

Supporting Information for

Aerosol marine primary carbohydrates and atmospheric transformation in the Western Antarctic Peninsula

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Table SI1. Method detection limits for DFCHO, DCCHO and PCCHO in seawater, and DFCHO_{aer} and CCHO_{aer} for aerosol particles per stage calculated from instrument detection limits of High-Performance Anion-Exchange Chromatography coupled with Pulsed Amperometric Detection (HPAEC-PAD).

	Sample volume of air (m ³)	Volume of sample/extract (mL)	Volume of used sample/extract (mL)	Percentage of the filter/foil for sugar analysis (%)	Volume of extract in HPAEC vial (μL)	Method detection limit per monosaccharide ^a
Instrument						0.4-2 μg L ⁻¹
DFCHO		ca. 6 ^b			ca. 600 ^b	0.04-0.2 μg L ⁻¹
DCCHO		2			700	0.13-0.7 μg L ⁻¹
PCCHO		150 ^c		ca.10 ^b	700	0.02-0.09 μg L ⁻¹
DFCHO _{aer}	350 ^d	5	ca. 2 ^b	33	ca. 300 ^b	2.3-13 pg m ⁻³
CCHO _{aer}	350 ^d	5	2	33	300	2.3-13 pg m ⁻³

a) Detection limits vary depending on the monosaccharide analyzed, b) exact amounts were weighed, c) the volumes varied between 50 and 200 mL, d) the volumes of sampled air varied between 188 and 397 m³ during this campaign.

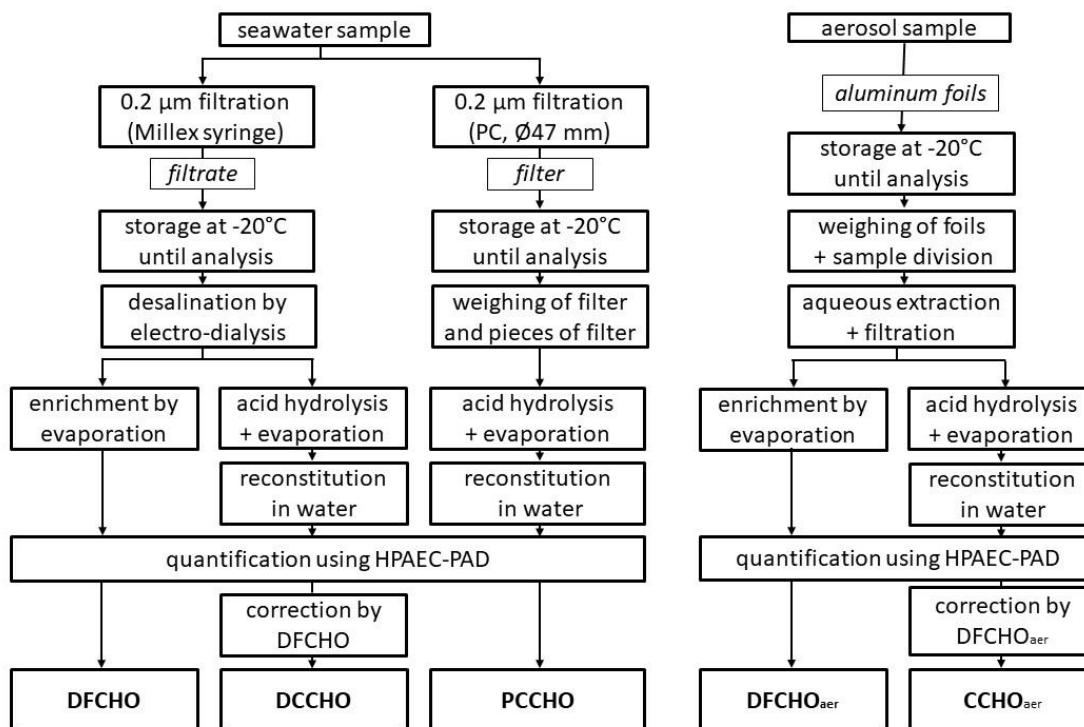


Figure SI1. Schematic overview of the workflow for the analysis of dissolved free carbohydrates in seawater (DFCHO), dissolved combined carbohydrates in seawater (DCCHO), particulate combined carbohydrates in seawater (PCCHO), free carbohydrates in aerosol particles (DFCHO_{aer}) and combined carbohydrates in aerosol particles (CCHO_{aer}). HPAEC-PAD = High-Performance Anion-Exchange Chromatography coupled with Pulsed Amperometric Detection, PC = polycarbonate.

