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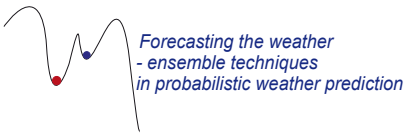

Field experiments and numerical simulations for investigating soil and planetary boundary layer interrelationships in Hungary – WRF case studies

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Partition of surface energy budget components is strongly dependent upon both soil moisture content and the soil hydraulic properties mainly via evapotranspiration. This partition determines the state of near surface air, so also the turbulent transport of momentum, heat and moisture. The transported energy via turbulent mixing also considerably affects the planetary boundary layer (PBL) height.
In this study, two soil datasets were considered, both refer to Hungary. One is called MARTHA (Hungarian Detailed Soil Hydrophysical Database), in which the number of soil samples is 15 times higher than in the other, the HUNSODA (Unsaturated Soil Hydraulic Database of Hungary), though the spatial resolution is only five times denser. Because of the amount of soil samples the main hydraulic properties as the wilting point, the field capacity and the saturated soil moisture content significantly differ which determine both the evapotranspiration and the PBL height. Simulations of the PBL height are to be conducted over the Carpathian basin on 3 km horizontal resolution. The calculated PBL heights will be compared to windprofiler and RASS observations on a synoptical station in Hungary. In order to analyze in depth the soil/PBL height relationships on mesoscale, a 160 km x 160 km size nest will be applied. The resolution of the one-way nest is 1 km with the center of the chosen synoptical station. Quantifying the relationships, a significance test which refers to the diurnal course of PBL height, air temperature at 2m surface latent heat flux is to be calculated as well. Preliminary results show that the simulated PBL height differences can be up to 25% at midday on a summer day.