

CLIVAR: CLIMATE & OCEAN

variability, predictability and change

WCRP's core project on the
Ocean-Atmosphere System

JSC36, 8-10 April 2015, Geneva
Lisa Goddard (SSG co-chair)



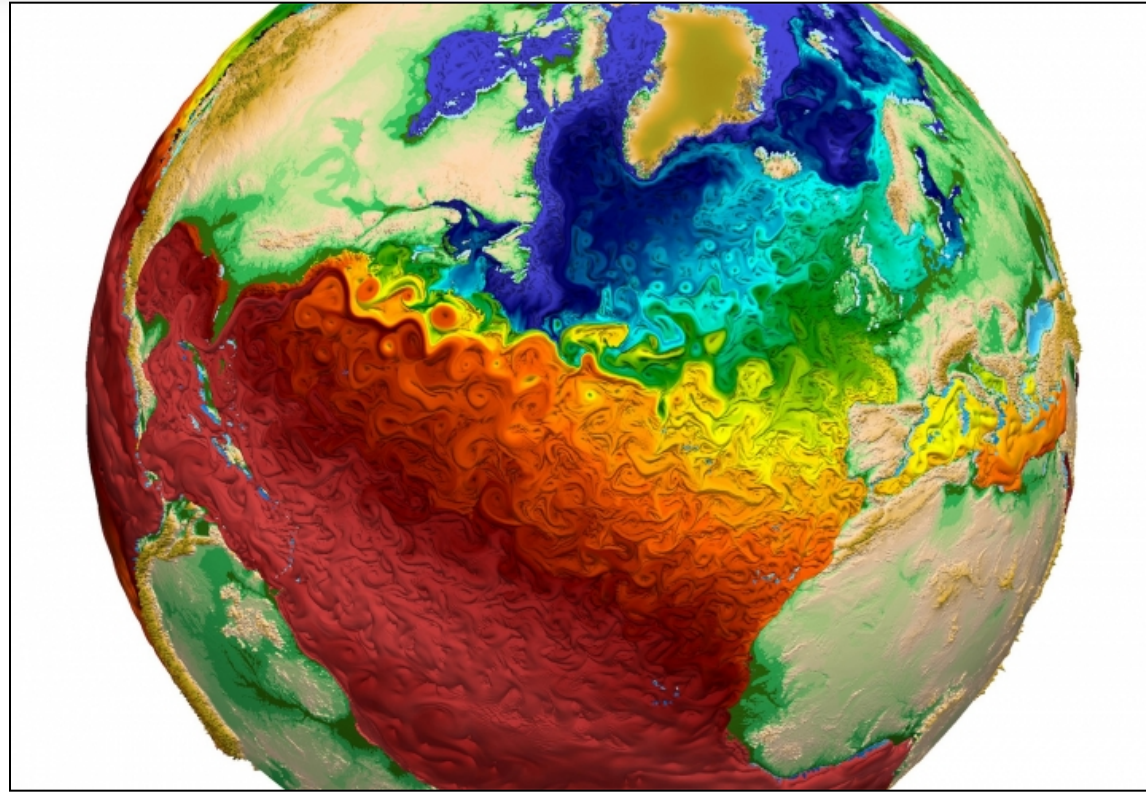
CLIVAR: CLIMATE & OCEAN

variability, predictability and change

To observe, simulate and predict changes in Earth's climate system with a focus on the **ocean-atmosphere system** as part of the climate system

