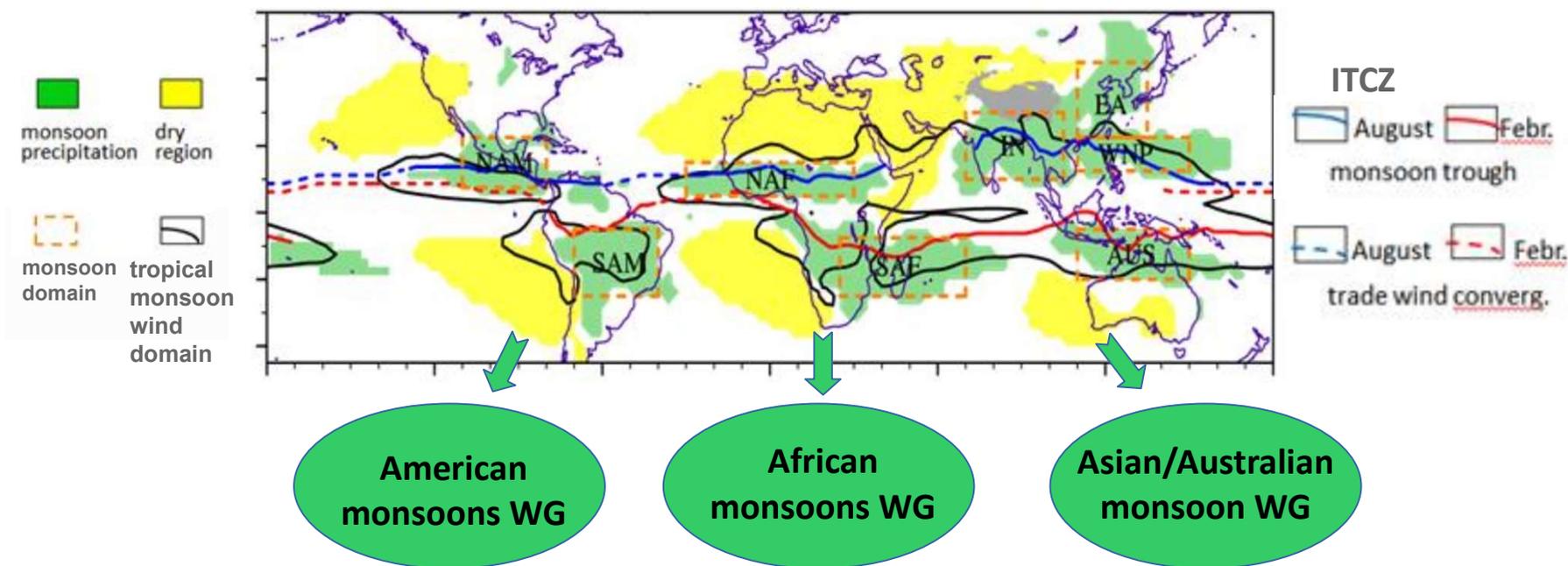


GEWEX/CLIVAR Monsoons Panel

Co-Chairs: **Dr Aurel Moise** (Australia/Singapore) & **Dr Leila Carvalho** (USA)

Dr Rupa Kumar Kolli, Executive Director, ICMPO (India)

