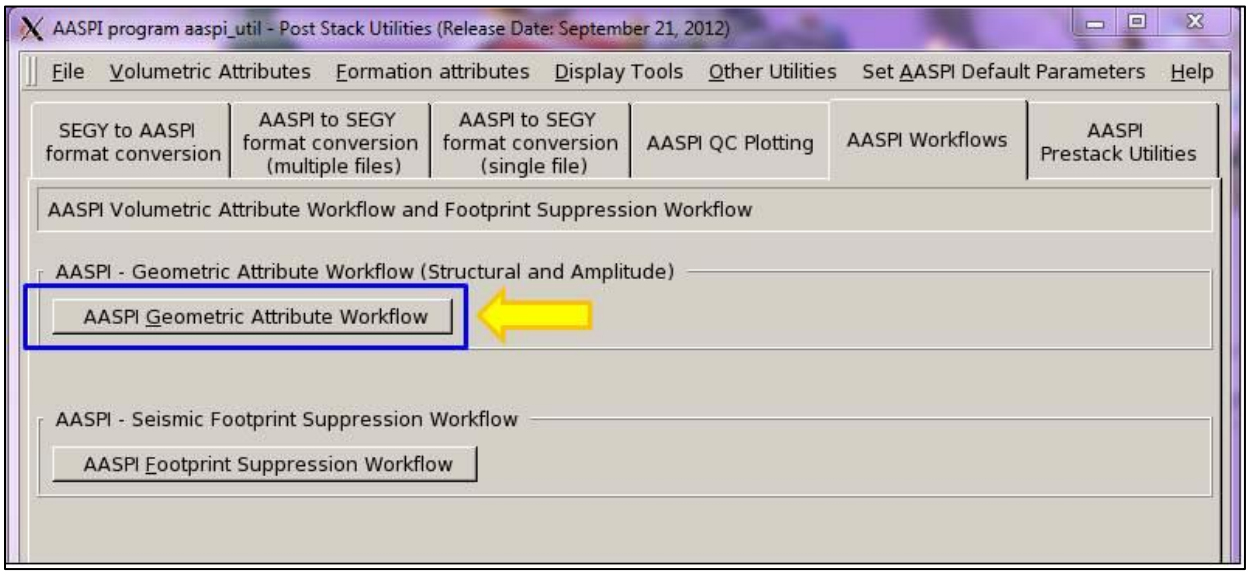
Constructing a Geometric Attribute Workflow

Introduction

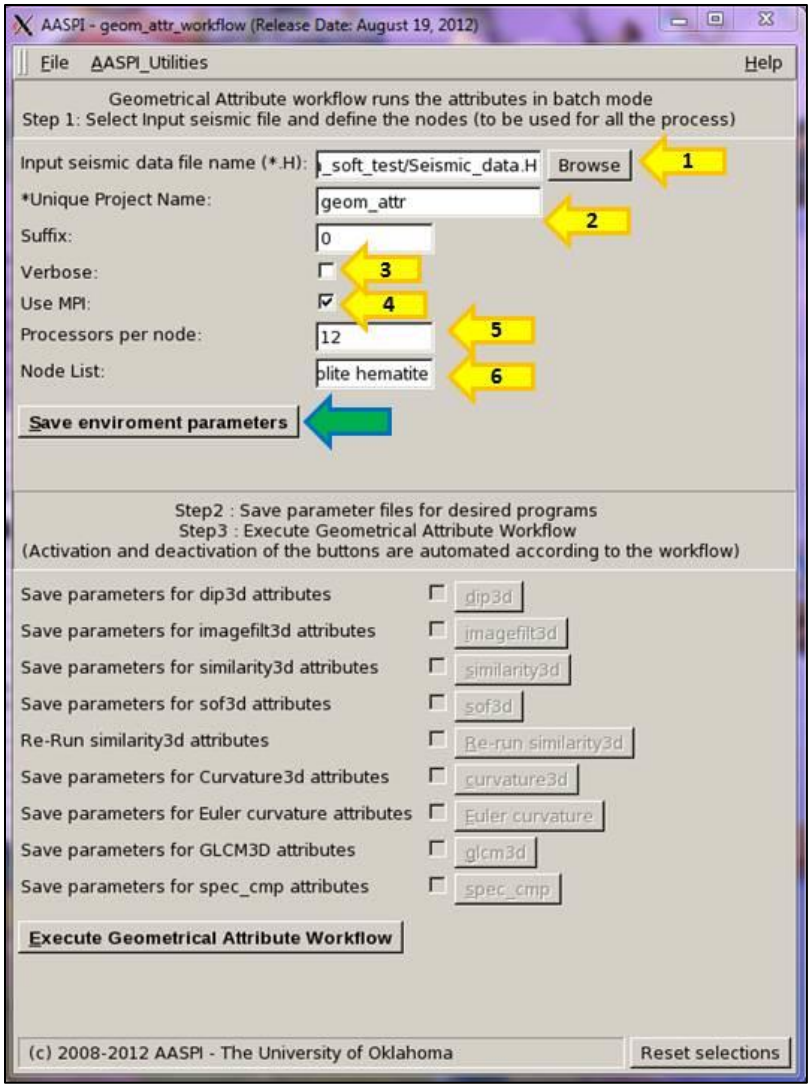
Attribute computation of very large data volumes can take considerable time. Experienced interpreters may already have familiarity with other data volumes from the same basin. Alternatively, they may have already analyzed a subset of the data using the 'interactive' steps described above. In this situation it may be useful to set up a workflow that will run a suite of attribute programs in the background, perhaps overnight.

