

# Carbon monoxide (CO) cycling in the Fram Strait, Arctic Ocean

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## SUPPLEMENTARY MATERIAL

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**Table S1**

Water mass characterization at the time of sampling in the study area (definitions after Marnela et al. (2016)).

Station	Depth [m]	Density [ $\theta$ , kg m <sup>-3</sup> ]	Salinity	Temperature [°C]	Water mass	Origin	Remarks
NT6A	5	24.12	30.04	1.36	wSW - Warm Surface Water	North Atlantic	Shelf break
Ice2	5	24.83	29.02	-1.05	PSW - Polar Surface Water	Arctic	Ice edge / Shelf break
D5	5	25.61	32.00	1.37	wSW - Warm Surface Water	North Atlantic	Shelf break / Sea ice melting
D7	5	27.22	34.78	5.68	wSW - Warm Surface Water	North Atlantic	Open ocean

## 15 S2 Methods

### S2.1 Ancillary measurements

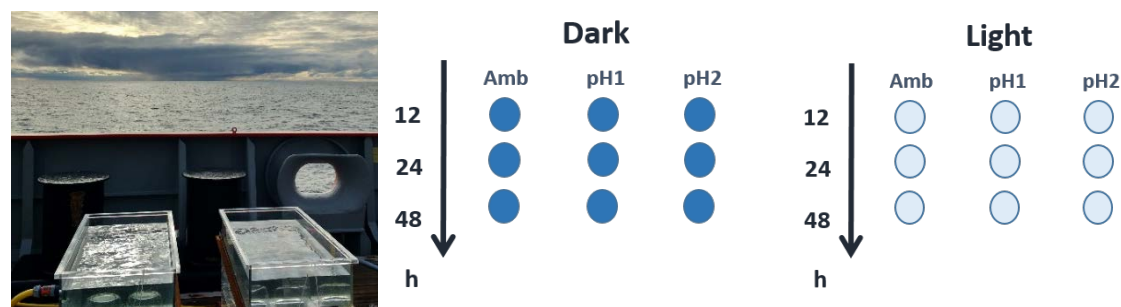
The spectral absorption coefficient of CDOM at 330 nm ( $a_{330}$ ) was determined for the seawater samples in 5 m from the CTD/rosette cast preceding the incubation experiments ( $= t_0$ ) and from the individual experimental units at each timepoint ( $t_{12}$ ,  $t_{24}$ ,  $t_{48}$ ) during the incubations. Each CDOM sample was filtered through a sterile, sample-washed 0.2  $\mu\text{m}$  membrane (GWSP, Millipore) into pre-combusted, sterile brown glass vials. CDOM absorption was measured according to the procedure as described in Lennartz et al. (2019) and the mean error of the method was 8%. We used purified MilliQ water as the reference. A Seabird SBE9plus sensor package (<https://www.bodc.ac.uk/data/documents/nodb/pdf/03plusbrochurejan07.pdf>) including an oxygen optode, a fluorescence sensor (Chl a) and a sensor for photosynthetic active radiation (PAR). All sensors were attached to the CTD/rosette. Vertical profiles recorded during lowering the CTD/rosette were considered here only.

25 Inorganic dissolved nutrients including nitrate were analysed using a Technicon segmented 4-channel flow colorimetric autoanalyser (Bran & Luebbe AAIII, SEAL Analytical). The analytical methods applied are described in Grasshoff et al. (1999). The detection limit was 2  $\text{nmol l}^{-1}$  during the cruise. The precision of the method was 8%, and of the colorimetric autoanalytical techniques was  $> 5\%$  (Woodward and Rees, 2001).

### S2.2 Note on statistical analysis

30 Simple regression test was chosen because multiple regression test had too low explanatory power due to the small number of experimental replicates.

## S3 Figures



35 **Fig. S3.1** Experimental set up of incubations. Left: The incubator tanks, which were, installed on-deck, supplied with natural seawater and made of natural sunlight-transmitting material, so that natural conditions of the surface ocean were mimicked. Middle/Right: Incubations were performed over a total of 48 hours in darkened and light tanks. Each dot represents one experimental unit referring to one treatment and sampling timepoint and was discarded after sampling (gases, CDOM, pH) was done. Samples were taken after 12, 24 and 48 hours. The pH in each experiment was manipulated to two lowered  $\text{pCO}_2$  (pH) levels

40 **pH1: 670 ppm and pH2: 936 ppm  $\text{CO}_2$**  in comparison to the ambient pH (amb) as a control.