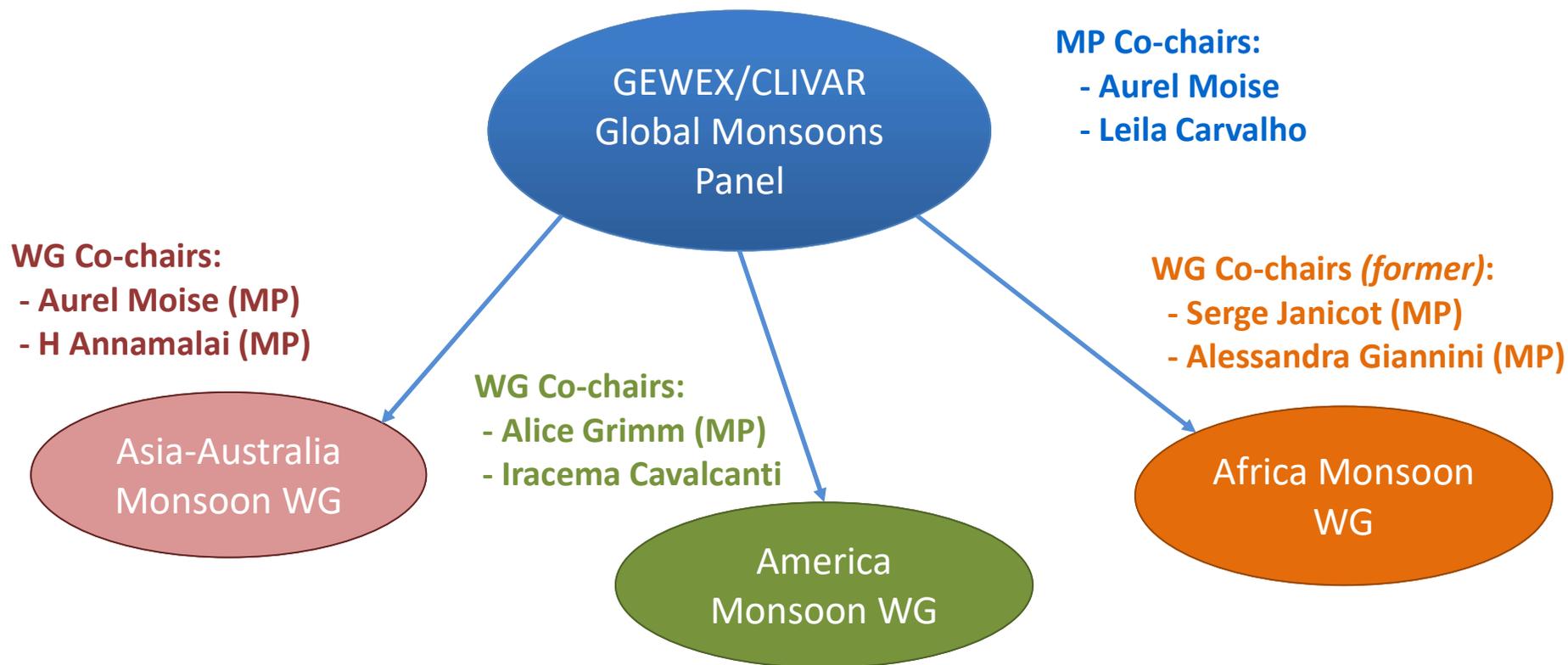


A joint panel spanning both CLIVAR & GEWEX with membership from both communities
 Established in its current form after June 2014 GEWEX Conference

<http://www.clivar.org/clivar-panels/monsoons>

Panel structure : Monsoon Panel (MP) & 3 regional Working Groups (WG)

- Regional WGs tasked with identifying priority areas for targeting advances
- Regional WGs relatively flexible to organize themselves under the guidance of MP



Panel Objectives

Overarching Goal: advancing understanding of monsoon variability and improving its prediction with observations and modelling as cornerstones of research activities

- Enhanced emphasis on **linkages across scales** and **physical processes**
- Seek for **new methods** to enhance monitoring, advance diagnostics and improve models
- Development of more elaborated **process studies** coordinated with modelling activities (e.g. **GMMIP** within **CMIP6**)
- Empowering the **next generation of scientists** around the world to advance our knowledge of monsoon systems, in particular in key regions of interest

Recent Activities

Monsoons Panel and its Regional WGs

COVID impact

- MP is fairly reliant on the efforts carried out in the three regional Working Groups.
- Little financial support/incentives for WG's: historically leverage on their ongoing national activities and programmes and this alignment facilitates overall progress for the working groups.
- Regional contributions have slowed down overall
- Once COVID-19 spread through the various regions, we saw an even stronger slowdown with many members having to cope with their countries' situation; and
- the incentive to contribute to the regional working group activities was not strong enough (in some regions) to prevent this stagnation in 2020
- **We are currently in the process of addressing/discussing this across the working groups and some renewal is going to be unavoidable. Happy to hear advice from SSG.**

The unexpected sad passing of one of the key members of its panel and leader of the African Regional Monsoon Working Group: Dr Françoise Guichard.