The workflow here is one of two currently provided. Unlike a mature 3D seismic processing system like ProMax, Seisup, or Focus, the linking and interchangeability is rigidly fixed. After sponsor feedback, we can either improve the workflow described below, or develop an alternative strategy

Geometrical attribute Workflow



The AASPI Geometrical Attribute Workflow GUI can be invoked from the main *aaspi_util* as shown above or by typing in *aaspi_geom_attr_workflow* separately in the terminal window. The following workflow GUI will then pop up.

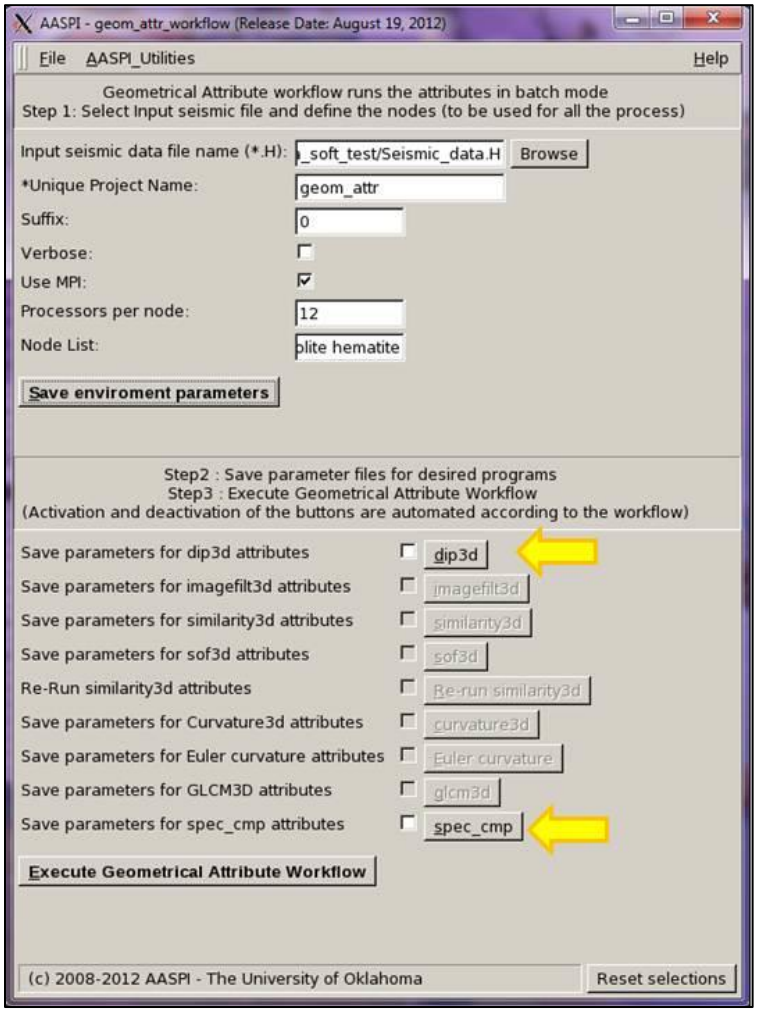


Step 1: Save the workflow environment parameters

In step 1 we need to input the seismic amplitude file and set up the project name and the MPI parameters which will be used for all the MPI processes. The seismic amplitude file is selected first (*Arrow 1*). Enter the project name and the suffix (*Arrow 2*). Verbose can be selected if required (*Arrow 3*). It is recommended to use MPI because except euler_curvature all the other processes run on MPIs (*Arrow 4*). Mention the processors per nodes and the node list. Each of our machines *tripolite.ou.edu* and *hematite.ou.edu* have 12 processors in it. Thus in the processors per node 12 is mentioned (*Arrow 5*) and in the node list *tripolite* and *hematite* is mentioned (*Arrow 6*).

