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**Future Evolution of**

**International CLIVAR Monsoon Project Office (ICMPO)**

*Towards*

***WCRP/WWRP International Monsoons Project Office***

***(WIMPO)***

A Draft Discussion Paper

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**1. Background**

1.1 The Climate Variability and Predictability (CLIVAR) project is one of the core projects of the World Climate Research Programme (WCRP), established in 1993 to study climate variability and predictability with a focus on the role of the coupled ocean and atmosphere within the climate system. The goal of CLIVAR is to improve understanding and prediction of ocean-atmosphere interactions and their influence on climate variability and change, to the benefit of society and the environment.

1.2 The CLIVAR Scientific Steering Group (SSG) guides the scientific and technical activities of the project and reports to the WCRP Joint Scientific Committee (JSC). Initially the activities of the CLIVAR were administered and supported by a single International CLIVAR Project Office (ICPO). Over the years the ICPO was hosted in different countries until the current situation with:

* International CLIVAR Global Project Office (Hosted by the First Institute of Oceanography, Qingdao, China), ICGPO
* International CLIVAR Monsoon Project Office (Hosted by the Indian Institute of Tropical Meteorology, Pune, India), ICMPO

1.3 The establishment of ICMPO at IITM, under the auspices of the Ministry of Earth Sciences, Government of India, was formalized under an agreement between WCRP and IITM, signed on 9 February 2015 with a validity of five years (i.e., up to February 2020). The agreement has been approved by the Union Cabinet, Government of India on 12 August 2015, providing a very high-level endorsement of the arrangement.

1.4 The Global Energy and Water cycle EXchanges (GEWEX) is another core project of WCRP, dedicated to understanding Earth’s water cycle and energy fluxes at the surface and in the atmosphere. GEWEX is supported by the International GEWEX Project Office (IGPO), located in Washington, USA. GEWEX has close ongoing linkages with CLIVAR, of which the monsoons constitute a key theme.

1.5 The CLIVAR/GEWEX Monsoons Panel was proposed at and established following the 7th International GEWEX Conference at The Hague, July 2014 following the closure of the CLIVAR Regional Panels (viz., Asian-Australian Monsoon Panel – AAMP, Variability of the American Monsoon Systems – VAMOS and Variability of the African Climate System – VACS). This global Monsoons Panel was conceived to:

* take a more global view of monsoon activities, enabling knowledge and best practice to be shared between the various monsoon regions; and
* better coordinate monsoons research between GEWEX and CLIVAR, particularly in emphasizing the role of convection and the land surface in the monsoons.

1.6 The Monsoons Panel membership crosses CLIVAR and GEWEX research interests and all monsoon regions, with in-country membership where possible. While the Panel can take a global view, it recognizes the importance of the need to retain focus on region-specific weather and climate processes, phenomena and variability, engaging regional stakeholders, develop linkages with the Coordination Office for WCRP Regional Activities (CORA) and managing local knowledge exchange and up-skilling. The Monsoons Panel has established an internal structure comprised of three Regional Working Groups, with explicit responsibilities to address the Asian-Australian, American and African monsoons. See Monsoons Panel website[[1]](#footnote-1) for terms of reference and membership.

1.7 With the impending completion of the tenure of the agreement between WCRP and IITM on 9 February 2020, it is imperative to draw up a new agreement to sustain this mutually beneficial arrangement, and also broaden the cooperation to cover monsoon research more comprehensively under the various programmes of the World Meteorological Organization (WMO), including those co-sponsored by it.

**2. International CLIVAR Monsoon Project Office (ICMPO)**

2.1 As part of the initial distribution of responsibilities amongst the ICPO partners identified in Annex A of the agreement between WCRP and IITM, the following were under the responsibility of the ICMPO (though noting these have changed over time):

* Implementation of the following CLIVAR "Research Opportunities":
  + Intra-seasonal, seasonal and interannual variability and predictability of monsoon systems, in close cooperation with the WCRP Grand Challenges on Regional Climate Information and Water Availability and all relevant WCRP modelling and other activities;
  + Development of a CLIVAR "Research Opportunity" on links between the monsoons and the cryosphere;
* Oversight for the following CLIVAR crosscutting "capabilities":
  + Improving Atmospheric observing systems
  + Monsoon Prediction and Predictability in the Coupled and Ocean, Atmospheric Models.
* Support to the following CLIVAR panels:
  + Monsoons Panel (in close coordination with GEWEX)
  + Indian Ocean Region Panel
* Liaison with all WCRP, and other international monsoon-related activities, e.g., MAIRS;
* Support to the Drought Interest Group;
* Support to ETCCDI (in close coordination with GEWEX and WMO CCI);
* Support to the Executive Director.

