PLANS FOR GLOBAL HYCOM

Alan J. Wallcraft

Naval Research Laboratory

HYCOM NOPP GODAE Meeting

October 27, 2004

DOD HPC CHALLENGE PROJECT

- Most of the computation for 1/12° Global HYCOM will come from a FY05-07 DoD HPC Challenge project
- DoD competitively awards about 20% of its HPC resources to a few large projects
- Our “Global Ocean Prediction using HYCOM” is the largest single project to date in total cpu cycles, and probably the largest in % of total Challenge workload
- In the first year only two new machines within DoD HPCMP are large enough for this project
  - 3,000 cpu IBM POWER 4+ at NAVO (available Jan 2005)
  - 2,000 cpu Xeon Cluster at ARL (available March 2005)
- In FY05 we will use the NAVO machine, with dedicated (24-hours every day) use of about 700 POWER 4+ processors
- Our requirements increase in FY06 and FY07, but we will be able to use multiple machines

1/12° GLOBAL HYCOM TIME-LINE: FY05

- The following must be performed in sequence
  - Hence a single machine in FY05
- 20 model-years with climatological atmospheric forcing
  - Starting from climatology
  - Several 5-10 year spin-up cases
- 1995-2002 NOGAPS-forced inter-annual simulation
  - Starting from climatologically-forced case
- **One** May 2001 to June 2002 data assimilative hindcast
  - Starting from NOGAPS-forced case
  - Time frame with three satellite altimeters

1/12° GLOBAL HYCOM TIME-LINE: FY06

- **Nine** May 2001 to June 2002 data assimilative hindcasts
- **Five** May 2001 to June 2002 sets of bi-weekly 30-day forecasts
- **One** June 2002 to June 2006 data assimilative hindcast
- Starting in July 2006:
  - **Daily** near-real time 3-day hindcasts and 4-day forecasts
  - **Weekly** 30-day forecasts
- 2003-2006 NOGAPS-forced inter-annual simulation
  - extend 1995-2002 NOGAPS-forced case

1/12° GLOBAL HYCOM TIME-LINE: FY07

- Continue near-real time runs until transition to NAVO (December 2006)
- **One** 1993 to May 2002 data assimilative hindcast
  - Gives us a 1993-present “reanalysis”
- 2007 NOGAPS-forced inter-annual simulation
  - Gives us a 1995-present inter-annual simulation
- 1979-2006 ECMWF-forced inter-annual simulation
- **Four** May 2001 to June 2002 advanced data assimilative hindcasts
- **One** 10 model-year Atlantic simulation at 1/25° with climatological atmospheric forcing

ISSUES FOR FY05

- Global Thermobaricity
  - Single thermobaric reference state not possible for global ocean
    - Antarctic: 0 °C, 34.5 psu
    - Atlantic: 3 °C, 35.0 psu
    - Mediterranean: 13 °C, 38.5 psu
  - Locally, use linear combination of at most two of the above
    - Implemented but not yet debugged
- Sea-Ice
  - So far, only used Energy-loan (thermodynamic) ice model
  - Want to use LANL's CICE
    - Implemented on 2° grid, with CCSM coupler
    - Target is 1/12° and ESMF-based coupler
- Arctic patch halo exchange
  - Allows Arctic to Pacific throughflow
  - Under preparation