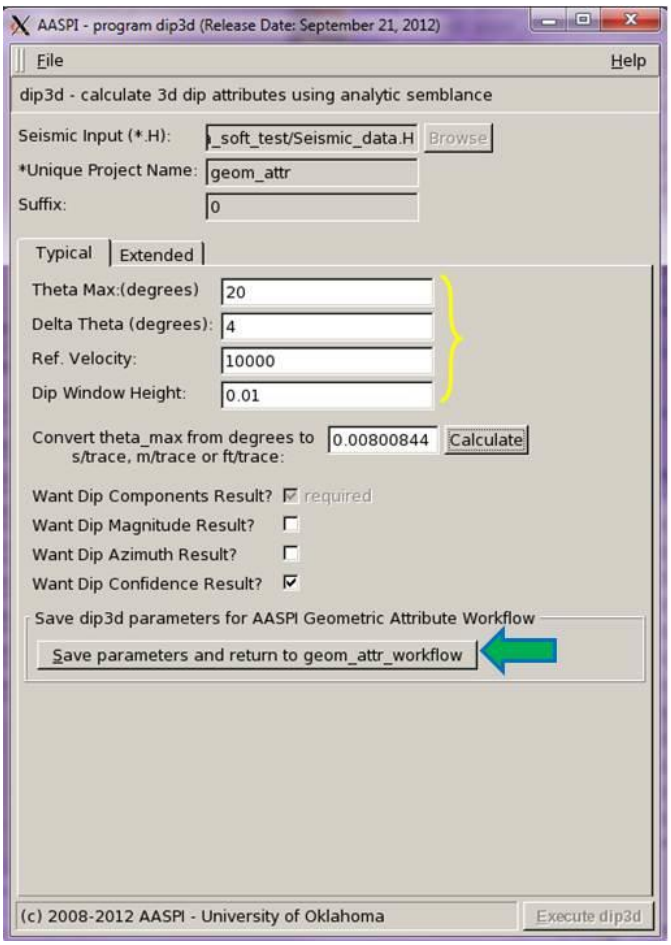
After entering out all the parameters these parameters are saved (*Green Arrow*) which will be subsequently used for all the processes. Note that initially all the attribute buttons will be disabled. When the "Save Environment parameters" is clicked the *dip3d* and the *spec_cmp* buttons will be highlighted as shown. These two takes in only the seismic

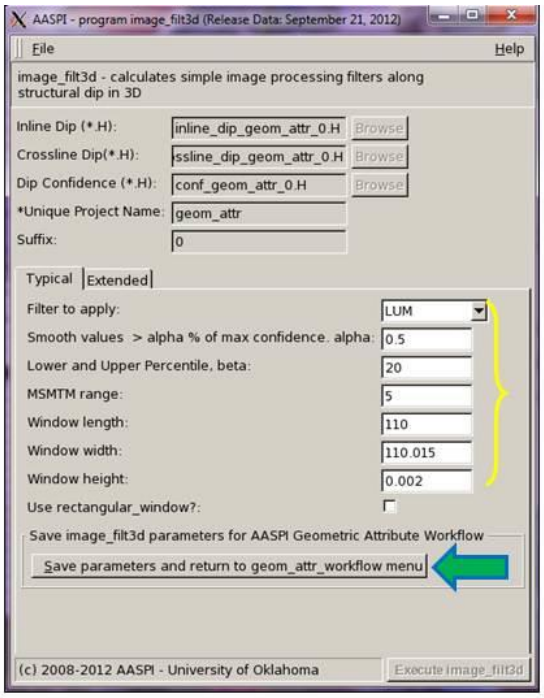
amplitude as inputs and are thus activated. The subsequent attribute buttons will be activated after their input file criterions are met.

