



Supplement of

Transient tracer observations in the Gulf of St. Lawrence reveal shift from younger to older inflow waters

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Supplementary Materials

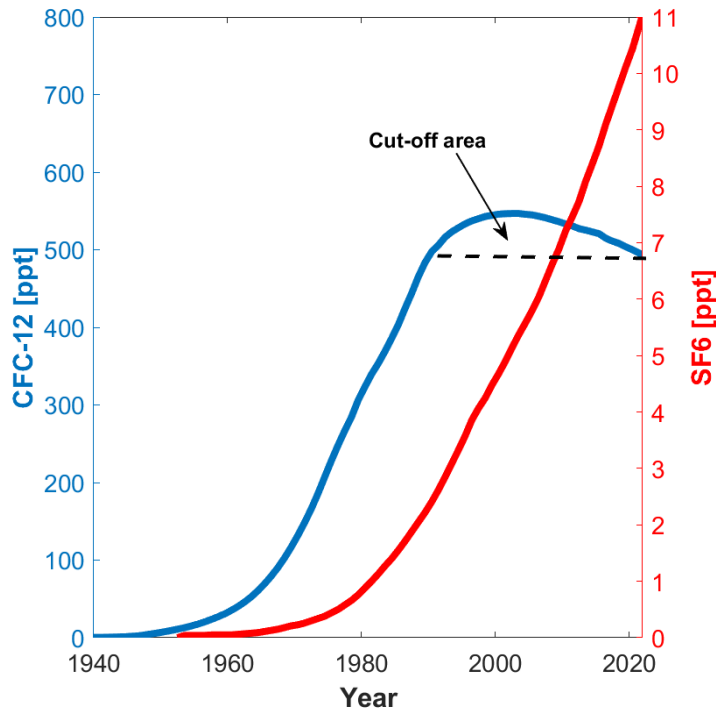


Figure S1: Atmospheric concentrations of the two transient tracers used in this study. CFC-12 (blue) with its by now decreasing atmospheric concentration and SF₆ (red) with steadily increasing concentrations since 1960. Both tracer concentrations are represented in ppt (parts per trillion) here.

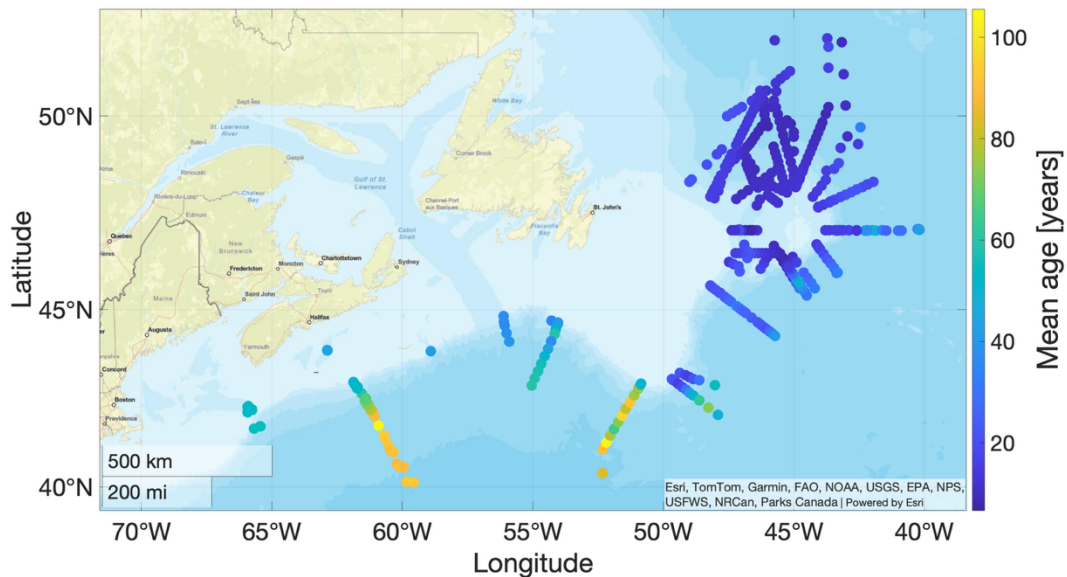


Figure S2: Mean ages from transient tracer measurements collected after 2010 in the North Atlantic Ocean in the source regions of the NACW and LCW. The mean ages are interpolated to the density of $\sigma_\theta=27.26 \text{ kg/m}^3$.

