



# Climate and Ocean - Variability, Predictability, and Change

## 43<sup>rd</sup> Session of the WCRP Joint Scientific Committee

*Sonya Legg*

*June 2022*

*Online*



International  
Science Council



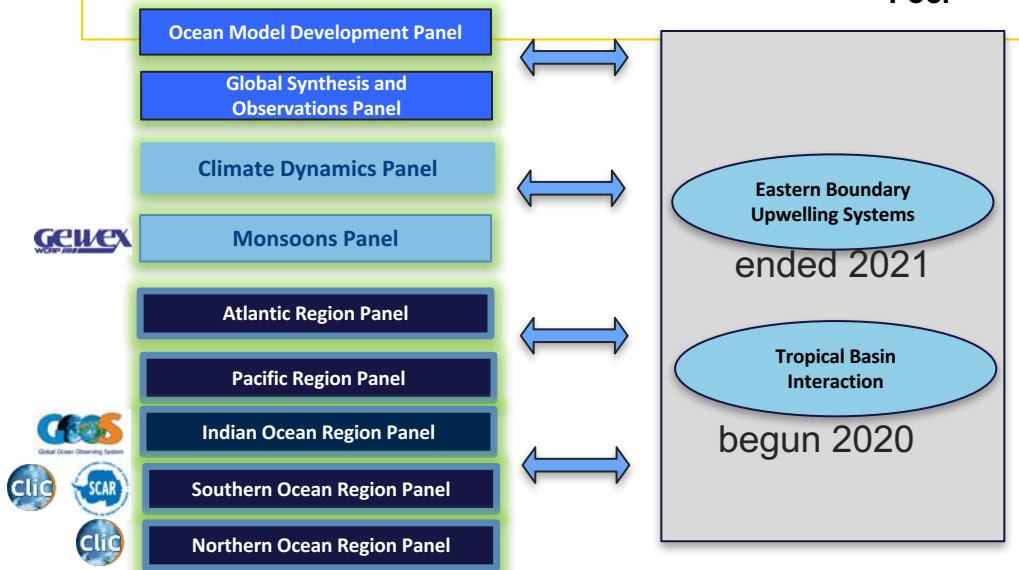
# CLIVAR Organization Chart

## CLIVAR Organization

Scientific Steering Group ICPO

Core Panel

Research Foci

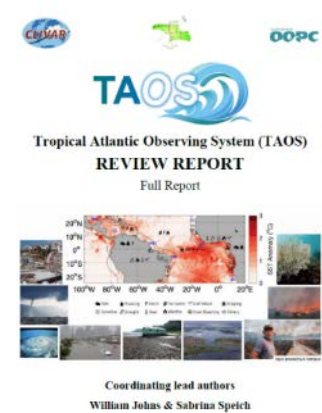


The CLIVAR SSG provides overall guidance for CLIVAR activities, in concert with WCRP objectives, and establishes CLIVAR Panels and Working Groups and their term of reference.

Research Foci address urgent and actionable research challenges. RFs have a limited life-time (3-5 yrs)

Panel membership has good gender balance, improving geographical and career-stage diversity.

# Progress and achievements



## 1. Tropical Atlantic Observing System (TAOS) Review Report published (<https://doi.org/10.36071/clivar.rp.1.2021>)

## 2. Papers:

Solomon, et al., Freshwater in the Arctic Ocean 2010–2019, *Ocean Sci.*, 17, 1081–1102, <https://doi.org/10.5194/os-17-1081-2021>, 2021. (by NORP)

Power et al., Decadal climate variability in the tropical Pacific: Characteristics, causes, predictability and prospects, *Science*, 2021 (by PRP)

## 3. Initiatives:

- Southern Ocean Freshwater release experiment Initiative (SOFIA) (by SORP)
- ENSO Metrics (by PRP)

## 4. Working Groups:

- ENSO Conceptual Model WG (by PRP, 2020- )
- Tropical Pacific Decadal Variability (TPDV) WG launched (by PRP, 2021- )
- 4 New Working Groups established by TBI RF (2021- ): WG1 - GCM Experiments; WG2 - Conceptual and Intermediate; Complexity Models and Statistical Approaches; WG3 – Observations; WG4 - Paleo Data

