

Requirement questionnaire for new global atmospheric dynamic core in NEMS/ESMF

Interface

- Subroutinize model as an ESMF7 NUOPC component inside NEMS with a “cap” layer
- Break into init, run, and finalize steps, with multiple phases for each
- Ensure model grid in decomposed domain is represented in ESMF grid
- Communicate model information to NEMS such as grid navigation
- Represent output and exchanged fields as ESMF fields
- Import required fields from NEMS such as land-sea mask and sea surface temperature
- Export required fields to NEMS such as wind stresses and 2-meter temperature
- Accept from NEMS as subroutine arguments control parameters such as forecast length

Control

- Accept run-time parameters not specified by NEMS
- Enable key run-time science parameters such as resolution, physics
- Enable key run-time control parameters such as write frequency, restart frequency
- Enable irregular write frequency control
- Enable changing resolution during forecast
- Enable incremental analysis update (IAU)
- Enable adiabatic (no physics) mode

Physics

- Call physics via a unified physics driver
- Ensure physics and dynamics only exchange data through argument list
- Enable options to invoke standard GFS physics
- Make clear where land and hydrology processes run
- Enable stochastic physics

Quilt

- Gather model data to designated quilt nodes for further processing
- Let model proceed on model nodes after gather step
- Enable model input and output on quilt nodes
- Enable post processing on quilt nodes
- Enable multiple quilt groups each of which may have multiple nodes
- Make clear if quilt nodes may require horizontal interpolation

Formats

- Keep initial conditions files in NEMSIO
- Keep restart files in NEMSIO
- Keep history files in NEMSIO
- Enable unified post to run on quilt, which would write GRIB2

Build

- Make clear which parallel strategy is needed, e.g. MPI and OpenMP
- Make clear which external libraries and utilities are needed
- Make clear which languages and compilers are needed
- Make clear which platforms can run model

Make clear how build process works

Make clear how workflow process work