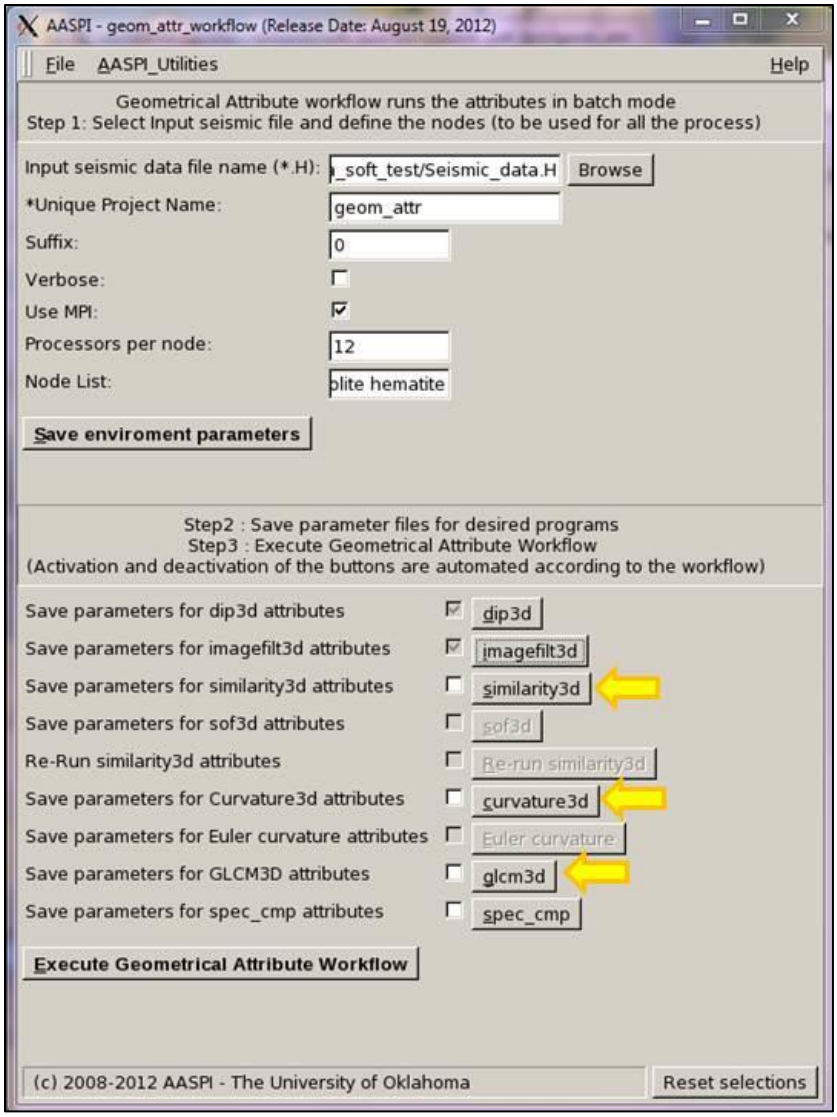


Step 2: Save the parameters for the volumetric attributes

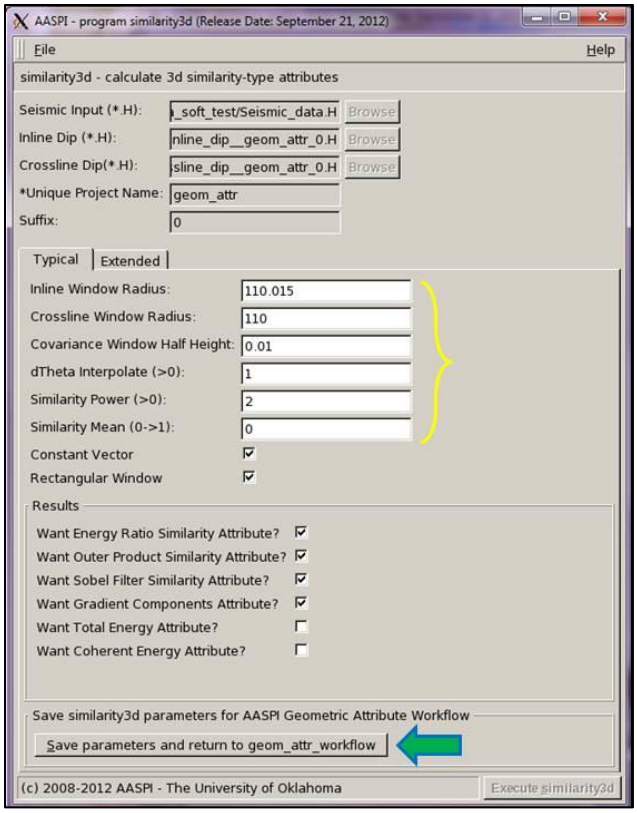
In this step each of the attribute program is opened and their parameters are saved. The buttons are activated only when their input criterion are met. For example the imagefilt3d gets activated only after we open and save the dip3d parameters. The next figure shows the GUIs for dip3d and imagefilt3d. The parameters are mentioned and the Save and Exit button (*green arrow*) is pressed.


AASPI - program dip3d (Release Date: September 21, 2012)
File
Help
dip3d - calculate 3d dip attributes using analytic semblance
Seismic Input (*.H):
_soft_test/Seismic_data.H
Browse
*Unique Project Name:
geom_attr
Suffix:
0
Typical
Extended
Theta Max:(degrees)
20
Delta Theta (degrees):
4
Ref. Velocity:
10000
Dip Window Height:
0.01
Convert theta_max from degrees to s/trace, m/trace or ft/trace:
0.00800844
Calculate
Want Dip Components Result?
required
Want Dip Magnitude Result?
Want Dip Azimuth Result?
Want Dip Confidence Result?
Save dip3d parameters for AASPI Geometric Attribute Workflow
Save parameters and return to geom_attr_workflow
(c) 2008-2012 AASPI - University of Oklahoma
Execute dip3d

