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GNSS Network and Velocity field of Georgia

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Continental collisions are a fundamental part of the Wilson Cycle and play a significant role in the evolution of the Earth's continents, including being responsible for many major mountain belts. Only two active continent-continent collisions occur today, India-Eurasia, and
Arabia-Eurasia (AR-EU). Because of its young age (less then 30 Ma), limited spatial extent (∼600 km across the entire collision zone), and less then 20 years of geodetic studies, the AR-EU continental collision zone offers the opportunity to determine the detailed kinematics of active deformation for the entire region of plate interaction, from the stable Arabian Plate in the south to the stable Eurasian Plate in the north. The Caucasus region is a broad zone of convergence that forms part of the Alpine–Himalayan collision belt. The Greater and Lesser Caucasus mountains roughly extend between the Caspian and Black seas, and are separated by an inter-mountain depression. The region is tectonically and structurally complex. Thus, quantifying the distribution of crustal strain within the collision zone, a principal objective of this research, is important both for clarifying our
understanding of the dynamics of continental deformation, and for
developing an improved physical basis for estimating and mitigating
earthquake hazards in this rapidly developing region.

We used the available GPS data throughout the collision zone obtained
throughout the Caucasus region and enhanced the existed GPS network by
means of installing new permanent stations and performing trans-section GPS surveys from the western part of the Caucasus mountains to the very eastern edge of the main Caucasus thrust. This effort utilized and build upon a new GPS velocity field (1994-2018) including all GPS sites of the Caucasus ountries (Armenia, Azerbaijan, Georgia). and further constrained by geodetic observations available in Turkey, the northern part of the Arabian Plate, the northern Caucasus in Russia, and Iran. Our study provided new constraints on, 1 - convergence across the Greater Caucasus (spatial distribution of active faults and their associated slip rates and locking depths) from the Black Sea to the Caspian Sea, 2 - faulting and block rotation in the Lesser Caucasus.