WCRP REPORT
World Climate Research Programme

Project Report

Report of the 10th Session of the CLIVAR Working Group on Ocean Model Development

11-13 January 2012 Venice, Italy

May 2012

ICPO Publication Series No. 177
WCRP Informal Report No: *6/2012*

CLIVAR is a component of the World Climate Research Programme (WCRP). WCRP is sponsored by the World Meterorological Organisation, the International Council for Science and the Intergovernmental Oceanographic Commission of UNESCO. The scientific planning and development of CLIVAR is under the guidance of the JSC Scientific Steering Group for CLIVAR assisted by the CLIVAR International Project Office. The Joint Scientific Committee (JSC) is the main body of WMO-ICSU-IOC formulating overall WCRP scientific concepts.

Bibliographic Citation
INTERNATIONAL CLIVAR PROJECT OFFICE, 2010:
Variability of the American Monsoon Panel. International CLIVAR
Publication Series No.177 (not peer reviewed).

Table of Contents

Action Items

Publish the CORE protocol and release notes as a WCRP-CLIVAR document.
Maintain and support the CORE-II wiki page as a venue for internal communication amongst the experiment participants, providing expedited exchange of information and documents.
Establish a data portal / storage area to host the output from participating groups.
Extend the CORE II data set to the end of 2009, particularly for use by the AOMIP community.
Provide data in NetCDF for CORE-II AMOC paper to G. Danabasoglu by 13 April 2012.
Submit a funding request to WCRP-CLIVAR to support delegates attending the WGOMD Workshops on Sea Level Rise and Ice Sheet Modeling.
Coordinate a special issue of CLIVAR Exchanges on Sea Level Rise and Ice Sheet Modeling as an outcome of the WGOMD workshop.
Submit membership nomination and extension forms for terms ending in 2011 and 2012 to the CLIVAR SSG.
Include the WGOMD panel members' additional memberships in other panels, task teams, working groups, etc. on the WGOMD webpage membership list.

1. Introduction

The 10th Session of the CLIVAR Working Group on Ocean Model Development (WGOMD) was held in Venice, Italy on 11-13 January 2012. Dr Georg Umgiesser of the Institute of Marine Sciences (ISMAR) hosted the meeting. The presentations from the meeting are available at http://www.clivar.org/organization/wgomd/activities/wgomd10. The agenda is provided in Appendix A and the List of Participants in Appendix B.

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 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.

The meeting brought together about 15 groups that are participating in CORE-II comparisons, with the exception of a few groups that were not in attendance, and focused on the coordinated analysis of the simulations. The first goal is to produce a benchmark CORE-II publication focusing on the Atlantic Meridional Overturning Circulation (AMOC) in a time for use in the IPCC Fifth Assessment Report (AR5). This baseline analysis and publication will be followed by a range of CORE-II sensitivity studies and process-oriented analyses and publications within a year. 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.

The meeting focused almost entirely on presentations from CORE-II participants and discussions on how to go about producing the reference publication materials. A half day of science talks was organized with ISMAR for WGOMD to present its activities and to hear about the ongoing research at ISMAR.

2. CORE-II

2.1 General status of CORE-II simulations

- CORE-II forced simulations are being used for a variety of topics including studies of:
- AMOC variability and mechanisms, e.g. mid-1990s subpolar gyre (SPG) warming case study;
- Initialization of decadal prediction experiments as CORE-II provides a consistent ocean – sea-ice initial condition set;
- Comparison against coupled model simulations for attribution of biases; and
- Cholofluorocarbon (CFC) and Carbon uptake.
- The following is the current list of expected participants in CORE-II comparisons:

