Geochemistry and geochronology of the volcanic rock and OIB type basalt from the Lajishan mélange in the Central Qilian, NW China

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The Central Qilian is one of the largest tectonic units of the Qilian orogenic belt in Northwest China. The Lajishan mélange located in the eastern Central Qilian, contains ophiolite, gabbro, basalt, volcanic rock, radiolarian chert, carbonate and clastic rock, which shows the characteristic of the block-in-matrix fabric. In this study, we report new geochemical and geochronological data of the volcanic rocks and basalts from the Lajishan mélange, to evalute the subduction - accretionary process of the Central Qilian. Zircons from the volcanic rocks yield the magma crystallization ages of 468 ± 2Ma and 460 ± 5Ma. The volcanic rocks display relatively high SiO_2, MgO and Fe_2O_3 contents, and low TiO_2 and P_2O_5 contents, and enrichment in large ion lithophile elements and light rare earth elements, no Eu anomalie, and obvious Nb, Ta and Ti negative anomalies, and also display the consistent Sr-Nd isotopic compositions and the εNd(t) values of +4.25 - +4.50. These data indicate the volcanic rocks have geochemical characteristics similar to those of island arc volcanic rocks. Therefore, the volcanic rocks are interpreted to be derived from a slightly metasomatized depleted mantle in a normal subduction environment. The basalts are characterized by lower contents of SiO_2, high K_2O+Na_2O, Fe_2O_3 and TiO_2, enrichment LREE and depletion HREE, and no Nb, Ta and Ti negative anomalies, suggesting typical ocean island basalt affinity. Zircons from the alkaline basalt yield the age of 476 ± 6 Ma. The OIB-type rocks from the Lajishan mélange are consider as accreted seamount fragments, and may represent mantle transition zone plume- related magmatism within an intra – oceanic setting. Therefore, we propose that there was a Paleo-ocean during the early Paleozoic era in the eastern Central Qilian. These new results, combined with published data from the Lajishan mélanges, favor a Japan-type subduction-accretion system in the Cambrian to early Silurian in the central Qilian.