

# What happened at ca. 40 ka in Arctic Ocean based on geochemical compositions of pelagic sediments?

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## Abstract

Authigenic carbonates and mud fractions of the sediment core (PS72/410-1) retrieved from the central Mendeleev Ridge of the western Arctic Ocean were investigated texturally and geochemically. The giant box core (GKG) is 39 cm long with age of ca. 76 ky BP and was collected from the water depth of 1,802 m. The sediments are mainly composed of silty to sandy silty clay with various grey to brown colours, reflecting glacial-interglacial and/or stadial-interstadial cycles. Authigenic carbonate minerals (high Mg-calcite, low Mg-calcite and aragonite) are present through the whole sequence except for a few centimetres in the middle part. Various crystal shapes of carbonate crystals together with clear growth shapes suggest that they are inorganic in origin. Highly enriched carbon isotope compositions indicate that they formed in methanogenic zone just below sediment/water interface. However, a wide range of oxygen isotope values ( $\delta^{18}\text{O} = -5 \sim +5\text{‰}$  vs. PDB) may indicate that porewater has been changed due to reaction between residual seawater and volcanic sediments. Relatively higher contents of K, Al, Fe and Be values of muddy sediments as well as low  $\delta^{18}\text{O}$  compositions of authigenic carbonates may imply strong input of meltwater from volcanic region (Eastern Arctic region) whereas higher oxygen isotope compositions of authigenic carbonates and higher Sr and K contents of muddy sediments reflect stronger influence from carbonate-rich region (Canadian Arctic region). Mineralogical changes from low to high Mg-calcite together with decrease in Mg, Sr and Fe contents at ca. 40 ka strongly support less freshwater input from glacial mode to interglacial mode. All the analyzed results strongly imply that significant paleoceanographic changes took place at about 40 ka, which may have influenced global climate changes during the last glacial period.

**Keywords:** Arctic, pelagic, authigenic, carbonates, stable isotope, trace element