Development of a complex dynamical modeling system for the meteorological support of unmanned aerial operations in Hungary

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The accurate, high detailed and specific meteorological information is essential for unmanned aerial operations. Fulfilling this requirement an Integrated Aviation Weather Prediction System (IAWPS) has been developed. An extensive technical implementation of Weather Research and Forecasting limited area model has been applied to supply operative numerical prediction information for IAWPS. Different parameterization of the model system have been investigated on 9 typical weather situations, all of them having aeronautical safety relevance from the weather hazard point of view. The model setup included parallel run of 30 different ensemble members, each of them having different combination of possible parameterization. Verification of the ensemble members against observation and measured vertical profiles of all typical weather situation yielded optimal model parameterization setup for operative usage. Furthermore, meteorological measurements with sensors developed especially for unmanned aerial operations have been done. This paper introduces the applicability of this numerical weather prediction system for special forecasting needs of unmanned aerial systems. Following the short introduction of the weather prediction system that was applied, results of the case study test runs are compared to both surface and spatial observations which consequently determined operative model setup and further investigations. The experiences of UAV flights are also presented. Results are introduced and the directions towards further development are described.