Geophysical Research Abstracts
Vol. 20, EGU2018-8018-1, 2018
EGU General Assembly 2018

The impact of Indian Ocean mean-state biases on the representation of the East African short rains

Linda Hirons and Andrew Turner
University of Reading, National Centre of Atmospheric Science, Meteorology, United Kingdom (l.c.hirons@reading.ac.uk)

The role of the Indian Ocean Dipole (IOD) in controlling interannual variability in the East African short rains, from October to December, is examined in the CMIP5 models and in detail in one particular climate model. In observations, a wet short-rains is associated with the positive phase of the IOD and anomalous easterly low-level flow across the equatorial Indian Ocean. A model's ability to capture the teleconnection to the positive IOD is closely related to its representation of the mean-state. During the short-rains season, the observed low-level wind in the equatorial Indian Ocean is westerly. However, half of the models analysed exhibit mean-state easterlies across the entire basin. Specifically, those models that exhibit mean-state low-level equatorial easterlies in the Indian Ocean, rather than the observed westerlies, are unable to capture the latitudinal structure of moisture advection into East Africa during a positive IOD. Furthermore, the associated anomalous easterly surface wind stress causes upwelling in the eastern Indian Ocean enhances the zonal sea-surface temperature gradient between west and east and strengthens the positive IOD pattern, further amplifying the easterly wind stress. This positive Bjerknes coupled feedback is stronger in easterly mean-state models, which results in a wetter East African short rain precipitation bias in those models.