Experiment Full-name: **Mount Rainier Full Waveform Ambient Noise Tomography**

Experiment Nickname: **RAINIERANTFWI**

Reference:

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## DATA PROCESSING DESCRIPTION

Data described here was used in *Flinders et al. 2016* as source data for a Mount Rainier full waveform ambient noise tomography project. These data were derived from the cross-correlation of ambient noise waveforms, yielding Empirical Green's Function (EGFs) between two seismic-station pairs, i.e., one station's far-field response to an impulsive source at the paired station. These EGFs were extracted from short-period (EHZ) and broadband (BHZ) high-gain vertical-component seismic stations within 110 km of Mt. Rainier (Fig. 1; 99 stations total). Data requests were made through the Incorporated Research Institution for Seismology (IRIS) Data Management Center, and limited to the years 2000-2014. Processing included removing the seismometer instrument response, cutting the records into daily segments, and normalizing their spectra. Normalization was performed via the frequency-time normalization method (Ekström et al., 2009) using 6.25 mHz wide frequency bands. Portions of seismic records overlapping with large earthquakes (M > 5.0) were nulled and tapered. Daily records for unique station-station pair combinations were cross-correlated and stacked by month, and EGFs calculated as their time derivative. EGFs for months with signal-to-noise ratios < 5 were removed from the database. This discrimination removed months where instruments were behaving erratically or when there was localized coherent noise. All daily cross-correlations for the remaining months were then stacked into a final cross-correlation record, and subsequent EGFs calculated. Additional discrimination was performed during the tomographic process and the EGFs provided here are only those that passed these criteria (1603 EGFs total).
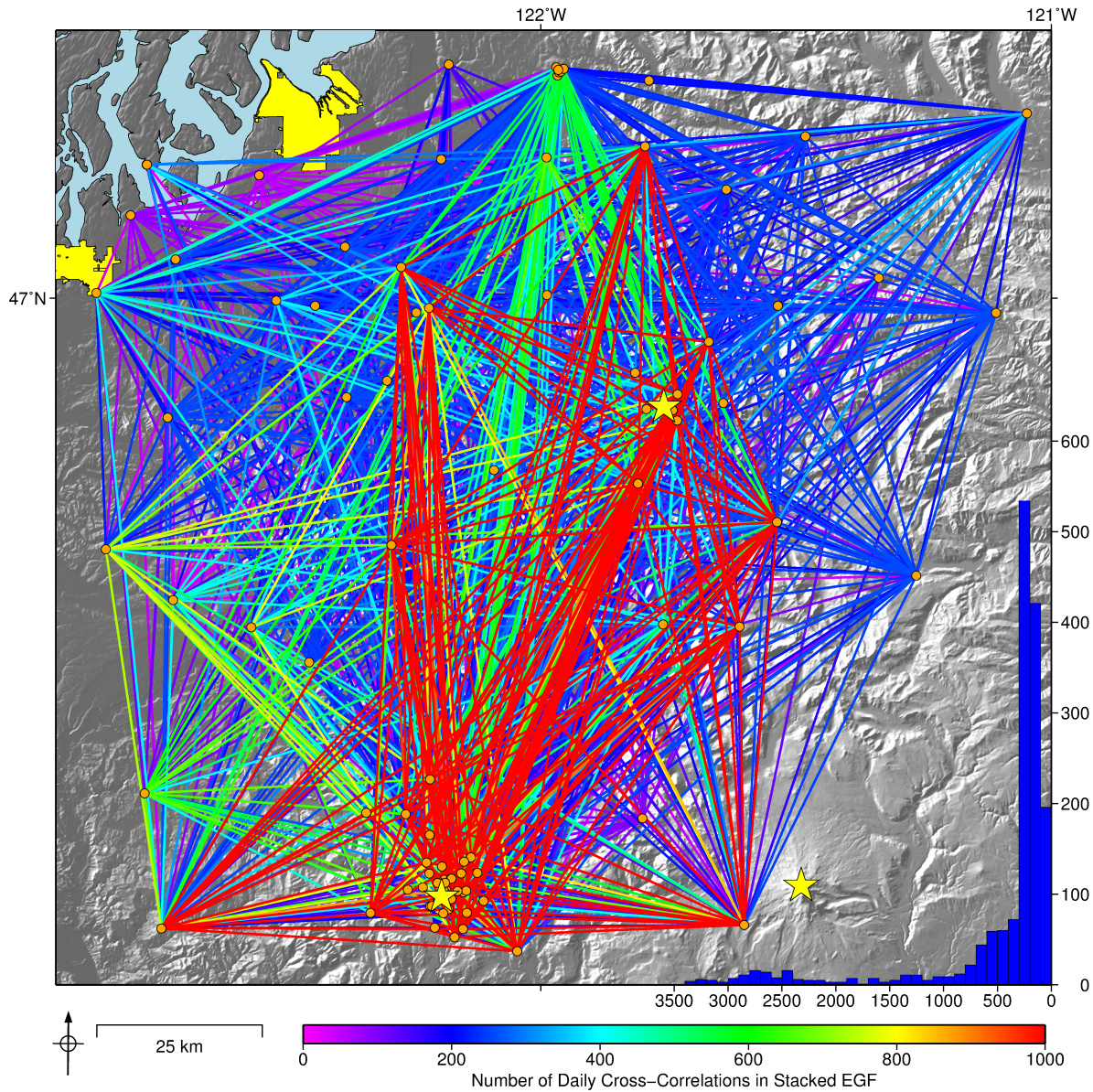
**Figure 1. Station locations and stacked distributions of empirical Green's functions.** Seismometer locations (orange circles) relative to volcano locations (yellow-stars). The number of daily cross-correlations in the final stacked empirical Green's function is shown by both the colored line-path between station locations, and the inset histogram (minimum of 30 days).
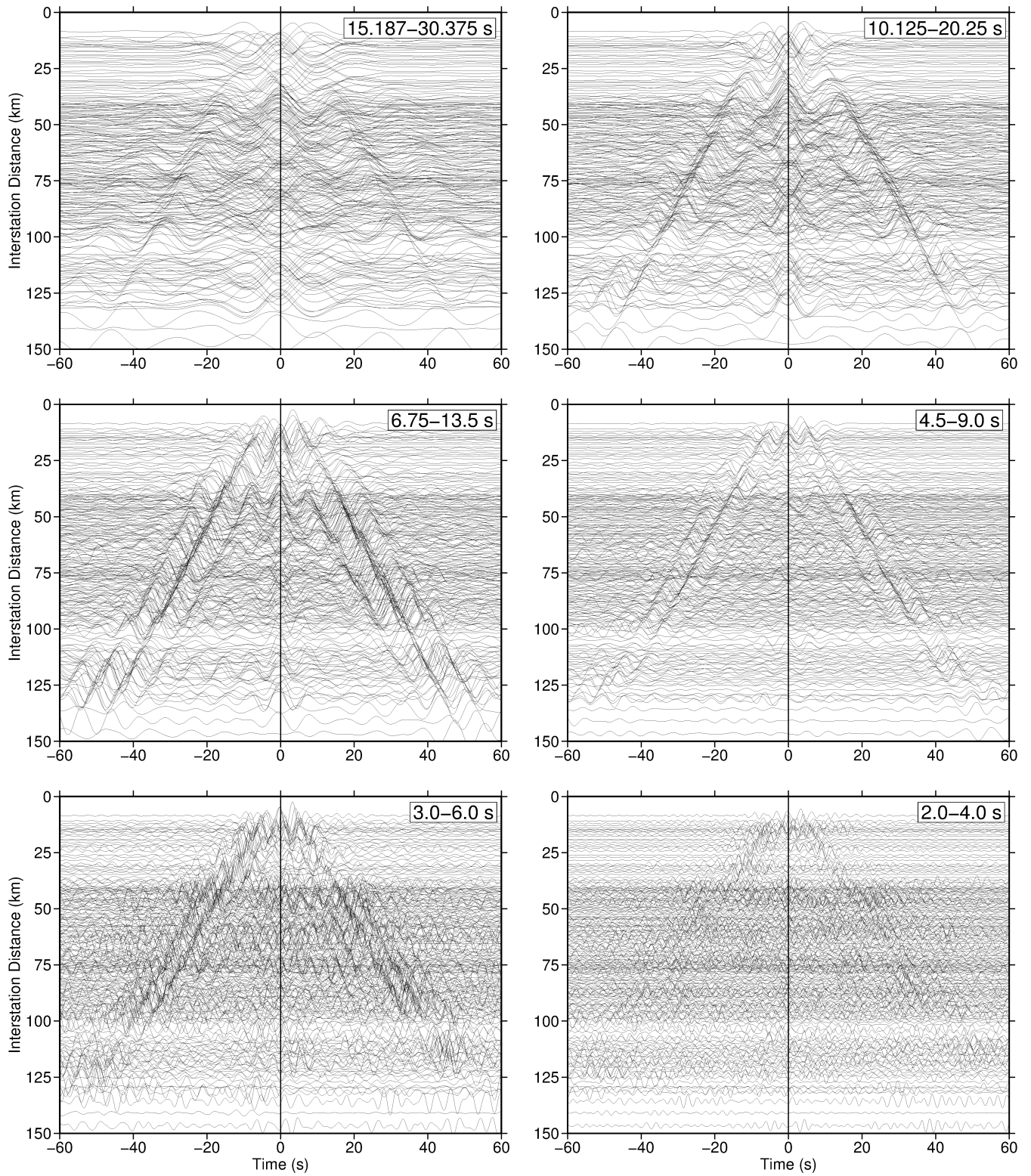
**Figure 2. Empirical Green's functions versus distance.** The six different frequency bands used in the tomography showing move out of the surface wave arrival.