Model	Country	P. I.
ACCESS	Australia	S. Marsland
NCAR CESM	USA	G. Danabasoglu
GFDL CM2.1 ESM2M ESM2Mb	USA	S. Griffies
HYCOM	USA	E. Chassignet
ROMS	USA	E. Curchister
MITgcm and ECCO	USA	P. Heimbach, G. Forget
NorClim	Norway	H. Drange, M. Bentsen
ORCA -DRAKKAR	Germany, France, UK	C. Boning, A. Biastock
FESOM	Germany	S. Danilov, Q. Wang
MRI	Japan	H. Tsujino
INMOM	Russia	N. Diansky
ICTP	Italy	R. Farneti
ORCA-CERFACS	France	S. Valcke
NEMO	UK	G. Nurser
MPIOM	Germany	H. Haak

A more comprehensive version of this table has been compiled that compares aspects of the contributing model configurations such as spin up and salinity restoring. While the configurations are being finalized and the experiments are underway, this table will be

maintained on the limited access CORE-II wiki page. Once the results are published, the corresponding version of the table will be made public.

Based on our discussions, the CORE protocol and release notes have been updated (Version 2, 15 February 2012, http://data1.gfdl.noaa.gov/%7Ennz/mom4/COREv2/doc/CORE_notes_15feb2012.pdf). This new version incorporates some minor corrections and addition of more details. Other changes include clarification of the CORE II protocol and the addition of information on how to incorporate ideal age and CFC tracers in these simulations.

ACTION: Publish the CORE protocol and release notes as a WCRP-CLIVAR document.

ACTION: Maintain and support the CORE-II wiki page as a venue for internal communication amongst the experiment participants, providing expedited exchange of information and documents.

ACTION: Establish a data portal / storage area to host the output from participating groups.

ACTION: Extend the CORE II data set to the end of 2009, particularly for use by the AOMIP community.

2.2 CORE-II publications

WGOMD is aiming to submit a CORE-II paper by July 2012 in time for the IPCC AR5. The CORE-II hindcasts are used to initalize decadal prediction experiments with coupled models. It is with this in mind that the first publication (led by G. Danabasoglu) will focus on describing the evolution of the AMOC, the Atlantic SPG, and overflows. Since variability in the CORE-II runs is constrained by the atmospheric forcing, understanding the decadal variability produced in the CORE-II runs will be useful to compare to decadal variability exhibited by coupled models.

To submit results for analysis in this paper, the data needs to be provided in NetCDF format by 13 April 2012.

ACTION: Provide data in NetCDF format for CORE-II AMOC paper to G. Danabasoglu by 13 April 2012.

WGOMD will coordinate other CORE-II publications on a longer time frame. The preliminary focus areas and leads for these additional papers are:

1. Mean state, drift, and variability (A. M. Treguier).
2. Sea surface height and variability (S. Griffies).
3. Arctic Ocean and AOMIP related analysis (R. Gerdes, D. Holland).
4. Ventilation – ideal age and CFCs (R. Farneti).

3. Future directions of WGOMD

The next topic that WGOMD will address within the CORE frameworks will be forcing ocean models with partial coupling (with an interactive atmosphere, but controlled forcing). Predictability, higher resolution, unstructured grids, ice shelf coupling, and biogeochemical modeling are some of the topics that WGOMD will address in the future.

The July 2012 CLIVAR SSG meeting will be held jointly with the IMBER (Integrated Marine Biogeochemistry and Ecosystem Research) project. WGOMD, like the rest of CLIVAR's working groups and panels, has been solicited to contribute to the upcoming joint discussion of possible areas of collaboration between CLIVAR and IMBER. The main topics of potential collaboration between WGOMD and IMBER are considering physics and BGS fields together during model development; obtaining initial conditions that also include BGC for prediction studies; Bio-Argo collaboration. We think that CORE-II simulations can provide a potential framework for collaboration along with joint workshops.

4. WGOMD Business

4.1 WGOMD Workshop 2013

WGOMD has been successful with a proposal for AUD $30,000 from CSIRO as seed funding for the next one of our WGOMD workshop series, with the proposed topic of Sea-Level Rise, Ocean/Ice-Shelf Interaction and Ice Sheets, tentatively scheduled for February 2013 in Hobart. The workshop will bring together leading international scientists and early-career researchers from the ocean, ice-sheet, ice-shelf, and sea level rise modelling and observational communities to explore the state-of-science and emerging pathways for development of the next generation of coupled climate models. The CLIVAR/CliC/SCAR Southern Ocean Panel will be participating and will also meet in a joint session with WGOMD in the ensuing working group meeting.

