Geophysical Research Abstracts
Vol. 14, EGU2012-5237-1, 2012
EGU General Assembly 2012

Ordovician of the Siberian Platform: sea-level and long-term lithological changes

A. Dronov
Geological Institute of the Russian Academy of Sciences, Moscow, Russian Federation (dronov@ginras.ru)

Comparative analysis of the Ordovician successions of the Siberian and North American platforms demonstrates a striking similarity in the long-term lithological changes and sea-level curve interpretation. On both platforms Ordovician succession starts with tropical stromatolite-bearing carbonates which abruptly changes to siliciclastic deposits (Baykit Sandstone in Siberia and Eureka Sandstone in North America respectively) and terminates with cool-water carbonates (Ettensohn, 2010; Herrmann et al., 2004; Kanygin et al., 2010). Numerous K-bentonite beds in the Upper Ordovician of North American and Siberian platforms stressed this similarity (Huff et al., 2010; Dronov et al., 2011). The sea-level curve for the Ordovician of North American platform assumes a prominent sea-level drop at the base of the Middle Ordovician and a long-term lowstand during all the Dapingian and Darriwilian (80-100 m lower than in the Lower and Upper Ordovician), (Vail eat al., 1977; Ross and Ross, 1992; 1995). The sea-level curve for the Ordovician of Siberian platform looks roughly the same (Dronov et al., 2009; Kanygin et al, 2010). On the other hand, sea-level curves for the Ordovician of the Gondwanan platforms (North Africa, Yangtze platform, South America, Avalonia) seems to share different patterns (Videt et al., 2010; Su, 2007; Heredia and Beresi, 1995; Woodcock, 1990). The Middle Ordovician represents rather a highstand interval in these reconstructions. As for the Baltica, there are two different sea-level models for this paleocontinent. The sea-level curve suggested by A. Nielsen (2004) demonstrate close similarity to the North American model while the sea-level curve presented by A. Dronov (2005) seems to fit better to the platforms rifted from the Gondwana paleocontinent (Munnecke et al., 2010). This contradiction reflects opposite opinions in the interpretation of limestone units within the deep water setting of the Ordovician basin of Baltoscandia. The invasion of carbonate facies into the black shale realm is interpreted as a shallowing event in the deep-water setting, assuming that limestone represents more shallow-water facies than the black shale (Nielsen, 2004). On the other hand, the same episodes in shallow-water areas are characterized by the expansion of the relatively deep-water marine red bed facies into the shallow-water realm, suggesting deepening events. Invasion of limestone facies into the deep-water black shale environment could be explained through the mechanism of "highstand shedding" (Schlager, 2007). According to this view carbonates were transported from a shallow-water environment into a deep-water setting only at the time of maximum carbonate production in the shallow-water environment, i.e. during sea-level highstand. According to this interpretation Ordovician succession of Baltica also follows the Gondwanan sea-level patterns. As a result instead of one global sea-level curve for the Ordovician (Huq and Shatter, 2008) it would be probably more correct to suggest two semi-global curves for two big tectonic regions one of which includes Siberian and North American platforms and the other combine Baltica and Gondwanan platforms. The subdivision probably reflects position of the main Ordovician lithosphere plates.
This work is a contribution to IGCP 591 project. It was supported by the Russian Foundation for Basic Research grant 10-05-00848.