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The geochemistry and geochronology of Early Jurassic igneous rocks from the Sierra Nevada de Santa Marta, NW Colombia, and tectono-magmatic implications

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Abstract

The Sierra Nevada de Santa Marta in NW Colombia is an isolated massif at the northernmost end of the Andes chain near the boundary with the Caribbean plate. Previous geologic mapping and K-Ar dating have shown that Jurassic plutonic and volcanic units make up a large part of the Santa Marta Massif (SMM). These rocks have been considered to be part of a Jurassic magmatic arc extending from NW Colombia to northern Chile, but without any geochemical basis for comparison. This paper reports on a geochemical and Sr-Nd-Pb isotope study of the Jurassic rocks in the SMM and provides 12 new U-Pb zircon ages from in-situ laser ICP-MS dating. The plutonic and volcanic units span a range from 44 to 77 wt.% SiO_2, with a dominance of intermediate to felsic compositions with SiO_2 > 57 wt.%. They classify as calc-alkaline, medium to high-K, metaluminous rocks with trace-element features typical for arc-derived magma series. In terms of their major and trace-element compositions, the SMM Jurassic units overlap with contemporary plutonic and volcanic rocks