Climate Variability & Climate Change in Tropical South America: Relevant Processes andTimescales + Application to Human Health

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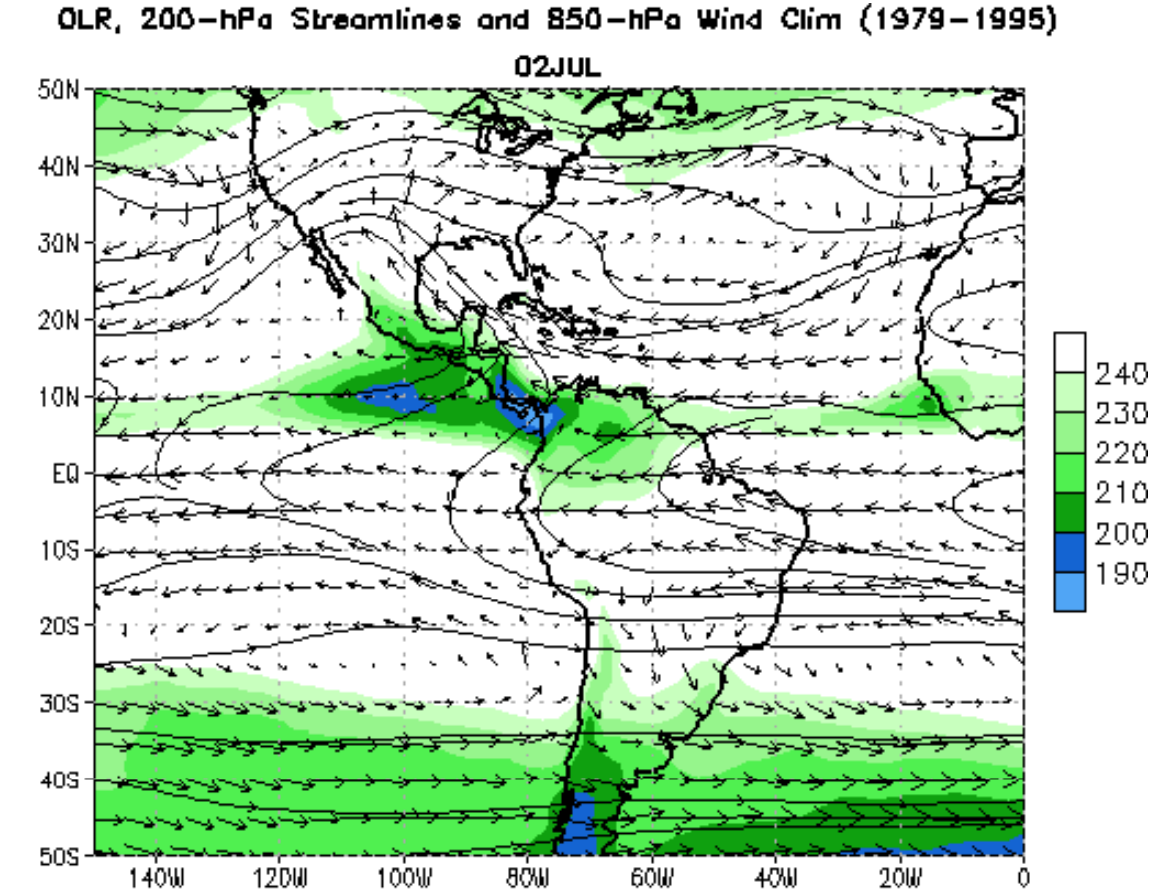
Annual Cycle of OLR, Streamlines 200 hPa, Winds at 850 hPa



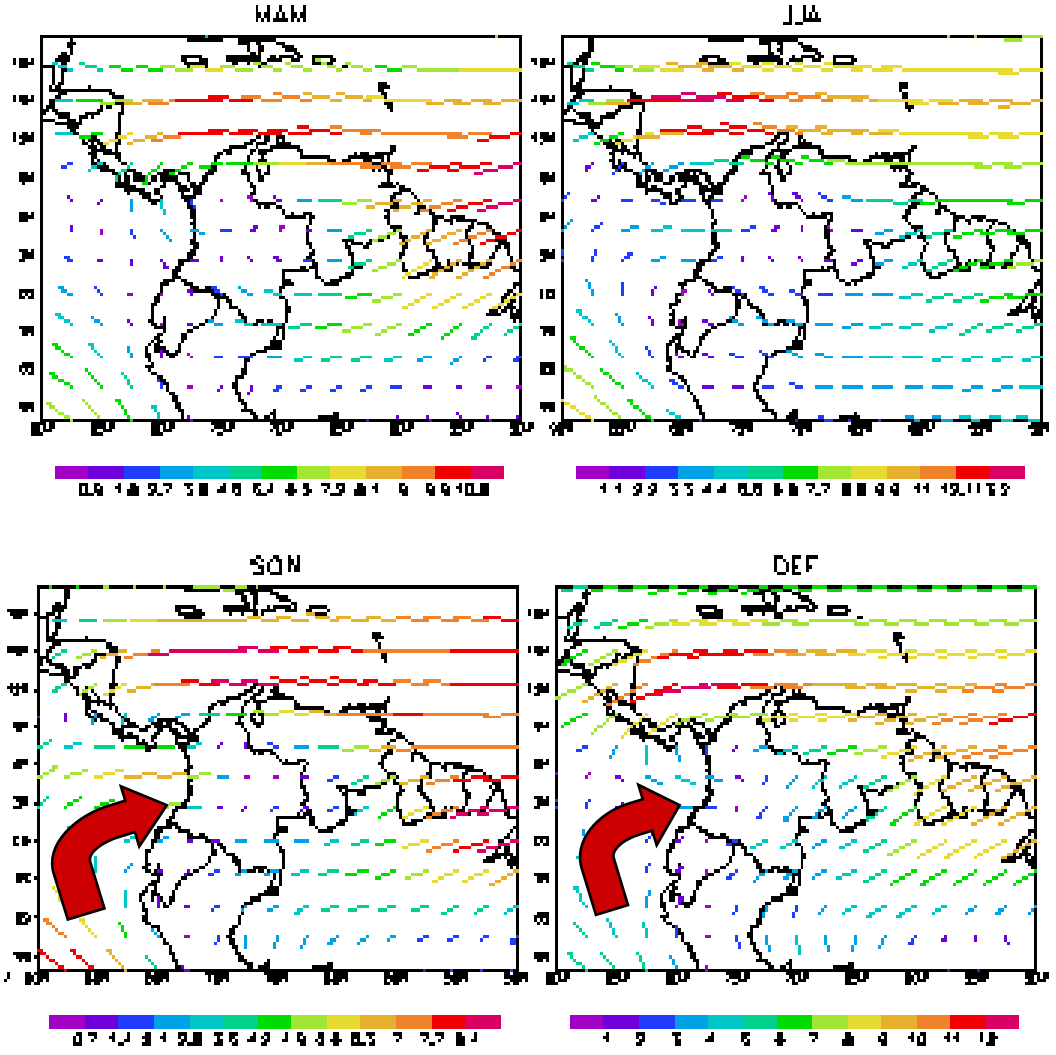
There is much more than the meridional displacement of the ITCZ:

e.g. What are the roles of:

- Land-Atmosphere interactions?
- Precipitation recycling?
- Understanding & Model Shallow-Deep Convection
- Atmospheric Rivers and Low-level Jets?
- Biotic Pump of Atmospheric Moisture?

http://www.cpc.ncep.noaa.gov/products/Global_Monsoons/American_Monsoons/American_Monsoons.shtml