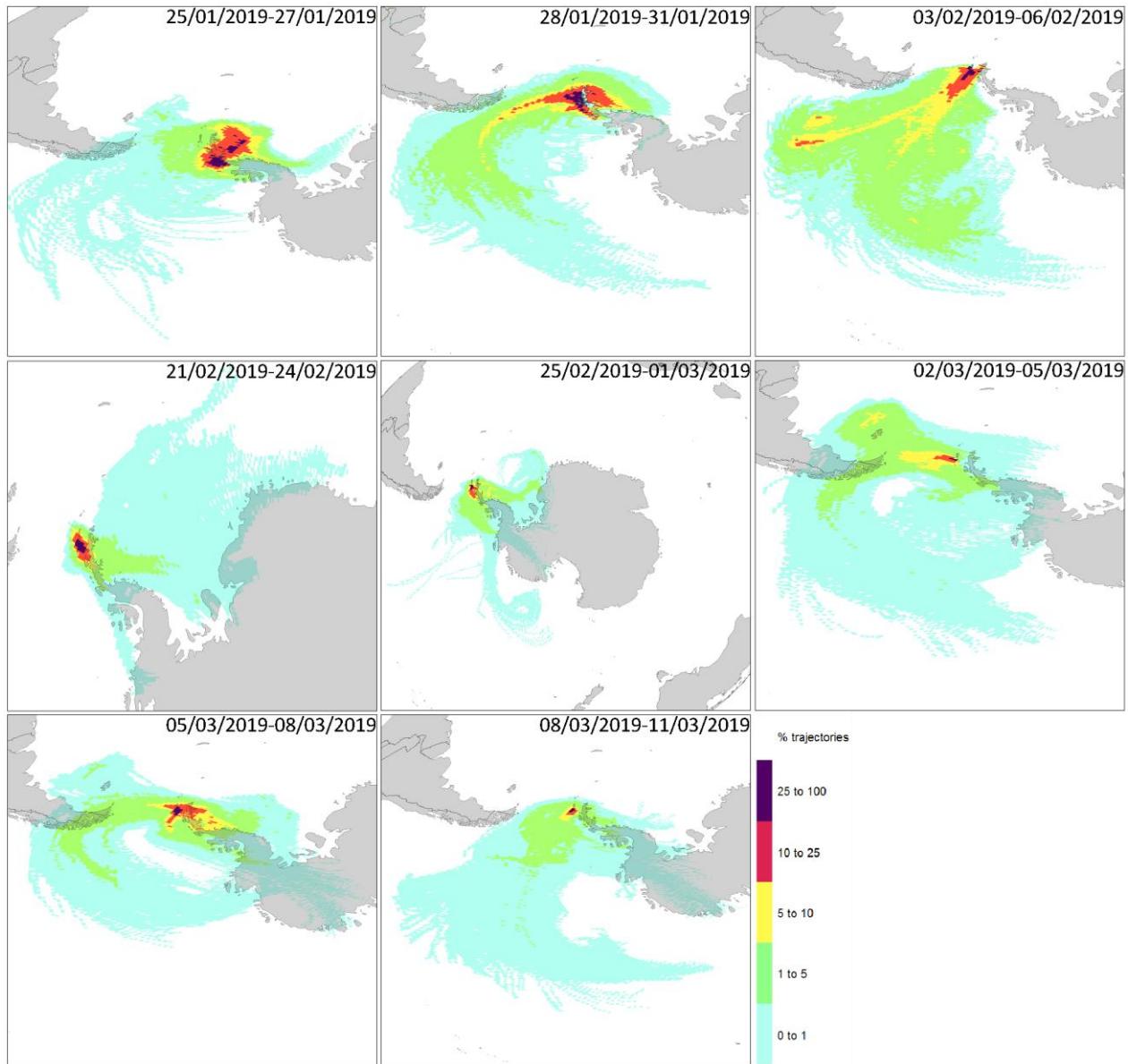


Figure SI2. Ensembles of 96 h-air back-trajectories calculated with the HYPLIT model on an hourly basis for the given sampling time of aerosol particles.

