



Vertical distribution of trace gas species in the troposphere over the south of West Siberia: comparison of airborne in situ measurements and satellite data

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A comparison of the vertical distributions of O₃, CO, CO₂ and CH₄ derived from the airborne in situ measurements and satellite observations over the southern part of West Siberia is presented. In this study we used data of monthly research flights of "Optik" TU-134 aircraft laboratory carried out from 2012 to 2013 and data retrieved from measurements of the Infrared Atmospheric Sounding Interferometer (IASI) instrument on-board the MetOp satellite.

It was found that differences in ozone mixing ratios between the airborne and satellite data can vary from +3 to +18 ppb at 0.5 km AGL and from -8 to -37 ppb at 7 km AGL, and relative ones ranged from +8 to +30 % and from -12 to -88 %, respectively.

Differences in CO concentrations varied from +32 to +103 ppb at 0.5 km height and from -18 to +23 ppb at 3 km. Relative differences were in the range from -4 to +48 % at 0.5 km and from -8 to +20 % at 7 km.

The maximal difference in all CH₄ profiles reached 150 ppb in the atmospheric boundary layer, and the minimal one was -10 ppb. The average relative difference varied between +2.8 and -0.5 %.

The average difference in CO₂ concentration lies within ±1.5 ppm, while individual profiles are incommensurable. Maximal and minimal differences during the all flights were observed in the atmospheric boundary layer (+10 and -12 ppm or +2.3 and -3.3%, respectively). In the free troposphere, relative difference decreased down to ±1.0%.

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