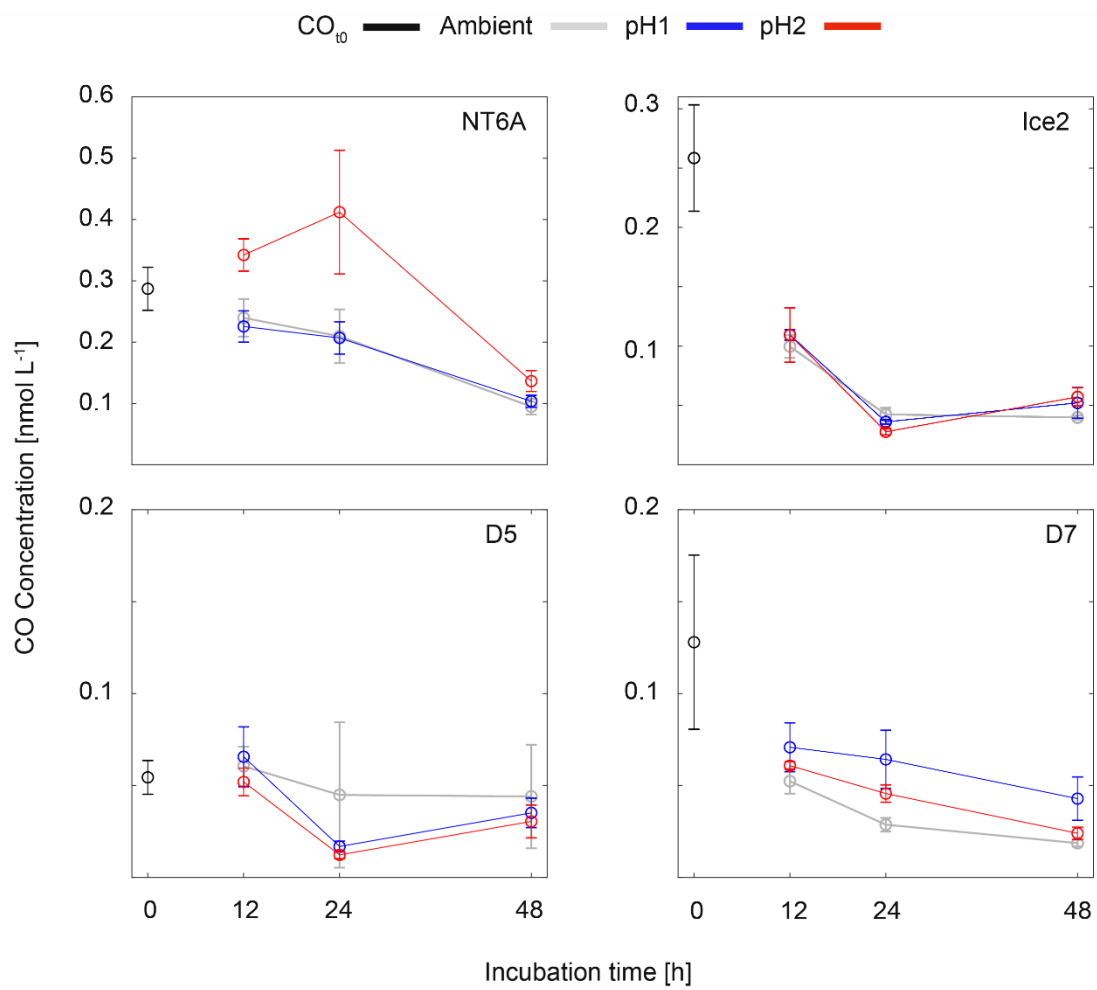
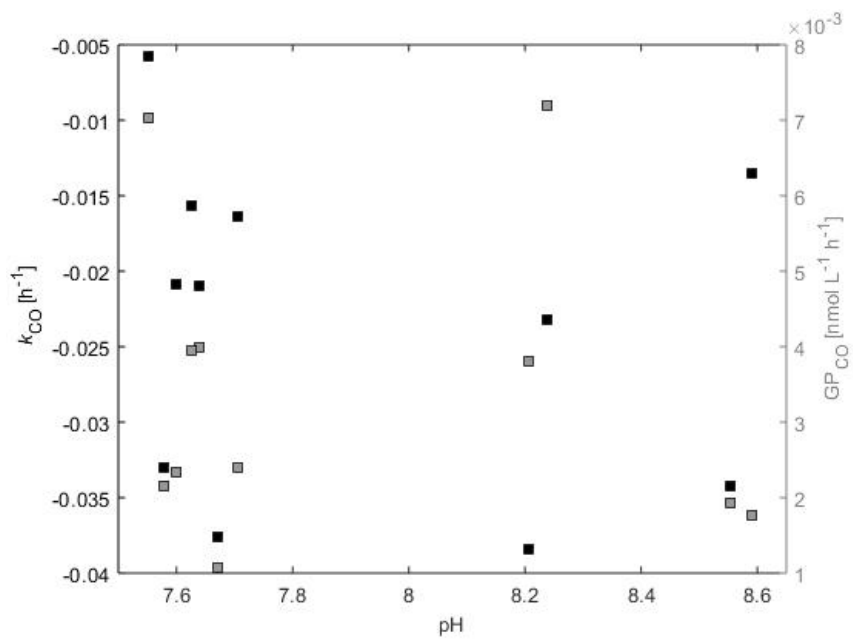
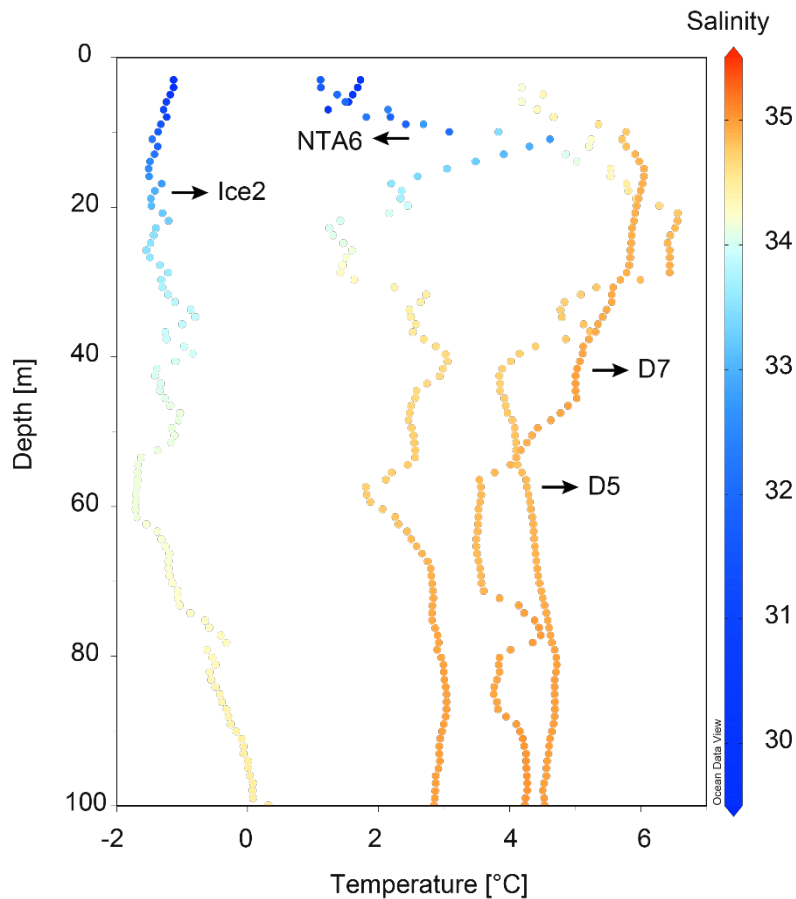


Fig. S3.2 Temporal development of CO concentrations during the dark incubations.  $CO_{t_0}$  represents the initial CO concentration for each experiment.



**Fig S3.3** pH vs.  $k_{CO}$  and  $GP_{CO}$ .



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**Fig. S3.4 Vertical profiles of temperature and salinity at each sampling station in which incubation experiments were conducted.**

### References

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