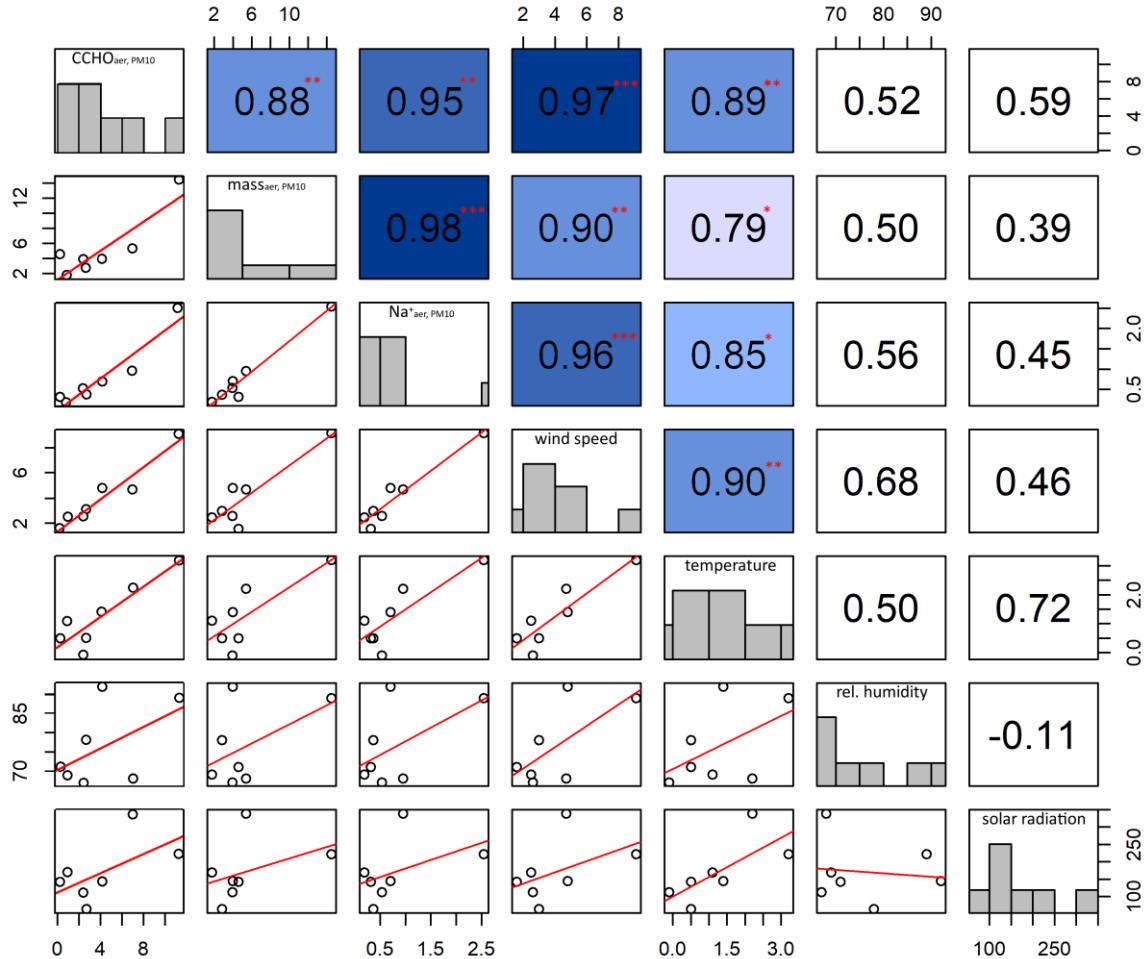


Figure SI3. Correlation matrix summarizing chemical data for Antarctic PM₁₀ particles (sum of the five stages of the size-resolved concentrations) and meteorological data (average over sampling times, measured at sampling station). The distribution of each variable is given in the histograms in the diagonal. Scatter plots with linear fit (red line) are shown below the diagonal. The Pearson correlation coefficients R and significance levels (red asterisks) are shown above the diagonal. Significant correlations are highlighted in blue.