The aim is to advance the state-of-knowledge of projections of future sea level by focussing on two major scientific challenges. Firstly, what is the global sea-level rise contribution from the stability (or otherwise) of ice-sheet mass exchanges with the oceans? Secondly, what is the regional signature of sea-level rise associated with the steric and mass redistribution of both the changing ocean and ice sheets? Together, these components of sea-level rise inform knowledge of potential coastal impacts, and contribute to the understanding of a topic currently drawing intense scientific and societal interest.

The specific objectives of the workshop are:

1. Evaluation of state-of-science of ocean and land-ice interactions.
2. Identify priorities for reducing uncertainties in the projections of global and regional sea-level rise.
3. Investigate pathways for the development of the next generation of climate models incorporating interactive land-ice components.

The scientific steering committee plans for about 100 people attending and is being particularly mindful in the planning to ensure that a 'working' meeting is nonetheless achieved. This is necessary to achieve tangible progress in sea level rise and ice sheet modeling and to increase participation in WGOMD experiments from the wider community.

A CLIVAR Exchanges special issue on sea level rise and ice sheet modeling is planned, soliciting from the main modeling centers overviews of their model development needs and plans.

ACTION: Submit a funding request to WCRP-CLIVAR to support delegates attending the WGOMD Workshop on Sea Level Rise and Ice Sheet Modeling.

ACTION: Coordinate a special issue of CLIVAR Exchanges on Sea Level Rise and Ice Sheet Modeling as an outcome of the WGOMD workshop.

4.2 11th Session of WGOMD

The next WGOMD meeting will be held in Hobart, Australia in February 2013 and will be hosted by S. Marlsand of CSIRO. The meeting will follow the WGOMD workshop. WGOMD is coordinating its next meeting and the workshop with the CLIVAR Southern Ocean Panel (SOP) who will also be meeting in Hobart. The panel meeting will include a joint session with the SOP.

4.3 Membership

The following is the status of the current WGOMD membership:

G. Danabasoglu (co-chair) (2012)	NCAR, USA
H. Drange (co-chair) (2012)	University of Bergen, Norway
E. Curchitser (2013)	Rutgers University, USA
S. Griffies (2013)	GFDL/NOAA, USA
S. Marsland (2012)	CSIRO-ACCESS, Australia
G. Madec (2011)	LOCEAN, France
R. Greatbatch (2011)	IFM GEOMAR, Germany
H. Tsujino (2011)	MRI, Japan
D. Holland (2013)	Courant Institute, USA
K. Fennel (2013)	Dalhousie University, Canada
G. Nurser (2013)	National Oceanography Center, UK

For terms ending in 2011:

R. Greatbatch will rotate off, though remain an active collaborator of WGOMD. In light of H. Tsujino's participation in CORE-II, an extension of his term is requested to take his membership to the start of 2013 (until after the 2013 WGOMD workshop). A selection of possible new members from Japan will be provided next year in accordance with WGOMD's future directions.

WGOMD seeks a new member to represent the operational ocean modelling community. Such a member would also provide key expertise in ocean data assimilation and ocean model verification.

For terms ending 2012:

WGOMD requests that all terms ending in 2012 (G. Danabasoglu, H. Drange and S. Marsland) are extended to 2014, including the maintaining the current co-Chairs, to ensure continuity and completion of the CORE-II experiments.

ACTION: Submit membership nomination and extension forms for terms ending in 2011 and 2012 to the CLIVAR SSG.

S. Marsland has been selected to be the WGOMD contact for the WCRP Climate Model Metrics Panel (WCMMP).

ACTION: Include the WGOMD panel members' additional memberships in other panels, task teams, working groups, etc. on the WGOMD webpage membership list.

