

OBS-specific Software

There are several publicly available software modules that can be useful for confirming or correcting data and metadata. If you calculate better clock drift or sensor orientation values than those provided in the data center, inform the data center of the new values and the method you used to calculate them. It would be best if all of these codes worked on the same data/metadata formats (for example, SeisComp Data Structure and StationXML)

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1 Descriptions of subjects

1.1 Modifying miniseed files

Tools that can be used for OBS-specific modifications to miniSEED data files.

1.2 Creating metadata

Tools to create StationXML files that integrate marine-specific information (clock drift, localization method, etc)

1.3 Calculating clock drift

The instrument clock drift (relative to a reference instrument) can be calculated using noise correlation or using the observed drift in earthquake hypocenter traveltimes residuals.

1.4 Correcting clock drift

Tools to inject clock drift corrections into miniSEED files, on a record-by-record basis.

1.5 Calculating sensor orientation

Determining the horizontal orientation of the sensors using teleseisms, local earthquakes and/or active seismic sources.

1.6 Removing noise

Removing noise caused by infragravity waves (based on pressure measurements) and dynamic tilt (based on correlation with horizontal channel noise and/or rotation of the vertical channel).

1.7 Converting data to active seismic data format

Create active seismic SEG-Y files from structured miniSEED data (SeisComp Data Structure, for example), a StationXML metadata file and a shot file (in a to-be-defined standardized format).

1.8 Relocating stations

Relocating station positions after deployment.

2 Available software

Subject	Software	Comments
Modifying miniseed files	msmod	Adding leapseconds into data, modifying header information (network, station, location and channel codes, dataquality code, etc)
	GIPP tools	Toolbox: modify header, cut in pieces, export header to ASCII, etc.
Creating metadata	obsinfo	Create stationXML files from instrumentation files and a “subnetwork” file describing deployments with marine-specific information (Crawford et al., 2025). Can also create yasmine-stationxml-cli commands to inject marine-specific information into stationXML files.
	yasmine-stationxml-editor	Python web application to create and edit stationXML files. Does not include marine-specific information.
	yasmine-stationxml-cli	Command-line script for merging/editing stationXML files from online instrumentation databases.
Calculating clock drift	Integrated Seismic Program	Graphical user interface within Ambient Noise toolbox (Cabieces et al., 2022). Also includes toolboxes for receiver functions, time-frequency analysis, earthquake analysis and moment tensor inversion
	OCloC	Python package associated with Naranjo et al. (2024) .
Correcting clock drift	gedit	Linear and piecewise linear clock drift correction
Calculating sensor orientation	ppol	P-wave polarization, based on Scholz et al. (2017) , plus event location uncertainty
	OBSIP orientation	Uses Rayleigh wave polarization (Stachnik et al., 2012)
	OrientPy	Audet (2020) . Includes Rayleigh-wave polarization (Doran and Laske, 2017) and P-wave polarization (Braunmiller et al., 2020).
Removing noise	ATACR	Automated Tilt and Compliance Removal (Janiszewski et al., 2019). Matlab version
	ATACR	Python version
	tiskitpy	Separate transfer-function based and rotation-based classes.
	BRUIT-FM Toolbox	Improved windowing selection and data stacking for more accurate transfer function calculation (Rebeyrol et al., 2024)
	Compy	Based on tiskitpy, adds periodic glitch removal and data processing automation

Subject	Software	Comments
	NoiseCut	Harmonic-percussive separation algorithms (Zali et al., 2023)
Relocating stations	OBSrange	Acoustic relocation of marine sensors with call-response acoustic transducers (Russell et al., 2019). Matlab and python versions.

3 Inexistent or unavailable software

Subject	Comments
Calculating clock drift	Correlation code (Hable et al., 2018) is not publically available.
	justCorrel (Hannemann, 2014) does not appear to be publically available
	Code using obspy (Beyreuther et al, 2010 ; Krischer et al., 2015)
	Code for calculating clock drift based on drift in earthquake location time errors. Has been done by various groups, but we know of no publically available versions.
	Fortran code (Weemstra, 2020) does not appear to be publically available
Correcting clock drift	msmod has been updated (July 2025) to allow for linear, piecewise linear, cubic spline and polynomial correction. As of August 2025, still needs to be validated. Modifications were made to a branch before a major overhaul of msmod, will need to copy over and revalidate afterwards.
Converting data to active seismic data format	No existing code known. Should be fairly simple using obsipy