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# New constraints from detrital zircon geochronology along the southwestern Siberian margin (Eastern Sayan): Implications to the Neoproterozoic tectonic evolution of the Central Asian Orogenic belt

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The Central Asian Orogenic Belt (CAOB) is one of the largest accretionary orogens in the world, occupying a vast area in Mongolia, Kazakhstan, Russia and China. Tectonic evolution of the CAOB started in the early Neoproterozoic and continued until the Mesozoic, giving rise to numerous assemblages of island arcs, ophiolites, continental fragments and sedimentary basins. Siberian Craton bounds CAOB to the north and recorded early stages of orogenesis in the Yenisey Ridge and Eastern Sayan during the Neoproterozoic-Early Palaeozoic time. Two continental fragments, containing the Precambrian crystalline basement and sedimentary cover, are identified within the structure of the CAOB and are commonly referred to as the Tuva-Mongolian and Zavkhan microcontinents. The Neoproterozoic strata of the southwestern Siberian margin, Zavkhan and Tuva-Mongolian microcontinents share similarities in their sedimentary cover by the presence of the terrigenous-carbonate rocks within the lower part of the cover and diamictite-cap dolostone association in the overlying stata. Sedimentological studies have shown that the terrigenous-carbonate rocks within these areas have been deposited in an extensional setting during Cryogenian, whereas diamictites and cap dolostone represent the Marinoan episode of glaciation. New detrital zircon U-Pb (LA-ICP-MS) and morphological data from the Neoproterozoic sedimentary rocks in the southwestern Siberian margin provide new insights in the tectonic evolution of the CAOB during the Neoproterozoic.

The studied sedimentary successions are from the Eastern Sayan and are subdivided into the rift-related Karagass Group and the younger foreland basin Oselok group with the Marinoan tillites at the base of the sequence. Detrital zircon populations of the Karagass group are predominantly ca. 2050-1800 Ma, ca. 2600-2400 Ma, ca. 2700-3000 Ma and 3300-3000 Ma, corresponding to the ages of the Siberian crystalline basement of the southwestern margin of the Siberian Craton. In contrast, the ages of the Oselok group show a significantly different detrital zircon age spectra. The Marinoan tillites contain highly abraded zircon populations within a range of 1000-750 Ma, 2100-1800 Ma and 2600-2350 Ma. The overlying strata within the Oselok grop show a different pattern with samples containing only Palaeoproterozoic and Archean zircon grains and the uppermost section containing high population variability: 640-570 Ma, 1000-650 Ma, 2100-1800 Ma, 2700-2400 Ma. Detrital zircon provenance from the Oselok group indicates that detritus were derived from the mature sources of the Siberian Craton basement and perhaps more distant Neoproterozoic arc sources. The abundant granitoids of the Yenisey Ridge may have provided an important contribution of the detritus to the studied tillites. Examination of age spectra from the Marinoan tillites against recently published detrital zircons data in the CAOB, shows that the 950-750 Ma and 2100-2000 Ma populations correspond to those from the Marinoan tillites in the Zavkhan (Bold et al., 2016) and Tuva-Mongolian (Demonterova et al., 2015) microcontinents. Our provenance studies suggest that the southwestern Siberian margin along with the Tuva-Mongolian and Zavkhan microcontinents could have been covered by a large ice sheet at ca. 635 Ma.