



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
- <http://www.journals.elsevier.com/ocean-modelling/virtual-special-issues/virtual-special-issue-core-ii>
- Atlantic x2, sea-level, southern ocean x2, arctic x3, pacific, ...

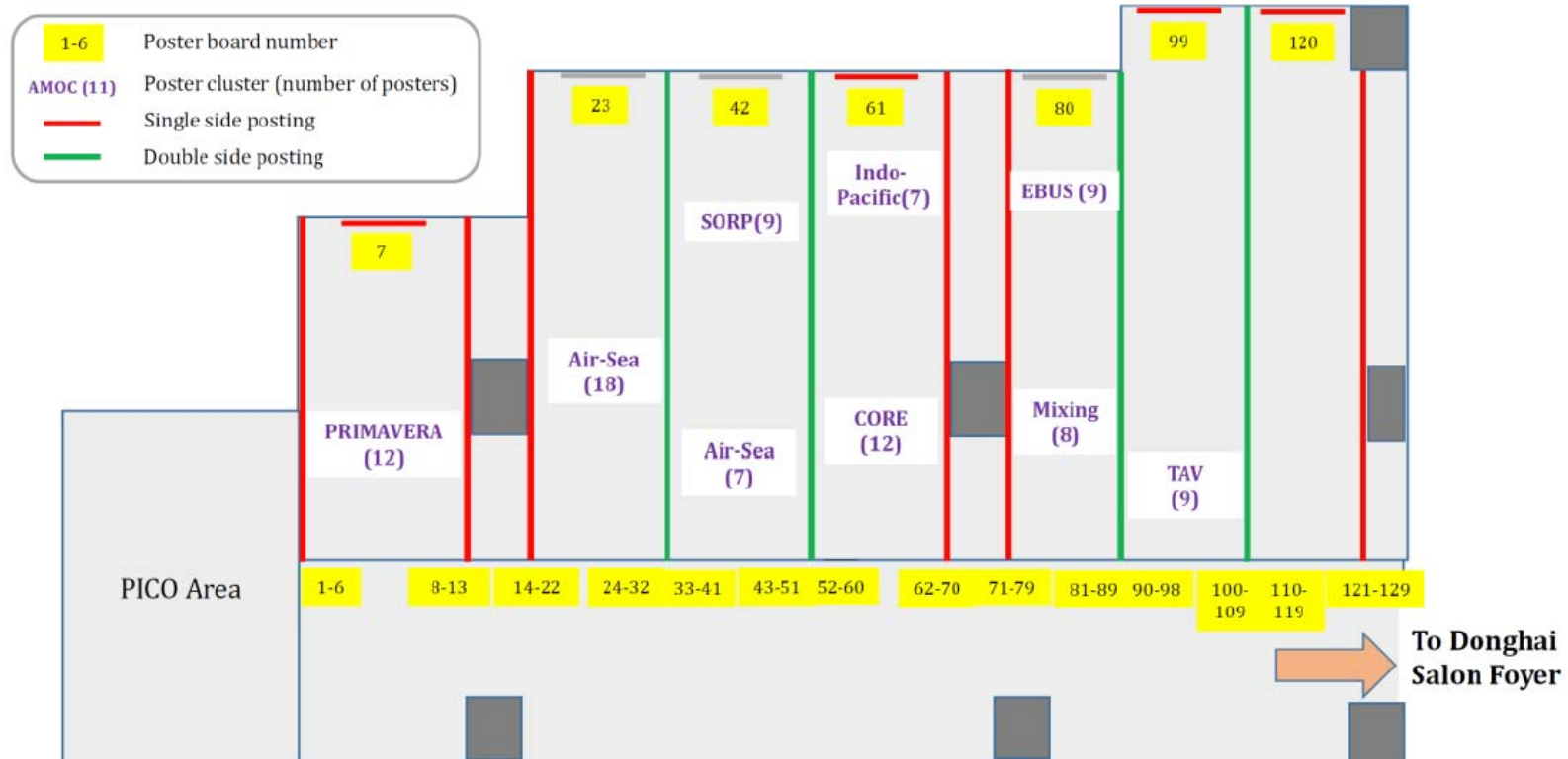
CORE-II poster cluster: Wednesday

