

Report to CLIVAR SSG-19

Panel or Working Group: Pacific Panel

1. Contributions to developing CLIVAR science; fit to CLIVAR imperatives

Monsoons:

- PP is coordinating activities studying western boundary currents NPOCE, GAIA, INSTANT-II, OKMC, SPICE and PACCSP.
- PP is spearheading new activities to improve our understanding of the South Pacific Convergence Zone (SPCZ).

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

a. Provision of skillful future climate information on regional scales

Research conducted by projects in the Pacific's western boundary currents region will provide the necessary understanding to support climate studies and impacts in the region. As an example, changes in the Northwestern Pacific (NWP) water properties and ocean circulation can influence the heat and freshwater budget and hence the atmospheric deep convection over the Indo-Pacific warm pool, thereby playing a role in modulating ENSO cycles and the East Asian Monsoon variations, as well as in the development and evolution of the NWP cyclones.

b. Regional sea-level rise

Recent regional sea-level trends in Indo-Pacific are largely wind-driven and there is a robust regional sea-level response pattern to CO₂ doubling which emerges as a response to SST-induced changes in wind-stress curl (Ekman pumping). Wind-induced sea-level changes can delay sea-level rise in some regions in the Southwestern Pacific by up to several decades. Some models do not capture well the magnitude of recent sea level trends although the pattern of those trends is well captured. There is a strong opportunity for the Pacific Panel to further explore links with sea level research community, and support research on the impact of sea level change for countries in the Pacific basin, mainly Small Islands States.

c. Science underpinning the prediction and attribution of extreme events

Rising mean sea level projects onto changes in extreme events. In addition to an increase in sea level extremes, other factors include, more extreme condition as a response of the South Pacific Convergence Zone to greenhouse warming, including droughts, and extreme tropical cyclones in regions in regions not accustomed to such events. Further, accelerated warming along western boundary currents may lead to

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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

change in cyclone tracks and frequency.

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. SPCZ and model biases
How can we improve simulation in global coupled models?
- b. ENSO: past, present, future
How may ENSO change in a warmer world?
- c. Regional sea level and extremes
How has regional sea level changed (including relative importance of anthropogenic contribution)?

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

The Pacific Panel has had some strong interaction with PICES and IMBER in the past. However, in general, the investigation of physical processes responsible for these biogeochemical and ecological impacts are not well covered by the current scope of programs under the WCRP. This is in contrast to the importance of the ocean and its interactions with the atmosphere given in the successful studies by TOGA for the equatorial Pacific and that have been expanded globally by CLIVAR. Therefore, the Pacific Panel and PICES are prepared to develop a project to address the “variability and change of physical processes of the global oceans impacting on biogeochemical cycles and marine ecosystems”, which could use field observations, data analysis and numerical modelings.

CLIVAR is in a strong position to lead such project, with a close collaboration of climatologists/physical oceanographers and scientists with biogeochemical and biological disciplines under a proper international framework. Integrated Marine Biogeochemistry and Ecosystem Research (IMBER), the core program of IGBP and SCOR, focuses on marine biogeochemical and ecological studies. It's worth pointing out that one of the themes of IMBER is “Responses of society”. Collaboration with IMBER is advantageous and could contribute to CLIVAR products that solve emerging issues of society in the Global Change Era. In the North Pacific, PICES (The North Pacific Marine Science Organization) has carried out several interdisciplinary marine science programs. PICES recently launched an integrated program FUTURE to understand how marine ecosystems in the North Pacific respond to climate change and human activities. FUTURE has developed new working groups on North Pacific Climate Variability and Change (WG27) and Regional Climate Modeling (WG29). Physical oceanographers and biogeochemical oceanographers have been collaborating in these activities. FUTURE and FUTURE-related national programs would be desirable partners for the CLIVAR Pacific Panel in their interdisciplinary collaborations.

5. Workshops/meetings held

- ITF Task Team meeting, 12-14 March 2012, Jakarta, Indonesia
- 7th Pacific Panel meeting, 28-29 April 2012 – Noumea, New Caledonia.

6. New activities being planned, including timeline

- Assessment of importance of time series that are most important to understand climate variability, to detect and attribute climate change, and to assess the relative importance of anthropogenic forcing and natural variability in the observed changes
- Focus on regional sea level, including understanding of past change, science information session to the IOC/Westpac scientists (depending on PP-IOC/WESTPAC agreement, see below)
- Low latitude west boundary current convergence at the equator, side meeting after Qingdao in October 2012

7. Workshops / meetings planned

- 8th Pacific Panel meeting, sometime June-September 2013 – China
- Decadal and Multi-decadal Variability in Pacific and Indian Ocean: The Ocean's Role in Global Climate Change, 4-7 September 2012, Qingdao, China
- Open Science Symposium on Western Pacific Ocean Circulation and Climate, 15-17 October 2012, Qingdao, China
- ENSO under climate change workshop, January, 2013, Australia, possibly in conjunction with an inaugural ENSO task team meeting

8. Issues for the SSG

Panel co-sponsorship by IOC-WESTPAC

At the PP 7th session, a possible sponsorship by IOC-WESTPAC was discussed with Wenxi Zhu. There is a good prospect that IOC-WESTPAC would sponsor some of the activities, e.g., capacity building through activities of the ITF task team, sponsorship of PP meetings, use of PP's expertise and science to provide training for scientists from member countries. However, a detailed arrangement is yet to be made.

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), against the following headings:

1. **Panel or Working Group:** Pacific Panel
2. **Title of meeting or workshop:** 8th Pacific Panel meeting
3. **Proposed venue:** China
4. **Proposed dates:** September
5. **Proposed attendees, including likely number:** panel members + 5 invitees
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:**
 - Advances in understanding of the SPCZ dynamics
 - Coordination of WBC projects, including ITF
 - ENSO and its response to climate change in CMIP5
 - Pacific climate change science and adaptation programme
8. **Anticipated outcomes (deliverables):** Panel report
9. **Format:** 2.5 days
10. **Science Organising Committee (if relevant):** Wenju Cai and Alex Ganachaud (panel co-chairs)
11. **Local Organising Committee (if relevant):** Lixin Wu, Nico Caltabiano (ICPO)
12. **Proposed funding sources and anticipated funding requested from WCRP:** \$10K