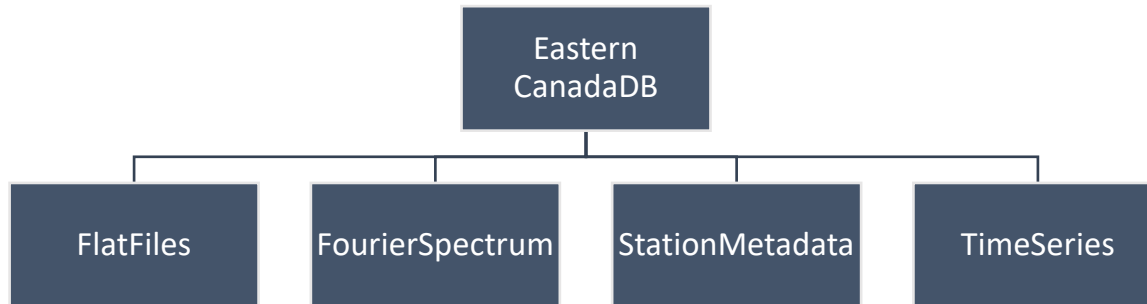


## Database Information

The Fourier Spectra Database for earthquakes in Eastern Canada is comprised of a folder network to provide a comprehensive ground motion database to users.



We will provide details for each folder below beyond that provided in the paper.

### Flat Files

All files can be found in `./EasternCanadaDB/FlatFiles/`

The flat file folder contains csv files which provide:

`EventMetadataFlatFile.csv` → provides a list of all events in the database. The file contains: event name (date and time); event latitude, longitude, depth (km); catalog magnitude, and type (NRCAN, 2020); moment magnitude; number of records; stations with records. Note the stations are named in the header and a 1 represents that a record exists for the station while a 0 represents no records are present for the station.

`FourierSpectraFlatFile_G14_<WAVETYPE>_<COMPONENT>.csv` → for each wave type and component we identify the location for each full Fourier Spectra SAC file in the Fourier Spectrum folder. The file contains: Record Name (which is a unique name composed of the event date, time, and station of the record); the events latitude, longitude, and depth (km); catalog magnitude, and type (NRCAN, 2020); moment magnitude; the station name, latitude, longitude, and elevation (m); component; epicentral distance (km); hypocentral distance (km); azimuth; back azimuth; the time lapse to rupture (which is elapsed seconds from the beginning of the time series for the record to the start time of the earthquake rupture at the source); the time elapsed user picked arrival times (which are elapsed seconds from the beginning of the time series for the record) of the p-wave, and s-wave (if these are -12345 this means no arrival was selected); the lower and upper signal to noise ratio frequency (Hz) where the signal to noise ratio is continuously larger than 3 (if this is -9.99 this means no range of frequency existed above 3 and for the Noise files the SNR lower and upper are filed with NaN); and the file location of the record.

FourierSpectraFlatFile\_G14 \_<WAVETYPE>\_Smoothed \_<COMPONENT>.csv → for smoothed Fourier Spectra for each wave type and component we provided the smoothed Fourier Spectrum. This file contains the same data as the Flat File above except that after the signal to noise frequency upper and lower values the amplitude of the smoothed Fourier Spectra amplitude (cm/s) for a given frequency (Hz) is provided.

ResponseSpectraFlatFile\_Horizontal\_ROTD<nn>.csv → for Response Spectra for different percentile value nn of 0, 50, and 100 we provided the Response Spectrum from 0.8Hz to 40 Hz (the range of filtering on the time series dataset) for 30 log<sub>10</sub> spaced frequencies. The file contains: the unique record name (date, time, station); event latitude, longitude, and depth (km); catalog magnitude, and type (NRCAN, 2020); moment magnitude; station name, latitude, and longitude; epicentral distance (km); hypocentral distance (km); and the response spectra for the 30 frequencies. The header has the 30 frequencies (Hz) associated to the response spectral amplitudes (cm/s/s).

TimeSeriesFlatFile\_<component>.csv → for each component we provide file locations of each full processed velocity time series in SAC format. The file contains: Record Name (which is a unique name composed of the event date, time, and station of the record); the events latitude, longitude, depth (km), and epicentral distance (km); catalog magnitude, and type (NRCAN, 2020); moment magnitude; station; component; the time elapsed user picked arrival times (which are elapsed seconds from the beginning of the time series for the record) of the p-wave, and s-wave; the time elapsed to the window beginning and end using the Goulet et al. (2014; 2021) windowing method for the entire waveform, noise, P-wave, SLg wave, and the Coda wave (which are elapsed seconds from the beginning of the time series for the record); and the file location of the record.

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Goulet, C.A., T. Kishida, T.D. Ancheta, C.H. Cramer, R.B. Darragh, W.J. Silva, Y.M.A Hashash, J. Harmon, J.P. Stewart, K.E. Wooddell, and R. R. Youngs. (2014). PEER NGA-East database, *PEER Report No. 2014/17*. Pacific Earthquake Engineering Research Center, Berkeley, CA.

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Natural Resources Canada's Earthquakes Canada - Geological Survey of Canada (GSC) on-line bulletin earthquake search at <http://www.earthquakescanada.nrcan.gc.ca/stndon/NEDB-BNDS/bulletin-en.php> (last accessed September 2020).

## Fourier Spectrum

This folder contains all record Fourier Spectrum. It is organized by magnitude, then by record, and then in each record folder the Fourier Spectrum for each wave type and component are provided. The Fourier spectrum are not smoothed and are provided in SAC format. We only provide the amplitude files. Note the Fourier amplitude spectra are acceleration and the SAC data file amplitudes are in nanometers/second.

### **Station Metadata**

All files can be found in ./EasternCanadaDB/StationMetadata/

Each file contains: Station Name, Latitude, Longitude, Elevation, Record type provided in this database, Surficial Geology, Bedrock Geology, Rock Sample ID, Seismic Instrument Mounting and Housing Type, Average Shear wave velocity in the upper 30m ( $V_{S30}$ ), Average Poisson Ratio, microtremor HVSR\*, earthquake HVSR, near surface shear wave velocity profiles computed for each station as a part of this study\*, Primary wave lithological unit velocities, and velocity profiles from literature.

Units are denoted in the label information.

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Ontario Geological Survey (2011) Bedrock Geology map for the Province of Ontario scale 1:250 000 MRD126 from <https://www.geologyontario.mndm.gov.on.ca/ogsearth.html#bedrock-geology> (last accessed November 21, 2021).

\*for more information on the computation of these profiles see:

Ladak, S., S. Molnar, and S.M. Palmer. (2021) Multimethod site characterization to verify the hard rock (site class A) assumption at 25 seismograph stations across eastern Canada, *Earthquake Spectra* **37**, 1487 – 1515.

Ladak, S. (2020) Earthquake site characterization of rock site in eastern Canada and stiff ground sites in Vancouver, British Columbia. MSc Thesis, University of Western Ontario, <https://ir.lib.uwo.ca/etd/6972>.

## **Time Series**

This folder contains all record Time Series. It is organized by magnitude, then by record, and then in each record folder the Time Series for each wave type and component are provided. Time Series are provided in SAC format. We only provide the amplitude files. Note time series are velocity time series and the SAC data file amplitudes are in nanometers/second.