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Supplement of

Arctic Ocean CO₂ uptake: an improved multiyear estimate of the air–sea CO₂ flux incorporating chlorophyll *a* concentrations

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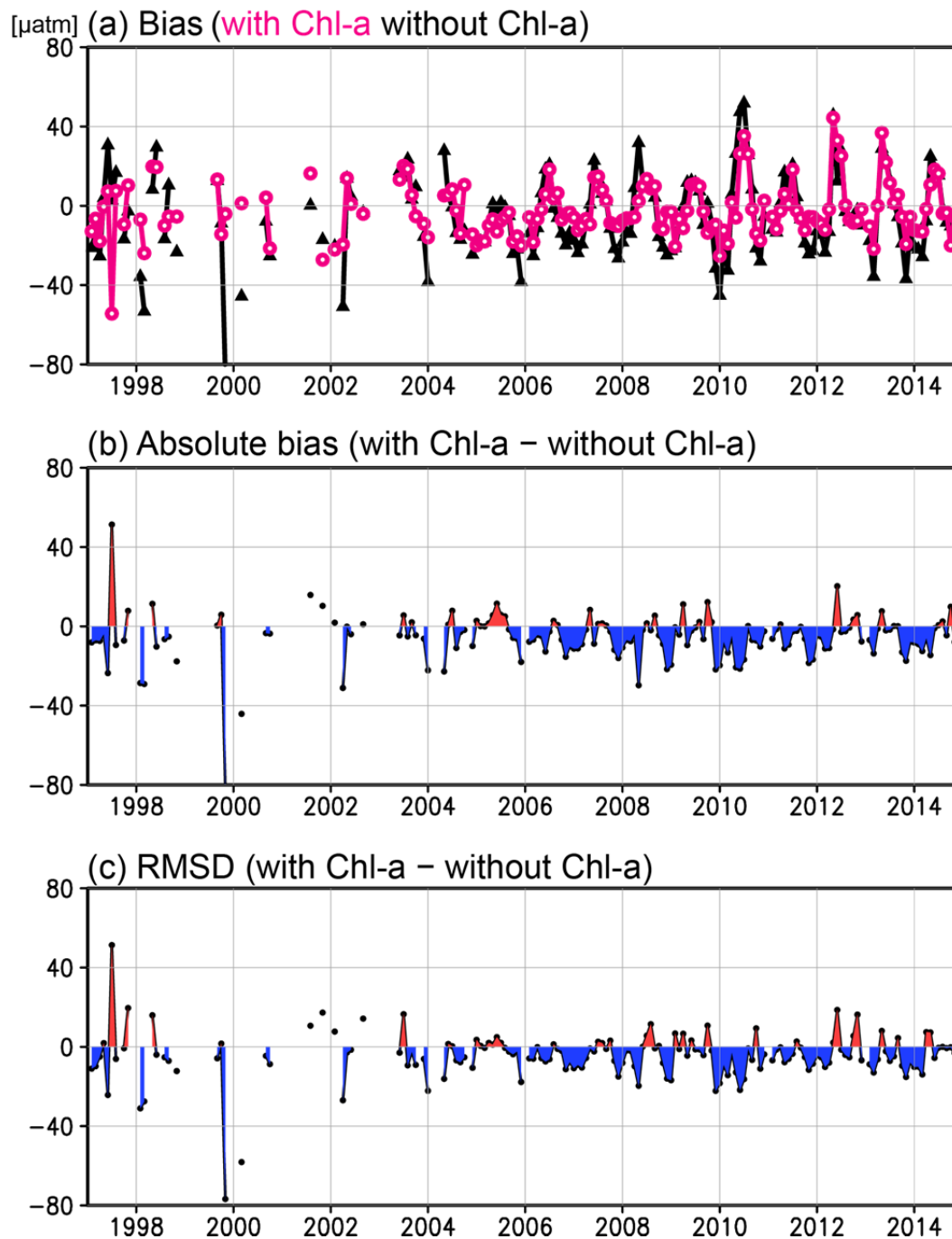


Figure S1: (a) $p\text{CO}_{2w}$ bias (estimate – observation) averaged over the entire analysis area [μatm], for the estimates with Chl-a (magenta) and without Chl-a (black). Difference in (b) absolute bias and (c) RMSD for $p\text{CO}_{2w}$ estimated with and without Chl-a averaged over the entire analysis area [μatm]. Negative value means improvement of the estimates in b and c.

