State of the GPS network and velocity solution across the entire East African Rift
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Abstract
We present the latest GPS velocity solution for the entire East African Rift, processed by the Geodesy and Geodynamics Group at MIT. The network consists of both continuously operating and survey-mode GPS sites, and is processed completely to the beginning of 2016. This will be updated periodically as new surveys are performed and continuous GPS data becomes available. The geodetic velocity solution provides constraints on the large-scale kinematics of surface motions as well as more local effects both within and outside of the rift structures.

Existing velocity solution
King et al. (2015) presented the GPS velocity solution generated at MIT using the GAMIT/GLOBK processing software with available data through to the end of June 2013 (2013.5). This velocity solution was made available to the scientific community and beyond through the GeoPRISMS Data Portal hosted by the Marine Geoscience Data System (MGDS) and formed the basis of Birhanu et al.’s (2016) study of deformation around the Main Ethiopian Rift.

New velocity solution
Here we present the updated GPS velocity solution generated at MIT using available data through to the end of December 2015 (2015.0), shown in Figures 1, 2, and 3. More sites have been added and time series have been extended for better precision (Figure 4). This velocity solution is likewise being made available through the GeoPRISMS Data Portal hosted by the Marine Geoscience Data System (MGDS).

References

Acknowledgments
The latest version of the East African Rift GPS velocity solution, relative to Nubia. Only velocities with horizontal component uncertainties (1σ) less than 1.5 mm/yr are considered useful and shown here. Blue vectors are survey GPS sites, red vectors are continuous GPS sites. Red squares are continuous GPS sites for which velocity data available but whose time series are not yet long enough to produce a reliable solution or otherwise do not fulfil our 1.5 mm/yr horizontal uncertainty criteria. Blue squares are new survey measurement sites undertaken as part of former and current GeoPRISMS project grants in the Turkana region.

Figure 1
Close-up view of the tectonic triple junction and Danakil region adjacent to the Red Sea. Velocity uncertainty limits, vectors and squares are as described for Figure 1, but note the change of scale.

Figure 2
Close-up view of the Main Ethiopian Rift region. Velocity uncertainty limits, vectors and squares are as described for Figure 1, but note the change of scale.

Figure 3

Collaborators and contributors
The GeoPRISMS EARS GPS Working Group includes the following institutions: Addis Ababa University, Ethiopia; Ardhi University, Tanzania; Arizona State University; Brandeis University; California Institute of Technology; King Abdullah University of Science and Technology (KAUST), Saudi Arabia; California Institute of Technology; Eritrean Institute of Technology; King Abdullah University of Science and Technology (KAUST), Saudi Arabia; Boston College; University of Montana; National Institute of Astronomy and Geophysics (NRIAG), Egypt; Purdue Technology (KACST), Saudi Arabia; King Abdullah University of Science and Technology (KAUST), Saudi Arabia; Massachusetts Institute of Technology; University of California, Berkeley; Massachusetts Institute of Technology; University of California, Irvine; University of Chicago; Massachusetts Institute of Technology; University of Colorado, Boulder; University of Minnesota; University of Montana; University of Montana; University of Missouri, Kansas City; University of New Mexico; University of Notre Dame; University of Oklahoma; University of Pittsburgh; University of Pennsylvania; University of Pennsylvania; University of Pennsylvania; University of South Carolina; University of Texas at Austin; University of Texas at Dallas; University of Texas at El Paso; University of Texas at Houston; University of Washington; University of Wyoming; University of Zurich.

Data sources
Velocity data for this release can be found in the GeoPRISMS Data Portal, hosted by the Marine Geoscience Data System (MGDS) (available for UNAVCO data sets) or other appropriate references. Use of these data should be accompanied by a citation given by the DOI (https://dx.doi.org/10.7266/n70). Survey-mode RINEX files (available for UNAVCO survey-mode data) are available from the IGS Data Centers: NASA Crustal Dynamics Data Information System (CDDIS) (http://cddis.gsfc.nasa.gov); Institut Geographique National (IGN) (http://geod泰讯.dicoogle.fr/spip/spip.php?article156 for survey-mode RINEX files). For further information, please contact the GeoPRISMS Working Group Chair (mike.floyd@nm.edu).

Figure 4
Histograms of east (a,c) and north (b,d) velocity uncertainties for the existing (black bars) and new (gray bars) solutions. Numbers indicate the sites from each solution with velocity uncertainties within the range of the x-axes. (a) and (b) correspond to the precise velocities shown in Figures 1, 2, and 3, and (c) and (d) show all velocities in the new solution, including those with large uncertainties.