Chapter 5. Usage Environments

Contents

Introduction

Currently, the SMOKE programs need to be executed using the C shell in the Unix environment, which is defined using environment variables. The environment variables can be defined at the UNIX prompt, in C shell scripts, through the Models-3 Study Planner, or with the Environmental Decision Support System (EDSS) Study Planner. Released implementations of SMOKE integrated with Models-3 or with EDSS are not currently available. However, SMOKE can be run using scripts until the time that these more user-friendly interfaces are available with SMOKE.

There are a very large number of environment variables used to control SMOKE. The variables can affect a single SMOKE program or multiple programs. SMOKE variables affect all programs. Depending on the interface that you are using for SMOKE, these variables are classified differently based on the structure of the interface. This chapter describes the different methods by which SMOKE can be run, and summarizes all of the environment variables that are

shared by two or more programs. In the next section, the descriptions of all shared environment variables are provided. In subsequent sections, these variables will be listed, but not explained.

Shared Environment Variables

The following environment variables are shared by two or more programs. They are listed in alphabetic order.

- **DAY_SPECIFIC_YN:** [P] [default N]
  Defines whether or not to import day-specific inventory data
  - Y: Imports day-specific data
  - N: Does not import day-specific data
- **G_SDATE:** Sets the default simulation starting date. Julian format (DDDYYYY).
- **G_STIME:** Sets the default simulation starting time for the simulation (HHMMSS). Midnight may be entered as 0 instead of 000000.
- **G_RUNLEN:** Sets the default length of simulation (HHMMSS).
- **G_TSTEP:** Sets the default time step (HHMMSS). SMOKE will not permit any other value that 10000 (hourly time steps), because many data formats assume hourly time steps.
- **HOUR_SPECIFIC_YN:** [P] [default N]
  Defines whether or not to import hour-specific inventory data
  - Y: Imports hour-specific data
  - N: Does not import hour-specific data
- **OUTZONE:** The Temporal and Tmpbio programs use this environment variable for output of hourly emissions with the correct time shift from Greenwich Mean Time (GMT). The date and time environment variables (G_STDATE and G_STTIME) are further defined to SMOKE with the OUTZONE setting, because SMOKE interprets the date/time settings to be for the time zone set by OUTZONE. Users should not attempt to account for daylight time in their setting of OUTZONE, but rather, **use the standard time** for the time zone of interest. SMOKE will adjust to daylight time for episodes that are during periods and in regions where daylight time applies.

  The table below provides possible allowed values for OUTZONE. The CMAQ and MAQSIP models expect OUTZONE to be 0, while other models, such as UAM-IV, UAM-V, REMSAD, and CAM_X often use time zone 5. All models expect that the emissions and the meteorology data provided to the model will have a consistent time zone. SMOKE expects that the meteorology data will be in GMT).

SMOKE "OUTZONE" settings for different SMOKE output time zones.

OUTZONE	GMT	Time zone	Description
0	+0:00	GMT	Greenwich Mean Time (Also known as Zulu time)
4	-4:00	AST	Atlantic standard time
5	-5:00	EST	Eastern standard time
6	-6:00	CST	Central standard time
7	-7:00	MST	Mountain standard time
8	-8:00	PST	Pacific standard time
9	-9:00	YST	Yukon standard time
10	-10:00	HST	Hawaiian standard time
10	-10:00	CAT	Central Alaska time
11	-11:00	NT	Nome time

Note that SMOKE expects OUTZONE to be set as a positive number for time zones in the Western Hemisphere, although standard notation would list these as negative values. For example, Eastern Standard Time is listed in this table as -5:00 hours from GMT, but OUTZONE for EST in SMOKE is 5.

For more information on time zones, see http://time.greenwich2000.com/info/timezone.htm.

- **PROMPTFLAG:** [default: Y]
  Defines whether the program prompts for user input.
  - Y: program runs interactively, prompting for user input
  - N: program runs automatically using only preset environment variables
- **REPORT_DEFAULTS:** [default: Y]
  Defines whether or not this program reports when the emission factor cross-reference file designates the default emission factor to an emissions source.
  - Y: list sources in the Logfile when they use default emission factors
  - N: does not list sources that use the default emission factors
- **SMK_DEFAULT_TZONE:** [A, M, P] [default: 5]

This variable defines the default time zone to use for sources that do not match entries in the COSTCY file.

- **SMK_EMLAYS:** [default: -1]
  integer, number of emissions layers, must be at least 4

- **SMK_MAXERROR:** [default 100]
  Defines the maximum number of each type of ERROR statements to be displayed by SMOKE. Set this environment variable to an integer, such as 100.

- **SMK_MAXWARNING:** [default 100]
  Defines the maximum number of each type of WARNING statements to be displayed by SMOKE. Set this environment variable to an integer, such as 100.

- **SMK_O3SEASON_YN:** [default: N]
  Indicates whether or not to read ozone season emissions instead of annual emissions from the inventory file. This settings affects Cntlmat reporting for the emissions values being annual or seasonal; Temporal for the emissions that are used for temporal allocation; and Smkmerge for the emissions that are read from the SMOKE inventory files *when merging without temporal allocation.*

  - Y: read ozone season emissions

  - N: do not read ozone season emissions

  - **SMK_PING_METHOD:** [default 0 (no PinG sources)]
    Defines the method to use in determining plume-in-grid point sources for further SMOKE processing.

  - 0: No PinG sources

  - 1: Use PinG section of PELVCONFIG configuration file

    For all models that SMOKE supports except MAQSIP, use of PinG sources is optional. MAQSIP does not include a released PinG implementation. Some models may have limitations on the number of PinG sources supported, and users must make sure that these limitations are met. SMOKE does not automatically compare with these limitations, if any (at the time of this writing, we do not know what these limitations are).

