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Multiproxy approach and HI-RES stratigraphy: Contrasting examples of degree of precision attained in correlation of mid-Palaeozoic strata

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Different methods are being used in order to improve correlation of sedimentary sequences and thus attain the highest precision possible. In reality, we are often facing a situation where the most needed data are missing at critical stratigraphic levels (e.g. stratigraphic boundaries and significant events). It represents a substantial constraint as the stratigraphic framework is fundamental for most subsequent geological studies.

Our practise in past years was a multi-proxy approach to correlation of carbonate and shale dominated successions in sections in different mid-Palaeozoic regions. These include areas in peri-Gondwana and some more distant areas e.g. [1], [2], [3], [4], [5]. Based on well-developed biostratigraphy using conodonts and/or graptolites we applied high resolution petrophysical correlation methods. These include magnetic susceptibility measurements (MS,) gamma-ray spectrometry (GRS), alignment of MS logs using the dynamic time warping (DTW) algorithm and oxygen isotope data.

The intention of the presentation is to show examples of the maximal precision in correlation attained using integration of several methods in contrast to their principal drawbacks that cause serious inaccuracies. As a consequence of misinterpretation of biostratigraphy on one hand, and inconsistency in radiometric data, on the other hand, examples of major problems in mid-Paleozoic stratigraphy will be manifested. These will include large discrepancies in correlation of prominent bio-events, eustasy driven changes and major stratigraphic boundaries (those between Mid-Palaeozoic periods and intra-stage boundaries in Silurian and Devonian).

Figure 1: The Basal Emsian GSSP, Zinzilban Gorge, Kitab State Geological Reserve, Qashqadaryo Region, Uzbekistan

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