Improved estimates of Caribbean plate motion and rigidity from COCONet and campaign GPS observations

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Abstract

The currently accepted Caribbean plate motion model presented by DeMets et al. (2007) is based on velocities from 6 continuous and 14 campaign GPS sites. COCONet is a multi-hazard GPS-Met observatory, which extends the existing infrastructure of the EarthScope Plate Boundary Observatory in North America into Central and northern South American and the eastern Caribbean. In 2010, UNAVCO in collaboration with UCAR, was funded by NSF to design, build, and initially maintain a network of 50 new cGPS/Met sites and include data from another 50 existing sites in the Caribbean region. COCONet is comprised of 85 new and refurbished stations, together with over 70 existing stations distributed across 26 nations. Data from all COCONet sites flow into the UNAVCO archive and are processed by the PBO analysis centers and are also processed independently by the UTA Geodesy Lab using GIPSY-OASISII (v.6.4) using an absolute point positioning strategy and final, precise orbits, clocks, and Earth orientation parameters from JPL in the IGS08b frame. Here we present a refined estimate of Caribbean plate motion and rigidity by evaluating data from an expanded number of stations with an improved spatial distribution. In order to better constrain the eastern margin of the plate near the Lesser Antilles subduction interface, campaign GPS observations have been collected on the island of Dominica over the last decade and combined with additional campaign observations from the western Caribbean, specifically from Honduras and Nicaragua. A total of 117 sites, including campaign data and the data from the cGPS stations that comprise COCONet were included in our analysis. We calculate updated site velocities for these stations and invert the velocities for 24 sites yields to yield a plate angular velocity that differs from previously published models. Our best fitting inversion for these 24 sites suggests that 2-plate model for the Caribbean is required to fit the GPS observations, although additional observations from cGPS stations appear to be weakening this constraint. This implies that the Caribbean is undergoing modest (

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