Geophysical Research Abstracts, Vol. 7, 04407, 2005
SRef-ID: 1607-7962/gra/EGU05-A-04407

ADVANCES IN ACTIVE REMOTE SENSING OF ATMOSPHERIC WATER VAPOUR BY AIRBORNE DIFFERENTIAL ABSORTION LIDAR

G. Ehret, A. Fix, H. Flentje, C. Kiemle, and M. Wirth

Institut für Physik der Atmosphäre, DLR Oberpfaffenhofen, 82234 Wessling, Germany

Gerhard.ehret@dlr.de

Improved modelling of the state of the atmosphere requires improved observations of atmospheric water vapour. Envisaged data can be provided by airborne Differential Absorption Lidar (DIAL) which enables the direct sampling of the horizontal and vertical variability of atmospheric water vapour with unprecedented accuracy and spatial resolution. Moreover, the unique nature of this measurement technique makes airborne H2O-DIAL a preferable instrument for the validation of other observational techniques such as space-borne passive and active remote sensing instruments. In this presentation we report on selected cases from recent field campaigns which highlight the potential of airborne water vapour DIAL for atmospheric research. During the IHOP field campaign, high spatial (150 m vertical, 150 m horizontal) and temporal (1s integration time) resolution water vapour cross sections have been measured which enabled the investigation of boundary layer heterogeneity and turbulence as well as the determination of water vapour fluxes with data obtained from co-located airborne Doppler wind lidar. Water vapour cross section received from IHOP transfer flights over the North Atlantic and the US exhibit the high structured water vapour field of extra tropical cyclones and stratospheric intrusions in great detail. Indication of the Hadley circulation have been obtained from measurements during TROCCINOX transfer from Brazil to Europe when crossing the ITC. Utilisation of strong water vapour absorption lines at 935 nm enables remote sensing of stratospheric water vapour by airborne DIAL. From dedicated validation flights in the subtropics the performance of water vapour soundings with the MIPAS instrument on ENVISAT in the UT/LS could be assessed.