Geophysical Research Abstracts, Vol. 8, 00409, 2006
SRef-ID: 1607-7962/gra/EGU06-A-00409

Improved understanding of convective cell growth under post-frontal conditions as a prerequisite for a hybrid forecast scheme

T. Weusthoff (1), T. Hauf (1)

(1) Institute for Meteorology and Climatology, University of Hannover, Germany (weusthoff@muk.uni-hannover.de / Fax-Nr. 0511 762 4418)

The formation of convective shower cells over land appears to be chaotic. It is difficult to predict, when and where a cell emerges and how it develops further, if it stays alone or if it attaches to other cells and finally form a larger complex. Cell growth of and within thunderstorms is a well-studied problem, whereas midlevel shower convection, where cell duration is shorter and individual cells are smaller and having lower radar reflectivities, has drawn less attention. This study deals with the evolution of convective cells under post-frontal conditions, in the cold air mass behind a cold front. There often an area can be found of up to several 100 km with shower precipitation, which appears to be distributed randomly. Previous studies on the same subject show that the geometrical structure of the precipitation field is describable by simple analytical and log-normal distributions. To investigate the development of the individual rain areas within the precipitation field, a tracking algorithm was developed, based on the new radar composite RZ of the DWD, and evaluated for two different days with post-frontal shower precipitation (with a total of more than 142,500 individual rain areas). The algorithm allows to track individual rain areas with time (at time steps of five minutes) and, thus, to investigate their behaviour. Such an enclosed rain area is referred to as cluster and can consist of one or more single cells, defined by the maxima of radar reflectivity inside the cluster.

The development of convective clusters is governed by a typical lifecycle and by the interactions with neighbor cells and clusters. It can be subdivided into different stages: (i) genesis, (ii) growth (including merging), (iii) stagnation, (iv) decay (including splitting) and (v) dissolving. First results of an analysis of post-frontal shower precipitation

of two days in the year 2004 are presented. Among other results, the transition likelihoods from a cluster with *n* to one with *m* maxima was determined. It was found that the transition within one time step is mainly from *n* to *n+1* or *n-1*. That means that cluster grow and decay preferably by one cell.

The information about cluster movement and undergoing changes is needed to determine local rain duration and rain amount and will contribute to a planned forecast scheme. This forecast scheme combines a deterministic dynamical forecast of the typical post-frontal convection with a probabilistic forecast of the apparent small-scale cloud and precipitation structure, resulting in a hybrid probabilistic forecast scheme. The development of the scheme will be done within the scope of the priority program SPP 1167 “Quantitative Precipitation Forecast”, funded by the German Research Foundation (DFG).