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# Analysis of the quality of current forecasts of total ozone behavior in the 21st century

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The anthropogenic impact on the ozone layer is expressed in the anomalies in the total ozone content (TOC) state on a global scale with periodic enhancement at the high latitude areas. In addition, there are significant variations in TOC time trends at different latitudes and seasons. The reliability of the TOC future trends projections using climate chemistry models must be constantly monitored and improved exploiting comparisons against available measurements.

In this work, the Earth's system model SOCOLv4.0 is used to simulate TOC behavior from 1960 to 2100. The model is based on the combination of the MPI-ESM climate model with the MEZON module for the ozone-related chemical processes. To assess the quality of the forecast we analyzed the accuracy of the hindcast simulations for the period 1990-2023 using ground-based (Brewer and Dobson instruments) and satellite TOC measurements based on reflected and scattered solar radiation (OMI instrument), as well as thermal IR radiation (IKFS-2 instrument). The analysis was carried out for different earth regions (as well as for the entire Earth) and seasons.

The study presents the results of comparisons of TOC modeling data and measurements for the considered period. Initial results have demonstrated that the global correlation between TOC temporal variation by the SOCOL and satellites is above 0.8. Mean bias and its standard deviation are in ranges ~5-30 and 10-50 DU, respectively and highly depend on Earth region. The best agreement is found in the tropics and middle latitudes of the Southern Hemisphere. In the conclusion, we provide recommendations for possible further model improvement.

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