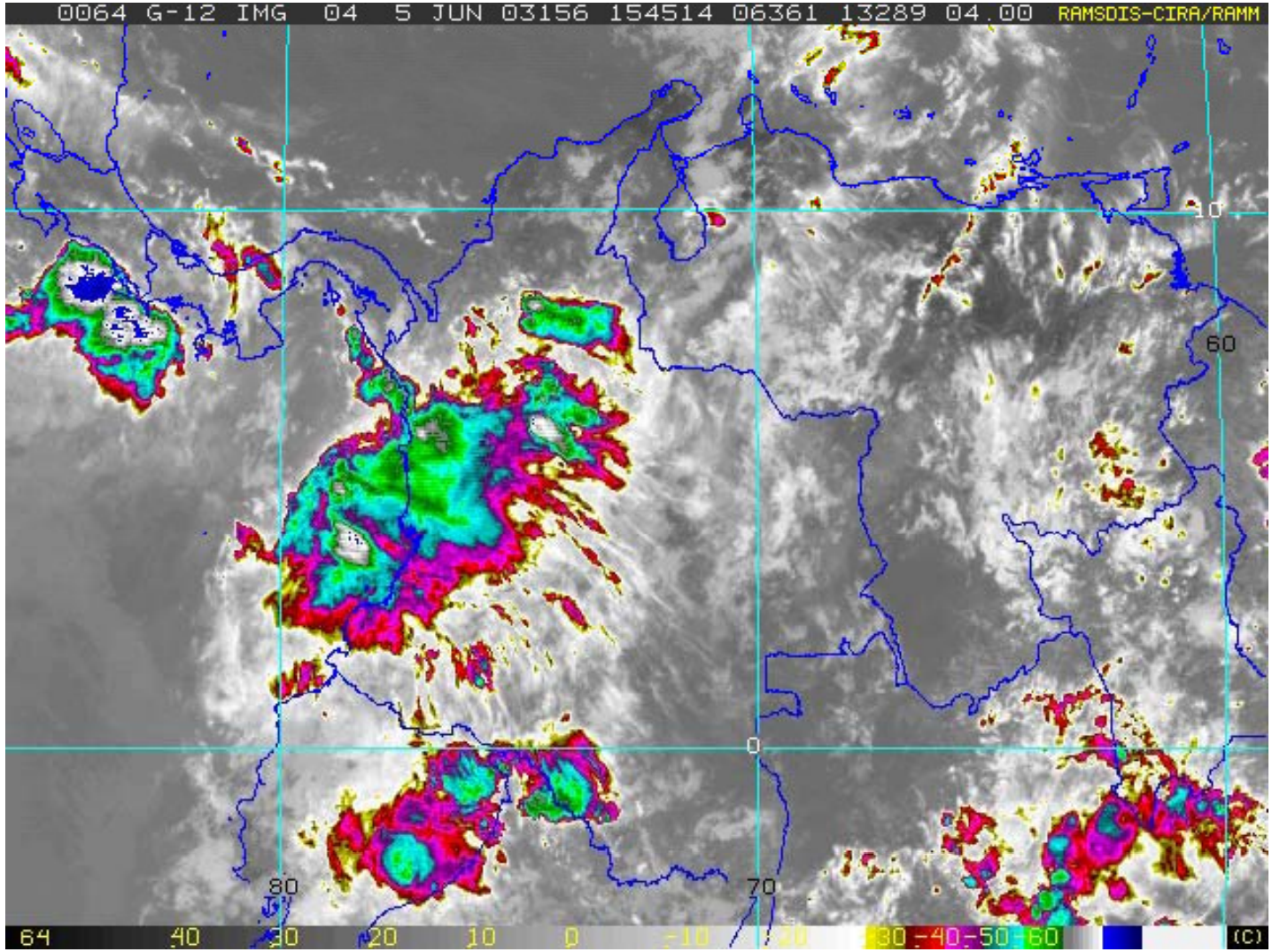
Annual Cycle of Low-Level Jets: Caribbean and Choco (Pacific)



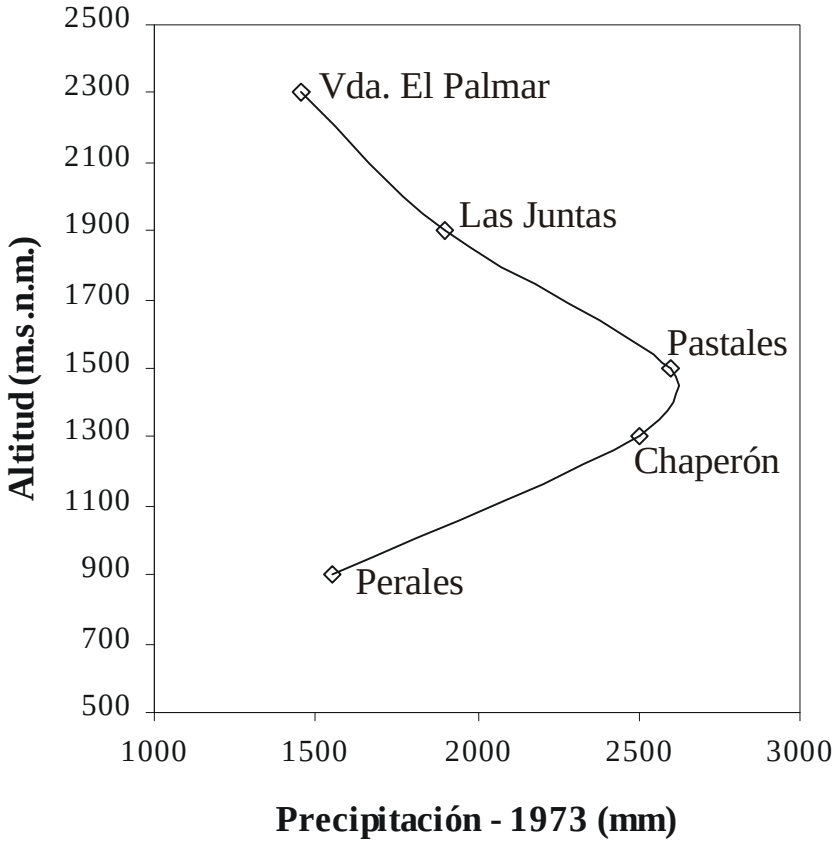
Data: NCEP/NCAR Reanalysis 1950-1998

Poveda (1998)

