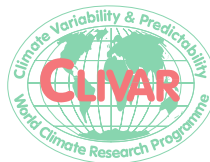


WHAT SHOULD CLIMAR BE?



Towards a CLIMAR science agenda
and implementation strategy



CLIVAR Research Challenges

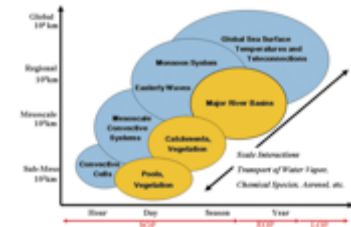
- Anthropogenic Climate Change

- Natural variability versus forced change
- Climate sensitivity and feedbacks
- Regional phenomena (e.g., ENSO, AMOC, ...)
- Extremes
- CMIP#
- Climate Engineering (Geo-engineering)



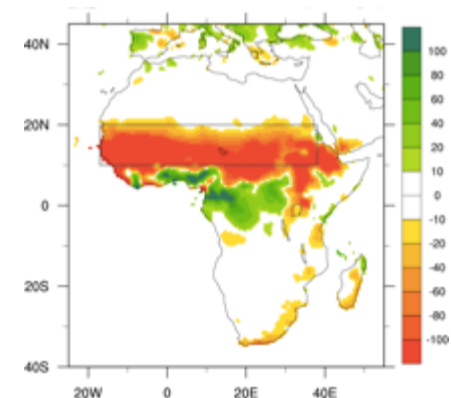
- Intra-to-Seasonal Variability, Predictability and Prediction

- Monsoons (and ENSO, TAV, ...)
- ISV/MJO
- Quantifying prediction uncertainty
- Building pan-WCRP and WWRP links
- CHFP



- Decadal Variability, Predictability and Prediction

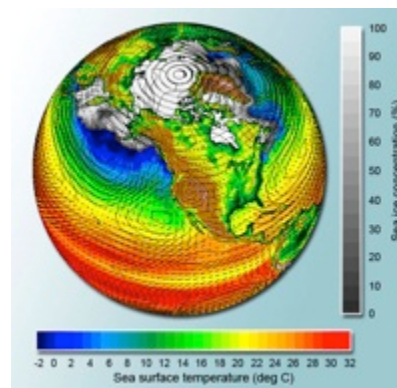
- Determine predictability
- Mechanisms of variability (AMO, PDV, ...)
- Role of oceans
- Adequacy of observing system
- Coupled Initialization
- Quantifying prediction uncertainty
- Building pan-WCRP links



CLIVAR Imperatives

- Improved Atmosphere and Ocean Components of ESMs

- Analysis and Evaluation
- “Climate Process Teams” (process studies)
- Building links pan-WCRP and IGBP
- Model-Data comparisons



- Data Synthesis and Analysis

- Ocean
- Coupled Data Assimilation Systems
- Links – carbon, biogeochemistry, marine-ecosystems

- Ocean Observing System

- Development, implementation and system design
- Advocacy for sustained observations
- IGBP links for Carbon, Biogeochemistry, Ecosystems