<http://www.clivar.org/omdp/core>

CORE-II Poster Cluster – Wednesday: 12 posters

Ocean and Climate Dynamics

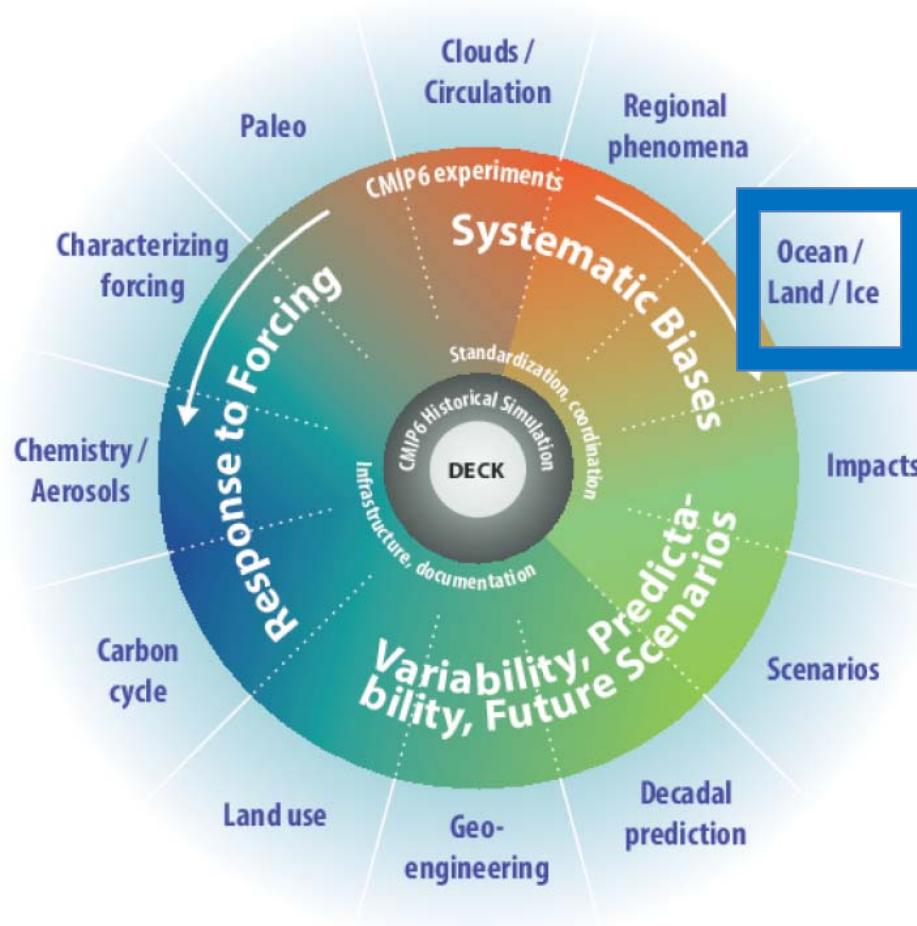
Setup in Donghai Salon II – Wednesday



Wednesday: Session 3 - 19:30-20:30

Ocean and Climate Modelling Town Hall Meeting

Ocean Model Intercomparison Project (CMIP6/OMIP)

