



## **Evaluation of the ECHAM boundary layer scheme against large eddy simulations**

A. Chlond

Max Planck Institute for Meteorology, Hamburg, Germany (chlond@dkrz.de)

To evaluate the quality of the representation of stratocumulus in a General Circulation Model, results from the standard ECHAM Single Column Model (SCM) are contrasted against diagnostics from large-eddy simulations. Results of the standard ECHAM-SCM reveal the following deficiencies: too low values of the liquid water path, and unrealistically large levels of turbulent kinetic energy within the cloud layer due to a numerical instability arising from a decoupling of radiative and diffusive processes. Based on these findings the SCM has been revised. The modifications include the vertical advection scheme, the numerical treatment of diffusion and radiation, and the combination of the 1.5-order turbulent closure model with an explicit entrainment closure at the boundary layer top in combination with a front tracking/capturing method. It is demonstrated that with these modifications the revised SCM produces a fair simulation of the diurnal cycle of the stratocumulus topped boundary layer which is significantly improved compared to the one performed with the standard SCM.