Data Article

Palynological data of cores MSM5/5–712–2 and PS2863/1–2 from northeastern Fram Strait spanning the last glacial maximum to present

Jade Falardeau a, *, Anne de Vernal a, Robert F. Spielhagen b, c

a GEOTOP-UQAM, CP 8888, Montréal, H3C 3P8, Canada
b GEOMAR Helmholtz Centre for Ocean Research, 24148, Kiel, Germany
c Academy of Sciences, Humanities and Literature, 55131, Mainz, Germany

ABSTRACT

The palynological data of two sites from northeastern Fram Strait (MSM5/5–712 and PS2863) encompassing the last 23,000 years are presented here. The data set first includes the palynomorph concentrations: dinocysts (cysts/g) and their fluxes (cysts/cm²/yr) as well as pollen grains, spores, organic linings, Halodinium, reworked palynomorphs and Pediastrum represented in #/g. It also includes the relative abundance (%) of dinocyst taxa at sites MSM5/5–712 and PS2863. Finally, this Data in Brief comprises reconstructions of sea-surface conditions at the two sites, which include sea-surface temperature (°C) in summer and winter, sea-surface salinity (psu) in summer and winter, sea-ice cover (month/yr) and productivity (gC/m²/yr). The most probable values in addition to minimum and maximum possible are reported. The data is presented in function of the cores depth and age. For more details on this data and the chronology of the cores, see [1].

© 2019 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).
1. Data

Three different kinds of data derived from the raw counts of palynomorphs at sites MSM5/5−712 and PS2868 located in northeastern Fram Strait [3], northwest of Svalbard, Norway, are shown in this Data in Brief article in the form of 6 excel sheets. The calculated concentrations (#/g) of dinocysts and their fluxes (#/g/cm^2) and concentrations of other palynomorphs: spores, pollen grains, organic linings of benthic foraminifers, *Halodinium*, reworked palynomorphs and *Pediastrum* in the sediments of sites MSM5/5−712 and PS2863, respectively, are presented in the first two tables. Then, the dinocyst assemblages (relative abundances of taxa in %) in the samples from each site are shown in the following two tables. Finally, quantitative reconstructions of sea-surface conditions (sea-surface temperature (°C) in summer and winter, sea-surface salinity (psu) in summer and winter, sea-ice cover (month/yr) and productivity (gC/m^2/yr)) at sites MSM5/5−712 and PS2863 can be found in the last two tables. The original maximum, minimum and most probable values derived from the reconstructions are reported as well (no additional corrections were applied). All data are presented against age and depth in the cores (according to the age models described in Ref. [1]). Details on all the calculations can be found in the next section.

1.1. Experimental design, materials and methods

For each sample, about 5 cm^3 of sediment were wet sieved and one capsule of the marker grain *Lycopodium clavatum* (the number of spores in one capsule is known) was added for the
palynomorph concentration calculations [6]. In order to preserve the organic matter only, the 10–106 μm fraction was subjected to three hydrochloric acid treatments to dissolve carbonate particles interspersed by hydrofluoric acid treatments to dissolve the silica particles. The residues were mounted on slides in glycerin jelly and observed under microscope at 400X optical magnification for palynological analysis. Minimum counts of 300 dinocysts per sample were targeted.

Once the counting completed, the palynomorph concentrations in #/g were calculated as follows:

(1) \( N_p = \frac{(Ne \times np)}{ne} \)

\( N_p \): Total number of the palynomorphs
\( Ne \): Known number of \( L. \ clavatum \) spores
\( np \): Number of palynomorphs counted
\( ne \): Number of \( L. \ clavatum \) spores counted

(2) Palynomorph concentrations (#/g) = \( N_p/dry \) sediment weight (g)

The fluxes were calculated as follows:

(1) \( N_p/volume \) (cm\(^3\)) = Dinocyst concentrations (#/cm\(^3\))
(2) Flux (#/cm\(^2\)/yr) = Sedimentation rate (cm/yr) \times Concentration (#/cm\(^3\))

Reconstructions of sea-surface conditions were obtained based on the modern analog technique (MAT; [2]) applied to the dinocyst relative abundances according to Ref. [7]. The MAT approach consists of identifying the 5 best analogs from the dinocyst spectra (relative abundance of each taxa) of the surface sediment data set (modern assemblages) that includes 1776 sites [7,8]. The sea-surface condition values represent the average of the 5 selected analogs weighted inversely to the distance. The maximum and minimum are determined based on the minimum and maximum values from the set of analogs.

