

Stratospheric Chlorine monoxide from Apr-Dec 2023

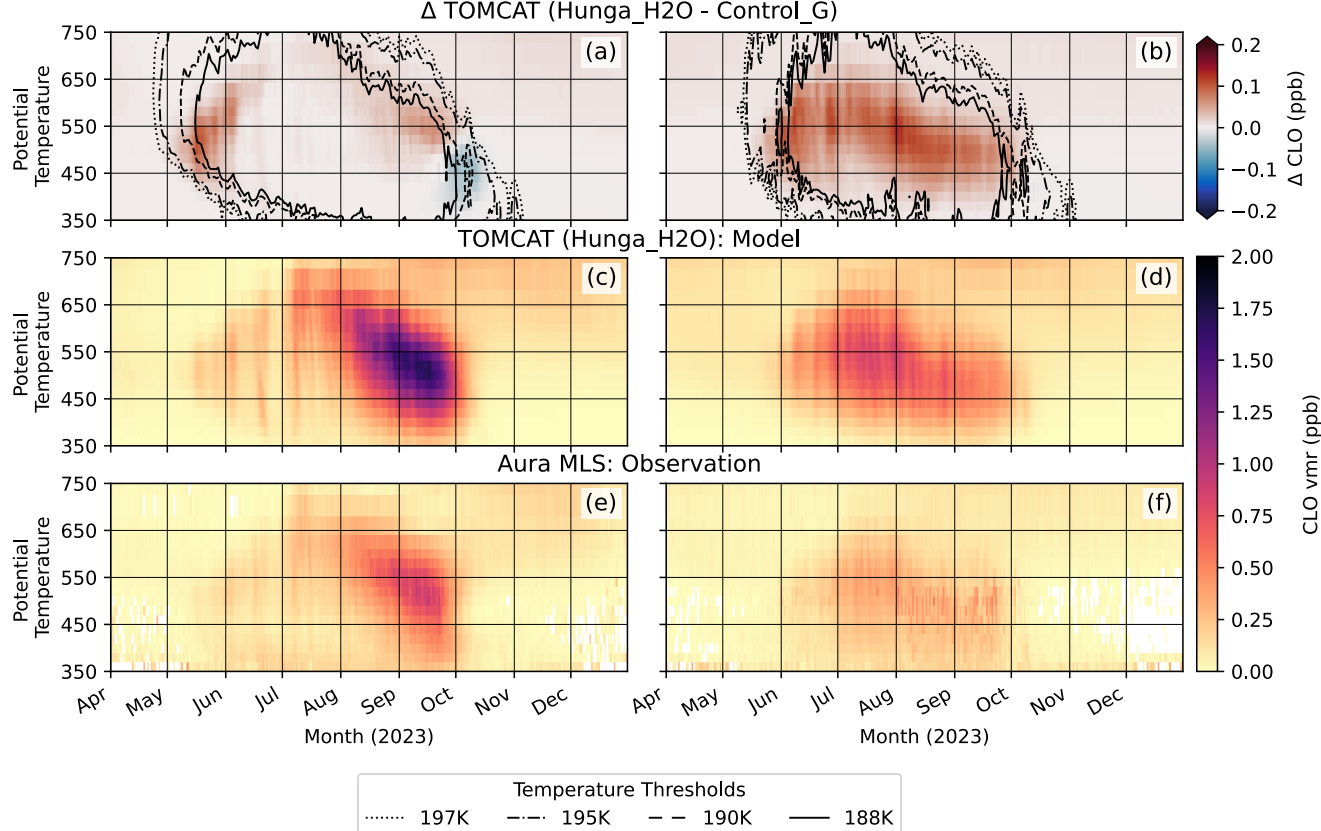


Figure S1. Chlorine monoxide (ClO) differences (Δ ClO) and volume mixing ratios (vmr) in parts per billions (ppb) from 1st April to December 31st 2023. Panels (a) & (b) show the Δ ClO from Hunga_H2O (with H₂O injection) – Control_G (without injection) overlaid with contours indicating the PSC threshold temperatures for NAT (195 K) and ice (188 K) as solid lines. Dashed lines mark the threshold temperatures +2 K. Panels (c) & (d) are the modelled ClO from Hunga_H2O as an area-weighted mean. Panels (e) & (f) show the MLS observations. Panels (b)-(e) use the same colour scale. The left panels are for the core region (-90° to -70° EL) and right is the edge (-70° to -55° EL).

