Characterizing lithospheric structure beneath Connecticut using Sp receiver functions

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The purpose of our study is to characterize the structure of the southern New England lithosphere and underlying asthenosphere in order to better understand the tectonic evolution of the region. The structure of the uppermost mantle beneath the eastern U.S. has been, arguably, understudied relative to other regions within the U.S., such as the more tectonically active western margin. From 2004-2013, Earthscope's Transportable Array (TA) travelled across the continental U.S., illuminating previously hidden and/or under-sampled mantle structure. Recent work highlights the presence of a slow S-wave velocity anomaly within the asthenosphere beneath New England. Superimposed upon this anomaly sits the New England lithosphere, which has its own complex tectonic history characterized by the presence of several accreted orogenic terranes, and a failed rifting center.

We have imaged the lithosphere-asthenosphere system in southern New England using Sp receiver function analysis. Data from 76 seismic stations, including data from TA, permanent stations, and the SEISConn seismic experiment (data from 2015-present), were downloaded. Waveforms were rotated into a P-SV-SH reference frame and deconvolved using an extended time multitaper deconvolution technique. Calculated single station stacks show considerable variability. In some instances, such as at permanent stations and several TA stations, our preliminary results agree well with the work of others. Moho depths range from 23 to 47km, in general agreement with the Earthscope Automated Receiver Survey (EARS). Prominent negative phases range from 45 to 99 km depth and show some similarity to the work of Hopper and Fischer (2018). In many instances, multiple negative phases are observed at a given station. CCP stacking shows stronger negative amplitudes to the west which gradually weaken to the east. This suggests a relationship between terranes and signal amplitude, which in turn may be related to variations in physical properties, such as the presence of melt. Future work, including modeling and additional CCP stacking to incorporate newly collected data, will help us to more fully understand the structure, physical properties, tectonic history and present-day dynamics of the region.

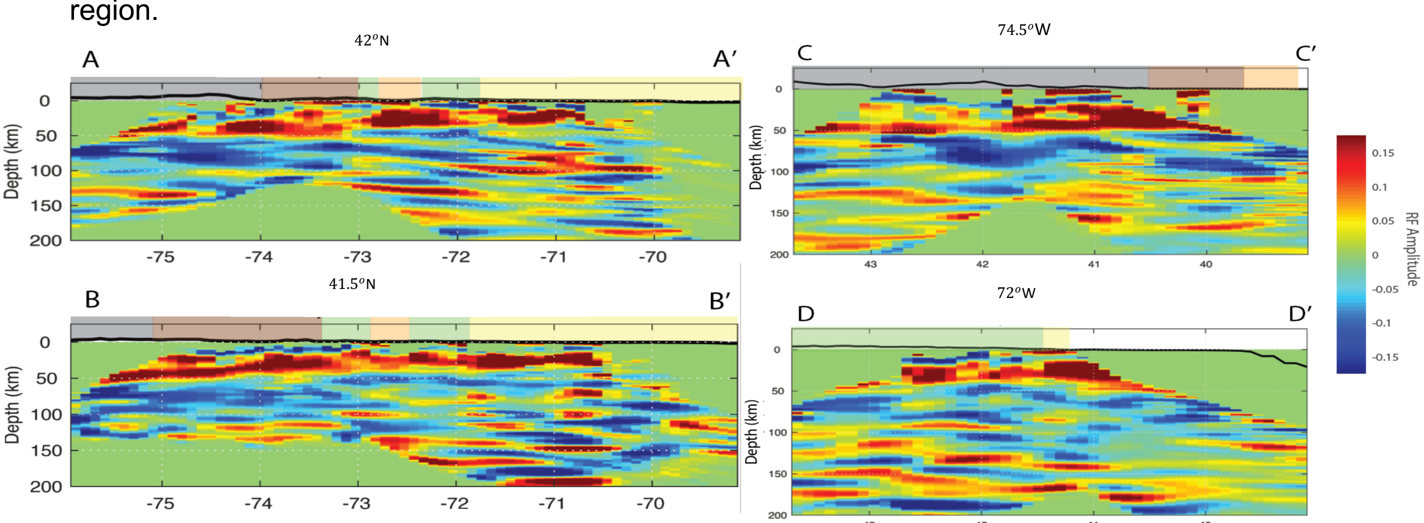

Figure 1: *Cross sections of common conversion point stacked Sp receiver functions. Positive amplitude phases are shown in red, while negative phases are shown in blue. Profiles A and B follow lines of latitude, while profiles C and D follow lines of longitude. Above each profile colored boxes correspond to the location of orogenies expressed at the surface. Gray is Laurentia, brown is the Taconic orogeny, green is the Gander orogeny and yellow is the Avalonian orogeny. The orange box indicates the location of the Hartford and Newark basins.*