

Report to Pan-CLIVAR meeting: Asian-Australian Monsoon Panel (AAMP)

1) Implementation of the science priority topics identified by the panel and how the panel's activities will be integrated within CLIVAR, and WCRP to advance CLIVAR objectives in the next 5-10 years.

a) Coordinated analysis of CMIP5 models

AAMP members have played a considerable role in coordinated analysis of CMIP5 models both within the remit of authorship and expert review of the Working Group I report of the IPCC 5th Assessment (Akio Kitoh & Tianjun Zhou as lead authors, Bin Wang as contributing author), and addition to more recent process studies:

- He, C., and **T. Zhou**, 2014: The two interannual variability modes of the Western North Pacific Subtropical High simulated by 28 CMIP5-AMIP models, *Climate Dynamics*, DOI 10.1007/s00382-014-2068-x
- Dong, L., and **T. Zhou**, 2014: The Indian Ocean Sea Surface Temperature Warming Simulated by CMIP5 Models during the 20th Century: Competing Forcing Roles of GHGs and Anthropogenic Aerosols, *Journal of Climate*, 27, 3348–3362
- Song, F., **T. Zhou**, and Y. Qian (2014), Responses of East Asian summer monsoon to natural and anthropogenic forcings in the 17 latest CMIP5 models, *Geophys. Res. Lett.*, 41, doi:10.1002/2013GL058705
- Song, Fengfei, **Tianjun Zhou**, 2014: Interannual Variability of East Asian Summer Monsoon Simulated by CMIP3 and CMIP5 AGCMs: Skill Dependence on Indian Ocean–Western Pacific Anticyclone Teleconnection. *J. Climate*, 27, 1679–1697
- Man, W. M., and **T. J. Zhou**, 2014: Regional-scale surface air temperature and East Asian summer monsoon changes during the last millennium simulated by the FGOALS-g1 climate system model. *Adv. Atmos. Sci.*, 31(4), 765–778
- Levine, RC, **AG Turner**, D Marathayil, **GM Martin**, 2013: The role of northern Arabian Sea surface temperature biases in CMIP5 model simulations and future predictions of Indian summer monsoon rainfall, *Climate Dynamics*, Volume 41(1), pp155-172 doi:10.1007/s00382-012-1656-x
- **Martin, G.M.** and R.C. Levine, 2012: The influence of dynamic vegetation on the present-day simulation and future projections of the South Asian summer monsoon in the HadGEM2 family. *Earth Syst. Dynam.*, 3, 245-261, doi:10.5194/esd-3-245-2012, 2012
- Chadwick, R., Boutle, I.A., and **Martin, G.M.**, 2012: Spatial patterns of precipitation change in CMIP5: why the rich do not get richer in the tropics. *J. Climate*, 26, 3803-3822. doi: <http://dx.doi.org/10.1175/JCLI-D-12-00543.1>
- Chadwick, R.C., P. Good, T. Andrews and **G. Martin**, 2014: Surface Warming Patterns Drive Tropical Rainfall Pattern Responses to CO2 Forcing on All Timescales. *Geophys. Res. Lett.*, 41, 1-5. doi:10.1002/2013GL058504

b) Design of coordinated multi-model experiments for land-atmosphere interaction for the monsoons

AAMP members Yongkang Xue and Ken Sperber are leading the design of a series of coordinated

multi-model experiments for to evaluate the role of land-atmosphere interaction in coupled models, particularly targeted at monsoon prediction/predictability associated with land/monsoon interactions. It aims at improving predictions of monsoon variability and change in the context of natural variations and anthropogenic change. The work will be coordinated with the GEWEX GLACE project (chairs: Joe Santanello and Aaron Boone) to design multi-model experiments and to discuss metrics and benchmarks for this activity; this will include meeting during the CLIVAR/GEWEX Conference in July 2014.

c) Participation and coordination of the Intraseasonal Variability Hindcast Experiment (ISVHE)

The broad objectives of the ISVHE are to assess the forecast skill and predictability of the ISV including the MJO and related phenomena, in a multi-model framework and to develop optimal strategies for multi-model ensemble (MME) prediction of the ISV. Ten models from major operational centres and research institutes have provided hindcast data for a 20-year period. Current multi-model hindcast skills for MJO and BSISV have been evaluated, and the predictability of boreal winter MJO and summertime ISV are being examined.

d) The MJO Task Force

AAMP is playing an ongoing role in the MJO Task force, particularly in the design of process-based metrics to understand MJO mechanisms and their representation in models.