## 5. Workshops:

- Future Directions in High-resolution Ocean Modelling (29 Sep-01 Oct, 2021, online, by OMDP)
- Towards providing more reliable regional climate change projections (21<sup>st</sup> June – 16<sup>th</sup> July, 2021, online, by CDP)

# Progress and achievements

## Other achievements

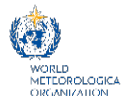
- Contribute to global and regional ocean observing system development
  - ✓ Assess COVID-19 impacts – by GSOP, IORP
  - ✓ Contributed to the SOOS Science Plan – by SOOP
  - ✓ Role of Deep Argo in the observing system – by GSOP
  - ✓ CoLaB (Coastal Lab in a Box) – By IORP in collaboration with SIBER
  - ✓ CLIVAR/GOOS workshop: From Global to Regional: Cultivating New Solutions and Partnerships for an Enhanced Ocean Observing System in a Decade of Accelerating Change (August 2022)
- Capacity building for ECS (e.g. Indian Ocean Youth Ambassador by IORP)



# Progress and achievements

## CLIVAR and the UN Ocean Decade

- **Digital Twin of the Ocean (DITTO) Programme**
  - ✓ Assisted in the preparation of the 1<sup>st</sup> International Digital Twins of the Ocean Summit at G7 (4-5 May 2022, London), and coordinate for virtual satellite activities to be organized alongside the Summit
  - ✓ CLIVAR has been accepted as a partner for DITTO
- **Ocean Observing Co-design Programme**
  - ✓ Attended Ocean Observing Co-design Programme meeting (Feb. 4 2022, online)
  - ✓ To link the CLIVAR/GOOS Workshop more closely with the programme
  - ✓ To support the co-design for a testbed in the Indian Ocean
- Supported the CLIVAR contributions to the Southern Ocean UN Decade
- Collaboration in SynObs (a Project under the UN Ocean Decade)
- To seek the UN Ocean Decade Endorsement for the CLIVAR-GOOS Workshop
- Participated in the development of UN Ocean Decade China's national strategy, actions and contribution



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# Progress and achievements

## CLIVAR Exchanges

### Published in 2021

No. 80, August 2021  
DOI: 10.1007/s10291-021-00211-1

CLIVAR Exchanges

Special Issue: WCRP-CLIVAR Workshop on Climate Interactions among the Tropical Basins

WCRP  
World Climate Research Programme  
International Council for Scientific Data Interchange

CLIVAR Ocean and Climate: Variability, Predictability and change is the World Climate Research Programme's core project on the Ocean-Atmosphere System

No. 81, November 2021  
DOI: 10.1007/s10291-021-00211-1

CLIVAR Exchanges

Special Issue: Advances in Climate Prediction Using Artificial Intelligence

WCRP  
World Climate Research Programme

CLIVAR (Climate and Ocean: Variability, Predictability and Change) is the World Climate Research Programme's core project on the Ocean-Atmosphere System

### Upcoming issues in 2022



**Open call: a CLIVAR Exchanges issue on highlighting Ocean Research, Data and Networks of Antarctic Programs**

The CLIVAR/CLIC/SCAR Southern Ocean Region Panel is seeking contributions on

- latest research highlights in physical or biogeochemical oceanography
- networking and educational efforts on international level
- sharing experiences and challenges in expanding Southern Ocean programs

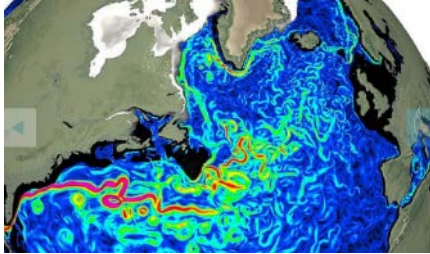
We particularly invite contributions from developing as well as newly emerging programs and those based in southern hemisphere countries.

