FracRisk
Reporting form for deliverables

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Lead participant	Dr Erica Galetti
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Deliverable summary text:

Seismic noise data recorded at Preese Hall during hydraulic fracturing operations was uploaded onto the FracRisk shared drive and made available on the FracRisk website by 30 April 2016.

The attached report provides a description of the data and of the structure of the shared directory.

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Preese Hall seismic noise data

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Directory PREESE_HALL *on the FracRisk shared drive contains seismic ambient noise and event data recorded in 2011 during hydraulic fracturing operations at Preese Hall. This document is intended to provide an overview of the data and of the structure of this directory and its subdirectories.*

Data ownership

The raw data in subdirectories EVENTS and NOISE/MINISEED were acquired and are currently owned by the British Geological Survey (BGS). Any use of this data, of the processed data in subdirectory NOISE/SAC, and of the instrument response files in directory RESP, must acknowledge the BGS as the source of the data and response files.

Directory structure

The data in this directory is organised as follows:

- SCRIPTS: this directory contains script proc_data.sh, which was written by Erica Galetti and used to produce the processed data contained in NOISE/SAC from the raw data in NOISE/MINISEED. It can be modified in order to re-process the data using different processing parameters (e.g., defining a different filter while removing the instrument response).

- NOISE: this directory contains seismic ambient noise data recorded by 4 seismic stations near Preese Hall for 4–6 months in 2011, and contains 2 subdirectories:

    - MINISEED contains raw data in miniseed format (no processing applied)

    - SAC contains processed data in SAC format. Processing was carried out using script proc_data.sh in directory SCRIPTS, and included removing mean, trend and instrument response, and tapering the edges of the seismic traces. These are standard processing steps when working with noise data, and more details can be found in Bensen et al. (2007). This subdirectory may also contain a series of text files which highlight if errors or warnings came up while processing the data. Note that the data were filtered using a tapered filter while removing the instrument response (see lines 52–56 in proc_data.sh).

- EVENTS: this directory contains seismic traces of events originating in Preese Hall and recorded by a number of seismic stations belonging to the BGS network GB. The data are in miniseed format and can be 'unpacked' using program mseed2sac to produce a series of .SAC files which can be read using the Seismic Analysis Code (SAC) or Matlab.

- STATIONS: this directory contains stations information:

- GB␣dataless.dseed is the dataless seed file containing station and response information for permanent GB stations

- rdseed.stations is the stations summary file obtained from GB␣dataless.dseed using rdseed

- stations.dat contains the geographical coordinates of permanent and temporary (Preese Hall) stations in the GB network

- mseed2sac-2.0: this directory contains a pre-compiled version of program mseed2sac, which can be used to convert miniseed files to SAC format. Any new version of the program and additional information can be found on the mseed2sac page.

Data quality control

Raw data (in directories EVENTS and NOISE/MINISEED) and processed data (in directory NOISE/SAC) have only been subjected to a minimal amount of quality control, and further QC should be carried out when the data is used. Such QC measures should include checks for instrument abnormalities and glitches (e.g., see files 2011-09-12-1800-00M.BAVH␣HHE.SAC and 2011-09-12-1900-00M.BAVH␣HHE.SAC and their miniseed counterparts for an example of instrument-related abnormalities).

Useful software

- SAC: http://ds.iris.edu/ds/nodes/dmc/software/downloads/sac/101-6a/

- mseed2sac: http://ds.iris.edu/ds/nodes/dmc/software/downloads/mseed2sac/2-0/

- rdseed: http://ds.iris.edu/ds/nodes/dmc/software/downloads/rdseed/5-3-1/

Contact

For any queries, please contact Erica Galetti at erica.galetti@ed.ac.uk.

References

Bensen, G. D., Ritzwoller, M. H., Barmin, M. P., Levshin, A. L., Lin, F., Moschetti, M. P., Shapiro, N. M., & Yang, Y., 2007. Processing seismic ambient noise data to obtain reliable broad-band surface wave dispersion measurements, *Geophysical Journal International*, **169**(3), 1239–1260.