## DATA FORMAT DESCRIPTION

Empirical Green's Functions are provided in **SAC** format with the following naming convention, for station name "*StnA*" from network "*Ntwk1*" and station name "*StnB*" from network "*NtwkB*";

> *Ntwk1.StnA.Ntwk2.StnB*.SAC

SAC records are 4459.9375 seconds in duration, beginning at $t = -2230$ $s$ and ending at $t = -2229.875$ $s$, with 0.0625 s sample spacing. The negative times of the record ($t < 0$) correspond to the acausal portion of the Empirical Greens Function, and the positive times to the causal portion. SAC header dates (KZDATE, KZTIME) for all files are set to the same arbitrary time (January 1, 2000, 12:00:00) to allow for easy plotting. Important header SAC header values to note, following the same *Ntwk1.StnA.Ntwk2.StnB*.SAC, convention described previously:

KNETWK = *Network 1 name*
KSTNM = *Station A name*
STLA = *Station A latitude*
STLO = *Station A longitude*
STEL = *Station A elevation*
STDP = NOT USED

KEVNM = *Ntwk2.StnB*
EVLA = *Station B latitude*
EVLO = *Station B longitude*
EVDP = *Station B elevation (NOT DEPTH!)*

DIST = *Interstation distance from Station A to Station B*
AZ = *Azimuth from Station B to Station A*

USER1 = *The number of days in the stacked cross-correlation*

KCMPNM = ?HZ *(indicates high-gain vertical stations)*


**A full SAC header example is provided below;**

FILE: UW.FMW.YB.S10.SAC
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NPTS = 71359
B = -2.230000e+03
E = 2.229875e+03
IFTYPE = TIME SERIES FILE
LEVEN = TRUE
DELTA = 6.250000e-02
IDEP = DISPLACEMENT (NM)
DEPMIN = -1.033634e+00
DEPMAX = 1.000000e+00
DEPMEN = 4.141155e-11
KZDATE = JAN 01 (001), 2000

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KZTIME = 12:00:00.000
KSTNM = FMW
CMPAZ = 0.000000e+00
CMPINC = 0.000000e+00
STLA = 4.694139e+01
STLO = -1.216710e+02
STEL = 1.859000e+03
STDP = 0.000000e+00
KEVNM = YB.S10
EVLA = 4.617850e+01
EVLO = -1.222138e+02
EVDP = 1.544000e+03
KHOLE =
DIST = 9.446676e+01
AZ = 2.594460e+01
BAZ = 2.063375e+02
GCARC = 8.500991e-01
LOVROK = TRUE
USER1 = 1.830000e+02
NVHDR = 6
SCALE = 1.000000e+00
NORID = 0
NEVID = 0
LPSPOL = FALSE
LCALDA = TRUE
KCMPNM = ?HZ
KNETWK = UW
```

## ACKNOWLEDGMENTS