Geophysical Research Abstracts,
Vol. 11, EGU2009-6996-1, 2009
EGU General Assembly 2009

Use of integrated profiling techniques for studying cloud-radiation interactions

K. Ebell (1), S. Crewell (1), U. Loehnert (1), and E. O'Connor (2)

(1) Institute for Geophysics and Meteorology, University of Cologne, Cologne, Germany (kebell@meteo.uni-koeln.de), (2) Department of Meteorology, University of Reading, Reading, United Kingdom

The calculation of radiative flux profiles requires the knowledge of the atmospheric state, i.e. temperature, humidity, cloud liquid water and cloud ice profiles. These properties have been derived for a continuous nine month period for a site in the Black Forest, Germany, using the Integrated Profiling Technique (IPT) and the CloudNet retrieval algorithms. The IPT employs multiple measurements of active and passive remote sensing instruments for various wavelengths, namely ground-based microwave radiometers, a cloud radar and lidar, as well as a priori information from radiosondes. In combination with the CloudNet target classification product these measurements are integrated via an optimal estimation technique to derive vertical profiles of temperature, humidity and liquid water content. This framework also yields error estimates for the derived profiles. Given the atmospheric profiles and their uncertainties, the effects of clouds on the vertical distribution of radiation can be investigated in a comprehensive way. First, we want to quantify the uncertainty of the retrieved profiles and the sensitivity of the results to retrieval modifications, e.g. inclusion of additional measurements, use of different microwave cloud absorption models. As a next step, radiative flux closure studies are performed using the IPT results as input data for the radiation scheme of the German Weather Service's COSMO-Model. In this context, the cloud radiative effects and forcings will be investigated as well as their limitations due to the uncertainty of the retrieval technique.