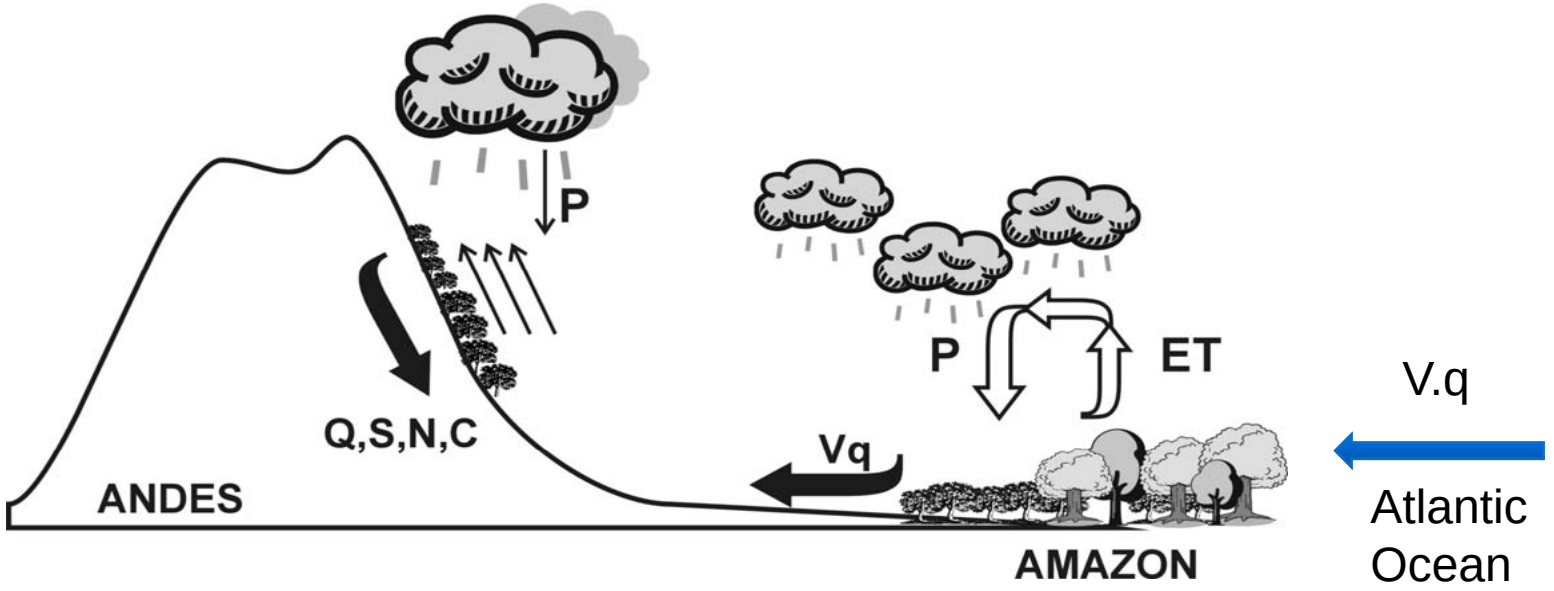
Mesoscale Convective Systems



Rainfall over the Andes
Pluviometric Optimum in Precipitation vs. Height



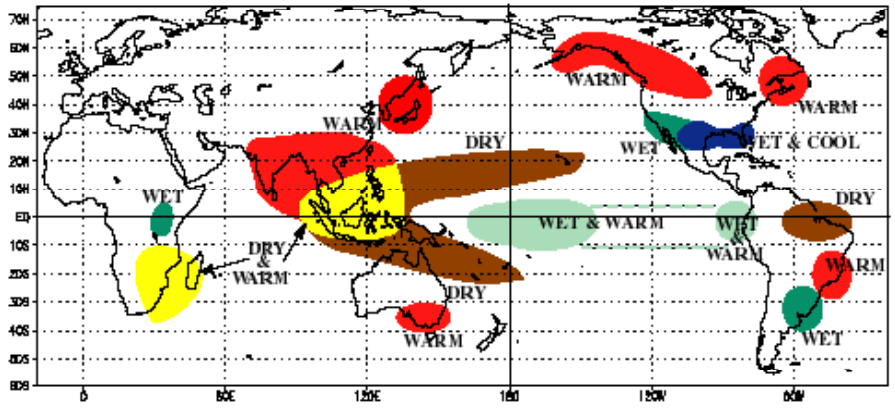
Andes ⇄ Amazonia Interactions



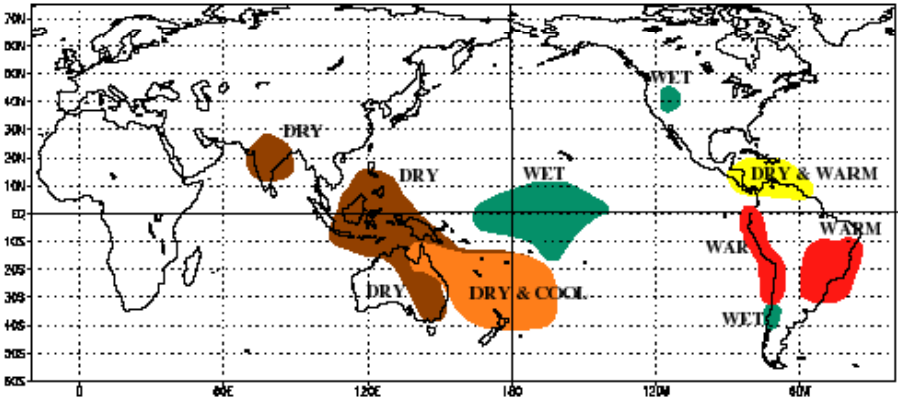
- Hydrological Processes.
- Bio-Geochemical Processes.
- Implications of Deforestation - Land Use/Change on the hydro-climatic integrity of the whole system, including planetry climate?

Interannual Timescales (ENSO *et al.*)

