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The seasonal phases of an Arctic lagoon reveal the discontinuities of pH variability and CO_2 flux at the air–sea interface

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Table S1. Discrete measurements of O_2 and pH from data Sonde (YSI), and in situ salinity (RBR). Discrete bottle samples collected for nutrients and carbonate chemistry parameters with reported A_T, pH_T, and bottle salinity. The breakup season occurs mid- to late-June over two to three weeks when the lagoon transitions from ice cover to open water. Date and time column with * correspond to the values marked with *.

Season	Zone	Date (UTC)	O_2 (μmol L^{-1})	pH YSI (NBS)	Salinity: RBR Concerto
Open Water 2018	Surface	4-Aug-2018 --:--	359.49	7.9	5.99
	Bottom	4-Aug-2018 --:--	387.62	7.8	36.28
		17-Aug-2018 21:00*	—	—	8.51*
	Pore Water	7-Aug-2018 --:--	—	—	—
Ice Cover 2018 – 2019	Surface	26-Apr-2019 06:10	359.49	7.4	38.2
		26-Apr-2019 21:50*		—	—
	Bottom	26-Apr-2019 06:10	156.30	7.1	39.7
		21-Apr-2019 22:05*	—	—	39.1*
	Pore Water	26-Apr-2019 --:--	—		—
Break Up 2019	Surface	21-Jun-2019 --:--	415.75	7.7	4.4
	Bottom	21-Jun-2019 --:--	547.05	7.7	38.7
	Pore Water	20-Jun-2019 --:--	—	—	—
Open Water 2019	Surface	08-Aug-2019 ~20:30	303.22	7.8	25.9
	Bottom	08-Aug-2019 ~20:30	303.22	7.9	25.9
	Pore Water	09-Aug-2019 ~18:00	—	—	—

NH_4^+ (µg L^{-1})	PO_4^{3-} (µg L^{-1})	SiO_2 (µg L^{-1})	TA (µmol kg^{-1})	Salinity: bottle	pH: spec (Total scale)
0.8	—	—	—	—	—
2.1	41.8	—	—	—	—
—	—	—	Rep_1 1645.1* Rep_2 1645.2*	12.1* 12.0*	8.143* 8.002*
683.1	1409.5		—	—	—
—	—	—	—	—	—
21.5*	152.6*	729*	—	—	—
—	—	—	—	—	—
61.7*	123.1*	1307*	Rep_1 3160.6* Rep_2 3171.3*	39.1* 39.0*	7.519* 7.644*
3764.7	853.5	5343	—	—	—
3.2	21	194	—	—	—
9.0	133.3	8.0	Rep_1 3059.1 Rep_2 3073.1	32.3 32.3	—
646.1	338.7	437	—	—	—
8	9.5	187	—	—	—
10.7	14	214	—	—	—
8013	757.7	26430	—	—	—

