



Hans-Ertel-Centre for Weather Research: The Planetary Boundary Layer in Numerical Weather Prediction

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The planetary boundary layer (PBL) plays an important role in numerical weather prediction (NWP) and climate simulations. In particular stable PBLs and PBLs over complex surfaces pose difficulties in both contexts. Coherent subgrid-scale (SGS) motions contribute to the exchange with the land surface and lead to SGS turbulence organization and intermittency that are not represented in current PBL parameterization schemes. The aim of the project is to address these topics with the following goals: (1) Development of a state-of-the-art PBL turbulence and cloud model, using a closure based on probability density functions (PDFs), but also stochastic approaches. (2) Analysis and representation of coherent SGS dynamics in the PBL parameterization, and hence of SGS organization and intermittency of SGS turbulence. (3) Development of assimilation and parameter estimation using surface-sensitive satellite observations in a 1D coupled land-atmosphere system. (4) Eventually better prediction of extreme and high-impact weather, as well as climate diagnostics, using these improved model components within the ICON (Icosahedral non-hydrostatic) general circulation model. In our contribution we will present our plans to address these goals.