Steps in synthetic correlation model / kernels:

1) Project name/directory 🡪 my\_name setup\_project <project\_name>

2) Edit the project configuration, in particular, fix the grid\_dx parameter and the half duration of the point source open question: how small dx is needed and reasonable based on the element size of specfem. Another open question: how long the synthetics should be (with/without attenuation).

3) Obtain the source grid (sourcegrid.npy) 🡪 my\_name setup\_sourcegrid <project\_name>

4) Prepare the input for specfem3d 🡪 my\_name specfem\_input <project\_name>

[

… specfem run …:

* Copy specfem input directory structure to remote scratch
* Fill in Par\_file remotely
* Copying binaries and all other necessary file into specfem directory on scratch using copy\_the\_necessary.sh
* Running mesher, solver using jobArray\_mesher.sbatch and jobArray\_solver.sbatch respectively
* Concatenating specfem results using jobArray\_cat\_specfem.sbatch 🡪 obtain one huge file per reference station
* Parsing the specfem results (filtering, decimation, derivative…) using jobArray\_decimate\_new.sbatch in conjunction with parse\_specfem\_output.py🡪 obtain one slightly less huge bin file
* Concatenate the resulting files again…
* Run bin\_to\_hdf5 (or get hdf5 directly in previous step?)

]

5) Initialize a source model. Any project can have several source models while using the same synthetics. One can think of the source model as a certain starting model for inversion. 🡪 my\_name setup\_source <source\_name>

6) Create the starting model for this noise source model. At this point, that has to be done semi-interactively using jupyter notebook and running setup\_noisesource.ipynb

6) Edit the source configuration. In particular, edit the bandpass filter and other preprocessing options, and the maximum lag for correlations. Run correlation:

my\_name correlation <source\_name> <step>

where step is a number from 0,1,2…. Starting the run for step 0 will, besides the correlation, also calculate preliminary kernels, and perform the preprocessing.

7) After checking source\_config.json contains the right measurement type, run the measurement / adjoint source:

my\_name measurement <source\_model> <step>

This will create a .csv file with the measurements. It will also determine the adjoint sources for the specified misfit, these will be placed in the directory

<source\_name>/<step\_nr>/adjt