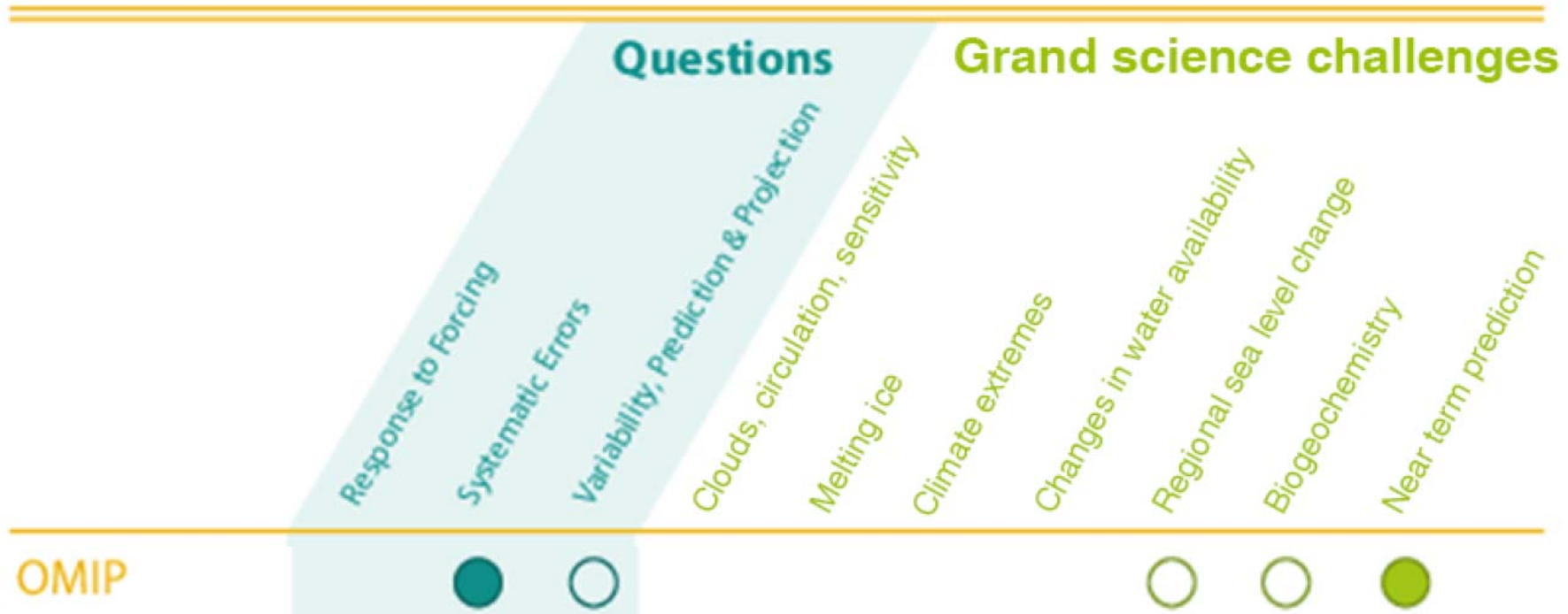


Eyring et al, GMD, 2016

	Questions				Grand science challenges					
	Response to Forcing	Systematic Errors	Variability, Prediction & Projection	Clouds, circulation, sensitivity	Melting ice	Climate extremes	Changes in water availability	Regional sea level change	Biogeochemistry	Near term prediction
AerChemMIP	●	○	○					●	○	
C4MIP	●	○	○					●	○	
CFMIP	●	○	○	●						
DAMIP	●	○	○		○	●				
DCPP	○	○	●							●
FAFMIP	●	○	○	○				●		
GeoMIP	○	○	●	●		○				
GMMIP	○	●	○	●						○
HighResMIP	○	●	○	○			●			
ISMIP6	●	○	○		●			●		
LS3MIP	○	●	○		○		●			
LUMIP	●	○	○						●	
OMIP	○	●	○							○
PMIP	●	○	○	●						
RFMIP	●	○	○	●						
ScenarioMIP	○	○	●			●	●			○
VolMIP	●	○	○	○						○
CORDEX	○	○	●			●	○			
DynVarMIP	○	●	○	○						○
SIMIP	○	●	○		●					
VIACS AB	○	○	●			●	○	○		

Eyring et al, GMD, 2016

OMIP Science Goals



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

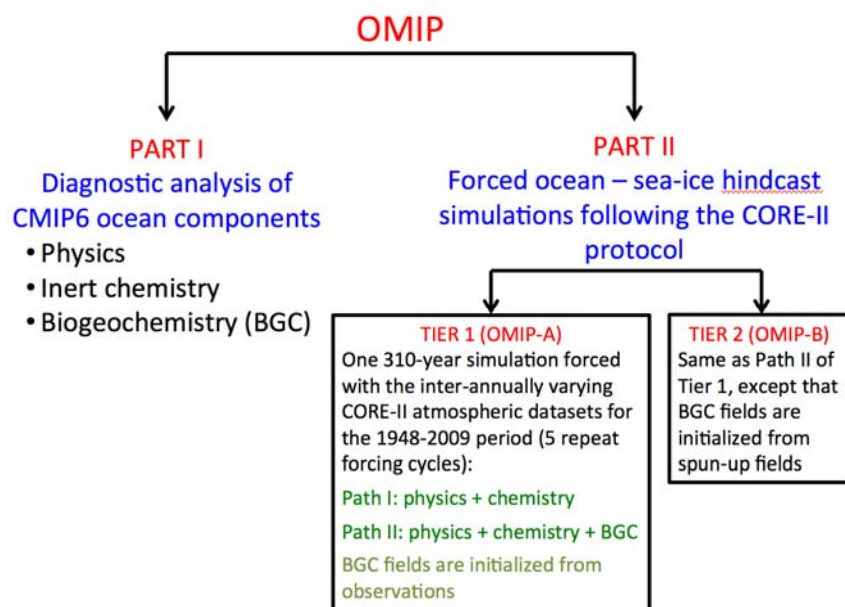
CMIP Special Issue of Geoscientific Model Development

http://www.geosci-model-dev.net/special_issue590.html

S.M. Griffies et al, 2016: OMIP contribution to CMIP6: experimental and diagnostic protocol for the physical component of the Ocean Model Intercomparison Project, *accepted*.

J.C. Orr et al, 2016: Biogeochemical protocols and diagnostics for the CMIP6 Ocean Model Intercomparison Project (OMIP), *in review*.

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, ...

Feature	JRA-55	CORE-II
Space resolution	55 km	200 km
Time resolution for the meteorology fields	8 times per day	4 times per day
Years available	1958-2015 (will be frequently updated)	1948-2009 (not updated)

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 : $0.25^\circ \times 0.25^\circ$
- 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???