CLIVAR: CLIMATE & OCEAN variability, predictability and change

WCRP Core Project on the Ocean-Atmosphere System

GEWEX SSG

26. February, 2019

WCRP World Climate Research Programme

CLIVAR

New CLIVAR Co-Chairs

Annalisa Bracco, Wenju Cai

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SSG 24 in DC, November 2018

Part of its aim:

- Review developments related to WCRP review and strategic plan.
- Interact with US CLIVAR community and US Inter Agency Group.
- Discus implementation of new science plan.

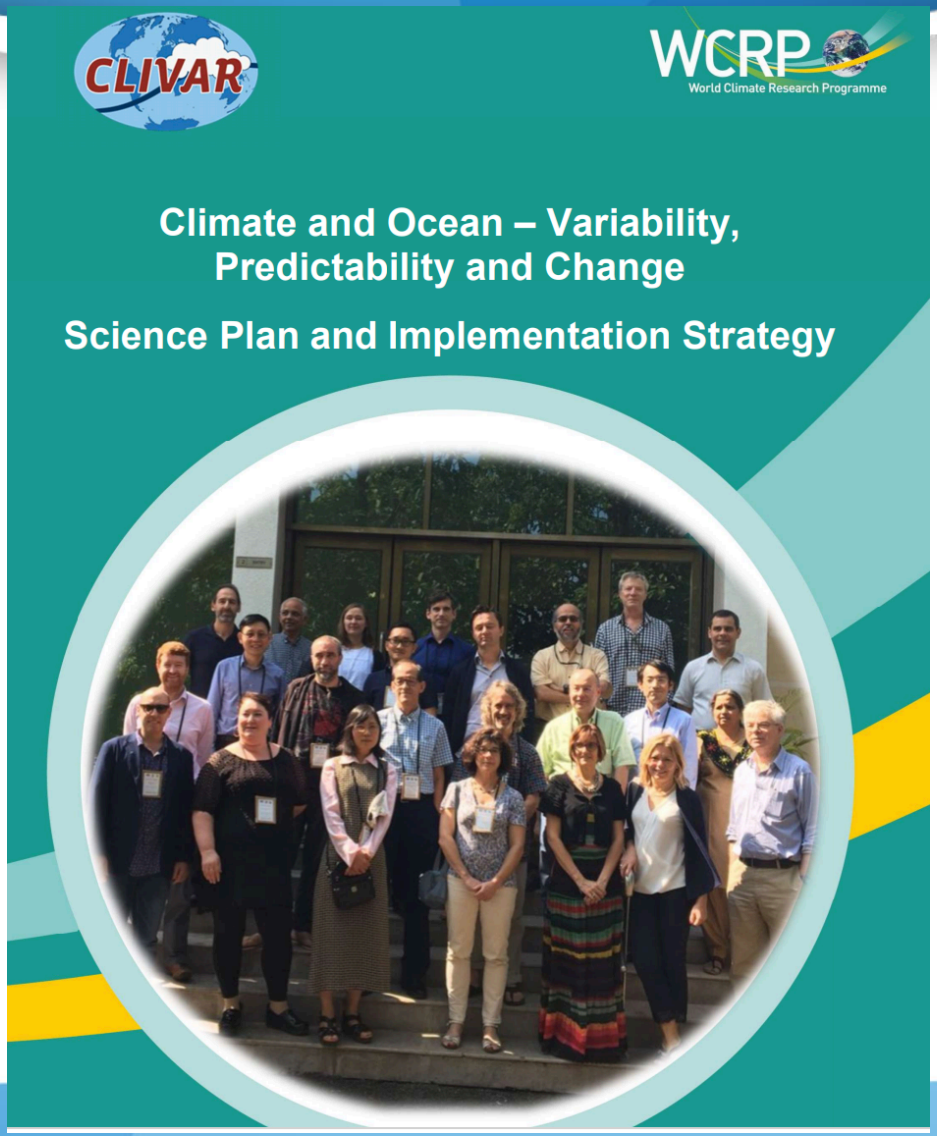
The entire first day was devoted to a discussion of the WCRP SP and potential consequences following its implementation.

