horiz_div	horizontal divergence [s^-1]	WP

3D Thermodynamic Properties of Air

Field Name	*Description[units]*	*Model Variables*
pi	Exner function [J/(kg K)]	PI
press	pressure [mb]	PI

theta	potential temperature [K]	THETA
dn0	reference state density [kg/m^3]	TOPT
pi0	reference state Exner function [J/(kg K)]	TOPT
th0	reference state virtual potential temperature [K]	TOPT
pert_pressure	perturbation pressure [mb]	TOPT, PI
tempk	temperature [K]	THETA, PI
tempc	temperature [deg C]	THETA, PI
tempf	temperature [deg F]	THETA, PI
theta_e	equivalent potential temperature [K]	RV, THETA, PI
theta_v	virtual potential temperature [K]	THETA, PI

3D Moisture Mass Mixing Rations and Humidity

Field Name	***Description[units]***	***Model Variables***
rv	water vapor mixing ratio [g/kg]	RV
cloud	cloud water mixing ratio [g/kg]	RCP
rain	rain mixing ratio [g/kg]	RRP
pristine	pristine ice mixing ratio [g/kg]	RPP
snow	snow mixing ratio [g/kg]	RSP
aggregates	aggregates mixing ratio [g/kg]	RAP
graupel	graupel mixing ratio [g/kg]	RPP
hail	hail mixing ratio [g/kg]	RHP
liquid	liquid water mixing ratio [g/kg]	RCP, RRP, RGP, Q6,RHP, Q7
ice	ice mixing ratio [g/kg]	RPP, RSP, RAP, RGP, Q6, RHP, Q7
total_cond	total condensate mixing ratio [g/kg]	RPP, RSP, RAP, RGP, Q6, RHP, Q7
rtotal	total water mixing ratio [g/kg]	RV, RCP, RRP, RPP, RSP, RAP, RGP, RHP
rtotal_orig	total water mixing ratio (original method) [g/kg]	RTP
dewptk	dew point temperature [K]	RV, PI, T
dewptf	dew point temperature [deg F]	RV, PI, THETA
Field Name	***Description[units]***	***Model Variables***
dewptc	dew point temperature [deg C]	RV, PI, THETA
rh	relative humidity [percent]	RV, PI, THETA
clear_frac	clear sky [fraction]	RV, PI, THETA

3D Hydrometeor, CCN, CN, Dep N and nonhygroscopic Aerosol Number Concentration

Field Name	*Description[units]*	*Model Variables*
cloud_concen_mg	cloud droplet number concentration [#/mg]	CCP
rain_concen_kg	rain number concentration [#/kg]	CRP
pris_concen_kg	pristine ice number concentration [#/kg]	CPP
snow_concen_kg	snow number concentration [#/kg]	CSP
agg_concen_kg	aggregates number concentration [#/kg]	CAP
graup_concen_kg	graupel number concentration [#/kg]	CGP
hail_concen_kg	hail number concentration [#/kg]	CHP
cloud_concen_cm3	cloud droplet number concentration [#/cm^3]	CCP, TOPT
rain_concen_m3	rain number concentration [#/m^3]	CRP, TOPT
pris_concen_m3	pristine ice number concentration [#/m^3]	CPP, TOPT
snow_concen_m3	snow number concentration [#/m^3]	CSP, TOPT
agg_concen_m3	aggregates number concentration [#/m^3]	CAP, TOPT
graup_concen_m3	graupel number concentration [#/m^3]	CGP, TOPT
hail_concen_m3	hail number concentration [#/m^3]	CHP, TOPT
ccn_concen	CCN number concentration [#/mg]	CCCNP
ifn_conc	IFN number concentration [#/kg]	CIFNP

3D Hydrometeor Diameters

Field Name	*Description[units]*	*Model Variables*
cloud_diam	cloud droplet mean-mass diameter [microns]	RCP, CCP
rain_diam	rain mean-mass diameter [mm]	RRP, CRP
pris_diam	pristine ice mean-mass diameter [microns]	RPP, CPP
snow_diam	snow mean-mass diameter [mm]	RSP, CSP
agg_diam	aggregates mean-mass diameter [mm]	RAP, CAP
graup_diam	graupel mean-mass diameter [mm]	RGP, CGP
hail_diam	hail mean-mass diameter [mm]	RHP, CHP

