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Expression of Milankovitch Cycles in Mid-Pliocene Strata of the Productive Series, Azerbaijan

The latitude of the South Caspian basin put it in a "Mediterranean" zone where the climate has oscillated from wet to very dry every 20,000 years, in response to insolation changes driven by variations in the Earth's orbit (Milankovitch cycles). About a dozen such cycles occurred just during deposition of the Pereriva Suite, implying that there are (at least) an equal number of internal sequence boundaries within just this interval of the reservoirs of the Productive Series. There are probably about 50 sequence boundaries within the Balakhany Suite.

The Caspian database also reveals that some fundamental paradigms in sequence stratigraphy require major revision before they can be applied to predict lacustrine reservoir architecture. Among these is the observation that the sequence boundary (lowstand exposure surface) and maximum flooding surface are closely coincident, because there are hardly any clastic sediments deposited in an enclosed lake during lake level fall – no fluvial discharge exists to provide a depositional mechanism. Also, sequence boundaries in the South Caspian have no time relationship to those formed by global eustasy; they are neither in- nor out-of-phase. This is because levels of the Caspian Sea are driven by low-latitude insolation, which is mostly controlled by 20,000-year precession and 100,000-year eccentricity cycles. In contrast, global eustasy is controlled by polar ice volumes, which are heavily influenced by obliquity changes on 40,000-year time scales. The duration of these cycles are constrained both by cycle tuning approaches and new outcrop-derived data on the paleomagnetic field reversals in the Pereriva and Balakhany sections, and limited biostratigraphic and radiometric constraints.