

Provenance Change in the Irkutsk Coal Basin during the Early and Middle Jurassic: Geochemical and Sm-Nd Isotope Evidence

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Abstract—On the basis of the recently accepted chronostratigraphic chart, Jurassic sedimentation in the Irkutsk coal basin took place over a short time interval (~23 My), from the Pliensbachian (~191 Ma) to the Aalenian (~170 Ma). In this study, we present geochemical and Sm-Nd isotope data for sedimentary rocks of the Prisayan and Kuda formations and those in the upper course of the Angara River, which were deposited over an even shorter time interval (from ~174 to 170 Ma), as indicated by new data on biostratigraphy. Our results suggest that a greater contribution from Transbaikalia compared to that from the Siberian Platform during sediment deposition in the Irkutsk coal basin may reflect the onset of mountain building in Transbaikalia and reorganization of the river drainage network during the Middle Jurassic.

Keywords: Jurassic, Irkutsk coal basin, sedimentary rocks, geochemistry, Sm-Nd model ages

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INTRODUCTION

The Irkutsk coal basin is located in the southern part of the Siberian Platform and extends along East Sayan from Lake Baikal in the southeast to the Uda River in the vicinity of the town of Nizhneudinsk in the northwest (*Ugol'naya...*, 2002) (Fig. 1). On the basis of the stratigraphic chart accepted in 1981 by the 3rd Interdepartmental Stratigraphic Meeting on the Mesozoic and Cenozoic of Central Siberia, the sedimentary fill of the basin is currently subdivided into the Cheremkhovo (Pliensbachian–early Toarcian), Prisayan (Toarcian–Aalenian), and Kuda (Aalenian–early Bajocian) formations (Fig. 2). The southeastern part of the Irkutsk coal basin and Angara-Koty intermontane zone identified within the Baikal Group also has a tripartite subdivision into the Dabat, Tal'tsy, and Koty formations, which are considered to be equivalents of the Cheremkhovo, Prisayan, and Kuda formations, respectively (*Resheniya...*, 1981). Alternatively, Akulov et al. (2015) suggest that the Koty Formation (called the Baikal Formation by Akulov et al. (2015)) is probably the oldest unit, which is succeeded by progressively younger formations (Dabat, Cheremkhovo, and Prisayan), whereas the Kuda Formation was excluded from consideration. A major problem of correlation between formations comprising the Baikal Group and those of the central Irkutsk coal basin is that the former were considerably displaced by post-Jurassic faulting relative to

their original position (Maslov and Lavrov, 1933; Tetyaev, 1934; Gladkov et al., 2000).

Most paleogeographic reconstructions for this area were proposed in the 1960s–1970s (*Yurskie...*, 1967; Timofeev, 1970; Fainshtein, 1971; *Ploskogor'ya...*, 1971; etc.), but thus far no attempts have been made to interpret the history of the area within the framework of plate tectonics.

Despite a long history of investigation of Jurassic strata of the Irkutsk coal basin, their stratigraphy remains poorly understood. In this paper, we present new paleontological data and the first geochemical and isotopic characteristics of the Prisayan and Kuda formations. Special emphasis was given to the section located on the right side of the Angara River, near its mouth, previously attributed to the Dabat Formation (Akulov et al., 2015). Our results were used to shed light on the provenance of detrital material making up the sedimentary fill of the Irkutsk coal basin and the processes of volcanism and mountain building that occurred in the area of present-day Transbaikalia, which appeared in the Jurassic as the Mongol-Okhotsk Ocean bordering the margin of the Siberian continent (Zonenshain et al., 1990).

MATERIALS AND METHODS

In this study, we present data on Jurassic deposits of the Kuda and Prisayan formations from the south-