Engaging the Community in the Development of Physics for NWP Models

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Contributions from the community (national laboratories, universities, and private companies) have the potential to improve operational numerical models and translate to better forecasts. However, researchers often have difficulty learning about the most pressing forecast biases that need to be addressed, running operational models, and funneling their developments onto the research-to-operations process. Common impediments are lack of access to current and portable model code, insufficient documentation and support, difficulty in finding information about forecast shortcomings and systematic errors, and unclear processes to contribute code back to operational centers.

The U.S. Developmental Testbed Center (DTC) has the mission of connecting the research and operational Numerical Weather Prediction (NWP) communities. Specifically in the field of model physics, the DTC works on several fronts to foster the engagement of community developers with the Unified Forecast System (UFS) employed by the U.S. National Oceanic and Atmospheric Administration (NOAA). As a foundational step, the UFS' operational and developmental physical parameterizations and suites are now publicly distributed through the Common Community Physics Package (CCPP), a library of physics schemes and associated framework that enables their use with various models. The CCPP can be used for physics experimentation and development in a hierarchical fashion, with hosts ranging in complexity from a single-column model driven by experimental case studies to fully coupled Earth system models. This hierarchical capability facilitates the isolation of non-linear processes prior to their integration in complex systems.

The first public release of a NOAA Unified Forecast System (UFS) application is expected for February 2020, with a focus on the Medium-Range Weather Application. This global configuration uses the CCPP and will be documented and supported to the community. To accompany future public releases, the DTC is creating a catalog of case studies to exemplify the most prominent model biases identified by the US National Weather Service. The case studies will be made available to the community, who will be able to rerun the cases, to test their innovations and document model improvements.
In this poster we will summarize how we are using the UFS public release, the single-column model, the CCPP, and the incipient catalog of code studies to create stronger connections among the groups that diagnose, develop, and produce predictions using physics suites.