

CLIVAR's American Monsoons Panel

Variability of the American Monsoon Systems (VAMOS)

Hugo Berbery co-chair for North America
Jose Marengo co-chair for South America



Variability of the American Monsoon Systems (VAMOS)

2001: "VAMOS is based on two internationally coordinated monsoon experiments: MESA in South America and NAME in North America."

2009: The term "**monsoon system**" encompasses not only the summer monsoon rainfall in the tropical Americas, but also the perturbations in the planetary, synoptic and mesoscale flow patterns that occur in association with it, including those in the winter hemisphere.

The region of interest covers both the tropical and the extratropical Americas and surrounding oceans.

VAMOS (2009)

Four Complementary Science Programs

- North American Monsoon Experiment (**NAME**)
- Monsoon Experiment for South America (**MESA**)
- VAMOS Ocean Cloud Atmosphere Land Study (**VOCALS**)
- Inter-Americas Study of Climate Processes (**IASCLIP**)

Cross-cuts:

- Modeling
- Extremes
- Anthropogenic Climate Change
- Decadal variability

CLIVAR and GEWEX endorsed activity:

- La Plata Basin Regional Hydroclimate Project



VAMOS

The annual cycle of convection over the Americas

IASCLIP Links

IASCLIP-NAME

Great Plains Precipitation

IASCLIP-VOCALS

Boreal summer circulation

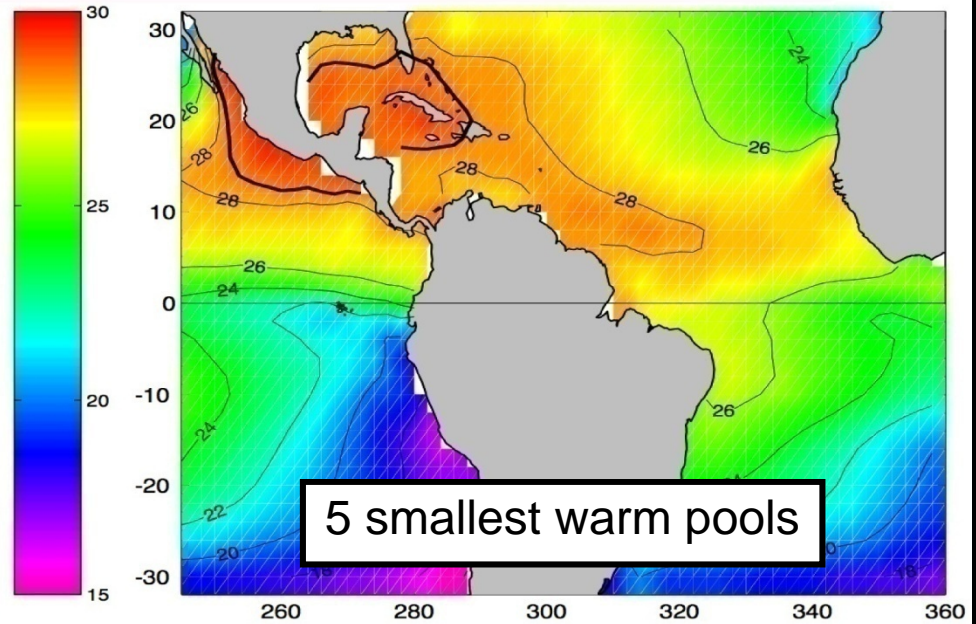
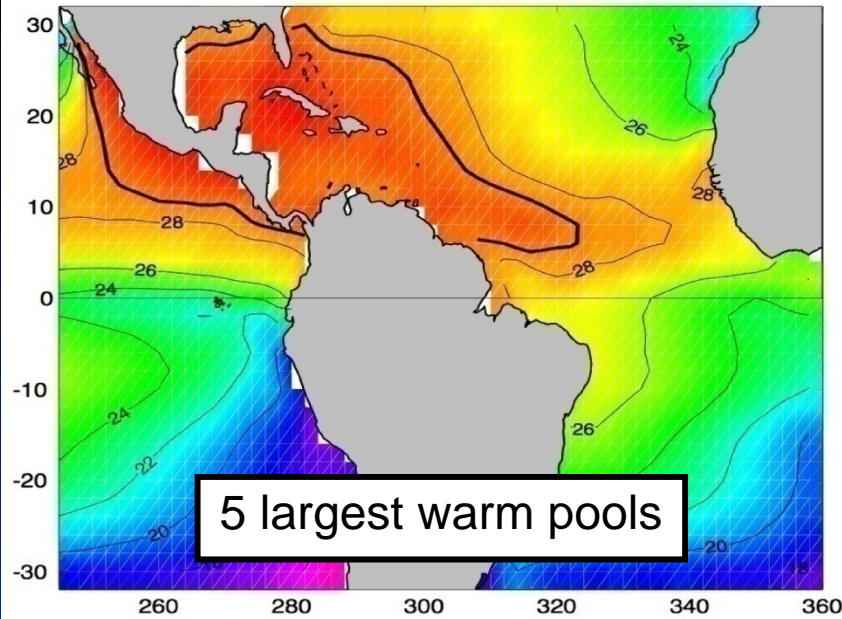
IASCLIP-MESA

