Install and Basic Operation Guide for
Baseline Integrated Environmental Modeling of the West Virginia Coal River watershed USGS HUC8 (05050009) with the FRAMESv2 (F2) modeling framework.

System Requirements

Software:
1 – MS Windows7 64bit OS.
2 – MS DotNet framework 4.
3 – 32 bit version of Java 7 JRE or JDK.
Hardware:
1 - A modern threading capable CPU with 8 GB RAM; operating at 3GHz or faster is recommended.
2 – 60 GB contiguous free HDD

Notes:
The DotNet framework can be found here
http://www.microsoft.com/en-us/download/details.aspx?id=24872 .
Either the full or client profile versions of the framework 4 will work. Java software can be found here http://java.com/en/download/manual.jsp .
The FRAMESv2 framework was built with a Java7 JRE release and is the best choice for versions of Java; earlier or later versions may work but have not been tested. Java technology is used to register the F2 domains, its variables, units and modules. Note that 64 bit versions of Java have been found not to work.

Installation

1 – Download the installer to local temporary storage.
2 – Obtain and install any software requirements as necessary.
3 – Run the installer **with administrative permissions**.

Notes:
The installer performs the following functions; installs the F2 core system and the iemWatersheds domain (data files, science and system files and completed simulation files), registers the domains with F2, chains in execution of the WASP7 model installer and finally copies large memory images of the WASP modeling system executables to the WASP install directory. **FRAMES installs to c:\iemTechnologies by default**. The WASP model installs to c:\wasp7 by default; **change the WASP install location to c:\wasp when prompted.** FRAMES-iemWatersheds has been configured for these locations; it is strongly recommended that you keep these locations or operation (see below) of the system as configured will fail.

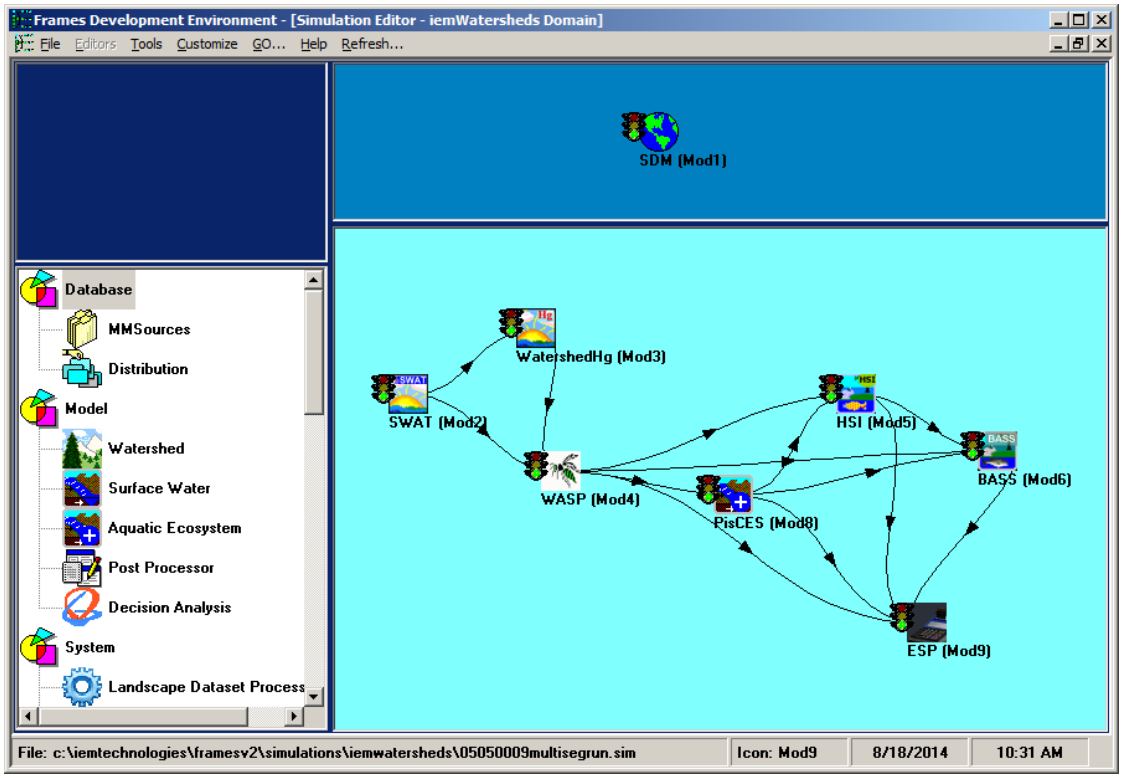
Installer behavior:
F2 core and iemWatersheds files are installed and, upon completion, F2 registration is performed and the FRAMES framework is subsequently invoked and starts. A one-time dialog appears and, if registration was successful, asks the user which domain to open via drop-down selection (Core or iemWatersheds). If successful, select iemWatersheds, exit FRAMES and continue with the installation process. If registration failed, close FRAMES, continue with the installation process, and perform the registration step after installation of WASP is completed. The WASP model installer is invoked next; follow the steps as presented in dialogs remembering to change the install location from c:\wasp7 to c:\wasp. In some instances, a not-enough-space warning dialog is displayed when installing WASP database components; ignore this and tell the installer to install anyway. As a final step the installer launches a script to overwrite the WASP model executable images with large-memory map versions and is dependent on WASP being installed to the c:\wasp folder for success. A desktop icon for the F2 FDE should now be accessible; right-click and select Run (as Administrator). If the application was installed by someone with admin rights and the user does not have these rights, the administrator must grant full access rights (create/delete/read/write/execute) to the users' account for the folders/files created during the install. After starting the FDE, proceed to the Operation section below.