Day-1 Objectives

With JSC lead and agency representatives:

- Discuss CLIVAR success and progress
- Review new CLIVAR Science Plan
- Summarize new WCRP Strategic Plan
- Discus future WCRP directions with respect to CLIVAR science
- Brainstorm on possible WCRP implementation directions in light of CLIVAR science needs and US agency suggestions.

New CLIVAR Science Plan



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New CLIVAR Science

New Scientific priorities

- **Mechanisms of climate variability and change** that require further investigation with the ultimate goal of better constraining the fluxes of energy and carbon in the climate system
- **Ocean processes** that modulate climate variability and change for which open questions remain
- **Climate predictability challenges** that exist over a broad range of space and time scales

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CLIVAR short-term priorities

- The ocean's role in transient climate sensitivity and changes to sea level under increasing anthropogenically induced radiative changes
- Ocean contributions to energy, heat, water and carbon budgets, their perturbations and changes
- Regional climate variability and change; high resolution model simulations; extremes; fine scales processes

CLIVAR short-term priorities

- Physical and biogeochemical interactions in the coastal ocean and changes to this vital and vulnerable region of the planet.
- How variations in the climate mean state interact with teleconnections and feedback on climate modes variability
- Scale (time and space) interactions in predictability

CLIVAR Enabling Capabilities

International cooperation is critical to grow the infrastructure that underpins all CLIVAR science:

- Climate and Ocean Process and Sustained Observations
- Global, Regionally Enhanced and Process Models
- Ocean Data, Synthesis and Assessment
- Capacity Development and Knowledge Exchange

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Long term objectives (input to WCRP SP):

- Identify ocean and coupled **climate processes** that are critical for global and regional climate variability and change
- Identify temporal and spatial scales of **climate predictability**
- Quantify constrains on **climate sensitivity**, air-sea exchange and Earth's energy budget / ocean heat content
- Quantify **regional impacts** of climate change in **sea level, cryosphere and water cycle**
- Quantify past/present/future **ocean role in CO_2 and heat uptake** and links between **climate and ocean ecosystems**

