Geophysical Research Abstracts
Vol. 14, EGU2012-838, 2012
EGU General Assembly 2012

Microfacies of the Billingen-Aseri (Lower-Middle Ordovician) carbonate deposits northwest of the Russian Platform

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The microfacies were distinguished based on distribution of associations of lithotypes of carbonate rocks in the natural outcrops along the Baltic-Ladoga Klint. The macrofacies were genetically interpreted considering distribution of the main types of microfacies in a different parts of homoclinal carbonate ramp, formulated by E. Flügel (2004).
The tidal deposits of the inner ramp are spread in the northwestern Estonia to the west of Tallinn and include Kunda (sandy fine-grained mudstones) and lowermost Aseri Regional Stages (echinoderm-algae dolomitized wackestones with admixture of quartz grains to the east of Tallinn and echinoderm-algae packstones with phosphate ooids to the west of Tallinn).
The uppermost O. evae conodont zone (Billingen Regional Stage, quartz-glauconitic sands and sandstones, packstones with various bentic fauna) probably should be referred to the sandy shoals and banks of the inner ramp. The echinoderm-ostracod packstones with goethite-hydrogoethite ooids (L. variabilis conodont zone and base of the Y. crassus Zone) in the Klint outcrops to the east of Tallinn were probably formed under the same conditions.
Protected-marine settings of the inner ramp are characterized by the bioclastic packstones with numerous echinoderms and wackestones with ostracods. In the outcrops of St. Petersburg Region these deposits correspond to the B. triangularis-lower part of L. variabilis conodont zones. In the North Estonia they compose lower part of the Kunda Regional Stage (Mäekalda road section and further to the east) and lower part of the Aseri Regional Stage (Sõtke River).
The sediments formed in the open-marine settings of the inner ramp (trilobite-echinoderm packstones) compose several stratigraphic intervals exposed along the Baltic-Ladoga Klint line from the Syas River on the east to the western most regions of the North Estonian Klint. In the eastern part of the territory (Lynna River) they form boundary interval of the B. navis and M. parva conodont zones and also L. variabilis Zone. In Northeastern Estonia these sediments corresponds to the lower part of the Kunda Regional Stage.
The sediments of the mid-ramp settings are represented by poorly stratified, non-bioturbated mudstones of the Valgejõe Member of the Loobu Formation (Sõtke River) and bioturbated ostracod-echinoderm wackestones with glauconite grains, and trilobite-echinoderm packstones (lower part of the Kunda Regional Stage and base of the Aseri Regional Stage in the Russian part of Baltic-Ladoga Klint).
The outer ramp deposits occupied eastern part of the region of Ladoga Klint and represented by echinoderm-trilobite and echinoderm-brachiopod-ostracod wackestones. They are typical for the Simankovo Formation.
Distribution of the carbonate microfacies along the profile of the Baltic-Ladoga Klint reflects onset of transgression and include microfacies from tidal-dominated environments of the inner ramp at the base of the succession to the relatively deep-water environments of the outer ramp at the top of the seccession. The sediments of the eastern parts of the Baltic-Ladoga Klint are relatively deep-water and correspond to the middle and upper outer ramp settings.

References

Flügel E. 2004. Microfacies of Carbonate Rocks. Analysis, Interpretation and Application. Springer Berlin Heidelberg New York. 976 p.