T6: Time-frequency analysis. Correlation techniques.

For all programs to work properly, you need to download and execute them from the directory you created last time (the one in which the data directory is located).

<u>Exercise 1</u> (Instrument Correction)

- a) Download correct_instrument.py and run it (run -i correct_instrument.py) from within IPython.
- b) Why do you NOT see a large artifact despite of the high water_level?
- c) Change the cut-off frequency f0 (line 36) (smaller than Nyquist 10Hz) and describe what happens?

<u>Exercise 2</u> (Counts to m/s)

- a) Download counts2displacement.py and run it (run -i counts2displacement.py).
- b) Change the water_level (line 11) to a high value, describe what happens in the m/s plot.

Exercise 3 (Correlation Example)

- a) Download xcorr_example.py and run it (run -i xcorr_example.py)
- b) Determine/calculate the position of the triangle (lower plot), can you explain it?

<u>Exercise 4</u> (*Correlation for Signal Detection*) Here a prototype earthquake is selected and cross-correlated with a 4.5h seismogram.

- a) Download xcorr_slide.py and run it (run -i xcorr_slide.py)
- b) Do we need to do an instrument correction for correlating prototype earthquakes, with?