If F2 registration of domains failed during installation:
FRAMESv2 registration of the Core/iemWatersheds domains will fail if the registration script cannot locate Java executables. Typically on a Win7 64 bit system Java is installed here: C:\ProgramFiles (x86)\Java\jre7 (or the equivalent for an installed jdk). The script reads a system environment variable JAVA_HOME. Create a JAVA_HOME environment variable pointing to the installed location of your jre/jdk; for example, JAVA_HOME="c:\program files (x86)\java\jre7" and then in WindowsExplorer browse to c:\iemtechnologies\framesv2 and run (as Administrator) "clean.bat" to register the domains. Clean registers the system and launches the FDE; you should now be able to select the iemWatersheds domain as the start-up domain for the F2 system. Proceed to the Operation section.

Operation

System resources for operation of FRAMES/iemWatersheds are considerable. It is best to run on a dedicated system but if that is not possible make sure no other programs are running when you start FRAMES. If Out_Of_Memory errors (OOM) are encountered (most likely during BASS or WASP operation), close FRAMES, re-boot the system, restart FRAMES and re-open the simulation. The simulation will be in the last-saved state and you can then re-run the module where the OOM error was encountered.

Start FRAMES by clicking on the FRAMESv2 FDE desktop icon. In the FDE select File→Open and browse to c:\iemtechnologies\FRAMESv2\Simulations\iemWatersheds folder and choose 05050009multiSegrun.sim. The completed West Virginia Coal River baseline simulation will open. Give it time to open; wait long enough (see Simulation file operations below) and you should see:



The 05050009multiSegrun simulation comprises 21 year runs (1990 through 2010) of all modules on a 97 segment hydrology scheme of the Coal River HUC8 (05050009). SWAT and WatershedHg run segment-by-segment, WASP runs in 3 stages for all segments (heat, eutrophication, Hg), PisCES and HSI run segment-by-segment, BASS runs once for each segment (97 times) and ESP aggregates simulation output of 45 variables of interest by year and segment (see file "esp.csv" in the scratch folder of the FRAMESv2\iemWatersheds\ESP folder hierarchy). Run times are significant, see table below.

To repeat the simulation:
Rright-click the SDM icon and select Run. A command window will appear with diagnostic and informational output as SDM runs. SDM prepares and distributes data files necessary for the science modules to operate. Upon completion note that the icon traffic lights for all downstream modules turned from green to yellow (meaning from execution completed to execution ready). Having re-run SDM, all modules must now be run in order as indicted by the arrows on the lines connecting the modules (left to right or up-stream to down-stream). Note that WASP is downstream from SWAT but WASP also consumes output from WatershedHg indicating that both SWAT and WatershedHg must complete before WASP execution is attempted. If fact the system will prevent execution of a downstream module by greying-out the Run option; Run only becomes selectable for a yellow-colored icon when all the module's inputs have been satisfied. It is important to sync F2's memory image of the simulation with the disk image by saving the simulation after each individual module is run; accomplished with File→Save. Execute the modules and, post-execution of each module, save the simulation; in upstream to downstream order.

Approximate Run Times:

Module	Intel Core2 Quad @ 3GHz (Q9650), w/ 8 GB RAM
SDM	2 min
SWAT	54 min
WatershedHg	12 min
WASP	1 hr 48 min
PisCES	14 min
HSI	15 min
BASS	6 hr 38 min
ESP	1 hr 10 min
Total	11 hr 13 min

Simulation file operations:
FRAMES FDE File→Open, File→Save and File→SaveAs operation times are variable depending on the amount of data being manipulated (i.e.; the number of modules that have run in a simulation). Upward of 5 minutes (or more on slower systems) can elapse before the FDE becomes user-interactive after an Open, Save or SaveAs; be patient.

Mercury Sensitivity

In an effort to reduce the disk requirement of the installer package size the Hg deposition baseline, low and high simulation files are not included; but the data for performing the simulations and the ESP output for these runs are.

To repeat the Hg sensitivity runs:
Edit the "APESDepositionData.csv" file in the c:\iemTechnologies\FRAMESv2\iemWatersheds\Data folder. Line number 1047 contains the Hg deposition data (PRECIP (Average annual, cm), TWDEP_HG (annual total wet deposition, ug/m^2), TDDEP_HG (annual total dry deposition, ug/m^2)) for the Coal River location; HUC12 05050009. See the associated document , Atmospheric Hg Deposition for the W.docx for the derivation of Hg deposition data. Note that the column header, "HUC12", is misnamed; this line represents data for the entire Coal River HUC8. Also note that if you're editing in MS Excel, the leading zero for the HUC identifiers may be missing. Regardless of your editing methodology, the edited file with this line must be saved as a CSV file back to disk with leading zero intact or the SDM module will fail in locating the data. Replace the deposition values with data found in the HgSensitivityData.xlsx file (same folder location). Use Hgbaseline, Hglow or Hghigh values (sheet CRHgDep, lines 40 through 43) as desired.
Open the 05050009multiSegRun simulation file in the FDE and select File→SaveAs and provide an appropriate name (e.g. CRBaselineHg, CRLowHg, CRHighHg,…). Repeat the simulation steps. After completion of the simulation save the ESP output by appropriately renaming the "esp.csv" file found in the scratch folder of the F2 ESP folder hierarchy.