Stratospheric Hydrogen chloride from Apr-Dec 2023

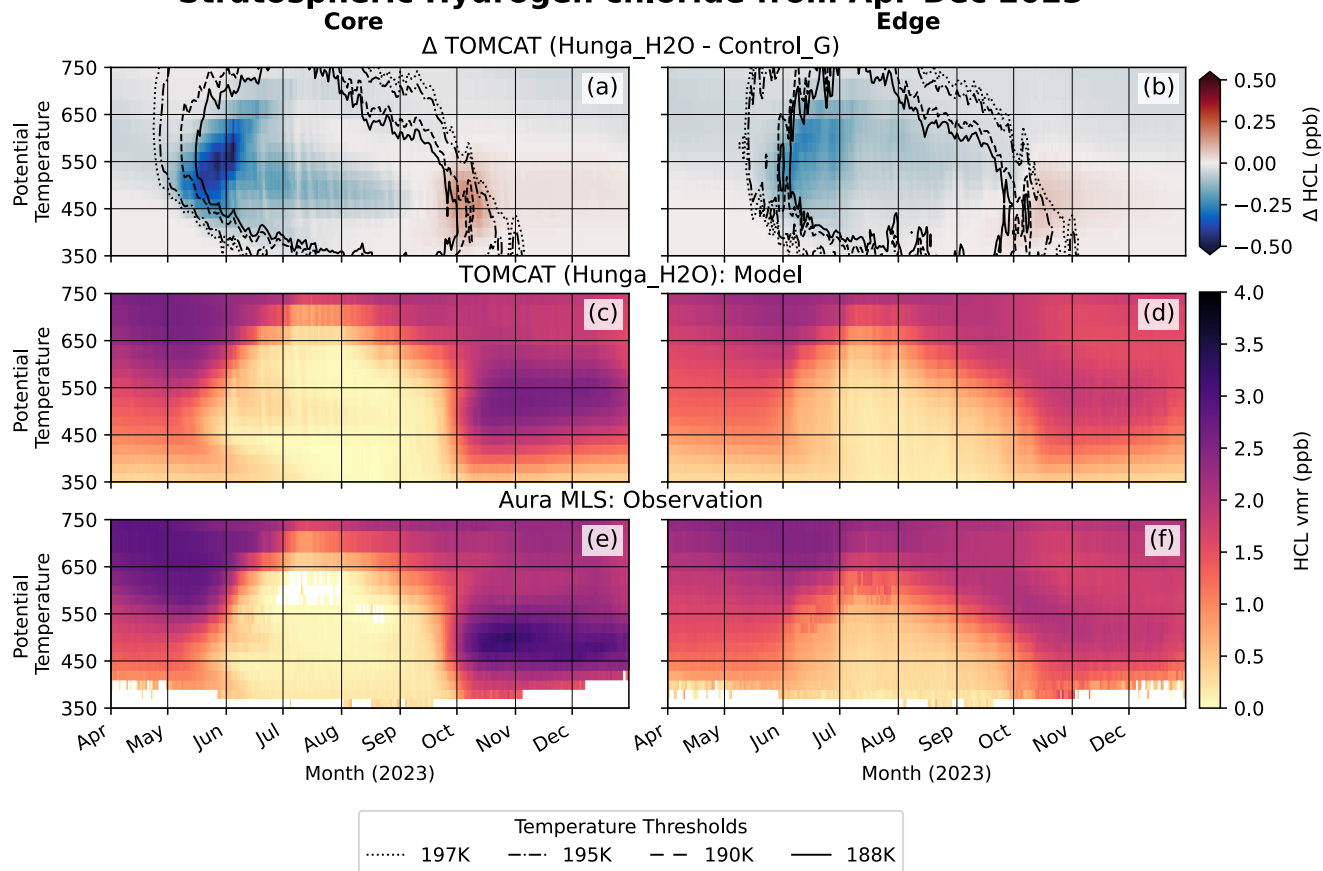


Figure S2. Same as Figure S1 but for hydrochloric acid (HCl).