2) Implementation of the CLIVAR Research Foci/WCRP Grand Challenges

a) Scoping and development of new CLIVAR/GEWEX Monsoons Panel structure

AAMP members, particularly H. Hendon and K. Sperber have taken the lead in ensuring a continuing coordination of CLIVAR monsoon efforts to follow the spin-down of the various regional panels. This includes drafting of the initial TOR, proposed membership structure and liaison with GEWEX.

b) CLIVAR Research Focus on Monsoon Predictability

AAMP members A. Turner, B. Wang, T. Zhou and AAMP ICPO contact C. Ereño are leading a task force for the CLIVAR Research Focus development team on predictability of monsoon systems and are developing a document on the key priority science questions and associated background, together with associated implementation plans and necessary resources. This work will be continued throughout 2014 including a break-out session at the pan-CLIVAR conference in July 2014. The task force will also engage with the new ICMPO in IITM, Pune and others to ensure that maximum input is achieved from across the monsoon research and impacts communities.

c) CLIVAR Research Focus on Decadal Variability

AAMP members A. Turner and T. Zhou are taking part in the CLIVAR Research Focus development team on decadal variability in the climate system and its predictability, led by Gokhan Danabasoglu and Yochanan Kushnir. The group will meet as part of a break-out session at the pan-CLIVAR meeting in July 2014.

c) Other collaborations

AAMP has collaborations with GEWEX GDAP in the assessment of water cycle in global monsoon domains, for example:

- Lin Renping, Tianjun Zhou, Yun Qian, 2014: Evaluation of Global Monsoon Precipitation Changes based on Five Reanalysis Datasets, *Journal of Climate*, 27(3), 1271-1289

3) Knowledge Sharing

a) Co-organisation of WWRP International Workshop on Monsoons-V

AAMP assisted in organizing the WMO WWRP IWM-V meeting in Macau, October 2013, helping make it a large conference with many international and regional participants. A key outcome of the meeting will be the revised edition of the hardcover book *The Global Monsoon System: Research and Forecast* with several contributed chapters from AAMP members. The IWM-V meeting also serves as a WMO training workshop for forecasting.

b) Contribution to peer-reviewed literature

- AAMP members have contributed to the peer-reviewed literature, including:
- Hsu, H. H., Zhou, T., & Matsumoto, J. (2014). East Asian, Indochina and Western North Pacific Summer Monsoon-An update. *Asia-Pacific Journal of Atmospheric Sciences*, 50(1), 45-68
- Zhou T., B. Wu, and L. Dong, 2014: Advances in Research of the Changes of ENSO Flavors and the associated Impacts on Asian-Pacific Climate, *Asia-Pacific Journal of Atmospheric Sciences*, under review
- Zhou T., X. Chen, L. Dong, B. Wu et al. 2014: Chinese Contribution to CMIP5: An Overview of Five Chinese Models' Performances, *Journal of Meteorology Research*, in press
- Zhang L., and T. Zhou, 2014: Drought over East Asia: A review, *Journal of Climate*, Special Collection "GDIS Drought Worldwide", under review
- ZHOU Tianjun, 2013: Preface to Special issue on Flexible Global Ocean Atmosphere Land System model (FGOALS) CMIP5 experiments. *Adv. Atmos. Sci.*, 30(3), 542-542, doi: 10.1007/s00376-013-0002-5

c) Topical workshop and conference session organisation

AAMP members have been involved in the following conference organisation:

