

APPENDIX

SOSAT

Hardware requirements

- 64-bits Windows Operating System
- Space is not a major constraint

Software requirements

- Java Runtime Environment (JRE) – 8 or a later version
- Steps to download included below

Installation

- SOSAT version 1.0 is available at the National Energy Technology Laboratory (NETL) Energy Data Exchange (EDX) platform for download
- First step is to sign into EDX <https://edx.netl.doe.gov/>
- You might need access from NETL to be able to sign in
- After signing in, navigate to the zipped folder SOSAT folder at <https://edx.netl.doe.gov/dataset/sosat-state-of-stress-analysis-tool-v2019-07-1-0>
- Then download the zipped folder named nrap-sosat-v2019.07-1.0.zip to the hard drive of your
- Extract the files from the folder in preparation for installation

- Download Java Runtime Environment (JRE) 8 or a later version. If you have JRE already on your computer skip the next couple of steps.
- Navigate to <https://www.oracle.com/java/technologies/downloads/>
- Scroll down to Java SE Development Kit
- Select the operating system, SOSAT has been designed to run on Windows
- SOSAT requires a 64-bit environment so select the x64 Installer
- If you had java before, ensure your JAVA-HOME is set to the version 8 runtime environment
- To do this, in your PC search bar, search for environment variables

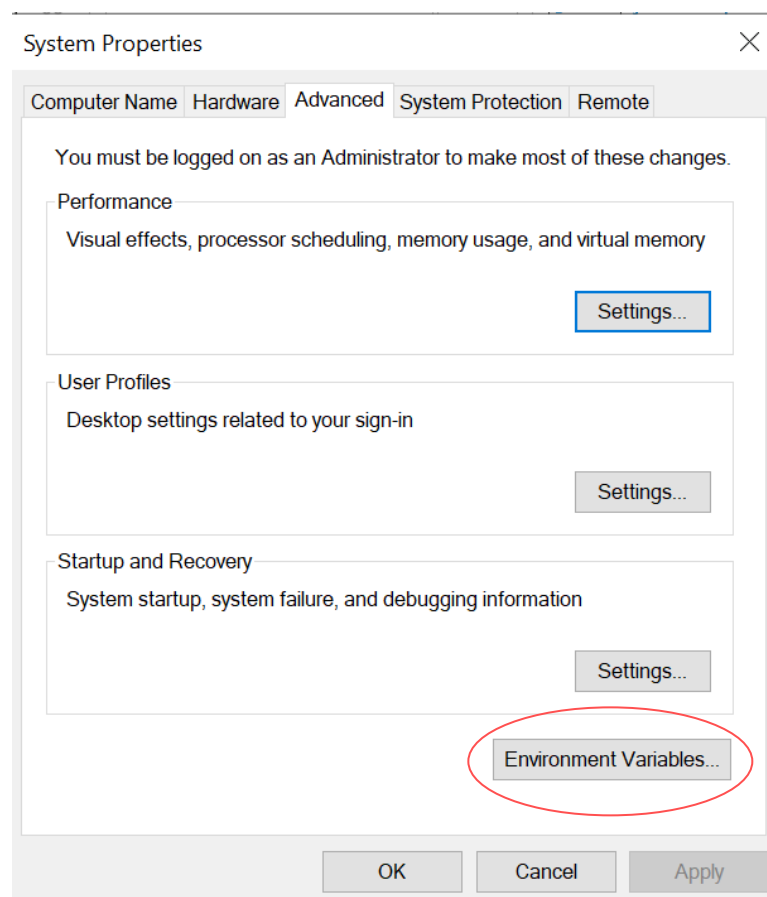


Figure 1: Environment Variables

- Select Environment Variables as highlighted above
- Ensure the JAVA_HOME and JRE_HOME are set to the java 8 runtime environment as shown below.

