DEVELOPMENT OF MOVING NEST IN HAFS: PROGRESS AND ONGOING EFFORTS

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OUTLINE

• Goal of Moving Nest in HAFS
• Current Efforts and Accomplishments
• Ongoing Work

The Ultimate HAFS

06L: Florence; 08L: Helene; 09L: Isaac; 17E: Olivia; 26W: Mangkhut
CURRENT EFFORTS AND ACCOMPLISHMENTS
HAFS MOVING NEST DEVELOPMENT APPROACH

UFS
(HAFS LAM & Global Static Nested)

FMS and Coupling Infrastructure

FMS Supporting Telescopic and Moving Nests

Multi-way Coupling: Ocean, Wave, etc.

HAFS
(Multiple Nested LAM & Global Moving Nested)

Telescopic and Moving Nests

Telescopic Nest

Moving Nest
MOVING NEST IMPLEMENTATION

- Development of hurricane nests on global cubed sphere
- All prognostic variables moving
- Diagnostic variables recalculated
- Dynamics run for multiple timesteps
- Stable in 6 hour run
- Physics run over open ocean
MOVING NEST IMPLEMENTATION

Current Functionality
- Stable dynamics after nest move
- Multiple nest moves
- Dynamic core runs
- Physics routines run over ocean
- Grid/nest metadata moved

Configuration
- C96 with 3X nest refinement
- 4x4 PEs each parent cube face
- 5x4 PEs for nest
- 90s timesteps; 6 hour run
VARIABLE STAGGERING

- Most prognostic fields on A-grid
- Winds staggered on D-grid
  - Interpolated winds
    - A-grid
    - C-grid for flux calculations

FV3 Prognostic Variable Staggering (Non-hydrostatic)
STORM TRACKING ALGORITHM

Offline code test & evaluation
- Stability, uniqueness, and completeness (completed)
- Parallel code reproducibility (ongoing)
- Scalability test (ongoing)
ONGOING DEVELOPMENT
MOVING NEST IMPLEMENTATION

Moving Nest
- Feedback to parent grid
- Merge w/new GFDL dycore code
- Validate with idealized cases
- Higher resolution tests
- Regional configuration (LAM)

Tracking Algorithm
- Online storm tracking T & E

Pre-processing
- Workflow
- High-resolution grid generation
- High-resolution orography including land attributes

Post-processing
- Workflow
- Research and forecast products for moving nest(s)
Moving nest capability in global and regional HAFS can provide the accuracy, timeliness, and efficiency of forecasts within available HPC resources

- Significant progress on moving nest implementation has been demonstrated

- Full functionality of moving nest, storm tracking, and workflow requires ongoing development, test, and evaluation in the coming months