Table S1: Endmembers of θ , S_p and Γ used for the water mass analysis, alongside each water mass fraction range. The mean age endmembers are defined in two cases, while temperature and salinity endmembers remain unchanged between case 1 and case 2. The two cases represent the lowest and highest mean ages observed within the respective LCW and NACW ranges.

Variables	NACW range	LCW range	NACW endmember (case 1)	LCW endmember (case 1)	NACW endmember (case 2)	LCW endmember (case 2)
θ [°C]	4.4 – 8	-0.7 – 3.2	6.2 ± 1.04	1.25 ± 1.13	6.2 ± 1.04	1.25 ± 1.13
S_p [psu]	35 – 35.2	33.4 – 35	35.1 ± 0.06	34.2 ± 0.46	35.1 ± 0.06	34.2 ± 0.46
Γ [years]	49 – 105	7 – 19	49 ± 1.67	19 ± 0.23	105 ± 1.67	7 ± 0.23

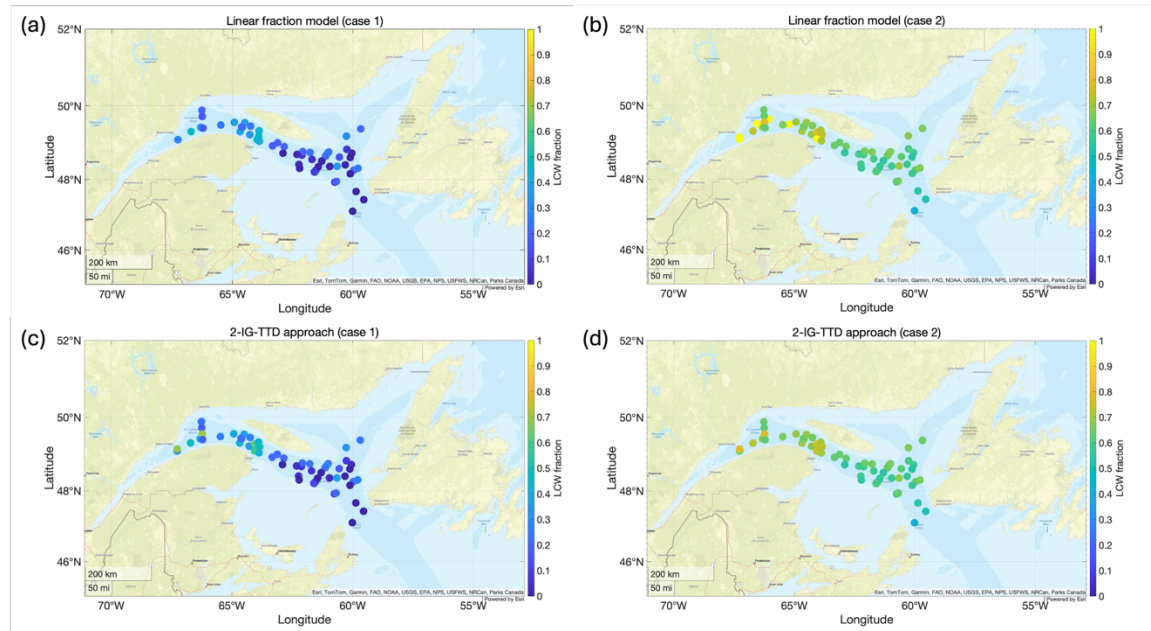


Figure S3: a)/b) LCW fraction on the $\sigma_\theta = 27.26 \text{ kg/m}^3$ isopycnal deep water in the Laurentian Channel calculated using the linear fraction model with θ , S_p and mean age (Γ) observations, plotted on a map. The endmembers used in the calculations for both cases are provided in Table T1. c)/d) LCW mixing factor on the $\sigma_\theta = 27.26 \text{ kg/m}^3$ isopycnal in the Laurentian Channel derived from the 2-IG-TTD analysis, using observed mean ages (Γ), plotted on a map of the GSL. Again, the endmembers used for both cases are provided in Table T1 and all observation data included was collected during the two TRex surveys in 2022.