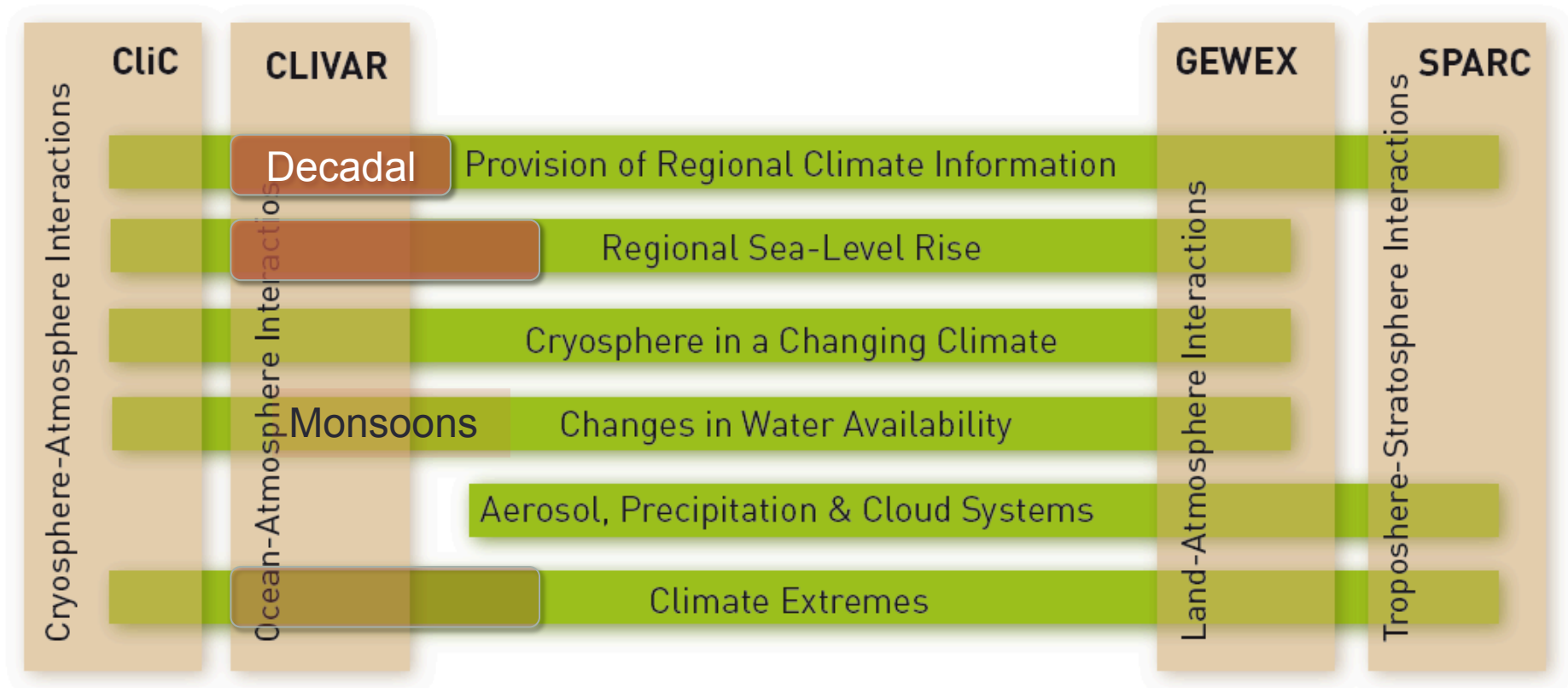


- Capacity Building

- Summer schools and topical workshops
- Expert training
- Call for panel membership



WCRP proposed Grand Challenges



GEWEX Science Questions

1. How can we better understand and predict variations and changes in **precipitation**?
2. How do changes in **land surface and hydrology** influence past and future changes in water availability and security?
3. How does a warming world affect **climate extremes**, especially droughts, floods, and heat waves, and how do land area processes, in particular, contribute?
4. How can understanding of the effects and **uncertainties of water and energy exchanges** in the current and changing climate be improved and conveyed?

CLIMAR

CLIMATE PROCESSES, VARIABILITY, PREDICTABILITY AND TRENDS IN THE MARINE REALM

Mission: To observe, simulate and predict changes in the climate system with a focus on ocean interactions with the atmosphere, cryosphere, marine biogeochemistry and ecology, enabling better understanding of ocean-climate processes, variability, predictability and change in the marine realm, to the benefit of society and the environment in which we live.

CLIMAR

Research Area (Grand Challenges)

- Intraseasonal – interannual mechanisms of monsoon systems
- Decadal mechanisms of ocean and climate variability
- Trends, nonlinearities and extreme events
- Biophysical interactions and upwelling systems
- Dynamics of regional sea level
- ...

Capabilities (Imperatives on global and regional scales)

- Improving ocean system models
- Improving ocean observing systems
- Ocean data, synthesis and information systems
- Knowledge transfer and stake holder feedback
- Education, capacity building and outreach

CLIMAR

Governance to implement a global effort

Research Foci Working Groups

- Predictability of **monsoon** (subseasonal – interannual)
- **Decadal** Variability (mechanism and predictability)
- Regional **sealevel** mechanism and variability
- Dynamics of **upwelling** systems and biogeochemistry, ecology
- Ocean trends, nonlinearities and **extreme** events

Capability Panels

- Basin implementation panels
- Ocean model development
- Ocean data, synthesis and information
- Knowledge transfer, capacity building, outreach

CLIMAR panels/working groups

- Cross panel membership encouraged 5 year term (3 year extension)
- Meet in leapfrog schedule (odd and even years)
- Nations are invited to send additional representatives at their expense

CLIMAR implementation panel (even year)

	Monsoon Predictability	Decadal Variability	Sealevel regional	Upwelling Ecology	Extremes Trends	...
Atlantic	X	X	X	X	X	
Pacific	X	X	X	X	X	
Indian	X	X	X	X	X	
Southern		X	X	X	X	
Model	X	X	X	X	X	
Data	X	X	X	X	X	
Transfer	X	X	X	X	X	
GEWEX	X	X			X	
SPARC	X	X			X	
CLIC		X	X		X	
WGSIP	X	X		X	X	
IMBER		X		X		

CLIMAR initiatives / studies

- Define criteria (mainly under research or capability)
- Endorsement process similar to CLIVAR
- More than one nation / funding mechanism involved

	Monsoon Predictability	Decadal Variability	Sealevel regional	Upwelling Ecology	Extremes Trends	...
Atlantic	TACE	AMOC		SPACES		
Pacific	SPICE	NPOES				
Indian	CINDY					
Southern		DIMES				
Model	CHFP	CORE				
Data						
Transfer						
...						