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Temporal Trends and CO2 emissions of Russian cities according to satellite data OCO-2 measurements

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The growth of greenhouse gases in the Earth's atmosphere leads to disturbances in the radiation balance and changes in the planet's climate. A significant contribution to emissions of the most important greenhouse gas CO2 is made by cities, whose contribution is estimated at ∼70%. Despite the measures taken to reduce anthropogenic emissions of CO2 in various countries, emissions continue to increase. Since 1990, global CO_2 emissions have increased by more than 60 percent. In recent decades, satellite remote sensing has been actively used to monitor total CO2 and anthropogenic CO2 emissions. Satellite measurements and determinations of CO2 have been carried out for a long period of time using SCIAMACHY, GOSAT, OCO -2 and -3 instruments. The paper presents examples of analysis of CO2 measurements by the OCO-2 satellite to study the spatial and temporal distribution of CO2 content in the vicinity of industrial cities of Russia (17 cities). The seasonal course of CO2 in the vicinity of the cities under study is characterized by a maximum in late winter-early spring and a minimum in late summer, which corresponds to the seasonal variation of CO2 content in other parts of the planet. The range of interannual trends of CSO2 according to the data of OCO-2 measurements, for example, in the cities of Chelyabinsk, Novosibirsk, and Yekaterinburg is 1.9-2.7 ppm/year/. The estimate of CO2 emission from the territory of Chelyabinsk for June 5, 2019 using OCO-2 measurements is 16 Mt g-1 from the probable source area or ~0.9 Mt g-1km-2. Analysis of anthropogenic CO2 emission based on EDGAR (The Emissions Database for Global Atmospheric Research) v8.0 inventory databases for 2019 showed a noticeably lower value - that the specific emission of the gas on the territory of the city is ~0.5 Mt g-1km-2.

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