Petrochemical features and petrogenesis of the silicic volcanism in Gümüldür area, Western Turkey

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Widespread silicic volcanism, represented by cluster of rhyolite domes and lava flows together with the pyroclastic deposits, located in NE-SW trending Çubukludağ graben in western Turkey. This volcanic succession forms an upper part of the graben infill which reflects extension related crustal fissure-fracture zone within the basin. Our K-Ar age datings reveal that the silicic volcanism was occurred during the Lower Miocene (17.2±0.5-17.9±0.6 Ma; K-Ar).

The first products of the volcanism were produced by large-scale explosive eruptions and are comprised by nearly all kind of pyroclastic deposits. The lava phase represents by mainly foliated stony rhyolite, intensely vesicular and pumiceous rhyolite, rhyodacite, dacite, and obsidian. Petrochemical studies indicate that two different series can be distinguished in the lavas. These are; a) shoshonitic, crystal rich (30-35 %) rhyodacite-dacitic serie, and b) high-K, high silica (SiO_2: 72-79 wt %), crystal-poor (5-15 %) rhyolites. Zr-saturation temperatures are 816-834°C and 737-783°C respectively [1, 2]. In a rhyolitic series, highly vesiculated rhyolites have very low Ba (2-20 ppm) and Sr (2.5-16 ppm) values with accompanied very deep negative Eu anomaly (Eu/Eu*= 0.01-0.12). Our field and petrochemical studies indicate that crystal-rich felsic magmas and cogenetic rhyolites are spatially and temporally associated. Correlation between decreasing age and decreasing Sr concentration of the lavas indicate that evolution of the rhyolite could be related with silicic mushes evolution in the upper crust as proposed by Bachmann and Bergantz [3, and references therein].

Although their trace and rare earth element compositions are very similar to active continental margin magmatic associations, they were formed under the extensional tectonic regime of the western Turkey during the Lower Miocene period.

[1] Watson and Harrison (1983) *EPSL* **64**, 295-304. [2] Miller *et al*. (2003) *Geology* **31** (6) 529-532. [3] Bachmann and Bergantz (2004) *Journal of Petrology* **45**, 1565-1582.

Impact of fine, coarse and PM_{10} size fractions on the solution of Positive Matrix Factorization analysis of atmospheric aerosol data

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A study was conducted in order to investigate the level of uncertainty arising from extracting the aerosol sources in the urban environment, when factor analysis is applied on different aerosol size fractions, using chemical composition data. Source apportionment was performed in an urban area where representative types of emission sources are present.

PM_{10} and PM_2 samples were collected within the Athens Metropolitan area and analysed for trace elements, inorganic ions and black carbon. Analysis by two way and three way Positive Matrix Factorization was performed, in order to resolve sources from data obtained for the fine and coarse aerosol fractions. A difference was observed: seven factors describe the best solution in PMF3 while six factors in PMF2. Six factors derived from PMF3 analysis correspond to those described by the PMF2 solution for the fine and coarse particles separately. These sources were attributed to road dust, marine aerosol, soil, motor vehicles, biomass burning, and oil combustion. The additional source resolved by PMF3 was attributed to a different type of road dust. When PMF2 was employed in PM_{10} concentrations the optimum solution included six factors. Four source profiles corresponded to the previously identified as vehicles, road dust, biomass burning and marine aerosol, while two could not be clearly identified. Source apportionment by PMF2 analysis based solely on PM_{10} aerosol composition data, yielded results of higher uncertainty with respect to the identification of typical source profiles, when compared to PMF2 and PMF3 analysis on fine and coarse aerosol composition data.

[1] Paatero P., 1997. *Chem. Inte.t Lab. Systems* 37(1), 23-35.