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Is there a Nazca flat-slab beneath Northern Colombia? compilation of seismological evidence

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The subduction pattern of the Nazca Plate beneath Northern South America clearly changes at a latitude of about 5.5°N, where the Sandra Ridge subducts beneath the North Andean Block. The current location of the volcanic arc and the seismicity distribution suggest this change, and several recent works propose different blocks separated by a major structure. In this work we collect several pieces of evidence that are consistent with a flat subduction of Nazca beneath the Baudó Range, and the Western and Central Cordilleras, north of 5.5°N; the subduction angle should steepen beneath the Eastern Cordillera of Colombia, where the Bucaramanga Nest is located. Teleseismic P-to-S receiver functions in the northern segment of the Central Cordillera suggest a relatively thick crust, which may reach 52 km, consistent with a superposition of the Northern Andean crust and the Nazca flat slab; using S-to-P receiver functions we inferred lithospheric thickness in this area, getting values around 105 km. Seismicity along east-west profiles between 6 and 7°N shows a continuous pattern that indicates flat subduction and a steepening beneath the Eastern Cordillera. Recent results of teleseismic body wave tomography shows a continuous region of fast seismic speeds that delineates the same pattern as the seismicity, and allows us to infer the thickness of the subducted lithosphere; such results are consistent with other recent works that use local body wave travel times. Under the Eastern Cordillera, at latitudes between 6 and 7°N, crustal and lithospheric thickness suggested by teleseismic receiver functions are ~45 and ~110 km respectively. High frequency receiver functions are compatible with a recent magmatic addition at the base of the crust, contributing to its thickening; our hypothesis is that this high velocity layer is linked to the Mio-Pliocene magmatism that generated the Paipa and Iza volcanic domes, located on the Plateau of the Eastern Cordillera. This volcanism taking place more than ~500 km away from the trench can be explained by the shallowing of the subducted slab at ~6 Ma.