PSC Area on selected levels for 2023

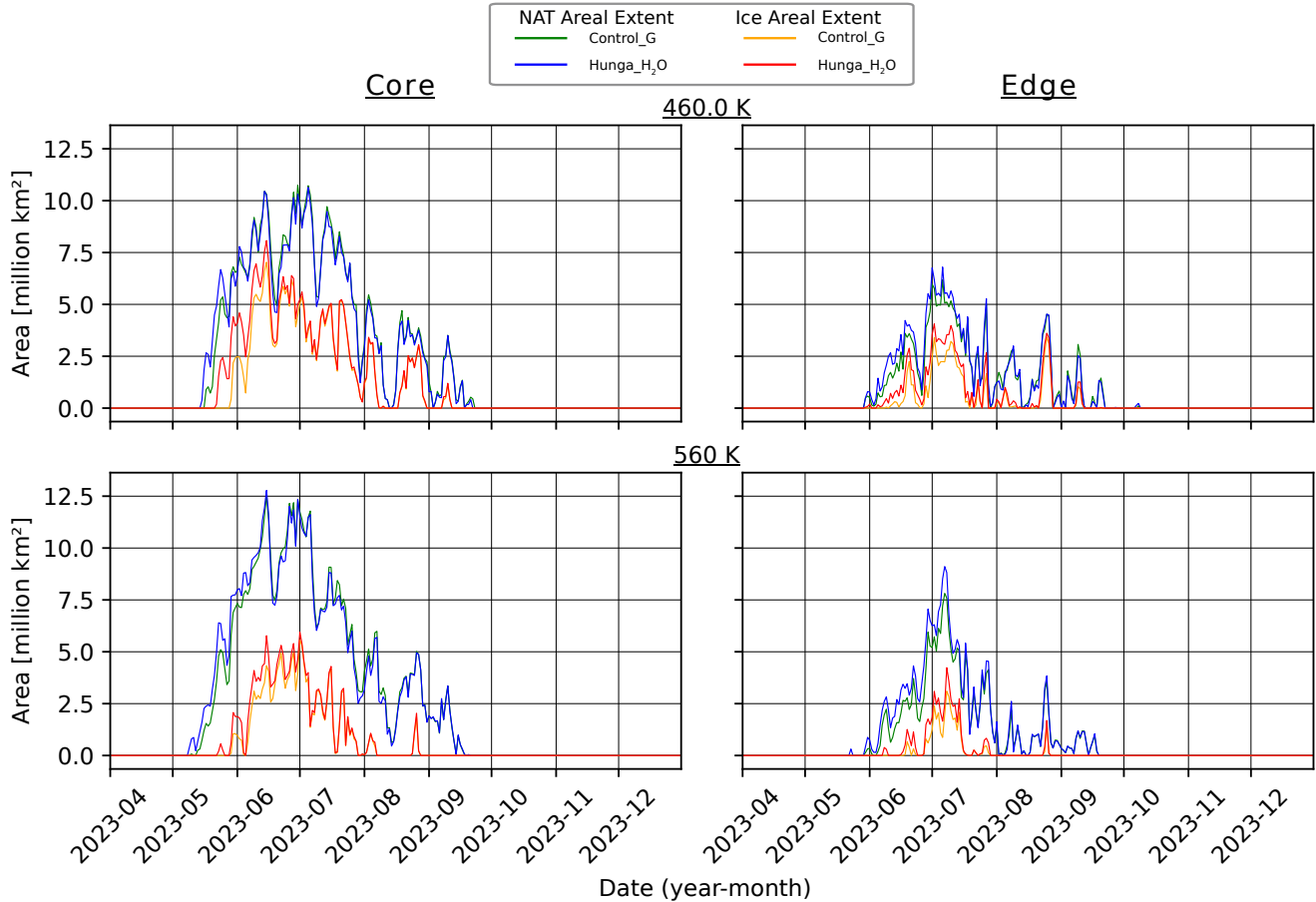


Figure S3. Antarctic vortex season (April-December) 2023 areal extent of NAT and ice PSCs (million km²) at 460 K (top) and 560 K (bottom) level from model runs Hunga_H2O and Control_G for the core (left), -90° to -70° EL, and edge, -70° to -55° EL, (right) regions.

