

APPENDIX 1: SUPPLEMENTARY METHODS

Methods: supplementary text

Towable video sled operation

At each site, camera drops were deployed at stations along a series of transects. Two to three stations were randomly selected along each transect line to sample depth gradients. Before every deployment, drift tests were conducted to assess the angle and speed at which the ship would drift, and stations were adjusted accordingly. Once at a station, the winch operator lowered the sled until the change in cable tension indicated that contact had been made with the seafloor. The sled was then raised slightly to minimize seabed disturbance and to approximately 1 m both when transiting and if the bottom was contacted. Where possible, the sled remained stationary on the seafloor long enough to record a stable image (e.g., low sediment turbidity, no movement), and this constituted a *drop*. At each station, the vessel drifted along the transect line as 5–10 drops were captured at each station, and video continued to be recorded between drops. After 5–10 drops, the vessel moved to the next station on the transect line, where the procedure was repeated. The ship's location and the depth of the seafloor were logged at the start and end of each transect and at each drop.

Perspective grid

Scaling lasers were not available with the sled camera system. To overcome this limitation, a perspective grid template was constructed during *in situ* experimental test trials. Perspective grids make it possible to compensate for the camera being at different distances from the seafloor when capturing the drop camera image. The perspective grid template was constructed by drawing horizontal lines at 5 cm increments and meridians at 6 cm increments. The perspective grid was overlaid on all images to select a “usable field of view,” which became the standardized quadrats from which substrate, flora, and fauna were quantified (described in the next section).

Multivariate analysis

Multivariate analyses were conducted using PRIMER 7 to investigate species assemblage patterns within and between sites and with substrate complexity. A square root transformation was applied to the quadrat abundance data to reduce the influence of zeros and rare species (Clarke et al. 2014). A resemblance analysis was conducted using S17 Bray Curtis similarity as the resemblance measure. This analysis compares every pair of samples in the dataset. In the case of two samples with zero species or a low number of individuals, the similarity would be generated as 0 or undefined. Due to the large number of samples in this situation, we opted for adding a “dummy species” (artificial species) to the matrix. This procedure allows two samples with no real content to become 100% similar by sharing the single dummy species;

therefore, two samples containing a single real individual will have some similarity (Clarke et al. 2014). The nMDS and PERMANOVA processes are explained fully in the body of the manuscript.

Methods: supplementary figure

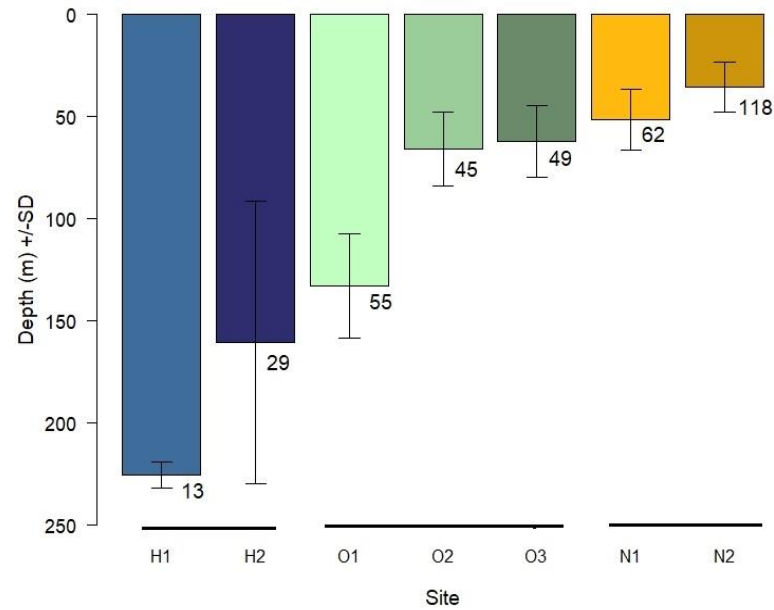


Figure A1.1. The average depth of quadrats in each of the three locations surveyed. Error bars show the standard deviation of the mean depth across quadrats. From left: Hebron (H1 outer, H2 inner), Okak (O1 outer north, O2 inner, O3 outer south) and Nain (N1, N2). Note that N2 is the site within the polynya. The number of analyzed quadrats at each site is printed to the right of error bars.