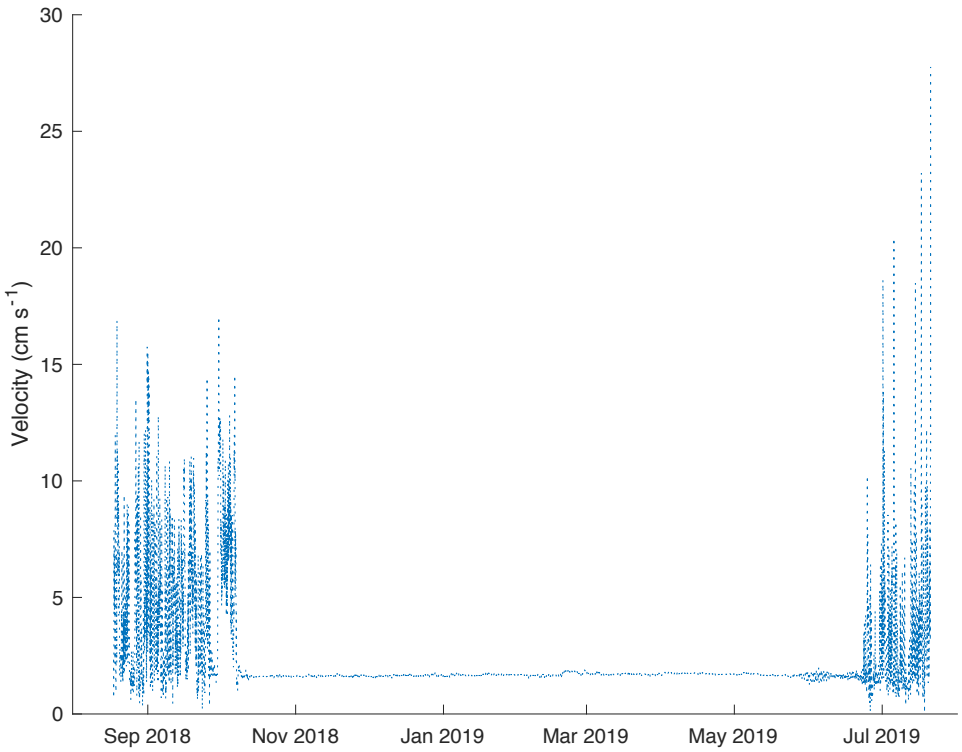
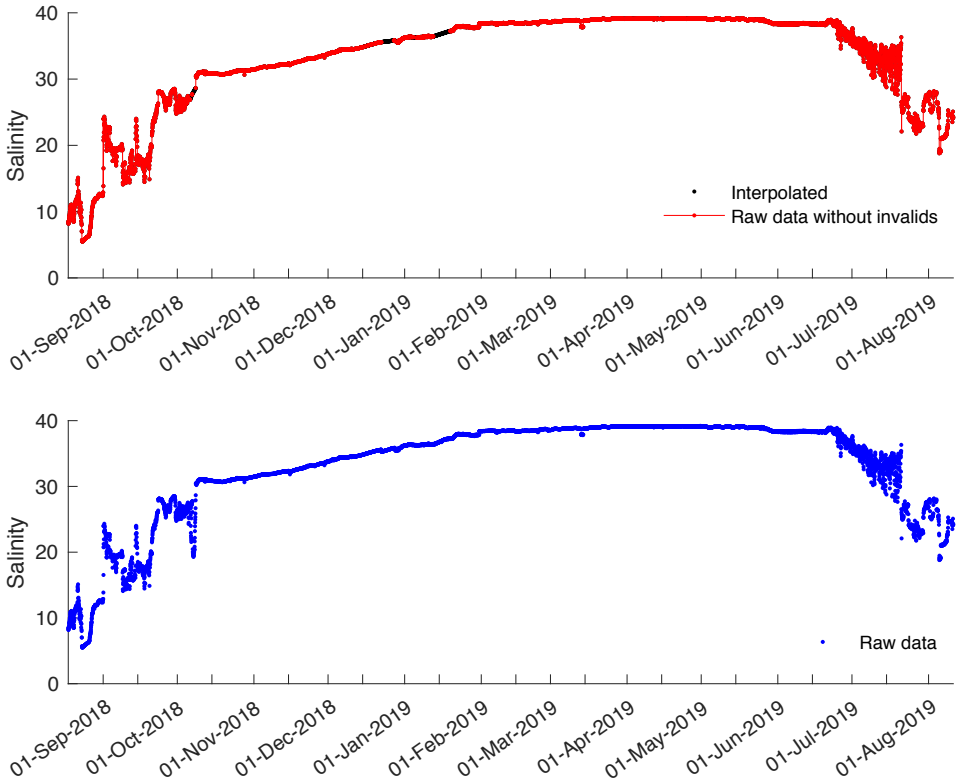


Figure S1. Times series of current speed in Kaktovik Lagoon for entire deployment period from 17 August 2018 to 11 August 2019.

a.



b.

Figure S2. Salinity times series with interpolated (black dots) data replacing removed invalid salinity measurements for entire deployment period from 17 August 2018 to 11 August 2019 (**a**). Raw salinity data for entire time series with invalid measurements (**b**).

