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OUTLINE OF GRANITOIDS OF THE CENTRAL ASIA OROGENIC BELT: FOCUSED ON THE SOUTHERN PART

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The Central Asian Orogenic Belt (CAOB), bounded by the Siberian craton to the north and the Tarim-North China cratons to the south, is a complex collage of microcontinental blocks, island arcs, oceanic crustal remnants and continental marginal facies rocks. It is one of the largest and most complex accretionary orogenic belts and the most important site of Phanerozoic continental growth on the Earth [*Jahn et al., 2000, 2004; Kovalenko et al., 2004*] The widespread occurrence of large volumes of granitoids, mostly with juvenile sources, is a typical characteristic of the CAOB. These granitoids have been intensely studied (e.g. [*Jahn et al., 2000, 2004; Kovalenko et al., 2004; Sorokin et al., 2004; Vladimirov et al., 2001; Han et al., 2010; Wang et al., 2006, 2015; Wu et al., 2011; Li et al., 2013; Yarmolyuk et al., 2002*]). However, these studies mainly focused on some certain countries or regions.

This paper is based on digital mapping by ca. 4000 zircon ages and summarizes the spatial-temporal evolution of Phanerozoic granitoids and reviews their possible source and tectonic settings. The granitoids occupy a total area of more than 5000000 km^2, with three major age peaks in the Cambrian-Ordovician, Carboniferous-Permian, and Jurassic. The zircon ages exhibit 6 major peaks at ca. 500, 430–370, 330–300, 290–260, 210–170, and 145–110 Ma.

The early Paleozoic granitoids (540–440 Ma, with a peak at ca. 500 Ma) mainly occur in the northwestern part of Central Asia, and are of calc-alkaline I-type. They probably formed in a subduction/accretionary setting (500–480 Ma) related to the Paleo-Asian Ocean and following microcontinental-collisional setting (ca. 460 Ma). The middle Paleozoic granitoids (440–360 Ma) predominately occur in the NW and southern CAOB and are characterized by high-K calc-alkaline features suggesting accretionary and/or collisional settings. During 540–360 Ma, the arc magmatism migrated from the NW to S. The Late Paleozoic (Carboniferous-Permian) granitoids are widespread in the CAOB and formed in variable settings: an intra-continental and active margin of the Paleo-Asian ocean, and an active margin of the Mongol-Okhotsk ocean. Permian granitoids (290–270 Ma) are predominantly I- and A-type and A-type with alkaline signatures, associated with coeval mafic magmatism, suggesting a post-collisional or intraplate setting, simultaneous with the LIP in the Tarim craton. Some Permian calc-alkaline arc-related granitoids also occur along an active margin related to the Paleo-Asian ocean and the Circum-Mongol-Okhotsk ocean. A tectono-magmatic transition from 270–250 Ma high-K calc-alkaline granitoids to 250–245 Ma high Sr/Y granitoids along the Xar Moron suture in the southernmost CAOB suggests closure of the Paleo-Asian ocean and transition from accretion to collision.

Early Mesozoic (Triassic-Jurassic) granitoids mainly occur in the central and eastern CAOB. The early-stage (250–230 Ma) granitoids are I- and S-types; the late-stage (ca. 230–190 Ma) are A-types and transitional I-A types or highly fractionated I-types. Early Mesozoic granitoids occur in variable settings (intraplate, post-collisional, and arc) related to three tectonics regimes (Paleo-Asian ocean (there was no PAO at 250 Ma), Mongol-Okhotsk ocean, and Paleo-Pacific ocean). Late Mesozoic granitoids mainly occur in the eastern CAOB and can be divided into 6 major phases: 190–180 Ma, 180–165 Ma, 165–145 Ma, 145–135 Ma, 135–100 Ma and 100–60 Ma. The Early-Middle Jurassic (190–160 Ma) granitoids are I-type, calc-alkaline/high-K calc-alkaline and developed along an active margin related to the Mongol-Okhotsk and Paleo-Pacific ocean plates. The Early Cretaceous (145–120 Ma) granitoids are strongly fractionated I-type, transitional I-A or, A-types, with high-K calc-alkaline/shoshonitic signatures. This magmatic evolution from Late Jurassic to Early Cretaceouss coincided with a tectonic transition from contractional, thickened crust to extensional thinning. The Late Cretaceous (120–65 Ma) granitoid magmatism is younger southeastward, suggesting a roll-back of the Paleo-Pacific ocean plate.

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