Distribution and origin of inorganic and organic carbon in the sediments of Kongsfjord, northwest Spitsbergen, European Arctic

Katarzyna Koziorowska, Karol Kuliński, Janusz Pempkowiak

www.elsevier.com/locate/csr

PII: S0278-4343(17)30169-3
DOI: http://dx.doi.org/10.1016/j.csr.2017.08.023
Reference: CSR3669

To appear in: *Continental Shelf Research*

Received date: 29 March 2017
Revised date: 29 August 2017
Accepted date: 30 August 2017

Cite this article as: Katarzyna Koziorowska, Karol Kuliński and Janusz Pempkowiak, Distribution and origin of inorganic and organic carbon in the sediments of Kongsfjord, northwest Spitsbergen, European Arctic, *Continental Shelf Research,* http://dx.doi.org/10.1016/j.csr.2017.08.023

Distribution and origin of inorganic and organic carbon in the sediments of Kongsfjord, northwest Spitsbergen, European Arctic

Katarzyna Koziorowska*, Karol Kuliński, Janusz Pempkowiak

Institute of Oceanology Polish Academy of Sciences, ul. Powstańców Warszawy 55, Sopot, Poland

*Corresponding author, e-mail: kkozio@iopan.gda.pl

Abstract

Sedimentary organic carbon in the Arctic, including the continental shelf and fjords, has been relatively well investigated, whereas much less is known about sedimentary inorganic carbon (carbonates) in fjords. The distribution and provenience of both sedimentary organic and inorganic carbon in a high-Arctic fjord (Kongsfjord, 79ºN) was the subject of this study. Stratified bottom sediments (cores) and suspended particulate matter (SPM) were analyzed for total (C_{tot}), organic (C_{org}), and inorganic (C_{inorg}) carbon as well as calcium, magnesium, and strontium. The sediments were dated using the ^{210}Pb method.

Sedimentation rates ranged from 0.14 cm (fjord mouth, FM) to several cm (close to the glacier front, GF) year^{-1}. Sedimentary C_{org} concentrations were higher at the FM (~20 mg g^{-1} dry sediment) than at the GF (~1 mg g^{-1}), while concentrations of C_{inorg} were lower at the FM (16.8 mg g^{-1}) than at the GF (45 mg g^{-1}). SPM concentrations were highest, and C_{inorg} most abundant at the GF.

The data suggest that C_{org} is mostly produced *in situ*, with glaciers serving as only a minor source. The C_{inorg} to C_{org} ratios, Ca, Mg, and Sr concentrations, and the molar ratios of Mg:Ca and Sr:Ca together indicated that carbonates close to the GF are of terrigenous origin and those at the FM almost exclusively biogenic. Carbonates originating from these two sources differ in their composition. The Mg:Ca and Sr:Ca molar ratios were 0.56 and 0.00015 for glacial carbonates and 0.94 and 0.00020 for biogenic carbonates.

Key words: high-Arctic fjord; suspended matter; sedimentary organic matter; sedimentary carbonates; provenience; Mg:Ca ratio

1. Introduction