

Climate and Ocean: Variability, Predictability, and Change (CLIVAR) Report

1. Highlights for JSC

- CLIVAR finalized its Science Plan, which was discussed during the SSG meeting in Pune last November. It will be made available to the Scientific Community for feedback shortly, in advance of the JSC.
- CLIVAR through its leadership role in the Sea Level Grand Challenge led the organization of the International WCRP/IOC Conference on Regional Sea Level Changes and Coastal Impacts held at Columbia University, New York, USA on 10-14 July, 2017. Over 300 participants met in New York including scientists, city planners, coastal zone developers and managers, and other stakeholders who brainstormed on how to strengthen climate change adaptation and disaster resilience.
<http://www.sealevel2017.org/>
- CLIVAR has traditionally played an important role in defining the ocean observing system requirements, and contributed to review these needs in various basins in the past year:
 - Tropical Atlantic Observing System: a workshop was organized in February 2018. <http://www.clivar.org/events/tropical-atlantic-observing-system-review-workshop>
 - Indian Ocean Observing System (IndOOS): A first draft was produced, consisting of 25 chapters with background materials on the operational and scientific drivers of IndOOS and on the current status of IndOOS, plus an 8-page executive summary including actionable recommendations for the future of IndOOS 2020-2030. All material has been made available for comments to the scientific community. <http://www.clivar.org/indoos-review-2006-2016>
- The Pacific Region Panel and ENSO Research Focus are organizing an International Conference on ENSO in a warmer Climate, to be held in Ecuador in October 2018. More than 200 scientists from around the world are expected.
<http://www.ensoconference2018.org/>
- The CLIVAR Decadal Climate Variability and Predictability (DCVP) Research Focus is actively contributing to the organization of the "International Conferences on Subseasonal to Decadal Prediction" to be held in September in Colorado.
<https://www.wcrp-climate.org/s2s-s2d-2018-home>
- CLIVAR has finalized planning to offer a Series of Summer Courses; on even years in collaboration with the First Institute of Oceanography (China), and on odd years with the International Centre for Theoretical Physics (Italy). The 2018 event is titled "Summer Course on Past, Present and Future Sea Level changes", and will be held in June 2018 in Qingdao. <http://www.clivar.org/events/clivar-fio-joint-summer-school-2018>

2. Primary science issues

Long Term Objectives (10 years):

- Work towards an integrated view of the ocean role in the climate system (heat, water, carbon)
- Improve understanding of climate processes on regional to local scales, including natural climate variability
- Contribute to the development of seamless approaches to climate simulations and predictions from intraseasonal to multidecadal time scales, with regional climate information provided to countries that require it.

Short Term Priorities (3-5 years):

- Identify regional impacts of a changing climate upon (regional) sea level, ocean heat content, cryosphere and the water cycle;
- Improve process understanding (ocean mixing, heat and freshwater fluxes, sea-ice control of buoyancy fluctuations, upwelling and shelf interactions in boundary currents, cross-equatorial transport, tropical-extratropical interactions...)
- Characterize and understand internal variability and the impact of external forcing on intrinsic modes of variability
- Expand understanding of oceanic constraints on global transient climate sensitivity.

3. Issues and challenges

- The main challenge for 2017 was the limited funding for CLIVAR activities, with a reduction of around 70% of the original allocation. Facing this drastic reduction, few of the activities and meetings planned for 2017 could receive support from the core budget.
- CLIVAR has some panels jointly organized with other core projects (CLIVAR/GEWEX Monsoons Panel, CLIVAR/GEWEX Research Focus on 'Planetary Heat Balance & Ocean Heat Storage' - CONCEPT-HEAT, CLIVAR/CliC Northern Ocean Region Panel and CLIVAR/CliC/SCAR Southern Ocean Region Panel). Some of these activities have worked well in partnership, but we recognize that in some cases communication and openness among partners needs to strengthen for a more effective collaboration.
- CLIVAR leads the Sea Level Grand Challenge, and played a key role in the successful organization of the WCRP/IOC Sea Level Conference in July 2017. CLIVAR is also engaged with the "Near-term climate prediction" GC through DCVP. Not much engagement, however, has taken place with the other GCs. CLIVAR is willing to contribute more if asked, and could/should play a more active role in the Carbon GC for its ocean component.
- Modeling efforts in CLIVAR are led by the Ocean Model Development Panel (OMDP), in particular through the Coordinated Ocean-ice Reference Experiments (CORE), now part of CMIP6 as the Ocean Model Intercomparison Project (OMIP). Further work with coordinated fine resolution process studies and global integrations will provide the means to cooperatively interrogate elements of the cascade hypothesis, including the important role of boundary layers, via a hierarchy of simulations resolving a growing portion of the energy spectrum. Such efforts, however, require support for meetings that cannot be easily organized in the current funding environment.
- CLIVAR regional panels and the Global Synthesis and Observations Panel (GSOP) have provided input to the Ocean Observations Panel for Climate (OOPC) in relation to EOVs and ECVs. One member from each of those panels is ex-officio members of OOPC and funding their attendance to OOPC annual meetings has become a challenge.

- In terms of use of ocean observations, GSOP leads the ocean reanalysis intercomparison project (ORA-IP), and promotes the International Quality Controlled Ocean Database (IQuOD) initiative, which aims to produce the definitive historical subsurface database to support climate science and services. However a clear path forward to improve existing ocean reanalyses/syntheses is missing. New GSOP leadership and membership need to reflect this.
 - CLIVAR initiated short-term Research Foci (RFs) on topics identified by the community as important and likely to achieve major breakthroughs within 3-5-years through international/interdisciplinary cooperation. Three of these activities will end within a year (DCVP will become part of a pan-WCRP effort, CONCEPT-HEAT will evolve into a pan-WCRP activity and ENSO will move into PRP). A new call is anticipated, but again the funding availability remains an issue.
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