

Evaluation of the Inline WRF-HYSPLIT Model for Mesoscale Atmospheric Transport and Dispersion

A new, inline framework that combines the Weather Research and Forecasting (WRF) model with the Hybrid Single-Particle Lagrangian Integrated Trajectory model (HYSPLIT) has been developed by the Air Resources Laboratory to improve atmospheric transport and dispersion (ATD) predictions. This inline model, herein referred as WRF-HYSPLIT, has been shown to have some advantages over the traditional off-line implementation of the HYSPLIT model, particularly for meso-gamma-scale, short-range, ATD predictions. Thus, it is of interest to investigate this new inline capability and to assess the potential advantages and limitations of its use. Here, testing of the WRF-HYSPLIT is conducted using field data from a tracer experiment over Colorado Springs, Colorado, USA on 21 October 2010. Two experiments are conducted using WRF, version 3.7, and WRF-HYSPLIT. Comparisons of the morphology of the plumes and computed differences are analyzed. The ability of the models to accurately represent the concentration measurements is also evaluated. Preliminary testing for this case study shows the WRF-HYSPLIT to have some advantages over the traditional implementation of HYSPLIT for mesoscale dispersion. Overall, the WRF-HYSPLIT model provides a unique platform for ATD predictions. Better model performance could be expected as additional parallelization of the code and prognostic fields are implemented and utilized.

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Track Classification: 1. The Earth as a complex system