Geophysical Research Abstracts
Vol. 19, EGU2017-4096-2, 2017
EGU General Assembly 2017
© Author(s) 2017. CC Attribution 3.0 License.

Sr, Nd and Pb Isotope Systematics of the Cenozoic Volcanism in the Algerian Tell Belt: a Key Constraint on the Geodynamic Evolution of the Westernmost Mediterranean

Yassamina Meddi (1), Carlos J. Garrido (2), Claudio Marchesi (2,3), Amina Louni-Hacini (1), Abla Azzouni-Sekkal (1,4), María Isabel Varas Reus (2), Jason Harvey (5), and Károly Hidas (2)

(1) Faculté des Sciences de la Terre, de Géographie et de l'Aménagement du Territoire - Université des Sciences et de la Technologie Houari Boumédiène - Laboratoire de Métallogénie et Magmatisme de l'Algérie, 32, El Alia, 16111, Bab Ezzouar, Algiers, Algeria, (2) Instituto Andaluz de Ciencias de la Tierra (IACT), CSIC & UGR, Avda. Palmeras 4, 18100 Armilla, Granada, Spain. (carlos.garrido@csic.es), (3) Dp. Mineralogía y Petrología, Facultad de Ciencias, Universidad de Granada, Avenida Fuentenueva s/n, 18002 Granada, Spain, (4) Faculté des Sciences de la Nature et de la Vie et des Sciences de la Terre et de l'Univers, Université Abou Bekr Belkaïd, BP. 119, 13000, Tlemcen, Algeria, (5) School of Earth and Environment, Universty of Leeds, UK.

The geodynamic evolution of the Western Mediterranean is closely linked to the spatio-temporal evolution of the Cenozoic magmatism in this region. Here, we present a detailed Sr-Nd-Pb study of Cenozoic volcanism from the external and the internal zones of the Algerian Tell belt, a segment of paramount importance to unravel the Alpine geodynamic evolution of the westernmost Mediterranean. The age of the studied volcanics rocks ranges from 17 to 3 Ma, and covers the temporal and spatial evolution of magmatism from calc-alkaline rocks with a clear signature of subduction (commonly referred as to orogenic magmatism), followed by progressively younger sub-alkaline and alkaline volcanism. On the basis of their major and trace element composition, the Tell Cenozoic volcanic rocks can be classified into three main groups: (1) a Si-poor group that is composed of basalt, trachybasalt and basaltic trachyandesite; (2) a Si-intermediate group —raging in silica from 56 to 66 wt. %— that is composed of andesite, dacite, trachyandesite et trachydacite; and a (3) Si-rich group —with silica contents generally greater than 66 wt.%— that is constituted by trachydacite, dacite and rhyolite. The Si-poor group occurs only in the External zone and it is characterized by non-radiogenic $^{87}Sr/^{86}Sr$ ratios, high initial $^{144}Nd/^{143}Nd$ ratios, significant variation of $^{206}Pb/^{204}Pb$ and $^{207}Pb/^{204}Pb$ ratios, and relatively constant $^{208}Pb/^{204}Pb$ ratios. The Si-intermediate and Si-rich groups from the Internal and External zones show substantial differences. The $^{206}Pb/^{204}Pb$ ratios of External zone volcanism are relatively constants [18.68–18.86], while they vary significantly in the Internal zone volcanism [18.55–18.92]. On the other hand, the initial $^{207}Pb/^{204}Pb$ and $^{208}Pb/^{204}Pb$ ratios in Internal zone volcanism [38.81–38.95] are significantly higher than those of the External zone [38.68–38.84]. These differing isotopic signatures reflect variable source contamination by subducted sediments similar to those now occurring in the Oligocene Flysch units, and crustal contamination by Kabylian crust in the Internal zone volcanism. A deeper primitive asthenospheric mantle source in the western External zone is increasingly patent in progressively younger Silica-intermediate and -poor volcanism. This spatio-temporal evolution of the Cenozoic evolution of the Tell magmatism is intimately correlated with the deep structures imaged by seismic tomography in this region that show the importance role of of slab tearing in the western Tell external zones, and remnants of two subducted slabs beneath the eastern Tell.

Funding: This research has been funded by a FP7-IRSES Marie Curie Action under Grant Agreement PIRSES-GA- 2013-612572