Deriving shallow elasticity structure from co-located pressure and seismic data and comparing it to Vs30 data

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There are now many stations that have both pressure and seismic instruments that are installed basically at the same location. The EarthScope Transportable Array and some IRIS GSN stations are some examples. Data from such co-located pressure and seismic sensors provide us new perspectives for the interactions between atmosphere and the solid Earth. In particular, coherence between pressure and seismic data is generally high for frequencies between 0.01 Hz and 0.05 Hz and we can show that this is due to atmospheric pressure loading effects on the solid Earth using coherence and phase relations between pressure and seismic data.

We have recently developed an approach that takes advantage of this highly coherent data and invert them for shallow structure (Tanimoto and Wang, 2019, JGR solid). In this paper, we summarize the main characteristics of this method and then show that this method can be used to test Vs30 models. A Vs30 map is often used for evaluating site amplification effects in ground-motion predictions and our results seems quite useful for testing and establishing Vs30 maps. We will show the results of inversion for nine co-located pressure and seismic data in the Pinon Flat Observatory (PFO) and some broadband stations in Southern California. At one of the co-located stations at PFO, our Vs30 estimate agrees quite well with an independent measurement by a USGS study (Yong et al., 2016).

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