The impact of global unknown teleconnection patterns on terrestrial precipitation across North and Central America

Ni-Bin Chang, Sanaz Imen, Kaixu Bai, Y. Jeffrey Yang

PII: S0169-8095(17)30379-4
DOI: doi: 10.1016/j.atmosres.2017.04.018
Reference: ATMOS 3931

To appear in: *Atmospheric Research*

Received date: 6 July 2016
Revised date: 3 December 2016
Accepted date: 4 April 2017

Please cite this article as: Ni-Bin Chang, Sanaz Imen, Kaixu Bai, Y. Jeffrey Yang , The impact of global unknown teleconnection patterns on terrestrial precipitation across North and Central America. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Atmos(2017), doi: 10.1016/j.atmosres.2017.04.018

The Impact of Global Unknown Teleconnection Patterns on Terrestrial Precipitation across North and Central America

Ni-Bin Chang[1], Sanaz Imen[1], Kaixu Bai[1,2], and Y. Jeffrey Yang[3]

1. Department of Civil, Environmental, and Construction Engineering, University of Central Florida, Orlando, FL, USA
2. Key Laboratory of Geographic Information Science, Ministry of Education, East China Normal University, Shanghai, China
3. U.S. EPA, Office of Research and Development, National Risk Management Research laboratory, 26W Martin Luther King Dr., Cincinnati, OH, USA

*Corresponding author: Ni-Bin Chang, Email: nchang@ucf.edu

Abstract: Global sea surface temperature (SST) anomalies can affect terrestrial precipitation via ocean-atmosphere interactions known as climate teleconnections. Nonstationary and nonlinear characteristics of the teleconnection signals passing through the complex ocean-atmosphere-land system may provide a unique opportunity to quantify large-scale climate variability. This work explores the systematic relationships between global SST anomalies and terrestrial precipitation variability with respect to long-term nonlinear and nonstationary teleconnection signals during 1981–2010 over three regions in North America and one in Central America. The aim of this study was to investigate the surveillance capacity of teleconnections through varying atmospheric pathways toward different types of landscape and geographical environments. After finding possible associations between the dominant variation of seasonal precipitation and global SST anomalies through the integrated empirical mode decomposition, wavelet analysis, and lagged correlation analysis, the statistically significant SST regions were extracted to identify both known and unknown teleconnections. Results indicate that previously unidentified SST regions contribute a salient portion of terrestrial precipitation variability over different terrestrial regions. Central America and Pacific Northwest study sites receive highest probable impacts of climate variability driven by some unknown teleconnections that reveal unique coupling interactions between oceanic and atmospheric processes, implying possible linkages with atmospheric rivers.