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INSIGHTS OF THE $^{40}Ar/^{39}Ar$ AGES FROM BLUESCHISTS OF THE JAMBALÓ AREA, CENTRAL CORDILLERA OF COLOMBIA, NORTHERN ANDES

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ABSTRACT

Step-heating $^{40}Ar/^{39}Ar$ spectra were obtained on mica separates from lenses of the Jambaló blueschists including in greenschist facies rocks, which could represent preserved cores of retrometamorphic processes that affected the high pressure rocks during their exhumation. The 67–61 Ma $^{40}Ar/^{39}Ar$ data indicates the timing of exhumation of the blueschists, because the dated micas were crystallized during development of the mylonitic foliation. The continuous exhumation of this blueschist belt between reflects the flow on a subduction channel that was interrupted by the collision of an intra-oceanic arc with the continental margin. This collisional event although synchronous with other arc-continent collisions in the Northern Andes is apparently not related to the collision to the great Caribbean arc, but to an arc built in the western margins of the Caribbean plate.

Keywords: Blueschists, $^{40}Ar/^{39}Ar$ geochronology, Central Cordillera of Colombia, Jambaló area, paragonite and phengite.

INTRODUCTION

The Jambaló blueschists has been related to oceanic subduction, accretion or collision of an oceanic plate from the northwest to the South American plate (Aspden et al., 1995). Although these are valid hypothesis, in order to test their feasibility the detail petrotectonic evolution and the age control of the different Mesozoic Barrovian and high pressure metamorphic belts in western Colombian must be established. In this text we present $^{40}Ar/^{39}Ar$ age data from blueschist rocks of the Jambaló, which argue that the Late Maastrichian to Early Paleocene cooling ages reflect the flow of the subduction channel during an arc-continent collision.

GEOLOGICAL SETTING

In the Jambaló area crops out an association of greenschists and greenschist facies rocks with impure marbles, serpentinized peridotites, and quartzites. Several lenses of blueschist facies rocks are also observed into the greenschist. The Jambaló association is in contact with the Cajamarca Complex, and at west with arc-related volcanic rocks (Quebradagrande Complex). The blueschist facies rocks are mainly fine-grained grey-bluish mica-glaucophane schists and glaucophane-mica schists, strongly mylonitic, and eventually folded. White micas and glaucophane are usually crystallized in this foliation, and occur associated discontinuous bands of epidote and white mica. (Bustamante, 2008).

RESULTS

Paragonite and phengite of blueschist facies rocks were concentrated and analyzed by the $^{40}Ar/^{39}Ar$ (Table 1) at the University of Michigan, following the Streepey et al. (2000) and Keane et al. (2006) methods.

Table 1. $^{40}Ar/^{39}Ar$ results and mineralogy of blueschists from Jambaló area.

Sample	Plateau age (Ma)	Analyzed mica	Mineralogy
121B	67.8 ±1.1	paragonite	glaucophane + paragonite + calcite + chlorite + quartz
123A	66.0 ±0.7	paragonite	glaucophane + epidote/clinozoisite + paragonite + phengite + quartz
124F	61.8 ±0.9		
124F	62.9 ±1.0	paragonite	glaucophane + albite + paragonite + calcite + chlorite + sphene + quartz
124F	62.4 ±0.2		
124G	62.3 ±1.1	paragonite	glaucophane + paragonite + calcite + chlorite + quartz
124G	63.0 ±0.3		
124J	67.5 ±1.1	phengite	phengite + glaucophane + albite + calcite + chlorite ± paragonite + quartz
125M	63.5 ±1.3	paragonite	glaucophane + albite + paragonite + calcite + chlorite
129C	66.9 ±0.2	paragonite	glaucophane + albite + paragonite + calcite + chlorite + quartz

These results indicate that the blueschists metamorphism occurred from 67 to 61 Ma (Maastritchtian–Danian) in a tectonic mélange, including mafic–ultramafic of intra-oceanic affinity with sedimentary rocks, metamorphosed in different grades. The exhumation occurred in thrust shear zones during the collisional regimen. The tectonic models for the Colombian margin considere that the young Maastrichian tectonic event is a consequence of the accretion of the plateau-like margins of the Caribbean plate (Pindell & Kennan, 2009), suggesting that the Jambaló blueschist are remnants of the subduction zone related to the approach of this Campanian intra-oceanic arc to the continental margin. We therefore envisioned a model for

the southwestern Colombian Andes, with the western margins of the Caribbean plate approaching to the continent (Pindell & Keenan, 2009), with an associated island arc at its margins that consume the ocean that separate it from South America. Contemporaneous accretionary events are recorded farther north in the Colombian Caribbean realm, which are related to the arc-continent collision of the front of the Caribbean arc with the Continent. This contrast with what is seen farther south, including the Jambaló region and Ecuador, were the collision took place with the western margin, and show the existence of multiple arc-continent collision along the eastern margins of the Caribbean plate.

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