3D Hydrometeor Temperature, Thermal Energy, Liquid Water Fraction

Field Name	*Description[units]*	*Model Variables*
q2	rain internal energy parameter [J/kg]	Q2

q6	graupel internal energy parameter [J/kg]	Q6
q7	hail internal energy parameter [J/kg]	Q7
rain_temp	rain temperature [deg C]	Q2
graup_temp	graupel temperature [deg C]	Q6
hail_temp	hail temperature [deg C]	Q7
rain_air_tempdif	rain-air temperature difference [K]	Q2, THETA, PI
graup_air_tempdf	graupel-air temperature difference [K]	Q6, THETA, PI
hail_air_tempdif	hail-air temperature difference [K]	Q7, THETA, PI
graup_fracliq	liquid fraction in graupel [ ]	Q6
hail_fracliq	liquid fraction in hail [ ]	Q7

3D Miscellaneous Fields

Field Name	***Description[units]***	***Model Variables***
geo	geopotential height [m]	TOPT
tke	turbulent kinetic energy [m^2/s^2]	TKEP
CO2	CO2 Concentration [ppm]	SCLP001
TKU0	CO tend concentration due convection transport	DUM3
cuthsh	Shallow convective heat hate [K/day]	THSRC_SH
curtsh	Shallow convective conv moisture rate [g/kg/day]	RTSRC_SH
cuthdp	Deep convective heat rate [K/day]	THSRC
curtdp	Deep convective moisture rate [g/kg/day]	RTSRC
curidp	Convective liquid/ice rate [g/kg/day]	D3500
fthrd	Radiate heat rate [K/day]	FTHRD
khh	horizontal scalar mixing coefficient [m^2/s]	HKH
khv	vertical scalar mixing coefficient [m^2/s]	VKH

2D Atmospheric Variables

The following variables are defined as a function of horizontal coordinates only and may only be plotted in horizontal cross section.

Field Name	***Description[units]***	***Model Variables***
tempf2m	2-meter-height air temperature [deg F.]	UP, VP, THETA, TOPT, TGP, SCHAR, GSF, PI

tempc2m	2-meter-height air temperature [deg C.]	UP, VP, THETA, TOPT, TGP, SCHAR, GSF, PI
speed10m	10-meter-height wind speed [m/s]	UP, VP, THETA, TOPT, GSF, SCHAR, TGP
clear_frac	clear sky fraction [fraction]	RV, PI, THETA
cloud_frac	cloud cover fraction [fraction]	RV, PI, THETA
pbl_ht	planetary boundary layer height [m]	TOPT, TKE

2D Surface Precipitation

Field Name	***Description[units]***	***Model Variables***
accpr	surface accumulated rain [kg/m2]	ACCPR
accpp	surface accumulated pristine ice [kg/m2]	ACCPP
accps	surface accumulated snow [kg/m2]	ACCPS
accpa	surface accumulated aggregates [kg/m2]	ACCPA
accpg	surface accumulated graupel [kg/m2]	ACCPG
accph	surface accumulated hail [kg/m2]	ACCPH
totpcp	surface accumulated resolved precipitation [mm liquid equivalent]	ACCPR, ACCPP, ACCPS,
totpcp_in	surface accumulated resolved precipitation	ACCPR, ACCPP, ACCPS,
precip	surface accumulated resolved plus convective precipitation [mm liquid	ACCPR, ACCPP, ACCPS,ACCPA, ACCPG, ACCPH, ACONPR
precip_in	surface accumulated resolved plus convective precipitation [inches liquid	ACCPR, ACCPP, ACCPS,ACCPA, ACCPG, ACCPH, ACONPR

Field Name	***Description[units]***	***Model Variables***
pcprr	surface precipitation rate of rain [mm/hr liquid equivalent]	PCPRR
pcprp	surface precipitation rate of pristine ice [mm/hr liquid equivalent]	PCPRP

psprs	surface precipitation rate of snow [mm/hr liquid equivalent]	PCPRS
pcpra	surface precipitation rate of aggregates [mm/hr liquid equivalent]	PCPRA
pcprg	surface precipitation rate of graupel [mm/hr liquid equivalent]	PCPRG
pcprh	surface precipitation rate of hail [mm/hr liquid	PCPRH
pcpg	total surface precipitation falling this timestep [kg/m^2]	PCPG
qpcpg	total internal energy of surface precipitation falling this timestep [J/m$_2$]	QPCPG
dpcpg	total added depth of surface precipitation falling this timestep [m]	DPCPG
pcprate	resolved surface precipitation [mm/hr liquid equivalent]	PCPRR, PCPRP, PCPRS,PCPRA, PCPRH, PCPRG, CONPRR
pcprate_in	resolved surface precipitation [inches/hr liquid equivalent]	PCPRR, PCPRP, PCPRS,PCPRA, PCPRH, PCPRG, CONPRR
precipr	resolved plus convective surface precipitation [mm/hr liquid equivalent]	PCPRR, PCPRP, PCPRS,PCPRA, PCPRH, PCPRG, CONPRR
precipr_in	resolved plus convective surface precipitation [inches/hr liquid equivalent]	PCPRR, PCPRP, PCPRS,PCPRA, PCPRH, PCPRG, CONPRR
conpcp	cumulus parameterization precipitation rate [mm/hr]	CONPRR

