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Implications of the weakening of the Walker circulation for the Indian Monsoon - ENSO relationship

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The Indian summer monsoon is a very important weather phenomenon, which undergoes dramatic irregular variations on intra-seasonal, inter-annual and inter-decadal timescales and interacts with other global Earth's climate system phenomena, such as El Niño / Southern Oscillation, ENSO.

In context of predicting the Indian monsoon, active investigations into the correlation between the All-India Rainfall and ENSO are in the focus of many recent studies on the subject. A marked recent-year decrease in the correlation of the Indian monsoon with ENSO has been noticed. This may be attributed, in part, to increasing influence on the Indian monsoon of global-scale factors other than ENSO, e.g., increasing greenhouse gas concentrations and/or aerosol loading of the atmosphere as well as increased surface temperatures over Eurasia.

Here we suggest another reason for the decrease in the Indian summer monsoon-ENSO correlation in the last decades of the twentieth century: we claim that this could happen due to a marked overall weakening of the Walker circulation in the last decades of the last century accompanied with the transition of the ENSO phase, on the decadal time scale, to that characterized by more often occurrence of "normal" ENSO patterns in the tropical Pacific. Our conclusions are based on the analysis of the recent-decade temporal trends of the Southern Oscillation (SOI), ENSO (NINO3 Index and Trans-Niño Index TNI), and the All-India Rainfall Index.