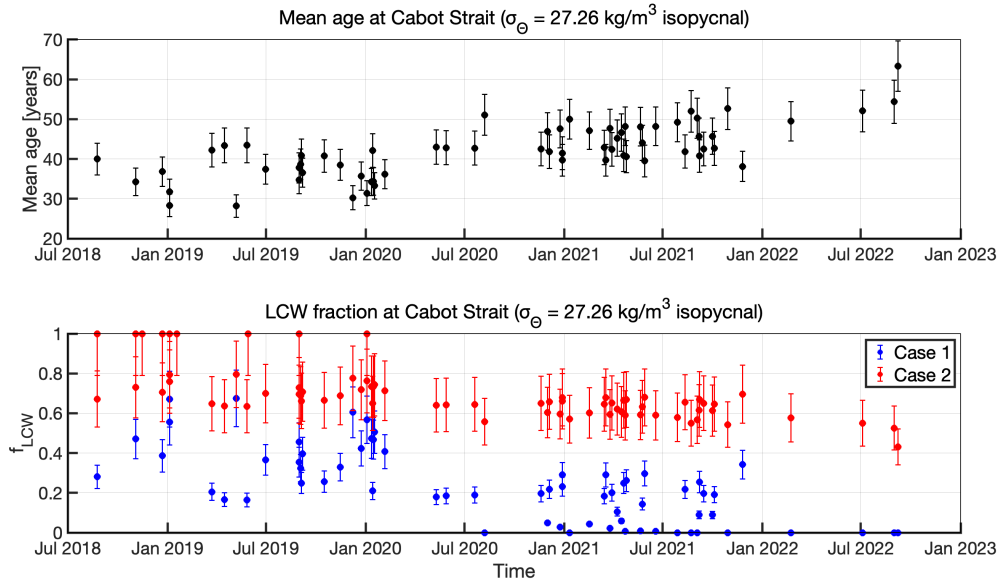


Figure S4: A proxy timeseries of mean age (top) and LCW fraction (bottom) at Cabot Strait from 2018 to 2022. The fractions are displayed for both cases analyzed in relationship to endmember choices. The error bars represent the 10% uncertainty in the mean age calculation in the upper panel and the 21% uncertainty from the water mass fraction uncertainty budget in the lower panel. The timeseries data only considers data collected during the two TRex cruises in 2022.

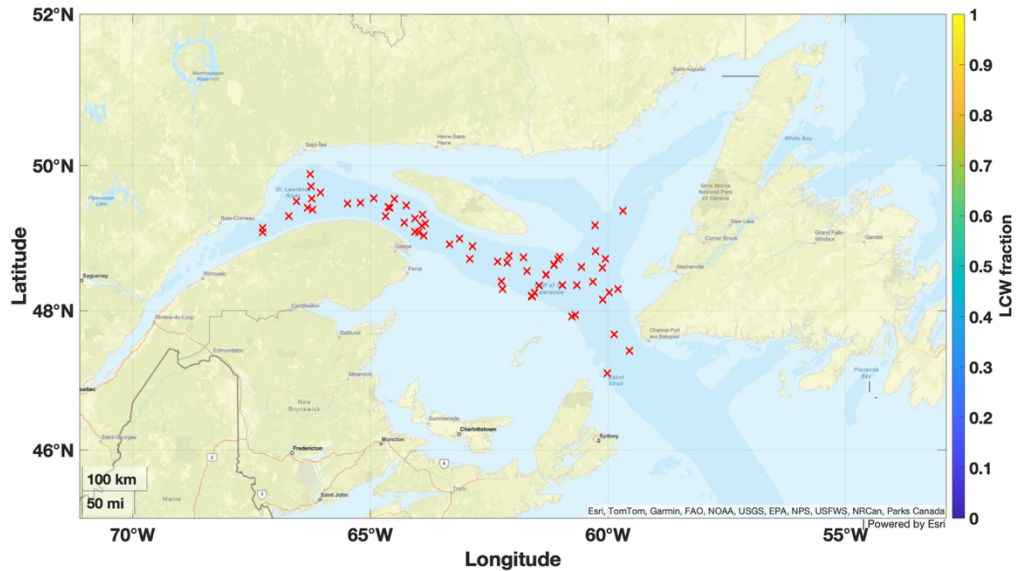


Figure S5: LCW fraction on the $\sigma_{\theta} = 27.26 \text{ kg/m}^3$ isopycnal deep water in the Laurentian Channel from θ and S_p observations plotted in a map. The red x's representing 0 % LCW fraction.

