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Cryogenian glacial and interglacial sedimentary systems in the Teya-Chapa basin at the northeastern Yenisey Ridge (Siberian Craton)

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The Yenisey Ridge is a Neoproterozoic accretionary-collisional belt in the southwestern Siberian Siberian craton. Late Cryogenian sedimentary systems of the Chingasan Group within the Teya-Chapa trough basin in the northeastern Yenisey Ridge (southwestern Siberian craton) were been investigated in terms of sedimentology, with implications for the basin history. Later data on sedimentation patterns led to the inference that the Vorogovka and Teya-Chapa basins were pre-Vendian (pre-Ediacaran) paleorifts (Sovetov, 1993, 1996; Sovetov and Le Heron, 2016). In the present framework, the Teya-Chapa basin filled with the Chingasan Gr. sediments is splited into several NW half-grabens with basement outcrops between them consisting the rocks of the Meso-Neoproterozoic Teya, Sukhoi Pit and Tungusik Groups, and Early Neoproterozoic Teya and Eruda granite plutons. The Ediacaran Chapa Group lies over the eroded surface of the Chingasan Gr. and over the Meso-Neoproterozoic metasedimentary rocks of the Sukhoi Pit Gr. in the eastern basin margin. Analysis of lithofacies and paleocurrents shows deposition control in the Chingasan Gr. by three Late Cryogenian (Sturtian) glaciaiton events and tectonic subsidence. The Chingasan Gr. comprises the Lopatinskiy Fm. (about 800 m), Quarry Fm. (330 - 760 m), and Chivida Fm. ($\sim$800 m). and slightly varies in structure in different parts of the Teya-Chapa basin. Early deposition in the Lopatinskiy basin was described by ten lithofacies and produced (1) continental glacial and glaciofluvial fan deposits grading northwestward into deltaic and shelf zones, and (2) postglacial shallow-marine carbonates on the uplifted basin side and clastic deposits with minor amounts of carbonates on the subsided shelf part. The Quarry Fm. deposition began with active transport of quartz and feldspar-quartz material to the tidal plain and shelf and may been described by eighteen lithofacies. The depositon environments changed from littoral to inner shelf. The Quarry-1 sub-formation comprises three groups of lithofacies: (1) levee and sand bar, (2) tidal channel, and (3) shoreface and shelf. The group of lithofacies of the Quarry-2 sub-formation deposited in the inner shelf channel system and on the deep storm shelf fan. This was typical interglacial sedimentation of the warm climate condition. The lower part of the Chivida Fm. (Chivida-1) composed of two lithofacies glacial continental diamictite and boulder conglomerate deposited in the northern basin side. The upper part of the Chivida Fm. (Chivida-2) comprises of three turbidite lithofacies of deep water submarine fan which overlap directly the basement rocks in the east side of the Chivida basin. Recently published coeval ages of detrital zircons from the Chingasan Gr. sandstones, suggest that the diamictites deposited during the late Sturtian glaciation. As well as compositions and metamorphism of diamictites and Ar-Ar ages of coexisting volcanics found in the Verkhnyaya Vorogovka basin separated by the Ishimba thrust, suggest that the diamictites has been deposited during the early Sturtian glaciation, rather than being part of the Chingasan Group. A diamictite in the base of the Vendian Chapa Gr. is similar to Pre-Ediacaran Marinoan tillite at the base of the Oselok Gr. in the Foothills of the East Sayan Range.