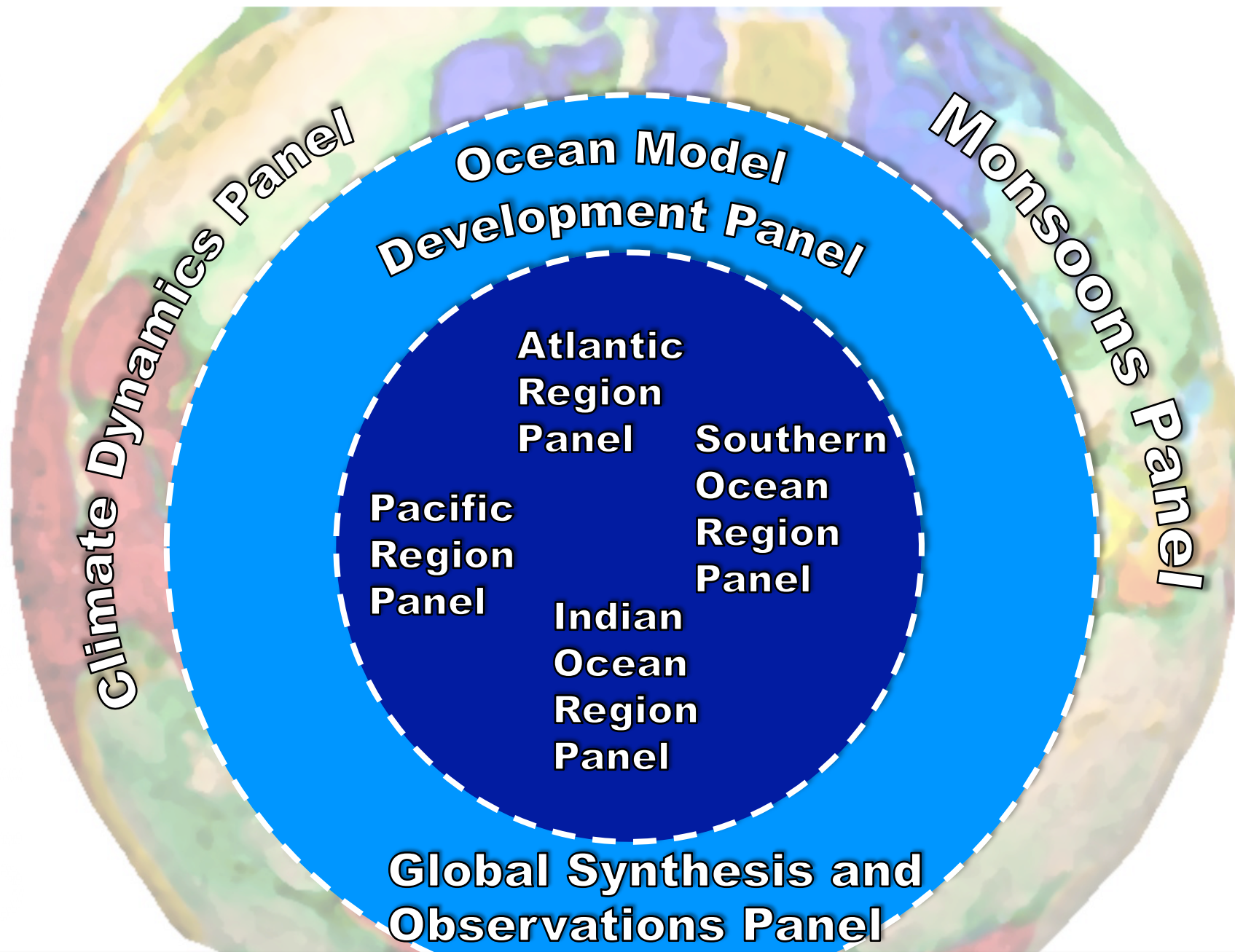
Enabling better understanding of climate variability, predictability and change

To the benefit of society and the environment in which we live



Credit: Los Alamos National Laboratory

CLIVAR Structure

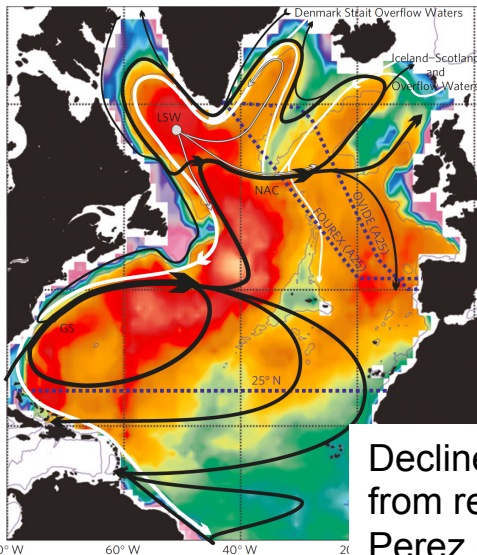
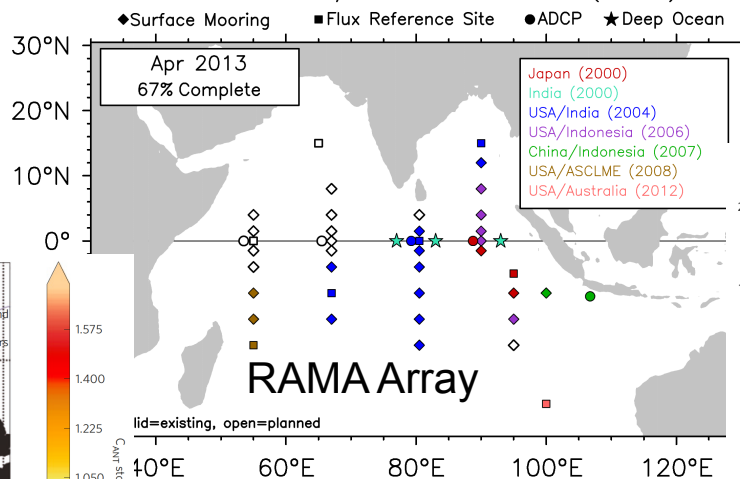


