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Seismic Travel-Time Tomography of the Northern Andean Volcanic Zone in Ecuador

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In this poster we present the results of an inversion of earthquakes travel-time data recorded by the national Ecuadorian network. We aim to identify the topography of the slab, to ascertain the velocity of P and S waves, as well as to locate more accurately events in the mantle and the crust beneath Ecuador. The data catalog of the Institute of Geophysics of Quito consists of 478,000 P and S phases corresponding to 21,152 events recorded between 1988 and 2012 by the national network. It provides a unique opportunity to improve our information on the lithospheric structure and the topology of the slab.

The domain within which the velocity model is searched for consists of a box oriented in the main direction of the trench and of the Andes Cordillera, taking account of the Earth's ellipticity, in addition to the surface topography. An *a priori* model of the Moho depth was first determined by matching together informations coming from global gravitational potential, wide-angle reflection seismics and bathymetry studies in the coastal area.

The inversion is performed through a non-linear least-square approach based on a stochastic description of data and model. The forward computation of time delay is performed by integrating slowness along the rays, which are determined by the Podvin-Lecomte algorithm which is based on a finite difference resolution of the eikonal equation. The regularization of the velocity fields is achieved through a covariance norm on P velocity and V_P/V_S velocity ratio over the box domain, with an exponential type kernel. The tuning of smoothing and damping parameters is carried out through an L-curve analysis.

The topography of the slab, as displayed by the seismicity, presents an increasing dip from north to south, with a deep cluster of seismicity in the $1.5^\circ - 2^\circ$ S latitude range.