Visit <https://www.wcrp.cn/oi/wov3Gw5.aspx> for more information and a brief questionnaire to sign up by **March 10, 2022**

# Progress and achievements

## CLIVAR Endorsed activities

### Future Directions in Basin and Global High-resolution Ocean Modelling



### Future Directions in High-resolution Ocean Modelling (29 Sep-01 Oct 2021, online)

- Supported by OMDP with GEOMAR, More than 150 participants
- The low-res design of the virtual conference center formed a nice contrast of the high-res models discussed at the conference



### The International workshop for mid-latitude air-sea interaction (8-9 & 12-14, June 2021, hybrid, Sapporo, Japan)

- Supported by CDP, sponsored by HotSpot2 project
- 20+ invited speakers, 50+ posters (by abstract sub. Deadline)
- Five sessions covering daily to centennial timescales, including extremes and teleconnections



### The East Asian Workshop on A Predicted Ocean was held successfully online



- Supported by OMDP
- More than 120 participants from the world
- 12 invited speakers
- Focus on prediction on key processes, prediction on extreme air-sea interaction.

### The East Asian Workshop on A Predicted Ocean (31<sup>st</sup> Dec 2021, online)

#### Endorsed project and activities (Archived)

- Multi-annual to decadal Climate Predictability in the North Atlantic-Arctic Sector Workshop (Online, 20-22 September 2021), supported by CDP

#### Newly endorsed project and activities

- Ocean to climate Seamless Forecasting system: An update of the Ocean Forecasting System (OSF) programme (Jan 2022)
- Ocean Salinity Conference (New York, USA), 6-9 June, 2022



United Nations  
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Oceanographic  
Commission



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# Future plans

- To continue to build connections with other LHAs/partner projects where strong links exist, or where stronger connections would be beneficial. Also need to avoid duplication.
  - ✓ Panels are encouraged to develop specific actions (e.g., joint activities, workshops) to build on these connections.
  - ✓ To provide ocean expertise for new core projects and LHAs.
  - ✓ GSOP and OMDP to be further involved in ESMO for strengthening model-observation connection.
  - ✓ To help identify ocean hubs for My Climate Risk Lighthouse Activity.
  - ✓ To connect to SLC LHA for sea ice tipping point and AMOC stability
  - ✓ To communicate panels/RF capacity building activities to the WCRP Academy.



# Future plans

## Linking with LHAs

LHAs	Future cooperation
My Climate Risk (MCR)	<ul style="list-style-type: none"> <li>Contribute to the development of <u>ocean climate risk hubs</u>;</li> <li>Provide ocean science expertise for MCR.</li> </ul>
EPESC	<ul style="list-style-type: none"> <li>OMDP and GSOP could provide oceanographer representatives in EPESC.</li> </ul>
WCRP Academy	<ul style="list-style-type: none"> <li>Panel co-chairs to communicate their capacity building activities to the WCRP Academy.</li> </ul>
Safe Landing Climate (SLC)	<ul style="list-style-type: none"> <li><u>Ocean variability &amp; Consequences</u> (High Risk WP of SLC): 1) AMOC stability (with OMDP and ARP); 2) systematic SST errors in models (with OMDP); 3) sea ice tipping point (with NORP &amp; SORP);</li> <li><u>Sea Level Rise</u> (Sea Level WP &amp; Safe Landing Pathways WP of SLC with SL GC)</li> <li><u>Ocean carbon uptake</u> (Perturbed Carbon Cycle WP of SLC)</li> <li>Southern Ocean Freshwater-release mode experiment Initiative (<u>SOFIA</u>) of SORP (High Risk WP and Safe Landing Pathways WP of SLC)</li> <li><u>Extreme events and their changes</u> (High Risk WP of SLC)</li> </ul>
Digital Earths (DE)	<ul style="list-style-type: none"> <li>Collaborate with OMDP on <u>high-res modeling</u> (DE focus 1), e.g. intercomparison 5-km scale ocean models recently done by OMDP.</li> <li><u>Model-data fusion</u> for long-term CMIP/IPCC scenario projection simulation; diagnosing and correcting systematic errors (OMDP and GSOP).</li> <li>Linking to the UN Ocean Decade action through <u>DITTO</u> programme, which CLIVAR is partnered with.</li> </ul>