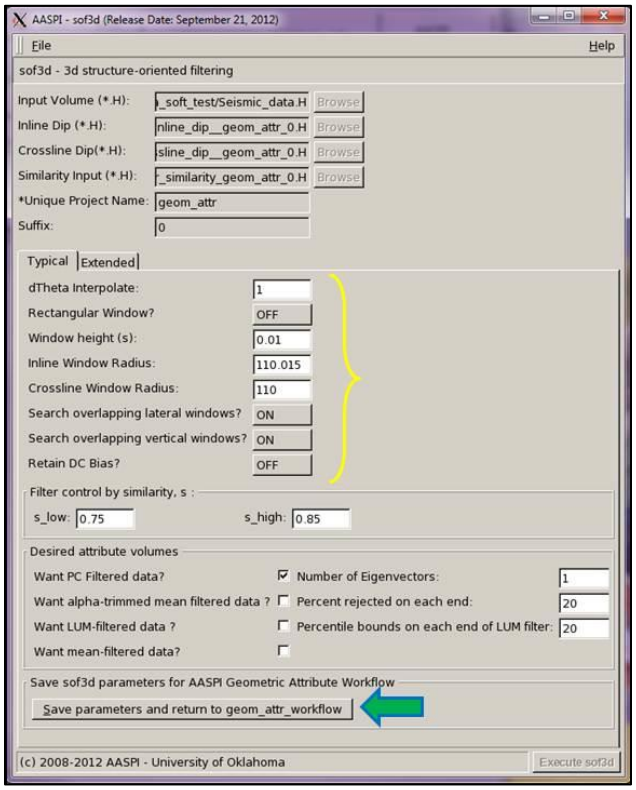

AASPI - program image_filt3d (Release Data: September 21, 2012)
File
Help
image_filt3d - calculates simple image processing filters along structural dip in 3D
Inline Dip (*.H):
inline_dip_geom_attr_0.H
Browse
Crossline Dip(*.H):
ssline_dip_geom_attr_0.H
Browse
Dip Confidence (*.H):
conf_geom_attr_0.H
Browse
*Unique Project Name:
geom_attr
Suffix:
0
Typical
Extended
Filter to apply:
LUM
Smooth values > alpha % of max confidence. alpha:
0.5
Lower and Upper Percentile, beta:
20
MSMTM range:
5
Window length:
110
Window width:
110.015
Window height:
0.002
Use rectangular_window?:
Save image_filt3d parameters for AASPI Geometric Attribute Workflow
Save parameters and return to geom_attr_workflow menu
(c) 2008-2012 AASPI - University of Oklahoma
Execute image_filt3d



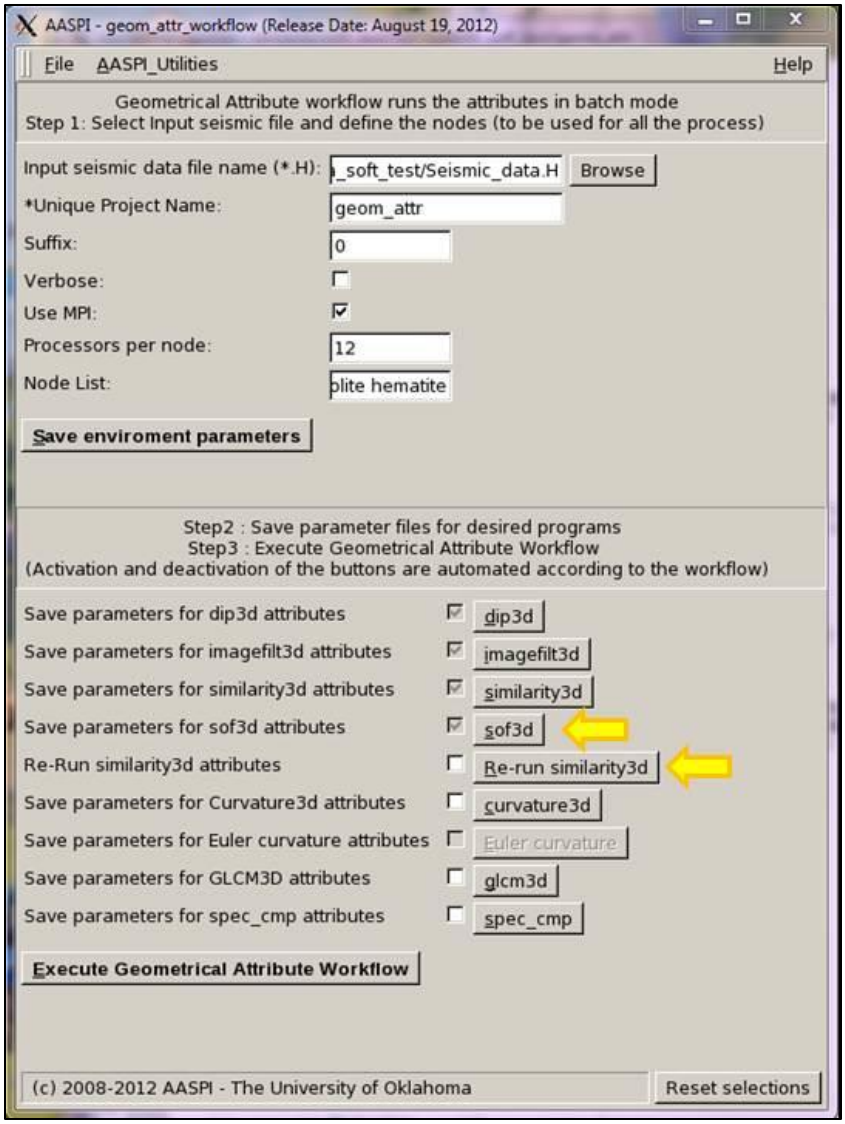
Note that after saving the imagefilt3d parameters the similarity3d, curvature3d and the glcm3d buttons are activated since all these three require the inline and crossline dip volumes as an input.



