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# Regional scale tomography in central Mexico. Preliminary results from the correlation of seismic noise

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In addition to local site effects, ground motion from coastal earthquakes on rock sites in central Mexico is amplified in a regional scale, relative to ground motion observed along a direction parallel to the coast. This regional amplification attains a factor of 10 at frequencies that are critical in seismic risk analyses (from 0.2 to at least 2 Hz). This amplification has been related to the irregular crustal structure associated with the presence of the Mexican Volcanic Belt (oblique to the trench along the subduction zone). However, this has not yet been verified. The available models are not well constrained and there is a significant lack of data regarding the crustal structure in this region.

Recent publications have shown that the Green's function between two seismic stations may be estimated from the cross-correlation of seismic noise. Most papers have shown that surface wave modes emerge in those correlation functions. The larger the distance between stations, the longer the records of seismic noise that are needed to obtain a useful result.

In this paper, we use seismic noise recorded by three different arrays to estimate Rayleigh wave dispersion between stations. two arrays were temporal and one, recently installed, is permanent. The first array consisted of only four stations. It operated continuously for three months in 1997. The second temporary array operated a line of 100 seismic recorders installed perpendicularly to the subduction zone in Mexico, the MASE (Middle American Seismic Experiment) array. From this large array we use data from 18 stations in central Mexico. Finally, we use data from the permanent Mexico basin seismic array, recently installed. We use week- and month-long noise records to compute cross-correlation between vertical components for all possible station pairs. The results show clearly the emergence of clear Rayleigh wave pulses. We use the multiple filter technique to determine group velocities in the period band 4 to 10 s. We show velocity maps at different periods, which are well correlated with geology and previous indications on the laterally changing thickness of the Mexican Volcanic Belt crustal structure. The inversion of these data will provide thickness and critical shear-wave velocity estimates. These results will be used in a a model of central Mexico for the simulation of ground motion for future earthquakes using a 3D numerical simulation code.