Geophysical Research Abstracts, Vol. 7, 01233, 2005
SRef-ID: 1607-7962/gra/EGU05-A-01233

Tropical Cyclone - baroclinic Wave Interaction in idealised moist Simulations

M. Riemer and S. C. Jones
Institute of Meteorology and Climate Research, University of Karlsruhe

It is well recognised that tropical cyclones are an outstanding feature of the tropical atmosphere. However, their potential influence on the midlatitudes is widely underestimated. A tropical cyclone undergoing extratropical transition (ET) has a direct influence on the synoptic-scale midlatitude circulation. However, arguably the more significant influence is the excitation of a Rossby wave train on the midlatitude potential vorticity gradient by the diabatically forced upper-level outflow of a poleward moving tropical cyclone. This wave train then propagates downstream and alters the midlatitude flow pattern. Thus an ET event taking place in the western North Atlantic can initiate explosive cyclogenesis in the eastern Atlantic and western Europe and might trigger severe precipitation events in the Mediterranean. Numerical weather forecasts frequently fail to capture this downstream influence. Thus the impact of ET on midlatitude predictability will be investigated as part of THORPEX.

To investigate the interaction of a tropical cyclone with the midlatitudes we are performing full physics numerical experiments using the PSU/NCAR MM5 modelling system with idealised initial conditions. Periodic boundaries in the zonal direction allow a channel configuration. A vortex-following nesting renders a higher resolution around the modelled tropical cyclone possible. In our initial experiment the midlatitude flow is represented by a balanced straight jet stream. A tropical cyclone approaches the jet stream from the south. The interaction between the tropical cyclone and the midlatitude circulation leads to the formation of a distinct jet streak. In the left exit region of the jet streak an extratropical cyclone develops and deepens rapidly. A Rossby wave train can be seen to propagate downstream from the ET event leading to the development of further baroclinic systems.

Currently the interaction of the tropical cyclone with an ongoing baroclinic develop-

ment of one of two paradigms of baroclinic life-cycles is being investigated. These simulations should allow an assessment of the tropical cyclone - midlatitude flow interaction under more realistic conditions. The results of this study will be used to quantify the influence of the tropical cyclone on the development of midlatitude systems located downstream of an ET event.