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# 2-D modelling of the Crustal structure of Merida Andes - Venezuela, from wide angle seismic and gravity studies

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The Merida Andes (MA) is an orogeny delimiting the Maracaibo block to the west in response to the subduction of the Caribbean Plate beneath South American continent. 2-D seismic and gravity modeling of the crustal structure of MA was carried out along the profile Central Andes with a length of 380 kilometers from the coast of Falcon, crossing perpendicular to the mountain range of the MA until its southeastern end in the Barinas-Apure basin. In the seismic data obtained from 11 shot points with 0.2 to 1 tons of explosive charges and recorded by 480 Texan recorders, we observed critical PmP reflections at distances of about 60 km for the northern part of the profile (Falcón Basin), and 120 to 90 km for the central and southern part of the profile, corresponding to the axis of the orogen and the Barinas Basin, respectively. Depth of the Moho discontinuity ranges from 29 km depth for the Falcon basin, to 40-53 km close to the core of the chain, and 35 km at the southern end of the profile in Barinas basin. The crustal root is defined with a maximum depth of 53 km, which is displaced with respect to the highest part of the chain at this segment, approximately 10 km towards the northwest. 325 gravity stations were acquired along the profile and modeled together with satellite gravity data in a high resolution 2D gravity forward model, which confirms the strong variations of the thickness of the crustal root and its asymmetry. Cenozoic sediments with a P-wave velocity (Vp) ranging from 2 to 4 km/s are underlain by Cretaceous sediments, (Vp = 4 to 5 km/s) with a maximum depth of 10 and 6 km in the Maracaibo and Barinas-Apure basins, respectively. The crystalline basement shows Vp between 5.5 and 6.3 km/s and a density of 2.78 g/cm3 down to about 15 km beneath the basins and 25 km beneath the orogen. The lower crust is modeled with Vp of 6.5 to 7 km/s and a density of 2.84 g/cm3, underlain by the upper lithospheric mantle, with Vp greater than 7.7 km/sand a density of 3.22 g/cm3. The density model suggests the existence of an incipient A-subduction of continental South America towards the Maracaibo block