International Geoscience Programme Project 653 **The onset of the Great Ordovician Biodiversification Event** Third Annual Meeting

## **Trekking Across the GOBE** From the Cambrian through the Katian



### Athens, Ohio 2018







International Geoscience Programme Project 653

The onset of the Great Ordovician Biodiversification Event

Third Annual Meeting

# Trekking Across the GOBE

### From the Cambrian through the Katian

June 3-7, 2018

## Program & Abstracts



Edited by

Alycia L. Stigall, Daniel I. Hembree & Rebecca L. Freeman

Athens, Ohio, USA 2018

*Cover photo: Edenian through Maysvillian Strata (Kope through Bellevue Formations) at the US-68 "Big Maysville Roadcut" visited on the mid-conference field excursion.* 

#### Assessing the quality of Baltoscandian chitinozoan biozones using quantitative stratigraphy

Hints, Olle<sup>1</sup>, Antonovitš, Liina<sup>1</sup>, Nõlvak, Jaak<sup>1</sup> and LIANG Yan<sup>1,2\*</sup>

<sup>1</sup>Department of Geology, Tallinn University of Technology, Ehitajate tee 5, 19086 Tallinn, Estonia <sup>2</sup>State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, 39 East Beijing Road, 210008 Nanjing, China

\*Corresponding author: liangyan@nigpas.ac.cn

Chitinozoans are one of the three most important groups in Early Paleozoic biostratigraphy, with well elaborated and widely adopted regional biozonal schemes in the Ordovician, and both regional schemes and a global standard in the Silurian. Baltoscandia is the region where chitinozoans were first described and where they have been actively studied since then. In the Ordovician succession of Baltoscandia, 26 chitinozoan zones and subzones have been established, and the most recent Silurian biozonal scheme contains 28 regional biostratigraphic units. However, the practical applicability of individual biozones varies due to different stratigraphic ranges and/or uneven geographic distribution of the key species, as well as their variable abundance and patchiness of the regional fossil record.

Here we apply quantitative stratigraphy to assess the quality and applicability of existing regional chitinozoan biozones and distinguish events that provide most promising additional correlation levels and hold potential for defining new formal biozones. We use the occurrence-level regional chitinozoan database CHITDB (http://chitinozoa.net), which was initially established for creating high-resolution diversity curves for the group in Baltoscandia (Hints et al., 2017). The database contains more than productive 6400 samples from 103 measured sections spanning from the Early Ordovician to Pridoli, altogether ca 35000 occurrence records of ca 300 taxa, including the zonal species.

Three different methods of quantitative stratigraphy were used to analyse the dataset by creating composite successions of events or associations (Hammer et al. 2001 and references therein): Constrained Optimization (CONOP9), Ranking-Scaling (RASC) and Unitary Associations (UAGraph). The most detailed composite succession was generated using CONOP9, providing opportunity to study how well the distribution of zonal species corresponds to the model. It appeared that FADs and LADs of most index species in the CONOP9 composite show below average misfit to the model and are thus stratigraphically well-constrained. It was revealed that the misfit values for zonal taxa are comparatively smaller in the Ordovician than in the Silurian. The RASC method also produced a reasonable composite succession, useful for assessing the individual biostratigraphic events and successions. On the other hand, the UAGraph composite, which is based on finding and ordering co-occurrences of taxa, strongly overestimated ranges of individual species and thus could not be readily used for analysing the current dataset.

#### **References:**

Hammer, Ø., Harper, D.A.T. & Ryan, P.D. 2001. PAST: Paleontological Statistics Software Package for Education and Data Analysis. *Palaeontologia Electronica*, **4**, 9 pp.

Hints, O., Antonovitš, L., Bauert, G., Nestor, V., Nõlvak, J. & Tammekänd, M. 2017. CHITDB: a database for documenting and analysing diversification of Ordovician–Silurian chitinozoans in the Baltic region. *Lethaia*. doi:10.1111/let.12249.