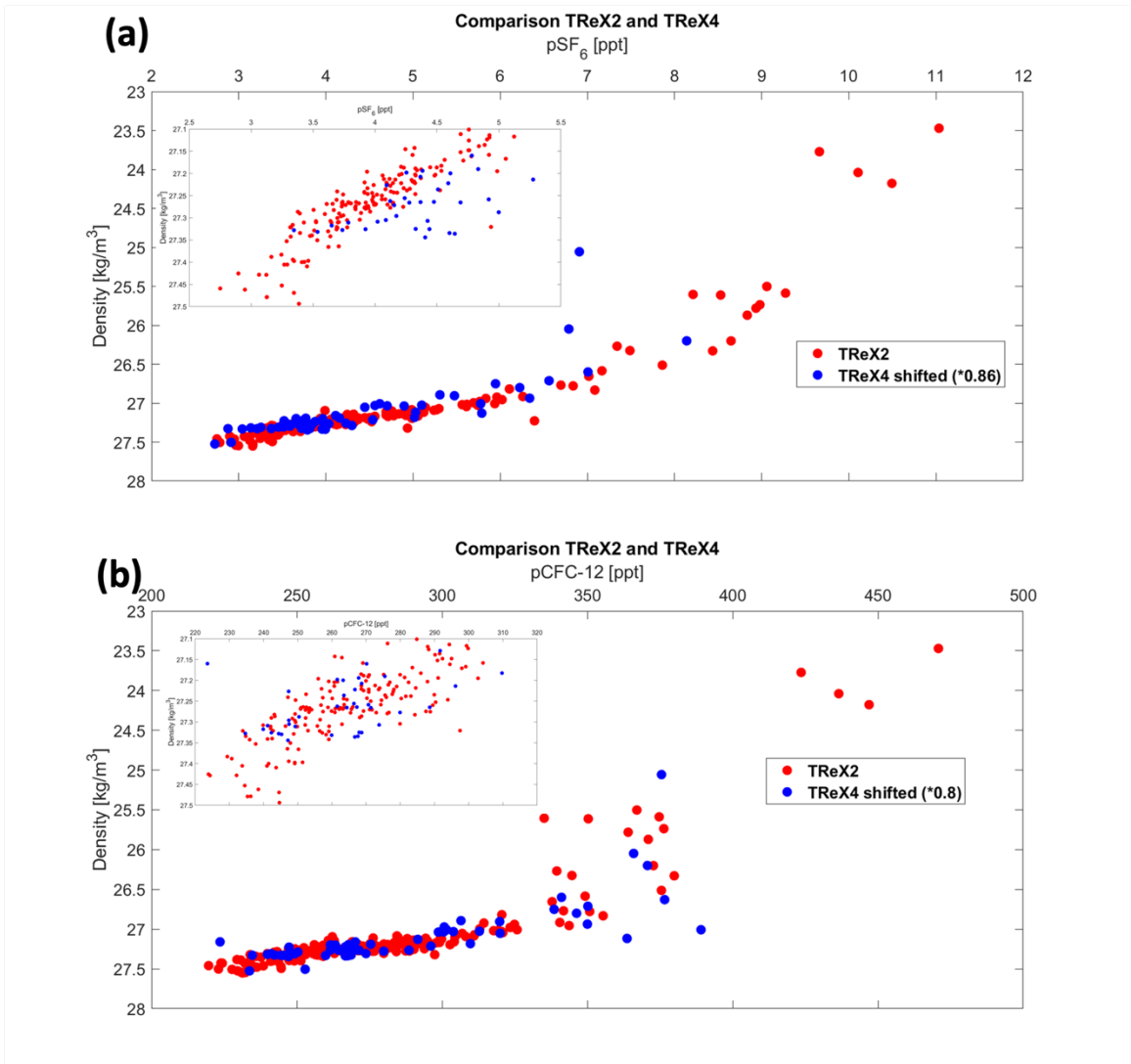


Figure S6: Display of the TreX 2 and shifted TreX4 data of (a) CFC-12 concentrations and (b) SF₆ concentrations. Each with a zoom into the area around the $\sigma_{\theta}=27.26$ kg/m³ isopycnal, showing a large amount of comparable datapoints.