Boreal winter circulation



IASCLIP

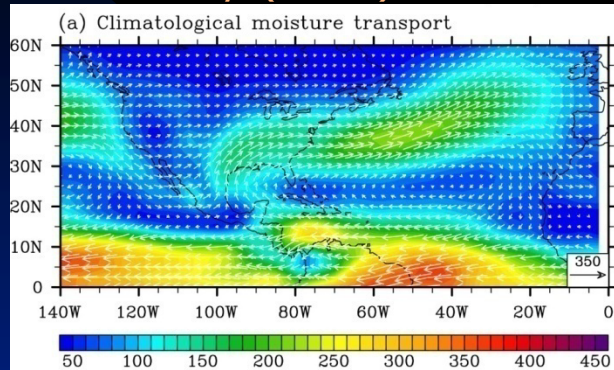
The Atlantic Warm Pool



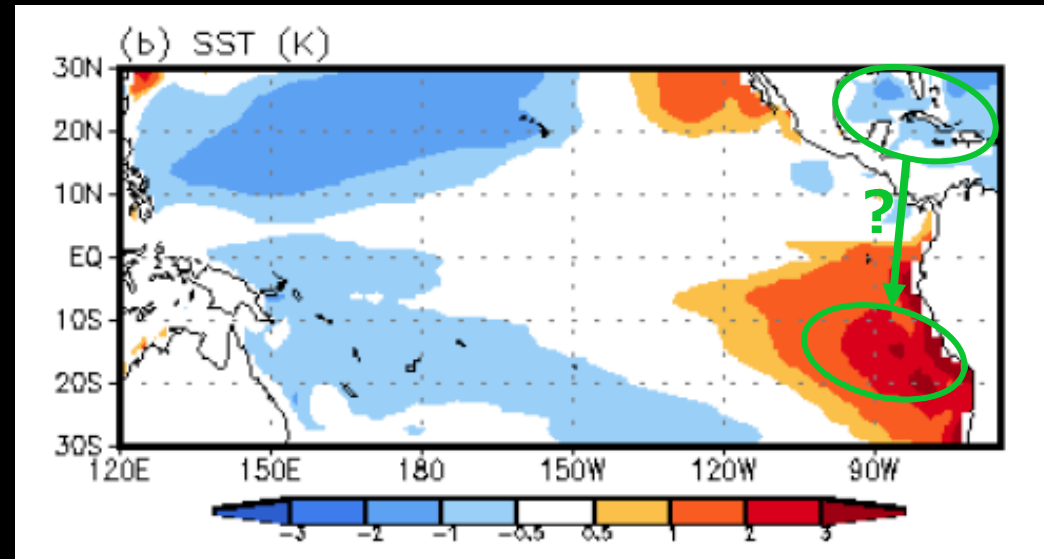
Question/issue: How much skill do the state-of-the-art CGCMs have for simulating the AWP?

