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# Estimation of the tropospheric and stratospheric $CO_2$ content by ground-based IR technique

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Ground-based spectroscopic international measurement systems TCCON and NDACC are important for regular obtaining the data on atmospheric gas composition. A great part of such data is derived as the total content of the gases and as an averaged mixing ratio for the dry atmosphere as, for example, $XCO_2$. On the other hand, the measurements of solar IR radiation spectra with high spectral resolution carry within them some amount of information on the vertical structure of the content of some gases. The method of estimation of $CO_2$ content in the troposphere and stratosphere was described in a study [Timofeyev Yu.M., Nerobelov G.M., Poberovskii A.V., Filippov N.N. Evaluation of $CO_2$ content in troposphere and stratosphere by ground-based IR method. "Izvestiya, Atmospheric and Oceanic Physics". 2021, No.2]. In our work we present the analysis of the inaccuracies of the suggested approach using different spectral windows. Also, we demonstrate the comparison between $CO_2$ tropospheric and stratospheric content obtained by the suggested approach using ground-based measurements of IR spectra with high resolution in Peterhof (2009-2019), by Copernicus Atmosphere Monitoring Service (CAMS) and by satellite measurements of $XCO_2$ in the troposphere and stratosphere using ACE instrument.