

## Early Cretaceous roll-back related metamorphism in the Northern Andes: Upper plate insights

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New petrological constraints from a subduction-accretionary complex (Pijao Metamorphic Complex) exposed in the western flank of the Central Cordillera of Colombia, allows the discrimination of two different metamorphic units that record the transition from a cold to a warmer subduction thermal gradient during the Early Cretaceous.

The eastern unit comprises interbedded garnet ± clinopyroxene amphibolites, garnet micaceous schists, amphibolized lawsonite-bearing eclogites, and serpentized peridotites; these unit record a high-pressure metamorphic event (20-24.5Kbar/480-610°C), followed by heating during partial decompression (9.5-15Kbar/610-740°C) before cooling during decompression associated with final exhumation. The western unit, which includes epidote ± garnet amphibolites, meta-gabbros, and minor serpentized peridotites, record a high- to medium-pressure event (10-14Kbar/520-610°C), characterized by both hair-pin clockwise and counterclockwise trajectories, supporting the increase in the geothermal gradient.

Provenance constraints on Early Cretaceous back-arc related volcano-sedimentary rocks spatially associated with the studied subduction-accretionary complex reveal detrital garnet and rutile with chemical composition akin with the former, that together with petrographic and heavy mineral data, suggest that the subduction-accretionary complex was already exposed or near the surface by 117-115 Ma.

The integration of petrologic, provenance and regional constraints, support the switching from a cold (<10°C/Km) to a warmer (14-22°C/Km) geothermal gradient, as well as the upper plate extension promoting back-arc basin development and filling. Such tectonic scenario is in good agreement with the slab roll-back tectonic model. This Early Cretaceous slab roll-back event triggered a heat-flow by asthenospheric mantle upwelling during late stages of metamorphism, the rapid exhumation rate of the subduction-accretionary complex, and the upper plate extension. This extensional scenario appears to be a margin-scale tectonic event that suggests major tectonic plate re-organization affecting the South American plate.