Field Name	***Description[units]***	***Model Variables***
acccon	cumulus parameterization accumulated surface precipitation [mm]	CONPRR
cape	Cape [J/kg]	RV, PI, THETA
cine	Cine [J/kg]	RV, PI, THETA

Vertically-integrated atmospheric moisture

Field Name	*Description[units]*	*Model Variables*
vertint_rt	vertically-integrated total water mixing ratio [mm liquid equivalent]	TOPT, RCP, RRP, RPP, RSP, RAP, RGP, RHP, RV
vertint_cond	vertically-integrated total condensate mixing ratio [mm liquid equivalent]	TOPT, RCP, RRP, RPP, RSP, RAP, RGP, RHP

2D Surface Heat, Moisture, Momentum and Radiative Fluxes

Field Name	*Description[units]*	*Model Variables*
SFLUX_T	SFLUX_T [m]	SFLUX_T
SFLUX_R	SFLUX_R [m]	SFLUX_R
SFLUX_W	SFLUX_W [m]	SFLUX_W
uw	surface x-component momentum flux [m^2/s^2]	UW
vw	surface y-component momentum flux [m^2/s^2]	VW
wfz	surface y-component momentum flux [m^2/s^2]	WFZ
h	surface sensible heat flux [W/m^2]	SFLUX_T, TOPT
le	surface latent heat flux [W/m^2]	SFLUX_R, TOPT
etrans	evapotranspiration rate [mm/hr]	SFLUX_R, TOPT
etrans_in	evapotranspiration rate [in/hr]	SFLUX_R, TOPT
umom_flx	surface x-component momentum flux [Pa]	UW, TOPT
vmom_flx	surface y-component momentum flux [Pa]	VW, TOPT
wmom_flx	surface x-component momentum flux [Pa]	SFLUX_W, TOPT
bowen	Bowen ratio [ ]	SFLUX_T, SFLUX_R
rshort	incident surface flux of shortwave radiation	RSHORT
rlong	incident surface flux of longwave radiation	RLONG
rlongup	upward surface flux of longwave radiation [W/m^2]	RLONGUP

Field Name	*Description[units]*	*Model Variables*
albedt	grid-cell-averaged surface albedo [ ]	ALBEDT
qsc1	qsc1 [???]	DUM1

2D Topography and Geographic Values

Field Name	*Description[units]*	*Model Variables*

topo	topography height [m]	TOPT
topoa	topography height [m]	TOPA
lat	latitude [deg]	GLAT
lon	longitude [deg]	GLON

2D Miscellaneous Fields

Field Name	*Description[units]*	*Model Variables*
slp_OLD	sea level pressure [mb]	TOPT, PI, THETA
slp	sea level pressure [mb]	TOPT, PI, THETA
sfc_div	horizontal divergence at surface [1/s]	WP
sst	water temperature [deg C]	TGP

LEAF2 Variables Section

Field Name	*Description[units]*	*Model*
ctprof	cloud top height [m]	???
land	land fractional area [ ]	PATCH_AREA
pfarea	patch fractional area [ ]	PATCH_AREA
soil_z0_ps, soil_z0_ps	soil roughness [m]	PATCH_AREA,
vtype, veg_class_bp	vegetation class [#]	PATCH_AREA, LEAF_CLASS
ndvi	ndvi [#]	PATCH_AREA, VEG_NDVIC
qveg_class_p, qveg_class_bp	q vegetation class [#]	PATCH_AREA, DATQ_CLASS
vegfrac, veg_fracarea_ps	vegetation fractional area [ ]	PATCH_AREA, VEG_FRACAREA
lai, veg_lai_ps	green leaf area index [ ]	PATCH_AREA, VEG_LAI

Field Name	*Description[units]*	*Model*
tai, veg_tai_ps	total leaf area index [ ]	PATCH_AREA, VEG_TAI
net_z0_p, net_z0_ps	net roughness [m]	PATCH_AREA, NET_Z0

vegz0, veg_z0_ps	vegetation roughness [m]	PATCH_AREA, VEG_ROUGH
vegdisp, veg_disp_ps	vegetation displacement height [m]	PATCH_AREA, VEG_DISP
patch_wetind	patch wetness index [ ]	PATCH_AREA, WET_INDEX
snowlevels	number of snow levels [#]	PATCH_AREA, KSNOW
grnd_mixrat_p, grnd_mixrat_ps	ground mixing ratio [g/kg]	PATCH_AREA, SFC_RS
soil_mixrat_p, soil_mixrat_ps	soil mixing ratio [g/kg]	PATCH_AREA, SOIL_RS
veg_moist_p, veg_moist_ps	vegetation moisture [kg/m2]	PATCH_AREA, VEG_MOIST
canopy_mixrat_p,canopy_mixrat_ps	canopy mixing ratio	PATCH_AREA, CAN_RV
tveg, veg_temp_ps	vegetation temperature [C]	PATCH_AREA, VEG_TEMP
tcan, canopy_temp_ps	canopy temperature [C]	PATCH_AREA, CAN_TEMP

