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Subduction related Triassic ultramafic lavas and wehrlites, associated with mafic to felsic volcanic and pyroclastic rocks of central and eastern Othris area, Greece.

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A Triassic igneous sequence consisted of ultramafic to mafic rocks and minor pyroclastic tuffs, occurs throughout the Othris region, central Greece. Ultramafic rocks include hypocrystalline ultramafic lavas of komatiitic composition with quench textured clinopyroxene but without spinifex olivine, and holocrystalline rocks classified as wehrlites. Mafic rocks consist of picrites, transitional boninites, pillow lava basalts and dolerites. Pillow lavas seem to be the dominant rock type. Tuffs are compositionally intermediate to felsic. We report geochemical, petrological and mineral chemistry results from the whole sequence in central and east Othris near the villages of Palia Neraida, Mili, Logitsi and Palia Spartia.

Both ultramafic rocks contain euhedral to subhedral cumulus olivine phenocrysts with high forsterite ($Fo_{88.21-94.65}$), spinels (Cr#=69.18-89.29), and rare orthopyroxene (Mg#=47.86-87.61). Ultramafic lavas additionally contain quench hollow shaped clinopyroxenes (Mg#=76.23-85.64), serpentine and devitrified glass, mainly made of amphibole and chlorite, but also clinopyroxenes (Mg#=51.69-58.63), rhoenite, and feldspar microlites. Wehrlites instead contain additionally cumulus clinopyroxene with high MgO contents (Mg#=82.44-91.68), primary magnesio-hornblende, high-Ti phlogopite, secondary serpentine and hydrogarnets. They probably have been accumulated deep in a magma chamber as can be inferred from the high magnesian olivine and clinopyroxene. The presence of the hydrous phases points to percolation of meta-

somatic fluids. In the same environment, at a later stage ultramafic lavas were brought up to the surface by the addition of a more evolved melt, as a few quench less Mg# clinopyroxene crystals suggest. Both types present similar chemical compositions. In particular they have subparallel REE patterns with $(La/Yb)_N$ from 1.3 to 3.5. The primitive mantle normalized patterns show relative to their neighbour elements Cs and Pb enrichments and Zr, Nb and Ti depletions. Subduction related ultramafic lavas from Cyprus[1], Solomon Islands[4] and Russia[2], show comparable major and trace element values, as well as mineralogical composition and textures with the ones of Othris.

Picrites lack olivine but contain spinifex textured pyroxenes. Transitional boninites present slightly higher Ti (TiO_2=0.62-0.69 wt%)than typical boninites, whereas dolerites are basaltic andesites. Alteration has affected most of these rocks. All these rocks have $(La/Yb)_N$ from 1.8 to 3.2, subparallel REE patterns and negative Nb, Zr, Ti anomalies in primitive normalized mantle patterns. Their Nb/Th (1.4-4.2) is consistent with IAT values. Pillow lavas are tholeiitic E-MORB basalts ($(La/Yb)_N$ from 2.9 to 3.9 and Yb_N=1.7-2.1 x PM). Pyroclastic tuffs have calc-alkaline affinities and show significant LREE, K, Pb enrichments, strong negative Eu, Ti and Sr anomalies and possible crustal contamination (high Th/Yb, low Sr/Nd and negative Nb anomalies). They present similarities with volcanics and pyroclastic tuffs of Triassic age in other places of continental Greece[3].

The association of high-Mg intrusives and komatiitic volcanics intercalated with tholeiitic volcanics and calc-alkaline tuffs and their geochemical characteristics suggest an origin in a subduction related environment close to a continental margin. Specifically, subduction of a young and hot oceanic crust in intra-oceanic settings is proposed for the formation of the volcanic arc related mafic and ultramafic rocks, with high degrees of partial melting under hydrous conditions, changing the earlier MORB rifting environment[5]. The calc-alkaline tuffs were probably produced as later products of a more mature arc, due to continental crust involvement.

References

[1] Cameron 1985, Cont. Min. Petr. 89, 239-255; [2] Kamenetsky et al. 1995, J. of Petr. 36, 637-662; [3] Magganas & Kyriakopoulos 2005, 2^{nd} Ec. Geol. & Min. Conf.-GSG, 189-198; [4] Schuth et al. 2004, Cont. Min. Petr. 148, 288-304; [5] Smith & Rassios, 2003, GSA, Sp. P., 373, 337-350.