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Fine tuning of WRF data assimilation frame with software container based simulation platform

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Development of a good performing data assimilation frame in an operative limited area numerical prediction system typically requires immense computational resources as plenty of experiments shall be performed, meanwhile these necessary capacities however are usually available on non-homogeneous IT platforms, even are hosted many places. To manage scalability and platform independent portability, a new layer – supporting state of the art software container technology and batch processing – has been applied. Encouraged by prior successful benchmark tests and promising fine tuning results of our operative WRF-ARW based numerical prediction system on this new technology the effect of various data assimilation setups has been investigated over 10 different cases and many configurations. These investigations performed typical data assimilation experiments especially forecast sensitivity to observation as new data category – provided by various unmanned aerial vehicles in the lower troposphere – has been newly introduced. The performance of plenty of different runs can be compared in a uniform database, yielding a sufficiently wide pool of samples in order to obtain configuration of the data assimilation frame and modeling system optimal to the scope of our research, based on a relatively objective selection method. Continuously expanding database of near real-time preliminary outputs gives the opportunity for run-time steering of the experiments. This research currently benefits the development of an aviation meteorological support system including unmanned aerial systems as well, in the meanwhile our contributions could be applied in an even wider aspect, either from the applicability of big data technology point of view, or with respect to the given best practice model setup.