Site effects and ground motion simulations in the Quito basin (Ecuador)

The city of Quito (3M inhabitants), capital of Ecuador, is prone to seismic hazard and has been damaged several times in the past by important earthquakes. It is built on the hanging-wall of an active reverse fault, constituting a piggy-back basin. Nevertheless, the deep structure of this basin remains unknown as well as its seismic response.

During the first part of the talk, I will present the recent results that we have obtained on the seismic response of the Quito basin (Laurendo et al, in revision). We use the recordings of 170 earthquakes on 18 accelerometers from the Quito permanent network (installed since 2010), and we perform a spectral ratio analysis in order to estimate the frequency peaks of the amplification. We find that the southern part of Quito shows strong site amplification at low frequency (around 0.35 Hz). At the contrary, the amplification appears weak on the sites in the northern part of the basin.

In the second part of the talk, I will show ground motion simulations using Empirical Green’s functions along with a blind methodology that aims to constrain the input parameters, especially the stress drop. The idea is to use constraints given by a global database of source time functions (i.e., the SCARDEC database) to define the average values and the variability of the input parameters. I will show an example of such blind simulation for the Pedernales Earthquake (April 16th 2016, Mw 7.8 earthquake).