Geophysical Research Abstracts, Vol. 7, 08428, 2005
SRef-ID: 1607-7962/gra/EGU05-A-08428

3D density structure along the Andean margin between Ecuador and Patagonia

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We present the main results of a three-dimensional (3D) forward modelling of the gravity field (Bouguer anomaly) along the active western margin of South America. The resulting 3D density model extends between latitudes 5˚S (Southern Ecuador) and 45˚S (Southern Patagonia of Chile and Argentina) and to a depth of 410 km (upper mantle transition zone). This model highlights the main density structure of the oceanic Nazca plate, the subducted slab below the continent and the Andean lithosphere. An updated compilation of seismic-seismological information allows the geometry of the subducted slab and locally the one of the continental Moho to be independently constrained previous to the gravity field modelling. The allocation of densities for the bodies forming the 3D model was done after a study on the relationship between density of rocks and the geochemical/mineralogical composition, pressure-temperature conditions and water content of oceanic and continental lithospheres. Interesting results to be presented and discussed include: spatial variations of oceanic upper mantle density related to thermal and/or compositional variations; relationship between structure of oceanic ridges and geometry of flat slab segments; geometry of the continental lithosphere-astenosphere boundary and its relationship to thermal state and magmatic activity; structure of the continental Moho and intracrustal density discontinuity related with past and current deformation of the continental lithosphere. We conclude that this 3D density model contains relevant information at continental scales that can be used by the Andean geoscientific community to gain hints on the structure, composition and evolution of the continental margin.