

Collaborative Research: Active kinematics of lithospheric extension along the East African Rift

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This one-year effort, supported by the GeoPRISMS program for the East Africa focus, encompassed two different primary activities. The first activity included installation of eight new campaign GPS sites, four in southernmost Ethiopia and four in northwest Kenya. These sites span the presumed actively spreading region of the Turkana Depression and will, with a subsequent measurement, provide the first estimates of the rates and location of extension in the Turkana segment of the East African Rift. Capturing observations of spreading in Turkana is critical to understanding the African Rift at the largest scale, because the Turkana segment must serve as a kinematic link between the single, focused Main Ethiopian Rift and the parallel, simultaneously active Western and Gregory Rifts in Kenya. The Turkana segment may also play a critical role in distinguishing the importance of magmatism to the form and rate of continental extension, and in deciphering the temporal evolution of the Indian Ocean monsoon and its relationship to African seasonal air masses. The second activity included collection of a huge amount of geodetic data for all of East Africa and subsequent calculation of a community velocity model. Some of these data were readily accessible through the NSF-supported UNAVCO data archive, but other data were collected by over a dozen international scientific entities and in many cases were not publically accessible or readily usable. Negotiating use of the data and then estimating velocities (Fig. 1) for all sites with a common methodological approach and in a common standard reference frame transforms the study of East African present-day kinematics from a regional to a continental scale, facilitates systematic comparisons

of different structural rift segments, and provides a synoptic framework for other active tectonics research in the region. This effort also identifies critical areas for future data acquisition, either through new data sharing agreements or new experimental deployments.

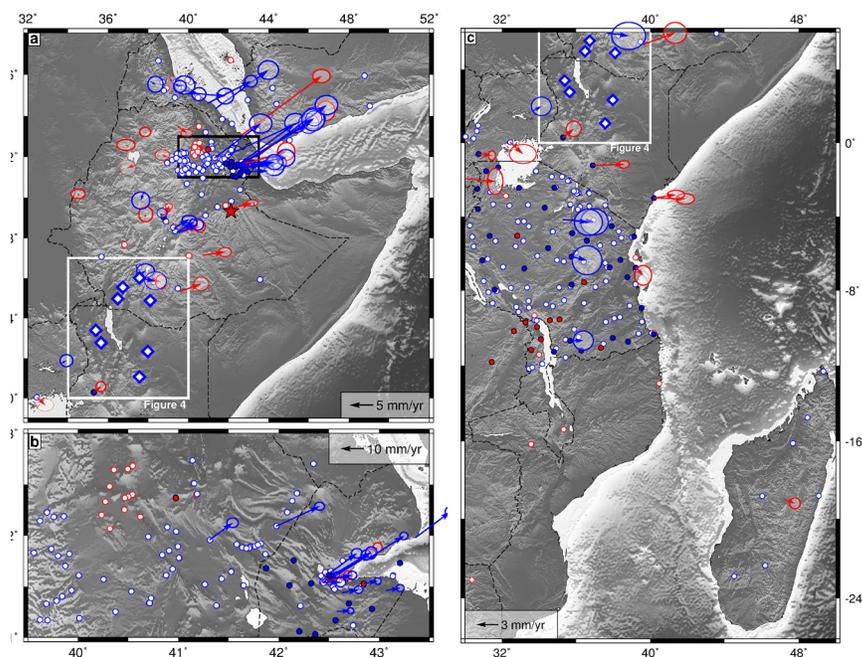


Figure 1. GPS velocities in a Nubian reference frame and locations for cGPS (red) and sGPS (blue) sites in East Africa. Only sites with velocity uncertainty < 1 mm/yr are shown as vectors here. Other sites with a currently less precise velocity estimate are shown with a white dot but no vector. Sites without a current velocity estimate are shown as circles only. Boxed sites with diamond markers are the location of sites installed in the Turkana Depression.