

The ability to detect and characterize seismic events is fundamentally limited by background noise levels at seismic stations across a given network. Such noise arises from both self-noise of the sensors as well as from local (< 10 m) site effects related to both the installation methodology and geographical setting. As improvements in the noise floor of seismic instruments have been small and incremental over the past few decades, new techniques for sensor emplacement must be developed to drive continued improvement in event detection. We investigate the potential of using stacking and other array processing techniques across a 10-element, 500 m aperture array at the U.S. Geological Survey Albuquerque Seismological Laboratory (ASL) to reduce station noise levels and improve event characterization.

The array was formed by supplementing the primary and secondary borehole sensors at the Global Seismographic Network (GSN) station ANMO and the ASL underground reference vault sensor with seven additional posthole sensors. The sites for each array element were selected such that each 2.5 m, cased posthole would be installed within Precambrian granite, could be accessible to the IRIS Transportable Array Alaska drilling rig towed behind a truck, and would provide complete azimuthal coverage within the footprint of the ASL land lease. As these sites are located far away from power and network connections, each station is powered by a 220W solar system and data is telemetered in real-time using wireless bridges. Small aperture arrays constructed similarly to this at select stations across the GSN may have the ability to improve the monitoring capabilities of the network. Here, we report some initial observations from the array including examining local sources of seismic noise and how they may be influenced by local geographic effects such as buildings and topography.

