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DART: New Research Using Ensemble Data Assimilation in Geophysical Models

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The Data Assimilation Research Testbed (DART) is a community facility for ensemble data assimilation developed and supported by the National Center for Atmospheric Research. DART provides a comprehensive suite of software, documentation, examples and tutorials that can be used for ensemble data assimilation research, operations, and education. Scientists and software engineers from the Data Assimilation Research Section at NCAR are available to actively support DART users who want to use existing DART products or develop their own new applications. Current DART users range from university professors teaching data assimilation, to individual graduate students working with simple models, through national laboratories doing operational prediction with large state-of-the-art models. DART runs efficiently on many computational platforms ranging from laptops through thousands of cores on the newest supercomputers.

This poster focuses on several recent research activities using DART with geophysical models: 1). Using CAM/DART to understand whether OCO-2 Total Precipitable Water observations can be useful in numerical weather prediction. 2). Impacts of the synergistic use of Infra-red CO retrievals (MOPITT, IASI) in CAM-CHEM/DART assimilations. 3). Assimilation and Analysis of Observations of Amazonian Biomass Burning Emissions by MOPITT (aerosol optical depth), MODIS (carbon monoxide) and MISR (plume height). 4). Long term evaluation of the chemical response of MOPITT-CO assimilation in CAM-CHEM/DART OSSEs for satellite planning and emission inversion capabilities. 5). Improved forward observation operators for land models that have multiple land use/land cover segments in a single grid cell, enabling studies of the inherent variability in a single gridcell.

Future enhancements are also discussed: 1). The CICE component of the Community Earth System Model will be added to the existing suite of components, which can be used for data assimilation. 2). Fully coupled assimilations, in which all observations can affect each model component, are under development.

The poster includes instructions on how to get started using DART for research or educational applications.