

## Estimation of Anthropogenic Emission of Carbon Dioxide from Measurement Data of CO<sub>2</sub> Concentration Obtained in Obninsk and at the World Meteorological Organization (WMO)/Global Atmosphere Watch (GAW) Stations

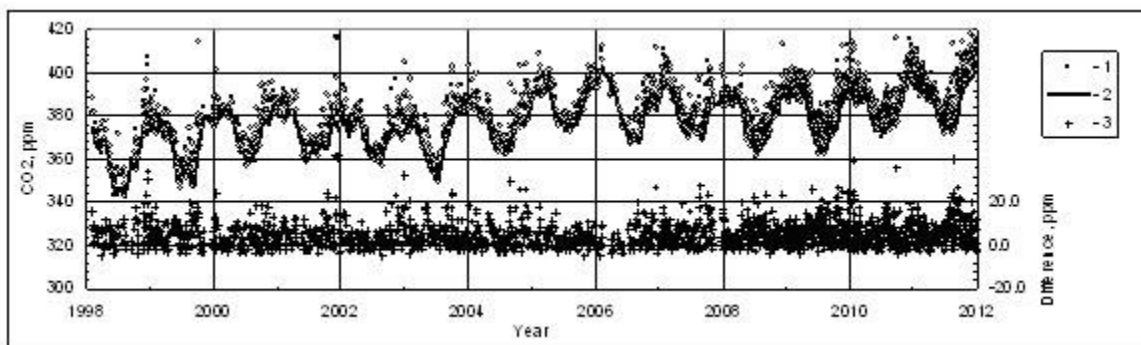
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Presented are the measurement data of CO<sub>2</sub> concentration in the air near the ground obtained in Obninsk ((55.1° N, 36.9° E., 186 m above the sea level) located at a distance of 105 km to the southwest of Moscow along with the results of data filtering, with the help of which it is possible to separate natural and anthropogenic variations of CO<sub>2</sub>. The data obtained are compared with the measurement data of the WMO/GAW stations filtered with the same procedure. After filtering measurement results obtained in Obninsk, minimal concentrations of CO<sub>2</sub> for each month of the year for the whole observation period were determined. Using them and the quadratic interpolation, we calculated minimal concentrations ( $C_{\min}$ ) corresponding to every measurement day (Fig. 1).

For comparison we used the results of CO<sub>2</sub> concentration measurements at the WMO/GAW stations (BLS, MHD, LLB, CBA, SHM) located in the latitudes close to that of Obninsk. The values of  $C_{\min}$  obtained after the filtering procedure for these stations and for Obninsk are in good agreement independently of their location in the islands and ocean coasts, where the influence of natural sources, sinks and anthropogenic sources is the smallest, or in the continental regions. The agreement of  $C_{\min}$  values for the continental and background stations makes it possible to conclude that the difference in the measured concentrations and the  $C_{\min}$  values is determined most probably by an anthropogenic emission. For Obninsk this difference [(Fig. 1 (3))] is a random one (its mean value is about 6 ppm) and stays near constant during the whole measurement period. The difference of  $C_{\min}$  and the measurement results obtained at other stations is of the same nature, and on the average makes for BLS (the continent) 5 ppm, MHD (the ocean coast) 2 ppm, LLB (the continent) 5 ppm, CBA (the ocean coast) 1.5 ppm, and SHM (the island in the ocean) 1 ppm.

Thus, the use of the measurement data filtering gives a possibility to determine an excessive CO<sub>2</sub> concentration in the atmosphere in the continental regions as compared to the oceanic (background) concentration. When considering the continents as anthropogenic sources, one may determine the global trend caused by the anthropogenic emission of CO<sub>2</sub> may be determined.



**Figure 1.** Results of filtering CO<sub>2</sub> concentrations measured in Obninsk: 1 – mean daily, 2 – minimal, 3 – difference of mean daily and minimal ones.