

Preliminary Findings of Petrology and Geochemistry of The Aladağ Volcanic System and Surrounding Areas (Kars, Turkey)

Olgun Duru (1) and Mehmet Keskin (2)

(1) Institute of Graduate Studies in Science and Engineering, İstanbul University, İstanbul, Turkey (lineasyon@gmail.com),
(2) Department of Geological Engineering, İstanbul University, Turkey (keskin@istanbul.edu.tr)

Between the towns of Sarıkamış and Kağızman, NE Turkey, a medium-sized strato-volcano with satellite cones and domes on its slopes unconformably overlies the Erzurum-Kars Volcanic Plateau (EKVP) with a subhorizontal contact. It is called the Aladağ volcanic system (AVS). Dating results indicate that the AVS is Pliocene in age. The EKVP is known to be formed by a widespread volcanism between Middle Miocene to Pliocene. The young volcanism in E Turkey including the study area is linked to a collision between the Eurasia and Arabian continents, started almost 15 Ma ago. The EKVP lies over 2000 m above the sea level, and is deeply cut by the river Aras. On the slopes of the valley, one of the best volcano-stratigraphic transects of Eastern Anatolia, almost half a km thick, is exposed. That transect is composed of aphyric andesites-dacites, ignimbrites, tuffs, perlite and obsidian bands. Pyroclastic fall and surge-related pumice deposits are also widespread. Top of the plateau is composed of the andesitic to basaltic andesitic lavas containing plagioclase (Plg) and ortho/clino pyroxene (Opx/Cpx) phenocrysts set in glassy groundmass. In the northwest of the study area, an eroded stratovolcano, probably coeval with the plateau sequence is situated. It also consists of high-silica rhyolites and pyroclastic equivalents.

The AVS is composed basically of intermediate lavas. The largest volcanic edifice of the Aladağ volcanic system, namely the Greater Aladağ stratovolcano reaches up to 3000 m height and includes a horseshoe shaped crater open to the North. Small volcanic cones and domes sit on the flanks of the Greater Aladağ volcano. The Aladağ lavas are divided into four sub-groups on the basis of their stratigraphic positions, mineral assemblages and textural properties. (1) The oldest products of the Greater Aladağ stratovolcano are andesitic and dacitic lavas. They directly sit on the EKVP. These are Plg and Opx/Cpx bearing lavas with porphyric, vitrophyric, and hyalopilitic textures. (2) The second stage lavas, covering large areas are andesitic to dacitic in composition, consisting of Plg and Px and amphibole (Amp) xenocrysts. (3) On the northwestern flank of the Greater Aladağ, about twenty lava flows are exposed. These aphyric lavas consist of Plg and Opx. (4) The aphyric lavas of the Lesser Aladağ, in the northwest of the Greater Aladağ volcano, are basaltic andesitic in composition. In the northeast of the study area, Upper Pliocene lavas exposed on the southern edge of the Kars plateau are the youngest volcanic units which are basaltic in composition displaying porphyritic textures in the study area. They are composed of plagioclase and clinopyroxene phenocrysts.

Volcanic products in the study area are calc-alkaline in character with a clear subduction signature. They show textures characteristic for magma mixing processes indicating periodic replenishment of magma chamber by primitive basaltic magmas. Our assimilation models indicate that AFC was an important process for the evolved lavas. However, AFC remained negligible during the magma chamber evolution of the basic volcanic units.