CLIVAR: Basin panels

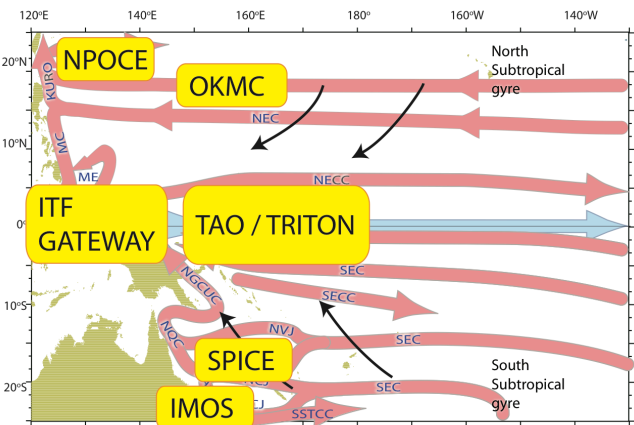
Int'l Coordination. Regional Implementation.

Observations -- process studies – modeling

Research Moored Array for African–Asian–Australian
Monsoon Analysis and Prediction (RAMA)



Decline of Carbon uptake
from repeat hydrography,
Perez et al 2013



Multi-national, -institutional,
and -investor
process study programs

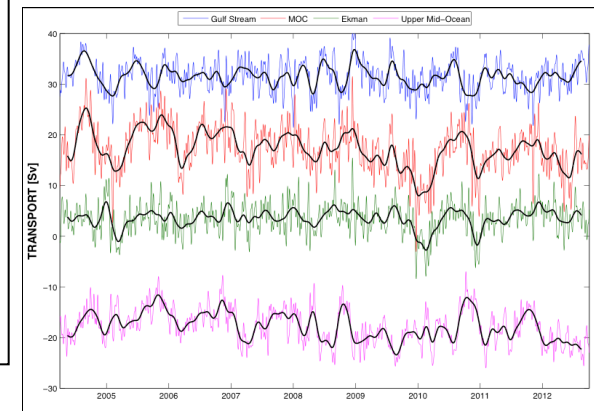
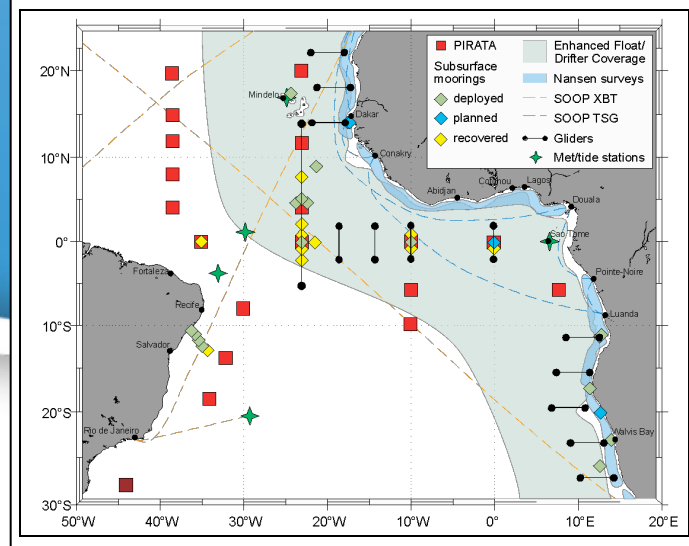
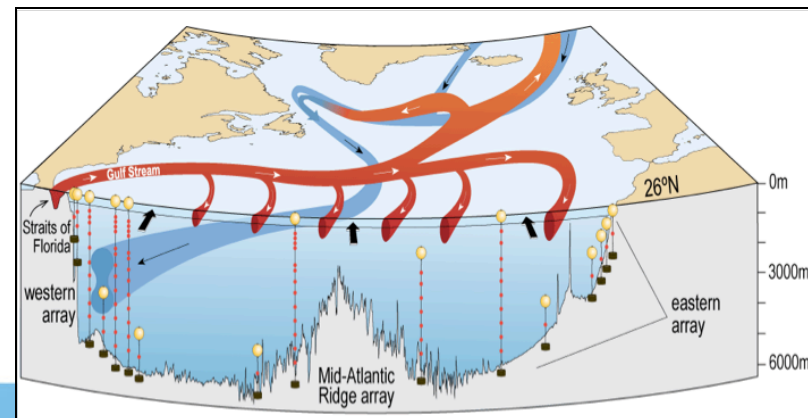
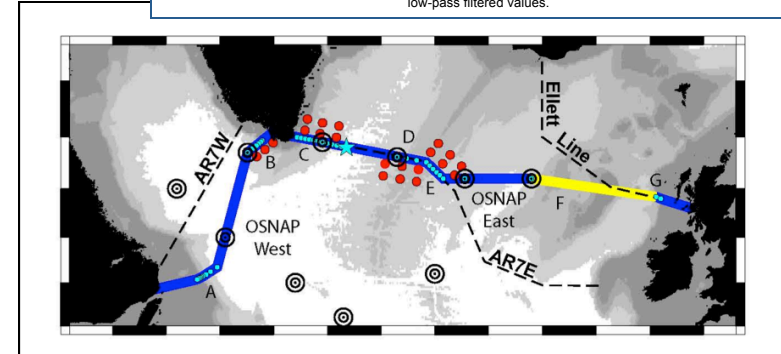
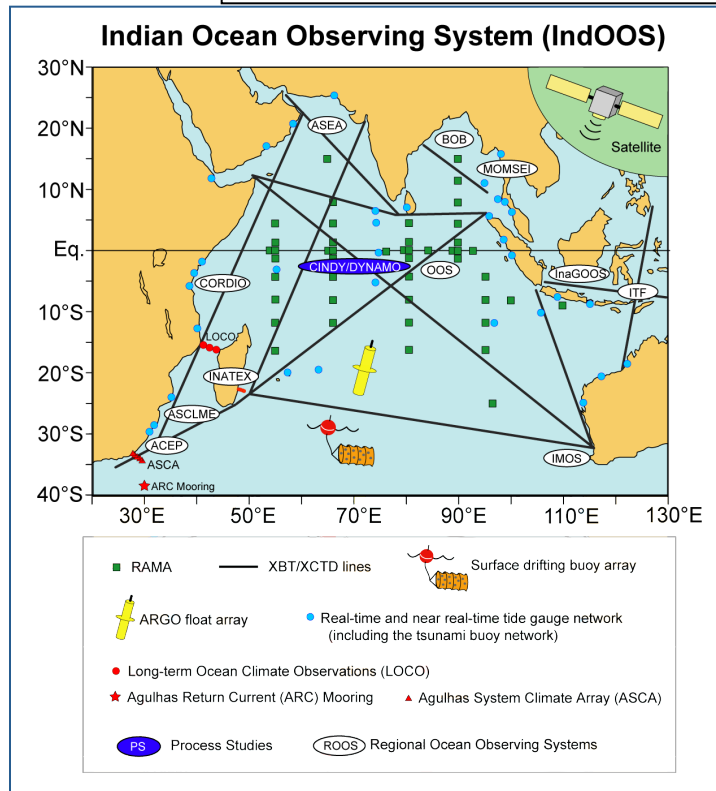


