# High Resolution Passive Imaging Using Dense Geophone Arrays

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The recent development of passive seismic imaging methods such as ambient noise tomography and receiver function combined with the availability of dense geophone arrays has now opened up many new opportunities on high-resolution imaging. In this presentation, I shall review the work our group has done recently on deploying geophone arrays and imaging hydrothermal, basin, and subduction structures. In each study, hundreds of autonomous geophones were deployed which recorded passive seismic signals continuously for up to 35 days. By using seismic interferometry method, surface waves traveling between station pairs can be extracted and used to study the detailed crustal structure from surface to about 25 km depth. Applying the method to data collected from the Upper Geyser Basin in Yellowstone, for example, has revealed a previously unknown hydrothermal reservoir of Old Faithful geyser between 20 and 60 meter depth. Despite the 5 Hz corner frequency of the geophone used, surface waves between 2 and 15 second period can be observed in ambient noise cross-correlations across a linear dense array in Oregon. Such a period range allows us to construct a detailed crustal model from the coast to Cascade Range. With three-component data, receiver function analysis can be done using teleseismic signals and multi-component deconvolution. With dense station coverage, coherent shallow crustal interfaces can be tracked, and local geology can be interpreted. Preliminary receiver functions across the Juan de Fuca subduction plate will be shown and discussed.