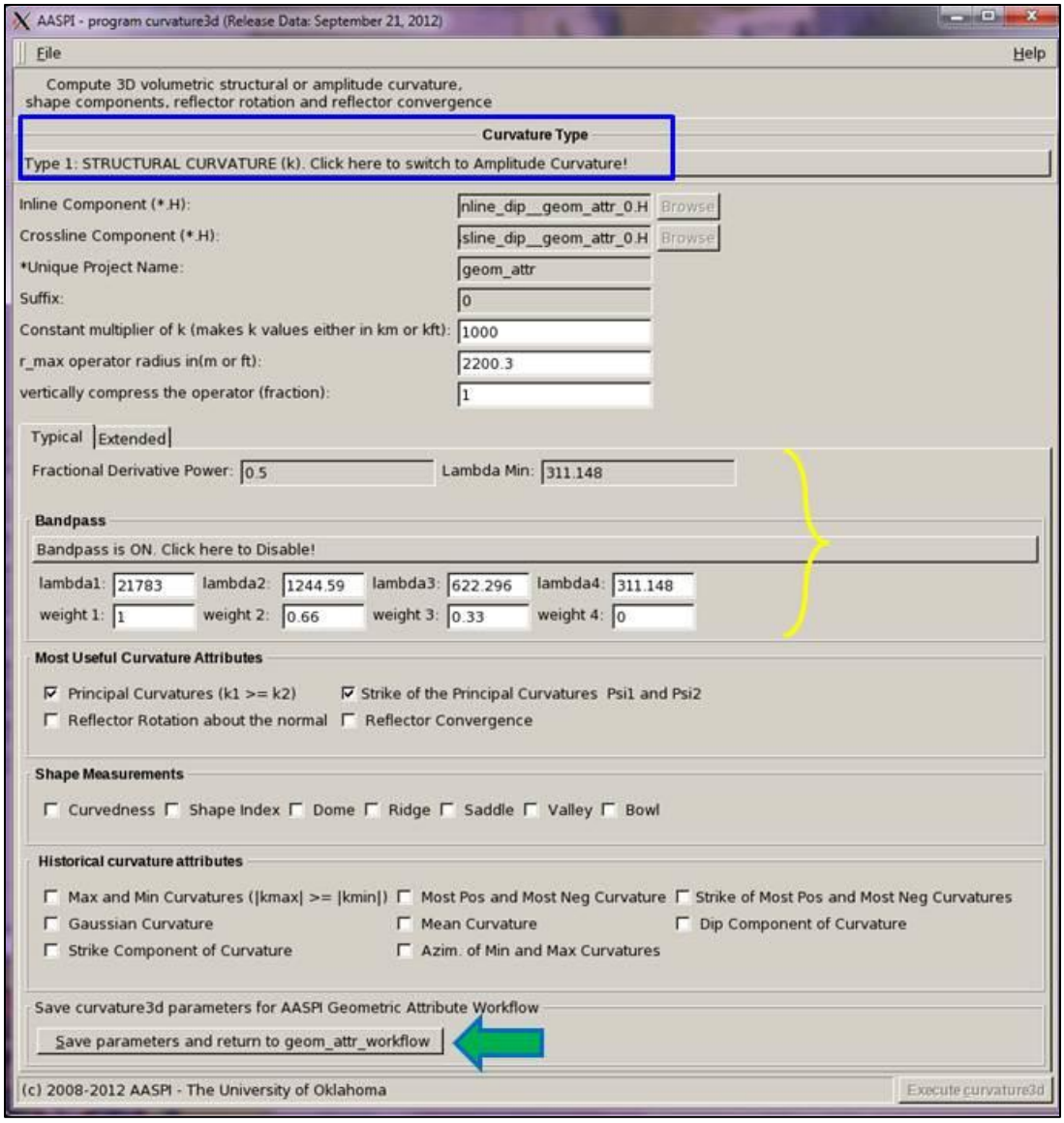
The GUI for similarity3d; the output from the imagefilt3d will be input to this program. Enter the proper parameters and then save and exit (*green arrow*). The parameter file get saved automatically as a similarity3d.parms file



The GUI for sof3d; the output from the imagefilt3d and the similarity3d will be input to this program. Enter the proper parameters and then save and exit (*green arrow*). The parameter file get saved automatically as a sof3d.parms file

