DART: A Community Facility Providing State-of-the-Art, Efficient Ensemble Data Assimilation for Large (Coupled) Geophysical Models


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1. DART 2.0 Highlights

- N-val handle much larger model states. This is needed for higher resolution and/or ensemble coupled DA with multiple components. Distributed model states cause all tasks during the extra cut in run time.
- N-val MPI communication allows tasks to request remote data from other processors, and the use of n-val communication allows easy tasks to request data from another task on demand without synchronizing tasks.
- In addition to data redistribution, a convenient step that translates between netCDF model files and a DART binary format file. This also reorganizes the leading dimensions to match data requirements.
- Ensemble data can be read and distributed across tasks on a variable basis, reducing redundant memory requirements.
- Diagnostic state space views now written in parallel with state-space variables, resulting in better I/O and lower memory requirements.
- Provides complete access to data, making it easy to access data in a heterogeneous computing environment.
- Support for all observation type localization radii.

2. DART in... The Data Assimilation Research Testbed (DART) is an open-source, community-driven framework for ensemble-based data assimilation developed at the National Center for Atmospheric Research (NCAR). DART works with a wide variety of climate and weather models and observation systems and has been funded and supported by the National Oceanic and Atmospheric Administration (NOAA) and the National Science Foundation (NSF) since 2005. DART’s development is an on-going process, and a new release of the system is being made available early 2016. DART works with a wide variety of observation types, including standard meteorological data (e.g., temperature, humidity, pressure) as well as more specialized data types (e.g., ocean salinity, sea surface temperature). DART can work with models that use netCDF files for I/O. There is no need for specific DART restart files. Models that do not use netCDF will still need conversion routines. DART’s support for multiple code bases, a Mellanox InfiniBand, 25 GB of user-usable memory per node, and redundant storage options makes the data available for future use.

3. Acknowledgments

The Data Assimilation Research Testbed (DART) is an open-source, community-driven framework for ensemble-based data assimilation developed at the National Center for Atmospheric Research (NCAR). The development is supported by the National Oceanic and Atmospheric Administration (NOAA) and the National Science Foundation (NSF) since 2005. The development is an on-going process, and a new release of the system is being made available early 2016. DART works with a wide variety of observation types, including standard meteorological data (e.g., temperature, humidity, pressure) as well as more specialized data types (e.g., ocean salinity, sea surface temperature). DART can work with models that use netCDF files for I/O. There is no need for specific DART restart files. Models that do not use netCDF will still need conversion routines. DART’s support for multiple code bases, a Mellanox InfiniBand, 25 GB of user-usable memory per node, and redundant storage options makes the data available for future use.