Late Miocene depositional environments in the Indol-Kuban Basin

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During the Late Miocene, the Skythian shelf was covered by vast oolite shoals. The junction towards the Black Sea depression with more than 1000 m water depth was the Indol-Kuban Basin. The Crimean islands formed a western shore whilst the branches of the Greater Caucasus and the Stavropol high formed its eastern and south-eastern shores. Surface outcrops of the basin fill of the Indol-Kuban Basin occur especially at Kertch in the eastern part of the Peninsula Crimea. Upper Miocene deposits of the Bessarabian stage form the seacliffs at Jurkino and Zavjetnoje. The c. 50-m-thick successions document the facies and depositional environments in this region during the Late Miocene. Aside from thick units of dark brown to greyish marls, rapid alternations of crossbedded oolites with diatomites and diatomitic marls characterise the sections. Small patches of microbialitic bryozoan-polychaete bioherms occur in contact with oolites. The associated mollusc fauna is poor in species but enormously rich in individuals. Typical molluscs, dominating the spectra in quantitative samples, are gastropods such as *Hydrobia, Pseudamnicola, Akburunella* and the bivalves *Venerupis* and *Cryptomactra*. The assemblages represent littoral to shallow sublittoral settings and thus point to shallow marine conditions. Low oxygen conditions are indicated by gypsum and pyrite in the dark to black marls in lower parts of the sections. In contrast, the wide spread oolites point to agitated shoals with elevated alkalinity and carbonate saturated sea water. An intermediate position is represented by the even more frequent diatomites and diatomitic marls. They indicate calm bottom sedimentation, high surface productivity and a large pool for dissolved silica.

The trigger mechanism for the formation of these thick diatomites is unclear. Freshwater runoff from the Crimean islands may have been a source for nutrients and silica. The thickness of the diatomites and the absence of seasonality rhythms in the diatomitic marls suggest long lasting diatom blooms. The enduring freshwater dilution, however, would have significantly hampered the oolite production. Thus, we discuss upwelling from the close by Black Sea depression as potential source for the nutrients. Moreover, the considerable thickness of the diatomites, might be an important factor in calculating carbon budgets and sinks in Late Miocene times.