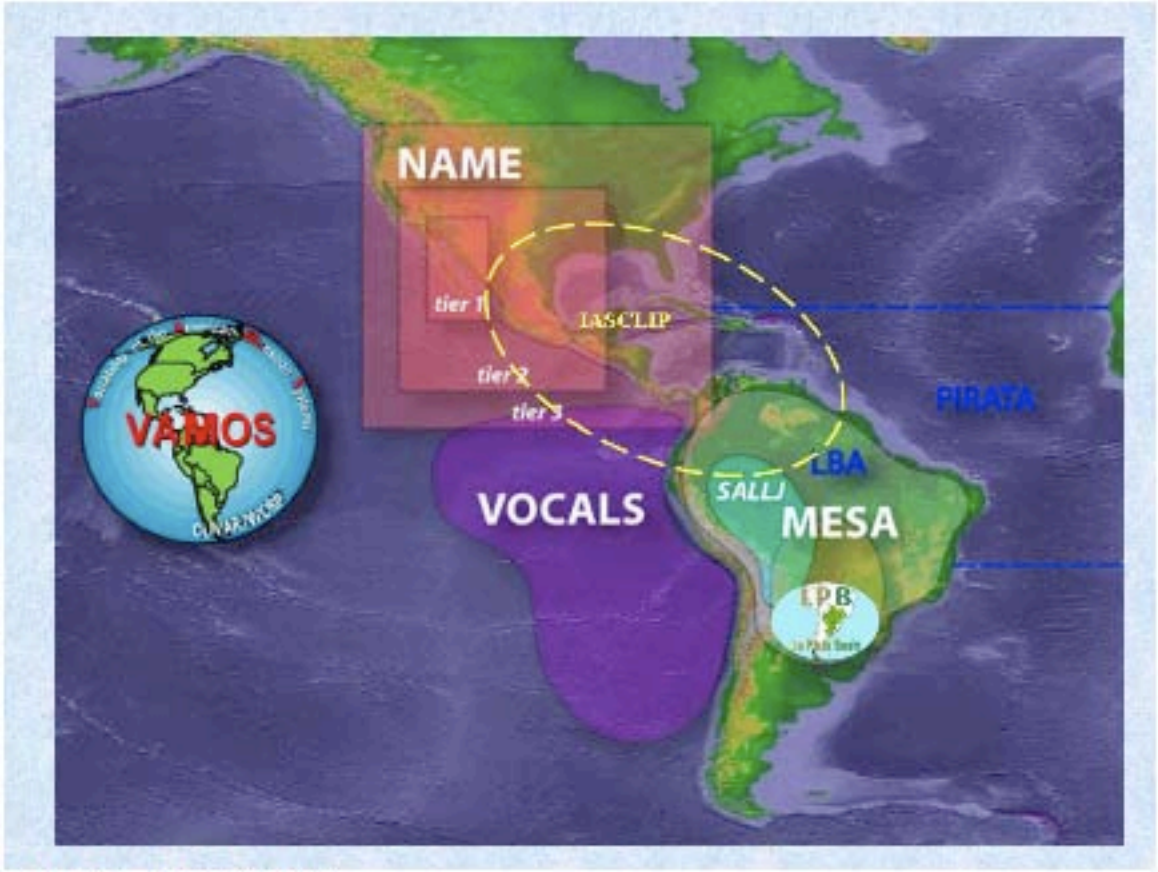
VAMOS Modeling and Data Assimilation For Improved Prediction:
A Multi Scale Approach