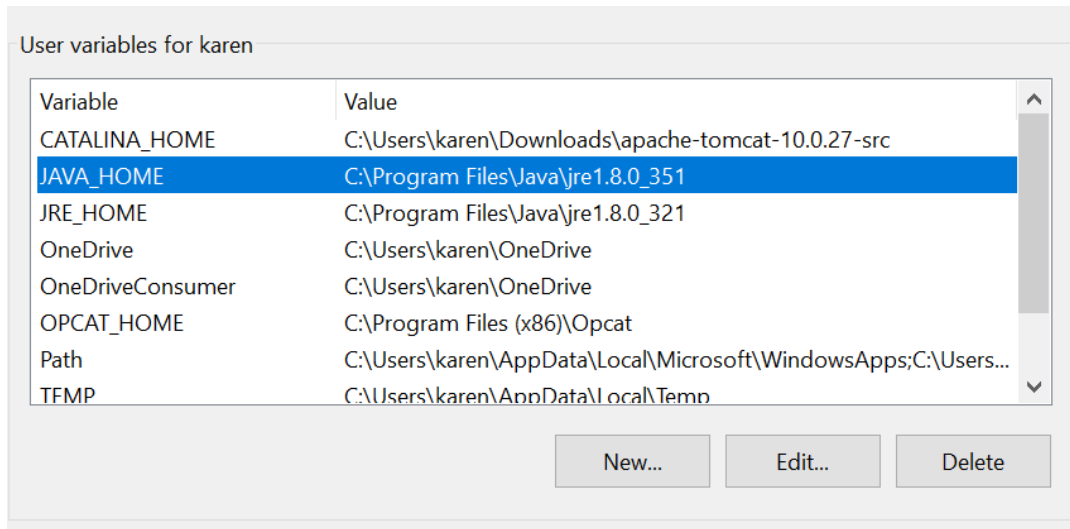


Figure 2: Updating JAVA_HOME and JRE_HOME

- After downloading and installing Java, go back to your SOSAT downloaded folder
- Click on the application.bat file in the folder and run
- If the JAVA_HOME and JRE_HOME are not set to the right version, SOSAT would run into an error and the main page would not appear. Circle back to previous steps and ensure these are set up well
- After installation, you would receive a Notice to User, acknowledge this and you would be redirected to the SOSAT Main Page shown below

