Ocean Model Development Panel (OMDP)

Co-Chairs
Simon Marsland (CSIRO, Australia), Gokhan Danabasoglu (NCAR, USA)

Mature: Coordinated Ocean-ice Reference Experiments (CORE-II)
Planned: Ocean Model Intercomparison Project (CMIP6/OMIP)
Emerging: New forcing product: JRA-55 (Japanese Re-analysis)

Thanks to Steve Griffies, Hiroyuki Tsujino, Veronika Eyring

http://www.clivar.org/clivar-panels/omdp
Coordinated Ocean-ice Reference Experiments (CORE)

Normal Year Forcing experiment (CORE-I): Griffies et al., 2009, Ocean Modelling
- 500 repeat years with synoptic variability (Griffies et al., 2009, Ocean Modelling)
- Large and Yeager (2009) corrected NCEP-NCAR reanalysis forcing
- Individual models choose own sea surface salinity restoring timescale
- Experiment for model-model intercomparison and benchmarking

Interannual Forcing Experiment (CORE-II): Danabasoglu et al., 2014, Ocean Modelling
- 5 x Repeat cycle hindcast 1948-2007 with interannual variability
- Addresses science questions related to real world events
- Special issue of ocean modelling – now 9 papers published
- Atlantic x2, sea-level, southern ocean x2, arctic x3, pacific, ...

CORE-II poster cluster: Wednesday

http://www.clivar.org/omdp/core
CORE-II Poster Cluster – Wednesday: 12 posters
Ocean and Climate Dynamics

Setup in Donghai Salon II – Wednesday

Wednesday: Session 3 - 19:30-20:30
Ocean and Climate Modelling Town Hall Meeting
Ocean Model Intercomparison Project (CMIP6/OMIP)

Eyring et al, GMD, 2016
OMIP addresses the CMIP6 science question on investigating the origins and consequences of systematic model biases, by providing a framework for evaluating (including assessment of systematic biases), understanding, and improving ocean, sea-ice, tracer, and biogeochemical components of climate and earth system models contributing to CMIP6.

Among the WCRP Grand Challenges (GCs), OMIP primarily contributes to the regional sea-level rise and near-term (climate / decadal) prediction GCs.
OMIP Overview

Specifically, OMIP provides a framework to:

- investigate physical, chemical, and biogeochemical mechanisms that drive seasonal, inter-annual, and decadal variability;
- attribute ocean-climate variations to boundary forced versus natural;
- evaluate robustness of mechanisms across models and forcing data sets;
- bridge observations and modeling by complementing ocean reanalysis from data assimilation;
- provide consistent ocean and sea-ice states useful for initialization of climate (e.g., decadal) predictions.
OMIP Part I: Diagnostic analysis of CMIP6 ocean components

CMIP Special Issue of Geoscientific Model Development
http://www.geosci-model-dev.net/special_issue590.html


OMIP Part II: Global Ocean and Sea-ice Simulations

- **Tier 1**: 310-year ocean/sea-ice hindcast
  - 1948-2009 by 5 repeat cycles
  - Initialised BGC fields from climatology

- **Tier 2**: 310-year simulation with interactive BGC after order millennia spin-up
Japanese Re-analysis (JRA-55)

Weaknesses of CORE-II:
• Over 10 years old, produced 2004 (last updated 2009); no new updates anticipated
• Lower resolution (space and time) product

Strengths of JRA-55:
• Higher resolution (space and time) product as models go to higher resolution
• Near real-time updates (tackle science questions for ‘current’ events
  • e.g. “hiatus”, 2015 El Nino, Arctic sea-ice decline, ...

<table>
<thead>
<tr>
<th>Feature</th>
<th>JRA-55</th>
<th>CORE-II</th>
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<tbody>
<tr>
<td>Space resolution</td>
<td>55 km</td>
<td>200 km</td>
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<tr>
<td>Time resolution for the</td>
<td>8 times per day</td>
<td>4 times per day</td>
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<tr>
<td>meteorology fields</td>
<td></td>
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<td>Years available</td>
<td>1958-2015 (will be</td>
<td>1948-2009 (not updated)</td>
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<td></td>
<td>frequently updated)</td>
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Participation in CORE-II/JRA-55 comparisons:
• MRI, NCAR, Kiel, CSIRO (ACCESS) and more anticipated ...
Runoff to the ocean (JRA-55 + CaMA-Flood)

Catchment-based Macro-scale Floodplain model:
• CaMa-Flood; Yamazaki et al. 2011
• Forced by runoff from JRA-55 land surface model adjusted relative to Dai et al. (2009)
• Horizontal resolution : 0.25° x 0.25°
• Daily time interval
• Support data for mapping to the ocean model grid are also provided

Southern Ocean runoff???

Choices for JRA-55 experimental protocols:
• What about Antarctica/Greenland?
• Currently blank
• Option 1: CORE monthly climatology
• Option 2: Iceberg distribution climatology (e.g. Merino et al., 2016)
• Questions: defining icescape? changing icescape? models with ice-shelf cavities?
• What will SOMIP do for landice/runoff from Antarctica???
Southern Ocean runoff???

Choices for JRA-55 experimental protocols:

- What about Antarctica/Greenland?
- Currently blank
- Option 1: CORE time invariant annual mean climatology
- Option 2: Iceberg spatial distribution seasonal climatology (e.g. Merino et al., 2016)

Questions:
- liquid versus solid?
  - No distinction in CORE
  - Deepporter et al. 2013, Rignot et al. 2013, converge on total, no seasonal cycle, distinguish liquid/solid
- defining icescape? BEDMAP2, what other products?
- changing icescape?
- injection over depth at coast?
- models with ice-shelf cavities?

- What will SOMIP do for landice/runoff from Antarctica???