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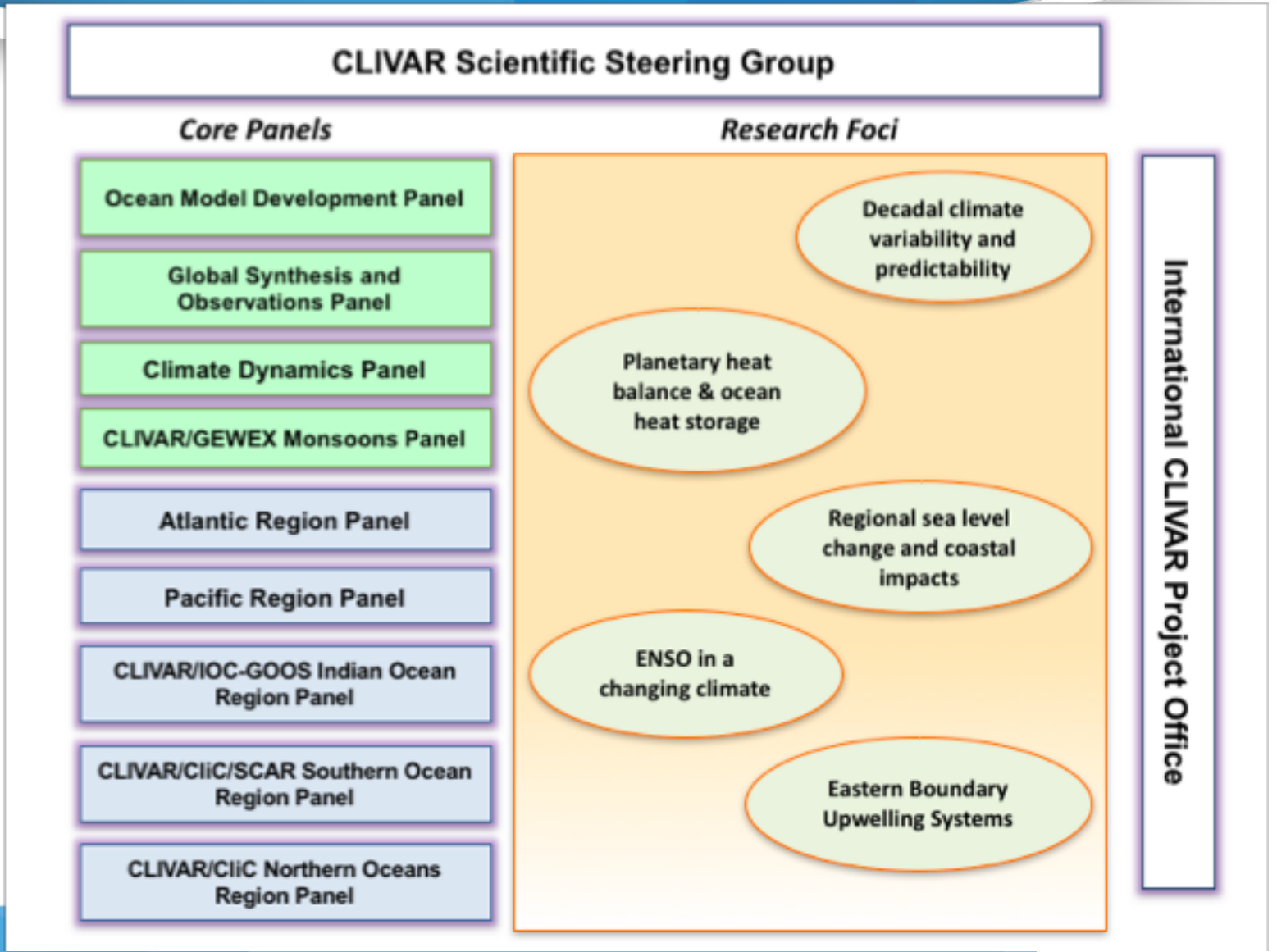
Long term objectives (input for WCRP SP):

- Providing **regional climate information and seamless predictions across timescales**, from intraseasonal to multidecadal
- Quantifying predictability of the climate system, including the predictive skills of extreme events in a transient climate
- Facilitating the provision of actionable forecast information, also for developing economies

