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Petrography and geochemistry of magmatic rocks from Admiralty Bay, King George Island (South Shetland Islands, Antarctica): Preliminary results

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South Shetland Islands in Western Antarctica is dominated by a widespread magmatism through Meso-Cenozoic due to the magmatic arc created by the subduction of Phoenix plate along the South Shetland trench. Within the scope of 4th Turkish Antarctic Expedition (TAE-IV) and Turkey-Poland Bilateral cooperation, field studies were conducted in Admiralty Bay (King George Island) that host various magmatic units in order to understand the magmatic evolution beneath Meso-Cenozoic Western Antarctica.

Magmatic products consists of Paleocene-Eocene aged volcanic and subvolcanic rocks in Admiralty Bay. Volcanic rocks are represented by terrestrial lavas and pyroclastic rocks (agglomerates, tuffs and volcanic breccias) while subvolcanic rocks consist of dykes and stocks. According to the petrographic investigations, volcanic and subvolcanic rocks in the area mostly display disequilibrium textures such as sieve textures and embayments in plagioclase and pyroxenes, patchy and oscillatory zoning in different generations of plagioclases and the existence of K-Feldspar xenocrysts with reaction rims along the borders.

Geochemically, the compositions of the magmatic rocks in the study area range from dacite to basalt. Volcanic and subvolcanic rocks show similar geochemical signatures. The samples show mostly calc-alkaline affinities. There are two predominant compositional variations, felsic and intermediate-mafic. Their MgO content ranges within 0.28-1.20 wt. % for the more felsic lavas and 2.78-5.24 wt. % for intermediate-mafic lavas. Their Al_2O_3 contents are relatively high (14.91-24.29 wt. %). The samples are slightly enriched in large ion lithophile elements (LILE) and light rare earth elements (LREE) compared to HFSE and HREE. The samples display high Th/Yb ratios ranging from 3.78 to 0.69. Strong depletions in Nb and Ti elements are observed as typical indicators for subduction zone magmatism. Although most of the samples show similar patterns in spider diagrams, a strong discrepancy is seen in immobile elements such as Hf and Zr, resulting in positive anomalies in felsic and negative anomalies in intermediate-mafic rocks. Similarly, negative Eu anomalies observed only in the felsic rocks. Eu/Eu* ratios varies within 0.59-0.71 for felsic rocks, and 0.85-1.12 for intermediate-mafic rocks. These different patterns in different compositions suggest an open system differentiation for the melt evolution. Petrographic and geochemical evaluations indicate that the magma beneath Meso-Cenozoic Western Antarctica is originated from lithospheric mantle metasomatized by subduction components, and fractional

crystallization/assimilation fractional crystallization contributed to the magmatic evolution.