Geophysical Research Abstracts, Vol. 7, 03547, 2005
SRef-ID: 1607-7962/gra/EGU05-A-03547

Dynamics of error growth and propagation in cloud-resolving models

C. Hohenegger and C. Schär

Institute for Atmospheric and Climate Science, ETH Zürich, Switzerland
(hohenegger@env.ethz.ch)

The rapid amplification of small-amplitude perturbations through the chaotic nature of the climate/weather attractor ultimately disrupts the deterministic skill of any weather forecast. On the synoptic scale, this process is mainly determined by the evolution of baroclinic disturbances, while on smaller scales, new evidence suggests the primacy of moist convection. In this study, the dynamics associated with the growth and propagation of errors on the meso scale is investigated by means of real-case simulations performed with the LM model of the German Weather Service. The model is run at a convection-resolving resolution of 2.2 km, and a wide range of initial perturbations is tested.

Results show that both sound and gravity waves concur to the propagation of small-amplitude perturbations, which in turn may excite new disturbances in convectively unstable regions. Moist convection appears to be a necessary condition for rapid error growth, but its presence is not always sufficient. The results also demonstrate a surprisingly small sensitivity of error growth to the imposed initial perturbation. This confirms the control through flow characteristics and/or topographic effects, and highlights the non-linearity of the system.