

Late Jurassic arc related metamorphism in the Northern Andes

D. Mejía^{1, 3}, A. Cardona^{2, 3}, C. Bustamante⁴, V. Valencia⁵

¹*Departamento de Materiales y Minerales, Universidad Nacional de Colombia, Medellín, Colombia*

²*Departamento de Procesos y Energía, Universidad Nacional de Colombia, Medellín, Colombia*

³*Grupo de Investigación en Geología y Geofísica (EGEO), Universidad Nacional de Colombia, Medellín, Colombia*

⁴*Departamento de Ciencias de la Tierra, Universidad EAFIT, Medellín, Colombia*

⁵*School of Earth and Environmental Science, Washington State University, Pullman, USA*

The Jurassic of the western margin of South America including the Colombian and Ecuadorian Andes is characterized by the development of a large continental arc recorded in different plutonic and volcanic units with ages between 203 Ma and 145 Ma, with an origin associated to the subduction of the Farallon plate beneath the South America continent.

The Central Cordillera of Colombia and the Upper Magdalena Valley preserve a major remnant of this arc and has been the object of recent geochemical, isotopic and geochronological studies that have suggest the existence of significant changes on arc magma sources, associated whit the transition from an extensional to a transpressional regime between 170-150 Ma.

Recent thermobarometric and provenance constraint from several amphibolite to greenschist facies metamorphic rocks have proven the existence of a metamorphic belt contemporaneous with the magmatic activity.

New field observations on correlatable metamorphic rocks have shown that this metamorphic is characterized by progressive east to west change in metamorphic as suggested by the change from greenschist to amphibolite facies. In addition, thermobarometric results suggest the existence a middle to low pressure metamorphic record with temperatures between 400-500° C and pressures of 3-6 Kbar on the east to 500°C to 600°C and 7-8 Kbar.

The existence of arc related protoliths as revealed by the geochemical data on greenschist rocks, together with detrital zircon ages as young as 167 Ma and the cross-cutting relation with undeformed ca.141 Ma suggest that metamorphism took place during the Late Jurassic, within the arc environment, probably associated to arc thickening during compression.

We suggest that this metamorphism marks the end of the former extensional dominated tectonic towards a more complex structural regime that may include both transtension and transpression along the continental margin.

Published regional scale plate tectonic reconstruction suggest that during the Late Jurassic plate convergence relations between South America and the Pacific Farallon plates, a change that can trigger the modification on the structural relations.

Additional complexities are not discharge such as the existence of different ribbon-like continental remnants formed during the former Early Jurassic dominated tectonics that were subsequently re-incorporated to the continental margin.