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Impact of a Land Surface Model (LSM) in a Mesoscale Model on the Prediction of Heavy Precipitation Events

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High-resolution mesoscale models have shown considerable promise in the prediction of mesoscale precipitation events. In particular, the Coupled Ocean/Atmosphere Mesoscale Prediction System (COAMPS), developed for use by the U.S. Navy, and applied for real-time prediction by the Interdisciplinary Centre for Mathematical and Computational Modeling (ICM), has shown skill in the prediction of significant mesoscale rainfall events. Although the original version of COAMPS used a slab model to represent the land surface, recent experiments have been conducted with a new version of COAMPS that uses the NOAH land surface model (LSM) and the NASA Land Information System (LIS). The NOAH LSM uses 24 different land-use categories and 15 plant functional types. Each grid cell in COAMPS is comprised of a mosaic of up to 5 different land-use types, and those grid cells with a vegetation land-use type are further broken down into a maximum of 4 different plant functional types. Simulations have been performed using the slab- and NOAH LSM-versions of COAMPS on several significant rain events that occurred over Poland during the spring and summer of 2010. These simulations indicate that the land-surface interactions can alter the generation, maintenance, and decay of these rain systems, although these interactions are often small and subtle. This talk will address the configuration of two versions of COAMPS, a brief description of the rain events under study, and the results and validation of the tests that have been performed; along with suggestions for further work that is required in this area. Within the validation of the runs, a comparison will be given of the structure of the boundary layers that are formed using the slab- and NOAH LSM configurations of COAMPS, and how the differences in the boundary layer structures from these two versions of the model affect the timing, strength, and distribution of these precipitation events.