



Two opposed subduction modes at the southern Caribbean plate margin of Colombia

Andreas Kammer and Alejandro Piraquive
Colombia (akammer@unal.edu.co)

Cretaceous to Paleogene convergence at the southern Caribbean plate margin is still little deciphered and a generalized interpretation is hindered by the absence of regionally correlatable tectonic elements, like magmatic arcs, time constraints and an intense crustal fragmentation brought about by Neogene strike-slip tectonics. In order to illustrate the diversity of these subduction settings and discuss possible tectonic controls on their subsequent collisional evolution, we outline the structural evolution along a thickened and a thinned continental segment. The first case is exemplified by the Sierra Nevada de Santa Marta, a triangular block that exposes an imbricated lower crustal section capped by nested plutons and a volcanic sequence of a Jurassic to Early Cretaceous arc. This exceptionally thick crustal section forms the upper plate of a continent-ward dipping main suture that is underlain by strongly sheared platform sediments and transitional basement rocks of a lower plate. Penetrative deformation developed under medium-grade conditions with a uniform top-to-the NE shear attests to a stable subduction interval of a still unknown duration. Onset of a collisional phase is marked by a crustal imbrication further inboard of the main suture, leading to a further crustal thickening, and links in the Paleogene to the emplacement of the dome-like Santa Marta batholith within the lower plate. It is likely that the juxtaposition of thickened continental Southamerican and thinner oceanic Caribbean crust triggered a crustal channel flow that fed the magmatic dome in the transitional part of these crustal realms, leading thus to some gravitational collapse of the continental crust.

The opposite case of the juxtaposition of a continental platform, previously thinned by Jurassic to Early Cretaceous rifting and a relatively thick Caribbean crust is documented in the northwestern Guajira Peninsula. Here platform sequences and their corresponding basement were subducted below the Caribbean crust, acquiring a penetrative transpressional deformation under low-grade conditions. An incipient collision is attested by the amplification of the crustal bend of the continental plate and the formation of imbricate slices along backthrusts that involve both basement rocks and platform sediments. Upper plate sediments record structures related to gravity sliding and thus attest to slope-forming processes. These sedimentary sequences further include ultramafic lenses and vestiges of serpentine mud volcanoes. Arc magmatism is recorded solely by a Paleogene stock.

The differences in subduction polarity cannot be explained by two events separated in time but reflect two concurrent subduction modes, governed by compositional and physical differences of the continental plate.