Figure 1. The latest RAPID time series including the AMOC (red), Gulf Stream (blue), Ekman (green) and upper mid-ocean (magenta) transports. Colored lines are ten-day values. Black lines are 90-day low-pass filtered values.



Consolidated CLIVAR Structure

Scientific Steering Group

ICPO

Core Panels

Ocean Model Development Panel



Global Synthesis and Observations Panel

Climate Dynamics Panel

Monsoons Panel

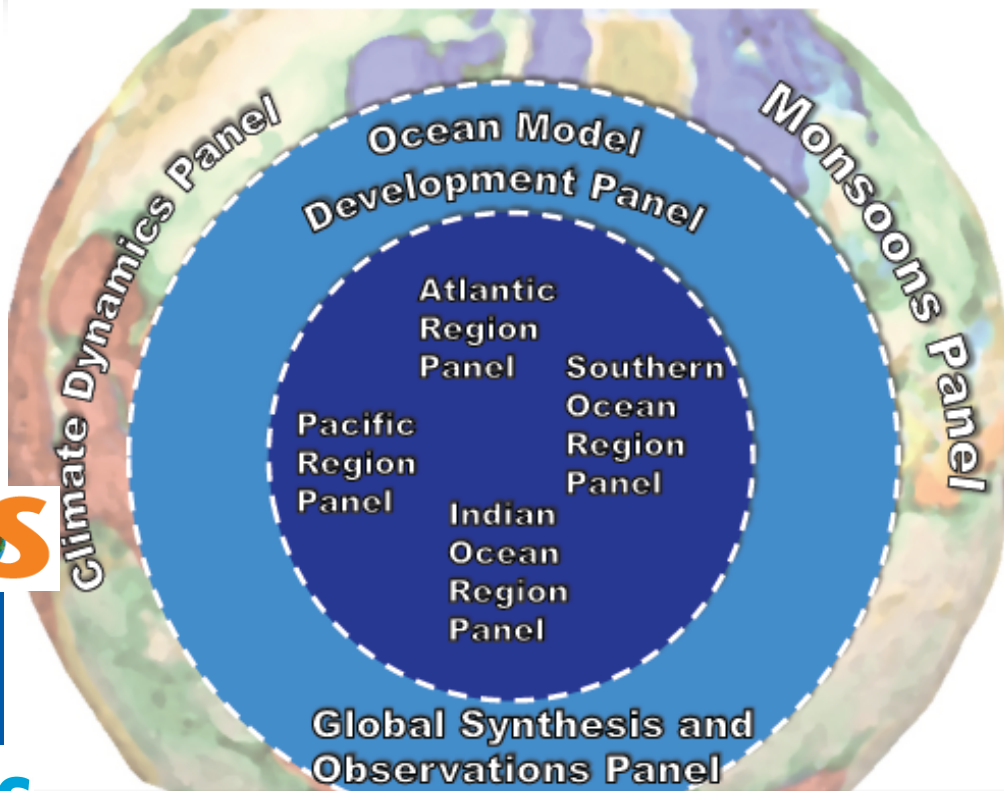
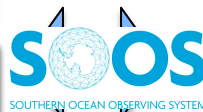


