From Climate-Scale to Convective-Scale: Unified Weather and Climate Modeling at GFDL

GFDL has developed a suite of numerical models for the full climate system, covering timescales from minutes to millennia, unified around a common framework and common components. All models include atmospheres built around the GFDL Finite-Volume Cubed-Sphere Dynamical Core, FV3. FV3 uses a flexible and adaptable cubed-sphere grid and switchable nonhydrostatic dynamics, and can serve as the foundation for both efficient climate simulation and high-resolution weather prediction, and can also be used for cloud-resolving simulations through its regional and global variable-resolution capabilities. We focus on weather and subseasonal prediction applications using the GFDL System for High-resolution prediction on Earth-to-Local Domains (SHiELD). We also discuss the value of a unified system as advances in one model configuration can be seamlessly adapted by other models in the GFDL modeling suite or other FV3-based models. We close with a brief discussion of the NOAA Unified Forecast System of which the GFDL models are a part.

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