Hommage à Françoise Guichard



Members of the CLIVAR/GEWEX Monsoons Panel and International CLIVAR Monsoon Project Office

- The former MP Co-Chair and leader in the African regional working group, Dr Françoise Guichard, suddenly passed away. This was of course a big shock to everybody and both the MP and the African regional Working Group have been affected, with the latter still feeling the lack of the leadership Françoise provided.

Global Monsoons Panel **meetings**

- **Last face-to-face: MP4 at AGU2019 Fall Meeting, December 2019**
- Monsoon Panel had (almost) monthly meetings throughout 2020
- Updating TORs and Work Plan; Presentations; Discussion on problems with regional WG's
- Coordination on contribution to GEWEX Quarterly and CLIVAR special issue.
- Regional WG's have been quite dormant

Contribution to GEWEX Quarterly, CLIVAR Special Issue and BAMS paper

1. Members of the MP contributed to a Special Issue of GEWEX Quarterly (vol 30, no. 4, Quarter 4, 2020; <https://www.gewex.org/gewex-content/uploads/2020/12/Q42020.pdf>) on “Monsoons of the World: Addressing Global Challenges in Monsoon Research”.
2. Recognizing the broader interest of the Monsoon Mission activities to the WCRP community, the CLIVAR/GEWEX Monsoons Panel has coordinated a special issue of *CLIVAR Exchanges* on India’s Monsoon Mission, with Dr M.N. Rajeevan as the Guest Editor. This issue showcases 12 articles highlighting the results achieved so far under Monsoon Mission and can be accessed here:
https://www.clivar.org/sites/default/files/documents/CLIVAR%20Exchanges%2079%20Monsoon%20Mission%20Final_1231.pdf
3. Several MP members contributed to a review on past monsoon changes and their primary drivers, the projected future changes and key physical processes, and discuss challenges of the present and future modeling and outlooks. This review was published in BAMS in 2020: Wang et al. (2020) Monsoons Climate Change Assessment, Bull. Amer. Meteor. Soc., <https://doi.org/10.1175/BAMS-D-19-0335.1>

Regional WG on Asian-Australian Monsoons

- Enhanced focus on **stakeholder engagement (RCOFs)**
- Continue systematic biases work/determining sources of error in GCMs for monsoon
- Continued exploitation of **S2S database for short time-scale prediction**
- QJRMS special issue on campaign **INCOMPASS** published
- Identification of the leading patterns of short-term, medium-term and long-term meteorological drought variations over Asia
- Climate change projections of tropical rainfall and a comparison of paleo and future monsoon circulations
- Investigation of extreme precipitation mechanisms around Japan in warm seasons, utilizing space-borne precipitation radar observation.
- Participation in Asian Precipitation Experiment (AsiaPEX), also in two workshops, the Extreme Severe Storm and Disaster Mitigation Strategy workshop and the AsiaPEX/SA.
- Characterization of seasonal and subseasonal predictability types in the Indian Monsoon.
- Identification of systematic errors in the Asian summer monsoon simulations
- Investigation of air–sea coupling and horizontal resolution in the representation of Indian monsoon system
- Inter-comparisons and process studies of Indian monsoon in a joint project WCSSP-India between Met Office, UK universities and India Ministry of Earth Sciences.

Regional WG on American Monsoons

- Continued exploitation of the [S2S database](#) for the South American monsoon, to assess possibility for subseasonal prediction
- Skill assessment of S2S-participating models in simulating [MJO](#) impacts on the American monsoons
- Attempted improvement in sub-seasonal prediction through [calibration](#) procedures
- Investigation on combined influence of ENSO and interdecadal oscillations on the rainfall characteristics and the production of extreme events
- ENSO impacts in South America, including influences on the monsoons via different mechanisms
- Work on the South America monsoon and Global Monsoons in the Brazilian Atmospheric Global Model (BAM)
- Attribution of the observed polar shift of the South Atlantic Convergence Zone in the historical period using observations and CMIP5 models
- Investigation of influence of Pacific Decadal Oscillation on ENSO teleconnections during the South American Pre-monsoon season
- Investigation of mechanisms associated with the South American Low-Level jet
- Temperature trend in the North American monsoon region in the last forty years
- Subseasonal predictability of precipitation in South America through observations, reanalysis and model simulations

Regional WG on African Monsoons

The pandemic caused great impact in the ability of MP members to report for the African WG. Additionally, the loss of the lead member Françoise Guichard significantly impacted the activities of the Africa WG.

