



## **Trace gas measurements in the lower troposphere over north-eastern Poland by means of light aircraft.**

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During the years 2002-2005 regular airborne measurements of long-lived trace gases were performed in the lower troposphere over north-eastern Poland by means of small aircraft, as part of the EU-projects: AEROCARB, TCOS-Siberia and CarboEurope-IP project. The measurements were made about 60 km to the north of Białystok (53°31'N, 22°4'E) in the area of the Biebrza National Park at intervals of 2-3 weeks. The objective of the programme is to measure continuous profiles of temperature, humidity, pressure and CO<sub>2</sub> mixing ratios (*in-situ*), as well as mixing ratios of CH<sub>4</sub>, CO, H<sub>2</sub>, N<sub>2</sub>O and SF<sub>6</sub> from flask analyses, which were sampled at altitudes of 300, 500, 1000, 1500, 2000, 2500 meters above ground level. The samples are analysed at the MPI-BGC laboratory, which is linked through regular inter-comparison tests with LSCE and IUP-UniHeidelberg laboratories. The peak-to-peak amplitude of the seasonal cycle of CO<sub>2</sub> in the atmosphere within the atmospheric boundary layer (ABL) of 19 ppm is about twice that observed in the free troposphere (10.9 ppm). ABL mixing ratios are larger than free troposphere values during winter time and lower during the summer reflecting the change of the continental biosphere from source to a sink. CH<sub>4</sub> mixing ratios show a small seasonal variability with the highest values in the ABL during winter. N<sub>2</sub>O, CO and H<sub>2</sub> also show a slight seasonal cycle with similar phasing. In contrast, the measured mixing ratios of SF<sub>6</sub> have exhibited a linear increase of 20% from the beginning of 2002 without any significant seasonal variations. The average vertical gradients will be compared to the output of atmospheric models, and will be analyzed with regards to the other trace gases. The large variability observed is caused by different air mass origins and necessitates a higher frequency of measurement flights in order to obtain representative trace gas climatology in Eastern Europe.

An intensive measurements campaign is to be performed with a frequency of one flight per 5-7 days, from the beginning of 2006.