The low-diversity benthic foraminiferal assemblage from Late Eocene deposits of Western Siberia

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Abstract

The West Siberian Sea was among the largest shallow epicontinental basins and well connected to the Peri-Tethys through the Turgay Strait. The final stage of this marine connection and isolation of the Western Siberian Sea is marked by Upper Eocene sediments of the Tavda Formation. The gradual isolation of the basin affected the entire oceanographic environment of the Peri-Tethys, including water exchange and circulation, and shifted most basins of Eurasia to long-term suboxi and anoxic bottom-water environments, water column stratification, brackish or anomalohaline evaporitic conditions, or even endorheic lakes. The strangulation and subsequent disappearance of the epicontinental West Siberian Sea resulted in a complete paleogeographic and paleoclimatic reorganization of the region and coincides with the period when the continents initiated the upheaval to the present-day constellation. In contrast to the extensive studies on the geologic evolution of the Peri-Tethys Ocean and adjacent marine areas, the terminal phase of the marine sedimentation in the West Siberian Basin still has been little studied. We have analyzed the composition, structure, and diversity of benthic foraminiferal assemblages in core material from the southwestern part of Western Siberia to reconstruct the environmental and depositional settings during the terminal phase of marine sedimentation in the West Siberian Basin and to provide a better understanding of the stratigraphy (Upper Tavda Subformation).
The material includes a total of 65 borehole samples from the Kyshtyrla Quarry located on the southwestern periphery of Western Siberia. The study site is situated at the boundary between Western Siberia and the Turgay Strait and holds important clues to reconstruct the connection between the shallow epicontinental West Siberian Basin and the Peri-Tethys Ocean. Drilling was conducted down to a depth of 65 meters and core samples were taken every meter.

A low-diverse assemblage, comprising 8 species of benthic foraminifera, was identified from a total of 412 picked specimens. This includes 6 perforate-hyaline, 1 porcelaneous, and 1 agglutinated species. Analyses of the benthic foraminiferal faunas revealed various species of Cribroelphidium including C. parainvolutum, C. cf. parainvolutum, and C. sp., a few perforate-hyaline and porcelaneous foraminifera, and a single agglutinated taxon. The foraminiferal biotas strongly suggest that the core material studied corresponds to the Upper

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Tavda Subformation and is of Priabonian age.
The benthic foraminiferal biotas recovered are characterized by low species richness and diversity indices and are mainly composed of taxa that are indicative of shallow-water subtidal and, tidal conditions. However, from the bottom to the top of the core section, abundance, species richness, and diversity values markedly decrease, suggesting an increase in environmental stressors. The lowermost units comprise an amalgamation of moderately low diverse subtidal and intertidal taxa (Miliolinella, Cibicides, Cribroelphidium, Porosononion, Ammonia, Trochammina) with Fisher α values of up to 5.5. The upper core units are almost exclusively composed of monospecific, typical intertidal, and stress-tolerant species (e.g. Ammonia, Trochammina). The faunal changes recorded from the bottom to the top of the core are indicative for the transition from a shallow subtidal to a tidal-influenced habitat.

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