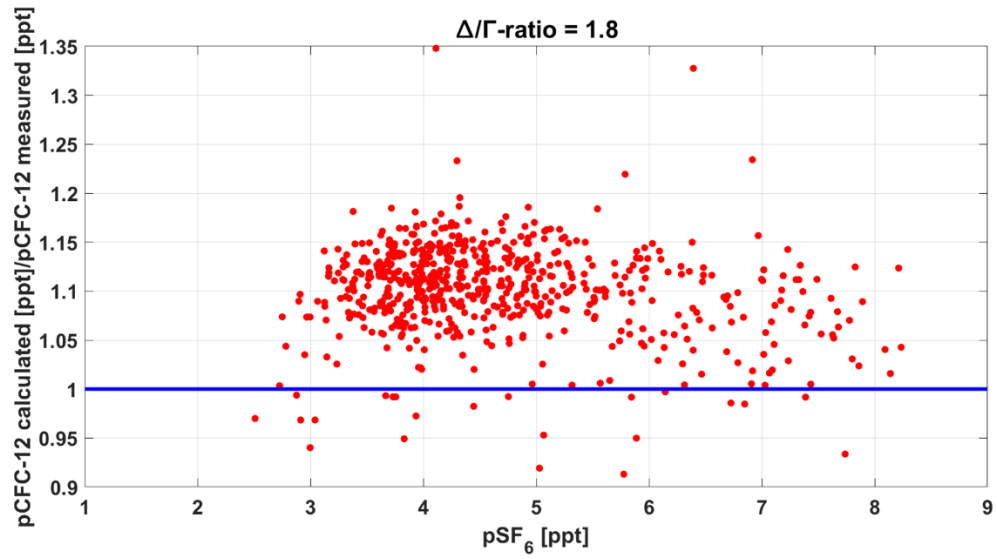


Figure S7: Display of the relationship between calculated and measured CFC-12 against PSF_6 concentrations using a ratio of $\Delta/\Gamma=1.8$ for the calculation of the CFC-12 concentrations.

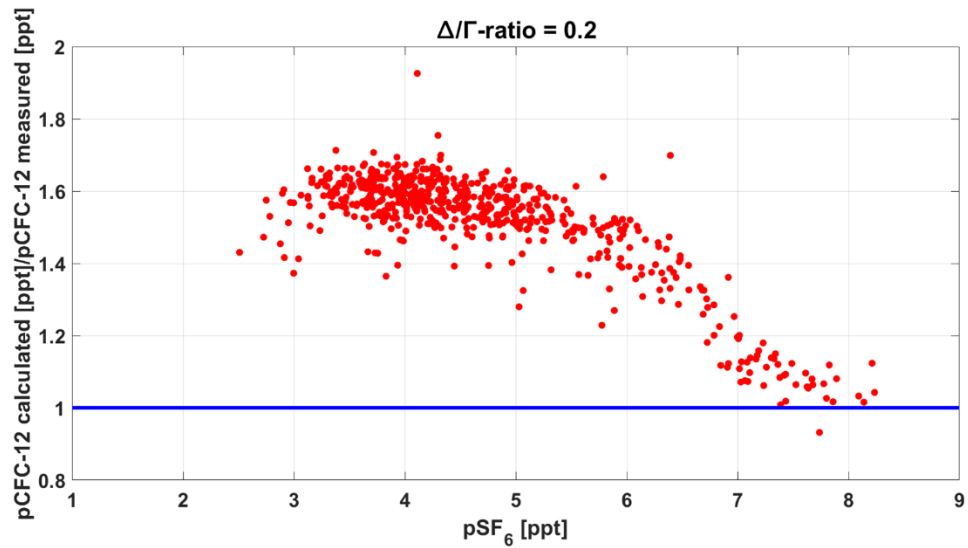


Figure S8: Display of the relationship between calculated and measured CFC-12 against PSF_6 concentrations using a ratio of $\Delta/\Gamma=0.2$ for the calculation of the CFC-12 concentrations.