Appendix A – Meeting Agenda of the 10th Session of WGOMD

ISMAR, Venice, Italy

11 - 13 January 2012

Agenda

Wednesday 11 January

09:00 – 09:30 Welcome, practical issues, recall of the outline of the CORE-II document (Gokhan, Helge, Anna, Georg)

General status of CORE-II simulations and analysis from participating groups

(10+ groups – the schedule will be adapted according to how many groups want to present. Presentations should not be over 30 minutes long, including discussion time)

- CORE□IAF with the ACCESS Ocean and Sea Ice Model - S. Marsland et al.
- CORE II experiments with the Finite Element Sea-ice Ocean Model (FESOM) Q. Wang et al.
- CORE-2 simulations, Bergen group (NorESM; Norwegian Earth System Model) - Mats Bentsen et al.
- Global modeling with the “Regional” Ocean Modeling System (ROMS): The good the bad and the ugly - E. Curchitser et al.
- CORE-IAF simulations with three GFDL-MOM-SIS configurations - S. Griffies
- CORE-II SIMULATIONS AT NCAR - G. Danabasoglu et al.
- CORE-Forcing in the NEMO Model - A. Biastoch et al.
- CORE II simulation with HYCOM - gx1v3 and GLBt0.72: Two Global Configurations of HYCOM - E. Chassignet et al.
- Numerical simulation of the ocean general circulation and its climatic variability for the 1948□2007 using the INMOM - N.A. Diansky, A.V. Gusev
- CORE-1 Comparisons NASA GISS - Ocean Mixing Research Group - T. Lebotissier et al.

End of day Summary (Gokhan and Helge)

Thursday 12 January

- A short, broad overview of WGOMD and its activities - H. Drange
- The Venice Lagoon and Global Climate Change - G. Umgiesser
- Polar and dense water formation work at ISMAR - A. Bergamasco

- Regional modeling with ROMS - E. Curchitser
- Polar, ice shelf, land-ice modeling - D. Holland
- A parameterization for gravity current overflows in the Community Earth System Model (CESM) ocean component - G. Danabasoglu et al.

End day with a ~40 min joint brain storming of (a) structure of CORE paper and (b) how to structure day 3 (Gokhan and Helge)

Group Dinner at the Ristorante Osteria Mocenigo

Friday 13 January

Plenary/group discussions of analysis/paper writing based on the structure of the

CORE paper.

60 min wrap-up, (re-defined) outline of paper(s), assessing writing responsibilities, discussing sharing of data, etc.

WGOMD business: membership, workshop in early 2013, climate model metrics panel membership, modeling council, updates on WGCM and CLIVAR SSG meetings, etc.

Appendix B – List of Participants of the 10th Session of WGOMD

WGOMD:

Gokhan Danabasoglu	NCAR, USA
Helge Drange	University of Bergen, Norway
Stephen Griffies	NOAA/GFDL, USA
Enrique Curchitser	University of Rutgers, USA
Simon Marsland	CSIRO, Australia
Hiroki Tsujino	MRA, Japan
George Nurser	National Oceanography Center, UK
David Holland	Courant Insitiute, USA
Richard Greatbatch	IFM-GEOMAR, Germany

Absent: Katja Fennel, Gurvan Madec

CLIVAR: Anna Pirani

Invited Participants:

Anne-Marie Treguier	IFREMER, France
Eric Chassignet	Florida State University, USA
Mats Bentsen	University of Bergen, Norway
Riccardo Farneti	ICTP, Italy
Arne Biastoch	IFM-GEOMAR, Germany
Georg Umgiesser	ISMAR, Italy
Andrea Bergamasco	ISMAR, Italy
B. Barnier	LEGI, France
Gael Forget	MIT, USA
Nikolay Diansky	Institute Numerical Mathematics, RAS, Russia
Quiang Wang	AWI, Germany
Sergey Danilov	AWI, Germany
Tony Leboissetier	GISS, USA
Armando Howard	GISS, USA