

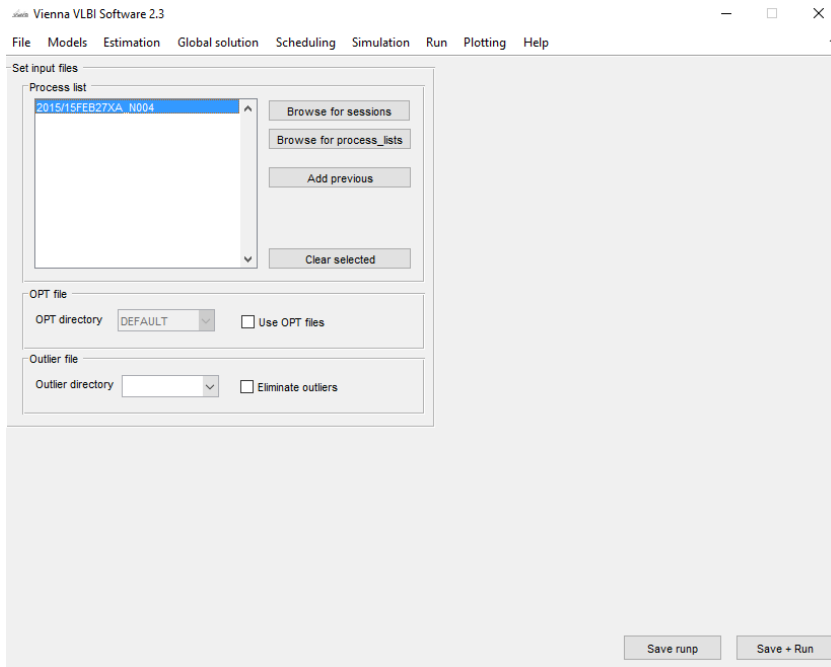
## Simulation exercise

We will simulate one session (15FEB27) and calculate expected baseline length repeatabilities using different assumptions of measurement noise and tropospheric turbulence.

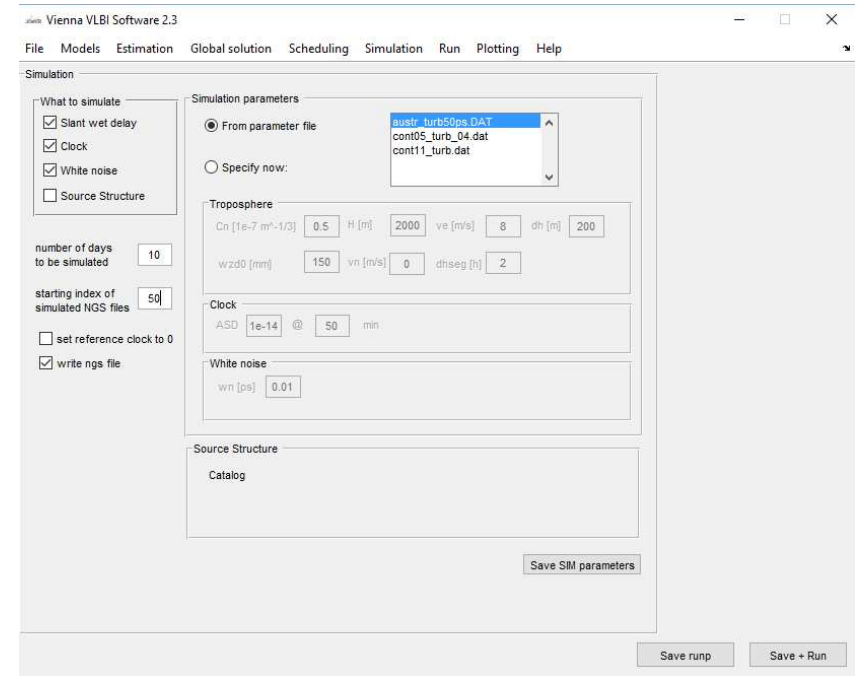
In a second exercise we will produce zero-input files for ten AUSTRAL sessions and investigate the effects of the solid Earth tides.

