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

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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 [θ, kg m^{-3}]	Salinity	Temperature [°C]	Water mass	Origin	Remarks
NT6A	5	24.12	30.04	1.36	wSW - Warm Surface Water	N 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	N Atlantic	Shelf break / Sea ice melting
D7	5	27.22	34.78	5.68	wSW - Warm Surface Water	N Atlantic	Open ocean

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Table S2: Mean initial dissolved inorganic carbon (DIC), total alkalinity (TA) and pH at t_1 (= t_0 + 12h) for the various treatments. pH was determined spectrophotometrically on board. We used the TA from the temperature/salinity relationship of Lee et al. (2006) to calculate DIC.

Station	pH			TA [µmol L^{-1}]			DIC [µmol L^{-1}]		
	Ambient	pH1	pH2	Ambient	pH1	pH2	Ambient	pH1	pH2
NT6A	7.96	7.57	7.29	2317.77	1985.29	1865.94	2078.52	1919.09	1882.26
Ice2	7.90	7.46	7.24	2304.14	1913.66	1843.30	2049.64	1895.55	1887.82
D5	7.68	7.30	7.22	2302.46	1871.91	1852.94	1955.49	1882.90	1888.73
D7	7.75	7.85	7.53	2301.06	2108.34	2064.11	2037.41	2013.11	1968.46

S2 Methods

S2.1 Ancillary measurements

The spectral absorption coefficient of CDOM at 330 nm (a330) 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 µm 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.

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 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

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

S3 Figures

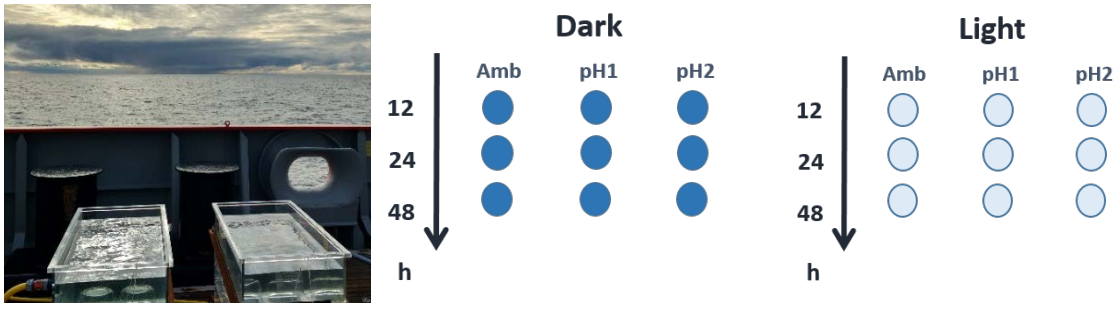

Fig. S3.1 Experimental set up of incubations. Left: The incubator tanks, which were, installed on-deck, supplied with natural seawater and made of natural sunlight-transmitting material, so that natural conditions of the surface ocean were mimicked. Middle/Right: Incubations were performed over a total 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 pCO_2 (pH) levels ph1: 670 ppm and pH2: 936 ppm CO_2 in comparison to the ambient pH (amb) as a control.

