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Planetary boundary layer depicted by most recent regional reanalyses

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During the last years computational power enables to perform regional climate simulations on high-resolutions (10 km and less) over a couple of decades. The so-called regional hindcasts allow to get a detailed picture of the atmospheric processes in the last decades, which can still not be provided by global reanalysis products as ERA, NCEP or MERRA. Thus, regional hindcasts become more and more important for applications in e.g. the field of reinsurance and renewable energy.
However, the main question arises how suitable are the regional hindcasts for the different applications. Within the framework of the project openFRED our main focus is on the energy system modelling of renewables. We aim at investigating the performance of various hindcasts with respect to the representation of the planetary boundary layer (PBL), i.e. how well the thermo- and hydrodynamic state of the PBL is captured by the models. Our study involves, on the one side, regional hindcasts utilizing sophisticated data assimilation techniques to force the model to observations. Thanks to the UERRA project most recently reanalyses over Europe were performed and provided by various European meteorological services (for instance the COSMO-REA6 product by the DWD). On the other side, our study involves regional hindcasts based on dynamical downscaling of global reanalyses (as done for example at the Helmholtz-Zentrum in Geesthacht).
In the presentation we address the problem of finding evaluation data independent in the sense of a data assimilation process. The evaluation of the daily cycle of the PBL is shown as well as the performance with respect to the timing of specific lower-tropospheric weather events. Moreover, it is discussed whether and how far the reanalysis products are superior over the “simple” downscaling products.