

## **Geochronology, geochemistry and isotope systematics of a mafic-intermediate dyke complex in the Istanbul zone, northern Turkey**

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We report our new U-Pb zircon dating, major and trace element data, mineral chemistry and Sr–Nd isotopic analyses of the mafic – intermediate dykes in the İstanbul zone. Mafic dykes are represented by calc-alkaline to alkaline lamprophyres (mainly vogesite) and diabases. Intermediate dykes are represented by the calc-alkaline andesitic to dacitic subvolcanic rocks and small granodioritic stocks. New zircon U–Pb LA-ICP-MS dating yield ages from  $72.49 \pm 0.79$  to  $65.44 \pm 0.93$  Ma (i.e. Upper Cretaceous) for the intermediate dykes.  $^{87}\text{Sr}/^{86}\text{Sr}$  initial values of the mafic and intermediate dykes span a range from 0.703508 to 0.706311, while their initial  $^{143}\text{Nd}/^{144}\text{Nd}$  values vary between 0.512614 and 0.512812 and  $\epsilon\text{Nd}_{\text{T}}$  values between 5.09 and 1.24. Nd TDM model ages range between 0.46 and 0.77 Ga.

These dykes are enriched in LILEs and LREE and depleted in HFSEs, indicating that the melts were derived from a mantle source modified by subducted slab-derived melts. N type MORB-normalized multi-element spidergrams of mafic and intermediate dykes display a distinct subduction signature. The mineral chemistry on amphiboles is used to constrain the pressure (P), temperature (T), oxygen fugacity ( $\log f\text{O}_2$ ) and water contents ( $\text{H}_2\text{O}_{\text{melt}}$ ) during the crystallization of the magmas in studied dykes. Amphibole temperatures for studied rocks are in a range of 769 – 991 °C (mean = 843°C). The crystallization depths are estimated to be in the interval of 3.0 – 20.2 km and they show polibarc crystallization. The mafic-intermediate dykes can be considered to have been equilibrated at oxygen fugacities of amphiboles ( $\log f\text{O}_2$ ) between –9.4 and –13.1 bars (mean = –11.8 bar) and at  $\text{H}_2\text{O}_{\text{melt}}$  contents changing between 4.8 % and 7.5 % (mean = 5.8 %) respectively. Calculated values indicate that all dykes were emplaced at mid - shallow crustal levels. In summary, in this study, dyke complexes are interpreted as emplaced in a volcanic rifted margin related to the rifting of the Black Sea during the Late Cretaceous.