Geophysical Research Abstracts, Vol. 9, 06574, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-06574

The Cirrus III Campaign: Comparison of Observations with Model Simulations

F. Weidle(1), M. Krämer(2), N. Spelten(2), P. Spichtinger(3) and H. Wernli(1)

(1) Institue for Atmospheric Physics, University of Mainz, Germany (fweidle@uni-mainz.de), (2) FZ Jülich, Germany, (3) Institute for Atmospheric and Climate Science, ETH Zurich, Switzerland

Microphysical processes that are involved in the formation and evolution of cirrus clouds are not well understood. Due to the complexity of these processes numerical weather prediction (NWP) models use highly simplified parameterisations of cloud formation - usually a simple bulk parameterisation predicting only the ice mass concentration. In addition the validation of cirrus clouds in NWP models is quite complex due to the lack of comparable measurements. The instrumentation of the Cirrus III campaign provide the opportunity to calculate the in-situ ice water content (IWC) in cirrus clouds which is the common prognostic parameter that describes ice clouds in NWP models.

The Cirrus III midlatitude frontal cirrus field experiment took place in November 2006 in Northern Germany. Six flights were performed in the altitude range from 7-12km, covering latitudes from 45 to 70 degree North. Extensive measurements inside and outside frontal cirrus clouds have been performed to analyse processes of heterogeneous and/or homogeneous cirrus formation. Here we use IWC data from operational ECMWF analyses and forecasts, and for a selection of cases from hindcast experiments with the nonhydrostatic limited-area model LM (Local Model). Data from these models is interpolated along the actual flight paths in order to make qualitative comparisons with observations. This comparison has two different goals:

- Model validation: Measurements are used to investigate how good cirrus clouds are represented by the different numerical models. In addition the LM provides capability to test the influence of different microphysical schemes on the cirrus cloud formation.

- Analyses of processes that lead to the formation of cirrus clouds: LM simulations

and ECMWF analyses and forecasts are used to investigate the history of air parcels within which cirrus clouds have been formed. To this end, trajectory calculations are performed, and a microphysical box-model with a more detailed microphysics (two moment bulk microphysics, different formation processes as homogeneous and heterogeneous nucleation including explicit impact of background aerosols) is run along these trajectories. This allows to derive information about the age of the cirrus clouds, the origin of the involved air masses and the detailed microphysical processes that lead to the cirrus formation.