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EDITORIAL

Global Monsoon across timescales

Pinxian Wang · Bin Wang · Thorsten Kiefer

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Scientific focus on monsoons can be traced back nearly 350 years. However, only recently have monsoons been analyzed as a global system. Traditionally, the variability of the monsoon has been studied almost exclusively on regional scales, in both the modern and paleo-monsoon communities. With the application of remote sensing and other new techniques, the concept of "Global Monsoon" has been introduced as a global-scale seasonally varying atmospheric overturning circulation (Trenberth et al. 2000) associated with seasonal migration of the monsoon trough and intertropical convergence zone. The Global Monsoon represents the dominant mode of annual variation of the Earth's climate system. However, it remains a debated issue as to what extent the Global Monsoon can be viewed as a major mode of climate variability.

P. Wang
State Key Laboratory of Marine Geology, Tongji University, Shanghai, China

B. Wang (✉)
School of Ocean and Earth Science and Technology, University of Hawaii, Honolulu, HI, USA
e-mail: wangbin@hawaii.edu

T. Kiefer
PAGES International Project Office, Bern, Switzerland

In an effort to better understand the dynamics of monsoon variability, the PAGES Working Group "Global Monsoon and Low-Latitude Processes: Evolution and Variability" has held two symposia at Tongji University, Shanghai (Wang et al. 2009, 2011a). The symposia brought together paleo- and modern climatologists as well as data-producers and modelers to compare monsoon studies from all regional monsoon systems to identify their similarities and differences across a range of timescales from interannual to tectonic, and to unravel the mechanisms causing variations in the Global Monsoon system and regional deviations from the global trend.

A collection of 13 contributions to the symposia are published here as a first Global Monsoon special issue, trying to put regional monsoons into the context of the global system and to analyze their variations across a range of timescales. The papers discuss monsoon response to internal feedback processes of the climate system (e.g. El Nino-Southern Oscillation) and to external forcing by orbital insolation changes and tectonic factors such as the uplift of the Tibetan Plateau. Some papers provide observational evidence in support of the Global Monsoon concept (Wang et al. 2011b; Cheng et al. 2012). A particularly prominent example is provided by the speleotheme records from Asia and South America. Their nearly symmetric response of monsoons from the two Hemispheres to precession cycles clearly demonstrates the global connectivity of regional monsoon systems at geological timescales (Cheng et al. 2012).

Meanwhile, this Special Issue is slightly imbalanced as a number of important contributions devoted to paleoclimate proxy records are not included in this issue, but being published elsewhere in paleoclimatic journals. Since Global Monsoon is a new concept, we are well aware that there is a long way to go before a global view on monsoon

evolution and variability can be established. Currently, the PAGES Global Monsoon Working Group is preparing a synthesis to summarize the recent progress and remaining issues in Global Monsoon studies, and to specify the key demands for further work on monsoon dynamics and its profound regional and global impacts.

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