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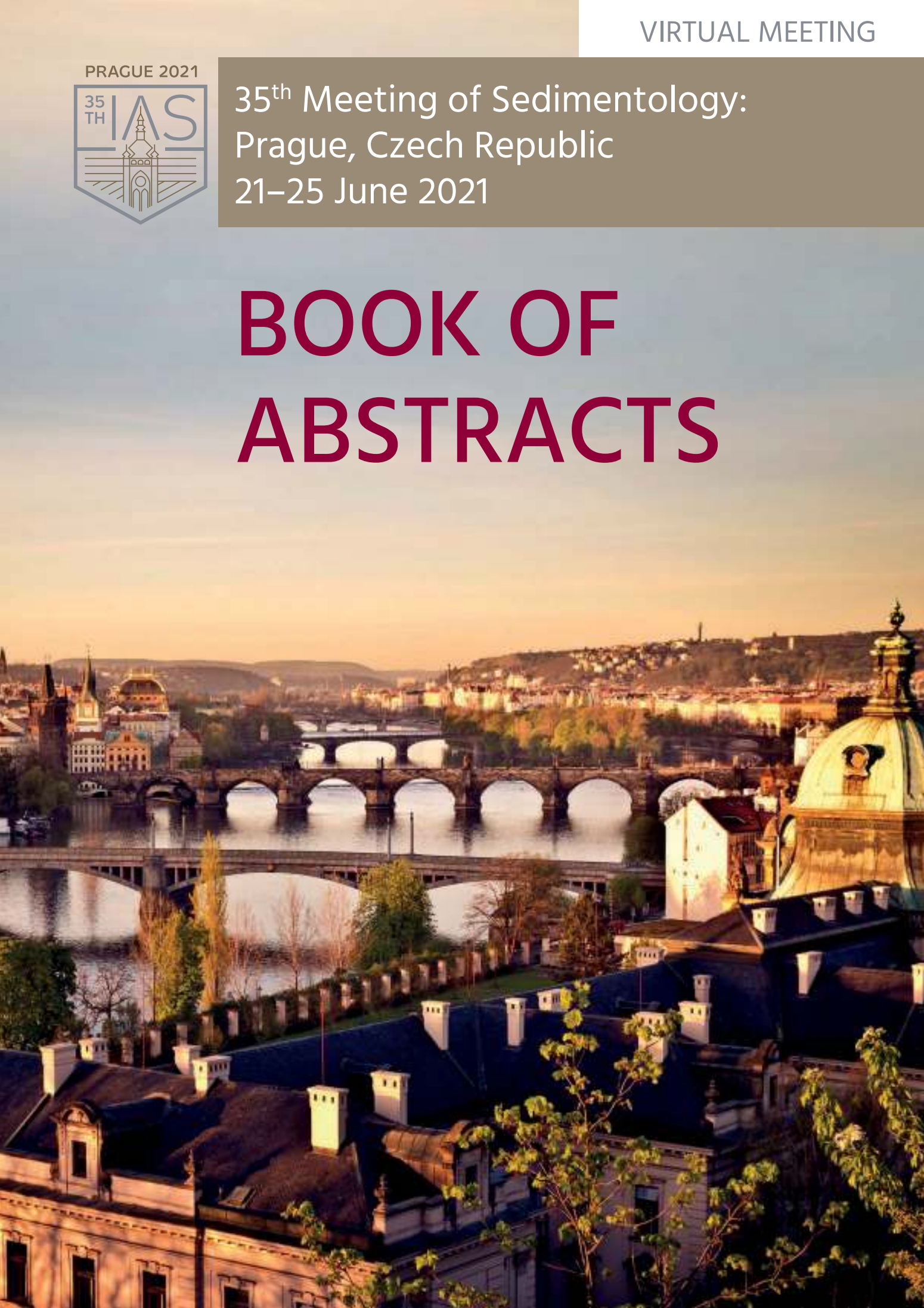
35th Meeting of Sedimentology:
Prague, Czech Republic
21–25 June 2021

BOOK OF ABSTRACTS



Palacký University of Olomouc

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Edited by Ondřej Bábek
and Stanislava Vodrážková

Olomouc 2021

Sedimentary and diagenetic environments of the terminal Ediacaran Khatyspyt Formation (Arctic Siberia)

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The terminal Ediacaran (555–544 Ma) Khatyspyt Formation of northeastern Siberia has been in the focus of attention because of the unusual carbonate-hosted preservation of soft-bodied organisms, the oldest evidence of bioturbation on Earth, and the unparalleled diversity of macroscopic fossil algae collectively offering a unique, perhaps the final glimpse into the structure and functioning of relatively deep-water ecosystems prior to the Cambrian explosion of ecological and morphological complexity. The formation is thought to represent a starved intracratonic rift basin developed in the inner ramp setting. We conducted a high-resolution study of carbon and oxygen isotope variations in relation to different lithofacies for the entire depositional system of the Khatyspyt Formation. Isotope variations in the studied sections range between −7‰ and +4‰ for carbon and between −10‰ and +2‰ for oxygen. The formation is divided into four members. The first member comprises intraclastic dolomitized limestones interstratified with thick-bedded and finely laminated limestones. It is characterised by positive δ13C values ranging between 2‰ and 4‰, with 3‰ on average, whereas δ18O values show a larger range of values between −7‰ and −2‰. The second member consists of limestones and shale interbeds interstratified with finely laminated limestones, thick-bedded limestones, and occasionally intraclastic limestones. Limestones in the second member are characterised by a gradual up-section 13C depletion, with δ13C values decreasing from +4 to as low as −5‰, followed by an increase to +3‰ towards the top of the member. The associated δ18O values, on the contrary, show an increase to +2‰ followed by a decrease to −9‰ in one of the studied sections (0601); however, no such trend has been observed in a coeval section (1811). The origin of the negative excursion of δ13C values, therefore, is unresolved. The third member comprises finely laminated limestones interstratified with thick-bedded limestones and limestone-shale alternations. It is characterised by mostly positive δ13C values, with an acme at +3‰, followed by a decrease in δ13C values where at least two negative excursions, with nadirs at −5‰ and −2‰, are separated a minor positive excursion (up to +1‰). The associated δ18O values show an increase from −8‰ to −3‰. In the upper part of the third member, there is a gradual up-section 13C enrichment, with the acme of δ13C values at +2‰; this trend is repeated in all studied sections, with exception of 0701 where δ13C are close to 0 and can even be negative. The associated δ18O values range between −8‰ and −2‰ slightly increasing up-section. The observed variations in δ13C values could be related to secondary alterations of carbonate material, possibly due to sediment bioturbation and subsequent diagenesis. The fourth member consists of intraclastic dolomitized limestones, finely laminated limestones and intervals of alternating thin layers of limestones and shales. It is characterised by a positive excursion of δ13C values, whereas δ18O values range between −10‰ and −2‰ with no particular trend. This work was supported by the Russian Science Foundation (grant 20-67-46028) and Russian Foundation for Basic Research (grant 18-05-7011).