1. **Normalized fluxes of nutrients (Figures 1a-1l) across the six Arctic stations.** Mean values and standard errors are given. In parentheses you can see the p-value of analysis of variance across the six stations.

**Fig. 1a.** Flux of nitrites in control cores. Mean values and standard errors are given (p>0.05).

**Fig. 1b.** Flux of nitrites in cores with ice algae. Mean values and standard errors are given (p<0.01).

**Fig. 1c.** Flux of nitrites in cores with phytoplankton. Mean values and standard errors are given (p<0.001).

**Fig. 1d.** Flux of nitrates in control cores. Mean values and standard errors are given (p<0.001).

**Fig. 1e.** Flux of nitrates in cores with ice algae. Mean values and standard errors are given (p<0.001).

**Fig. 1f.** Flux of nitrates in cores with phytoplankton. Mean values and standard errors are given (p<0.001).

**Fig. 1g.** Flux of phosphates in control cores. Mean values and standard errors are given (p<0.01).

**Fig. 1h.** Flux of phosphates in cores with ice algae. Mean values and standard errors are given (p<0.01).

**Fig. 1i.** Flux of phosphates in cores with phytoplankton. Mean values and standard errors are given (p<0.001).

**Fig. 1j.** Flux of silicates in control cores. Mean values and standard errors are given (p<0.001).

**Fig. 1k.** Flux of silicates in cores with ice algae. Mean values and standard errors are given (p<0.001).

**Fig. 1l.** Flux of silicates in cores with phytoplankton. Mean values and standard errors are given (p<0.001).

1. **Normalized fluxes of dissolved inorganic carbon (Figures 2a-2b) across the six Arctic stations.** Mean values and standard errors are given. In parentheses, you can see the p-value of analysis of variance across the six stations.

**Fig. 2a.** Flux of dissolved inorganic carbon in cores with ice algae. Mean values and standard errors are given (p>0.05).

**Fig. 2b.** Flux of dissolved inorganic carbon in cores with phytoplankton. Mean values and standard errors are given (p<0.001).

1. **Fluxes of oxygen consumption (Figures 3a-3c) across the six Arctic stations.** Mean values and standard errors are given. In parentheses, you can see the p-value of analysis of variance across the six stations.

**Fig. 3a.** Flux of oxygen consumption in control cores. Mean values and standard errors are given (p>0.05) (Please mention that Station 407 is not included due to problematic data).

**Fig. 3b.** Flux of oxygen consumption in cores with ice algae. Mean values and standard errors are given (p>0.05) (Please mention that Stations 407 and 435 are not included due to problematic data).

**Fig. 3b.** Flux of oxygen consumption in cores with phytoplankton. Mean values and standard errors are given (p<0.01) (Please mention that Stations 407 and 435 are not included due to problematic data).

**Notes:**

1. The fluxes of nutrients have been normalized to the amount of organic matter added in sediment cores.
2. The fluxes of Dissolved Inorganic Carbon have been normalized to the amount of organic carbon added in sediment cores.

The factors used for the normalization of fluxes on nutrients and DIC can be seen in the Table below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Normalization factor  for nutrients | mg C/m2 | C:N ratio | mg N/m2 | Normalization factor  for carbon |
| St435\_IA | 1.0 | 425 | 7.43 | 57 | 1.0 |
| St435\_PP | 1.5 | 425 | 4.84 | 88 | 1.0 |
| St407\_IA | 1.4 | 600 | 7.43 | 81 | 1.4 |
| St407\_PP | 2.2 | 600 | 4.84 | 124 | 1.4 |
| St177\_IA | 1.3 | 545 | 7.43 | 73 | 1.3 |
| St177\_PP | 2.0 | 545 | 4.84 | 113 | 1.3 |
| St500\_IA | 1.4 | 600 | 7.43 | 81 | 1.4 |
| St500\_PP | 2.2 | 600 | 4.84 | 124 | 1.4 |
| St323\_IA | 1.4 | 600 | 7.43 | 81 | 1.4 |
| St323\_PP | 2.2 | 600 | 4.84 | 124 | 1.4 |
| St124\_IA | 3.5 | 1475 | 7.43 | 198 | 3.5 |
| St124\_PP | 5.4 | 1475 | 4.84 | 305 | 3.5 |

1. The fluxes of oxygen have been corrected for the addition of seawater after a the collection of a sample at a time point (such a correction has not taken place for the fluxes of nutrients / DIC).