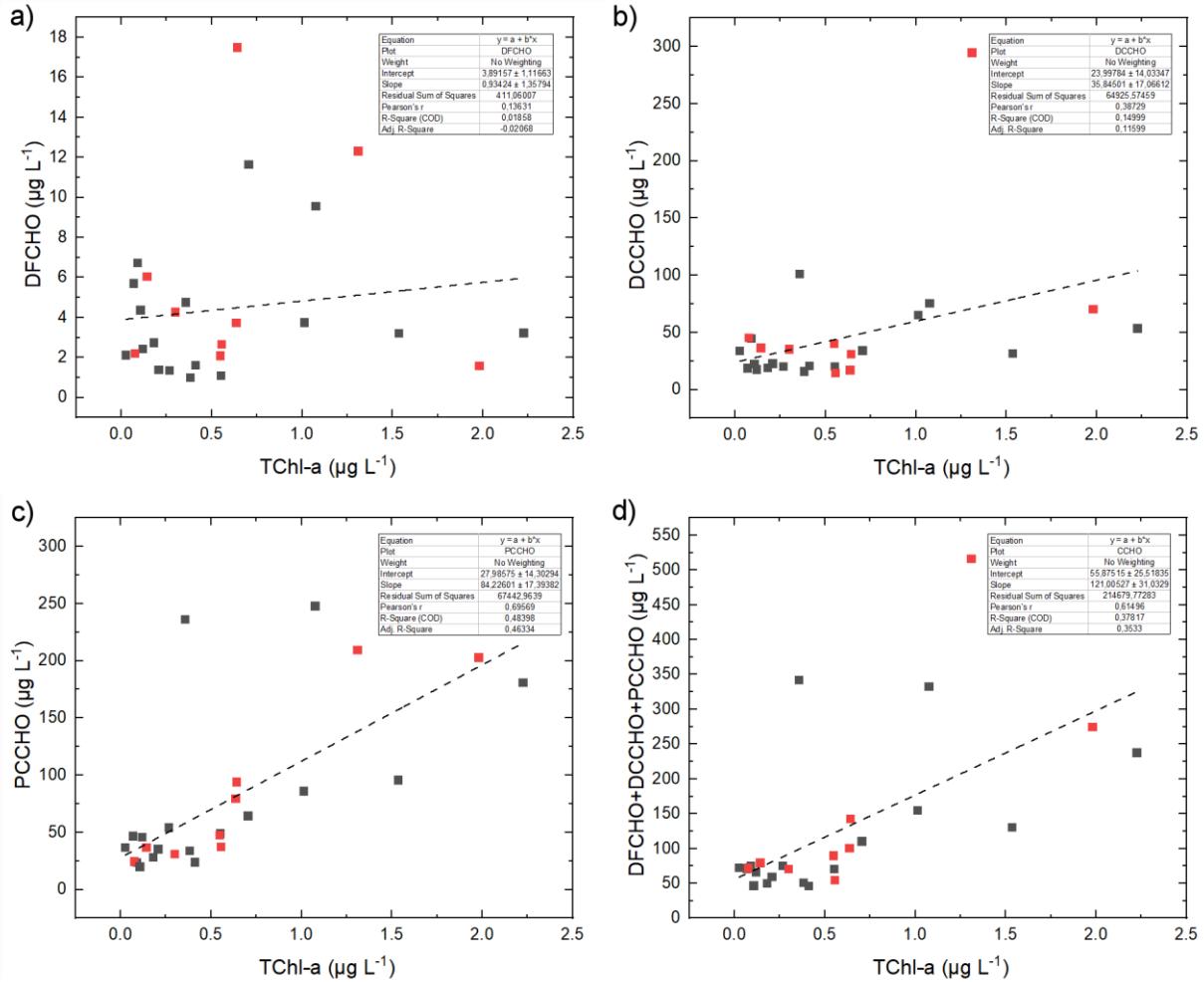


Figure SI4. Correlation plots between TChl-a and a) DFCHO, b) DCCHO, c) PCCHO and d) DFCHO+DCCHO+PCCHO. Black and red squares represent bulk and SML samples, respectively. The dashed line represents the linear fit with additional statistical information in each box.