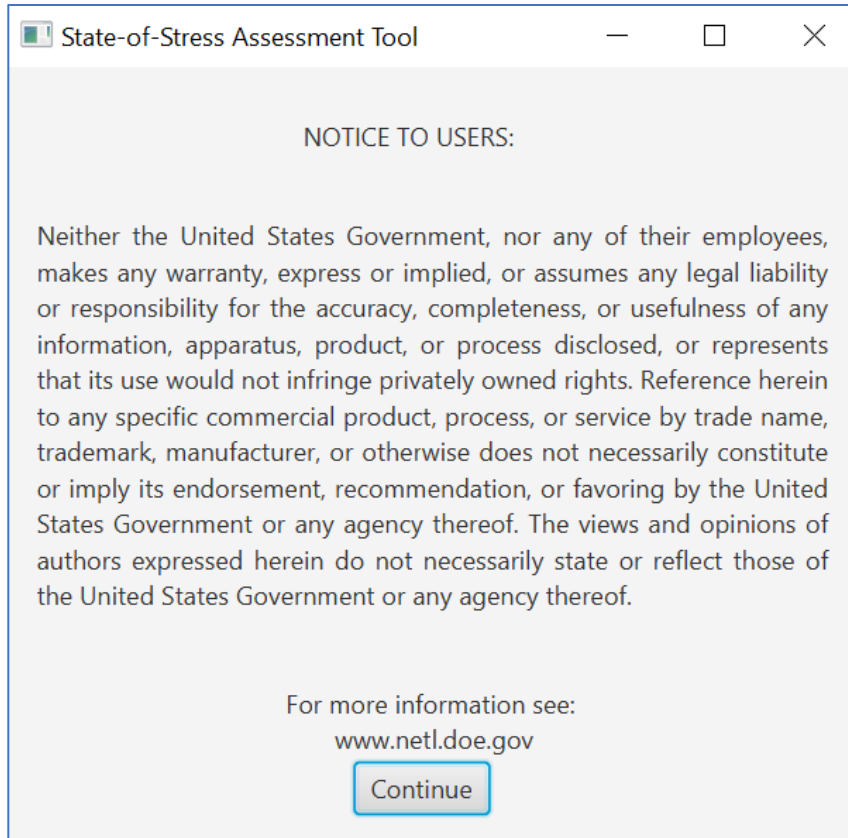


Figure 3: Notice to Users

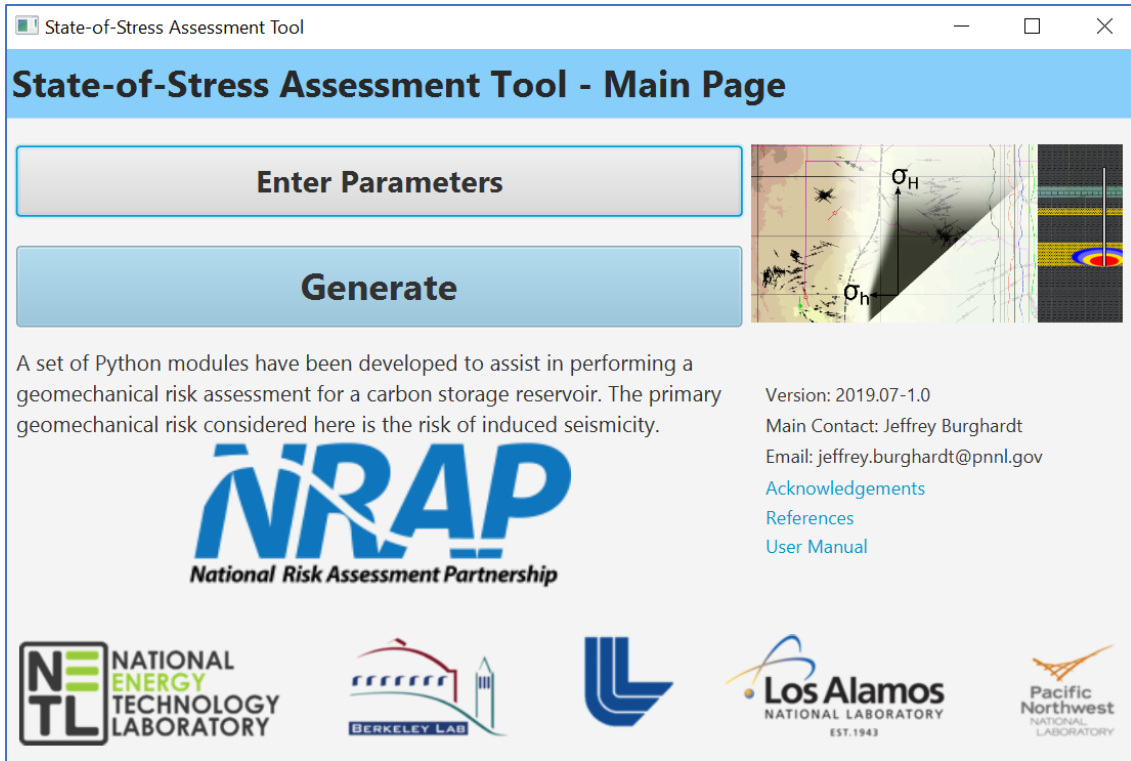


Figure 4: SOSAT Main Page

- The next step is to click on enter parameters in the tab shown below to enter the required parameters as defined in chapter 2 of this report

The screenshot displays the 'State-of-Stress Assessment Tool' window. It features a menu bar with 'File' and a tabbed interface with four tabs: 'Reservoir Properties', 'Regional Stress Info', 'Stress Measurement', and 'Calculation and Plot'. The 'Reservoir Properties' tab is active, showing several input fields with numerical values and units:

Parameter	Value	Unit
Median friction coefficient	0.7	
Standard deviation of logarithm of fault friction coefficient	0.15	
Maximum possible friction coefficient	1.5	
Reservoir depth	4000	feet
Pore pressure gradient	0.465	psi/ft
Average overburden density	2537.3245984	kg/m ³
Maximum injection pressure	50	MPa

Below these fields, there is a section titled 'Pore pressure at depth of interest divided by depth of interest' which is currently empty. At the bottom of the window, there are three buttons: 'Revert Parameters to Defaults', 'Cancel', and 'Save'.

Figure 5: Enter Parameters in SOSAT

- Enter the reservoir properties, regional stress information, stress measurement information and the calculate and plot
- In the calculation and plot tab, don't forget to specify the directory where the plots would be stored as shown below.

