

## Altitude troposphere ozone profiles over Kyiv-Goloseyev station by simultaneous Umkehr and FTIR observations

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Total ozone column and ozone profile data have been obtained from both: (1) standard Dobson measurements and Umkehr method, and (2) using modeling of the ozone absorption spectral band profile near 9.6 microns with the MODTRAN4.3 Atmospheric Radiation Transfer Model based on the HITRAN molecular absorption database from Fourier transform infrared spectroscopy (FTIR) observations. The simultaneous ground-based Dobson/Umkehr and FTIR ozone observations have been performed in 2014-2015 at the mid-latitude Kyiv-Goloseyev KGV GAW station for joint altitude troposphere ozone profiles analysis. To retrieve ozone column estimates and ozone profiles from FTIR observations, we used the satellite Aqua-AIRS water vapor, temperature and ozone profiles, and the simultaneous with FTIR observations the Umkehr ozone profiles and surface ozone measurements as input a priori information for the MODTRAN4.3 model. The altitude ozone profiles retrieved from Umkehr method and satellite measurements are in good correspondence in stratosphere layer. However the troposphere part of ozone profiles is uncertain and reproduced with large errors. Therefore we use the MODTRAN4.3 model for interpretation of observed FTIR absorption spectrum to retrieve and improve the troposphere part of ozone altitude distribution. The synergy of Umkehr, satellite and FTIR simultaneous observations including surface ozone measurements allows rendering the ozone profile features in troposphere that indicate the stratosphere-troposphere exchange processes. Season ozone profile variations observed from Umkehr measurements are discussed as well.

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