Characteristics of ambient noise near Nenana basin, central Alaska

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Ambient noise is useful for characterizing frequency-dependent noise levels and for assessing data quality for seismic stations. We use ambient noise spectra—downloaded from the MUSTANG portal at IRIS—to study the effects of nature (river turbulence and wind speed) and structure (soft sediment and bedrock) on seismic stations at different spatial-temporal scales. Noise is analyzed from two perspectives: time-averaged noise and time-varying noise. Time-varying noise has the averaged noise subtracted out; an example is shown on Figure 1. We attempt to relate time-varying residuals of ambient noise to distance from main river channel, river stage height, and wind speed. Our results provide evidence for seasonal signals at 10 Hz from the main river channel. Correlations between wind speed and long period seismic signals (> 10 seconds) are probably due to tilt effects that have been previously documented. The time-varying residuals also reveal consistent noise anomalies across different stations for certain time periods which could be from weather anomalies. Our time-averaged noise show stations on the Nenana basin excited at 4 seconds. Time-averaged noise results show trees do not have much of an effect. Cultural noise does have some impact with higher frequency signals for stations closer to human activities. Our analysis allows us to better monitor the performance of temporary and permanent seismic stations, as well as to understand the physical causes of time-dependent noise variations in Alaska.

![Figure 1: Vertical deviatoric daily spectrogram of station F3TN for the time period 2014-09-01 to 2016-04-28. Signals around 4 seconds follow a seasonal trend coming from oceanic standing waves. 10 Hz signals follow a seasonal trend which we believe to be dominated by the nearby main river channel.](image-url)