WARM EPISODE RELATIONSHIPS DECEMBER - FEBRUARY

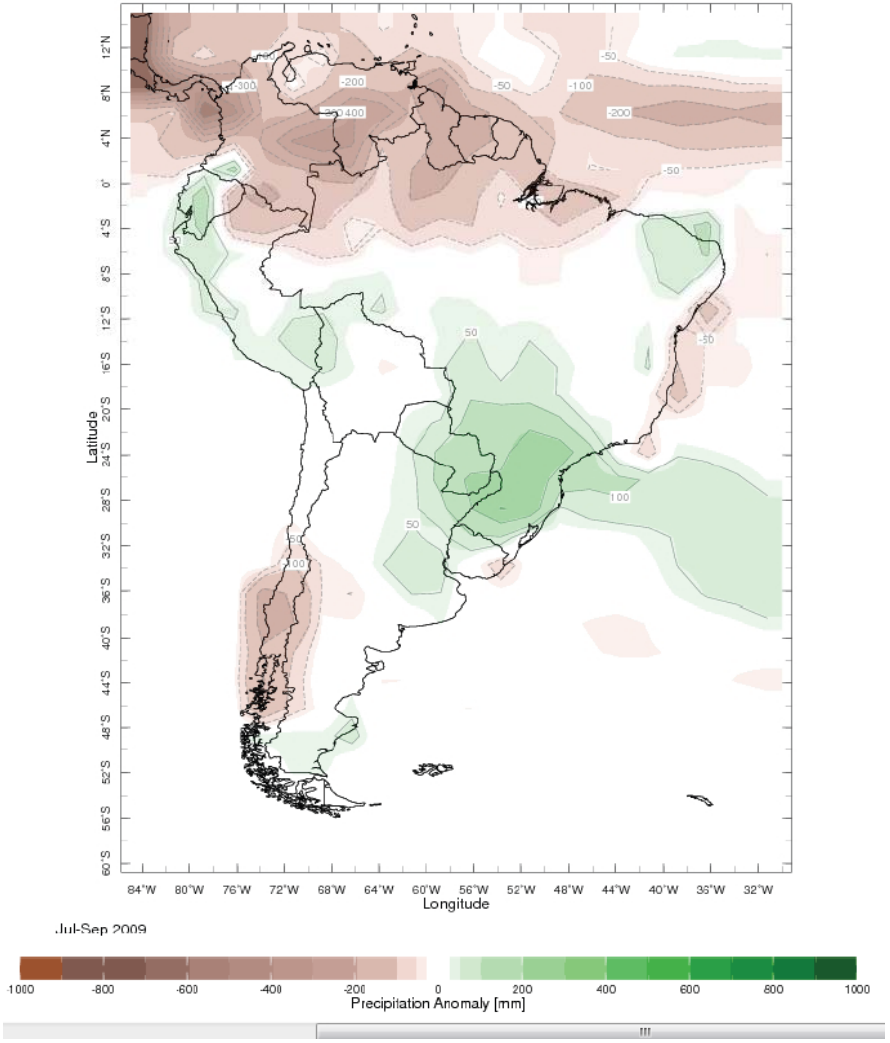


WARM EPISODE RELATIONSHIPS JUNE - AUGUST



Climate Prediction Center

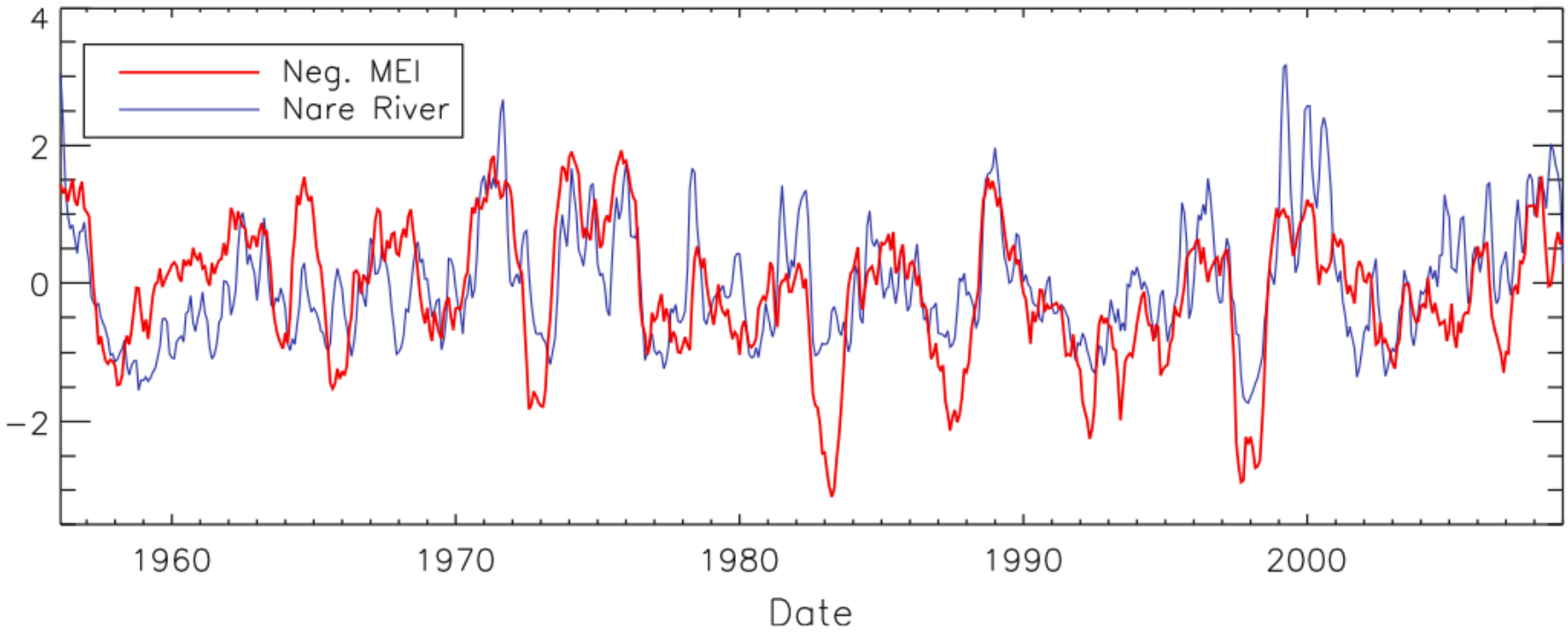
Precipitation Annomalies
July-September 2009 (El Niño)



