

Geochronological and geochemical study of mafic dykes from the northern West Junggar, NW China: petrogenesis and tectonic implications

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Early Devonian mafic dykes occur in the Xiemisitai Mountains of the northern West Junggar. However, their ages, petrogenesis and geodynamic process remain to be unraveled. We report hornblende ^{40}Ar - ^{39}Ar ages and geochemical data for the Xiemisitai dykes. The Xiemisitai dykes give hornblende ^{40}Ar - ^{39}Ar age of 405.9 ± 4.9 Ma (Fig.1). The Xiemisitai dykes show low $\text{Mg}^\#$ (46–59) and low Cr (11.3–197 ppm) and Ni (19.9–102 ppm) abundances indicating that they have experienced significant fractional crystallization. These dykes contain hornblende and biotite and display negative Nb-Ta-Ti anomalies, enrichment of LREEs, LILEs and depletion of HREEs and HFSEs, similar with an origin from a lithospheric mantle metasomatized by subducted slab-derived fluids. In addition, the Xiemisitai dykes are plotted within melting trends with little to no garnet (Cpx : Grt=6:1) in their source. The La/Yb vs.Tb/Yb plot also indicates the presence of less than 1% residual garnet in the source region for the Xiemisitai dykes. Therefore, it can be inferred that the Xiemisitai dykes were generated at a correspondingly shallow depth, mostly within the spinel stability field. The Xiemisitai dykes were most probably generated by partial melting of metasomatized lithospheric mantle in relatively shallow level (<80 km). They could have been triggered by asthenospheric upwelling as a result of the rollback of the subducted Irtysh-Zaysan oceanic lithosphere.

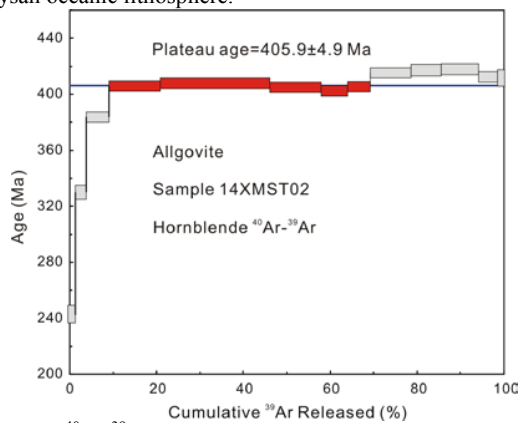


Fig.1. $^{40}\text{Ar}/^{39}\text{Ar}$ analyses for the Xiemisitai dykes in the Northern West Junggar.