    For CMAQ, SMOKE will output a STACK_GROUPS file from the Elevpoint program and a PINGTS_[S|L] file from the Smkmerge program to support PinG. For UAM-style processing, it causes SMOKE to will flag PinG sources in the ASCII elevated file created by Smkmerge, and should be used with the SMK_ASCIIELEV_YN option set to Y to create this ASCII elevated file.

- **SMK_SOURCE:** [default: blank]
  Defines the type of sources to be processed. Valid values are:
  - A: area sources
  - M: on-road mobile sources
  - P: point sources
  - B: biogenic sources
- **SPEC_OUTPUT:** [A, M, P] [default: ALL]
  Defines the types of speciation outputs to create.
  - MASS: output speciation matrix based on mass
  - MOLE: output speciation matrix based on moles
  - ALL: output both mass and mole speciation matrices
- **TVARNAME:** [default: TEMPG]
  The name of the temperature variable to use for temperatures read by the program.
- **WEST_HSPHERE:** [default: Y]
  Defines how the program interprets spatial coordinates.
  - Y: converts longitudinal coordinates for the Western Hemisphere (positive values are converted to negative values)
  - N: does not convert longitude values (positive values are not changed)

SMOKE Scripts

The headers of the SMOKE scripts list most of the environment variables used by the SMOKE programs called from the script. These listings of environment variables are arranged by program and by multiple-program variables.

Program-Specific Environment Variables

The program-specific variables are description in Chapter 7.

Multiple-Program Environment Variables

All variables listed above as Shared Environment Variables should be listed as a multiple-program environment variable in the scripts.

Assigns File

The Assigns file is a UNIX script that defines environment variables for running a SMOKE program or programs from the UNIX prompt or from scripts. The environment variables in the Assigns file are either parts of file names or directories (e.g, ESCEN is the emissions scenario name and is used in file names), particular directories, or particular files. Those environment variables that correspond to files are logical names. Global, plan, and program environment variables are generally set in run scripts and not the Assigns file, but they could be set in the Assign file if the user wanted to.

The Assigns files are located in the $SMKROOT/assigns directory, but this directory is different depending on whether you have installed SMOKE under EDSS or Models-3. If you have installed SMOKE under EDSS, the directory is $EDSS_ROOT/subsys/smoke/assigns. If you have installed SMOKE under Models-3, the directory is $M3MODEL/smoke/assigns.

In order to utilize this ASSIGNS file, first edit the file so the statements use appropriate path and file names for your computer and preferences. Then, change your active directory to the directory containing the ASSIGNS file and issue the following shell command. Note that in this example, the Assigns file is simply named "ASSIGNS," but the names usually have the emissions scenario, chemical mechanism abbreviation, and grid names in the file name.

```
source ASSIGNS
```

Models-3 Study Planner

Global Environment Variables

The implementation of SMOKE in the Models-3 environment groups the shared environment variables into two groups: global and plan. Global environment variables affect the behavior of many or all SMOKE programs. To define the global environment variables in the Study Planner, go to the Study Properties screen and enter these variables under Study Global Environment Variables. The Study Planner will also show these same variables as plan and program environment variables, so that the user can override the global setting for specific plans or programs.

The shared environment variables that are provided as global Study Planner variables are the following:

G_SDATE

G_STIME

G_RUNLEN

G_TSTEP

OUTZONE

PROMPTFLAG

REPORT_DEFAULTS

SMK_MAXERROR

SMK_MAXWARNING

SMK_O3SEASON_YN

SMK_PING_YN

SMK_SPECELEV_YN

WEST_HSPHERE

Plan Environment Variables

Plan environment variables affect a group of programs or for a source category. In the Models-3 Study Planner, these variables are defined at the plan level within a study. To define these variables in the Study Planner, first select a plan, and then select its Env Parameters tab. Define and initialize the environment variables on this screen. The Study Planner will show these same variables (with the exception of the date and time variables, which are not shown at all) as program environment variables, so that the user can override the plan settings.

The shared environment variables that are provided as plan Study Planner variables are the following:

DAYLIGHT_EXEMPT

DAY_SPECIFIC_YN

HOUR_SPECIFIC_YN

SMK_DEFAULT_TZONE

SMK_SOURCE

TVARNAME

Program Environment Variables

Program environment variables affect the behavior of a single program. These variables are described in the Program documentation. When using the Models-3 interface, define program-specific environment variables in the Program Manager module as part of defining the program's files and settings. To do this, select a program from the Program Manager, and then select Details. Go to the Env Vars screen and view the variables that have been defined for that individual program. For SMOKE programs, this step will have already been done when the

SMOKE programs were registered with the Models-3 database.

To change the value of an environment variable for the study, first open the program within the Study Planner by double clicking with your computer mouse on the SMOKE program node in the plan. The program environment variables will be one of the elements of the window for the program. Edit the environment variable values you need to change and save your changes before executing the study. The specific program environment variables used by each program are described with each program.

EDSS Study Planner

Study Planner variables in EDSS are similar to those in the Models-3 Study Planner. One major exception is that there are no plan environment variables. This is because in EDSS, only one plan is allowed per study. So, there is no need to differentiate between variables that affect just a plan, and those that affect all plans.

Global Environment Variables

The following variables are global environment variables in the EDSS implementation of SMOKE. Some shared variables are treated as program environment variables in order to reduce the number of global environment variables.

G_SDATE

G_STIME

G_RUNLEN

G_TSTEP

OUTZONE

PROMPTFLAG

Program Environment Variables

All shared variables not treated as global variables in the EDSS Study Planner are treated as program environment variables. In addition, the true program environment variables are described in Chapter 7.
