Geophysical Research Abstracts, Vol. 7, 04334, 2005
SRef-ID: 1607-7962/gra/EGU05-A-04334

Intraseasonal oscillations of the East African long rains and their connection with MJO activity over the Indian Ocean

P.Camberlin (1), B.Pohl (1), R.Okoola (2)

(1) Centre de Recherches de Climatologie, CNRS/Université de Bourgogne, Dijon, France

(2) Department of Meteorology, University of Nairobi, Nairobi, Kenya

(camber@u-bourgogne.fr)

Our understanding of the East African long rains (March-May) variability remains relatively poor. Interannual variations are quite small compared to intraseasonal variations. An analysis of pentad rainfall and OLR data shows organised variations in the range of 20-75 days, though quite irregular from year to year. However, rainfall and OLR variations are strongly consistent over the highland region only. For this region, NCEP-DOE II reanalysis data are used to detect atmospheric patterns associated to wet events. Significant zonal wind anomalies, of opposite sign at 850 and 200 hPa, are found locally over East Africa. Anomalous low-level westerlies (upper-level easterlies) are observed during wet events. Years of weakened or enhanced correlations between rainfall and zonal wind tend to occur simultaneously at 850 and 200 hPa. Zonal cross-sections show that these anomalies are neither isolated in time nor in space : the wind anomalies often tend to propagate eastward, especially over the Indian Ocean. They are suggested to be associated with Madden-Julian Oscillations (MJO).

To confirm this hypothesis, a MJO signal is extracted based on an EOF analysis of pentad velocity potential anomalies along the tropics, for the MAM season. The first two principal components depict MJO activity over the Indian Ocean and the Pacific Ocean, respectively, and are in quadrature. Based on Wheeler and Hendon (2004), eight different phases of the MJO signal are identified and their association with atmospheric dynamics over the East African region is investigated. It is found that significant zonal wind anomalies occur over East Africa in conjunction with the eastward

propagation of a MJO over the global tropics. These anomalies display an opposite signal in the upper and lower levels, a pattern reminiscent of that associated to wet events over the East African Highlands. However, the maximum wind, ascent and rainfall anomalies over this region occur when the MJO-induced convective activity has already settled over the central Indian Ocean. It is also found that rainfall and circulation anomalies near the East African coastal area do not follow this pattern. In particular, anomalous ascending motion occurs well before the development of deep convection over the highlands, and is restricted to the mid-troposphere. The resulting rainfall is considered to be of stratiform origin, hence the absence of a clear OLR signal for wet events along the coast.