### Example 1: Simulate the expected measurement precision

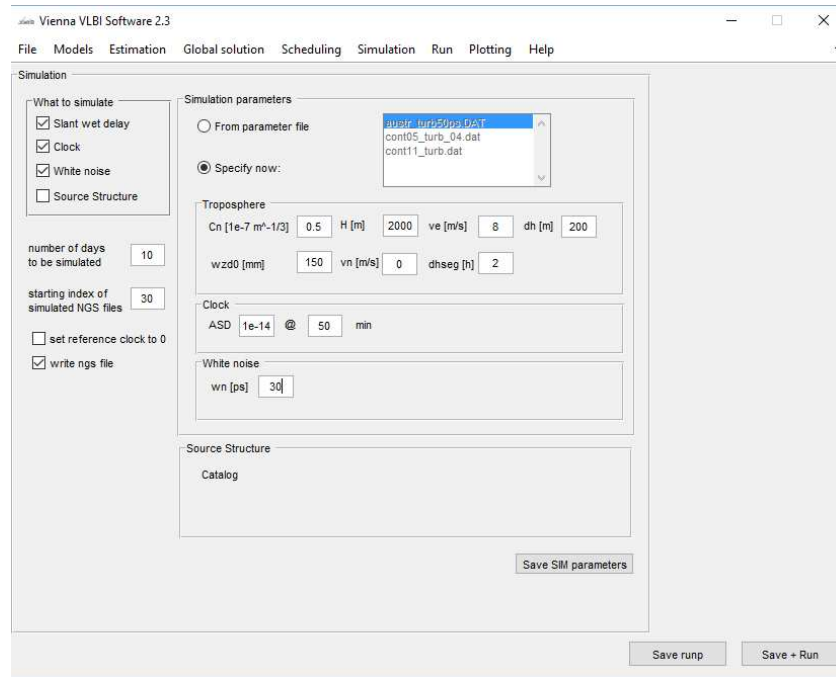
1. In the VieVS GUI, select the session you want to simulate (15FEB27XA)



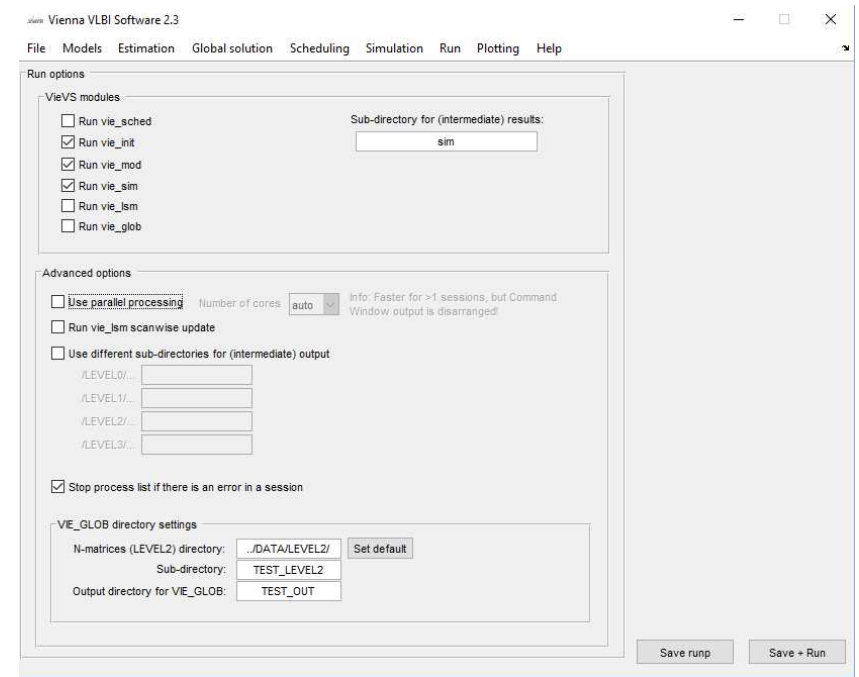
2. In the panel "Models - Observation restrictions" set the quality code limit to 10. Select the start of the session in the "Session start" panel
3. Go to the panel "Simulation".
  - a. Run simulations using a predefined parameter file (austr\_turb50ps.DAT)
    - i. Simulate 10 days
    - ii. Remember the starting index you set (e.g. 50).
    - iii. Then go to step 4.



