



Carbon isotope chemostratigraphy and conodonts of the Middle–Upper Ordovician succession in the Tungus Basin, Siberian Craton

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Abstract

Stable carbon isotope chemostratigraphy has been applied for correlation of Ordovician marine sedimentary successions of many continents but not yet for those located on the Siberian Craton. In this study we present the first $\delta^{13}\text{C}$ data from the Middle and Upper Ordovician successions of the Tungus Basin, the extensive Palaeozoic intracratonic basin on the Palaeocontinent Siberia. Carbon isotope curves from two separate areas of the craton, from the Kulyumbe River and Podkamennaya Tunguska River regions, demonstrate a great similarity. Three global carbon isotope events can be recognized in the Tungus Basin: the Mid-Darriwilian Excursion (MDICE), the Upper Kukruse Low, and the lower rising interval of the Guttenberg Excursion (GICE). These data partly support the previous inter-continental stratigraphic correlations but also suggest that the base of the Upper Ordovician in the Siberian succession lies at a lower level than previously thought. Although the conodont fauna in Siberia differs almost completely from that in Baltoscandia, the distribution of selected Upper Ordovician conodont taxa do not contradict the isotope chemostratigraphic conclusions.

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1. Introduction

Secular variations of $\delta^{13}\text{C}$ in marine carbonates have become an important tool in regional and global correlation of sedimentary successions. The stable carbon isotope chemostratigraphy is especially useful in correlation of separated marine basins and continents with different faunas and depositional environments. Numerous publications have dealt with Ordovician $\delta^{13}\text{C}$ chemostratigraphy in Baltoscandia (e.g., Kaljo et al., 2004, 2007; Ainsaar et al., 2010; Bergström et al., 2011a), North America (e.g., Saltzman and Young, 2005; Young et al., 2005; Bergström et al., 2010a), China (e.g., Zhang et al., 2010; Munnecke et al., 2011), and elsewhere. These data are summarized in the

Ordovician generalized global $\delta^{13}\text{C}$ curve (Bergström et al., 2009) and in regional $\delta^{13}\text{C}$ chemostratigraphic zonation schemes (e.g., for Baltoscandia; Ainsaar et al., 2010). Numerous outcrops are located in the extensive area of Palaeozoic deposits in Siberia. Although most of them occur in remote and difficult-to-access regions, the stratigraphy and palaeontology of these successions have been studied by numerous geological expeditions during the last century (Kanygin et al., 2010a, and references therein). However, the $\delta^{13}\text{C}$ chemostratigraphy has not been applied to the Ordovician successions of the Siberian Craton. A few of stable isotope studies of the Cambrian stratigraphy in the Tungus Basin have included also the Tremadocian interval (Kouchinsky et al., 2008), but the main part of the extensive marine sedimentary succession in the region has not been studied in sense of this method. In our paper we present the results of the first $\delta^{13}\text{C}$ studies from the Middle and Upper Ordovician sections located in the Kulyumbe River and Podkamennaya

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