Atlantic Region Panel

Pacific Region Panel

Indian Ocean Region Panel

Southern Ocean Region Panel



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Predictability of monsoon systems

Decadal climate variability and predictability

Biophysical interactions and dynamics of upwelling systems

Regional sea-level change & coastal impacts

Understanding and predicting weather & climate extremes

ENSO in a changing climate

Planetary energy balance & ocean heat storage

...

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Research Foci

- Timely, tractable and socially-relevant research challenges; limited life-time (2-5 yrs)
- Cross-cutting between CLIVAR & WCRP, modeling & obs.

GCs



PACES
Regional sea-level change & coastal impacts


Mature & Ongoing

Decadal climate variability and predictability


Planetary energy balance & ocean heat storage

ENSO in a changing climate

Under Development

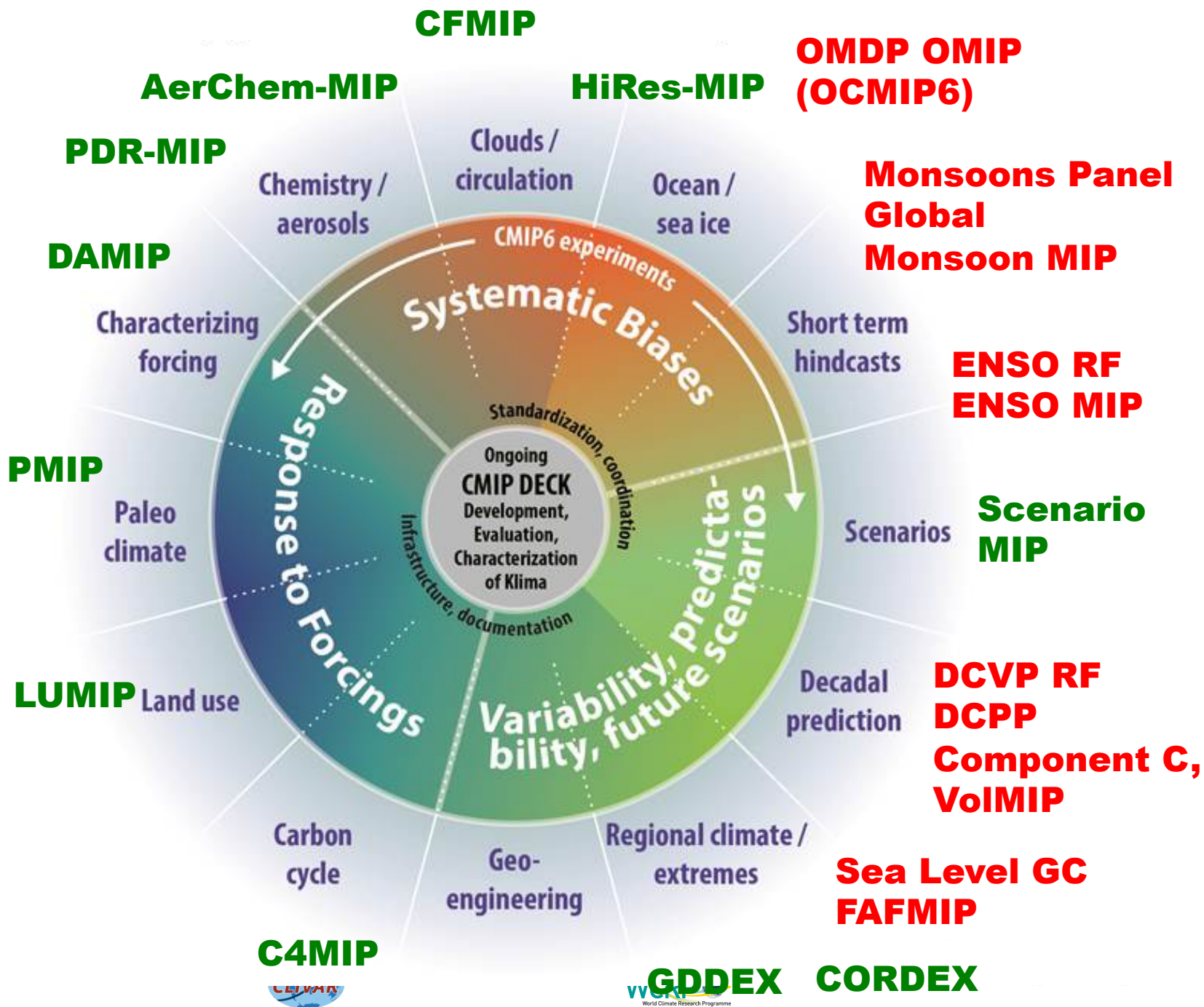


Predictability of monsoon systems



Upwelling Systems

Extremes



CLIVAR pressing needs

Observations:

- ✧ Enhance sustained observations of ocean surface, subsurface and deep ocean;
- ✧ High-resolution paleo-climate proxy data.

