

## Report to CLIVAR SSG-19

**Panel or Working Group:** CLIVAR/PAGES Working Group

---

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

---

#### *Ocean 2K Initiative*

Following a suggestion from the CLIVAR Scientific Steering Group (SSG) and a meeting of the PAGES 2k network leadership in Bern, July 2011, the PAGES Scientific Steering Committee (SSC) endorsed the formation of a ninth group focusing on the global oceans during the last 2,000 years (2K): Ocean2K.

Motivating this project is an interest in placing observed historical marine conditions into the context of climatic variation over the past 2,000 years.

Two outputs are planned: a metadatabase of Ocean2k-relevant paleodata and paleomodeling simulations; and a preliminary synthesis of the principal common features in the underlying data and model output, both to be developed in time for consideration in the IPCC's Working Group I Fifth Assessment Report, and ultimately contributing to the PAGES2K synthesis planned for 2014/2015.

#### *CLIVAR/PAGES Working Group Meeting*

Working group members met for a half-day meeting in Denver, Colorado, in October 2011. This meeting coincided with the WCRP Open Science Conference, therefore other members of CLIVAR panels present were invited to facilitate knowledge transfer and collaboration.

Discussions were focused on rejuvenation of the panel, and where it would sit within the evolving WCRP structure.

#### *Workshop on the Use of Paleo-Climate Model/Data Comparisons in Constraining Future Projections, Hawaii, 1-3 March 2012*

The focus of the 50 attendees was on how to use the paleo-climate simulations that have been performed for the 5th Coupled Model Intercomparison Project (CMIP5) for the last glacial maximum, the mid-Holocene and last millennium, to better interpret the future simulations using the exact same models.

#### *WCRP Workshop on CMIP5 Model Analysis*

The participants of the workshop on the use of paleo-climate model/data comparisons in constraining future projections – organized by the CLIVAR/PAGES working group – developed a poster for the WCRP workshop on CMIP5 model analysis (Hawaii, 5-9 March 2012).

### *CLIVAR Exchanges 58*

The working group also contributed to the CLIVAR Exchanges 58, February 2012, which was a thematic issue on CLIVAR's ocean basin panels. The article aimed to communicate to the wider CLIVAR community on the "Ocean2K" activities.

### *New Members*

The group recruited five new members at the start of the year, with an emphasis on obtaining more 'CLIVAR' related expertise to the panel.

### *CLIVAR/PAGES Listserve*

The working group has set up a new mailing list. The focus on this list is on the facets of climate variability and paleoclimate where there is (or should be) an overlap of interests. This could be used to highlight papers or products that would be of interest to this community, advertising of positions or relevant funding opportunities or workshops or meeting sessions, or simply continuing the discussion from the CMIP5/PMIP3 workshop.

The mailing list is free and open to anyone to subscribe to via the CLIVAR website.

### *WCRP Open Science Conference*

At the WCRP Open Science Conference in October 2011, the co-chairs of the CLIVAR/PAGES working group convened the poster session "Using Paleoclimate Observations and Analysis for Improving Earth System Prediction".

---

## **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 meeting<sup>1</sup>**

---

### *Provision of skillful future climate information on regional scales*

- Development of methodologies relating model skills for paleoclimates to projections.

### *Cryospheric response to climate change*

- Improving understanding of MOC variability.

---

<sup>1</sup>

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

*Improved understanding of the interactions of clouds, aerosols, precipitation, and radiation and their contributions to climate sensitivity*

- Analysis of insights on climate sensibility based on past climate, based on model/data comparisons.

*Past and future changes in water availability (with connections to water security and hydrological cycle)*

- Improving understanding of past changes in water cycles including droughts and floods.

*Science underpinning the prediction and attribution of extreme events*

- Information from paleoclimate data and long (millennial) simulations on the recurrence of extreme events and relationships with external forcings.

---

**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)**

---

A number of key scientific issues have been identified by the working group and will be addressed by the intersection over the coming years.

1. Forward modeling of proxy data

Reducing uncertainties in proxy reconstructions (and data synthesis in general) are important for improving climate modeling targets and for understanding the intrinsic variability and forced response of the climate system.

2. Calibration of proxies against variability seen in the instrumental period

Is a pre-requisite for improved synthesis of proxy- and observation-based approaches and requires interaction between paleoclimatologists and climatologists.

3. Climate variability over the last few millennia

Well-dated, high-resolution proxy reconstructions and model simulations incorporating estimates of natural and anthropogenic forcings for the last 2 ka offer opportunities to assess the natural decadal- to centennial-variability and forced responses in conditions similar to present.

4. North Atlantic circulation changes

Interactions among the ocean, atmosphere, and sea ice are the likely cause of

decadal-multi- decadal and centennial variability in the Atlantic meridional overturning circulation (MOC), with attendant impacts on spatial patterns of temperature and precipitation. Thus improved understanding of MOC variability may serve to improve the climate projections in these regions.

---

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

---

The CLIVAR-PAGES Working Group is an intersection between WCRP CLIVAR and IGBP PAGES.

---

#### **5. Workshops/meetings held**

---

The PAGES/CLIVAR Intersection Panel organised a workshop on March 1-3 at the Bishop Museum in Honolulu on the use of paleo-climate model/data comparisons in constraining future projections.

The focus of the 50 attendees was on how to use the paleo-climate simulations that have been performed for the 5th Coupled Model Intercomparison Project (CMIP5) for the last glacial maximum, the mid-Holocene and last millennium, to better interpret the future simulations using the exact same models.

The participants agreed that the 'out-of-sample' nature of these paleo-simulations was an important test of the models and the preliminary results - for global mean climate changes, climate variability, and regional responses in temperature and precipitation - showed that the models do match important aspects of the observed responses.

Challenges still remain in finding suitable synthesis data sets to compare to the models, quantifiably linking skill in paleo-simulations with structural variations in future projections, and in doing cross-model comparisons (since not all the CMIP5 data have been uploaded yet). Significant progress in all these aspects was however apparent and many of the participants, notably the many Early Career scientists, left the workshop excited and motivated to continue work on these aspects.

The organisers hope to have a summary paper of the discussions and early results for submission in the next few months.

The CLIVAR/PAGES working group also met following the WCRP Open Science Conference in Denver, October 2011. The meeting focused on rejuvenating the group and discussing where the group would sit under the restructured WCRP.

---

#### **6. New activities being planned, including timeline**

---

- Revision of the vision document will be mandate for new members

- Continued recruitment of new members, particularly with expertise spanning CLIVAR and PAGES.
- Continuation of the Ocean 2K initiative.
- CLIVAR/PAGES paper to be submitted to a peer reviewed journal.

---

## **7. Workshops / meetings planned**

---

Panel meeting planned to coincide with 2012 AGU.

Possible workshop on the relationship between volcanic forcing and climate in 2013.

## **8. Issues for the SSG**

## **Annex A**

### **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](mailto:Catherine.beswick@noc.ac.uk)), against the following headings:

- 1. Panel or Working Group:**
- 2. Title of meeting or workshop:**
- 3. Proposed venue:**
- 4. Proposed dates:**
- 5. Proposed attendees, including likely number:**
- 6. Rationale, motivation and justification, including: relevance to CLIVAR themes & JSC cross cutting topics and any cross-panel/working group links and interactions involved:**
- 7. Specific objectives and key agenda items:**
- 8. Anticipated outcomes (deliverables):**
- 9. Format:**
- 10. Science Organising Committee (if relevant)**
- 11. Local Organising Committee (if relevant)**
- 12. Proposed funding sources and anticipated funding requested from WCRP:**