# Future plans

## Linking with core projects

Core project	Future cooperation
RfS	Ocean-connected weather and climate extremes (Cluster 3 of RfS)
ESMO	GSOP and OMDP to be further involved in ESMO discussion, e.g. model-data fusion, activities on reanalysis intercomparison, observation requirements, analysis of increments for detecting model bias, or data assimilation methods for climate).
GEWEX	<ul style="list-style-type: none"><li>• Monsoons Panel</li><li>• Global Precipitation Experiment (GPEX)</li></ul>
SPARC	ICPO Coordinate the Qingdao node for SPARC General Assembly in 2022.
CliC	Through joint panels of SORP and NORP and joint activities, e.g. NORP-SORP workshop, Arctic Processes CMIP6 Bootcamp

# Future plans

- Call for new CLIVAR research Foci (currently only 1 active RF – Tropical Basin Interactions)
- Strengthening cross-panel interactions (e.g. cross-panel workshops).
- Panels/RFs are requested to devise specific plans for capacity building, by involving early career scientists (ECS) and researchers from the Global South.
- Summer school series through long-term capacity building agreements of CLIVAR-FIO and WCRP-ICTP.
- Continue to make effort to improve gender and geographic balance of CLIVAR members.
- Summarize experience and lessons from online/hybrid meetings, hoping to be useful for the WCRP OSC.

# Upcoming Conferences/workshops in 2022

From Global to Coastal: Cultivating New Solutions and Partnerships  
for An Enhanced Ocean Observing System  
in A Decade of Accelerating Change



15th-17th August 2022  
Trieste, Italy & Online



CLIVAR CLIMATE DYNAMICS PANEL (CDP)  
ANNUAL WORKSHOP: EXTERNAL VERSUS INTERNAL  
VARIABILITY ON DECADEAL AND LONGER TIME SCALES



Online, 6 weekly 2-hour sessions  
September 12 - October 21, 2022



Hybrid, cross-panel meeting, invited speakers from developing rim nations. Discuss priorities and cross-cutting strategies for expansion of regional ocean observing systems.



FilaChange  
2022

FilaChange, an international conference on ocean processes  
linking filaments and finescales (1-100 km) with climate change

29 Aug-2 Sep 2022

NORP-SORP WORKSHOP ON POLAR FRESH WATER



Sources, Pathways and Impacts of Fresh Water in



Northern and Southern Polar Oceans and Seas (SPICE UP)

ONLINE, 19-21 September, 2022

[Register Now](#)



CLIVAR-OMDP and SWOT-AdAC meeting. In-person meeting with 4 locations (France, USA, China, Australia).



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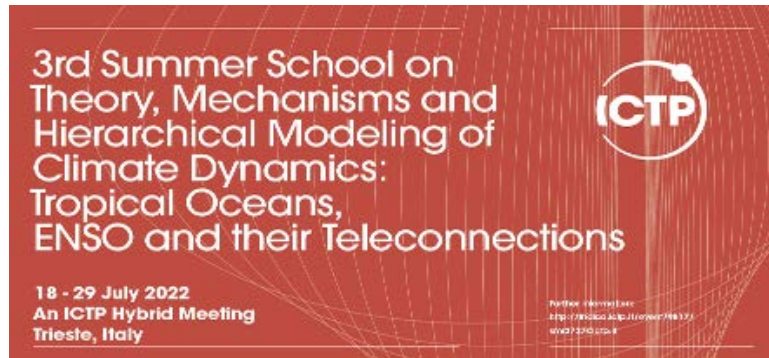
# Capacity building activities



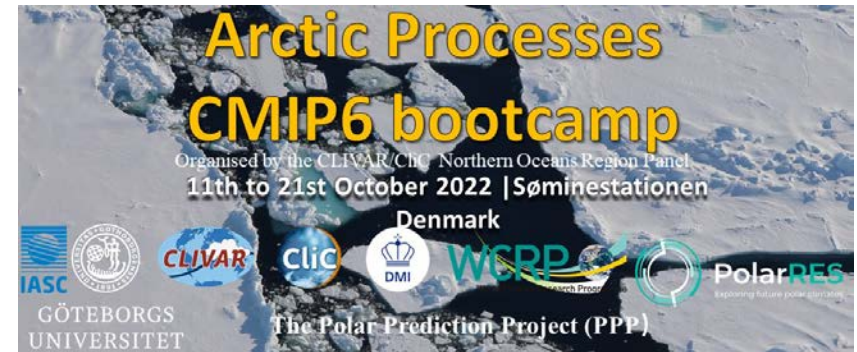
Just completed, 1<sup>st</sup> hybrid event of CLIVAR IORP