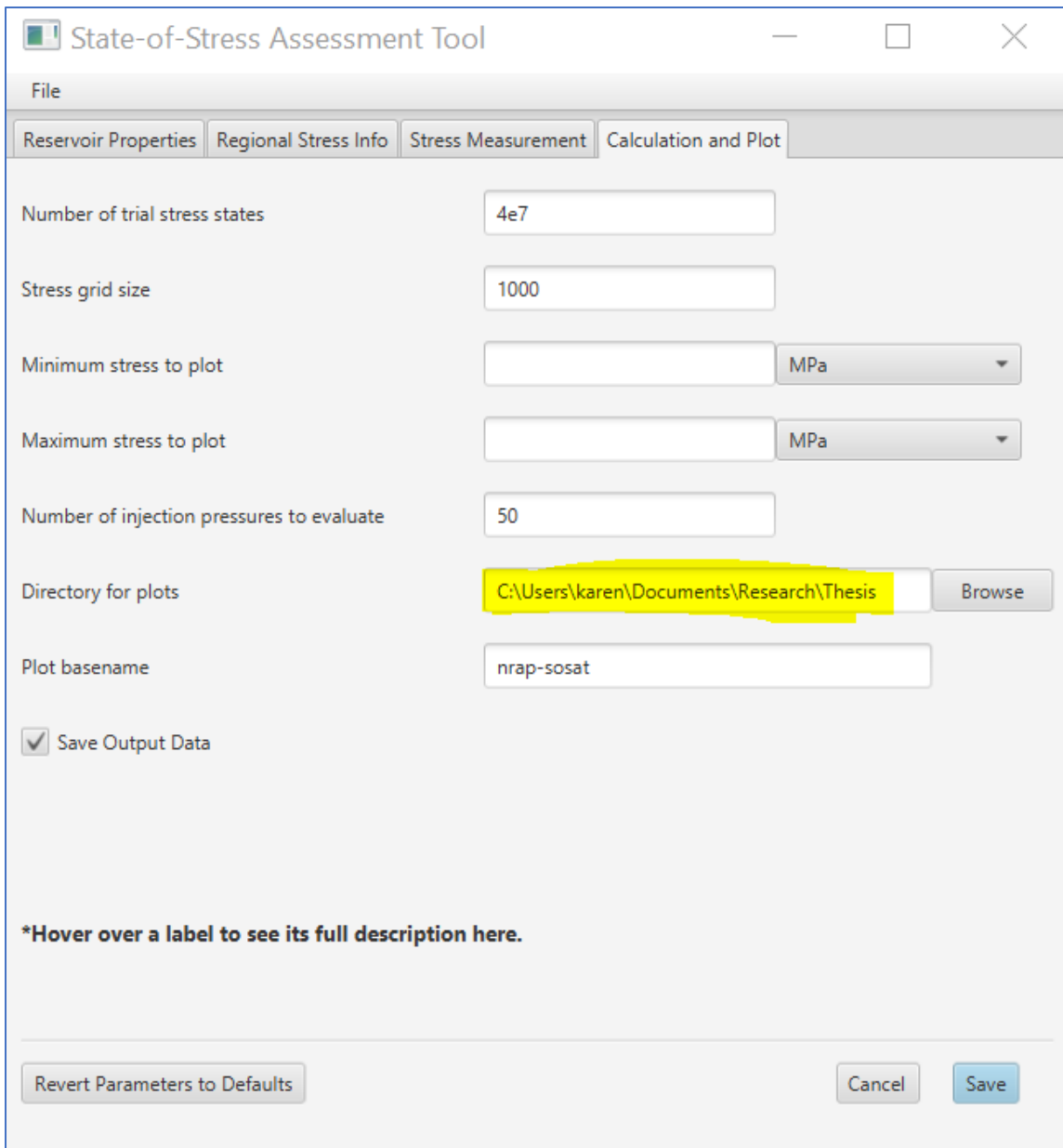
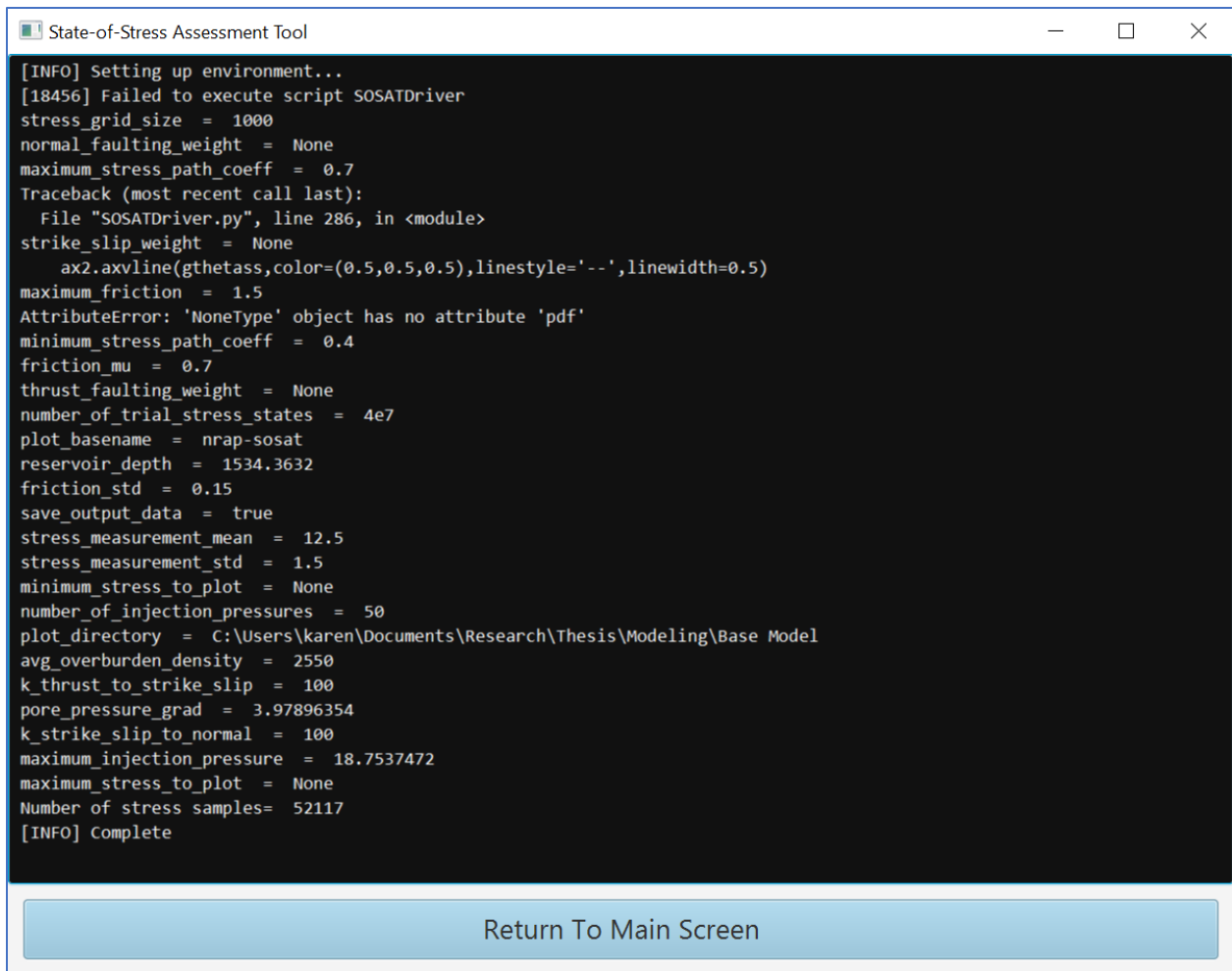


