Location performance of the Alaska regional seismic network: an evaluation by the SNES method

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Seismic networks are powerful tools for understanding the state of seismo-tectonic processes taking place in a region. Their numerous applications, from monitoring seismicity to characterizing seismogenic volumes, make seismic networks essential tools for the seismic risk assessment. Appropriately structured seismic network may also be a valuable tool for the study of deep geological structures through seismic tomography. The ability to detect small and medium sized events requires a seismic network with sufficient number of low noise stations that are optimally distributed. It is, therefore, important to assess existing capabilities of a seismic network, to identify seismic areas that are not adequately covered, and to further ascertain measures for the network improvement.

Alaska is the most seismically active region of the United States. Seismicity is associated with the subduction of the Pacific plate beneath the North American plate, with the transform boundary in the southeast Alaska, and with numerous crustal faults throughout the State. Regional seismicity in Alaska is monitored by the Alaska Earthquake Information Center (AEIC) utilizing combined regional seismic network that comprises over 400 seismic sites.

In this poster we will evaluate earthquake location performance of the Alaska regional seismic network though SNES (Seismic Networks Evaluation through Simulation) method. This method analyzes noise levels of existing stations, location errors, and velocity uncertainties and produces certain metrics that allow to asses capabilities of an existing network.

In particular, through SNES we have identified high and low seismic noise areas of Alaska seismic network. Through statistical analysis of P and S residual times we have assessed validity of velocity models used by AEIC in their earthquake location routines and produced empirical formulas that link travel time residual time variance to the hypocentral distance.

Finally, from analysis of produced SNES maps, we will identify regions in Alaska where it may be opportune to improve the existing seismic network.