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Sensitivity tests of the roughness length for heat to the GABLS4 experiment

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The GABLS4 experiment (Gewex Atmospheric Boundary Layer Study) is an inter-comparison exercise which aims at studying the interaction between the snow surface of the Antarctic Plateau at DomeC and the boundary layer under strong stability.

The first GABLS4 comparisons of surface and boundary layer variables exhibited a large variability among models. It was shown that roughness lengths played a key role in the first meters of the surface boundary layer at DomeC.

In this study, we tested two approaches to specify the roughness length for heat, first assuming it is a fixed ratio of the roughness length for momentum and second by relating this ratio to the Reynolds roughness number (Zilitinkevitch 1995). The impact of these two approaches will be shown on stand-alone surface simulations covering a 15 days period (LSM) and 1d-coupled single column model runs of a diurnal cycle (SCM), made with the CNRM models SURFEX and Arome/Arpege respectively.