INTRODUCTION
To increase the understanding of clouds and precipitation (CP) and its representation in GCMs, the High Definition Clouds and Precipitation for advancing Climate Prediction (HD[CP]2) project aims at performing large-eddy simulation (LES) hind casts of diurnal cycles of convection using (horizontal) grid spacings of \( \Delta = 100 \) m at spatial scales as large as Germany. These grid spacings are sufficient to explicitly represent dry/shallow convection and avoid modeling issues in the convective grey zone, but leave some other processes unresolved. One potentially explicit representation in GCMs, the stable nocturnal boundary layer (NBL), requiring a grid spacing of \( \Delta z \sim 300 \) m (~100 m coarse as 100 m)?

LARGE-EDDY SIMULATION CODE
UCLA-LES 4.0 is used for the numerical experiments, with a (non-dynamic) Smagorinsky-Lilly type sub-grid scheme as it is a likely candidate for the HD[CP]2 model setup. A simple land-surface model (LSM) was added to allow for feedbacks between the surface and atmosphere.

SETUP OF THE NUMERICAL EXPERIMENTS
The physical setup is summarized by Fig. 1: within a 21 hour simulation, ~3 hours of convection (Fig 1a) is followed by the development of a stable NBL (Fig 1b) and a second day with convection (Fig 1c). To cover the typical summertime NBL conditions (characterized from measurements at Cabauw and Hamburg), the geostrophic wind and surface cooling rate is varied over three experiments (Table 1). Variation of the surface cooling rate is achieved by reducing the thermodynamic (turbulent) aspects, moisture is excluded from the setup. For each experiment a sensitivity study on resolution is performed, increasing the grid spacing in factors of two from \( \Delta = 3.125 \) m to \( \Delta = 100 \) m at spatial scales as large as Germany. These grid spacings are sufficient to explicitly represent dry/shallow convection and avoid modeling issues in the convective grey zone, but leave some other processes unresolved. One potentially explicit representation in GCMs, the stable nocturnal boundary layer (NBL), requiring a grid spacing of \( \Delta z \sim 300 \) m (~100 m coarse as 100 m)?

RESULTS
The ABL depth and ABL-averaged potential temperature biases (compared to the \( \Delta z \) reference cases) at sunset (t=ii), sunrise (t=ii) and noon during the second day of convection (t=iii) are summarized in Figure 3.

CONCLUSION AND OUTLOOK
Although insufficient resolution introduces significant biases in the NBL, the influence of these dynamically introduced biases on daytime convection is small. However, being focused on dynamics, our experiments neglect the influence of moisture. With moisture included, the relative large NBL biases might result in the (spurious) formation of fog or low clouds. When interacting with radiation, this could further amplify the biases in the NBL. We will address this question in future work.