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The Thompson-Eidhammer Microphysics Parameterization for Operations (TEMPO): A Flexible Microphysics Parameterization for Operational Applications

Microphysics parameterizations are used in operational and research models across scales to understand clouds and precipitation and their impacts on weather and climate and to provide useful information for stakeholders. Models are continually being pushed toward higher resolutions and longer prediction times and are also being developed for both global and regional applications using various dynamical cores. To improve understanding of clouds and precipitation across scales, applications, and dynamical cores, there is a need to develop a more unified microphysics parameterization. A microphysics submodule, the Thompson-Eidhammer Microphysics Parameterization for Operations, or TEMPO, has been developed with the goal of unifying the parameterization across different applications while allowing for flexible development, flexible tuning for specific applications, and the flexibility to couple the parameterization to various dynamical cores. The initial version of TEMPO includes support for the Common Community Physics Package (CCPP) and the Model for Prediction Across Scales (MPAS), allowing the submodule to be used in the Global Forecast System (GFS), which currently uses the CCPP and the Finite-Volume Cubed-Sphere (FV3) dynamical core, and the Rapid Refresh Forecast System (RRFS) version 2, which is being developed with MPAS. TEMPO is tested using an Atmospheric River event case study from February 2023 that produced significant snow accumulation in the mountains east of Los Angeles, California. Preliminary results using both FV3 and MPAS at different horizontal resolutions will be discussed.