

Report to CLIVAR SSG-19

Panel or Working Group:

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

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.

2. Briefly list any specific areas of your panel's activities that you think would contribute to the WCRP Grand Challenges as identified by the JSC at its most recent meeting¹

1. Provision of skillful future climate information on regional scales (includes decadal and polar predictability)
2. Regional sea-level rise
3. Cryosphere response to climate change (including ice sheets, water resources, permafrost and carbon)
6. Science underpinning the prediction and attribution of extreme events.

3. Key science questions that you anticipate your community would want to tackle in the next 5-10 years within the context of a more ocean-atmosphere orientated CLIVAR (1-3 suggestions)

- Continue to look at model biases and improve model physics including biogeochemistry and ecosystems
- High resolution modeling and regional/coastal modeling
- Sea level and interactions with ice sheets
- Role of ocean in decadal variability
- Operational oceanography and data assimilation

4. Cooperation with other WCRP projects, outside bodies (e.g. IGBP) and

¹

1. Provision of skillful future climate information on regional scales (includes decadal and polar predictability)
2. Regional sea-level rise
3. Cryosphere response to climate change (including ice sheets, water resources, permafrost and carbon)
4. Improved understanding of the interactions of clouds, aerosols, precipitation, and radiation and their contributions to climate sensitivity
5. Past and future changes in water availability (with connections to water security and hydrological cycle)
6. Science underpinning the prediction and attribution of extreme events

links to applications

WGOMD maintains strong links with the following activities:

- US CLIVAR AMOC Program
- Arctic Ocean Model Intercomparison Project (AOMIP)
- WCRP Climate Model Metrics Panel (WCMMP)
- CLIVAR Atlantic Implementation Panel (AIP)

Ocean modelling groups are moving to developing the physical and biogeochemistry components in a collaborative way. This paves the way for potential cooperation between WGOMD and IMBER (see note prepared for the SSG on WGOMD-IMBER collaboration).

5. Workshops/meetings held

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 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 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, including sea level rise studies. 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.

6. New activities being planned, including timeline

20 groups have completed the CORE-II runs. Within the next year to year and a half, WGOMD and its partners will complete five papers to document various CORE-II results. The papers that are currently planned are:

- Evolution of the AMOC, the Atlantic sub-polar gyre, and overflows
- Mean state, drift, and variability
- Sea surface height and variability
- Arctic Ocean and AOMIP related analysis
- Ventilation – ideal age and CFCs

The next topic that WGOMD will address will be forcing ocean models with partial coupling (with an interactive atmosphere, but controlled forcing). A suite of experiments will be designed within the CORE framework.

7. Workshops / meetings planned

WGOMD workshop on Sea-Level Rise, Ocean/Ice-Shelf Interaction and Ice Sheets
18-20 February 2013, Hobart, Australia

11th Session of WGOMD
21-23 February 2013, Hobart, Australia

8. Issues for the SSG

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.
Suggested replacement is H. Johnson

H. Tsujino - In light of H. Tsujino's participation in CORE-II, an extension of his term is requested to take his membership to 2013.

Gurvan Madec (LOCEAN, France) – to rotate off. We are actively seeking a replacement.

Note:

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. The suggested new member is M. Balmaseda.

- 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.

Annex A1

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

Requests should be made through D/ICPO (Catherine.beswick@noc.ac.uk), against the following headings:

1. **Panel or Working Group:** WGOMD
2. **Title of meeting or workshop:** 11th Session of WGOMD
3. **Proposed venue:** Hobart, Australia
4. **Proposed dates:** 21-23 February 2013
5. **Proposed attendees, including likely number:** 15 - 30
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 will use the meeting to wrap up the CORE-II activity, culminating with a set of publications. The group will initiate new activities within the CORE framework on ocean-atmosphere partial coupling. Other topics that will be addressed include ocean biogeochemistry, high resolution ocean modeling. Potential collaborative interactions with IMBER will also be explored.

WGOMD will meet jointly with the CLIVAR/CLIC/SCAR Southern Ocean Panel and the WCRP/IOC Task Force on Sea Level Rise to discuss the outcomes of the workshop and to promote coordinated research activities on ocean, ice shelf and ice sheet interactions.

7. **Specific objectives and key agenda items:**
8. **Anticipated outcomes (deliverables):**

Publication of the CORE-II papers

The development of a coordinated set of experiments to explore partial ocean-atmosphere coupling within the CORE framework.