Methods: supplementary table

Table A1.1 illustrates the number of transects, waypoints and drops that were entered into the ship log and the number that were analyzed, with totals for each transect included. Drops at each waypoint are presented in a single row but are presented in chronological order and are identified by bullets. The square brackets indicate the discrete drop numbers that make up the total drops at each waypoint. Some drops were excluded from the ship log before comparison with the video log if the camera was noted to be off the bottom or otherwise compromised.

| Site | Transect | Waypoints (#) | Drops at each waypoint: # included in ship log [discrete drop #] | Drops at each waypoint: # analyzed from video [discrete drop #] [†] | Difference in drops at each waypoint (# analyzed from video - # included in ship log) [§] |
|--------|----------|---------------|--|--|--|
| Hebron | T1 | No data | No data | No data | No data |
| Hebron | T2 | 3 | 7 [1-7] 11 [1-11] 6 [1-6] | 7 [1-7] 6 [1-6] 0 | 0 5 6 |
| Hebron | T3 | 5 | 2 [1-2] 1 [1] 5 [1-5] 6 [1-6] 7 [1-7] | 2 [1-2] 1 [1-2] 3 [1-3] 8 [1-8] 2 [5-6] | 0 0 2 +2 5 |
| Hebron | T4 | 3 | 5 [1-5] 5 [1-5] 5 [1-5] | 5 [1-5] 3 [1-3] 5 [1-5] | 0 2 0 |
| Okak | T1 | 4 | 7 [1-7] 6 [1-6] 6 [1-6] 9 [1-9] | 8 [1-8] 10 [1-10] 9 [1-9] 8 [1-8] | +1 +4 +3 1 |
| Okak | T2 | 3 | 6 [2-7] 6 [1-6] 7 [1-7] | 7 [1-7] 13 [1-16] 0 | +1 +7 7 |
| Okak | T3 | 3 | 8 [1-8] 6 [1-6] 6 [1-6] | 8 [1-8] 6 [1-6] 7 [1-7] | 0 0 +1 |
| Okak | T4 | 4 | 7 [1-7] 8 [1-8] 5 [1-5] | 7 [1-7] 5 [1-5] 5 [1-5] | 0 3 0 |

| | | | | | |
|------|-----|---|---|---|-----------------------|
| | | | 7 [1-7] | 7 [1-7] | 0 |
| Okak | T5 | 3 | 7 [1-7] 7 [1-7] 4 [1-4] | 7 [1-7] 5 [1-5] 4 [1-4] | 0 2 0 |
| Okak | T6 | 3 | 6 [1-6] 6 [1-6] 7 [1-7] | 4 [1, 3-5] 6 [1-6] 7 [1-7] | 2 0 0 |
| Nain | T1 | 4 | 5 [1-5] 5 [1-5] 5 [1-5] 5 [1-5] | 5 [1-5] 5 [1-5] 5 [1-5] 5 [1-5] | 0 0 0 0 |
| Nain | T2 | 4 | 8 [1-8] 5 [1-5] 5[1-3, 5-6] 5 [1-5] | 8 [1-8] 4 [1-4] 6 [5-10] 5 [1-5] | 0 1 +1 0 |
| Nain | T3 | 4 | 6 [1-6] 5 [1-5] 5 [1-5] 9 [1-9] | 5 [1-5] 6 [1-6] 4 [1-4] 4 [1-4] | 1 +1 1 5 |
| Nain | T4 | 4 | 5 [1-5] 6 [1-6] 8 [1-8] 7 [1-7] | 5 [1-5] 6 [1-6] 8 [1-8] 8 [1-8] | 0 0 0 +1 |
| Nain | T5 | 5 | 6 [1-6] 8 [1-8] 11 [1-11] 8 [1-8] 6 [1-6] | 6 [1-6] 8 [1-8] 8 [1-8] 8 [1-8] 6 [1-6] | 0 0 3 0 0 |
| Nain | T6 | 5 | 5 [1-5] 5 [1-5] 5 [1-5] 6 [1-6] 8 [1-8] | 5 [1-5] 5 [1-5] 4 [1-4] 6 [1-6] 8 [1-8] | 0 0 1 0 0 |
| Nain | T7‡ | 4 | 6 [1-6] 7 [1-7] 8 [1-8] 10 [1-10] | 6 [1-6] 2 [1-2] 4 [1-2, 4-5] 15 [1-15] | 0 5 4 +5 |

† This is the number of drops included in the analyses here.

‡ This transect was within the rattle (polynya).

§ The drops that were recorded in the ship log but not in the video analysis were drops where the imagery was blurry, compromised with suspended sediment, or otherwise did not have a visible field of view — these are denoted by the negative number in the last column. On some transects, extra drops not recorded in the ship log were analyzed if there were clear fields of view — these are denoted by the positive number in the last column.