CLIVAR Structure



CLIVAR Panels

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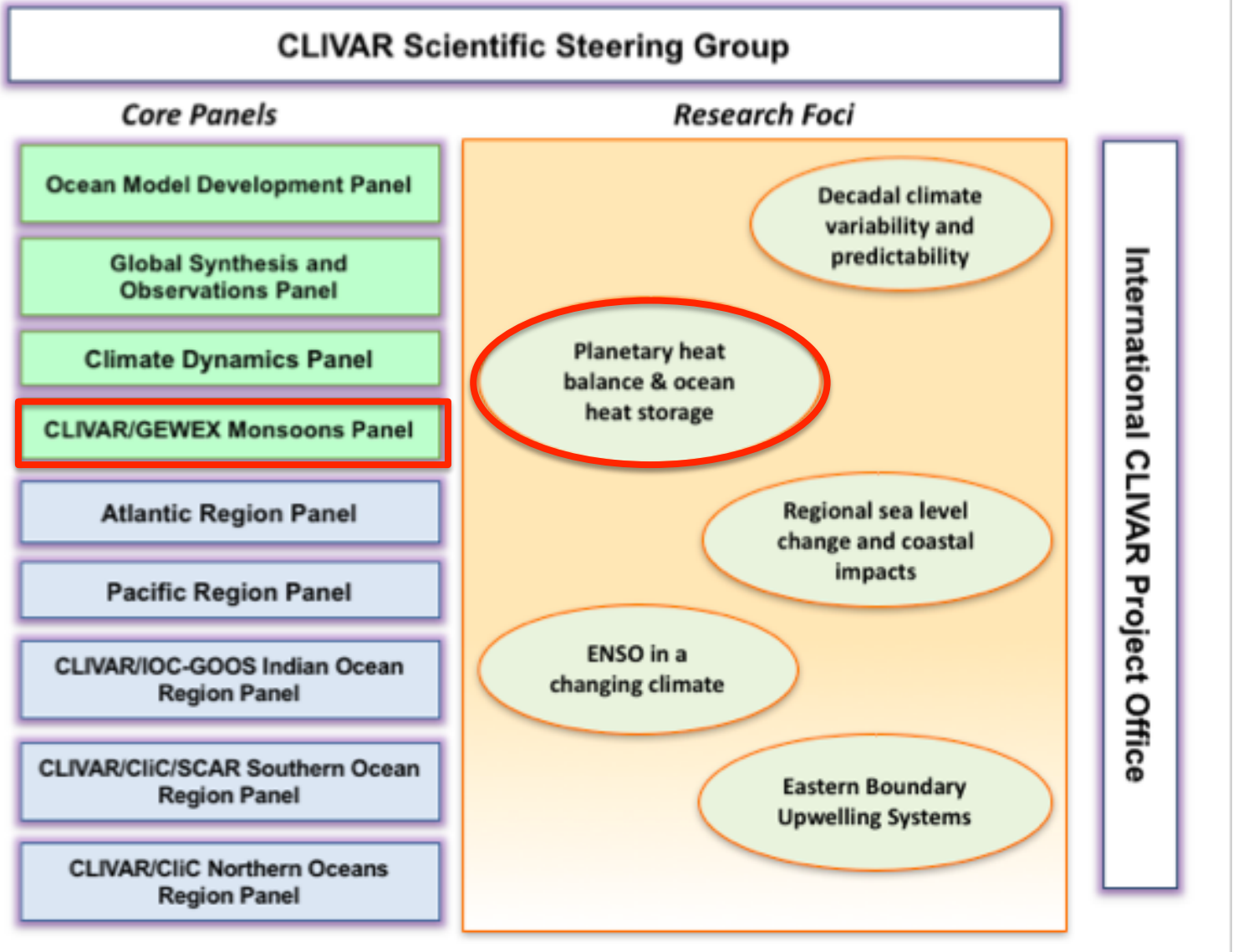
CLIVAR Structure

CLIVAR Panels



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CLIVAR Global Panels

CLIVAR GLOBAL SYNTHESIS AND OBSERVATIONS PANEL

- Demonstrated the value of ocean observing systems (both satellite and in-situ) and ocean state estimation, e.g., for initializing seasonal-to-interannual climate prediction.
- GSOP has fostered the International Quality controlled Ocean Database (IQuOD).

CLIVAR OCEAN MODEL DEVELOPMENT PANEL

- Fosters the development of ocean models for research in climate.
- Provided ocean model diagnostics guidelines for the evaluation of ocean-ice model components of CMIP6 programs.

CLIVAR CLIMATE DYNAMICS PANEL

- Coordinates international research efforts to increase understanding of the dynamical processes that control coupled climate variability and change in the atmosphere and ocean on synoptic to centennial time scales.

CLIVAR CLIVAR/GEWEX MONSOONS PANEL

- **Has a global remit and joint membership and operation between GEWEX and CLIVAR.**
- **Work encompasses aspects of tropical dynamics, the ITCZ, multi-scale convective physics and much work in understanding the response of monsoons to common forcing.**

CLIVAR Region Panels

CLIVAR PACIFIC REGION PANEL

- Focus on process studies, ocean circulation and interannual to decadal climate variability and predictability in the region;
- Understanding the Western Boundary Currents.
- Supports the CLIVAR Indonesian. PRP has much involved in the TPOS-2020 planning.