Ongoing activities:

S2S activities for Africa and also in the context of the global monsoons (SWIFT, CREWS projects (extreme rain and heat events, oceanic & tropical waves influences), also new project on weather forecast for West African cities (STEWARD))

African climate and climate change

- Analysis of CMIP5/CMIP6 simulations
- Future Climate For Africa (FCFA) program (AMMA-2050, HyCristal, FRACTAL, UMFULA); IMPALA: CP4 regional simulations with a 4 km grid size over whole Africa (past and future climate)
- Sahelian heat waves (ACASIS) climatology, mechanisms
- CORDEX-Africa (ongoing activities): Development of Flagship Pilot Study (FPS) projects (lead C. Lennard); Involvement of Central Africa into this work

Capacity building: in Central Africa (ongoing) , LMI ECLAIRS2, international conference on Heat Waves and Health issues (Oct 2018, Saint Louis du Sénégal)

Climate Services: (ongoing) e.g. Atlas for end users

Cross-Panel and Cross-Regional activities

Asian-Australian Monsoons

- S2S: Developing capacity of Southeast Asian countries to apply subseasonal-to-seasonal forecasts in impact forecasting tools
- RCOFs: Participation in South Asian Climate Outlook Forum (SASCOF) sessions
- Participation in the ASEAN Climate Outlook Forum (ASEANCOF-15).
 - the forming of an ASEANCOF Working Group,
 - updates on the forming of the Southeast Asian RCC Network and
 - the WMO-led discussion on finalising the roadmap towards objective RCOF outlooks

Global Monsoons MIP (GMMIP) contribution to CMIP6 and IPCC AR6

GMMIP initiated through the Monsoon Panel Co-Chairs T. Zhou, J. Kinter III, A. Turner

- 21 modelling groups signed up
 - Tier 1 Extended AMIP
 - Tier 2 Ocean pacemaker (AMO, IOP)
 - Tier 3 orographic forcing
 - Analysis of simulations is ongoing; some papers already published
 - ESG has data from GMMIP
 - Andy Turner is Lead Author (LA) IPCC 6th Assessment Report WGI The Physical Science Basis, Chapter 10: Linking global to regional climate change. Contributing Author (CA) of Technical Summary.
- IPCC WG-I panel meeting scheduled for July 2021 (likely virtual)

Interaction with WMO/WWRP Monsoons Panel

- Contributed to next volume of “The Multi-Scale Global Monsoon System, 4th Edition”; now published;
 - A. Grimm : South and North American monsoons
 - L. Carvalho: Extremes in South American Monsoon
 - A. Moise : Australian summer monsoon
 - A. Lenouo, S. Janicot, F. Kamga et al. : Central African monsoon
 - H. Annamalai (+ other members of the Asia-Australia WG): Grand challenges in monsoon modelling and systematic biases
- Published a BAMS paper on this (by the end of December for IPCC AR6 deadline; Wang et al., 2020)

Chih-Pei Chang, Kyung-Ja Ha, Richard H. Johnson, Daehyun Kim, Gabriel NC Lau and Bin Wang (eds), (2021) The Multi-Scale Global Monsoon System, 4th Edition. World Scientific Series on Asia-Pacific Weather and Climate., Vol. 11

Interaction with SPARC and GEWEX

Ongoing discussions on

- monsoon teleconnection dynamics; **possible collaboration is still being developed**; SPARC traditionally works through focussed activities, discussion is focusing on which of those best coordinates work associated with Monsoon Panel
- SPARC also keen to be involved in monsoon-related summer schools / training workshops (halted due to COVID)
- In discussion with GASS Co-Chairs on cross-panel activities during 2021
- The diurnal cycle white paper/project provides a good way forward for further collaborations

