Empirical data as well as modelling experiments show that the stability of the Arctic cryosphere is in great threat due to global warming. Along the circum-arctic continental periphery this cryosphere is comprised today of terrestrial permafrost. However, during Quaternary times this frozen landscape feature was repeatedly changed due to global sea-level fluctuations which affected, in particular, the shallow Siberian shelves. Since a potential change of the permafrost in the future is of major climatic relevance, it seems crucial to investigate some natural aspects behind permafrost variability in order to better evaluate this important issue.

Numerous radiocarbon-dated gravity cores with sediment recoveries of up to 9 m have been taken from the Laptev Sea shelf. Their chronologies allow for a detailed reconstruction of the Laptev Sea inundation history since early Holocene times. However, longer sediment cores could not be obtained by such conventional means because of the existence of sediments being too stiff. A scientific drilling campaign was therefore conducted to the outer Laptev Sea shelf with the goal to recover sediments from a Cenozoic rift system of the eastern Laptev Sea that would allow a study of Arctic climate change on time scales beyond the Holocene. The selected site had been previously investigated by acoustic profiling and a gravity core. Radiocarbon ages and micropaleontological data suggested a Holocene sediment package of about
10 m thickness. The cores recovered during the drilling campaign from below this depth level revealed various types of ice-bearing sediments which contain a rich terrestrial plant flora as well as beetle fauna both suggesting a late glacial age in accordance with obtained dates. Oxygen isotopes measured on the ice yield values of about Ū10 per mil. As these values are rather heavy when compared with ice wedge values of similar age, it seems evident that the frozen terrestrial sediments were altered during the ensuing global transgression.