

**Subject: Determination of the photosynthetic responses and acclimation of sea ice algae to changes in light climate, especially as governed by snow thickness**

Actual field dates: 11 April – 23 May 2015  
 Field site: Station Nord  
 Number of man-days in the field: B. Sorrell (22),  
 D. A. Jensen (22), Kasper Hancke (21)

**Summary:**

Sea-ice cores were collected for biological analyses and light and temperature gradients through the snow quantified at a series of stations mainly along Transect 1 in the aerial map below, extending into the multi-year ice. At Station 1C a permanent monitoring site was established which allowed a time series to be followed, and here a permanent light monitoring station (incident radiation, albedo and transmission through snow and ice) and thermistor chain established. Samples have been collected for algal biomass, species composition, and nutrients from both sea ice and seawater. We have also collected seawater samples for analysis of chromophoric dissolved organic matter, particularly for identifying contribution of run-off from land, as there appears to be a major input of glacial water under the ice. The site as a whole was characterized by first-year ice of ca. 1 – 1.4 m thickness and multi-year ice typically > 2 m and up to 3 m thickness. Snow cover was very heavy at the site (1 – 1.5 m thick), requiring considerable effort to remove during sampling, and the weight of which caused extensive flooding of negative freeboard seawater in sampling holes during field work (see photos below). The effect of such deep snow on the degree and nature of light attenuation, and its extreme insulation of the sea ice from atmospheric temperatures, are key features of this site and have formed a major focus of our work.

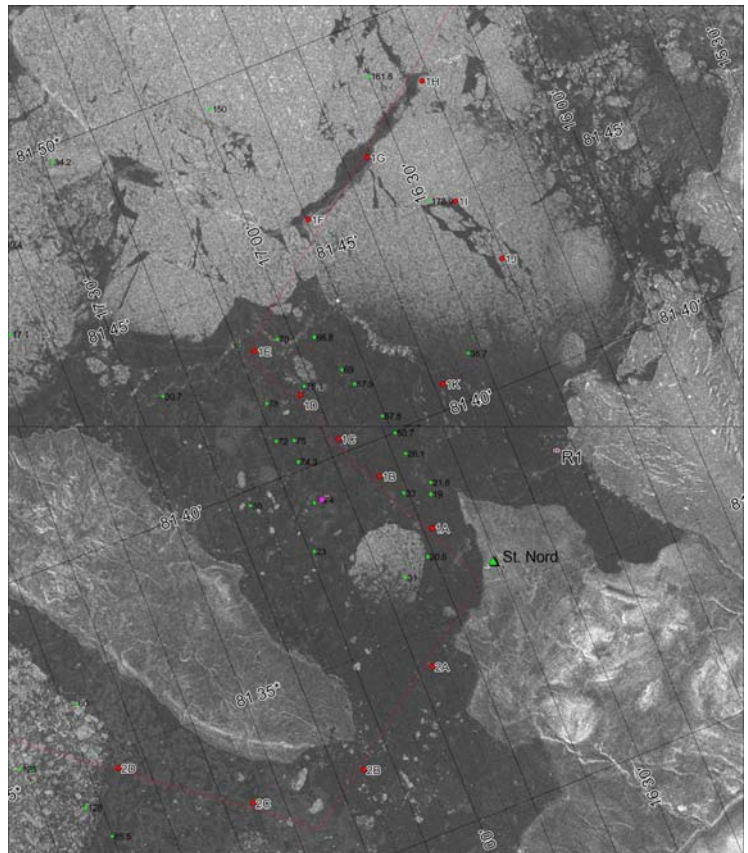


Figure 1



Figure 2

**Photos:**

Fig.1: Map of sea ice adjacent to Station Nord. Ice coring for sea ice algal studies was mainly along

transect 1, with the main time series site located on first-year ice at 1C. Sampling continued past 1E into the multi-year ice visible at ca. 81° 45'. Credit: Niels Nørgaard

Fig. 2: Drilling and coring sea ice under > 1 m snow cover. Credit: Ditte Arp Jensen

Fig. 3: Sea ice under 1.5 m snow at main station 1C immediately after coring. The hole is filling with 20-30 cm depth negative freeboard seawater due to the pressure of the snow cover. The ice is first year ice of ca. 1.3 m thick. Credit: Brian Sorrell

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**Participants:**

Brian Sorrell, Ditte Arp Jensen, Kasper Hancke, Lars Chresten Lund-Hansen (PI, not in field).

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Figure 3