Sib-stuffs, itb, CO2 src.

Field Name	***Description[units]***	***Model Variables***
src_co2	CO2 flux [umol/m**2/sec]	SRC_CO2
CO2_SIB	CO2 Concentration [ppm]	SCLP001
pco2ap	CAS CO2 [Pa]	pco2ap
pco2m	REF LEVEL CO2 [Pa]	pco2m
rst	stomatal resistance [sec/meter]	rst
CO2	CO2 Concentration [ppm]	SCLP001, SCLR004

ITB New Diagnostics

Field Name	Description[units]	Model Variables
fss	sensible heat flux [W/m^2]	fss
fws	latent heat flux [kg H2O/m^2/sec]	fws
assimn	canopy net assimilation [mol/m^2/sec]	assimn
respg	ground respiration [mol/m^2/sec]	respg
rstfac1	stress factor 1-leaf to CAS humidity [(-)]	rstfac1
rstfac2	stress factor 2-soil moisture[(-)]	rstfac2
rstfac3	stress factor 3-temperature[(-)]	rstfac3
rstfac4	stress factor 4-combination of factors 1-3[(-)]	rstfac4
ect	canopy transpiration [W/m^2]	ect
eci	canopy interception evaporation [W/m^2]	eci
egi	ground interception evaporation [W/m^2]	egi
egs	top soil layer evaporation [W/m^2]	egs
hc	canopy sensible heat flux [W/m^2]	hc
hg	ground sensible heat flux [W/m^2]	hg
capac1	VEGETATION INTERCEPTION STORE	Capac1
capac2, capac2_ps	GROUND INTERCEPTION STORE [kg/m^2]	PATCH_AREA, capac2
ustar, ustar_ps	ustar [m/s]	PATCH_AREA, USTAR
tstar, tstar_ps	tstar [K]	PATCH_AREA, TSTAR
rstar, rstar_ps	rstar [kg/kg]	PATCH_AREA, RSTAR
hp,sens_heat_flux_ps	sfc sensible heat flx [W/m2]	PATCH_AREA, USTAR, TSTAR, TOPT
lep, lat_heat_flux_ps	sfc lat heat flx [W/m2]	PATCH_AREA, USTAR, RSTAR , TOPT
snow_depth_p, snow_depth_ps	snow depth [m]	PATCH_AREA, SNOW_DEPTH
snowcover_p, snowcover_ps	snowcover [kg/m2]	PATCH_AREA, SNOW_MOIST
sltex_p, sltex_bp	soil textural class [#]	PATCH_AREA, SOIL_TEXT
soilq, soilq_ps	soil q [J/m3]	PATCH_AREA, SOIL_ENERGY
tsoil, soil_temp_ps	soil/sea temp [C]	PATCH_AREA, SOIL_ENERGY, SOIL_WATER, SOIL_TEXT
5050_temp_ps, 5050_tempf_ps	5050 tempF [F]	PATCH_AREA, CAN_TEMP

Field Name	Description[units]	Model Variables

smoist, SOIL_WATER_ps	soil moisture [m3/m3]	PATCH_AREA, SOIL_WATER
stext, stext_ps	soil texture [ ]	PATCH_AREA, SOIL_TEXT
SOIL_WATERf_p, SOIL_WATERf_ps	soil moisture frac [m3/m3]	PATCH_AREA, SOIL_WATER, SOIL_TEXT
leaf2_moisture	leaf2 moisture frac [m3/m3]	PATCH_AREA, SOIL_WATER, SOIL_TEXT, SNOW_MOIST, VEG_MOIST, CAN_RV
leaf2_temp	Similar to leaf2_moisture [m3/m3]	PATCH_AREA, SOIL_WATER, SOIL_TEXT, SNOW_MOIST, VEG_MOIST, CAN_RV

