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Improvement of fog predictability in a coupled system of PAFOG and WRF

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Fog is difficult to predict because of the multi-scale nature of its formation mechanism: not only the synoptic conditions but also the local meteorological conditions crucially influence fog formation. Coarse vertical resolution and parameterization errors in fog prediction models are also critical reasons for low predictability. In this study, we use a coupled model system of a 3D mesoscale model (WRF) and a single column model with a fine vertical resolution (PAFOG, PArameterized FOG) to simulate fogs formed over the southern coastal region of the Korean Peninsula, where National Center for Intensive Observation of Severe Weather (NCIO) is located. NCIO is unique in that it has a 300 m meteorological tower built at the location to measure basic meteorological variables (temperature, dew point temperature and winds) at eleven different altitudes, and comprehensive atmospheric physics measurements are made with the various remote sensing instruments such as visibility meter, cloud radar, wind profiler, microwave radiometer, and ceilometer. These measurement data are used as input data to the model system and for evaluating the results. Particularly the data for initial and external forcings, which are tightly connected to the predictability of coupled model system, are derived from the tower measurement. This study aims at finding out the most important factors that influence fog predictability of the coupled system for NCIO. Nudging of meteorological tower data and soil moisture variability are found to be critically influencing fog predictability. Detailed results will be discussed at the conference.