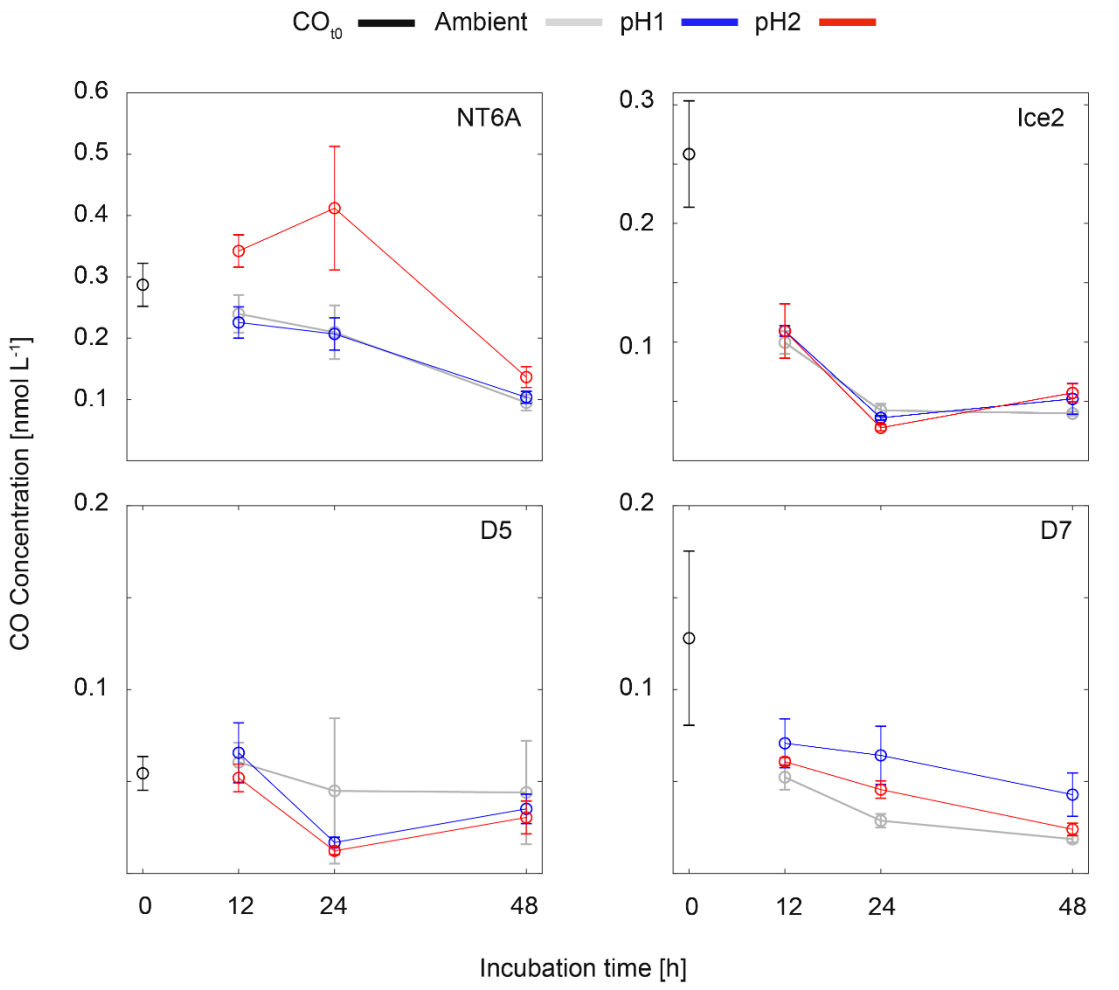

Fig. S3.2 Temporal development of CO concentrations during the dark incubations. CO_{t0} represents the initial CO concentration for each experiment.

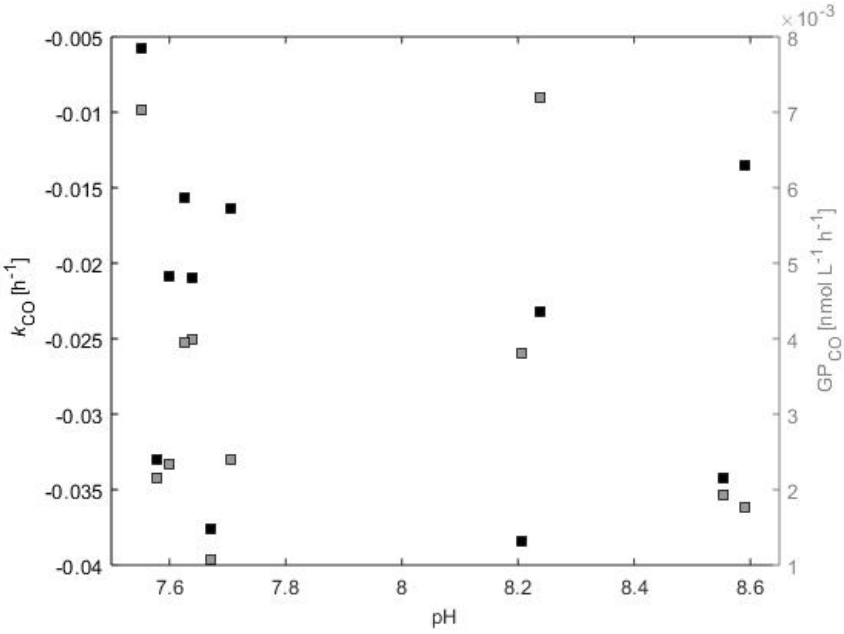

Fig S3.3 pH vs. k_{CO} and GP_{CO}.

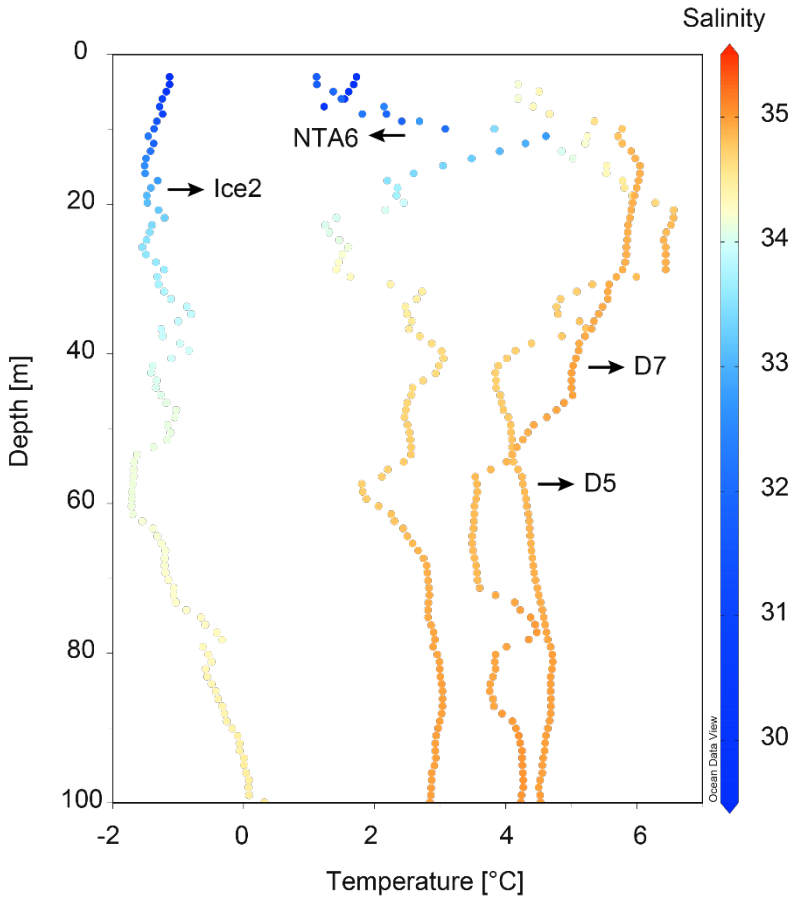

Fig. S3.4 Vertical profiles of temperature and salinity at each sampling station in which incubation experiments were conducted.

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