Geophysical Research Abstracts
Vol. 14, EGU2012-11123, 2012
EGU General Assembly 2012

Understanding the large scale driving mechanisms of rainfall variability over central Africa

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Large-scale drivers of rainfall variability over central Africa (approximately 12°S – 7°N and 15°E – 32°E, roughly comprising the Democratic Republic of Congo basin) are examined using rain gauge data and the NCAR-NCEP reanalysis. Research into central Africa has been neglected relative to other regions of Africa, primarily because of a lack of suitable observational data. This study focuses on how local SSTs, the African jets and mesoscale convective systems (MCSs) modulate precipitation through their influence on the tropical rain belt and the ITCZ. The role of ENSO teleconnections on the tropospheric jets and SSTs will also be described.

Our results show that central Africa is a very complex region, with different mechanisms influencing rainfall in each regions and season. It is also shown that the influence of the large scale drivers on rainfall is not necessarily linear, with wet and dry years affected by different factors. The loci and intensity of the tropospheric jets play a determining role in the strength and position of the rainbelt with MCS activity mostly coupled between their axes. Displacement of the ITCZ (resulting from variability in SST and land-surface gradients) is also indicated as a likely influence on rainfall. SST and land-surface gradients can also modulate rainfall by directly influencing the strength and loci of the tropospheric jets.