Geophysical Research Abstracts
Vol. 14, EGU2012-2480, 2012
EGU General Assembly 2012

A critical humidity threshold for monsoon transitions

J. Schewe (1,2), A. Levermann (1,2), H. Cheng (3,4)

(1) Potsdam Institute for Climate Impact Research, Earth System Analysis, Potsdam, Germany (jacob.schewe@pik-potsdam.de), (2) Institute of Physics, University of Potsdam, 14476 Potsdam, Germany, (3) Institute of Global Environmental Change, Xi'an Jiaotong University, Xi'an 710049, China, (4) Department of Geology and Geophysics, University of Minnesota, Minneapolis 55455, USA

Monsoon systems around the world are governed by the so–called moisture–advection feedback. Here we show that, in a minimal conceptual model, this feedback implies a critical threshold with respect to the atmospheric specific humidity q_o over the ocean adjacent to the monsoon region. If q_o falls short of this critical value q_o^c, monsoon rainfall over land cannot be sustained. Such a case could occur if evaporation from the ocean was reduced, e. g. due to low sea surface temperatures. Within the restrictions of the conceptual model, we estimate q_o^c from present–day reanalysis data for four major monsoon systems, and demonstrate how this concept can help understand abrupt variations in monsoon strength on orbital timescales as found in proxy records.