

Open and semi-closed Paleogene marine systems in northeastern Peri-Tethys: stable and transitional biostratigraphic, paleogeographic and paleoclimatological aspects

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Paleogene geological events, which occurred in middle latitudes of central Eurasia, have defined all natural conditions in extratropical Eurasia, except its Pacific margin. Three phases are distinguished in the development of the region in the Paleocene and Eocene: a) development of direct (through) meridional communications between Arctic and the Tethys (Paleocene-Early Eocene); b) their intermittent interruption, up to their complete termination (Lutetian); c) separation of the West Siberian marine basin from Arctic, maintaining connection only with Peri-Tethys (Bartonian-Priabonian). The climate of each stage was transformed correspondingly from paratropical (Paleocene-Early Eocene), through summer-wet monsoonal, subtropical (Latest Early Eocene-Lutetian) to the seasonal winterwet with semi-arid features, and, finally, to warm-temperate, up to subtropical with concurrent alternation of humid and arid phases (Priabonian).

The Early Paleogene phase was characterized by uniform composition of sediments in sedimentary basins, which were interconnected and occurred on both sides of the Alpi-Himalayan belt. While studying the Early Paleogene stage, the model of the palinspastic reconstruction (Scotese, 1998), was used. It was modified by Jan a. Harrison, (2003) for the International Tectonic Map, prepared under the head of International Union of Geological Sciences (<http://jan.ucc.nau.edu/~rcb7/eocenasia.jpg>). This model substantiates the independence of the north branch of the trade wind flow, which connects the Tethys with marginal basins of Peri-Tethys, extending further to the West Siberian basin. This branch is one of the sources that bring warmth to high latitudes.

Lockhartia Katinia, *Rotalia*, *Rhanikotalia*, *Miscellania* and other large foraminifera, typical of Pakistan and India, were found in the Shikergin Formation of the Peter the Great Ridge (Tadjikistan). *Lockhartia luppovii* (Bugrova, 1980) was identified in southern Turkmenistan (Badkhyz, Kushka) and Uzbekistan. Numerous dinocysts taxa have been identified in Upper Paleocene and Lower Eocene sections of the Tethys in India and Pakistan (Patala, Nammal, and Subathu sections of the Salt Range, Jammu and Kashmir, and other states), on the one hand, and in West Siberian and Turanian sections, on the other. Another sequence includes *Apectodinium augustum* (RETM episode).

The next phase in the West Siberian basin is characterized by recurrent loss and restoration of direct marine communications between Arctica and marginal basins of the Peri-Tethys. The phase ended in the ultimate loss of the connections in Late Lyulin time (Late Lutetian). The West Siberian basin became semi-close with circular water motion of an estuary type, open to the south to Peri-Tethys. Marine biota was reorganized being accompanied by the appearance of endemic dinocysts in the West Siberian basin (*Kisselovia ornata*, *Thalassiphora elongata*, *Wetzeliiella irtysensis* a. oth.). Xerophilous flora with *Arthotaxis*, xeromorphic *Quercus*, *Palibinia*, Myrtaceae and others were abundant along the entire coast of Northern Peritethys, from the Voronezh antecline to Pavlodar area (Irtys River). Pollen assemblages were dominated by xerophytes. The formation of *Azolla* beds started when the Arctic basin got completely isolated from the West Siberian inner sea (Tavda time, Late Bartonian). This occurred in periods of maximum lowering of the Ocean level, when the inflow of fresh water into the inner basin prevailed over supply of sea water from Peri-Tethys. This was accompanied by water column differentiation, desalination of surface water and bottom disoxia involving an assemblage of suppressed benthic foraminifera. Since the rise of sea level in the latest Late Eocene, the inlet of salty water from Peri-Tethys increased and the West Siberian basin became wholly salty. This was confirmed by rich plankton and benthic foraminifers in the Tavda Formation terminal strata.

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