Modeling:

- ✧ Systematic investigation of processes and parameterization that impact the representation of decadal variability in climate models – using coupled global models and theoretical/process studies.
(e.g. mixed-layer, vertical mixing, resolution, nonlinear processes including eddies)

WCRP CLIVAR 2016 Open Science Conference

➤ **Three segments**

- Early Career Scientists Symposium (2.5 days)
- Regional stakeholder forum (1 day)
- Main Conference (4.5 days)

➤ **Estimated participants: 600**

➤ **Scientific Organizing Committee**

- WCRP projects, WMAC groups, and partner projects

➤ **Sponsored by** China SOA FIO

➤ **Strong support** from USCLIVAR, SCOR, APN, START, ICES, PICES...*fundraising launched!!*

➤ **Commitment from JSC/WCRP is critical**



CLIVAR Science Plan

- First draft anticipated 2nd half of 2015.
- Will reflect greater collaboration across Earth science disciplines.
- Implementation will include enhanced interactions with other WCRP projects and FutureEarth.
- Scientific scope will be informed by JSC (i.e. funding).

Future WCRP/CLIVAR ?

- **Bloom:** Continue to evolve, embrace new problems, new people, new opportunities?
- or
- **Shrink:** Respond to shrinking budget?



CLIVAR challenge: Variability & Prediction Across Timescales

GCs



Regional sea-level
change & coastal
impacts

Extremes

Mature & Ongoing

Decadal climate
variability and
predictability

Planetary energy
balance & ocean
heat storage

ENSO in a
changing climate

Under Development



Predictability
of monsoon
systems

Upwelling Systems





CLIVAR challenge: The changing ocean circulation

GCs

   
Regional sea-level
change & coastal
impacts



Mature & Ongoing



Decadal climate
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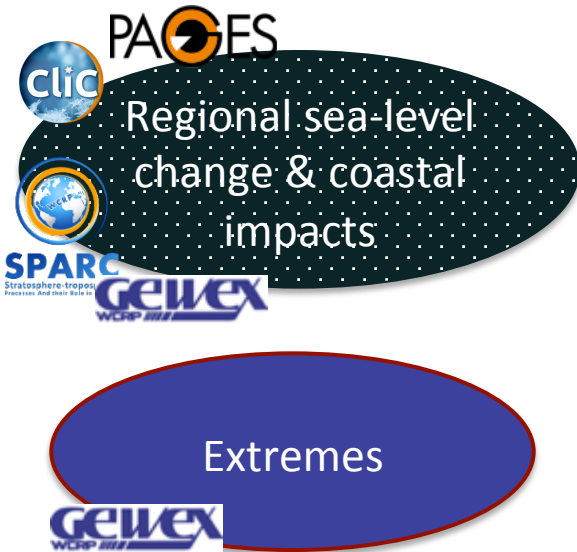
 