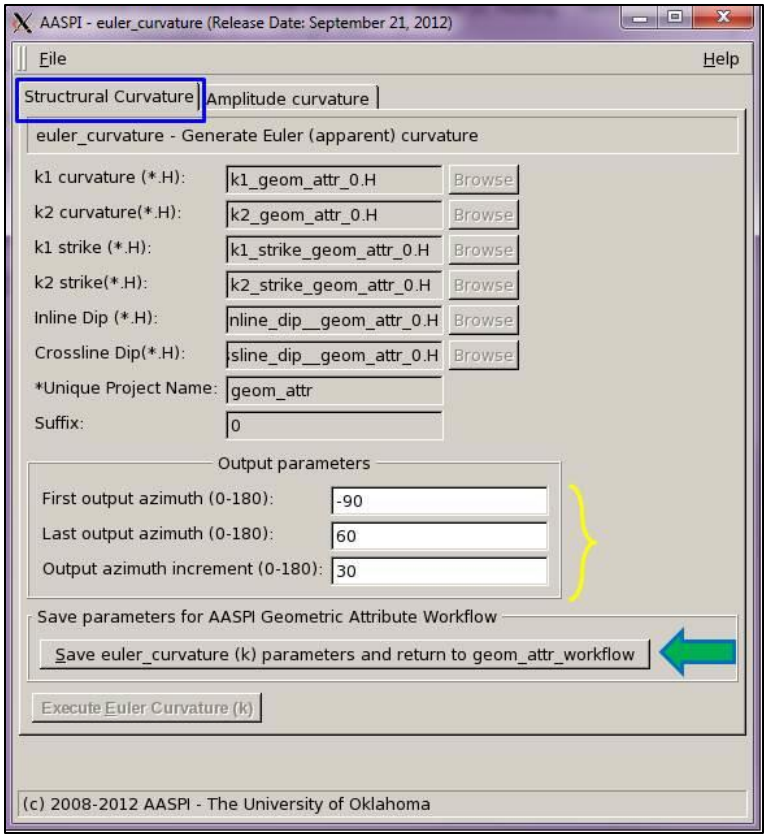


Note that with the saving the sof3d and the re-run similarity3d is activated. The re-run similarity calculates again the energy-ratio, Sobel-filter attributes taking in the PC or LUM filtered seismic dataset (output from the sof3d program). Thus it is sometimes better to re-run the similarity3d attributes so that the attributes are created on the filtered volume.



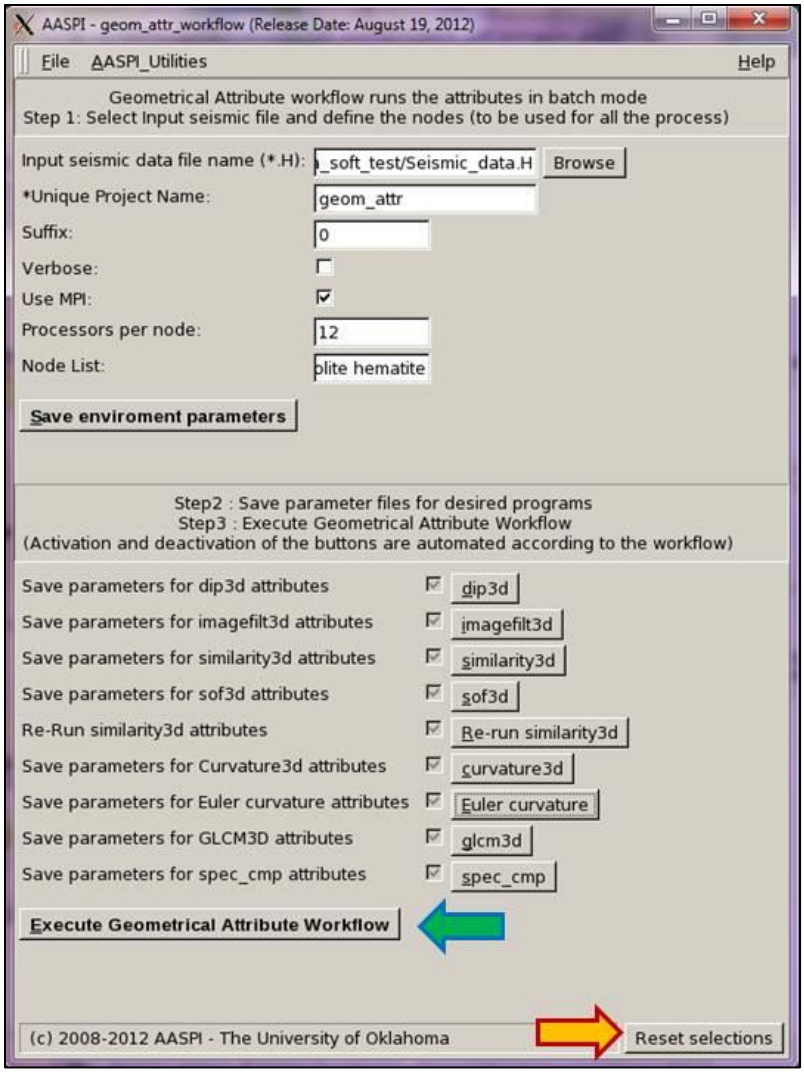
The GUI for curvature3d; the output from the imagefilt3d will be input to this program. Enter the proper parameters and then save and exit (*green arrow*). The parameter file get saved automatically as a curvature3d.parms file.

Note: Only one of the curvature programs (either structural or amplitude curvature) can be executed for at one time. By default, the structural curvature GUI will pop up. To run the attributes for the amplitude curvature, it can be done separately or one can toggle the button (highlighted in blue) to change into amplitude curvature.



The GUI for euler_curvature; the output from the curvature3d will be input to this program thus the button for euler_curvature gets activated only after saving the curvature3d parameters. Enter the proper parameters and then save and exit (*green arrow*). The parameter file get saved automatically as a euler_curvature.parms file.

Note: By default, the structural Euler curvature GUI will pop up. To run the attributes for the amplitude Euler curvature, it can be done separately or one can go to the next tab to change into amplitude Euler curvature. Also remember that if the parameters for structural curvature in saved for the curvature3d program the parameters for structural Euler curvature should be saved and vice-vesa.

