Lecture 0:
Welcome and workshop overview

OBS training workshop, VUW, April 14-16, 2025

Organizers:

- Pascal Audet, pascal.audet@uottawa.ca (instructor)
- Martha Savage, martha.savage@vuw.ac.nz

Location:

- Victoria University of Wellington, Cotton Building
- Computer room: CO-501 (5th floor)
- Break & Lunch room: CO-216 (2nd floor)
- Online content: https://github.com/nfsi-canada/OBSW2025

Sponsoring program:

- Catalyst Fund: Leaders program

Other funding:

- National Facility for Seismological Investigations
- Victoria University of Wellington
- University of Ottawa

Scope:

This workshop will cover training in seismological methods and software for broadband OBS data analysis encompassing three broad themes: 1) Data pre-processing and cleaning, 2) Subsurface seismic velocity structure, and 3) Earthquake detection and location.

Participation:

17 participants from 6 research institutions across New Zealand (VUW, GNS, NIWA, Auckland, Canterbury, Otago) at **various research-related occupations and career stages**. Even though a background in geophysics/seismology is not required, this workshop offers technical seismology training with expected active participation.

Learning outcomes

At the end of this workshop, you should be able to:

- Understand seismic data and metadata conventions and formats and how to access them.**
- Understand the limitations of OBS data for standard seismological analyses.
- Find the orientation of a 3-component broadband OBS station.**
- Characterize seafloor noise properties and perform tilt and compliance corrections for OBS data.
- Calculate and model teleseismic receiver functions using OBS data.**
- Determine preliminary earthquake catalogues using deep learning techniques.**

** Also useful for broadband terrestrial data

Learning plan

- Material introduced in four “high-level” lectures. Interactions are encouraged.
- Hands-on experience using open-source Python codes applied to real data during six tutorials.
- Develop fast thinking skills through repeated practice of simple coding commands and scripts.
- Develop slow thinking skills by developing and completing small projects using material covered in the workshop.

Day 1

Time	Room	Topic
0830	CO-216	*Light breakfast*
0900	CO-501	Welcome and workshop overview
0915	CO-501	**Tutorial 1**: Intro to computer environment in CO-501
0945	CO-501	**Lecture 1**: Intro to broadband OBS instrumentation and data
1030	CO-216	*Morning break*
1045	CO-501	**Tutorial 2:** Station orientation on the seafloor: OrientPy
1215	CO-216	*Lunch*
1315	CO-501	**Lecture 2**: Seafloor noise and analyses
1445	CO-216	*Afternoon break*
1500	CO-501	**Tutorial 3:** Compliance and tilt corrections: OBStools
1630		*End of Day 1*
1730		*Dinner reservation at St Johns Bar and Eatery* *5 Cable Street, Te Aro,* *Wellington*

Day 2

Time	Room	Topic
0830	CO-216	*Light breakfast*
0900	CO-501	**Lecture 3**: Intro to passive source seismic imaging
1030	CO-216	*Morning break*
1045	CO-501	**Tutorial 4:** Calculating teleseismic receiver functions: RfPy
1215	CO-216	*Lunch*
1315	CO-501	**Tutorial 5:** Modelling teleseismic receiver functions: Telewavesim
1445	CO-216	*Afternoon break*
1500	CO-501	**Hackathon:** • Determine OBS orientation for selected station(s) • Remove tilt + compliance noise for selected station(s) • Calculate compliance for selected station(s) • Calculate and model RFs for selected station(s)
1630		*End of Day 2*
1730		*Dinner reservation at Burger Liquor* *129 Willis Street, Te Aro* *Wellington*

Day 3

Time	Room	Topic
0830	CO-216	*Light breakfast*
0900	CO-501	**Lecture 4**: Intro to earthquake detection and location
1030	CO-216	*Morning break*
1045	CO-501	**Tutorial 6a:** Picking (and detecting) earthquakes with OBS data: SeisBench + DL pickers
1215	CO-216	*Lunch*
1315	CO-501	**Tutorial 6b:** Building a preliminary earthquake catalogue: SeisBench + GAMMA/PyOcto
1445	CO-216	*Afternoon break*
1500	CO-501	**Hackathon:** • Build a catalogue for selected OBS stations • Compare catalogues for different pickers/associators
1630		*End of Day 3; End of Workshop*