CATT

Field Name	***Description[units]***	***Model Variables***
CO	CO Concentration [ppb]	SCLP001
src1	Emission 1 [kg/m2/day]	scrsc001
src2	Emission 2 [kg/m2/day]	scrsc002
src3	Emission 3 [kg/m2/day]	scrsc003
src4	Emission 4 [kg/m2/day]	scrsc004
src5	Emission 5 [kg/m2/day]	scrsc005
src6	Emission 6 [kg/m2/day]	scrsc006
src7	Emission 7 [kg/m2/day]	scrsc007
src8	Emission 8 [kg/m2/day]	scrsc008
COstc	CO Conc. without conv. Transp [ppb]	SCLP002
COANT	CO Concentration ANTRO [ppb]	SCLP005
PM25	PM25 Concentration [ug/m3]	SCLP003, TOPT
PMINT	PM25 vert int [UG/M3]	SCLP003, TOPT
aot256	AOT 256nm [ ]	AOT
aot296	AOT 296nm [ ]	AOT
aot335	AOT 335nm [ ]	AOT
aot420	AOT 420nm [ ]	AOT
aot482	AOT 482nm [ ]	AOT
aot500	AOT 500nm [ ]	AOT
aot550	AOT 550nm [ ]	AOT

Field Name	Description[units]	Model Variables
aot598	AOT 598nm [ ]	AOT
aot690	AOT 690nm [ ]	AOT
secog	GOES-8 ABBA CO emission [kg/m2/day]	DUM1
secod	Duncan CO emission [kg/m2/day]	DUM1
secoant	Antropogenic CO emission [kg/m2/day]	DUM1
secoe	EDGAR CO emission [kg/m2/day]	DUM1
scco	Emitted CO mass [kg/(m2 day)]	QSC1
scpm25	Emitted PM25 mass [kg/(m2 day)]	QSC2
sccofe	Emitted CO FWB – EDGAR mass [kg/(m2 day)]	QSC3
sccoae	Emitted CO AWB – EDGAR mass [kg/(m2 day)]	QSC4
sccobbe	Emitted CO BB – EDGAR mass [kg/(m2 day)]	QSC5
sccod	Emitted CO Duncan mass [kg/(m2 day)]	QSC9
sccol	Emitted CO mass – logan [kg/(m2 day)]	QSC3
sccoant	Emitted CO mass – ANTRO [kg/(m2 day)]	QSC9
pwv	precipitable water vapor [cm]	RV, TOPT
CO2	CO2 Concentration [ppm]	SCLP004
TKUO	CO tend conc due conv trans [ppb/day]	DUM3
TKUOSH	CO tend conc due Shallow conv trans[ppb/day]	DUM8

Stilt – RAMS Coupling

Field Name	Description[units]	Model Variables
afxu	advect u flux [kg/m^2s]	AFXU
afxub	averaged adv u flux [kg/m^2s]	AFXUB
afxv	advect v flux [kg/m^2s]	AFXV
afxvb	averaged adv v flux [kg/m^2s]	AFXVB
afxw	advect w flux [kg/m^2s]	AFXW
afxwb	averaged adv W flux [kg/m^2s]	AFXWB
sigw	sigma W [ ]	SIGW
sigwb	averaged sigma W [m/s]	SIGWB
tlb	averaged Lagr timescale [s]	TLB
tl	Lagr timescale [s]	TL

Field Name	Description[units]	Model Variables
tkeb	average turb kinetic energy [m2/s2]	TKEPB
facup1	frac area cov up -deep [ ]	FACUP1
facup2	frac area cov up -shal [ ]	FACUP2
facdn1	frac area cov down -deep [ ]	FACDN1
cfxup1	conv up flux deep [kg/m^2s]	CFXUP1
cfxup2	conv up flux shallow[kg/m^2s]	CFXUP2
cfxdn1	conv down flux deep [kg/m^2s]	CFXDN1
dfxup1	deep conv flx up->env [kg/m^2s]	DFXUP1
efxup1	deep conv flx env->up [kg/m^2s]	EFXUP1
dfxdn1	deep conv flx env->down [kg/m^2s]	EFXDN1
dfxup2	shallow conv flx up->env [kg/m^2s]	DFXUP2
efxup2	shallow conv flx env -> up [kg/m^2s]	EFXUP2

GRELL cumulus scheme

Field Name	Description[units]	Model Variables
wdm1	Wet deposition mass tracer 1 [kg/m2]	wetdep001
wdm3	Wet deposition mass tracer 3 [kg/m2]	wetdep003
ierr	ierr [ ]	XIERR
ierrsh	ierr [ ]	XIERRSH
upmf	updraft mass flux [kg/(m^2 s)]	UPMF
dnmf	downdraft mass flux [kg/(m^2 s)]	DNMF
shmf	shallow cum mass flux [kg/(m^2 s)]	UPMFSH
lsfth	DEEP forcing theta [K/day]	lsfth
lsfrt	DEEP forcing water vapor [g/kg/day]	lsfrt
lsfthsh	Shallow forcing theta [K/day]	LsfthSH
lsfrtsh	Shallow forcing water vapor [g/kg/day]	lsfrtSH
topcl	Cloud top [ ]	XKTOP
jmin	Down starts level [ ]	XJMIN
cprtint	vertint cp rt [kg/m2*s]	TOPT, RTSRC

