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17O18O and 18O18O in ice core O2 from Greenland: implications to reconstruct past atmospheric photochemistry

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Abundances of $^{17}O^{18}O$ and $^{18}O^{18}O$ (also called clumped isotopes and denoted by Δ_{35} and Δ_{36}) of O_2 in firn and ice core air are novel tracers that can be useful to study past changes in atmospheric photochemistry and temperature. We present Δ_{35} and Δ_{36} values measured in firn and ice core air O_2 from North Greenland (NEEM; 77.45°N 51.06°W). The aim is to reconstruct the preindustrial-industrial, Holocene and glacial-interglacial variation in the tropospheric ozone photochemistry and temperature. Measurements of Δ_{35} and Δ_{36} are carried out using a high-resolution stable isotope ratio mass spectrometer Thermo Fisher 253 ULTRA[1]. Our measurements of Δ_{35} and Δ_{36} across past air, from archive samples, to the modern-day show significant changes in the atmospheric photochemistry via ozone burdening and stratospheric- tropospheric transport processes. We will present the measurement results along with a detailed discussion on the dominant process using explicit dynamic simulations of Δ_{36} in the AC-GCM EMAC model [2,3,4].