

DRAFT - for OBSIP Symposium discussion

OBSIP Instrument Functional Specifications

OBSIP Oversight Committee

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# Broadband OBS

## Science Targets

Lithospheric and asthenospheric structure; mantle dynamics; deep earth structure; earthquake studies, moment tensors etc.

## Specification

1. Number of instruments needed for these science targets?
2. Shielding: for some, capable on others (studies of the benefits of shielding at various depths still needed)
3. Trawl resistance: for trawl resistant instruments are desirable
4. Clock: drift < ?? e.g. Atomic clock (Symmetricom Chip Scale Atomic Clock – CSAC)
5. Flotation: Syntactic foam
6. Recovery: Preferable for OBS to re-surface by acoustic release
7. Recording duration: 18 months or greater at 40 sps or higher
8. Clock operation duration: 24 months or greater
9. Depth: 6000 meters
10. Velocity transducer
    1. Passband: flat to velocity from [240 or 120?] seconds to [35 or 50?] Hz.
    2. Self-noise: below NLNM 100 s to 10 Hz.
    3. Mass centering: Automatic motorized re-centering.
    4. Bandwidth: -3dB points at 240 s and 200 Hz
    5. Clip level: 26mm/s from 0.1Hz to 10Hz
11. Absolute Pressure Sensor or DPG? - one or the other or both?
    1. 0-10000 psia
    2. Passband: flat response between 1 Hz and DC.
    3. Factory calibrated.
12. Datalogger
    1. 4 channels minimum BB + APG/DPG (may be interest in strong motion sensor, temperature etc. also), at ~130 dB dynamic range (to accommodate additional 3-component sensor e.g., accelerometer)
    2. Anti-aliasing FIR filter. Double Precision FIR Filter Causal/Acausal; >140 dB attenuation at output Nyquist
    3. Record and communicate multiple sample rates.
    4. Sampling rates: 1, 10, 20, 50, 100, 200, 250, 500, 1000 sps
    5. Each channel can be configured independently.
    6. Multiple data formats and telemetry protocols.
    7. Frequency response: DC to 80 Hz @ 200 sps.
    8. Acquisition modes: Continuous, triggered, time windows
    9. Timing: Accuracy: <1 microseconds of UTC with GPS
    10. Power: Low power consumption: <100mW (active)
13. Data delivery requirement:
    1. DMC: SEED

# Long-term short-period OBS

## Science Targets

Seismotectonics of plate boundaries, earthquakes, microseismicity experiments: hydrothermal processes, magmatic processes, mid-crustal activity, subduction zones. Seafloor volcano activity.

## Specification

1. Number of instruments needed for these science targets?
2. Clock: drift < ?? (Symmetricom Chip Scale Atomic Clock – CSAC)
3. Flotation: Syntactic foam
4. Recovery: Preferable for OBS to re-surface by acoustic release
5. Recording duration: 18 months or greater at 250 sps or higher
6. Clock operation duration: 24 months or greater
7. Depth: 6000 meters
8. Three-component seismometer with [1-4.5 Hz][modular?] natural frequency
9. Hydrophone or Absolute Pressure Sensor - both?
10. Datalogger - same as Broadband datalogger
11. Data delivery requirement:
    1. End of cruise: SEGY
    2. DMC: SEED and SEGY

# Active-source short-period OBS

## Science targets

Short-term rapid deployment pool; cheap so can have large numbers

Can deploy 100 off any regional class vessel

## Specification

1. Number of instruments needed for these science targets?
2. Clock: Temperature-controlled clock, maximum drift < 0.5msec/day before correction.
3. Recovery: OBS must re-surface by acoustic release, without the use of an ROV. Upon release, rise rate in water 45 meters/minute, 60 m/min would be preferable. Recovery aids: Strobe and radio beacon.
4. Recording duration: 2 months at 500 sps or higher
5. Clock operation duration: 3-4 months or greater
6. Depth: 6000 meters
7. Sensors
   1. Self-gimballing seismometer package.
   2. Three-component seismometer with 4.5 Hz natural frequency
   3. Hydrophone
8. Datalogger
   1. Four channels (three seismometers and a hydrophone)
   2. Anti-aliasing filter.
   3. Sampling rates can be programmed before deployment: 100, 200, 250, 500, 1000 sps
   4. 24-bit data logger.
   5. Acquisition modes: Pre-programmed time windows
9. Data delivery requirement:
   1. End of cruise: SEGY
   2. DMC: SEED and SEGY