Field Name	Description[units]	Model Variables
xave	X_AVE [ ]	DUM5

xavec1	X_AVE Capmax [ ]	DUM5
xavec3	X_AVE Capmax [ ]	DUM5
xff0	XFF0 for deep [ ]	d2003
xff0sh	XFF0 for shallow [ ]	d2002
prgr1	precip closure 1 large cap [mm/h]	d3004
prgr2	precip closure 1 medium cap [mm/h]	d3004
prgr3	precip closure 1 low cap [mm/h]	d3004
prw1	precip closure 2 large cap [mm/h]	d3004
prw2	precip closure 2 medium cap [mm/h]	d3004
prw3	precip closure 2 low cap [mm/h]	d3004
prmc1	precip closure 3 large cap [mm/h]	d3004
prmc2	precip closure 3 medium cap [mm/h]	d3004
prmc3	precip closure 3 low cap [mm/h]	d3004
prst1	precip closure 4 large cap [mm/h]	d3004
prst2	precip closure 4 medium cap [mm/h]	d3004
prst3	precip closure 4 low cap [mm/h]	d3004
pras1	precip closure 5 large cap [mm/h]	d3004
pras2	precip closure 5 medium cap [mm/h]	d3004
pras3	precip closure 5 low cap [mm/h]	d3004
xstd	X_STD [ ]	DUM5
xske	x_ske [ ]	DUM5
xcur	x_cur [ ]	DUM5
xmbgr	xmbgr [ ]	DUM5
xmbw	xmbmc [ ]	DUM5
xmbst	xmbst [ ]	DUM5
xmbas	xmbas [ ]	DUM5
prgr	prgr [ ]	DUM5

Field Name	***Description[units]***	***Model Variables***
prw	prw [ ]	DUM5
prmc	prmc [ ]	DUM5
prst	prst [ ]	DUM5
pras	pras [ ]	DUM5
um	u mean [m/s]	DUM5

vm	v mean [m/s]	DUM5

TEB (Town Energy Budget)

Field Name	***Description[units]***	***Model Variables***
TROOF	Roof layers temperature [K]	T_ROOF
TROAD	Road layers temperature [K]	T_ROAD
TWALL	Wall layers temperature [K]	TWALL
TCANYON	Canyon Temperature [K]	T_CANYON
RCANYON	Canyon humidity [g/kg]	R_CANYON
TSROOF	Roof surface temperature [K]	TS_ROOF
TSROAD	Road surface temperature [K]	TS_ROOF
TSWALL	Wall surface temperature [K]	TS_WALL
LE_tr	Latent heat flux from traffic [W/m2]	LE_TRAFFIC
LE_in	Latent heat flux from industry [W/m2]	LE_INDUSTRY
H_tr	Sensible heat flux from traffic [W/m2]	H_TRAFFIC
H_in	Sensible heat flux from industry [W/m2]	H_INDUSTRY
PM25m3	PM25 Concentration [ug/m3]	PPM25, TOPT
NOm3	NO Concentration [ug/m3]	PNO, TOPT
NOppm	NO Concentration [ppmv]	PNO
NO2m3	NO2 Concentration [ug/m3]	PNO2, TOPT
NO2ppm	NO2 Concentration [ppmv]	PNO2
COm3	CO Concentration [ug/m3]	PCO, TOPT
COppm	CO Concentration [ppmv]	PCO
Field Name	***Description[units]***	***Model Variables***
SO2	SO2 Concentration [ug/m3]	PSO2, TOPT
SO4	SO4 Concentration [ug/m3]	PSO4, TOPT
O3m3	O3 Concentration [ug/m3]	PO3, TOPT
O3ppm	O3 Concentration [ppmv]	PO3
VOCS	VOCS Concentration [ppmv]	PVOC
HO2	HO2 Concentration [ppmv]	PHO2
O3P	O3P Concentration [ppmv]	PO3P
O1D	O1D Concentration [ppmv]	PO1D
HO	HO Concentration [ppmv]	PHO

