

The Caucasus Seismic Network (CNET): Seismic Structure of the Caucasus

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The Greater Caucasus is segment of the Alpine-Himalayan mountain belt, that has undergone rapid uplift in the past 5 million years. Being one of the youngest mountain systems of the earth, it can be considered as the unique place to understand early stage of mountain formation. Recent studies showed, that region has lack of instrumentally obtained observation data and requires improving and extending geophysical monitoring systems to understand its complex structure. Relatively lower resolution seismic velocity models of this region show contradictory lateral variability. Furthermore, recent waveform modeling and relocation of old earthquake dataset has clearly demonstrated the presence of deep earthquakes (with a maximum hypocentral depth of 175 km) below the Greater Caucasus. The region has been largely unexplored in terms of the detailed uppermost mantle and crustal seismic structure.

Seismic network resolution in the Caucasus countries has been improved during past several years. National networks deployed new seismic stations and established good collaboration in exchanging online waveform data. Recently Seismic Network of the region improved tremendously in the framework of the joint regional project “The Uplift and Seismic Structure of the Greater Caucasus”, supported by USA Department of Energy, IRIS Passcal and Science and Technology Center in Ukraine (STCU). Project has started since April 2017. Scientific teams from Armenia, Azerbaijan, Georgia and USA (Michigan State University, Oregon State University, Missouri State University) jointly deployed 53 seismic stations in the region. Our seismic array has two components: (1) a grid of stations spanning the entire Caucasus and (2) two seismic transects consisting of stations spaced at distances of less than 10 km, that cross the Greater Caucasus.

Our study address fundamental questions about the nature of continental deformation in this poorly understood region. Using data from over 106 new seismic stations in Azerbaijan, Armenia, Russia, and Georgia, we hope to gain a better understanding of the structure of the Greater Caucasus and the nature of seismogenic deformation in the region