



## **Island-arc tholeiites, boninites and related felsic rocks in Hispaniola: magmatic and age constraints on initiation of intra-oceanic subduction and development of the Caribbean island arc**

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Located in the Cordillera Oriental of Hispaniola (Dominican Republic), the Early Cretaceous Los Ranchos Fm (LRF) comprises a thick sequence of volcanic and volcanoclastic rocks with variable geochemical characteristics, which is intruded by tonalite batholiths, minor gabbro/diorite plutons and mafic dykes. From top to bottom, three main stratigraphic units have been mapped: upper basaltic, intermediate rhyodacitic and lower basaltic. Combined detailed mapping, stratigraphy, geochemistry, Rb-Sr/Sm-Nd isotopic studies and U-Pb/Ar-Ar geochronology have shown that mafic rocks of the LRF include boninites and LREE-depleted tholeiitic island arc basalts in the lower unit, which are interpreted to be genetically related, and normal island arc tholeiites in the upper unit. The source for these rocks was variably depleted mantle, overprinted by a subduction zone component. Contemporaneous Aptian U-Pb zircon ages of rhyodacite from the intermediate unit ( $116.0 \pm 0.8$  Ma) and tonalite from Zambrana batholith ( $115.5 \pm 0.3$  Ma), with equivalent trace-element geochemical characteristics, argue for a genetic link between felsic volcanic rocks of the LRF and the voluminous tonalite magmatism that intrude their lower stratigraphic levels. Low-K dacites, rhyolites and tonalite batholiths are interpreted as products of secondary melting at the base of thickened early arc crust.  $^{40}\text{Ar}/^{39}\text{Ar}$  plateau ages of hornblende in four tonalite batholiths are Albian (109-106 Ma) and interpreted as the final cooling

after emplacement, previously to the Albian sedimentation of unconformably reef limestones of the Hatillo Fm. In this context, LREE-depleted IAT and boninites of lower basaltic unit are interpreted to have formed during subduction zone initiation, and the normal IAT of the upper unit are thought to represent the posterior stabilization of the volcanic front.