**Table S2.** Physical, chemical and biological environmental variables in first year sea ice core bottom ice sections collected from McDougall North (MC), Barrow Strait (BS), McDougall South (MS), Wellington Channel (WC) and Resolute Passage (RP), Canadian Archipelago, in 2010 and 2011. All values are mean ± standard error (S.E.) except MS11 where both values are given. Number of samples (n) is given underneath location name.

|  |  |  |
| --- | --- | --- |
|  | **Sea ice 2010** | **Sea ice 2011** |
| **region** | **MS10** | **BS10** | **RP10** | **MN11** | **MS11** | **BS11** | **RP11** | **WC11** |
| **n =**  | 4 | 3 | 6 | 3 | 2 | 6 | 5 | 7 |
| Ice thickness (cm) | 151.3 ± 5.0 | 104.0 ± 16.2 | 143.4 ± 2.4 | 119.7 ± 14.1 | 108 – 113 | 130.76 ± 4.8 | 144.3 ± 11.7 | 139.1 ± 5.0 |
| Salinity | 12.8 ± 0.8 | 13.6 ±2.3 | 9.9 ± 0.6 | 8.7 ± 1.5 | 10.1 – 11.3 | 12.9 ± 0.6 | 11.6 ± 0.9 | 12.12 ± 1.2 |
| Downwelling irradiance (µmol m-2 s-1) | 951 ± 47 | 931 ± 50 | 925 ± 84 | 779 ± 152 | 905 – 1046 | 1188 ± 115 | 773 ± 44 | 1103 ± 107 |
| snow thick (cm) | 7.5 ± 3.2 | 5.2 ± 0.4 | 14.4 ± 3.2 | 8.7 ± 4.1 | 6.1 – 8.6 | 6.8 ± 0.6 | 11.3 ± 3.0 | 7.6 ± 1.2 |
| **Dissolved nutrient concentrations** (mmol m-3) |
| NO3- | 7.65 ± 1.03 | 1.16 ± 0.51 | 5.33 ± 1.29 | 2.63 ± 0.11 | 3.7 – 11.6 | 16.5 ± 6.23 | 9.12 ± 2.13 | 24.2 ± 5.9 |
| PO43- | 10.5 ± 2.33 | 0.74 ± 0.14 | 6.32 ± 2.25 | 2.79 ± 0.52 | 6.7 – 15.1 | 8.73 ± 2.56 | 4.20 ± 1.29 | 7.07 ± 1.34 |
| Si(OH)4- | 9.74 ± 4.0 | 2.16 ± 0.36 | 4.24 ± 0.66 | 3.28 ± 0.77 | 6.6 – 12.0 | 4.53 ± 1.42 | 4.20 ± 1.49 |  6.66 ± 0.96 |
| **microbial cell densities** (x 103 cells mL-1) |
| total bacteria | 7898 ± 607 | 374 ± 39 | 5621 ± 1529 | 4964 ± 732 | 5999 – 7500 | 5247 ± 925 | 4329 ± 1378 | 6880 ± 545 |
| total protists | 263 ± 32.5 | 22.5 ± 12.2 | 270 ± 92.0 | 251 ± 72.4 | 437 – 636 | 269 ± 69.9 | 309 ± 143.6 | 335 ± 56.2 |
| picocyanobact | 0.480 ± 0.08 | 0.160 ± 0.07 | 0.456 ± 0.15 | 0.104 ±0.02 | 0.31 – 0.73  | 3.671 ± 2.460 | 2.377 ± 1.782 | 0.132 ± 0.055 |
| nanocyanobact | 0.974 ± 0.39 | 0.062 ± 0.05 | 0.688 ± 0.34 | 0.014 ± 0.007 | 0.06 – 0.14 | 4.371 ± 3.169 | 1.489 ± 1.160 | 0.019 ± 0.011 |
| picoeukaryotes | 75.7 ± 15.1 | 2.2 ± 0.92 | 139.1 ± 63.9 | 71.5 ±20.7 | 129 – 281 | 109.4 ± 32.9 | 198.2 ± 95.6 | 146.1 ± 23.5 |
| nanoeukaryotes | 186 ± 25.6 | 20.1 ± 11.3 | 130 ± 28.0 | 179 ± 52.1 | 307 – 354 | 151 ± 32.9 | 107 ± 46.5 | 189 ± 36.0 |