CLIVAR ATLANTIC REGION PANEL

Promote, recommend and oversee the implementation of observational systems in the Atlantic Ocean sector and major research initiatives on Atlantic climate variability and predictability. Important achievements have been made in development of the Atlantic observing system, ocean and climate modeling systems.

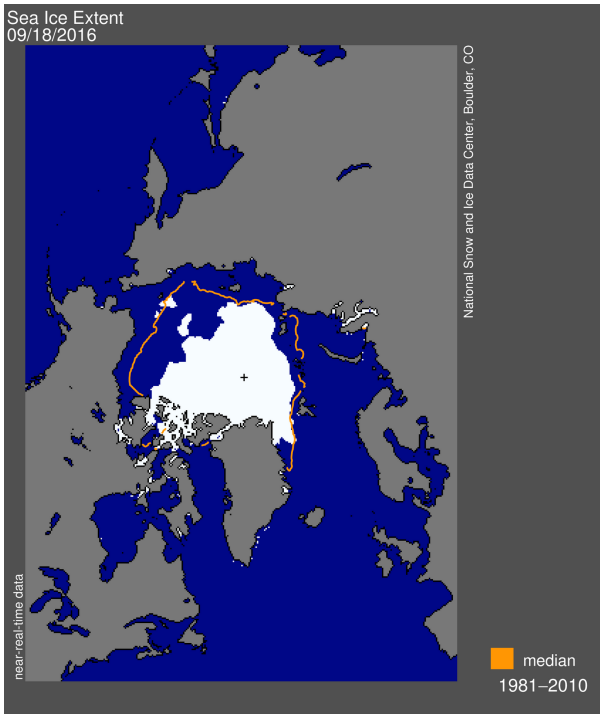
CLIVAR/CLIC/SCAR SOUTHERN OCEAN REGION PANEL

- Development of tools and methods required to assess climate variability, climate change and climate predictability of the ocean-atmosphere-ice system in the Southern Ocean.
- Works closely together with SOOS, providing scientific and technical input, and collaborating as required with other relevant programs.

CLIVAR/IOC-GOOS INDIAN OCEAN REGION PANEL

- Designs and implements an integrated observing system for the Indian Ocean, IndOOS with RAMA array.
- The climate variability modes of different time scales from intraseasonal to decadal are always the research priorities
- Involved in the planning of IIOE-2 project as one of the four organizing groups.

New CLIC/CLIVAR Panel: **NORP**



An International Panel to Coordinate and Facilitate Activities on the Role of the Northern Oceans in the context of the Global Climate System from a Coupled Ocean-Air-Ice Perspective

NORP plays a central role in coordinating, monitoring, and evaluating the progress of such activities during and beyond the Year of Polar Prediction.

Founding Chairs:
Amy Solomon and John Fyfe

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First Round of RF

- Decadal variability and predictability of ocean and climate variability
- Regional sea level change and coastal impacts
- Planetary heat balance and ocean heat storage
- Biophysical interactions & dynamics of upwelling systems
- ENSO in a changing climate

Research Foci

First RF will come to end:

- Decadal Climate Variability & Predictability:
  - 2019 conference
  - Will become pan-WCRP effort
- Planetary Heat Balance & Ocean Heat Storage:
  - 2018 workshop,
  - could now become pan-WCRP; TBD
- ENSO in a Changing Climate:
  - Conference in 2018
  - will move into PRP

- **New call anticipated**

Issues for GEWEX

The two CLIVAR and GEWEX PO's offices are trying to work together in relation to the Monsoon panel (P. v. L.)

Monsoon Panel is planning joint activities, including the summer school in Brazil that may or not happen, given that they insist in asking funds for Brazilian students.

What is the future of Earth Energy Change activity?