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GABLS4: An intercomparison case for 1D models to study the stable boundary layer at Dome-C on the Antarctic plateau

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Within the GEWEX Atmospheric Boundary Study (GABLS) so far three column model intercomparison experiments have been organised. Since GABLS1 (Cuxart et al. 2006, BLM), GABLS2 (Svensson et al 2011, BLM) and GABLS3 (Bosveld et al 2012, ECMWF proceedings), some progress has been made in numerical weather prediction and climate model for the stable boundary layer. Nevertheless, under strongly stable stratification and depending on the parametrization used, models still produce a large warm or cold bias, excess of mixing or strong decoupling from the surface (Holtslag et al, 2013, BAMS).

Here the set-up of a new GABLS case will be discussed for Dome-C on the Antarctic plateau. For this case, several types of in-situ measurements on the surface and the boundary layer are available: a 45m tower with 6 levels of sensors measuring temperature, wind and humidity (Genthon et al, 2010), the temperature profile in the snow pack from the surface to 2m depth, radiative fluxes (Lanconelli et al, 2011), and twice a day radio-soundings at specific times.

The new GABLS4 case is based on a "typical diurnal cycle for summer" at Dome-C with a amplitude about 18°C, with a very shallow boundary layer during night. The effects of the initial conditions and the forcing for the single column model will be studied in detail. Two 1D experiments will be proposed: the first one with a full coupling with the surface (snow) scheme and the second one with a prescribed surface temperature. Finally, the possibilities for a LES inter-comparison will be discussed.