



Development and Implementation Strategies for NOAA's Unified Forecast System for operational NWP at NCEP

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NOAA's Next Generation Global Prediction System (NGGPS) has provided the unique opportunity to develop and implement a community based Unified Forecast System (UFS) powered by the Finite Volume Cubed Sphere (FV3) non-hydrostatic Dynamic Core developed at the Geophysical Fluid Dynamics Laboratory (GFDL). This enables the Production Suite at National Centers for Environmental Prediction (NCEP) to make a leap-step advancement in seamless prediction capabilities across all spatial and temporal scales. Model development efforts are centralized within the NOAA Environmental Modeling System (NEMS) infrastructure using Earth System Modeling Framework (ESMF) and a more sophisticated coupling among various earth system components using National Unified Operational Prediction Capability (NUOPC) standards.

Apart from the advanced non-hydrostatic dynamic core and coupling to various earth system components, advanced physics and data assimilation techniques are essential for improved forecast skill. NOAA's UFS is being developed using advanced physics and data assimilation strategies, using Common Community Physics Package (CCPP) and Joint Effort for Data Assimilation Integration (JEDI) respectively. Convective Allowing Model (CAM) capabilities using FV3 dynamic core are developed simultaneously to address the needs of severe weather forecasts including tropical cyclones using high-resolution ensemble based guidance. All these initiatives are designed to be community developed, with emphasis on research transitioning to operations (R2O). The R2O plans are further facilitated through the development of Community Common Unified Modeling Infrastructure (CCUMI) and Common Research and Operations Workflow (CROW).

Different layers of community partners are also established within the UFS governance, with specific roles/responsibilities for researchers, core development partners, trusted super-users, and operations. Stakeholders are engaged at all stages to help drive the direction of development, resources allocations and prioritization.

This talk presents the current and future plans of NOAA's UFS development at NCEP for weather, sub-seasonal, and seasonal climate prediction applications with special emphasis on the role of community interactions and strategies for advanced research transition to operations.