Source: CAMS-OPI dataset, NOAA Climate Prediction Center

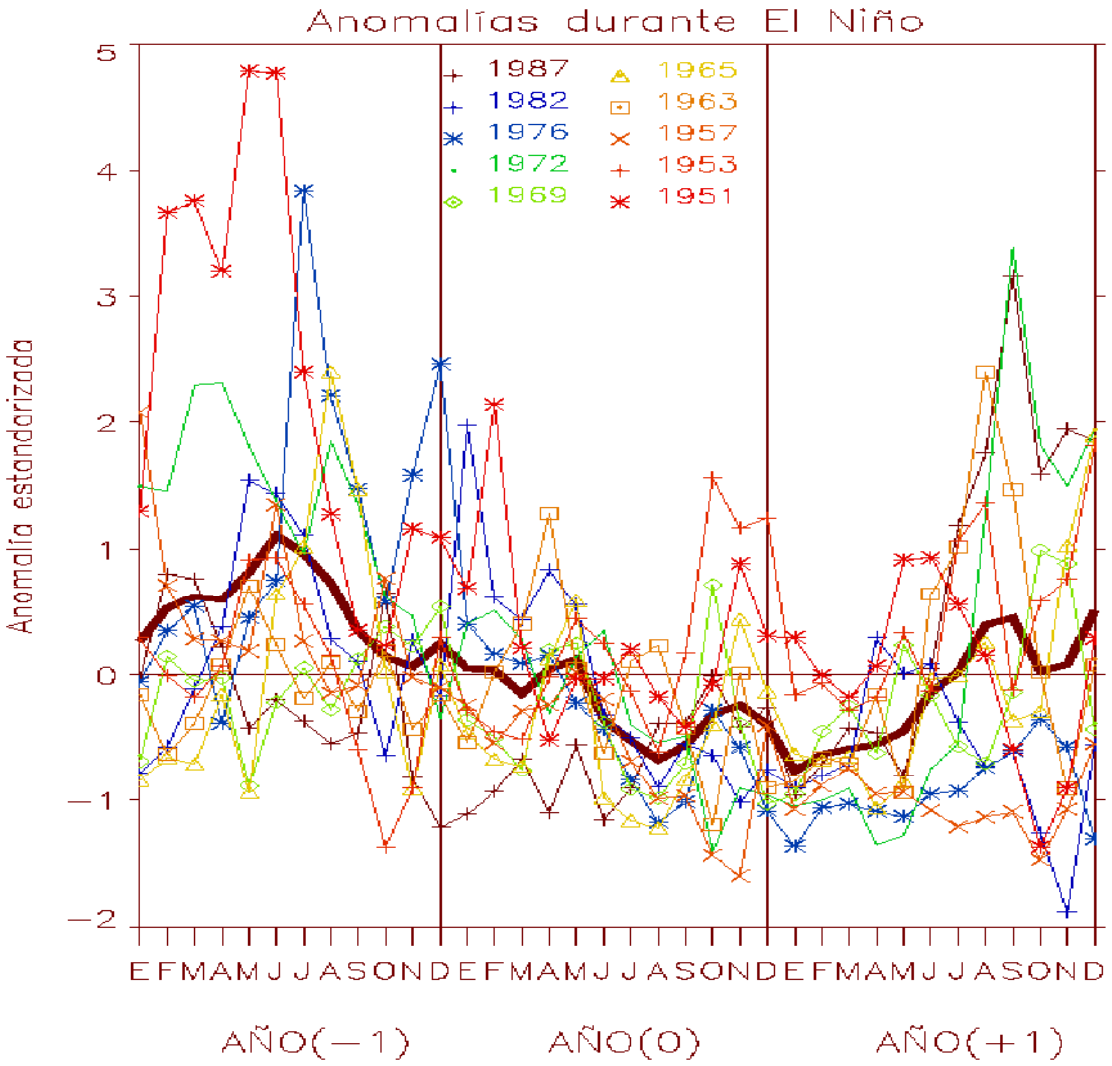
MEI vs. River Flows Nare River

G. Poveda et al.: Hydro-climatic variability over the Andes of Colombia associated with ENSO



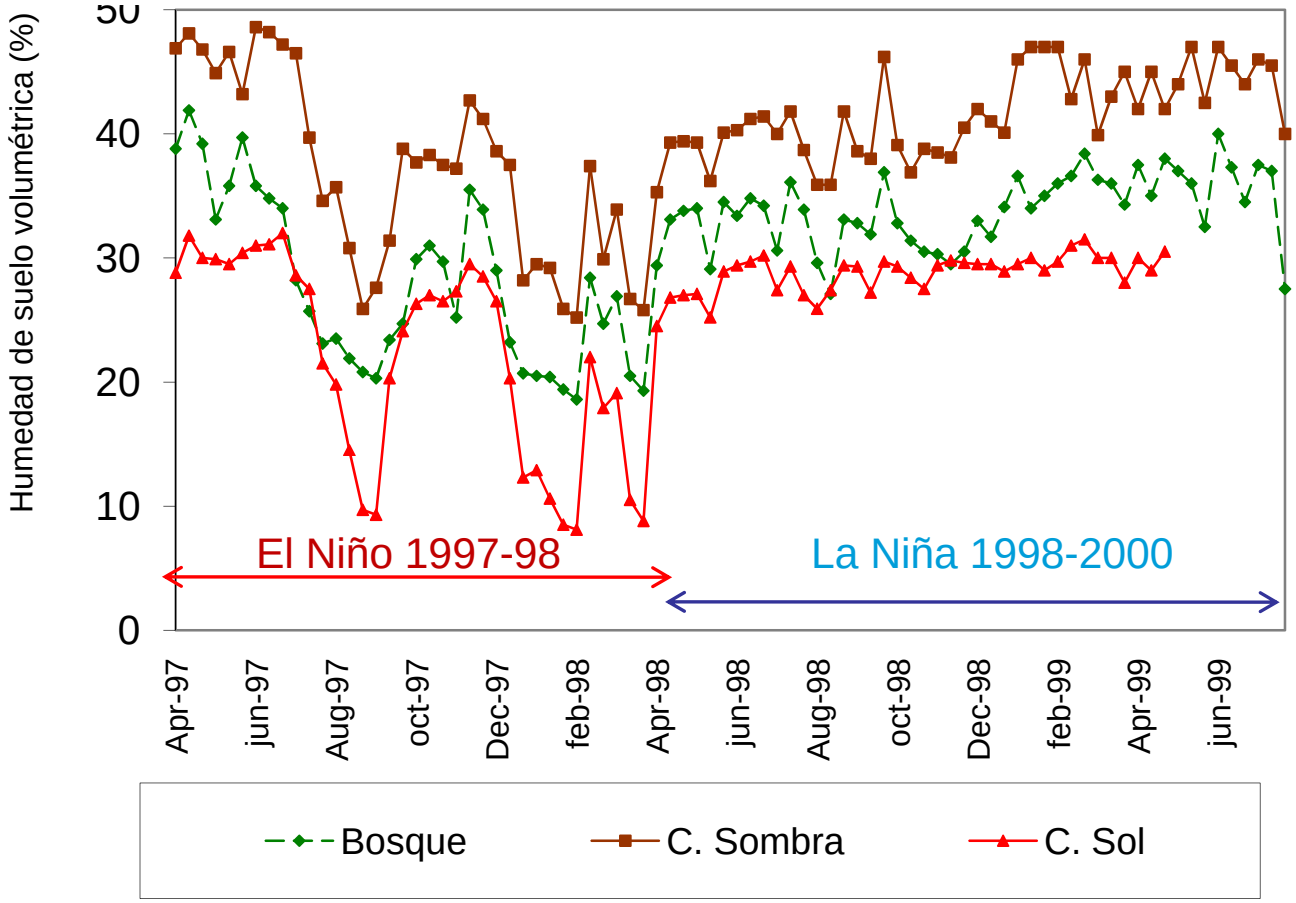
Poveda et al., Climate Dynamics, 2011

El Niño Effects Come in Different Flavors



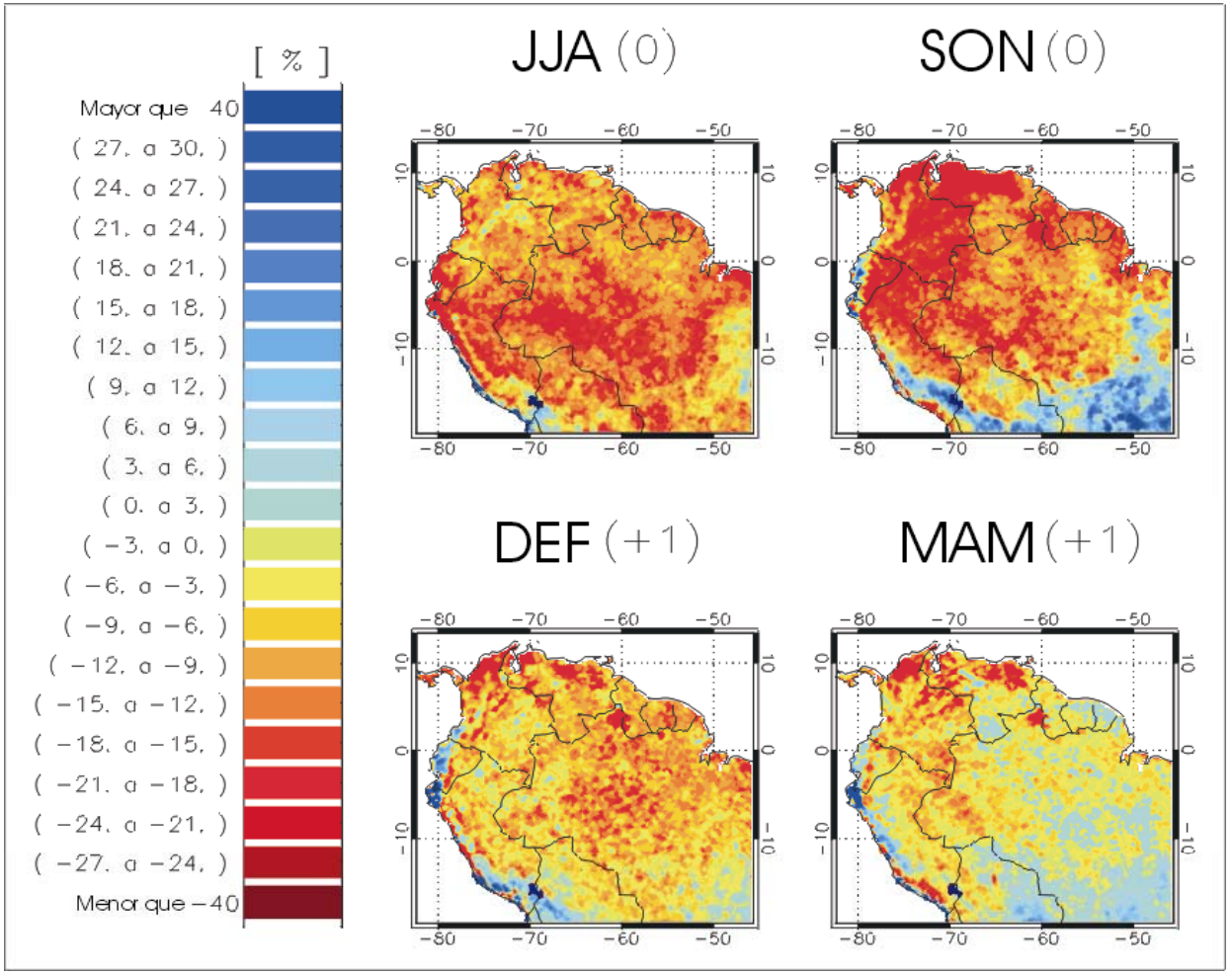
La Vieja River, Colombia

Soil Moisture:
El Niño amplifies annual cycle – Stronger deficits
La Niña supresses it!



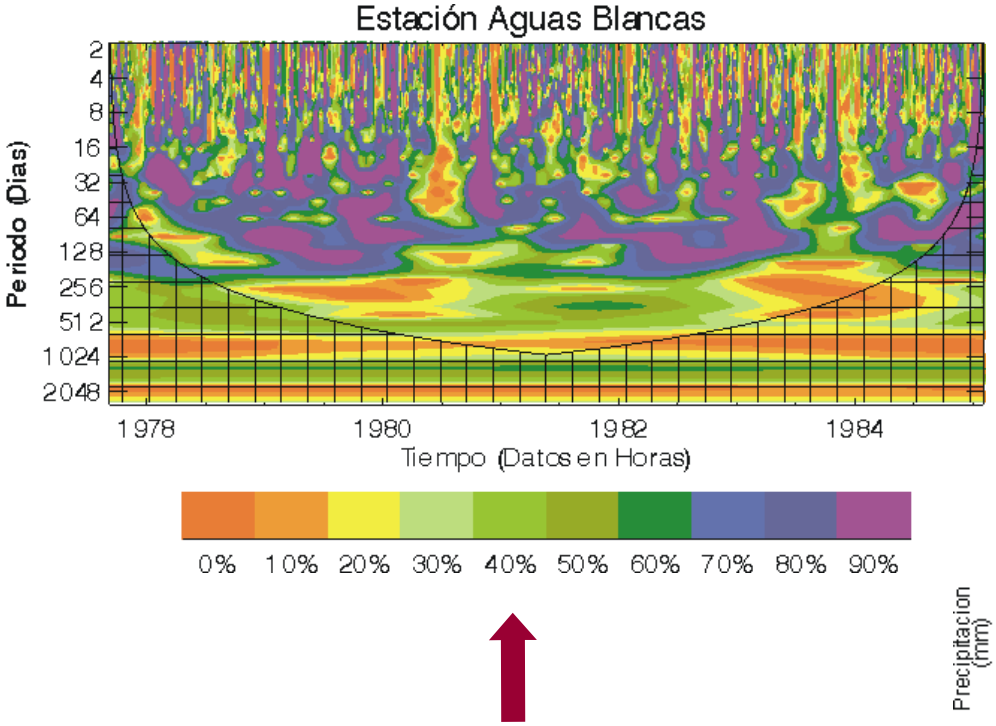
Poveda et al (2011)

