

Paleo-Current Activity in the Eastern Arctic Ocean - Evidence from Seismic

Four stages of deposition regime have been detected on high-resolution seismic reflection profiles. First, in strata of Paleocene-Eocene age small vertical faults indicate differential compaction of probably anoxic sediments deposited in the still isolated Eurasian Basin.

Then, a high-amplitude-reflector sequence indicates a time of widespread changes in deposition realm associated with the gradual opening of the Fram Strait and ongoing subsidence of the Lomonosov Ridge (LR) in Eocene and Oligocene. Episodical incursions of water masses from the North Atlantic were the consequences and led to the deposition of sediments of strongly different lithology.

The third stage marks widespread and pelagic sedimentation since earliest Miocene. Sediment waves are evidence for paleo-bottom current activity and the onset of an ocean circulation system. The slope of the LR is structured into terraces, indicating fault-controlled sediment drifts arisen due to the onset and intensification of current circulation. Advanced deepening of the Fram Strait likely enabled an effective exchange of water masses between the North Atlantic and Arctic Ocean. Continuous sagging of the LR, reactivation of former faults and bottom currents passing along the ridge may shape the steep sediment free flanks of the terraces in addition.

At least, a continuous regional drape of reflectors marks the transition to glaciation of the northern hemisphere in early Pliocene.