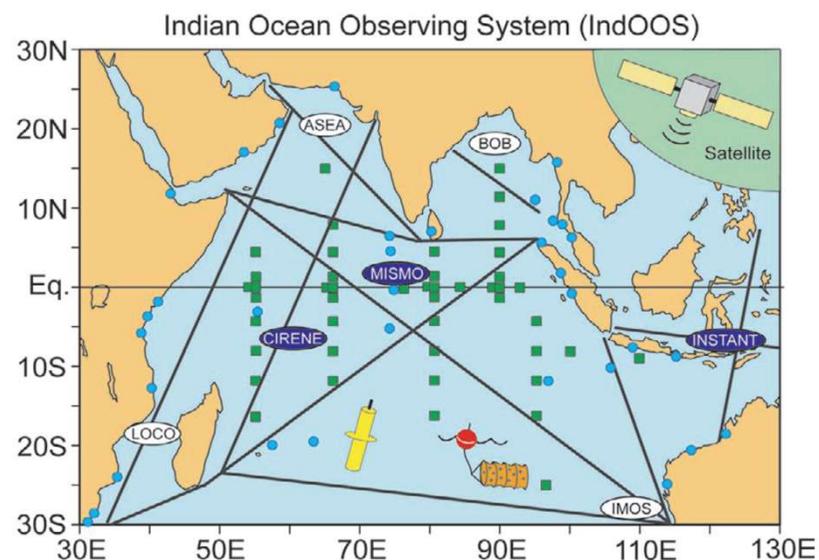
IPCC AR6 Activities

- 15 monsoon-relevant authors across the chapter IN IPCC AR6
- Most of the monsoon topic covered in Ch. 8: Water Cycle Changes
- Feb-Apr 2020: MP members participated as expert reviewers of the SOD
- WGI SPM Writing workshop (Nov 2020)

Links with ocean activities

CLIVAR/IOC-GOOS Indian Ocean Region Panel (IORP)

- Annamalai contributed to the IORP activities (cross CLIVAR activities)
- As a contribution to cross-panel activities, he developed research on Indian Ocean observing systems (IndOOS-2) (two publications).

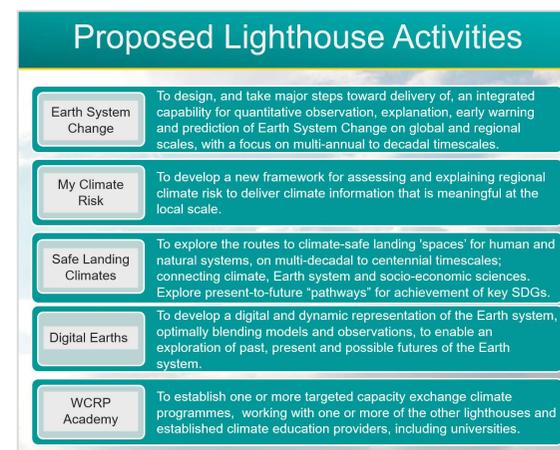
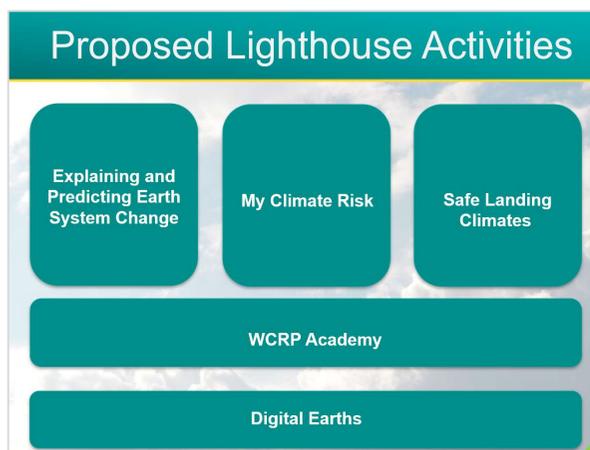


Training and workshops

- The ASEAN Regional Climate Data, Analysis and Projections (**ARCDAP**) **workshop** series, to enhance synergies in generating regional/national climate change projections. Due to COVID, ARCDAP-3 has been rescheduled from Feb-2020 to March-2021.
- Regional **NWP training** series on model parameterization. This workshop series is being led by the ASEAN Specialised Meteorological Centre (ASMC). Due to COVID, the 2nd Workshop was rescheduled from April-2020 to May-2021.