Tornado Activity and Moisture Transport from the AWP

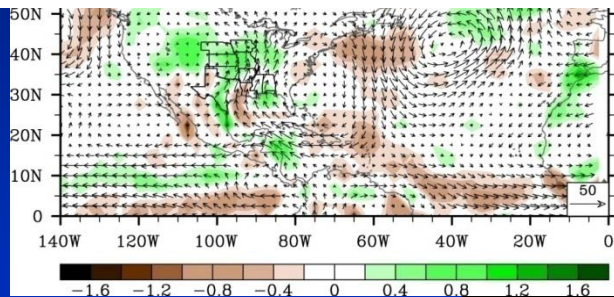
March to May (MAM) of 1950-2007



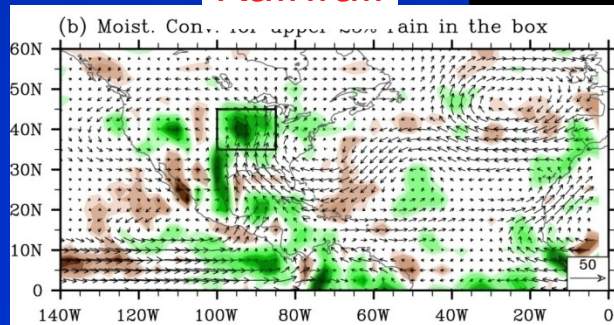
CFS Model Bias



Moisture transport from the AWP



Rainfall

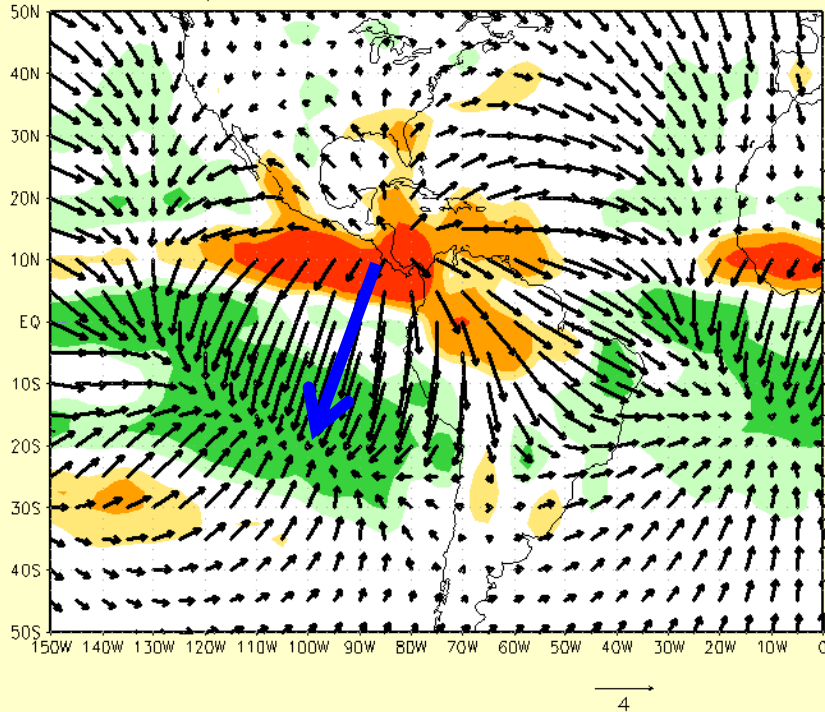


Is it possible for model bias in the AWP to affect model error over other regions (e.g., S. E. Pacific)?

Upper level circulations associated with the IAS

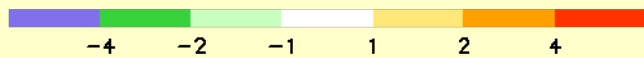
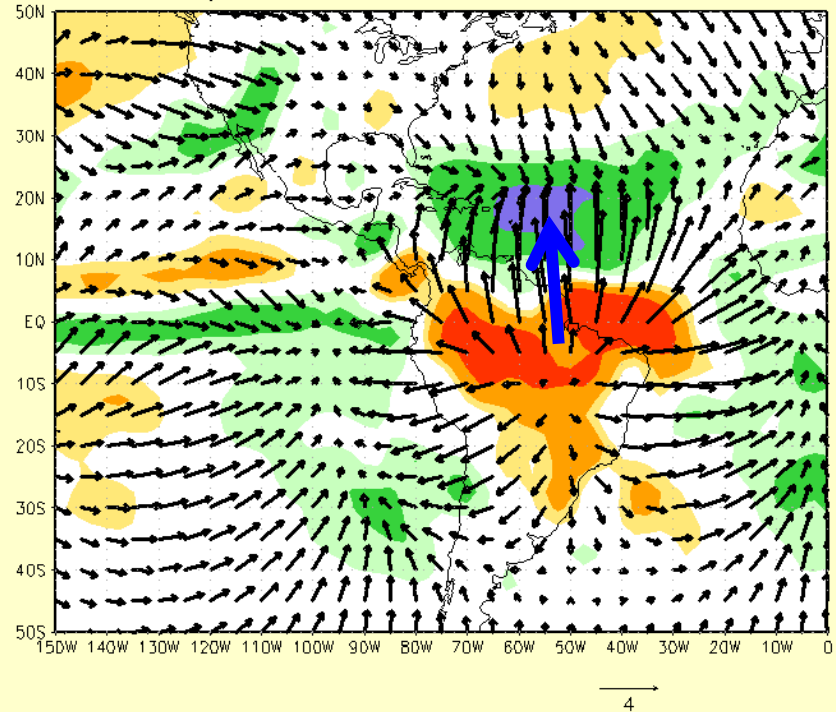
VOCALS - IASCLIP

