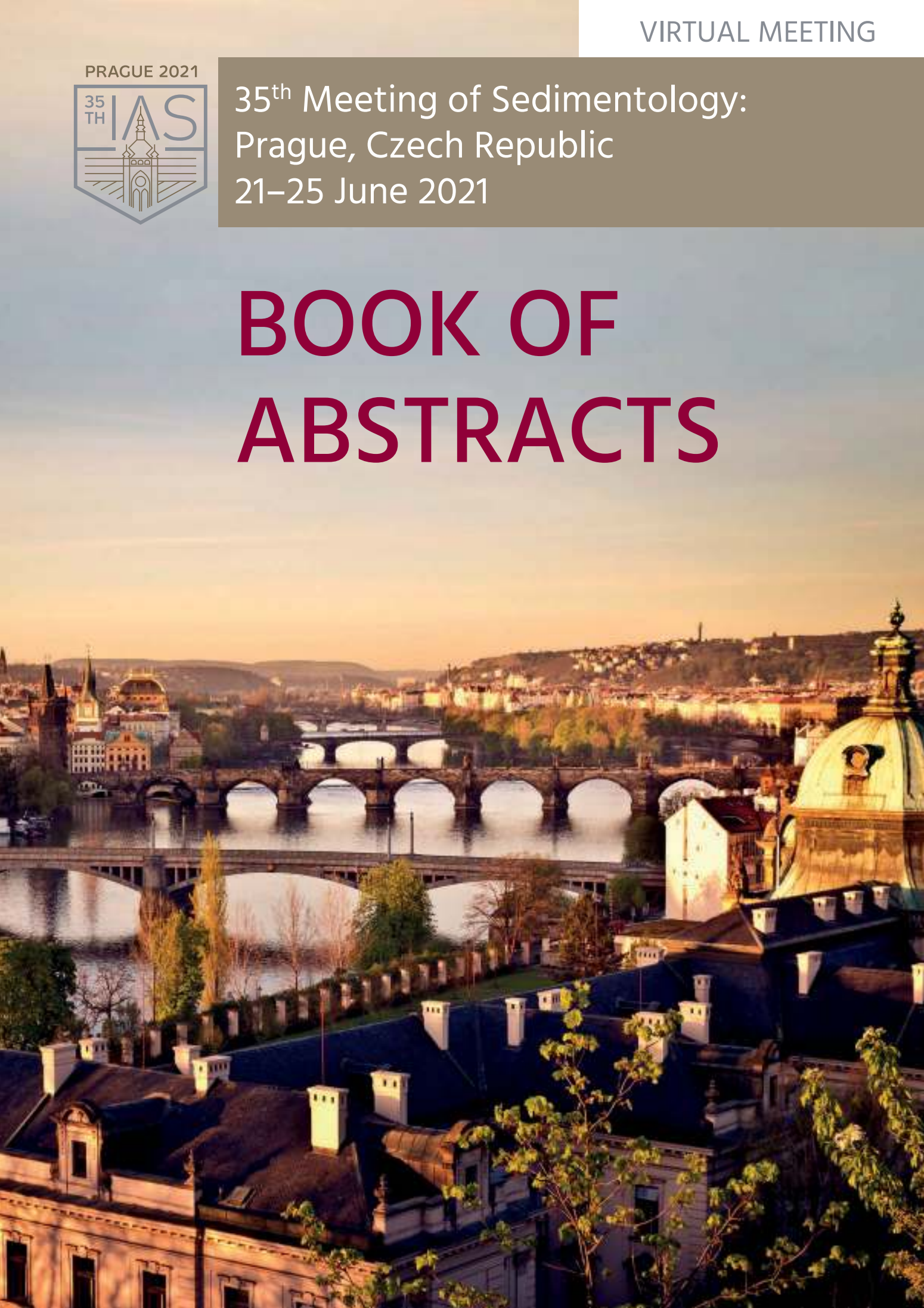
VIRTUAL MEETING

PRAGUE 2021

35th Meeting of Sedimentology:
Prague, Czech Republic
21–25 June 2021

BOOK OF ABSTRACTS



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Neoproterozoic glaciogenic sediments in southeastern Siberia re-interpreted as a sedimentary archive of tectonic activity

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Palaeoclimatic reconstructions in the Proterozoic geological record critically rely on our correct recognition of the products of glaciations (glaciogenic sediments, landforms and glacitectonic structures) and the interpretation of genetic processes that formed these products. Diamictites are often and rather enthusiastically used as the only evidence of past glaciations; however, the diamictites can form by a variety of process in glacial, glacially influenced and non-glacial settings. Furthermore, diamictites often record tectonic events related to basin evolution and localised glaciation of uplifted margins. In certain sections a subaqueous debris-flow origin of the diamictites cannot be entirely excluded. Results of a comprehensive sedimentological study of a section of Proterozoic glaciogenic deposits cropping out along the Uda River in the East Sayan Ranges, southwestern Siberia suggest that even the universally accepted Cryogenian succession is of no exception to these recurrent problems. Areas such as Siberia where the Proterozoic glaciogenic deposits are almost entirely absent is of particular importance for testing the Snowball Earth hypothesis.

A 500-m-long riverbank outcrop at the mouth of the Karapchetui Creek, Uda River has been the focus of particular attention. Here, a ca. 100-m-thick succession of planar- and cross-bedded sandstones and finely laminated dolostones (traditionally referred to as the Karapchetui Member of the Marnya Formation) passes laterally into a thick 'faceted-boulder breccia that has a peculiar sub-vertical contact with Mesoproterozoic stromatolitic dolostones (Tagul Formation) and siltstones (Ipsit Formation). The Karapchetui Member was previously interpreted as glaciofluvial and glaciolacustrine sediments, whereas the breccia was thought to represent a tillite deposit. It is not surprising that the sub-vertical contact has been reconstructed as a glacial valley incised into Mesoproterozoic strata. Importantly, the base of the Karapchetui Member is marked by a thin (0.1–0.2 m) unit of 'ferruginous silicified cataclastic rocks' that turned out to be heavily altered basaltic rocks. Upon careful examination, the faceted-boulder breccia has been re-interpreted as a conglomerate consisting of winnowed and reworked silica-cemented siltstone concretions: some of the so-called 'boulders' occasionally merge with each other or overgrow the adjacent boulders, whereas the clasts in the breccia could be fragments of the concretions chipped off in the process of winnowing and re-deposition. The concretions derived from the Ipsit Formation where they were observed in situ. The sub-vertical contact between the 'breccia' and the Ipsit Formation, however, is puzzling. Underlying the Ipsit siltstones are stromatolitic dolostones of the Tagul Formation that host enigmatic vertical wedge-shaped bodies previously interpreted as sand-filled glacial crevasses extending along the sub-vertical contact with the 'breccia'. When studied in petrographic thin-sections, these 'sand-filled crevasses' turned out to be silicified dolostones. Presumably, the silicification was due to silica fluid penetration from the overlying Ipsit Formation along a system of palaeofaults. By analogy, the sub-vertical contact between the 'breccia' and the Ipsit Formation is here re-interpreted as a palaeofault formed as a result of local tectonic activity. The above-mentioned basaltic rocks at the base of the Karapchetui Member could be related to the tectonic activity. The entire geological history of the East Sayan Ranges can now be re-interpreted.