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A Regional Phase Amplitude Model of 2-D Attenuation for North America

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A Regional Phase Amplitude Model of 2-D Attenuation for North America

We analyzed seismic attenuation patterns across the North America using over 70,000,000 Lg wave amplitudes recorded by the various networks at frequencies of 0.1-32 Hz. Our inversion solved for laterally varying attenuation, site terms, moments, and apparent stress following Phillips et al., (2016). The inversion was anchored by independently constrained: corner frequencies (via coda spectral ratios) to control the attenuation-stress tradeoff and moment measurements of teleseismic (GCMT, USGS) and regional (St. Louis University and UC Berkeley) earthquakes to provided absolute scaling. The quality factor (Q) shows clear regional patterns: low values in coastal, volcanic, and tectonically active regions, and high values in stable areas like the Great Plains and major plateaus throughout North America. These 2-D *Q* models enable improved regional source characterization, magnitude estimation, and yield determination.

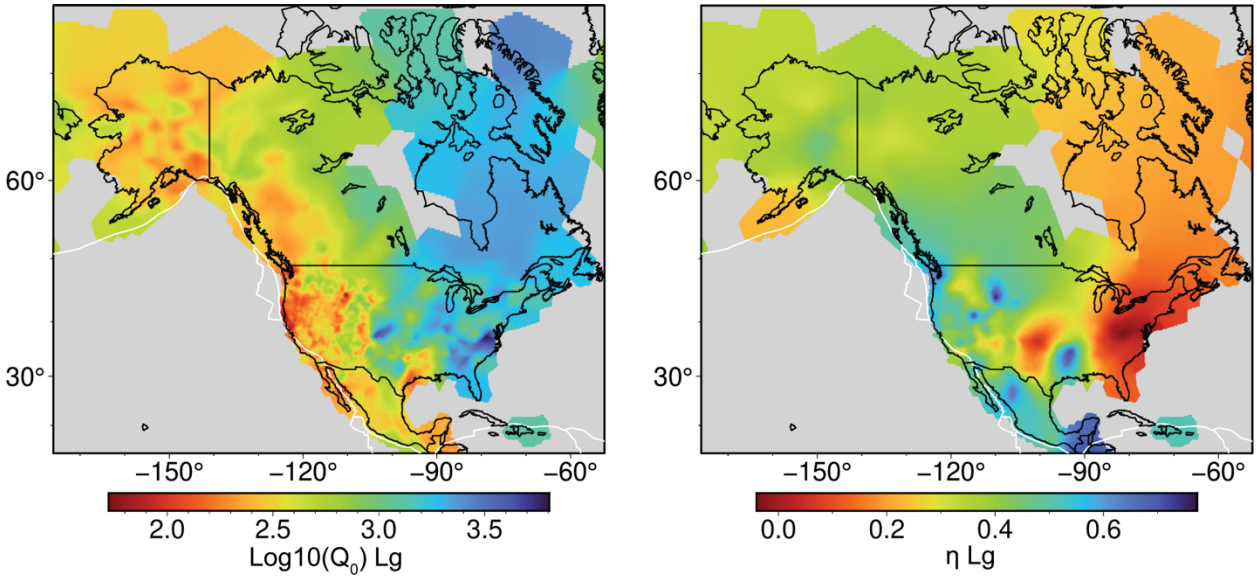

Figure 1. Frequency-dependent attenuation across the study region. Left panel shows the 1-Hz quality factor (Q_0), while right panel shows the frequency dependence parameter (η). Results are derived from a 2-D inversion that solved simultaneously for Q_0, η, and source parameters (moment and apparent stress) for each event, incorporating source constraints from Phillips et al. (2016).

References

Phillips, W.S., Mayeda, K.M. & Malagnini, L. How to Invert Multi-Band, Regional Phase Amplitudes for 2-D Attenuation and Source Parameters: Tests Using the USArray. Pure Appl. Geophys. 171, 469–484 (2014). https://doi.org/10.1007/s00024-013-0646-1

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