PSC Area on selected levels

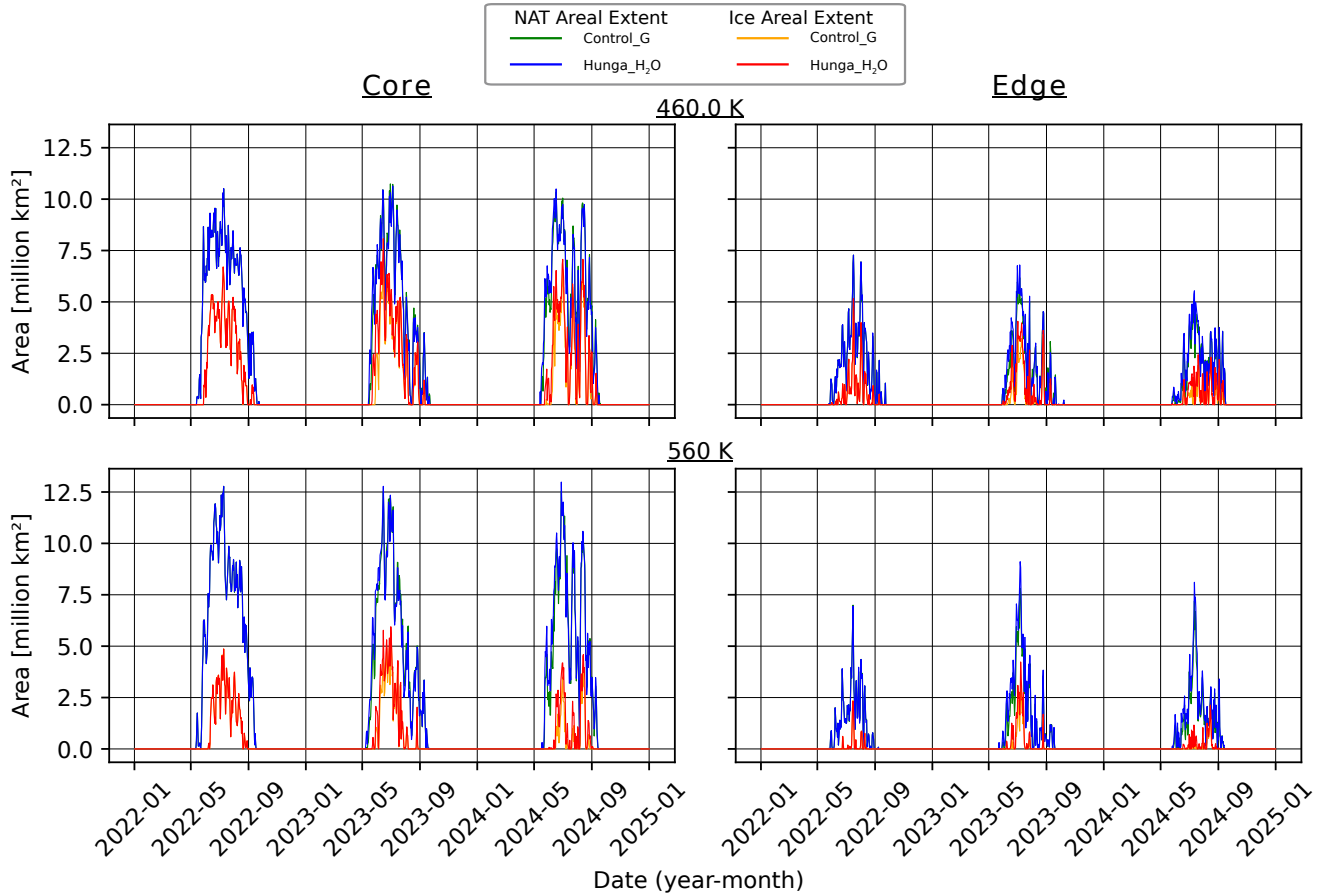


Figure S4. Antarctic post-Hunga (2022-2025) areal extent of NAT and ice PSCs (million km²) at 460 K (top) and 560 K (bottom) level from model runs Hunga_H₂O and Control_G for the core (left), -90° to -70°EL, and edge, -70° to -55° EL, (right) regions.