- European Geosciences Union General Assembly 2014, Global monsoon Session, Vienna, Austria, 27 April – 02 May 2014
- Fifth WMO International Workshop on Monsoons (IWM-V), Macao, China, 28-31 Oct., Hong Kong, China, 1 Nov. 2013
- CLIVAR C20C Project 6th Workshop, Melbourne, Australia, 5-8 November, 2013
- The 2nd International Workshop on CMIP5 Model Intercomparisons for Future Projections of Precipitation and Climate in Asia. 13-14 January 2014, Tokyo, Japan
- The 12th AMIP/East Asian Climate Workshop, Busan, South Korea, 1-3 July, 2013

d) Other positions of responsibility

AAMP co-chair Tianjun ZHOU is now serving as Secretary-general of Chinese National Committee for Future Earth project (CNC-FE). He has been involved the organization of the joint meeting of ICSU Future Earth project Scientific Committee (FE SC) and CNC-FE to be held on June 3 in Beijing, China. AAMP member R Krishnan is a member of the Scientific Steering Group of Monsoon Asia Integrated Research Study (MAIRS).

4) Capacity Growth and Transfer, including WCRP Coordinated Regional Downscaling Experiment (CORDEX) programme

CORDEX covers the provision of climate information for decision making, especially at regional and local levels, which requires a better understanding of the response of regional and local climate systems to global climate, and in turn their influence on the global system. Based on current GCM limitations, advanced downscaling methods are required to translate coarse global-scale information onto finer grids. This is necessary to obtain suitable information required for

assessing impacts and vulnerability of natural and human systems to such changes, and to develop ultimately the science-based information required for climate adaptation, mitigation and risk management. AAMP member R. Krishnan is leading the CORDEX activities for the South Asian region. He contributed to the following workshops and conferences:

Some training activities involving AAMP members are:

- a. Zhou T, 2013: **Interannual Variability of East Asian-Western North Pacific summer monsoon: Regional Ocean-Atmosphere coupled modeling**, Fourth WESTPAC Summer School on Monsoon Onset Monitoring and its Social & Ecosystem Impacts (MOMSEI), Terengganu, Malaysia, 19-23 Aug. 2013
- b. Zhou T, 2013: **Interannual Variability of East Asian-Western North Pacific summer monsoon: From CMIP3 to CMIP5**, Fourth WESTPAC Summer School on Monsoon Onset Monitoring and its Social & Ecosystem Impacts (MOMSEI), Terengganu, Malaysia, 19-23 Aug. 2013
- c. Zhou T, 2013: **Interannual Variability of East Asian-Western North Pacific summer monsoon: Forcing from Equatorial E. Pacific, WNP, and TIO**, Fourth WESTPAC Summer School on Monsoon Onset Monitoring and its Social & Ecosystem Impacts (MOMSEI), Terengganu, Malaysia, 19-23 Aug. 2013
- d. Zhou T, 2013: **Interdecadal Variability of EA Summer Monsoon: Observational Evidences and Numerical Modeling**, Fourth WESTPAC Summer School on Monsoon Onset Monitoring and its Social & Ecosystem Impacts (MOMSEI), Terengganu, Malaysia, 19-23 Aug. 2013
- e. Zhou T, 2013: **East Asian Monsoon: Changes and Social Impacts**, Fourth WESTPAC Summer School on Monsoon Onset Monitoring and its Social & Ecosystem Impacts (MOMSEI), Terengganu, Malaysia, 19-23 Aug. 2013
- f. **CORDEX South Asia Training Workshop, 17-20 October 2012, CCCR - IITM, Pune, INDIA**
- g. **The 2nd WCRP CORDEX Science and Training Workshop, 27-30 August 2013, ICIMOD, Kathmandu, Nepal**
- h. **The International Conference on Regional Climate – CORDEX 2013**, Brussels, Belgium 4-7 November 2013, jointly organized by the World Climate Research Programme (WCRP), the European Commission (EC) and the Intergovernmental Panel on Climate Change (IPCC).