New GNSS velocity field and preliminary velocity model for Ecuador

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In this work, we present a new preliminary velocity model of Ecuador based on the GNSS data of the REGME network (continuous monitoring GNSS network). To date, there is no velocity model available for the country. The only existing model in the zone is the regional model VEMOS2009 for South America and Caribbean (Drewes and Heidbach, 2012).

This model was developed from the SIRGAS station positions, the velocities of the SIRGAS-CON stations, and several geodynamics projects performed in the region. Just two continuous GNSS (cGNSS) stations of Ecuador were taking into account in the VEMOS2009 model.

The first continuous station of the REGME network was established in 2008. At present, it is composed by 32 continuous GNSS stations, covering the country. All the stations provided data during at least two years. We processed the data of the 32 GNSS stations of REGME for the 2008-2014 period, as well as 20 IGS stations in order to link to the global reference frame IGb08 (ITRF2008). GPS data were processed using Bernese 5.0 software (Dach et al., 2007). We obtained and analyzed the GNSS coordinate time series of the 32 REGME stations and we calculated the GPS-derived horizontal velocity field of the country. Velocities in ITRF2008 were transformed into a South American fixed reference frame, using the Euler pole calculated from 8 cGNSS stations throughout this plate. Our velocity field is consistent with the tectonics of the country and contributes to a better understanding of it.

From the horizontal velocity field, we determined a preliminary model using the kriging geostatistical technique. To check the results we use the cross-validation method. The differences between the observed and estimated values range from ± 5 mm. This is a new velocity model obtained from GNSS data for Ecuador.