Predictability
of monsoon
systems


Upwelling Systems

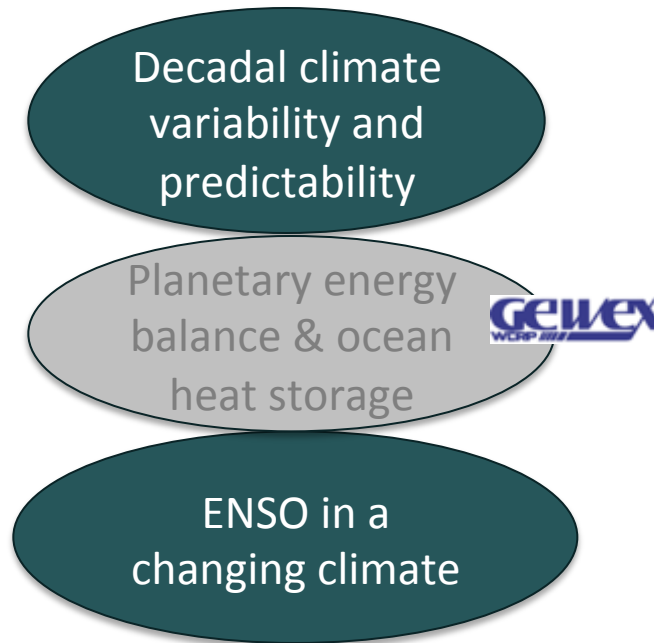

Extremes

CLIVAR challenge: Ocean's Role in Climate Extremes

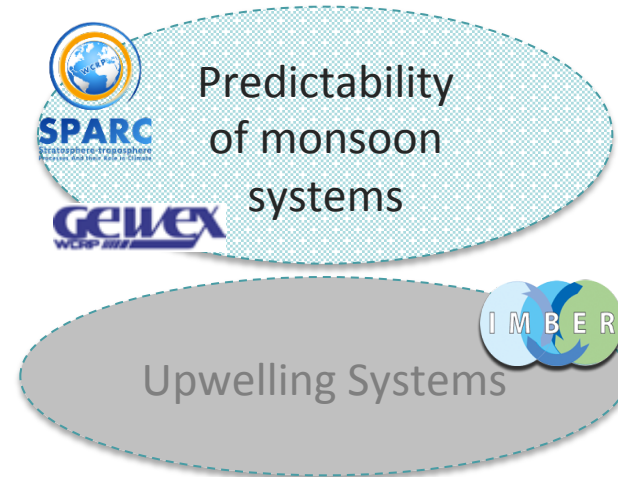
GCs



Mature & Ongoing

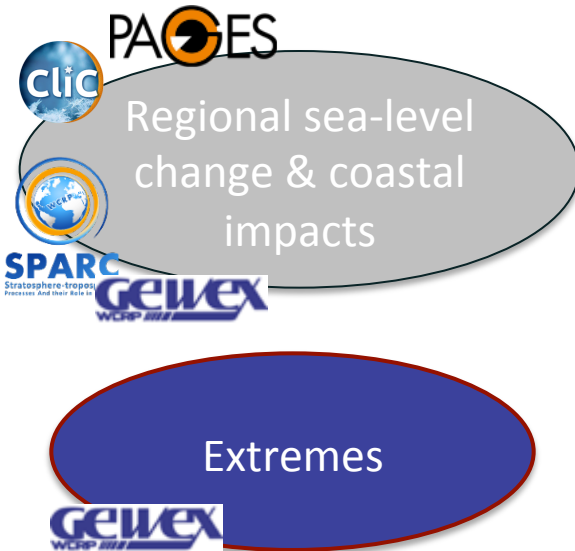


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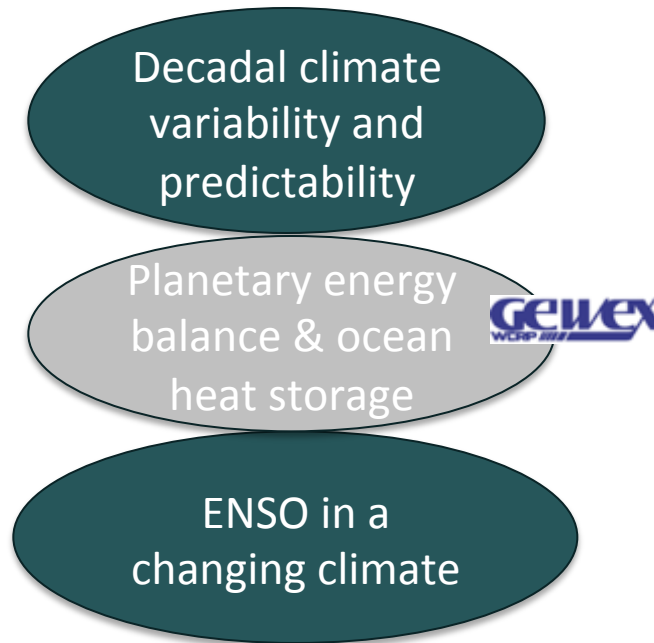