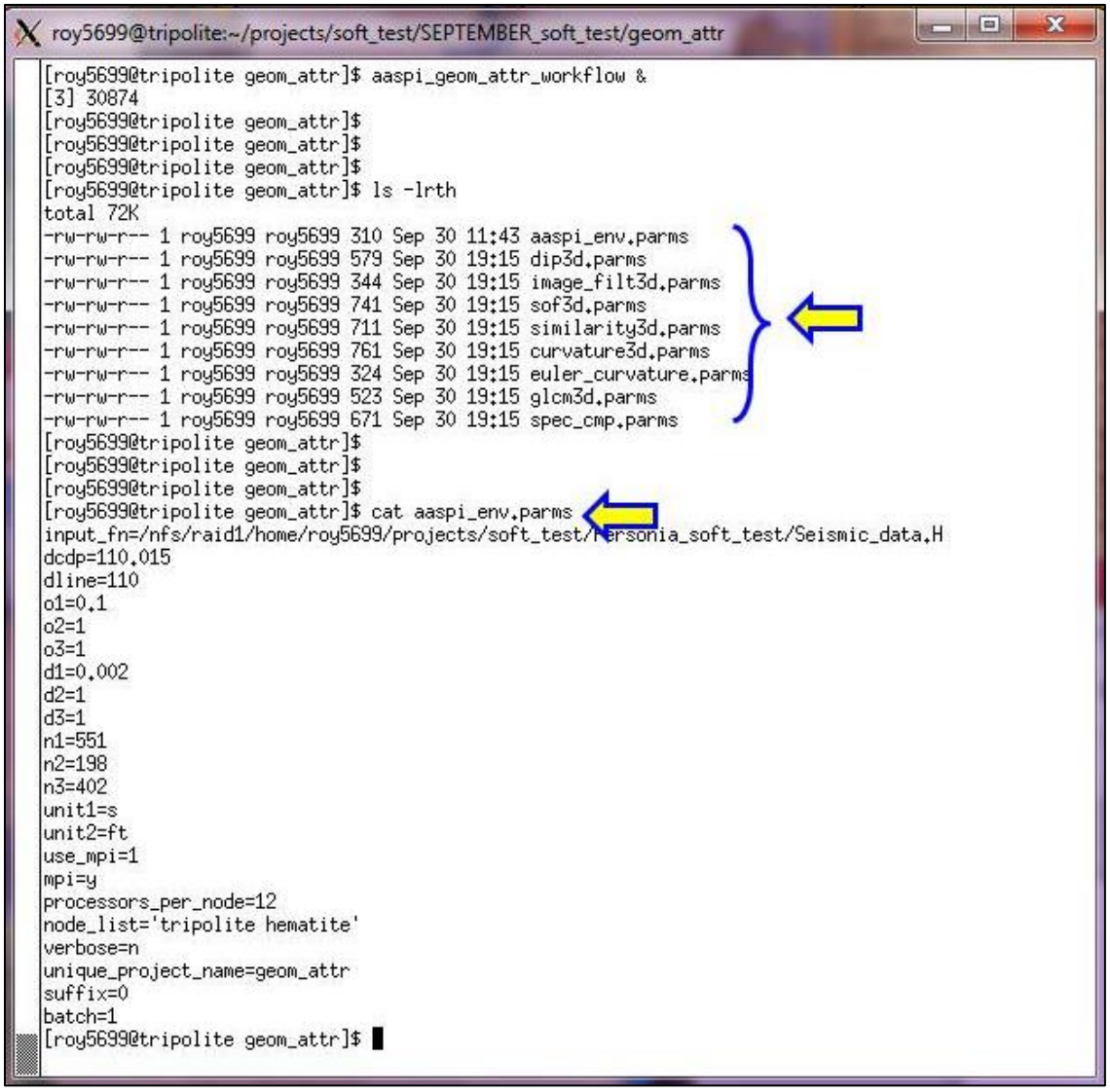


Step 3: Execute the geometric attribute workflow

Above shows the GUI for one of the typical workflows. To execute the workflow press the "Execute Geometrical Attribute Workflow" (*green arrow*). The reset selection button (*orange arrow*) can be pressed if one wants to reset the program selections.

A typical workflow for *structural geometrical attributes* will be dip3d>imagefilt3d>similarity3d>sof3d>rerun-similarity3d>k_curvature3d>k_euler_curvature>

A typical workflow for *amplitude geometrical attributes* will be dip3d>imagefilt3d>similarity3d>sof3d>rerun-similarity3d>e_curvature3d>e_euler_curvature>glcm3d>spec_cmp



The above shows the terminal window after saving all the *.parms (parameter) files. The aaspi_env.parms is a text file with the information of the input seismic file, the project and the suffix names and the MPI settings. We can do cat *aaspi_env.parms* to see the file contents. The other *.parms contents the saved parameters from all saved programs.

At any time, the terminal window will show the progress of the workflow. The text file *aaspi_geom_attr_workflow.out* can be checked to see the completion status of the workflow or whether there is any error in the execution of the program.