P72 Coupling of WRF and a Lagrangian particle dispersion model that includes a scale-aware cumulus parameterization.

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Evolution in our understanding of tropospheric convection has led to the development and use of a wide range of cumulus parameterizations for numerical weather prediction, each offering a unique set of closure assumptions and parametric descriptions to govern the interaction between the convection and ambient forcing. Many factors determine the suitability of a particular cumulus parameterization for a given set of requirements. For inverse flux applications—where emissions, e.g. of a greenhouse gas, are inferred from atmospheric receptor measurements and an atmospheric transport model—the use of the mass flux class of parameterizations to represent cumulus convection is critical for maintaining mass conservation and minimizing transport errors. Furthermore, in order to address the complications arising from model resolutions in the grey zone between parameterized and resolved convection, scale-aware formulations such as the Grell-Freitas Ensemble Scheme (option 3) have been added to WRF. In earlier work the WRF model (v2.1.2, and more recently v2.2 and v3.0) was coupled to the Stochastic Time-Inverted Lagrangian Transport (STILT) model, which incorporated a version of the Grell-Devenyi Ensemble Scheme. However, that option was deprecated in WRF v3.5 (option 93). This paper describes recent WRF model changes that are needed to couple STILT to the Grell-Freitas Ensemble Scheme and presents some results that demonstrate the performance of the WRF-STILT model.