2.2 As part of the IITM-WCRP Agreement, IITM has agreed to provide (i) salaries and allowances for the Executive Director of ICMPO, two scientists and two secretarial staff; (ii) official travel support including 2/3 trips abroad for the Executive Director and 2 visits of ICPO Executive Director to IITM; (iii) office infrastructure and facilities to all ICMPO staff; (iv) support to preparation of newsletters and hosting of web pages; (v) meeting arrangement expenses (if held in India) except travel of non-ICMPO staff; and (vi) hosting of CLIVAR Scientific Steering Group (SSG) meetings on rotational basis with other ICPO nodes.

2.3 ICMPO is currently staffed by the following personnel:

1. Dr Rupakumar Kolli, Executive Director (since 22nd October 2019);
2. Dr Ashwini Kulkarni, Senior Scientist;
3. Mr. Somnath Mahapatra, Senior Scientist;
4. Mr. Sandeep Sukhdeve, Assistant Engineer (IT) (since 10 July 2019).

**3. Advantages of Hosting ICMPO at IITM**

3.1 The Indian summer (southwest) monsoon is referred to as the lifeline of India, as variability in any of its aspects (onset, withdrawal, quantum and space-time distribution of rainfall) greatly influences the agriculture, economy, water resources, power generation, ecosystem and every walk of life. Understanding and predicting the variations in monsoon rainfall can help reduce the adverse impacts related to extreme anomalies often leading to large-scale droughts and floods. Reliable prediction of monsoon rainfall is thus a basic need for the nation but remained a challenge over the decades. There is a large and thriving community of scientists and institutions with international reputation highly motivated in improving the monsoon forecast skill through a collective effort, providing an ideal location for ICMPO in India.

3.2 The Ministry of Earth Sciences (MoES), Government of India has launched 'National Monsoon Mission' (NMM) with a vision to develop a state-of-the-art dynamical prediction system for monsoon rainfall on different time scales. MoES has bestowed the responsibility of execution and coordination of this mission to IITM. For this national mission, IITM is collaborating with MoES organisations and various other academic institutions/organizations both within and outside the country. The Phase I of NMM was conducted from 2012 to 2017, and now Phase II is underway. With active involvement of several international groups in NMM projects, and NMM Project Directorate being located in IITM, the work of ICMPO is further enriched.

3.3 IITM, with its strong international linkages around the world, state-of-the art infrastructural facilities, long experience in hosting international events and programmes and historic relationships with WMO and WCRP, provides an excellent resource for the IPO functionality. On the other side, the MoES can potentially enhance the visibility of its programmes in the world scientific community through its support to the ICMPO. Monsoon research can be better prioritized by the world community through the efforts of the ICMPO, deriving mutual benefits to both WMO/WCRP and MoES/IITM. Further, young scientists of MoES and other institutes will get an opportunity for two-way interactions with the international experts under the auspices of this project office. In effect, it is a win-win arrangement.

3.4 Several of IITM scientists hold important positions in various bodies of WCRP and its core projects, facilitating the work of ICMPO, as indicated below:

* Dr R. Krishnan, Member, Joint Scientific Committee, WCRP;
* Dr A. Suryachandra Rao, Member, CLIVAR/GEWEX Monsoons Panel;
* Dr (Ms) Swapna Panickal, Member, WCRP Working Group on Coupled Modeling;
* Dr Roxy Mathew Koll, Co-Chair, CLIVAR/IOC-GOOS Indian Ocean Region Panel;
* Dr J. Sanjay, Member, Science Advisory Team, WCRP Coordinated Regional Downscaling Experiment (CORDEX)
* Dr Parthasarathy Mukhopadhyay, Member, Monsoons Panel Regional Working Group on Asian-Australian Monsoons;

**4. Monsoon activities under the World Weather Research Programme (WWRP)**

4.1 WMO’s World Weather Research Programme (WWRP) also has a longstanding targeted focus on monsoon, as part of its Working Group on Tropical Meteorology Research (WGTMR). WGTMR has a dedicated Monsoon Panel[[2]](#footnote-2), which in turn has expert teams working on severe monsoon weather and impacts of climate change on monsoon weather.

