Supporting Information for

Variation of Summer Oceanic pCO_2 and Carbon Sink in the Prydz Bay Using SOM Analysis Approach

Suqing Xu¹, Keyhong Park^{2*}, Yanmin Wang³, Liqi Chen^{1*}, Di Qi¹, Bingrui Li⁴

- 1. Key Laboratory of Global Change and Marine-Atmospheric Chemistry, Third Institute of Oceanography, Xiamen 361005, PR China.
- Division of Polar Ocean Sciences, Korea Polar Research Institute, Incheon 21990, South Korea.
- Haikou Marine Environment Monitoring Central Station, State Oceanic Administration, Haikou 570100, China.
- 4. Polar Research Institute of China, Shanghai 200136, China.

Corresponding author: Liqi Chen (chenliqi@tio.org.cn);

Keyhong Park (keyhongpark@kopri.re.kr)

Contents of this file

Figures S1 to S6

We used four datasets including SST, CHL, MLD, and SSS to train the SOM. We downloaded daily data from AVHRR ONLY sea surface temperature for SST of 1/40 spatial resolution (see Fig.S1) (https://www.ncdc.noaa.gov/oisst). CHL data was downloaded from MODIS-Aqua 8-D composite chlorophyll-a at a space resolution of 4km (http://oceancolor.gsfc.nasa.gov, see Fig. S2). SSS and MLD data were from the daily 1/12° global analysis and forecast product from the Copernicus Marine Environment Monitoring Service (CMEMS, http://marine.copernicus.eu/, see Fig. S3-4). Sea ice concentration is from the daily 3.125-km AMSR2 dataset (https://seaice.uni-bremen.de, see Fig. S5). Daily ASCAT wind speed data (http://www.remss.com/, see Fig.

S6) of 1/4 degree was downloaded to calculate the air-sea carbon flux. Daily datasets were first averaged to be 8-d field regarded as weekly for this study and re-gridded with a horizontal resolution of $0.1^{\circ} \cdot 0.1^{\circ}$ from 63°E to 83°E and 64°S to 70°S. From the beginning of February to the early of March we have four independent week series, which are week-1 (from 02/02/2015 to 02/09/2015), week-2 (from 02/10/2015 to 02/17/2015), week-3 (from 02/18/2015 to 02/25/2015), and week-4 (from 02/26/2015 to 03/05/2015).



Figure S1. Spatiotemporal distribution of 8-D averaged SST from Avhrr (resolution of **1**/4) for SOM-derived air-sea carbon flux estimates.



Figure S2. Spatiotemporal distribution of 8-D composite Chla from Modis (resolution of 4km) for SOM-derived pCO_2 estimates.



Figure S3. Spatiotemporal distribution of 8-D averaged Global Forecast SSS (1/12) for SOM_derived *p*CO₂ estimates.



Figure S4. Spatiotemporal distribution of 8-D averaged Global Forecast MLD(1/12) for SOM_derived *p*CO₂ estimates.



Figure S5. Spatiotemporal distribution of 8-D averaged AMSR2 sea ice concentration (3.125km) for SOM_derived *p*CO₂ estimates.



Figure S6. Spatiotemporal distribution of 8-D averaged Ascat wind speed (1/4) for SOM_derived *p*CO₂ estimates.