RO2	RO2 Concentration [ppmv]	RO2
RHCO	RHCO Concentration [ppmv]	PRHCO

APPENDIX B – CHEMICAL VARIABLES LIST

Field	Description[units]	Model Variables	RELACS	RACM	CB07
COX	CO Concentration [ppb]	SCLP001	*x*	*x*	*x*
PRNO2	PRNO2 mix ratio [ppbm]	DCPB, TPAND, HC5P, HC8P, ETEP, OLTP, OLIP, ISOP, APIP, TOLP, XYLP, CSLP, ACO3P, KETP, ETEP	*x*	*x*	*x*
PRCO	PRCO mix ratio [ppbm]	DCPB, TPAND, APIP, ISOP, DIENP, OLIP, ETEP, HC3P, MACRP, GLYP	*x*	*x*	*x*
TCCO	CO total column [moles/cm^2]	SCLP001, TOPT	*x*	*x*	*x*
CO	CO Concentration [ppbv]	COP	*x*	*x*	*x*
COWD	Wet deposition mass CO [kg/m2]	COWD	*x*	*x*	*x*
CODD	Dry deposition mass CO [kg/m2]	CODD	*x*	*x*	*x*
NOWD	Wet deposition mass NO [kg/m2]	NOWD	*x*	*x*	*x*
O3WD	Wet deposition mass O3 [kg/m2]	O3WD	*x*	*x*	*x*
O3DD	Dry deposition mass O3 [kg/m2]	O3DD	*x*	*x*	*x*
Field	**Description[units]**	**Model Variables**	**RELACS**	**RACM**	**CB07**
H2O2WD	Wet deposition mass H2O2 [kg/m2]	H2OWD	*x*	*x*	*x*
HO2	HO2 Concentration [ppbv]	HO2	*x*	*x*	*x*
CO2	CO2 Concentration [ppbv]	CO2P	*x*	*x*	*x*
SO2	SO2 Concentration [ppbv]	SO2P	*x*	*x*	*x*
O3	O3 Concentration [ppbv]	O3P	*x*	*x*	*x*
TCO3	O3 tropos total column [moles/cm^2]	O3P, TOPT, GLAT	*x*	*x*	*x*
TCNO2	NO2 tropos total column [moles/cm^2]	NO2P, TOPT, GLAT	*x*	*x*	*x*
TCCO	CO tropos total column [moles/cm^2]	COP, TOPT ,GLAT	*x*	*x*	*x*
OH	OH Mixing Ratio [ppbv]	HOP	*x*	*x*	*x*
H2O	H2O Mixing Ratio [ppbv.1e6]	H2OP	*x*	*x*	*x*
OHD	OH Density [molec/cm^3]	HOP, THETA, PI	*x*	*x*	*x*
H2O2	H2O2 Mixing Ratio [ppbv]	H2O2P	*x*	*x*	*x*

NO	NO concentration [ppbv]	NOP	*x*	*x*	*x*
NO2	NO2 mixing ratio [ppbv]	NO2P	*x*	*x*	*x*
NO3	NO3 mixing ratio [ppbv]	NO3P	*x*	*x*	*x*
N2O5	N2O5 concentration [ppbv]	N2O5P	*x*	*x*	*x*
HONO	HONO concentration [ppbv]	HONOP	*x*	*x*	*x*
HNO3	HNO3 concentration [ppbv]	HNO3P	*x*	*x*	*x*
PAN	PAN mixing ratio [ppbv]	PANP	*x*	*x*	*x*
CH4	CH4 concentration [ppbv]	CH4P	*x*	*x*	*x*
PAR	PAR concentration [ppbv]	PARP			*x*
CRES	CRES concentration [ppbv]	CRESP			*x*
C2O3	C2O3 concentration [ppbv]	C2O3P			*x*
ISPD	ISPD concentration [ppbv]	ISPDP			*x*
ISOP	ISOP concentration [ppbv]	ISOPP			*x*
ETH	ETH mixing ratio [ppbv]	ETHP	*x*	*x*	*x*
MEOH	MEOH concentration [ppbv]	MEOHP			*x*
ETOH	ETOH concentration [ppbv]	ETOHP			*x*
OLE	OLE mixing ratio	OLEP			*x*
Field	***Description[units]***	***Model Variables***	***RELACS***	***RACM***	***CB07***
FORM	FORM mixing ratio [ppbv]	FORMP			*x*
ALD2	ALD2 mixing ratio [ppbv]	ALD2P			*x*
PNA	PNA mixing ratio [ppbv]	PNAP			*x*
NMVOC	Non methane VOCs mixing ratio CB07 [ppbv]	NMVOC = ETHP + PARP + CRESP + C2O3P + ISOPP + ETHP + MEOHP + ETOHP + OLEP + FORMP + ALD2P			*x*
NMVOCm	Non methane VOCs mixing ratio CB07 in mass [ppbm]	NMVOCm = ETHP + PARP + CRESP + C2O3P + ISOPP + ETHP + MEOHP + ETOHP + OLEP + FORMP + ALD2P			*x*
HC3	HC3 mixing ratio [ppbv]	HC3P		*x*	
HC5	HC5 mixing ratio [ppbv]	HC5P		*x*	
HC8	HC8 mixing ratio [ppbv]	HC8P		*x*	
TOL	TOL mixing ratio [ppbv]	TOLP		*x*	*x*
XYL	XYL mixing ratio [ppbv]	XYLP		*x*	*x*
CSL	CSL mixing ratio [ppbv]	CSLP		*x*	
ETE	ETE mixing ratio [ppbv]	ETEP		*x*	