Figure 6: Including file directory

- After clicking save, you would be directed to the Min Page where you click generate and this would launch the analysis routine as shown below



The screenshot shows a window titled "State-of-Stress Assessment Tool". The main area is a black terminal window with white text. The text displays the following information:

```
[INFO] Setting up environment...
[18456] Failed to execute script SOSATDriver
stress_grid_size = 1000
normal_faulting_weight = None
maximum_stress_path_coeff = 0.7
Traceback (most recent call last):
  File "SOSATDriver.py", line 286, in <module>
strike_slip_weight = None
  ax2.axvline(gthetass,color=(0.5,0.5,0.5),linestyle='--',linewidth=0.5)
maximum_friction = 1.5
AttributeError: 'NoneType' object has no attribute 'pdf'
minimum_stress_path_coeff = 0.4
friction_mu = 0.7
thrust_faulting_weight = None
number_of_trial_stress_states = 4e7
plot_basename = nrap-sosat
reservoir_depth = 1534.3632
friction_std = 0.15
save_output_data = true
stress_measurement_mean = 12.5
stress_measurement_std = 1.5
minimum_stress_to_plot = None
number_of_injection_pressures = 50
plot_directory = C:\Users\karen\Documents\Research\Thesis\Modeling\Base Model
avg_overburden_density = 2550
k_thrust_to_strike_slip = 100
pore_pressure_grad = 3.97896354
k_strike_slip_to_normal = 100
maximum_injection_pressure = 18.7537472
maximum_stress_to_plot = None
Number of stress samples= 52117
[INFO] Complete
```

At the bottom of the window, there is a light blue button with the text "Return To Main Screen".

Figure 7: Running analysis