Future Plans

2020



- Topic of Monsoon as a whole, can be **mapped onto the LHAs** on 'My climate risks' and 'Explaining and predicting earth system change'. The Monsoons Panel currently links closely with IORP, but it also necessary to link with other panels.
- The existing expertise of MP in modeling and data can contribute to the new core projects on 'Earth system modeling and observational capacity', but MP will not become a joint activity with this new core project. MP may have the closest **connection to the new core project on 'Regional climate information for societies'**.

(1) As part of the restructure, the MP is keen to contribute to

- A greater coordination between panels, including cross-panel workshops;
- Emphasize the role of region panels in bringing together observation and model communities;
- Revisit TORs and include ECS, particularly from under-represented countries.

(2) In terms of ‘WCRP Academy’, the MP is keen to contribute to future activities, as it has done in the past through organising capacity building workshops, etc.

(3) Regarding a mechanism to ensure ECS involvement: we are strongly encouraging the regional monsoon WG’s to seek YESS representatives from the relevant regions.

(4) The LHAs on ‘My climate risk’ and ‘Safe landing climate’ have strong societal relevance and with limited expertise on WCRP in this area, new core project on ‘Regional climate information for societies’ has been included. MP has a strong regional focus and networks and will contribute to this LHA.

- **Enhance involvement/Promote/Stimulate the interest of researchers and students in monsoon-related topics**, by organizing or supporting workshops and advanced schools, in addition to organizing, in scientific congresses, sessions on monsoon themes.
- **Promote interactions among scientists from different disciplines** (atmospheric scientists, oceanographers, hydrologists, and relevant others) interested in monsoon science activities
- **Communicate existing products and provide guidance** on their (adequate) application and limitations to the operational community, (relevant) impacts community and participate in relevant training activities
- **Advise and coordinate with other WCRP and WWRP panels on issues important for advancing monsoon research**, including new observational studies, process studies, and strategic priority setting for modelling/prediction studies
- **Oversee development and implementation of plans** for an optimised set of process studies in the Asian-Australian, American, and African monsoon regions
- **Coordinate a strategy to utilize satellite observations** to investigate multi-scale monsoon variability and its response to climate change, to cooperate with numerical model groups, and advise on future satellite earth observation plans

- **Coordinate the formation and function of regional working groups** and to advise WCRP on the development of mechanisms of support for meetings of the regional working groups
- **Stakeholder engagement/end users & Climate Services;**
- **SASCOF and other related stakeholders:** direct involvement of the panel and working groups in improving the consensus seasonal outlook;
- **Better cross-group collaborations;**
- **Cross-panel activities:** coordinate with other panels (e.g., Indian Ocean) for emerging research for societal needs.
- **Supporting observational/field studies work**
- **Support a monitoring strategy designed by the Ocean Panels** for the tropical and subtropical oceans necessary for investigating the structure and variability of the regional monsoons

Panel Activities

- Continued interaction with the IPCC AR6 and CMIP6 process, especially GMMIP through Andy Turner and other MP members.
- Promote continued S2S diagnosis: we will seek to engage further with regional activities (S2S-SEA) and the university sector in analysing the available large data
- Finalise plans for engagement with SPARC
- Finalise plans for further engagement with GEWEX GLASS & GASS (in particular regarding land-surface interactions and projects such as ALMIP, coordinated by A. Boone)

Possible constraints and Challenges

- Continued COVID impact
- Regional WG's need reinvigoration
- Membership diversity: CLIVAR/GEWEX; regional monsoon balance; topic balance; gender balance; etc.
- WCRP transition mapping onto CLIVAR and its panels will need continued support: more engagement and discussions with 'working level' needed

Thank you for your attention