OLT	OLT mixing ratio [ppbv]	OLTP		*x*	
OLI	OLI mixing ratio [ppbv]	OLIP		*x*	
DIEN	DIEN mixing ratio [ppbv]	DIENP		*x*	
ISO	ISO mixing ratio [ppbv]	ISOP		*x*	
API	API mixing ratio [ppbv]	APIP		*x*	
LIM	LIM mixing ratio [ppbv]	LIMP		*x*	
ALD	ALD mixing ratio [ppbv]	ALDP	*x*	*x*	
KET	KET mixing ratio [ppbv]	KETP		*x*	
MACR	MACR mixing ratio [ppbv]	MACRP		*x*	
MGLY	MGLYP concentration [ppbv]	MGLYP		*x*	*x*
HCHO	HCHO mixing ratio [ppbv]	HCHOP		*x*	

Field Name	Description[units]	Model Variables	RELACS	RACM	CB07
NMVOC	Non methane VOCs mixing ratio RACM [ppbv]	NMVOC = ETHP + HC3P + HC5P + HC8P + ETEP + OLIP + OLTP + DIENP + TOLP + XYLP + CSLP + HCHOP + ALDP + KETP + MACRP + MGLYP + GLYP + ORA1P + ORA2P		*x*	
NMVOCm	Non methane VOCs mixing ratio RACM in mass [ppbm]	NMVOCm = ETHP + HC3P + HC5P + HC8P + ETEP + OLIP + OLTP + DIENP + TOLP + XYLP + CSLP + HCHOP + ALDP + KETP + MACRP + MGLYP + GLYP + ORA1P + ORA2P		*x*	
VOC	VOCs mixing ratio RACM [ppbv]	VOC = ETHP + HC3P + HC5P + HC8P + ETEP + OLIP + OLTP + DIENP + TOLP + XYLP + CSLP + HCHOP + ALDP + KETP + MACRP + MGLYP + GLYP + ORA1P + ORA2P + CH4P		*x*	
ALKA	ALKA mixing ratio [ppbv]	ALKAP	*x*		
ALKE	ALKE mixing ratio [ppbv]	ALKEP	*x*		
ARO	ARO mixing ratio [ppbv]	AROP	*x*		
BIO	BIO mixing ratio [ppbv]	BIOP	*x*		
CRBO	CRBOP mixing ratio [ppbv]	CRBOP	*x*		
NMVOC	Non methane VOCs mixing ratio RELACS [ppbv]	NMVOC = ETHP + ALKAP + ALKEP + AROP + BIOP + HCHOP + ALDP + KETP + CRBOP + ORA1P + ORA2P	*x*		
NMVOCm	Non methane VOCs mixing ratio RELACS in mass [ppbm]	NMVOCm = ETHP + ALKAP + ALKEP + AROP + BIOP + HCHOP + ALDP + KETP + CRBOP + ORA1P + ORA2P	*x*		

Field Name	Description[units]	Model Variables	RELACS	RACM	CB07
VOC	VOCs mixing ratio RELACS [ppbv]	VOC = ETHP + ALKAP + ALKEP + AROP + BIOP + HCHOP + ALDP + KETP + CRBOP + ORA1P + ORA2P + CH4P	***x***		
NOSRCBB	NO_bburn_SRC	NO_bburn_SRC	***x***	***x***	***x***
NO_src	NO src [kg/kg/day]	NO_src = NO_bburn_SRC + NO_antro_SRC + NO_bioge_SRC	***x***	***x***	***x***
CO_src	CO src [kg/kg/day]	CO_src = CO_bburn_SRC + CO_antro_SRC + CO_bioge_SRC	***x***	***x***	***x***
PM25_src	PM25 src [kg/kg/day]	bburn2_SRC	***x***	***x***	***x***
SO4_src	SO4 src [kg/kg/day]	urban2_SRC	***x***	***x***	***x***
PM10_src	PM10 src [kg/kg/day]	bburn3_SRC	***x***	***x***	***x***