b) JAS d200 and Chi wind



MESA - IASCLIP

a) JFM d200 and Chi wind



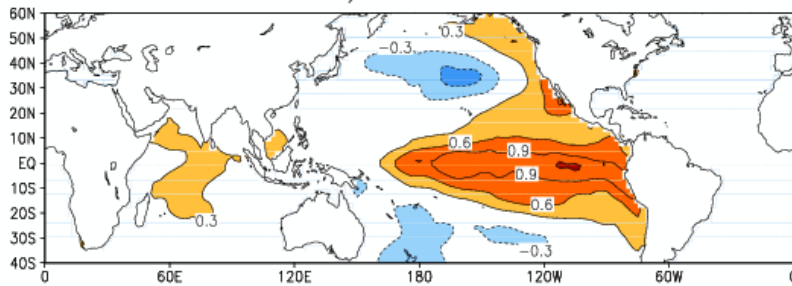


VAMOS Extremes Task Force

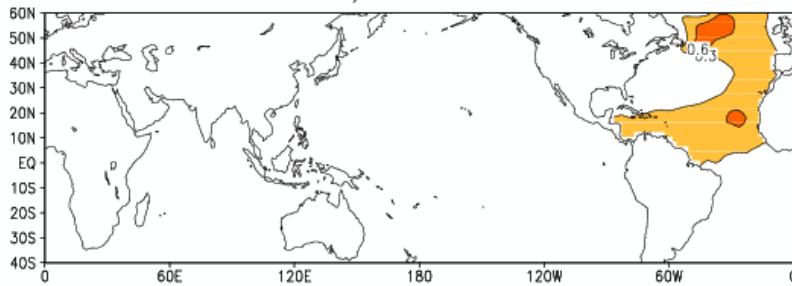
co-chaired by Lisa Goddard and Jean-Philippe Boulanger

Taking advantage of USCLIVAR drought studies
to expand analysis to the Americas

a) SSTA PAC



b) SSTA ATL



a) Climatology

b) Pacific SSTAs: wPnA, cPnA

c) Atlantic SSTAs: nPwA, nPcA,

d) Combined SSTAs: cPcA, cPwA,
wPcA, wPwA

Models: GFS/NCEP, GFDL and NSIPP,
CCM3, CCM3.5

Schubert et al, 2009

VAMOS will consider its continental perspective in linking extremes in warm season climate behavior to the circulation structures defined as the monsoon systems.

The VAMOS Extremes Task Force considered:

- (1) Issues that are coherent across VAMOS program areas,
- (2) Aspects of extremes that can be somewhat unique to VAMOS, and
- (3) How to capitalize on existing and on-going efforts within the climate community (e.g., USCLIVAR; CEOP).
- (4) **Social impact of extremes:** seeking to quantify the cost of specific extreme events

This perspective should consider a multi-scale approach to **understanding the subtle interplay of processes occurring at different space and time scales within monsoon systems**, such as terrain heating, vegetation-atmosphere coupling, land-sea breezes, regional moisture flux patterns, synoptic disturbances and teleconnections.

A document was prepared and is available at:

http://www.clivar.org/organization/vamos/Publications/vamos_extremes_21jul08.pdf

VAMOS ACC task force

Tereza Cavazos, Dave Gochis, Jose Marengo, Jean-Philippe Boulanger

In the climate change context, there is a need to identify and understand important processes that control monsoonal climates in the Americas, their variability and changes, and how these processes interact with broader societal issues, such as impacts, vulnerability and adaptation.

Challenges

- **Assessment of GCM model performance and uncertainties**
- Improvement of the simulation and understanding of major tropical and monsoon-related modes of variability
- Investigation of the role of aerosols, land cover and land use on the radiative balance and hydrological processes
- Development of detection and attribution studies
- **Regional climate downscaling for integrated assessments of climate change**

The Modeling Plan from VAMOS

Status: Presented at previous meetings with very positive reviews

Future activities: Coordinate the VAMOS modeling activities with modeling groups, particularly WGSIP and WGCM



Thanks...