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0.0.1 Determination of actual time of sedimentation of Cambrian – Ordovician sandstones of North-West Russian platform

A. Lalomov (1), G. Berthault (2)

(1) Institute of Geology of Ore Deposits, Petrography, Mineralogy and Geochemistry of Russian Academy of Science (IGEM RAS) (lalomov@mail.ru / Phone: +7-495-2308427), (2) Meulan, France

Cambrian – Ordovician sandstones (COS) of St.-Petersburg (SPb) area have regional extension (more than 300 km width) and relatively small thickness (30 – 40 m). The sequence consists of several formations, which usually are divided by erosion surfaces. Conventional stratigraphy based on paleontological method supposes that the Formations were deposited one after another during 25 million years. The sandstones have obvious evidences of deposition in conditions of moderate to intensive hydrodynamic activity with lateral transport of sediments – cross beds, ripple marks and inverted beds. Dividing volume of COS formations by calculated total sediment discharge of paleoflow it is possible to estimate real time of sedimentation of COS.

The total bed sediment discharge for unit width q_T can be calculated according to Einstein procedure [Julien, 1995] from the sum of the unit bed sediment discharge $q_b$and the unit suspended sediment discharge q_s.

$q_T = q_b$ [1+ I_1ln(30h/d$_s$) + I_2]

where h – flow depth; d$_s$ – sediment size; I_1 and I_2integrals that can be solved numerically or with the use of nomographs preparing by Einstein.

This calculation indicates that specific sediment discharge per unit width had variations from 4 to 40 m^3/day per unit width. Applying of the discharge to available volume of COS allows to suppose that duration of deposition of all COS sequence did not exceeds 3000 years, that is about 0.001% of 25 million years that is assigned to the sequence by stratigraphic chart. Neither interrupts of sedimentation (stagnation)

nor erosion of part of the strata could explain this lack of coincidence.

Reliability of the calculation is confirmed by independent sedimentological methods based on modern analogues of the strata that provide the estimation even shorter than Einstein procedure. Based on the analysis of tidal cycles, Kulyamin and Smirnov [1973] established that the pure deposition period of analogy sandstones in the Baltic region is approximately 170 days.

Absence of 99.999% of assumed sedimentary sequence is reason for questioning of the conventional chronostratigraphy based of Stenon's principles that should be revised on the foundation of modern observations and experiments [Berthault, 2002, 2004].

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