8th International Symposium
on Andean Geodynamics
(ISAG)

First time-constraints on Ecuadorian Coastal Cordillera uplift: Geodynamic implications

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Ongoing mountain building on the overriding plate of active subduction margins, depends on several parameters, such as the rate and direction of the convergence, the age of the downgoing plate and dip of the slab, the subduction of seafloor reliefs, among others, which are supposed to control the coupling mechanism between plates. Consequently, the timing and how relief generation occurred in the forearc domain is a key point to understand the evolution of the subduction systems. In the Ecuadorian forearc, the uplift of the coastal cordillera, which culminates at about 800 m above sea level, has hindered the sediment pathways from the Andes. As a result, Andean sourced sediments are currently rerouted to the north and to the south using the Esmeraldas and Guayas river systems. Furthermore, the change in the morpho-tectonic conditions at the Ecuadorian forearc could strongly impacts the tectonic and seismogenic plate interface coupling.

Application of multiple chronometer tools, usually provide quantitative constraints on relief generation and topographic growth. Here, we provide the first detrital apatite (U-Th-Sm)/He and zircon U/Pb ages from the coastal cordillera and forearc basins of Ecuador. Our preliminary results indicate that the Middle-Late Miocene Angostura Fm was buried during Late Miocene, recording high enough temperatures to partially reset AHe ages. We show that the basin then records ~1 km of uplift associated to erosion and cooling since Miocene- Pliocene. This timing for the exhumation of the coastal cordillera is tentatively associated with the subduction of the Carnegie ridge.