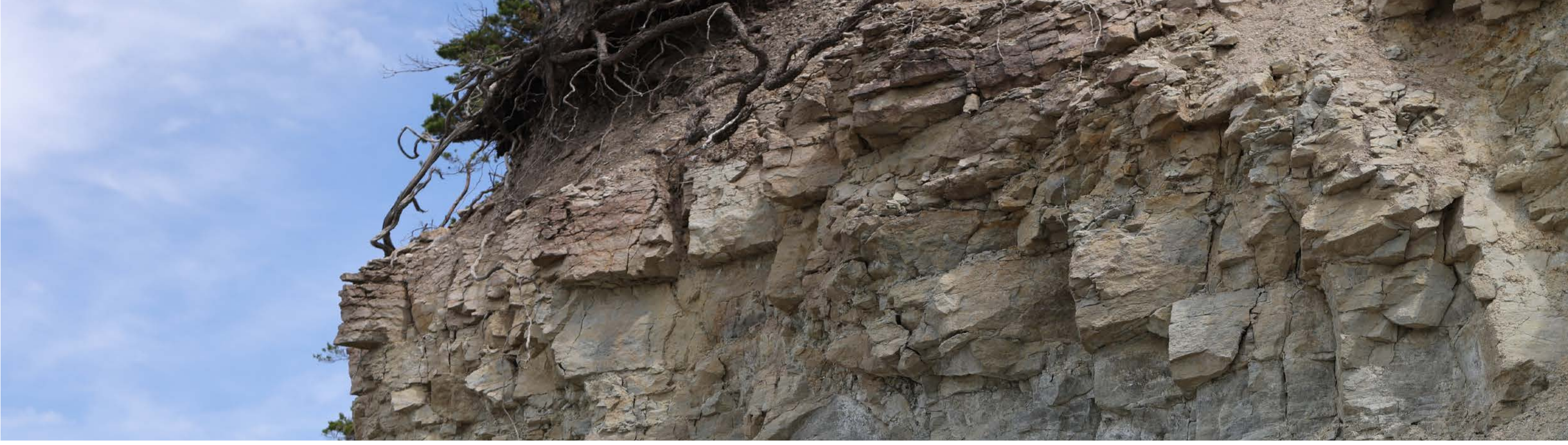

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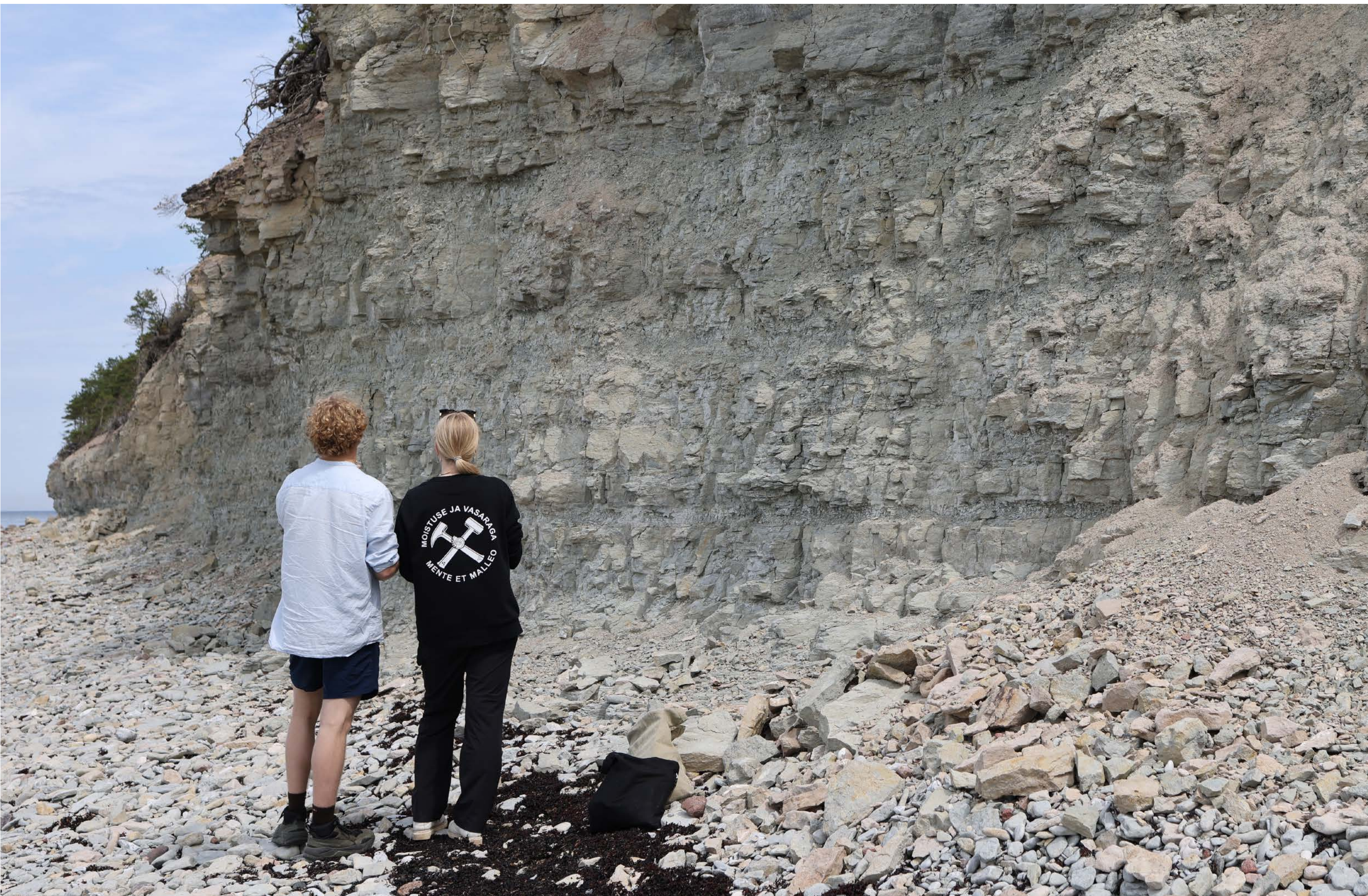

