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Seismic Test Data

Strong motion seismometers (accelerometers) usually require data validation in a quiet underground facility (seismic vault), which so far has been at the Pacific Geoscience Center (PGC) in Sidney, BC. Lately, this is done at the MTC. The data are recorded over a period of one week for spectral analysis and instrument sensitivity verification. The intention is to measure the instrument's noise floor. Comparison to seismic data from another instrument that is co-located in the seismic vault and owned by NRCAN/CHIS ensures the data quality of the tested instrument. Once these tests are done, the instrument is transferred to ONC's Marine Technology Center (MTC) to be connected to the Data Acquisition Framework (DAF) testing environment in Oceans 3.0, ONC's integrated data management system. In this step, the derived parameters that are essential input to the EEWS Software suite are verified and compared to existing test data available in Oceans 3.0.

The technique to collocate a strong motion seismometer and a GNSS instrument is relatively new and only a few sites with collocated instruments exist worldwide. The algorithms for the joint processing of seismic and GNSS data so far have been verified with recorded data in offline experiments. ONC in cooperation with the Canadian Geodetic Survey has developed a mechanical platform which allows controlled movements of GNSS antenna and seismometer. This simplified earthquake motion simulator known as HERB (Highly Engineered Rotating Base) is able to subject the instruments to controlled displacements in order to rigorously test the EEW software algorithms. HERB consists of a motorized platform rotating a collocated accelerometer and GNSS antenna in the horizontal plane while at the same time maintaining their orientation in space. It is meant to rotate at 5Hz which is like a subduction earthquake signal. The HERB platform is able to generate accelerations well over one g (earth's acceleration) as they may be associated with large earthquakes. Both instruments are rotated in a circle with a varying turn rate while the accelerometer maintains its orientation in space. The real-time double integration of acceleration under control of a Kalman filter algorithm (Bock et al. 2011, Bar-Shalom, 2001) driven by the GNSS precise point positioning (PPP) must then reproduce the circle with the correct radius. Several experiments have been carried out in this way to verify that the calculations required to generate the PPP data series and the two integration steps work correctly. Example video: https://youtu.be/0oLiS75iAig.

Oceans 3.0 API filter: `dataProductCode=SEISTEST`

Revision History

- 20180503: Initial release

Data Product Options

The datasets corresponding to the vault tests have "-VAULT" as part of their filename, while datasets corresponding to HERB tests have "-HERB" as part of their filename.

Formats

Both vault and HERB test files have been zipped prior to archival. The files included within the zip file are in .seed or .miniseed format. For information on these formats, refer to https://wiki.oceannetworks.ca/display/DP/102 section "Formats". Compared to data product 120 (Seismometer Data), vault and HERB test data is not currently being sent to IRIS, but only stored in the archives in Oceans 3.0.

Zip files should include an instrument response file in RESP, dataless SEED or XML format. For information of these formats, refer to RESP file page, Dataless SEED, StationXML Schema page and the SEED Manual Appendix G. If such file is missing, please contact ONC for a copy of such file.

Oceans 3.0 API filter: `extension=zip`

Examples

Sample for download: https://data.oceannetworks.ca/AdFile?filename=NANOMETRICSTITANSMA000638_20180919T192050.000Z-HERB.zip and https://data.oceannetworks.ca/AdFile?filename=NANOMETRICSTITANEA000144_20180114T090000.000Z-VAULT.zip.

Discussion

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