NDVI is strongly affected by El Niño



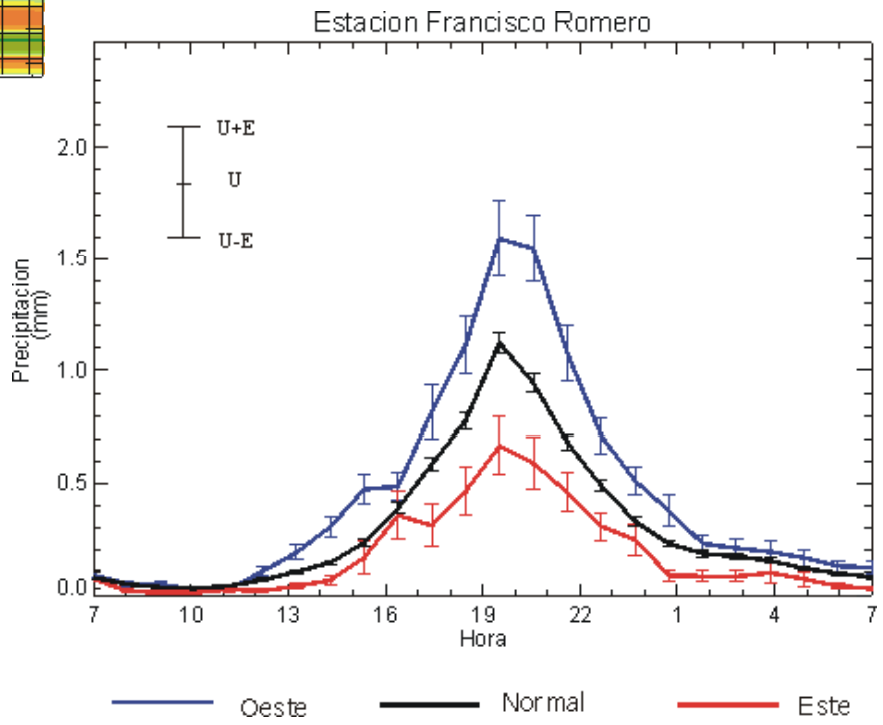
Poveda et al., *Water Res. Res.*, (2001)

Influence of the Phase of the MJO in Colombia



Espectro de potencias en Onditas (“Wavelets”) de la serie de precipitación diaria en la estación Aguas Blancas.

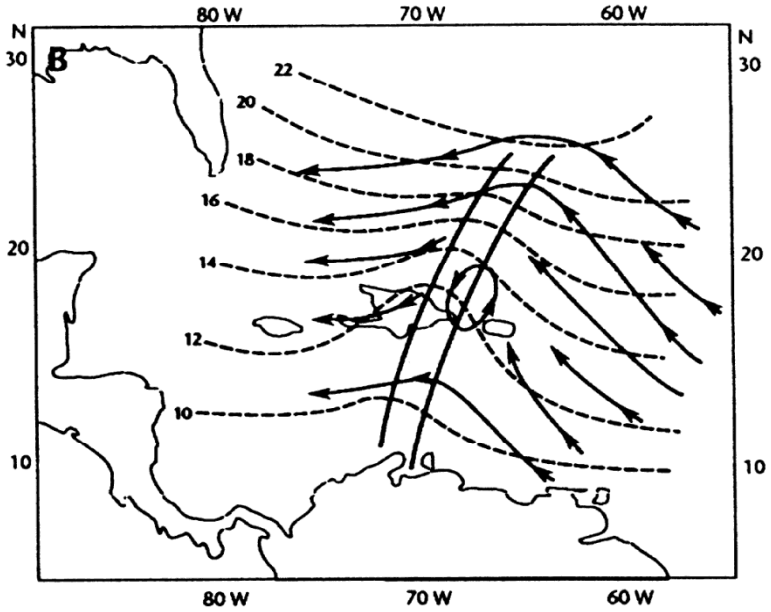
Ciclo diurno promedio de precipitación para una estación (Francisco Romero, Santander) durante las fases este y oeste de la MJO. Poveda et al. (2001).

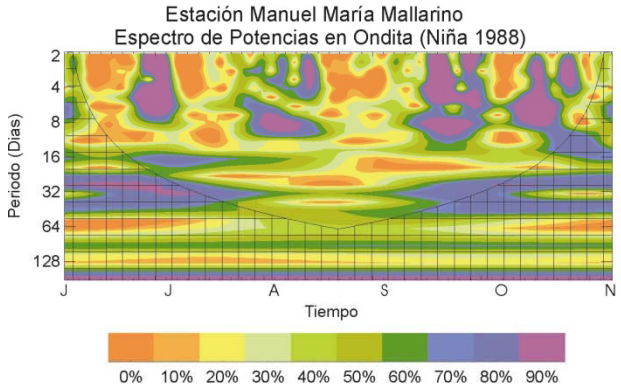


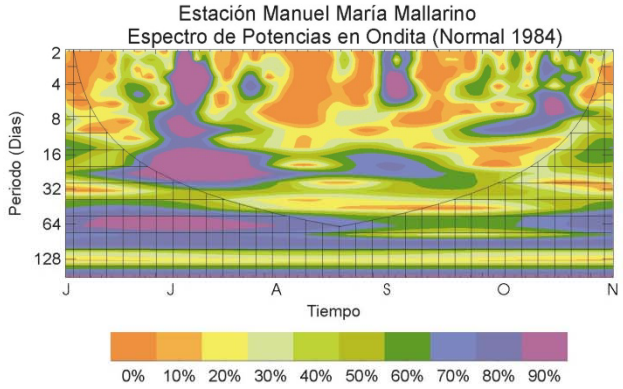
ENSO effects on Tropical Easterly Waves

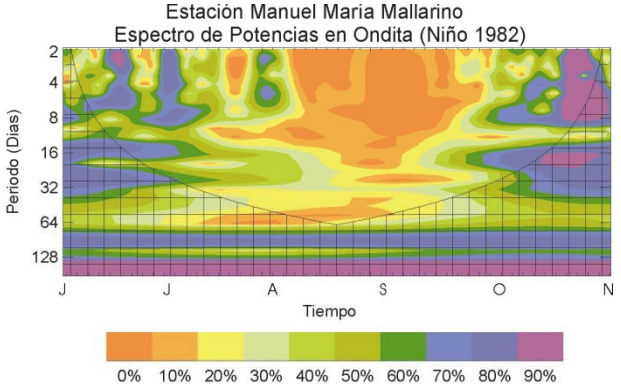
- Perturbaciones de verano-otoño sobre el Atlántico Norte, con origen en África occidental.

- Ondas viajeras en la ZCIT (4-8 días).

