

Report to CLIVAR SSG-18

Panel or Working Group: Working Group on Ocean Model Development (WGOMD)

1. Contributions to developing CLIVAR science and fit, where appropriate, to the CLIVAR imperatives

Evaluation of the ocean components of the coupled models participating in CMIP5 as well as providing oceanic initial conditions for CMIP5 decadal prediction experiments represent major current focus areas for WGOMD. For both purposes, ocean-only or ocean – sea-ice coupled hindcast simulations forced with the new, interannually varying WGOMD CORE-II (<http://www.clivar.org/organization/wgomd/core/core.php>) atmospheric forcing data sets (CORE IAF.v2, Large and Yeager, 2009) are utilized. These data sets cover the 1948-2007 period and provide a common framework for assessing robustness of model solutions subject to identical forcing data sets. Moreover, the hindcast solutions at particular dates can be used to initialize ocean and sea-ice models for decadal prediction experiments as an alternative to reanalysis approach. Our baseline experiments will be complemented by sensitivity studies on model numerics, physics, and various aspects of forcing. We will pay particular attention to the period after 1984 – as all the forcing fields have true interannual variability only after this date – and provide comparisons to available ocean state estimates and observations. Our analysis will cover time-mean diagnostics over 1988-2007, variability defined with respect to the 1988-2007 mean, and trends and changes over this period. Regional case studies will contribute to understanding of observed variability, such as changes in the strength of the Atlantic sub-polar gyre, dynamic-thermodynamic induced variations in sea level, the role of spatial model resolution, and variability of the Atlantic Meridional Overturning Circulation. These CORE-II simulations can also explore sensitivity in the climate system, for example due to changes to precipitation at high latitudes, changes in zonal wind trend over the Southern Ocean, and the role of buoyancy and mechanical forcing for abrupt climate shifts. We note that the new ocean fields requested by the WGOMD for CMIP5 archival will be extensively used in the above analyses.

2. Cooperation with other WCRP projects, outside bodies (e.g IGBP) and links to applications

WGOMD's membership has been expanded over the past year or so. WGOMD is now actively linked to the regional ocean modeling, the ocean biogeochemical modeling and polar ocean-ice modeling communities.

3. Workshops/meetings held

The 9th WGOMD meeting was held on 23-25 September 2010 at NCAR in Boulder, CO, USA (http://www.clivar.org/organization/wgomd/wgomd9/wgomd_ncar.php). The meeting focused on the Co-ordinated Ocean-ice Reference Experiments (CORE), particularly on the CORE-II protocol and plans for coordinated analysis, as well as the status and developments of the CORE interannual forcing (IAF) dataset and the Repository for Evaluating Ocean Simulations (REOS). WGOMD held joint sessions with the DIMES Project and the US CLIVAR Working Group on Decadal Predictability (WGDP). The former brought together modelers and observationalists and stimulated an exchange of information about how current models treat

isopycnal and diapycnal mixing and the state of Southern Ocean observations. The joint session with WGDP gave an overview of some proposed decadal variability diagnostics and a discussion of possible uses of CORE-II forced experiments. The WGOMD-GSOP Workshop on Decadal Variability, Predictability and Predictions: Understanding the Role of the Ocean was held in Boulder on 20-23 September 2010 (www.clivar.org/decadal.php).

4. New activities being planned, including timeline

WGOMD will produce CORE-II synthesis papers within the timeframe for evaluation by IPCC AR5.

5. Workshops/meetings planned (see ANNEX B also)

10th Session of WGOMD – 11-13 January 2012, ISMAR, Venice, Italy

6. Issues for the SSG

Annex B

Proforma for CLIVAR Panel and Working Group requests for SSG approval for meetings

Requests should be made through D/ICPO (Robert.Molinari@noc.soton.ac.uk) against the following headings:

1. Panel or Working Group: **WGOMD**
2. Title of meeting or workshop: **10th Session of WGOMD**
3. Proposed venue: **Institute of Marine Sciences (ISMAR), Venice, Italy**
4. Proposed dates: **11-13 January 2012**
5. Proposed attendees, including likely number: **15**
6. Rationale, motivation and justification, including: relevance to CLIVAR themes & JSC cross cutting topics and any cross-panel/working group links and interactions involved:

WGOMD focuses on the fundamentals of ocean modeling and model development, in support of the CLIVAR/WCRP Working Group on Coupled Modeling and the CLIVAR Imperatives, in particular, Imperative IV on Improved atmosphere and ocean component models of Earth System Models.

WGOMD is currently coordinating the second phase of Coordinated Ocean-ice Reference Experiments (CORE-II) - hindcasts forced with interannually varying surface data sets for the period 1948-2007 (Large and Yeager 2009). The CORE-II simulations provide a highly anticipated framework to evaluate ocean model performance, to study mechanisms of ocean phenomena and their variability from seasonal to decadal timescales, to identify forced variability changes, and to develop mechanistic descriptions of observed climate variability and change.

7. Specific objectives and key agenda items

The CORE-II experimental protocol, that was developed and tested over the past year or so, has reached maturity with groups represented on WGOMD agreeing to all run the CORE-II experiments. Other groups will also join the intercomparison including, for the first time, the MIT ocean model that forms the backbone of the ECCO synthesis framework.

WGOMD wishes to bring together the coordinated analysis effort to produce the benchmark CORE-II publication in a timeframe in keeping within the IPCC assessment schedule. The outline of the paper was developed during the last WGOMD meeting and, due to the thoroughness of the analysis, it is likely that the peer reviewed publication will be complemented by an online atlas or technical report. This baseline analysis and publication will serve as a starting point for a range of CORE-II sensitivity studies and process-oriented analyses and publications. The extensive documentation of the CORE-II simulations will also serve the CMIP5 decadal prediction community as a product that will

be used to initialize and evaluate decadal predictions and historical coupled climate simulations of the 20th Century.

8. Anticipated outcomes (deliverables):

Meeting report, CORE-II reference publication and CORE-II atlas.

9. Format: 2.5-day WGOMD working meeting and 0.5 day science exchange with local scientists

The 10th Session of WGOMD will focus almost entirely on the process of putting together the reference publication material for CORE-II. A half-day of open meeting with invited guests will likely be organized for WGOMD to present its activities and to promote future involvement of local scientists and their expertise in CORE-II and other WGOMD activities.

10. Science Organising Committee (if relevant): WGOMD

11. Local Organising Committee (if relevant): G. Umgiesser (ISMAR), A. Pirani

12. Proposed funding sources and anticipated funding requested from WCRP:

WCRP

A. Pirani	Italy	Full: Train plus per diem
S. Marsland	Australia	Partial support (flight 750-850 EUR)
R. Greatbatch	Germany	Per diem
H. Drange	Norway	Full support (flight 200-400 EUR)
K. Fennel	Canada	Partial support (flight ~1000 EUR)
G. Nurser	UK	Full support (flight ~200 EUR)
R. Gerdes	Germany	Partial support (flight 200-250 EUR)

US CLIVAR

G. Danabasoglu	USA	Full support
S. Griffies	USA	Full support
D. Holland	USA	Tbd
E. Curchitser	USA	Full support

The Institute of Marine Sciences has generously offered to provide refreshments for the meeting.

Approximate per diem: US\$200 (~EUR140)
Approximate WCRP funding request: US\$10K (~ EUR7K)