Alkaline mafic dykes witness the Triassic evolution of the Adriatic passive margin

Marco Filippi*[1], Davide Zanoni[1], Massimo Tiepolo[1], Michel Corsini[2], Gisella Rebay[3], Jean-Marc Lardeaux[2,4], and Maria Iole Spalla[1]

[1]Dipartimento di Scienze della Terra 'A. Desio', Università degli Studi di Milano – Italie
[2]Géoazur – Observatoire de la Cote d'Azur, Université Côte d'Azur, Centre National de la Recherche Scientifique, Institut de Recherche pour le Développement – France
[3]Dipartimento di Scienze della Terra e dell'Ambiente, Università degli Studi diPavia – Italie
[4]Centre for Lithospheric Research, Czech Geological Survey – République tchèque

Résumé

Some classical models concerning the post-Variscan evolution of the future Alpine region suggest a long-lasting cooling phase following a Permian period characterized by high-temperature metamorphism and extensive emplacements of tholeiites. This process resulted in the formation of a magma-poor continental margin prior to the Jurassic oceanization. However, recent data indicates that magmatism persisted throughout the entire Triassic, in agreement with numerous high-temperature metamorphic ages indicating the persistence of a high-thermal regime suggesting a lithospheric thinning scenario. Lamprophyre dykes intruding the Variscan basement of the central Southalpine domain are here described to improve the understanding of the Triassic magmatism along the future Adriatic passive margin. The dykes contain clinopyroxene, amphibole, biotite, ilmenite, and plagioclase. Whole-rock analyses reveal an alkaline affinity, while 40Ar-39Ar dating on igneous biotite grains indicates 204 ± 7 Ma, in agreement with the late Triassic alkaline activity traced out from the Ivrea-Verbano to eastern Southalpine domain. Microstructural analysis suggests that clinopyroxene was resorbed by the magma from which amphibole and biotite crystallize, and remarkably, minor and trace element analyses on clinopyroxene and amphibole indicate that these minerals crystallized from magmas with contrasting compositional characters. The clinopyroxene parental melt exhibits an apparent arc affinity, which is a typical feature of the middle Triassic magmatism, in contrast to the alkaline and Nb-rich signature of the amphibole parental melt. These signatures are interpreted as reflecting the compositional heterogeneities of a continental mantle contaminated by Variscan subduction-collision, subsequently affected by partial melting during the thinning of continental lithosphere announcing the Jurassic oceanization.

Mots-Clés: High Nb basalts, Southalpine domain, central Alps

*Intervenant