Geophysical Research Abstracts,
Vol. 10, EGU2008-A-10046, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-10046
EGU General Assembly 2008

Determination of mixing layer height with a ceilometer at a tall-tower site near Bialystok, Poland

D. G. Feist, E. Popa, C. Gerbig and M. Heimann

Max Planck Institute for Biogeochemistry, Jena, Germany (dfeist@bgc-jena.mpg.de)

Tall tower measurement sites can provide continuous records of various climate-relevant atmospheric gases at different altitude levels. With the help of inverse transport models, the results can be used to determine sources and sinks of important greenhouse gases. One such tall tower site has been established near Bialystok, Poland, by the Max Planck Institute for Biogeochemistry in Jena, Germany. It has been providing accurate in-situ measurements of CO_2, O_2/N_2, CH_4, CO, N_2O, and SF_6 at five sampling levels from 5 m to 300 m since July 2005.

Depending on the height of the tower and meteorological conditions, the different levels are influenced by air masses on a local to synoptic scale. A critical parameter for the analysis of the data is the mixing layer height. If the top of the tower is still inside the mixing layer the measurements at the top level would be mostly influenced by local to regional sources and sinks. If the top is already in the free troposphere the measurements would be influenced by long-range transport. However, the mixing layer height cannot be derived from the tower measurements alone.

To support the tower measurements, a Vaisala CL31 ceilometer was installed at the tower site in September 2007. Similar to a Lidar it sends a pulsed laser signal up into the atmosphere and measures the backscattered signal from aerosols. The measurement principle works during day and night.

Normally, the instrument provides only cloud base ceiling height for up to three layers of clouds. However, it is also possible to derive the mixing layer height directly from the backscatter signal. With this additional information, the interpretation of the tall tower measurements should become more accurate. If the scheme works well, other

tall tower sites will be equipped with similar systems.