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Uplift of the Eastern Cordillera, Colombia

Gaia Siravo (1), Claudio Faccenna (1), Maria Giuditta Fellin (2), Paola Molin (1), German Bayona (3), and Emanuele Giachetta (2)

(1) Università Roma Tre, Rome, Italy (gaia.siravo@uniroma3.it), (2) Department of Earth Sciences, ETH Zürich, Zürich, Switzerland, (3) Corporación Geológica ARES, Bogotá, Colombia

The Eastern Cordillera (EC) of Colombia is a double-vergent thrust and fold belt formed during the Cenozoic by the inversion of a Mesozoic rift. It is located ∼400 km far from the trench where the Nazca slab subducts below the South American plate. Tomography and seismicity highlight the presence of a flat slab subduction north of 5° N. Our goal is to explore the relation between surface and crustal processes in the topography growth of the EC north of 6° N. To reach this aim we integrate data derived from the fluvial network analysis with long-term erosion data derived from thermochronology.

The northern EC is an asymmetric chain with a gentle flank on the western side and steep flank to the east. The two sides are separated by the maximum elevation of 5000 m reached at the Cocuy Sierra. Here the EC has the widest width (∼200 km) and changes northward to the Santander Massif Range. We obtained new low-T (U-Th)/He ages on zircons (ZHe) and apatites (AHe) from samples collected along two transects. Our ages combined with previous data indicate that along both transects exhumation occurred from shallow burial depths ($\leq$ 6-8 km) during the Oligo-Miocene and locally continued until the Pliocene. Along the transect across the central part of the EC up to the Cocuy Sierra, the youngest Pliocene ages (AHe) are located at the highest elevations above 4000 m. Along the second transect the youngest ages are found close to and east of a main strike-slip structure (Bucaramanga fault). This fault has a significant dip-slip component evidenced by an offset of about 10 Ma among the AHe ages across the fault.

The main rivers draining the northern EC flow parallel to the main tectonic structures and locally cut across them. The analysis of river longitudinal profiles reveal transient features such as knickpoint not related to lithological or structural contrast. Channel slope and chi analysis suggest a river capture event possibly influenced by the crustal structures. Wind gaps with matching Pleistocene fluvial deposits in addition to river elbows appear to confirm a drainage network reorganization phase given by fluvial piracy.