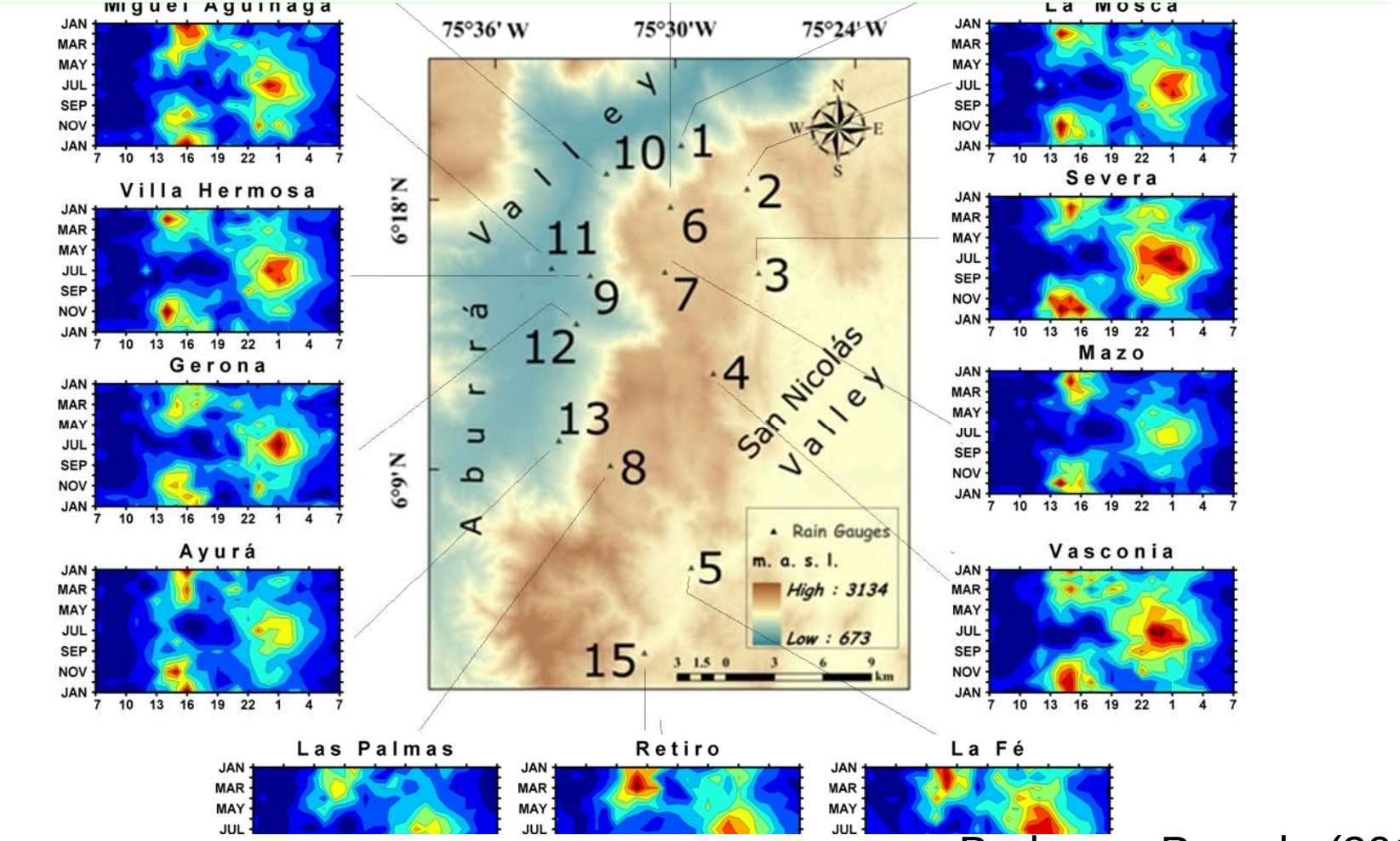






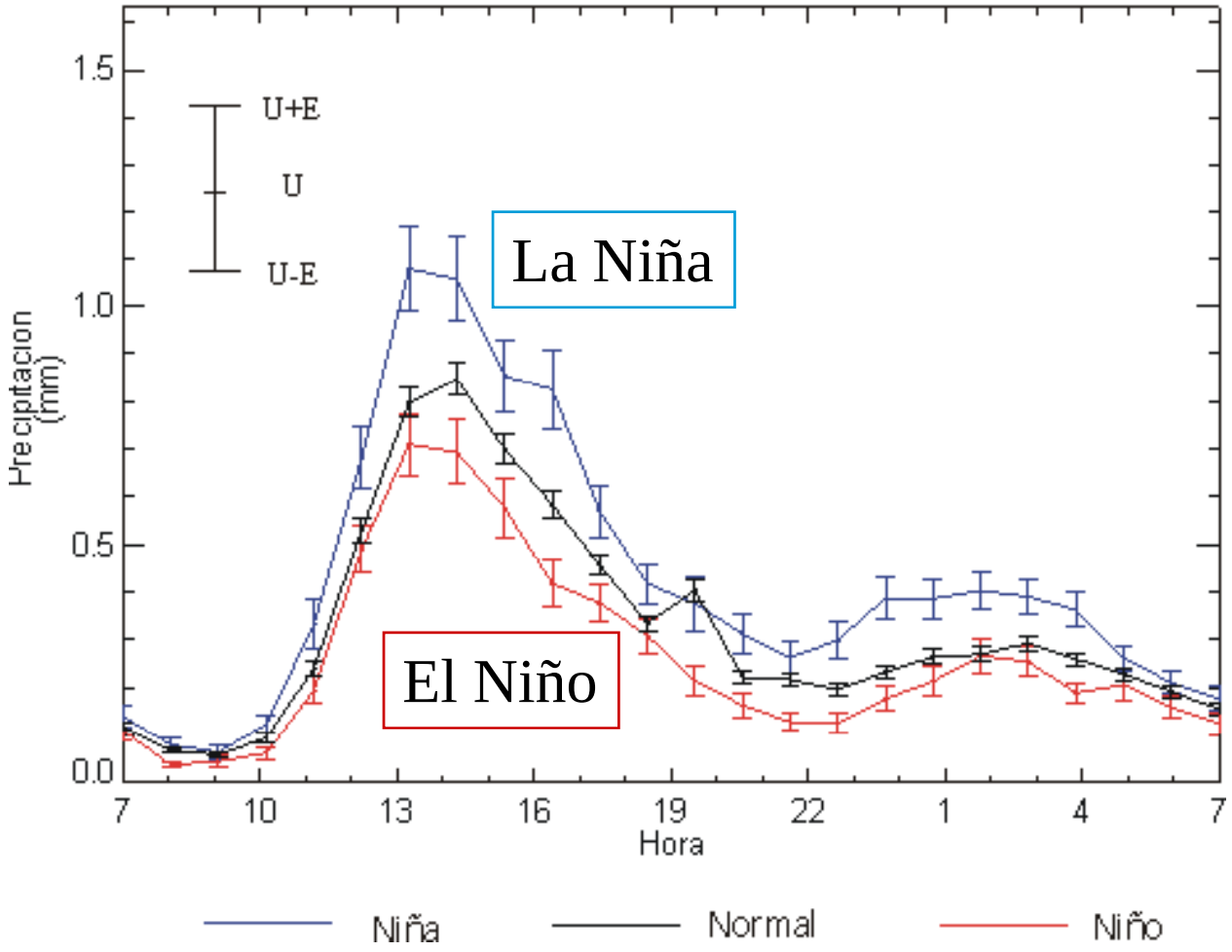


Phase of the Diurnal Cycle Changes with Phase of the Annual Cycle - Central Colombia