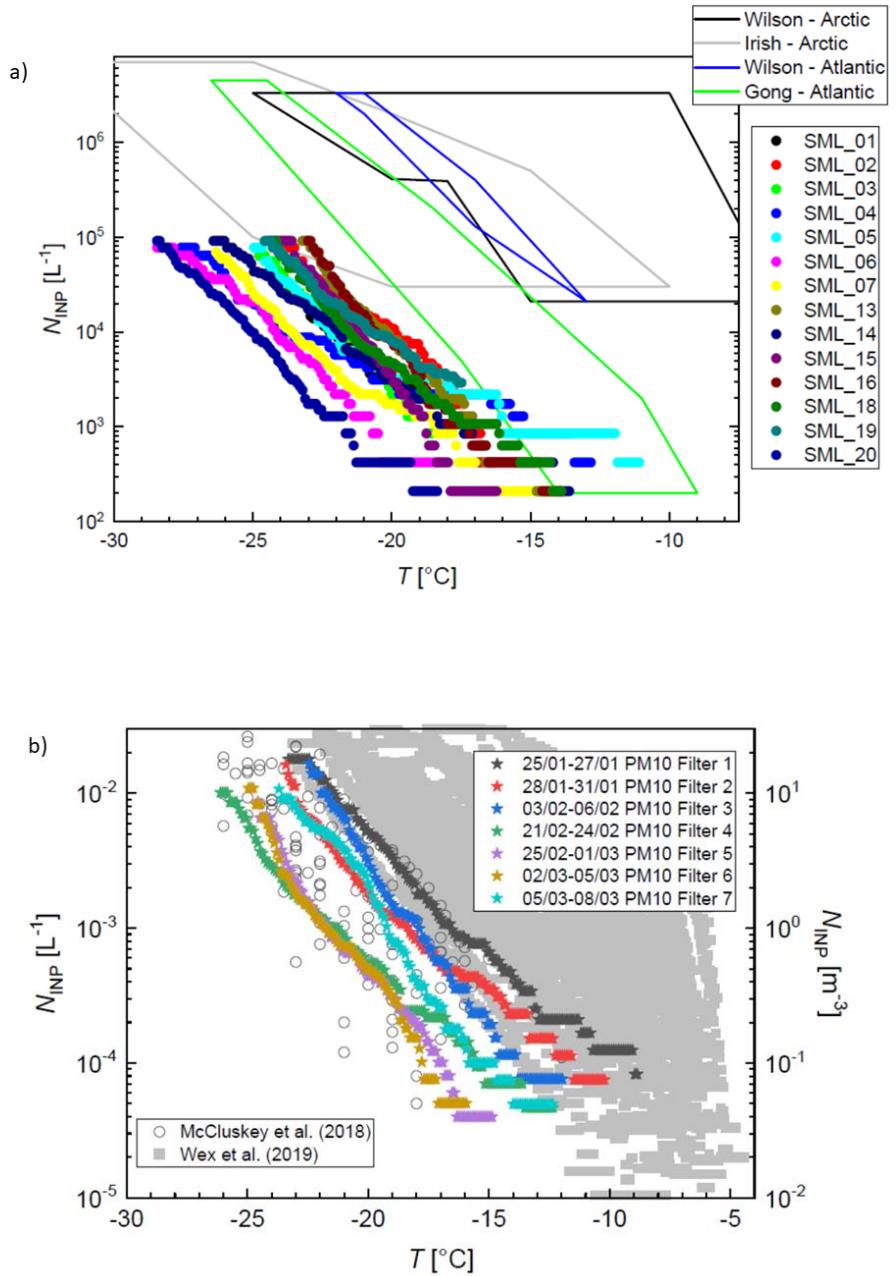


Figure S15. a) INP concentrations in SML samples collected during this study. For comparison, colored boxes indicate the concentration ranges that were found for SML in the Arctic Ocean by Wilson et al. (2015) and Irish et al. (2017), and for SML in the North Atlantic Ocean (Wilson et al., 2015) and in the Atlantic close to the Cabo Verde islands (Gong et al., 2020). INP concentrations in the SML obtained in the here presented study are clearly at the lower end and below those found at the other locations. Measurements were performed as described by Gong et al. (2020); b) atmospheric INP concentrations on PM₁₀ quartz fiber filters collected during this study (colored stars) were below those measured at four Arctic stations (Wex et al. (2019), gray squares), but in the same range as determined in the Southern Ocean (McCluskey et al. (2018), open circles). Measurements were performed as described by Wex et al (2019).

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