9. **Format:** Working group meeting

10. **Science Organising Committee (if relevant)** WGOMD

11. **Local Organising Committee (if relevant)** S. Marlsand, CSIRO/ACCESS

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

Funding requests (Per diem = \$230)

CLIVAR

Members/staff

K. Fennel – \$2500 (Flight Halifax, Canada – Hobart, Australia)

G. Nurser – \$2000 (Flight UK – Australia)

A. Pirani – \$2000 (Flight Italy – Australia) plus 7(230) (per diem, WGOMD meeting and workshop) = \$3610

S. Griffies - \$2000 (flight USA – Australia) plus 7(230) (per diem, WGOMD meeting, SOP meeting and workshop) = \$3610

New members that may need support:

H. Johnson - \$2000 + 4(230) = \$2920

M. Balmaseda – \$2000 + 4(230) = \$2920

Emeritus

E. Chassignet - \$750 (accommodation)

C. Boening – 4(230) per diem = \$920

A. M. Treguier – 4(230) per diem = \$920

US CLIVAR/NOAA

D. Holland – \$3000 (Flight USA – Australia)

G. Danabasoglu – \$2000 (flight USA – Australia) plus 7(230) (per diem, WGOMD meeting, SOP meeting and workshop) = \$3610

E. Curchister – \$2000 (flight USA – Australia) plus 7(230) (per diem, WGOMD meeting, SOP meeting and workshop) = \$3610

CLIVAR estimate = \$20150 (Note Griffies is also a SOP member)

US CLIVAR estimate = \$10220

Annex A2

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

Requests should be made through D/ICPO (Catherine.beswick@noc.ac.uk), against the following headings:

1. **Panel or Working Group:** WGOMD

2. **Title of meeting or workshop:**
WGOMD/SOP/CliC Workshop on Sea Level Rise/, Ocean/Ice-Shelf Interaction and Ice Sheets

3. **Proposed venue:** Hobart, Australia

4. **Proposed dates:** 18-20 February 2013

5. **Proposed attendees, including likely number:** 100

6. **Rationale, motivation and justification, including: relevance to CLIVAR themes & JSC cross cutting topics and any cross-panel/working group links and interactions involved:**

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 and the WCRP/IOC Task Force on Sea Level Rise have joined as partners for this workshop.

7. **Specific objectives and key agenda items:**

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.

8. Anticipated outcomes (deliverables):

The workshop is directed at achieving 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.

A multi-model CORE-II paper will be published on sea level rise.

9. Format:

The workshop will follow the structure of a series of previous successful meetings organised by CLIVAR/WGOMD. The WGOMD has organized five earlier scientific workshops. The workshops are part of the WGOMD terms of reference to educate and communicate topical ocean science issues to both early career researchers and the wider community. Each workshop provides pedagogical lectures introducing state-of-the-science ideas and results; offers opportunities for discussions and candid debates; and facilitates networking and collaboration.

A specific program will be developed around the following topics:

- Day 1 - Sea level, land ice, and the ocean-ice margins: observations, theory, and modelling.
- Day 2 - Ocean modelling of sea level and water masses.
- Day 3 - The next generation of climate models.

The three-day workshop will consist of sessions formed around the above topics. In addition to the invited talks, we will invite contributed talks and consider the possibility of poster presentations. The invited speakers will be asked to review the current state of research related to a particular topic with candid and critical comments, rather than focusing on their own research. Presentations will be conducive to discussion, and will be expanded on in explicitly scheduled discussion sessions.

10. Science Organising Committee (if relevant)

Gokhan Danabasoglu (WGOMD co-chair), NCAR, USA
Helge Drange (WGOMD co-chair), University of Bergen, Norway
Matthew England (SOP co-chair), University of New South Wales, Australia
Kevin Speer (SOP co-chair), Florida State University, USA
Simon Marsland, CSIRO Marine and Atmospheric Research, Australia

John Church (WCRP/IOC TFSR co-chair), CSIRO Marine and Atmospheric Research, Australia
Konrad Steffen (WCRP/IOC TFSR co-chair), CIRES, USA
Catia Domingues, Antarctic Climate and Ecosystems CRC, Australia
Stephen Griffies, NOAA/Geophysical Fluid Dynamic Laboratory, USA
Richard Greatbatch, Institut für Meereskunde, Germany
David Holland, Courant Institute, New York University, USA
Anna Pirani, CLIVAR Project Office, UK

11. Local Organising Committee (if relevant) S. Marlsand, CMAR

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

Meeting Costs (assuming 1 AUD = 1 USD)

Accommodation is expected to cost \$150. All the recommended hotels will be in walking distance of CSIRO

\$15 approx cafe breakfast and coffee

\$12 max (including a drink) lunch at CSIRO cafeteria, or \$15-30 at the local restaurant strip

\$30-70 for a nice dinner in a large range of local restaurants.

Taxi to and from Hobart airport approx \$90 (\$45 each way)

Estimated per diem: \$80 + \$150 = \$230

4 night per diem (Sunday – Wednesday) = \$920

Incidental costs (tea, coffee, etc) will be supported by means of a delegate *registration fee of \$100.*

Approximately 10 invited speakers will be travelling from Europe

Flights to Hobart from London ~\$2.4K (~1.5K GBP)

Approximately 11 invited speakers will be travelling from the US

Flights to Hobart from East Coast ~\$2K

Assume that WGOMD members who are invited speakers will be funded through the WGOMD meeting application.

Estimated cost of full funding for invited speakers = 21(90) + 21(920) + 10(2.4K) + 11(2K) = \$67210

Estimated cost of travel for invited speakers = \$47890

Estimate of funding available for young scientists = \$1200 or more

Funding Sources (for invited speakers and emerging scientists)

CSIRO OCE - \$30K awarded hold a Cutting Edge Science Symposium

NASA/NOAA/NSF – \$15K

WCRP CLIVAR – \$15K

WCRP CliC - tbd