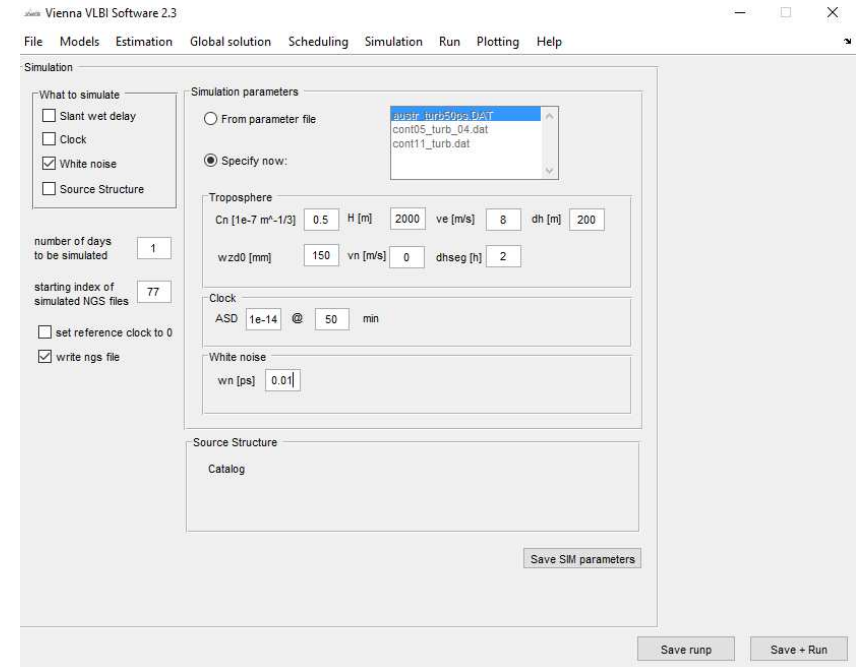
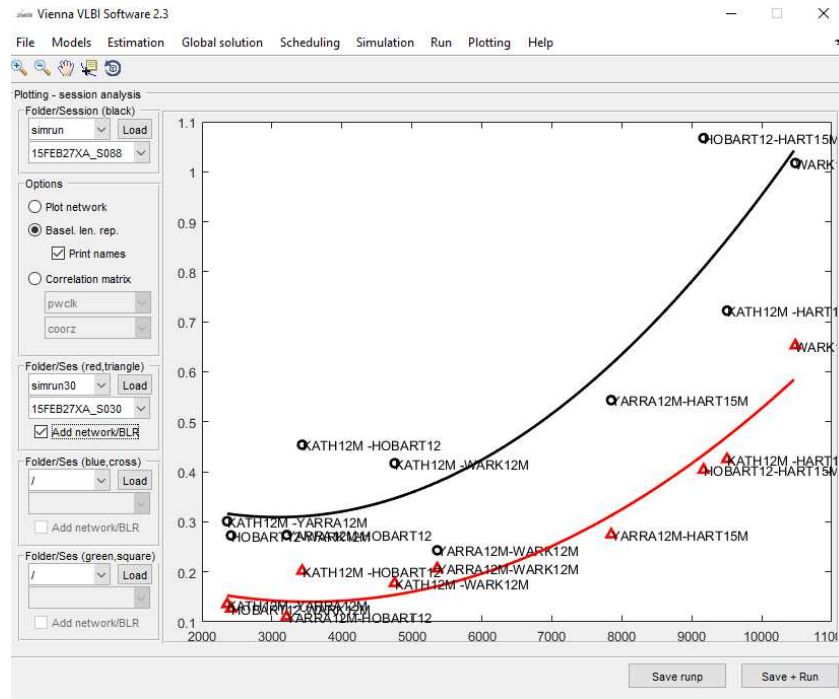
- b. Run simulations using specified parameters
  - i. Choose low troposphere turbulence (e.g. 0.5)
  - ii. Choose lower noise (e.g. 30 ps)
  - iii. For all other values, use the default settings.
  - iv. Choose a different starting index (e.g. 30)



4. Go to the panel "Run"
  - a. Un-tick the box vie\_ism
  - b. Tick the box vie\_sim
  - c. Choose a sub-folder (e.g. sim\_50, sim\_30 etc)
  - d. Run the simulation by clicking "Save+Run". Do this for both sets of simulations.
  - e. You now have simulated NGS files in /DATA/SIM/subfolder/year/session



5. Process the sessions
  - a. Go to the panel "File" and choose your simulated sessions. Since by default VieVS directs you to the DATA/NGS directory, you need to go one level up to the DATA/SIM directory. ATTENTION: run your two sets of sessions separately, using different subfolders.
  - b. In the panel "Run", tick the boxes vie\_init, vie\_mod, vie\_ism. Choose different sub-directories for your two sets of simulations (e.g. simrun50, simrun30).
  - c. Run the simulated sessions. You can use parallel processing to speed things up a bit.
6. Results.
  - a. For illustrating the results, we use the plotting tool in "Plotting – Session analysis"
  - b. Comparing the two simulations, we find the second option delivering a bit too optimistic results while the first one showing sensible values for baseline length repeatabilities, close to the results we get from real AUSTRAL data.



## Example 2: Zero-input files

1. In the VieVS GUI, select the sessions you want to simulate.
  - a. We want to simulate 10 AUSTRAL sessions of 2014. They can be loaded via the process list "sim\_zero\_austr".
2. In "Simulations" choose your parameters as follows:
  - a. Untick "Slant wet delay" and "Clock". "White noise" remains ticked.
  - b. Change the number of days to 1.
  - c. Choose a specific number for the NGS file counter (e.g. 77).
  - d. In order to avoid a program crash (e.g. by dividing with 0), it is advisable to simulate a tiny noise (e.g. 0.01 ps).

3. You can then simulate the sessions.
  - a. Remember to set the right options in "Run".
  - b. Tick "vie\_init", "vie\_mod", "vie\_sim".
  - c. Also choose a subdirectory.
4. After simulation, you can analyse the sessions.
  - a. Select the simulated sessions in "File".
5. Run a test zero simulation.
  - a. To test whether you use the identical settings run one session.
  - b. The residuals should then be at the same level that you chose your noise in 2.d (e.g. 0.01 ps).
6. In a next step, you can change one of your modelling settings and investigate its effect on the results.
  - a. E.g. you can deselect the solid Earth tides in "Models – Station models".
  - b. Then analyse the sessions. (in "Run" untick "vie\_sim" and tick "vie\_ism").
  - c. You can then investigate the effects in
    - i. Plotting – residuals
    - ii. Plotting – parameters (coorx, coory, coorz)
    - iii. Plotting – session analysis – baseline repeatabilities.