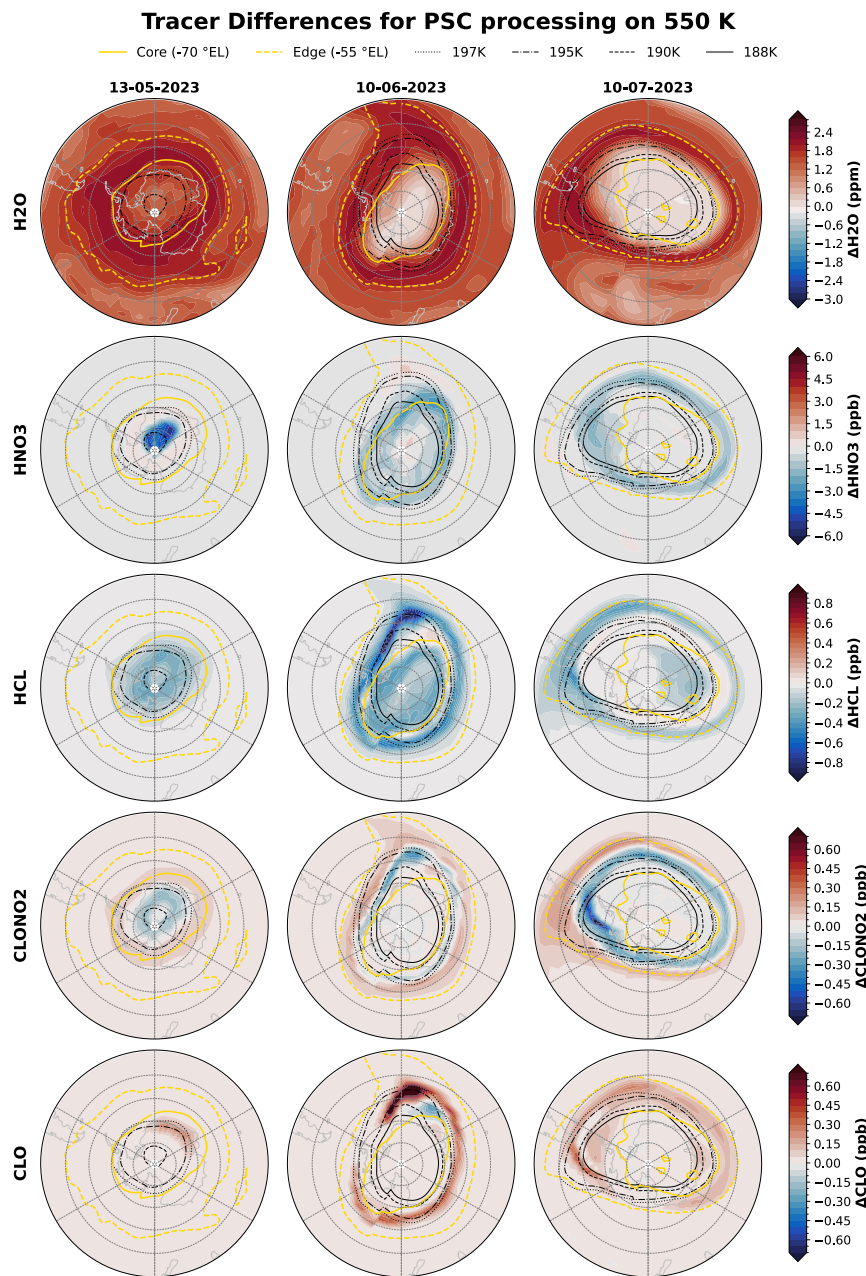


Figure S5. Antarctic polar projections of modelled H₂O, HNO₃, HCl, ClONO₂ and ClO on the 550 K level for 3 days (13.05.23, 10.06.23, 10.07.23) to show the evolution of the PSC chemical processing. Core (−90° to −70°EL) and edge (−70° to −55° EL) regions are marked in yellow. PSC threshold temperatures for NAT (195 K) and ice (188 K) and threshold temperatures +2 K (197 K, 190 K) are marked in black.

