Geophysical Research Abstracts
Vol. 18, EGU2016-11144, 2016
EGU General Assembly 2016

Geochemical record of subduction initiation in the sub-arc mantle: insights from Loma Caribe peridotite (Dominican Republic)

Claudio Marchesi (1,2), Carlos J. Garrido (2), Joaquín A. Proenza (3), Károly Hidas (2), María Isabel Varas-Reus (2), Lidia Butjosa (3), and John F. Lewis (4)

(1) Departamento de Mineralogía y Petrología, Facultad de Ciencias, Universidad de Granada, Avenida Fuentenueva s/n, 18002 Granada, Spain, (2) Instituto Andaluz de Ciencias de la Tierra (IACT), CSIC-UGR, Avenida de las Palmeras 4, 18100 Armilla (Granada), Spain, (3) Departament de Cristal·lografia, Mineralogia i Dipòsits Minerals, Facultat de Geologia, Universitat de Barcelona, Barcelona, Spain, (4) Department of Earth and Environmental Sciences, The George Washington University, Washington DC, U.S.A.

The Loma Caribe peridotite body is mainly composed of serpentinized spinel harzburgite and lherzolite and minor (Opx-bearing) dunite. Modal proportions, mineral and whole-rock major and trace element compositions generally coincide with those of abyssal mantle rocks from mid-ocean ridges for lherzolite and refractory supra-subduction peridotites for harzburgite and (Opx-) dunite. Cpx-bearing harzburgite has intermediate compositions that overlap those of residual mantle from both these settings. Major elements in peridotite were mostly undisturbed by serpentinization and/or seafloor weathering whereas LREE and LILE were enriched by syn- and/or post-melting interaction with fluids/melts. Major element variations support that protoliths of Loma Caribe peridotite mostly melted at 1-2 GPa and 1300-1500 °C, as normal mid-ocean ridge and supra-subduction zone mantle. MREE/HREE fractionations in whole-rocks and clinopyroxene can be explained by initial low (5-6%) fractional melting of a garnet lherzolite source followed by variable (5-20%) melting in the spinel stability field. Lherzolite and Cpx-harzburgite are residues of increasing melting triggered by increasing addition of fluids to a spinel peridotite source, while melting of the harzburgite protolith was likely promoted by focused flux of hydrous melts. Dunite and Opx-bearing dunite are products of pyroxene dissolution in residual peridotite caused by reaction with two different subduction-related melts, likely the parental magmas of Early Cretaceous low-Ti IAT and boninite from Central Hispaniola, respectively. We propose that the geochemical heterogeneity of Loma Caribe peridotite records shifting conditions of melting during the development of subduction beneath the incipient Greater Antilles paleo-island arc in the Early Cretaceous. The common presence in the Caribbean realm of oceanic mantle rocks related to subduction indicates that most peri-Caribbean ophiolitic bodies are not fragments of an oceanic plateau generated above a plume.