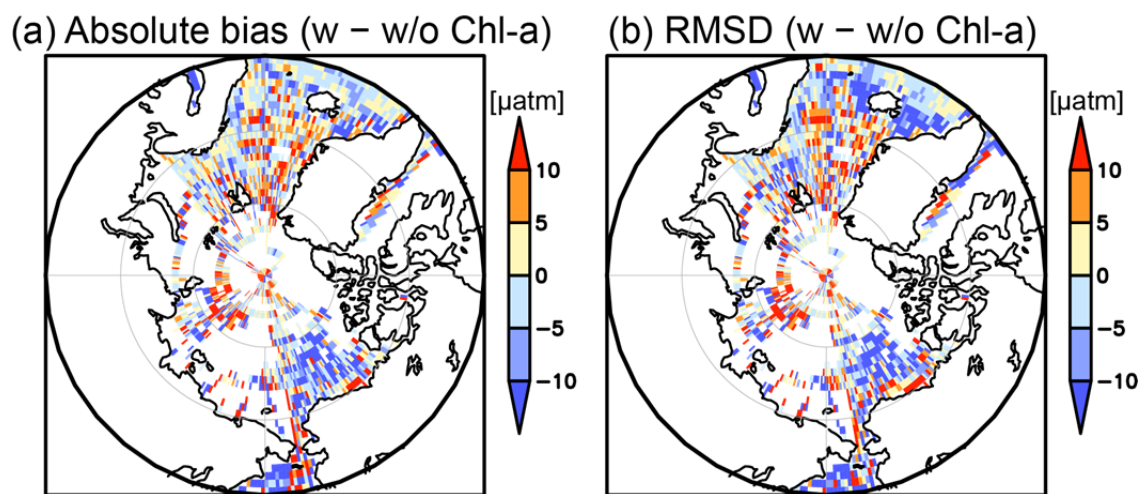


Figure S2: Difference in (a) absolute bias and (b) RMSD for $p\text{CO}_{2w}$ estimated with and without Chl-a averaged over the whole analysis period [μatm]. Negative value means improvement of the estimates.

$p\text{CO}_{2w}$ trend and the year of the first observation

To confirm that the spatial distribution of the $p\text{CO}_{2w}$ trend did not correspond to the year when the first observation was conducted, we examined the correspondence between $p\text{CO}_{2w}$ trend and the year when the first observation was made in each grid point (Figs. 12 and S3). Spatial distribution of $p\text{CO}_{2w}$ trend did not correspond to the year when the first observation was made. We also checked the $p\text{CO}_{2w}$ interannual variation and the year of observed in the several regions. Here we show them in 73–77°N 175°E–175°W, 73–77°N 160–150°W, and 73–77°N 135–125°W where the trend and the observed year are different separating only several degrees in longitude (Fig. S4). The $p\text{CO}_{2w}$ trends increase from west to east, while the observational data are from 2004 in the west, from 1999 in the middle, and from 2011 in the east. It shows again the amplitudes of trend do not correspond the year when the first observation was conducted.

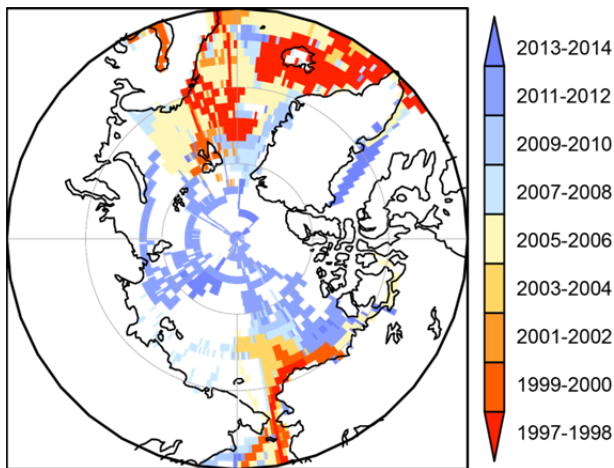


Figure S3: Year when the first observation was retained.

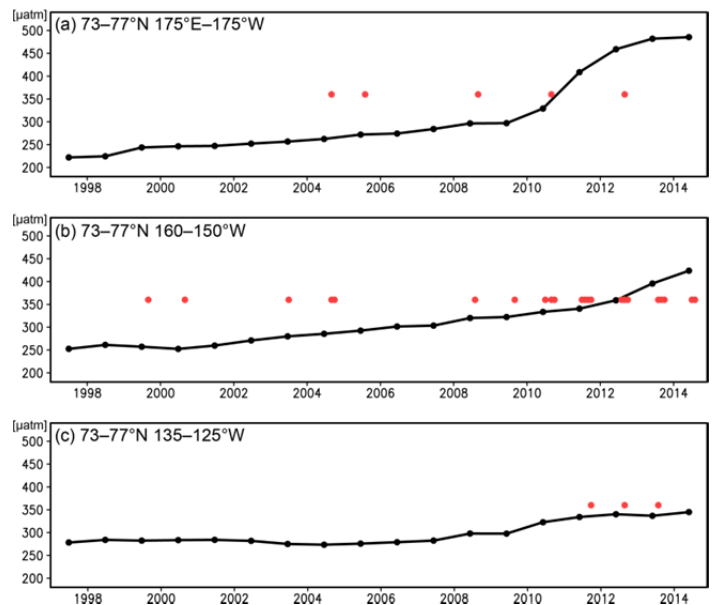


Figure S4: The $p\text{CO}_{2w}$ interannual variation (black line) and the year of observed (red dot) in (a) 73–77°N 175°E–175°W, (b) 73–77°N 160–150°W, and (c) 73–77°N 135–125°W.