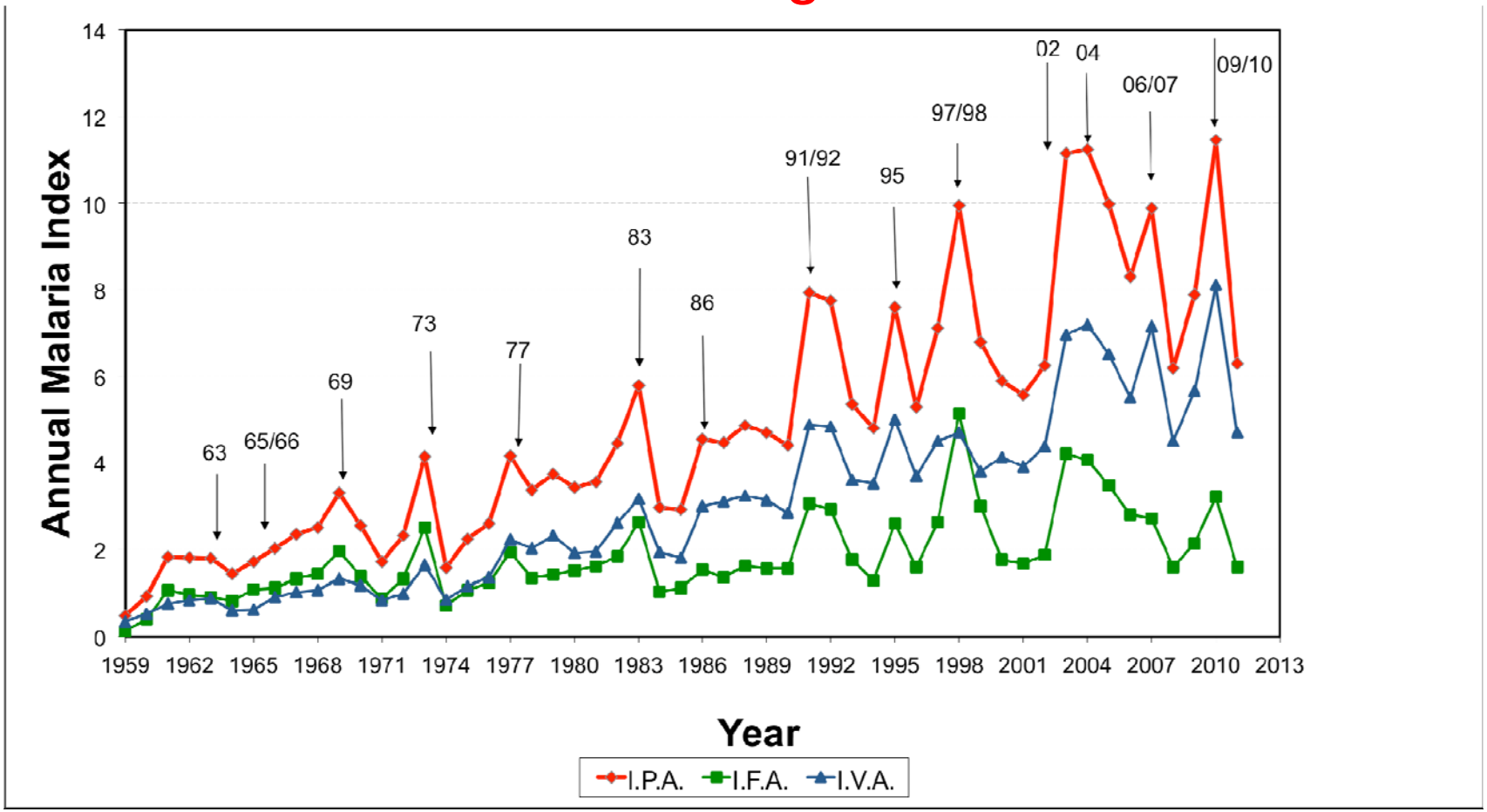
Bedoya y Poveda (2012)

ENSO affects Diurnal Cycle of Rainfall



Poveda et al., Mon. Wea. Rev. (2005)

Malaria Incidence in Colombia: Trends due to Global Warming? Outbreaks during El Niño!

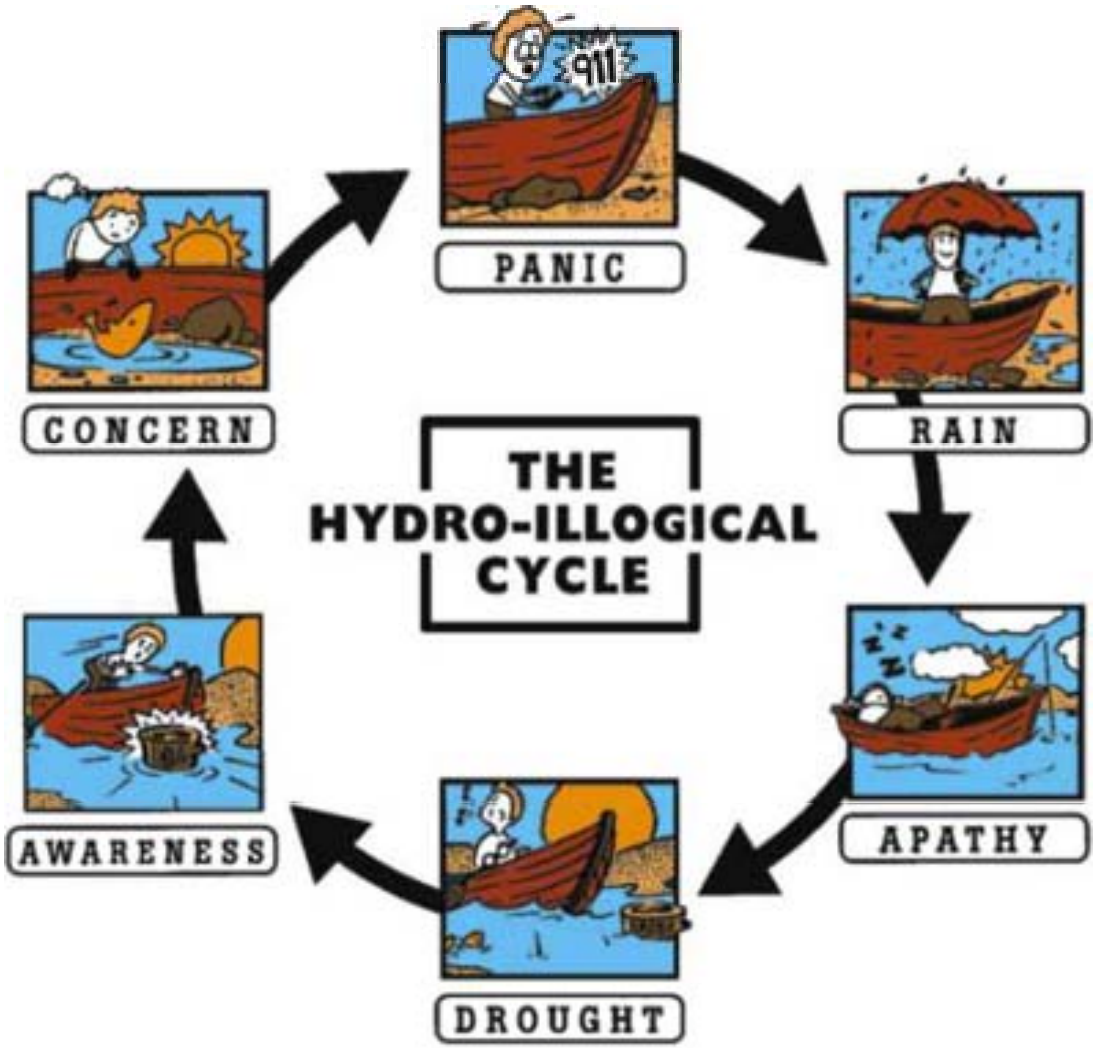


Poveda et al., *Current Opinion in Environmental Sustainability* (2011)

On Climate Change and Human Health:

I have noted the dismal under-recognition of the importance, role and connectedness of human health to other goals/objectives. I live in hope that we can impress on other sectors and policy-makers that population health is not a side-show to the main event. In the long run, it is the main event. Why else do we want an economy, security, social cohesion and material comfort?

T. McMichael (Pers. Comm., 2012)


THE HYDRO-ILLOGICAL CYCLE
911
PANIC
RAIN
APATHY
DROUGHT
AWARENESS
CONCERN