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Depositional environments of the Šilalė Event (early Přidoli, Silurian) in Milaičiai 103 core section, Lithuania

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The Šilalė Event, first identified in the Milaičiai 103 core in southwestern Lithuania, is marked by a negative carbon isotope excursion in carbonate rocks known as the Šilalė Negative Carbon Isotope Event. The Šilalė Event resulted in a decline in conodont diversity and abundance, and a corresponding increase not just in the diversity of brachiopods but in their absolute abundance as well. After the event, conodont abundance surged during the interval of biotic recovery from the Šilalė mass rarity. In the presented contribution, the depositional environments during the Šilalė Event were studied using the geochemistry and lithology of the Milaičiai 103 core. Diagenetic overprint was estimated by CL (cathodoluminescence) technique. The grain size, carbonate/siliclastics ratio, redox etc were established from the major and minor element and REE data. Thin sections were used for detailed lithology and diagenetic studies. The studied interval shows a deep and relatively deep shelf sedimentary environments. In thin-sections, mainly micrite and allochems of different proportions are present. The shallowing of the basin could be suggested by the fact that the amount of allochems, mainly crinoids, increased. The composition of trace, REE and some ratios of the trace elements were used to investigate sedimentary environment peculiarities. Some of them – U, Th, V, Cr – are redox-sensitive elements and, along with Ce, were used for oxidation/reduction sedimentation environment identification. We used the Zr/Rb ratio as an indicator of grain size variation in the succession. The Th/U ratio was applied as a redox indicator, with high values typically of more oxic settings. Low values reflect less oxic to dysoxic and possibly anoxic depositional conditions. Because the Th/U, Zr/Rb and (Zr+Rb)/Sr ratios are all influenced by the chemical composition of the provenance area, a comparison of sediments from the same source is therefore important in order to rely on an environmental interpretation of the geochemical distribution. The (Zr+Rb)/Sr ratio was used as terrigenous (siliclastics) material vs carbonates indicator. Variations in redox conditions as well as differences in REE complexation and adsorption behavior, are reflected by changes in the oxidation state of cerium Ce (III) – Ce (IV). These changes may result in differences in Ce abundances. Ce-anomaly (Ce/Ce*) values we calculated by $Ce/Ce^* = Ce_{EUS} / (0.5*(La_{EUS} + Pr_{EUS}))$. The values less than 1.0, depletion in sediment Ce, suggest reductive dissolution of insoluble Ce (IV) to soluble Ce (III). It was observed that only Sr is negatively correlated with the rest of the elements. It suggests that two fractions – carbonate and terrigenous – could be responsible. The major source of Sr, as it could be seen from the thin sections, is detrital carbonate fauna – brachiopods, bivalves, crinoids etc. U/Th ratio >0.75 up to 1.25 indicates dysoxic environment – samples from 1104.5 and 1092 m are from Šilalė Bioevent interval. From the U/Th, Ce/Ce* data, the depositional conditions look slightly different. There are samples from all studied intervals which could be deposited under dysoxic conditions. U/Th vs V/Cr and U/Th vs Ce/Ce* data suggest that either the deposition took place close to the oxic – dysoxic boundary or some diagenetic alteration might have occurred, as could be seen in some thin-sections. (Zr+Rb)/Sr ratio approaching zero clearly indicates carbonate sedimentation or carbonate content increase. We could see that almost all Šilalė Event core interval is represented by carbonates, while after the event, the terrigenous material prevails. Zr and Rb ratio variation through the section has not revealed any noticeable changes even when carbonate depositional environment switched to terrigenous material dominated one and vice versa.

Keywords: Silurian, Šilalė Event, geochemistry, sedimentology.

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