Constraints about the Chaco-Paraná basin density structure from seismologic and gravity data

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Abstract

We are experimenting whether density structure can be reliably estimated from seismic velocities using a density-velocity relation. As an input, we use a shear-wave velocity model that we have just derived for the region of the Paraná, Chaco-Paraná, and Pantanal basins, which relies on measurements from both ambient noise and earthquake Rayleigh wave dispersion curves, where the shallower structure depends on short period noise-derived phase delays and the deeper structure depends on long period earthquake-derived group delays. This model has improved resolution in the region of the Chaco-Paraná basin compared with previous tomographic studies, especially at shallower depths. Also, although the Paraná and Chaco-Paraná basins had a similar evolution, the former has been investigated more thoroughly in the literature. So, here we use the seismic velocity signature beneath the Chaco-Paraná basin and neighboring regions to derive our lithospheric density model, not only to have a better understanding of the Chaco-Paraná basin but also of the Paraná basin. We find a distinction in seismic velocities between the northern and central-southwestern portions of the Chaco-Paraná basin coherent with the Bouguer anomaly map, which indicates an association between density and velocity. Because in gravity products it is complicated to determine the depth of anomalous masses, and by calculating a density distribution for the study area using seismic velocities we expect to better constrain these masses with depth, therefore improving the understanding of the lithospheric structure and basin formation. To check the consistency of our density model, we will use it to calculate synthetic gravity data, which can be compared to observed gravity data.