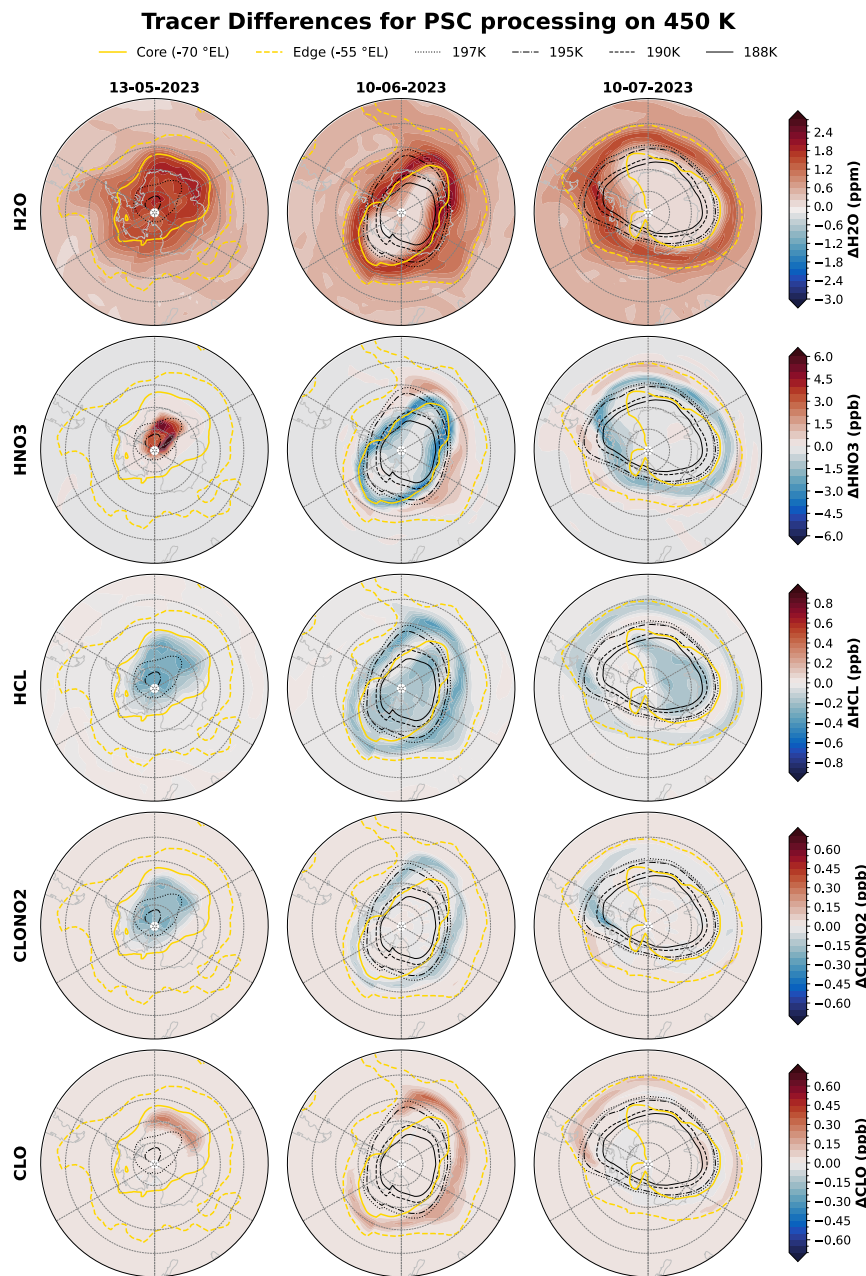


Figure S6. Antarctic polar projections of modelled H₂O, HNO₃, HCl, ClONO₂ and ClO on the 450 K level for 3 days (13.05.23, 10.06.23, 10.07.23) to show the evolution of the PSC chemical processing. Core (−90° to −70°EL) and edge (−70° to −55° EL) regions are marked in yellow. PSC threshold temperatures for NAT (195 K) and ice (188 K) and threshold temperatures +2 K (197 K, 190 K) are marked in black.