

# Lesson 13:

## Debugging

Debugging tends to be highly problem specific. If you get an error message that is not self-explanatory, the general approach is to find the earliest indication of trouble, and to try to figure out what operation was in progress and what has gone wrong. In this exercise, we'll look at few examples of errors that cause PEET to fail in the earliest stages of processing.

- 1) `cd $WORKSHOP_HOME/PEET_Labs/Intro-1/PEET/badSettings`
- 2) `etomo *.epe`

Etomo will display a dialog stating that it is unable to parse the parameter file, *pi.prm*. Additionally, it will state that the problem appears to be a missing “[” delimiter and that the problem occurred while attempting to parse line 96.
- 3) Close the dialog by pressing **No** and then exit the resulting Etomo window.
- 4) `gedit pi.prm`
- 5) In the upper right, select the **Go to line** function in the menu of your version of Gedit and enter “96” and press **return**. Notice that line 96 currently reads “`lstThresholds = 1:1:-3]`”. As the error message stated, there appears to be a missing “[” delimiter. Change the line to read `lstThresholds = [1:1:-3]`, Press **Save** and exit gedit.

Errors that occur very early in processing and particularly syntax errors that prevent parsing the parameter file can often prevent generation of helpful error messages. When Etomo is unable to start and no clear message is given, it is often helpful to try to

manually run `prmParser *.prm` and examine the resulting output; in this case, the error message was reasonably descriptive, and we were able to locate the problem, so this is not necessary. If Etomo runs, but an unclear error message results shortly after pressing Run, it can be helpful to examine the `prmParser.log`, `*start.log`, and `*WarningsAndErrors.log` files for clues as to the source of the problem.

6) `etomo *.epe`

Now Etomo starts successfully, but gives a prominent warning in red that one or more specified files cannot be found.

7) Press **Fix Incorrect Paths**

A file chooser dialog will open; you'll see that it's looking for the initial motive list file named `initMOTL.csv`, and is currently expecting this file to be in the PEET directory one level up. It's actually in the `badSettings` project directory.

8) In the resulting file chooser, double-click `badSettings`, and then `initMOTL.csv`. In this case, this is the only file Etomo was having trouble locating, so the red error text in Fix Incorrect Paths dialog will automatically disappear. If there were additional missing files, they would be shown in successive file choosers.

9) Go to the **Run** tab and press **Run** at the bottom of the page

Now we get a "Chunk Error" saying "ERROR: prepareEM pi.prm: exited with status 255". Chunk errors and exit status are often not helpful. Press **OK** to exit the error dialogue. At least we know that the problem occurred during `prepareEM`, which, in this case, is the final step in the `pi-start.com` chunk; specifically, this is where the initial motive list for the first iteration is generated. (Motive lists were stored in a different format and called EM files in early versions of PEET).

When an unhelpful error message is given, often a good next step is to try to rerun the first failing step manually. *I.e.* in this case, we would run `prepareEM pi.prm` and examine the output.

`gedit pi_WarningsAndErrors.log` followed by `gedit pi-start.log` to see a better readout of the error. In this case the chunk error message and the log files `pi_WarningsAndErrors.log` and `pi-start.log` all give a more explicit, more helpful error message: “ERROR: List of number of particles to average can not be empty!”

- 10) In Etomo, go to the **Run** tab and check the setting for the number of particles to average. You’ll see that the End value has been mistyped as -3 rather than 3. *I.e.* we’re asking to average a list of particles numbers from 1 to -3 in steps of +1. MATLAB evaluates that as a null or empty vector, which explains this error message. Change the **End value for Number of Particles to Average** to 3 and press **Run** again. Now the project should run to completion.
- 11) Exit Etomo and run `PEETCleanup *.prm` followed by `rm *~` to remove unwanted files.