

Late Permian to Early Triassic back-arc type volcanism in the southern Mongolia volcano-plutonic belt of the Central Asian Orogenic Belt: Implication for timing of the final closure of the Palaeo-Asian Ocean

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The timing of final subduction and closure of the Palaeo-Asian Ocean is still controversial in the eastern segments of the Central Asian Orogenic Belt (CAOB). A more detailed understanding is needed with respect to the formation of volcanic rocks and sediments associated with the final closure of the Palaeo-Asian Ocean in southern Mongolia. We investigated alkali series volcanic rocks newly discovered in the southern Mongolia volcano-plutonic belt of the CAOB and classified as basalt, basaltic trachyandesite, andesite, trachyandesite, and trachyte, mainly showing andesitic-dacitic compositions. In Harker diagrams, the TiO_2 , FeO , MnO , Al_2O_3 , CaO , and MgO contents generally decrease with increasing SiO_2 , representing a series of differentiated volcanic rocks. The primitive mantle-normalized trace element spider diagram is characterized by incompatible element-rich patterns and negative Nb anomalies. The tectonic discrimination diagrams show that the volcanic rocks were formed by arc-related volcanism rather than within-plate volcanism. K-Ar dating of feldspars from six volcanic rocks yields ages ranging from 270 to 239 Ma, indicating that andesitic and dacitic magmatism occurred during this period. These geochemical and geochronological data indicate that the differentiated volcanic rocks intruding middle to late Palaeozoic volcanic sediments were formed by back-arc type subduction ca. 270–240 Ma. Based on detrital zircon U-Pb ages, the terrigenous sandstones underlain by the volcanic sediments record a maximum depositional age of Late Triassic (ca. 220–200 Ma) and include a main cluster of Early Devonian ages (ca. 410–390 Ma), possibly derived from the Devonian-Carboniferous arc complex observed surrounding this study area. These results from the volcanic and sedimentary rocks in this study, combined with investigations in previous studies, imply that subduction beneath the eastern segments of the CAOB to consume the Palaeo-Asian Ocean continued until Late Permian to Early Triassic.

Keywords: Palaeo-Asian Ocean, southern Mongolia, Central Asian Orogenic Belt, back-arc type volcanism