Hybrid: 2 in-person locations and online



PRP



# Emerging issues

Please let the JSC know of any emerging issues or problems that require action or the JSC to be aware of

- Interests from CLIVAR community on **climate extremes, risks and impacts**. Possible joint WG with PICES on Climate Extremes and Coastal Impacts in the Pacific as well as connection to MCR LHA.
- **Increasing need for hybrid events**: Understandable wish for in-person interaction, but continued restrictions on travel for some participants. Panels/RFs are encouraged to do a survey after hybrid events, and share the best practices for capacity building. CLIVAR Exchanges can be used as a venue to communicate best practices.
- Care is needed not to always identify the same people representing ECS and/or Global South serving in different groups, not to overburden them by community work, or to negatively affect their career advancement.
- Seek more opportunities to cooperate with other partners through WCRP, e.g. **GOOS, IMBeR, SCOR, UN Ocean Decade**, and etc.

# Additional Slides



# Progress and achievements

## Other CLIVAR panel activities

- **IORP:** RAMA-OMNI coordination, Indian Ocean Youth Ambassador, IndOOS-2 implementation progress report, WIO training workshop
- **SORP:** contributed to the SOOS Science Plan and SO UN Ocean Decade; special issue on 'SO and S Atlantic' in *Front. in Mar. Sci.*
- **PRP:** ENSO metrics, ENSO conceptual models WG, ENSO Summer School, CLIVAR-PICES Joint WG on Climate Extremes and Coastal Impacts in the Pacific
- **ARP:** 3 focal areas: AMOC, Tropical Atlantic, risks and extreme events.
- **NORP:** Arctic Processes CMIP6 Bootcamp; review papers on seasonality of Arctic freshwater and Arctic Ocean heat flux, NORP/SORP joint workshop
- **MP:** Regional working groups updated: Asian-Australian Monsoons (17 members), African Monsoons (19 members), American Monsoons (14 members)
- **GSOP:** Focus on 2 topics: The Deep Argo role in the observing system; and collaboration in SynObs (a Project under the UN Ocean Decade)
- **OMDP:** 1 new paper emanating from panel activities; three workshops within OMDP; SWOT-Adopt-a-Crossover calibration and validation experiments
- **CDP:** Arranged two workshops: on "towards providing more reliable regional climate change projections"; and "Multi-annual to Decadal Climate Predictability in the North Atlantic-Arctic Sector", 3 sessions on big conferences



# Summer courses

- FIO-WCRP Agreement (2018.1-2023.1): to host a CLIVAR-FIO Summer School on even years, beginning in 2018.
- WCRP-ICTP Agreement (long-term): to host Summer School and other capacity building activities of CLIVAR on odd years, beginning in 2019.



1<sup>st</sup> CLIVAR-FIO Summer School on Past, Present and Future Sea Level Changes. June 2018



ICTP-CLIVAR Summer School on Oceanic Eastern Boundary Upwelling Systems. July 2019

# Progress and achievements

## CLIVAR's Contribution to WCRP Implementation

- Support the preparation and organisation of **WCRP activities**:
  - ✓ Support to the WCRP Climate Research Forum in the Eastern Asia (7 April, 2021, online) and South America (8-9 September, 2021) in 2021
  - ✓ WCRP 2022 Sea Level Conference (12-16 July, 2022, Singapore, Jose & Jing in the Organising Committee)
  - ✓ SPARC General Assembly (Boulder, USA & Reading UK and Qingdao, China, Jose & Qian in coordination with FIO for the Qingdao Node)
- Contribute to the **WCRP LHA Science Plan** development and 3 emerging initiatives (Climate Intervention TT, GPEX Tiger Team, Cycles and Budgets TT)
- Jose participated in the **WCRP leadership group** on behalf of ICPO
- Attended the **WCRP Secretariat and IPO regular teleconferences**
- Contributing to the **WCRP reports** to partners (e.g. WMO, SCOR, SOLAS) and the **WCRP Newsletter**
- **Advertising WCRP activities** through CLIVAR network