4.2 WWRP and WCRP also coordinate a Sub-seasonal to Seasonal (S2S) Prediction Project[[3]](#footnote-3), which has major applications in monsoon regions that can be more effectively pursued through active collaboration with the relevant monsoon groups. S2S has completed Phase I during 2013-17, and is currently running in its Phase II during 2019-23. S2S is managed by an International Coordination Office (ICO) located in the Republic of Korea.

**5. Future Evolution of ICMPO**

5.1 Based on the experience over the past 5 years of the operation of ICMPO, while it helped CLIVAR to have a dedicated support for all its monsoons interests, a key requirement that needs to be addressed is a well-balanced and equitable engagement of CLIVAR and GEWEX governance with the ICMPO activities. ICMPO, having been established originally as one of the nodes of the ICPO, does not have an ongoing formal relationship with the GEWEX SSG or the IGPO.

5.2 The future evolution of ICMPO should adequately consider future decisions made with regards to the structure of WCRP (being discussed in the March-May 2020 timeframe), the 2018 WCRP Review[[4]](#footnote-4), as well as changes to WCRP’s co-sponsors (e.g., the WMO reform). While these ongoing developments may take some time to stabilize, future responsibilities of ICMPO will depend upon how monsoon research is organized in the new structure(s).

5.3 The 2018 WCRP Review noted that the synergy between WWRP and WCRP was not being fully capitalized upon at the moment, with several examples of parallel initiatives, where these would have benefited from greater alignment through a rigorous co-design phase in which WWRP and WCRP worked together to ensure that the initiatives realized and maximized the synergies. Therefore, the Review recommended that WCRP be pro-active in establishing a process of full engagement with WWRP via the practice of co-design of projects to exploit the synergies that seamlessness offers.

5.4 Another important aspect that needs to be factored into ICMPO future planning is the ongoing major WMO Reform as per the decisions of the Eighteenth World Meteorological Congress. While the Reform itself is on an unprecedented scale and historic, the element of direct consequence to ICMPO is the constitution of the new Research Board on Weather, Climate, Water and the Environment that translates the strategic aims and decisions of WMO into overarching research priorities, and ensures the implementation and coordination of the research programmes to achieve these priorities. One of the key terms of reference of the Research Board is to initiate, coordinate and promote research activities in weather, climate, water and related environmental aspects through the WMO and co-sponsored research programmes (WCRP, GCOS, GOOS, WWRP, GAW and possible future research programmes). It is important for ICMPO to be appropriately linked with the monsoon-relevant substructures of the Research Board. Likewise from the perspective of WCRP’s other co-sponsors it is important to ensure that their aims and requirements are taken into account with regards to monsoon activities.

**6. Towards a joint WCRP/WWRP Monsoon Research Coordination**

6.1 It is proposed to consolidate all the monsoon research activities of both WCRP and WWRP, and organize support to the relevant expert groups and governing structure through a much wider portfolio of the future evolution of the ICMPO, possibly with a changed title such as WCRP/WWRP International Monsoons Project Office (WIMPO). Such consolidation can be progressively strengthened to evolve WIMPO into a global hub of monsoon research coordination in a seamless manner, from weather to climate change time scales and addressing all the common and region-specific aspects of the monsoons around the world.

6.2 This proposal, if agreed in principle by all the relevant stakeholders (CLIVAR SSG, GEWEX SSG, WCRP JSC, WWRP SSC and WMO/WCRP Secretariat), can be further developed as more details emerge of the WMO Reform and WCRP Review follow-up, to prepare a new formal agreement between WMO and IITM. The forthcoming SSG meetings of GEWEX and CLIVAR, the inaugural session of the Research Board, WCRP JSC, etc., in the first half of 2020, may provide an opportunity to discuss and obtain feedback.

6.3 While waiting for the final version of the revised agreement between WMO and IITM, it is proposed that an extension of the present agreement by one year (i.e., up to 9 February 2021) be put up for approval on both the sides through exchange of letters.

1. <http://www.clivar.org/clivar-panels/monsoons> [↑](#footnote-ref-1)
2. <https://www.wmo.int/pages/prog/arep/wwrp/tmr/monsoon-panel.html> [↑](#footnote-ref-2)
3. <http://s2sprediction.net/> [↑](#footnote-ref-3)
4. <https://council.science/wp-content/uploads/2018/08/WCRP_Report_full_screen_16112018.pdf> [↑](#footnote-ref-4)