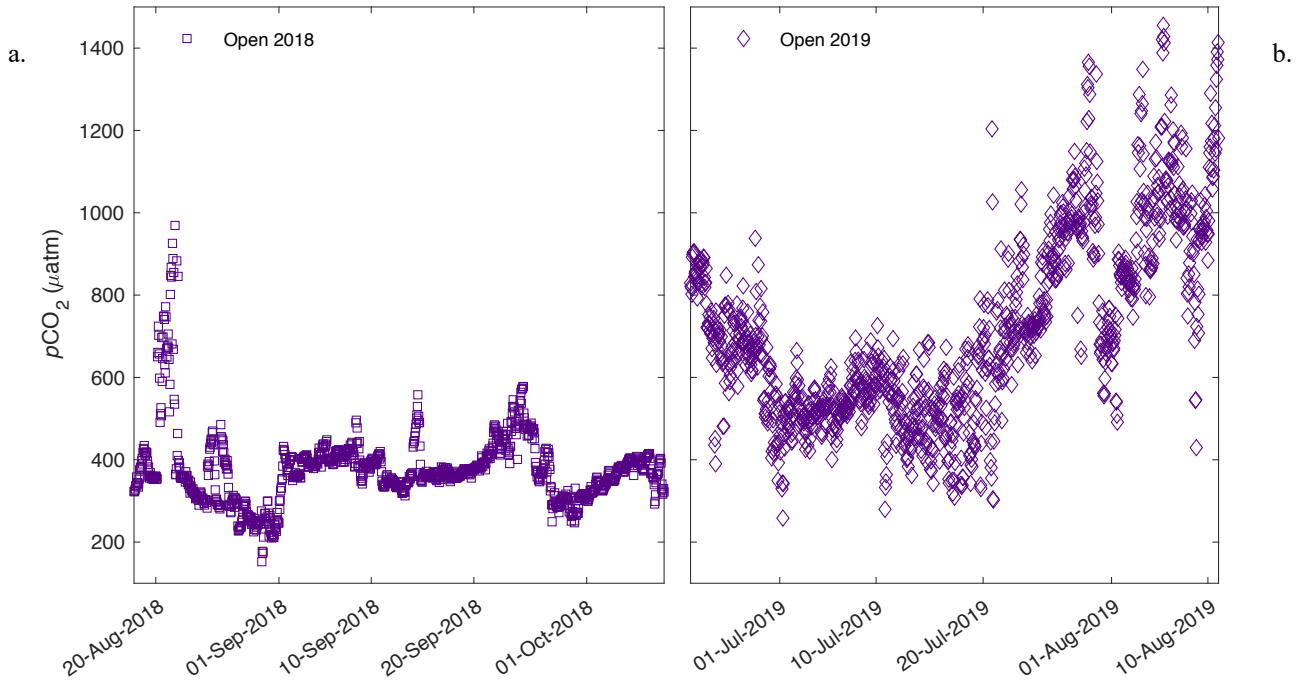


Figure S3. Estimated PCO_2 for open phase 2018 (**a**) and open phase 2019 (**b**).

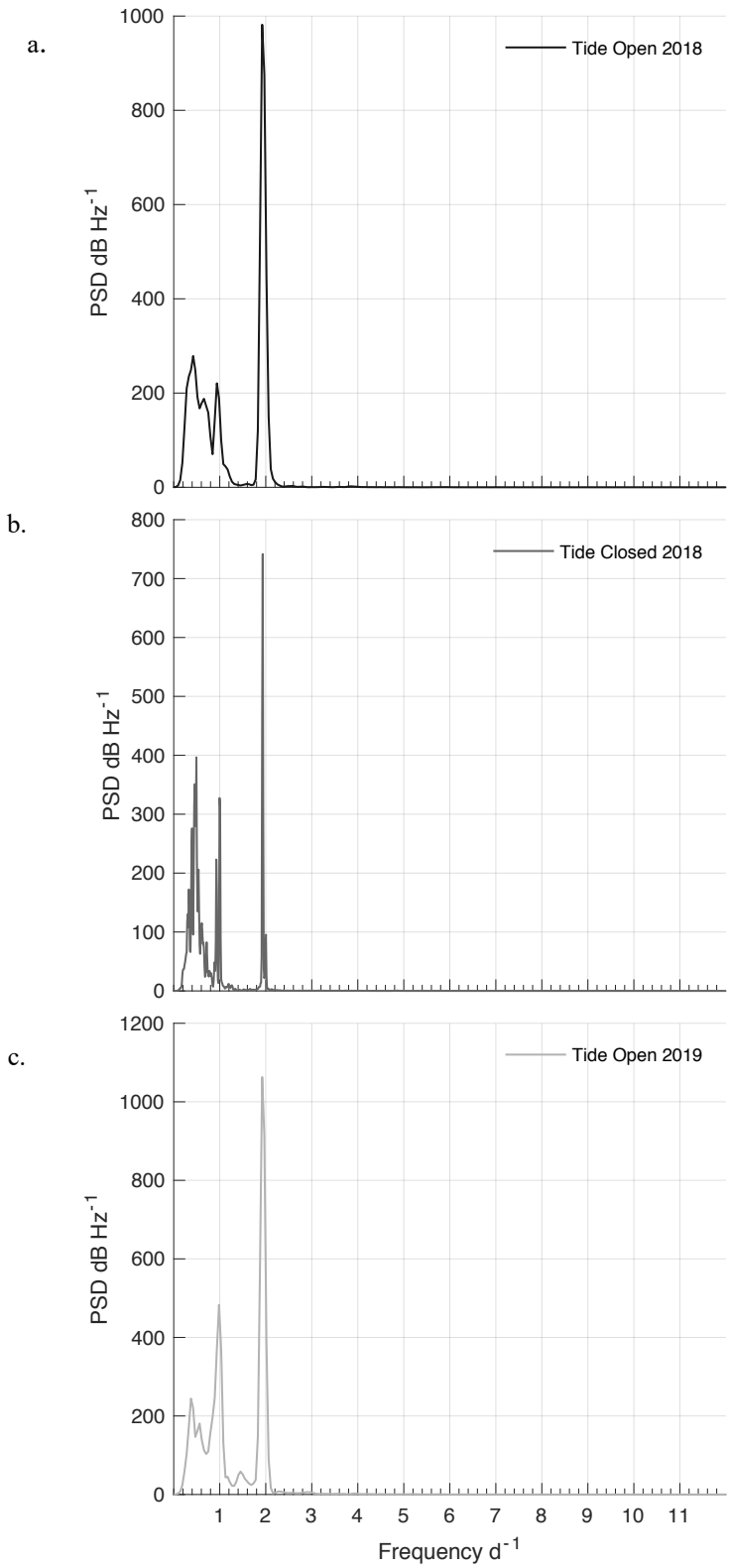


Figure S4. Power spectral density for tide during open phase 2018 (**a**), closed phase 2018 – 2019 (**b**), and open phase 2019 (**c**).

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