AfricaArray Workshop, University of the Witwatersrand, Johannesburg, 20-21 January 2014

RIFINED KINEMATIC MODEL OF EAR

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The kinematics of the East African Rift (EAR) is currently starting to be unraveled thanks to a recent augmentation of space geodetic data in Africa as well as the documentation of the earthquake slip direction. Here, we use a new data set combining episodic GPS measurements with continuous measurements on the Nubian, Somalian, and Antarctic plates, together with earthquake slip vector directions and geologic indicators along the Southwest Indian Ridge to update the present-day kinematics of the EAR. We find that the data is best fit with a model that includes three microplates embedded within the EAR, between Nubia and Somalia (Victoria, Rovuma, and Lwandle), consistent with previous findings but with slower opening rates. We find that earthquake slip vectors provide information that is consistent with the GPS velocities and helps to significantly reduce uncertainties of plate angular velocity estimates. We also find that 3.16 My MORVEL average spreading rates along the Southwest Indian Ridge are systematically faster than prediction from GPS data alone. This likely indicates that outward displacement along the SWIR is larger than the default value used in the MORVEL plate motion model.