

Bourke, R.B., Link, F., Li, Y., Masis Arce, R., Espinal, K., Luo, Y., Long, M.D., Karabinos, P., and Webb, L.E., 2023. Sharpness estimates of the New England crust-mantle transition. In AGU Fall Meeting Abstracts (Vol. 2023, T43E-0314).

The Appalachian Mountains are the most striking feature of Eastern North America geology and record multiple episodes of accretion and subsequent rifting over the last 0.5 GA. Trending near north-south, the surficial expression of the Appalachians in New England can be sub-divided into distinct tectonic terranes such as Avalon, Gander, and Moretown, however their lateral limits and nature of lowermost boundaries at depth remain unknown. Recent densely deployed temporary seismological experiments (NEST, SEISConn, QM-III) have observed a clear step-like increase in bulk crustal thickness from east to west, advancing our understanding of the region's tectonic history.

In this study, we present new constraints on the nature of the lowermost crustal boundary of the New England region, focusing on the sharpness (i.e. thickness) of the transition between crust and mantle rocks. We use the receiver function (RF) methodology, specifically back-azimuthal harmonic regression to isolate the directionally invariant portion of P-to-S converted signal. Based on the resulting pulse shapes in the constructed RF time series at different frequency bands, we estimate the thickness of the crust-mantle transition. We present our results for both a regional dataset and for the temporary deployments NEST (2018 - present) and SEISConn (2016 - 2018). Preliminary results of this study suggest a sharper crust-mantle transition to the east (< 1.5 km thickness) compared to the west ($1.5 - 3.5$ km thickness). These results represent first-order observations on the nature of the lower most boundary of the New England crust and will aid in the further investigation of its tectonic history.