**SUPPLEMENTARY INFORMATION  
  
Using under-ice hyperspectral transmittance to determine land-fast sea-ice algal biomass in Saroma-ko Lagoon, Hokkaido, Japan**

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| **Site** | **C1** | **C2** | **C3** | **C4** | **C5** |
| Snow depth (m) | 0.09 | 0.10 | 0.08 | 0.08 | 0.09 |
| Freeboard (m) | 0.03 | 0.01 | 0.03 | 0.03 | 0.03 |
| Ice thickness (m) | 0.50 | 0.46 | 0.45 | 0.47 | 0.51 |
| Chl. *a* (mg m-2) | 29.42 | 26.96 | 16.97 | 21.22 | 28.06 |
| Bottom 0.1 m Chl. *a* (mg m-3) | 250.36 | 229.32 | 144.76 | 180.65 | 220.66 |
| PAR Transmittance | 3.510-3 | 3.010-3 | 5.810-3 | 6.110-3 | 2.810-3 |
| Columnar-ice percentage (%) | 5.3 | 11.5 | 13.8 | 0 | 10.9 |

**Table S1** Snow depth, freeboard, ice thickness, and vertical integrated Chl. *a* at sites C1-C5.

A close up of a map

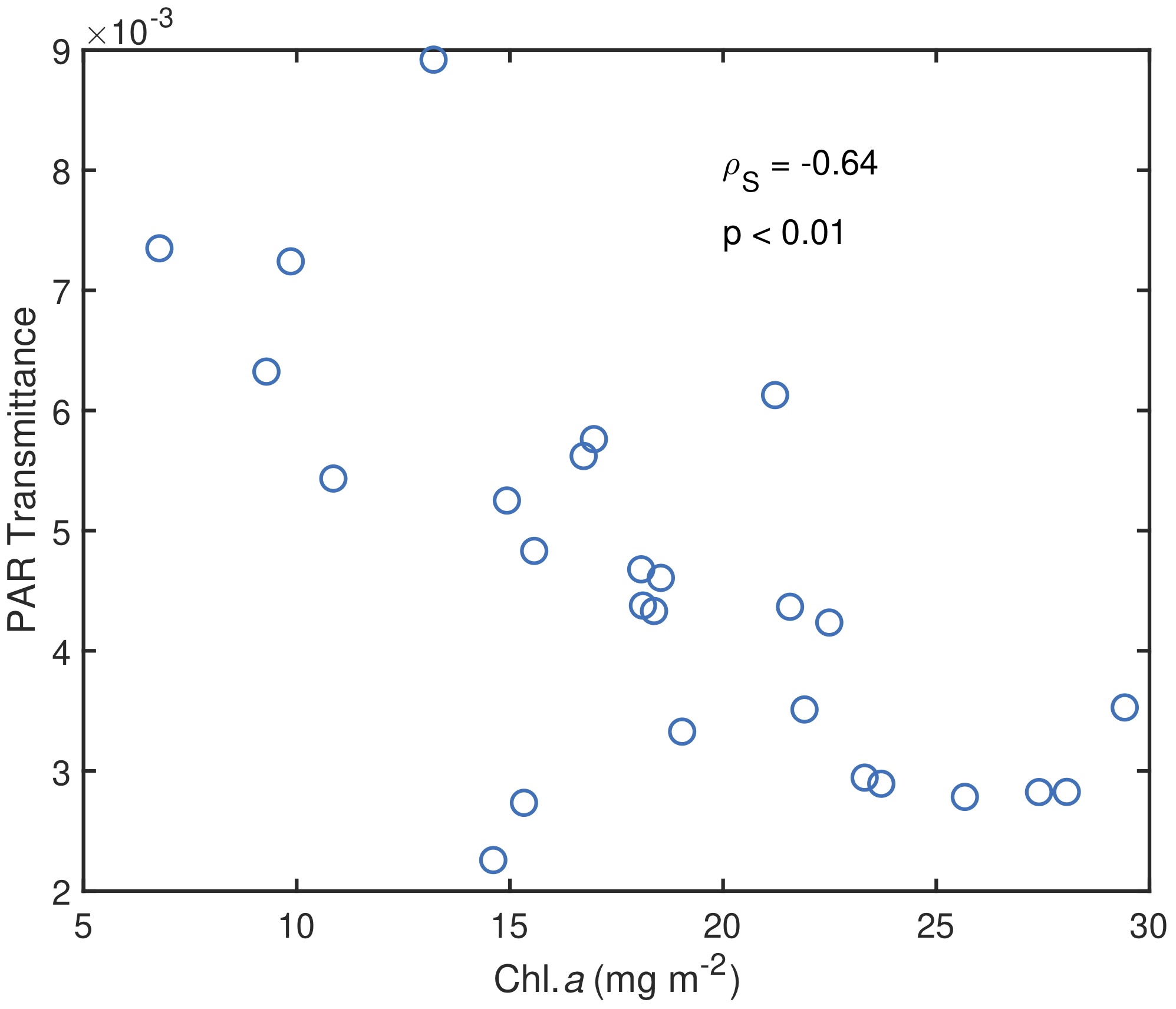
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**Fig. S1** **Short-term change of solar radiation and air temperature during the observation.** Temporal vertical dashed lines represent the sampling times for 27 stations. Vertical solid lines show the sampling times of the NDI-estimate survey.

A close up of a map

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**Fig. S2 The NDI analysis for under-ice irradiance.** (a) The coefficient of determination (R2) surface constructed from all possible wavelength pairs in . (b) An example (and the best pair) of the linear fit used to construct the NDI relationship for under ice irradiance and represented as a pink cross in (a).

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**Fig. S3 Spearman’s rank correlation coefficient of PAR Transmittance and Chl. *a*.** PAR Transmittance is defined as:

**A picture containing sitting, black, bunch, side

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**Fig. S4**. **Variability of sea-ice textures for selected sampling sites (C-sites).** Ice thicknesses and Chl. *a* concentration in the bottom 0.1 m of the sea-ice cores are indicated under each ice core in white and green, respectively. Granular and columnar texture are highlighted with filled and unfilled vertical white boxes. Vertical dashed brackets denote the bottom 0.1 m of the ice cores. Snow depth, freeboard, and vertical integrated Chl. *a* are shown in **Table S1**.