Accretionary and Reworking Processes of Lower Continental Crust in the Eastern Central Asian Orogenic Belt: Zircon Hf Isotopic Evidence from Neoproterozoic-Mesozoic Granitoids

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The Central Asian Orogenic Belt (CAOB) is the largest Phanerozoic crustal accretionary orogenic belt in the world. The Neoproterozoic, Paleozoic, and Mesozoic granitoids widely occur within the eastern segment of the CAOB. The Hf isotopic compositional variations of zircons from these granitoids and their geochemical data provide direct evidence for accretionary and reworking processes of the lower crust. The zircons from Neoproterozoic granitoids within the Erguna and Songnen-Zhangguangcailing massifs have T_{DM2} values ranging from 1400 to 2100 Ma, revealing Meso- and Paleo-proterozoic crustal accretionary events. The zircons from Early Paleozoic granitoids have T_{DM2} values ranging from 1000 to 1300 Ma in the Erguna Massif and from 1400 to 1800 Ma within the Songnen-Zhangguangcailing Massif, revealing Meso- and Paleo-proterozoic crustal accretionary events. Meanwhile, with the decreasing of formation ages of Early Paleozoic granitoids, T_{DM2} values of the zircons gradually become younger. In Mesozoic, granitic magmatic events within the Erguna Massif can be subdivided into Early Mesozoic (180-245 Ma), Late Jurassic, and Early Cretaceous. The ε_{Hf} (t) values of zircons from these granitoids gradually increase whereas their T_{DM2} values gradually decrease with the decreasing of formation ages of these granitoids, revealing the existence of the Meso- and Neo-proterozoic crustal accretionary events. Additionally, their Sr/Y ratios and δEu values gradually decrease with the decreasing of formation ages of these Mesozoic granitoids, implying that these early Mesozoic granitoids could be derived from partial melting of a thickened crust with the ages of Meso-proterozoic, whereas the late Mesozoic granitoids mainly formed by partial melting of lower continental crust with the ages of Neoproterozoic. The results above mentioned indicate that the coexistence of granitoids with diverse ages within the same region reveals the reworking processes of the lower continental crustal material with different accreationary ages.

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