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Mesospheric Ozone and Temperature trends derived using the merged METEOR merged datasets

The METEOR (MEsospheric TEmperature and Ozone climate data Record) project aims to develop a high-quality, long-term climate data record of mesospheric ozone and temperature by merging observations from multiple satellite instruments. A primary objective is to assess mesospheric temperature and ozone trends, with a particular focus on the impact of solar particle precipitation on ozone levels in polar regions.
For the merged ozone and temperature dataset, we used limb and occultation satellite instruments that provide measurements in the mesosphere and lower thermosphere. The dataset includes observations from ACE-FTS, GOMOS, MIPAS, MLS, HALOE, and SOFIE.
The initial phase involved calculating deseasonalized monthly mean anomalies using pressure as the vertical coordinate. Anomalies were computed separately for each illumination condition (daytime, nighttime, sunset, and sunrise). The merged dataset was then created by taking the median of individual instrument anomalies for each altitude, latitude band, and month. The final data record for ozone and temperature consists of deseasonalized anomalies structured in 10° latitude bands from 90°S to 90°N, covering an altitude range from 10 hPa (~30 km) to 0.001 hPa (~95 km) for the period 1991 to 2023.
In this presentation we will show results from the data merging process and preliminary mesospheric ozone and temperature trends analysis.

Topic

Atmospheric composition (Earth and planets), chemistry and transport

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