Geophysical Research Abstracts,
Vol. 11, EGU2009-3858-1, 2009
EGU General Assembly 2009

Use of spectral analysis method to evaluate the precision of different fast response ozone sonde and the effect on ozone fluxes

Z. Zhu (1,2), A. Tsokankunku (1), M. O. Andreae (1), T. Fpken (3), F. X. Meixner (1,4)

(1) Max-Planck_institute for Chemistry, Biogeochemistry, Mainz, Germany (zhuzl@mpch-mainz.mpg.de), (2) Key Laboratory of Ecosystem Network Observation and Modeling, Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing, China, (3) University of Bayreuth, Dept. of Micrometeorology, 95440 Bayreuth, Germany, (4) Department of Physics, University of Zimbabwe, Harare, Zimbabwe

High concentration ozone in the troposphere has negative effect on human health and plant tissue. To investigate the vertical changes of ozone fluxes at different heights, 4-layer ozone fluxes were measured by using eddy covariance method above and below the canopy of a 55 yr old spruce forest (Fichtelgebirge, Germany). The heights are 1m 17m 25m and 32m above ground. The mean tree height is about 21m. The sonic anemometers are 3 Gill R2 and 1 CSAT3, and fast ozone sonde are also made in different companies or home-built. As ozone sondes at different heights are not the same, to eliminate the error caused by instruments, side-by-side comparison was also executed. The results show there was lager difference in ozone flux measured by different sondes located at the same position. The biggest relative error can reach as high as 40
standard, spectral analysis method was used to evaluate their precisions and uncertainties. In this study, we calculated the power spectra and cospectra (with vertical speed) of 5 sondes using 72 run half-hourly 20Hz raw data. All normalized spectral density was averaged according to different frequency range. By analyzing spectral density distribution with frequency and comparing to theoretic curve, we determined the best one as the relative standard. Meanwhile, the relationships between the standard and other sondes were calculated. Finally, we compared the ozone fluxes before and after correction. The corrected fluxes at different heights are more reasonable compared with that before.