Geophysical Research Abstracts
Vol. 18, EGU2016-11735, 2016
EGU General Assembly 2016

Future projections of Indian Ocean SSTs and its impact on monsoon

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Assessing the future projections of the Indian Ocean (IO) Sea Surface Temperatures (SSTs) under the global warming scenario has a paramount societal impact considering its potential to alter the seasonal mean rainfall over the Indian subcontinent. Observations show a pronounced warming in the western tropical IO compared to other ocean basins. Here, we explore the projections of boreal summer SSTs over the IO using the Representative Concentration Pathways 8.5 (RCP8.5) scenarios of Coupled Model Intercomparison Project Phase5 (CMIP5) simulations. Consistent with observations, most of the CMIP5 models show a faster warming rate over the western tropical IO compared to other ocean basins. Model simulations indicate a shift in the mean Walker circulation with an anomalous ascending motion over the central equatorial Pacific and an anomalous descending motion over the eastern tropical IO. As a consequence of this, a negative SST skewness is evident in the eastern tropical IO which leads to the increased frequency of positive Indian Ocean Dipole (IOD) events. Mechanisms responsible for this pronounced western IO warming is studied by analyzing the changes in the mean thermocline depth and circulation features. The impact of these changes in IO SST on seasonal mean monsoon precipitation and circulation in a warming scenario and its associated mechanisms are also investigated.