Acknowledgements

This study is a contribution to the Canada-Germany ArcTrain program. As stated in Ref. [1], this study was supported by the Fonds Québécois de la Recherche sur la Nature et les Technologies (FQRNT), the Natural Sciences and Engineering Research Council of Canada (NSERC), and the Academy of Sciences, Humanities and Literature Mainz through the Akademien programm. The laboratory analyses have been possible thanks to the GEOTOP facilities. The sediment samples from cores PS2863/1-2 and were made available through the ARK-XIII/2 expedition of the RV Polarstern and through the MSM05/5b expedition of the RV Maria S. Merian for core MSM5/5-712-2. A \(^{14}\)C age was made by the NOSAMS facility at the Woods Hole Oceanographic Institution with National Science Foundation sponsorship (OCE-1239667). Special thanks are due to Maryse Henry and Sophie Bonnet for the palynological analysis of the first 315 cm of the MSM5/5-712-2 core. We thank Simon Van Bellen for his help in developing the age models from the Bacon software.

Transparency document

Transparency document associated with this article can be found in the online version at https://doi.org/10.1016/j.dib.2019.103899.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.dib.2019.103899.
References

[1] J. Falardeau, A. de Vernal, R.F. Spielhagen, Paleoceanography of northeastern Fram Strait since the last glacial maximum: palynological evidence of large amplitude changes, Quat. Sci. Rev. 195 (2018) 133–152.

[2] J. Guiot, Methodology of the last climatic cycle reconstruction in France from pollen data, Palaeogeogr. Palaeoclimatol. Palaeoecol. 80 (1990) 49–69.

[3] J. Falardeau, Paléocéanographie du nord-est du Détroit de Fram depuis le dernier maximum glaciaire, Université du Québec à Montréal (2017), 110 pages.

[4] G. Budéus, Short Cruise Report RV Maria S. Merian Cruise MSM05/5, University of Hamburg, Institute of Oceanography, 2007. https://www.ldf.uni-hamburg.de/merian/wochenberichte/wochenberichte-merian/msm05/msm05-5-scr.pdf.

[5] R. Stein, K. Fahl, Scientific cruise report of the Arctic expedition ARK-XIII/2 of RV "Polarstern" in 1997 = Wissenschaftlicher Fahrtbericht über die Arktis-Expedition ARK-XIII/2 von 1997 mit FS "Polarstern", in: Berichte zur Polarforschung (Reports on Polar Research), vol. 255, 1997.

[6] J. Matthews, The assessment of a method for the determination of absolute pollen frequencies, New Phytol. 68 (1969) 161–166.

[7] A. de Vernal, C. Hillaire-Marcel, A. Rochon, B. Fréchette, M. Henry, S. Solignac, S. Bonnet, Dinocyst-based reconstructions of sea ice cover concentration during the Holocene in the Arctic Ocean, the northern North Atlantic Ocean and its adjacent seas, Quat. Sci. Rev. 79 (2013) 111–121.

[8] E. Allan, A. de Vernal, Knudsen, C. Hillaire-Marcel, M. Moros, S. Ribeiro, M.-M. Ouellet-Bernier, M.-S. Seidenkrantz, Sea-surface instabilities in the Disko Bugt area, west Greenland, in phase with δ18O-oscillations at Camp Century reveals climatic change during the late Holocene, Paleoceanography Paleoclimatol. 33 (2018) 227–243.