CLIVAR challenge: Climate Dynamics and Coupled Climate Modes

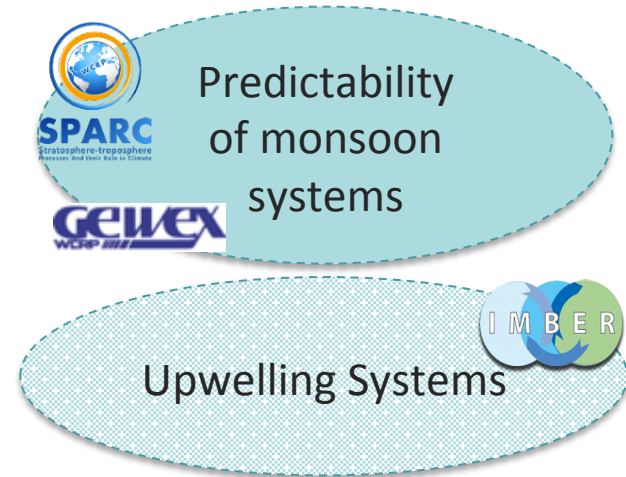
GCs



Mature & Ongoing

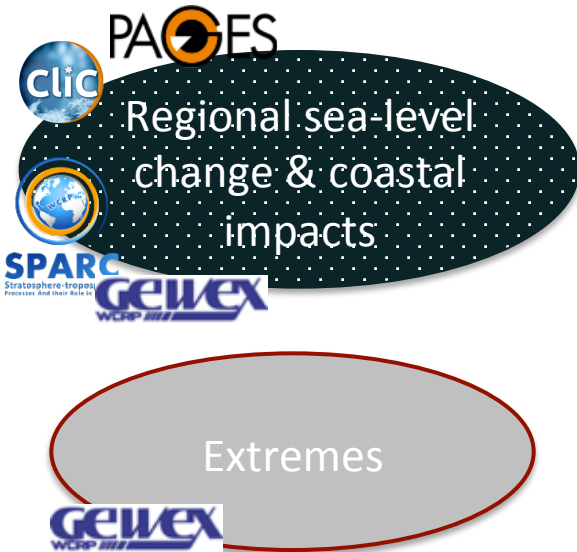


Under Development

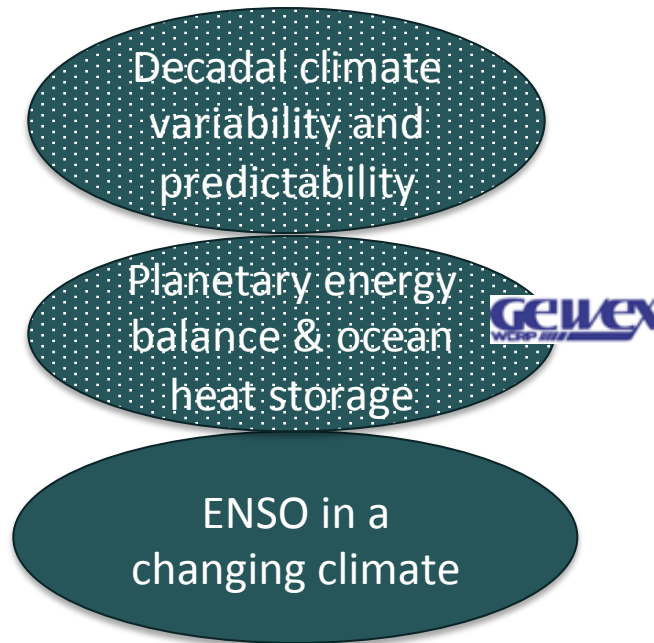


CLIVAR challenge: The Role of Upwelling Systems

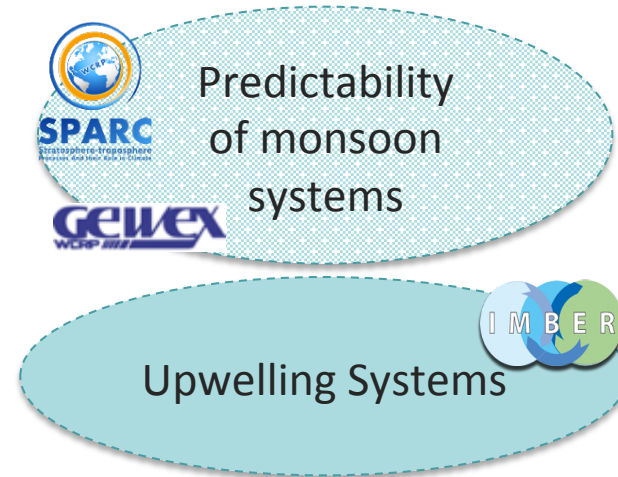
GCs



Mature & Ongoing



Under Development



Truly International ICPO

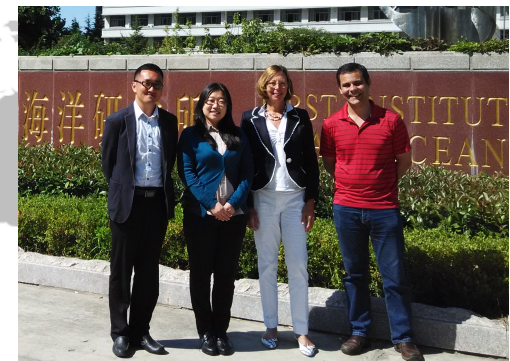
**ICPO Deputy
Director,
Trieste, Italy**



**ICMPO,
Pune,
India**



**ICGPO, ICPO
Executive Director,
Qingdao**



NEW Collaborations

- Monsoons Panel with WCRP
- Upwelling RF with IMBER
- New GEC Ocean projects network,
 - CLIVAR, SOLAS, IMBER, OceanCarbon, PAGES, SCOR, WCRP, GOOS, Future Earth
- ECS network
- Stronger links to national programs, e.g. USCLIVAR



CLIVAR challenge: Overarching

How the surface and deep ocean circulation and the climate system interact?

Global Synthesis and
Observations Panel

Climate Dynamics Panel

Ocean Model Development
Panel

