Intraseasonal Variability of the South American Monsoon System

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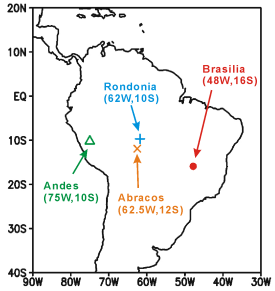
Introduction:

This study aims to a better understanding of the variability of the South American Monsoon System (SAMS) based on the observational datasets and the UCLA AGCM simulations for the southern summer (December-January-February). The focus is on intraseasonal and diurnal time scales.

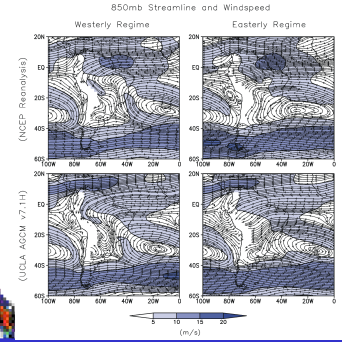
The intraseasonal variability is examined by Westerly and Easterly Wind Regimes (WWR and EWR) which refer to periods at least three days long during which low-level wind in Abracos is from the west or east, respectively.



Intraseasonal Variations:

Lower level circulation

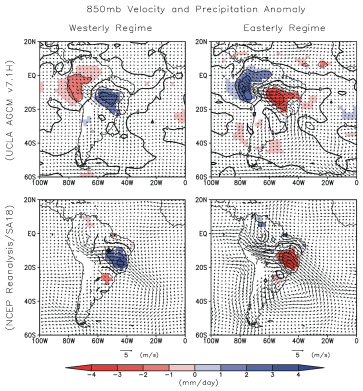
The Atlantic subtropical high extends westward over south-east of South American continent which modifies the low-level circulation during different regimes.



Intraseasonal Variations:

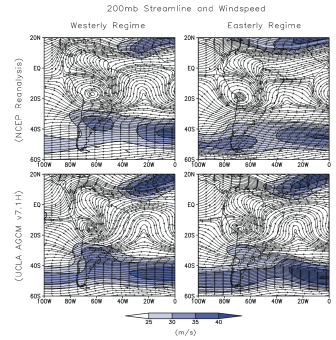
Precipitation anomaly

The composites of anomalous precipitation over South America show a dipole pattern with poles in northwestern and central-southeastern Brazil.



Upper level circulation

During WWRs the monsoon high at upper levels is stronger and the subtropical jet in the South American sector is stronger and closer to the equator. Also, there is enhanced cyclonic flow over southeastern South America.



Diurnal Cycle of Precipitation:

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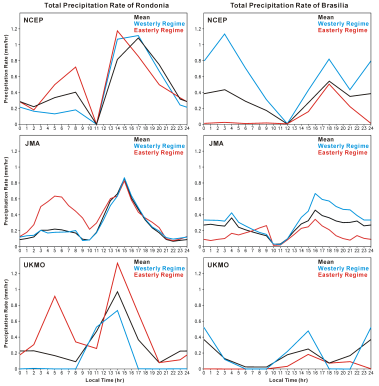
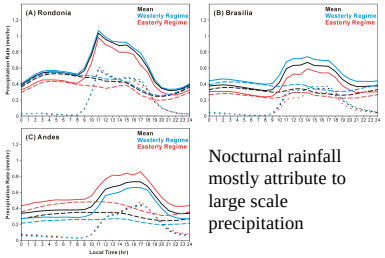
EWR days has a strong precipitation maximum in the early morning, and more rainfall than WWR days



UCLA AGCM

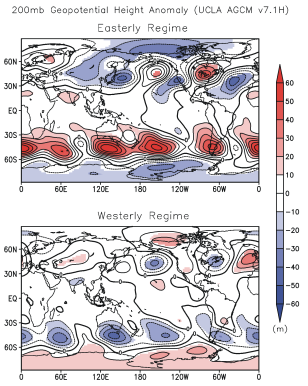
Simulations capture the observed dipole pattern in rainfall over South America during WWRs and EWRs, but not the differences in diurnal cycles. The reason for the AGCM difficulties is under investigation.



Nocturnal rainfall mostly attribute to large scale precipitation

Global Connections:

The difference between composite geopotential fields in WWR and EWR has a global pattern



Conclusion:

(1) In Central Amazonia, westerly and easterly wind regimes were defined by the persistence of low-level winds.
(2) WWR and EWR show a dipole pattern in precipitation, with poles in northwestern and central-southwestern Brazil. SAMS upper-level high is weaker during EWR than WWR.
(3) EWR days have a strong precipitation maximum in the early morning, and more enhanced rainfall rate than WWR days.
(4)The AGCM captures the dipole pattern in rainfall, but the diurnal cycles in the WWR and EWR are very similar. The simulated intraseasonal variability is, therefore, weaker than in the observation.

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