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Ozone isotopologue monitoring from ground-based FTIR spectrometry

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Atmospheric ozone (O_3) is affected by an interplay of chemical reactions and atmospheric dynamics that makes it difficult to precisely predict its long-term evolution. Monitoring and investigating the O_3 isotopologue composition can help us to disentangle this complex scenario, giving us novel insights into the current ozone recovery and its link to global warming.

In this context, this work examines the potential of the ground-based FTIR (Fourier Transform InfraRed) spectrometry for monitoring the main O_3 isotopologues ($^{48}O_3$, symmetric and asymmetric $^{50}O_3$, symmetric and asymmetric $^{49}O_3$). We present for the first time the long-term series of the stratospheric $^{50}O_3/^{48}O_3$ isotopologue ratios as observed from mid-infrared solar absorption spectra at two ground-based FTIR sites: the subtropical Izaña Atmospheric Observatory (28.3ºN, 16.5ºW, Tenerife, Spain) and the polar Kiruna station (67.8ºN, 20.4ºE, Sweden). Both stations have operated within the Network for the Detection of Atmospheric Composition Change (NADCC) for more than 15 years (Kiruna since 1996 and Izaña since 1999). By analysing these long-term series at different time scales, we will explore the intra-annual variability and the long-term evolution of $^{50}O_3/^{48}O_3$ ratios at subtropical and polar latitudes, and its role as tracers of the ozone transport.