The Energy Exascale Earth System Modeling Project: Goals for Meeting

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March 19, 2019
”They” said it couldn’t be done..
DOE said “Just Do It!!!!...
WE did it!!!!

The DOE E3SM coupled model version 1: Overview and evaluation at standard resolution

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A Quick Review
“A DOE Model for the DOE Mission on DOE Computers”
Science and mission drives development and experimentation

- **Resolution** – weather-scale to convective scale-atmosphere and eddy-resolving ocean for simulation of multi-scale phenomena
- Utilize *next-generation disruptive computing* to enable high-throughput, high resolution simulations
- Extensive use of *ensembles* to quantify and bound uncertainty for *actionable predictions*. Even small reductions in uncertainty are useful in risk analysis.
- Coordinated efforts to *reduce biases* and *address mission questions*
Overlapping Development Cycle

- Two time horizons
  - Near term – v1 and v2 simulation campaigns and analysis
  - Intermediate term – developments for v3 and v4 models that are tested and functioning in the coupled v3 system in 5 years (both scientific and computational)

- Changed (and changing) computing landscape
  - Summit hybrid CPU-GPU design; 100+ PFLOP machine
  - NERSC9 – hybrid
  - Aurora ExaFLOP architecture just announced – hybrid
Phase 2 project structure

• Core activities
  – Run more like a “traditional” modeling center
  – v1 simulation campaign
  – Finalize v2 development, testing and simulation campaign
  – Performance optimization on current machines (Jones)
  – 5 groups – one for each science question, infrastructure (Jacob) and performance

• Next Generation Development for v3/v4 versions
  – Algorithms and Software
  – Cloud-Permitting Global Atmosphere
  – Atmospheric Physics
  – Land and Energy
Deliverables, Metrics and Roadmaps

• The project is evaluated
  – from delivering products
  – from documenting objective progress against metrics
• The plan to meet these objectives is in the roadmaps
• Reporting is everyone’s responsibility
Goals for meeting

• Project team cohesion (with or without alcohol)
• Synchronization (reality) check on current status
• Revision of plans and road maps
  – Project-wide and groups/sub-projects
  – Gaps and needs
  – Reallocation of effort