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Balloon-borne radiometer measurements of Northern Hemisphere mid-latitude stratospheric HNO₃ profiles spanning 12 years

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Abstract. Low-resolution atmospheric thermal emission spectra collected by balloon-borne radiometers over the time span of 1990–2002 are used to retrieve vertical profiles of HNO₃, CFC-11 and CFC-12 volume mixing ratios between approximately 10 and 35 km altitude. All of the data analyzed have been collected from launches from a Northern Hemisphere mid-latitude site, during late summer, when stratospheric dynamic variability is at a minimum. The retrieval technique incorporates detailed forward modeling of the instrument and the radiative properties of the atmosphere, and obtains a best fit between modeled and measured spectra through a combination of onion-peeling and optimization steps. The retrieved HNO₃ profiles are consistent over the 12-year period, and are consistent with recent measurements by the Atmospheric Chemistry Experiment-Fourier transform spectrometer satellite instrument. We therefore find no evidence of long-term changes in the HNO₃ summer mid-latitude profile, although the uncertainty of our measurements precludes a conclusive trend analysis.

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