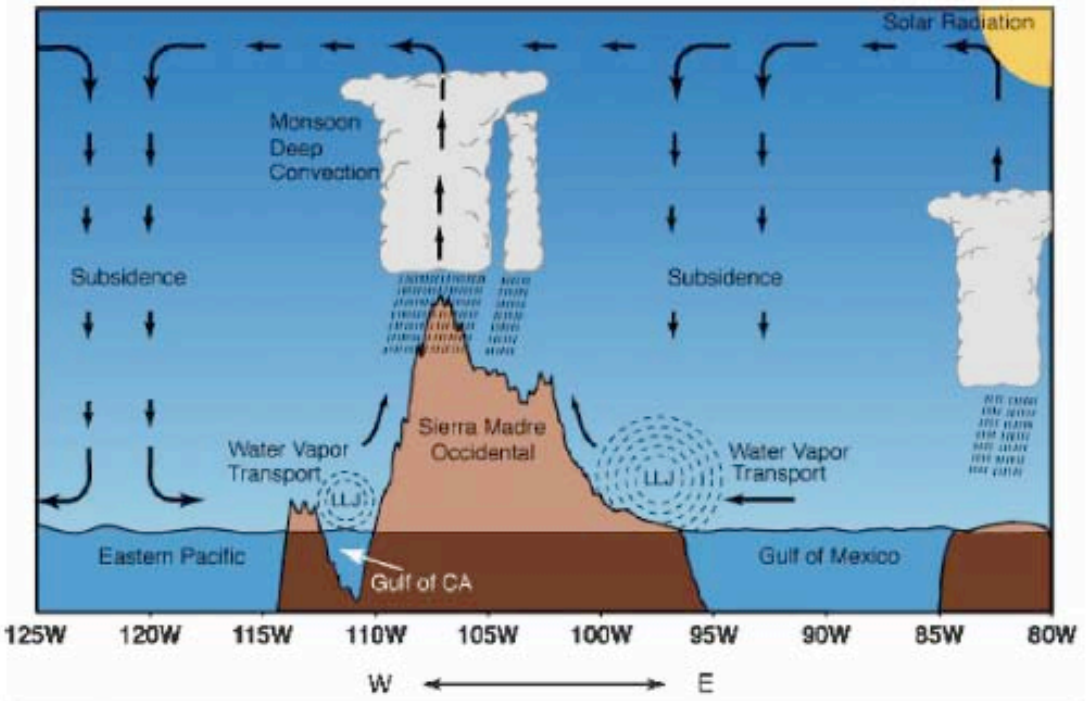


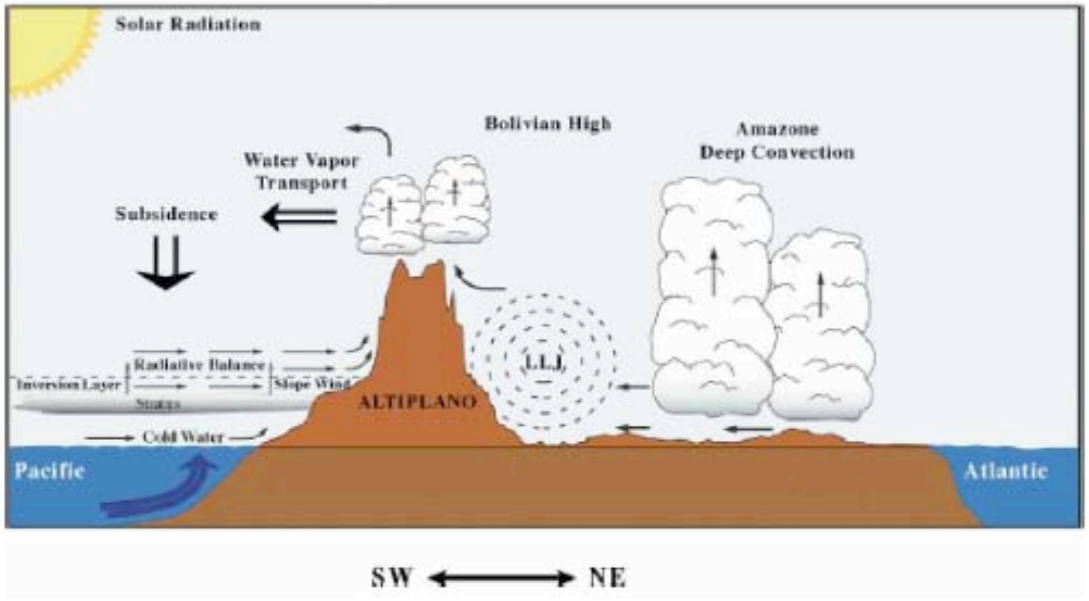
DRAFT – January 2008

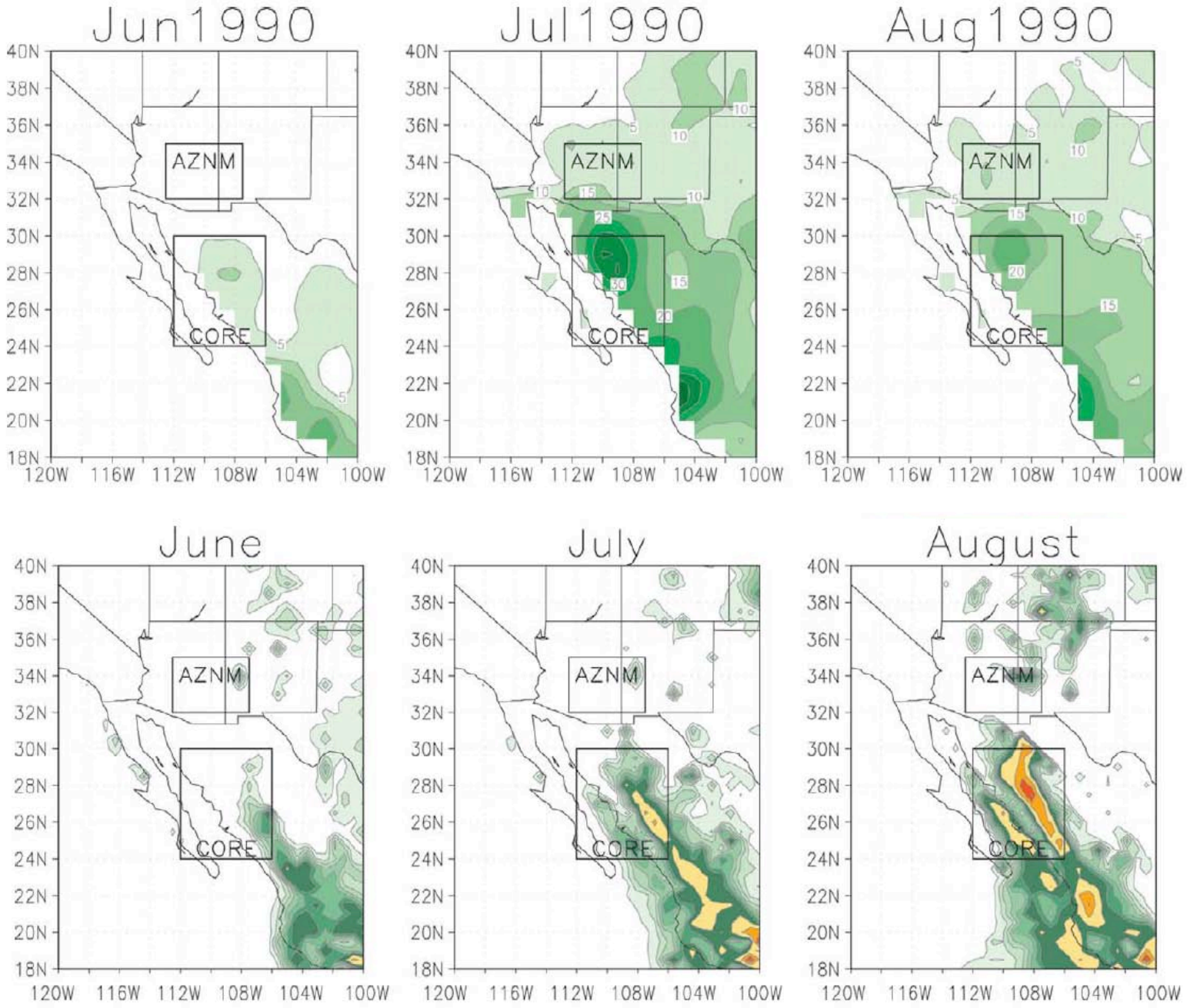
Extensive Contribution from the VAMOS Modeling Community

VAMOS Modeling Plan

- **Modeling Strategy: Multi-Scale Approach**
  - Simulating, Understanding and Predicting the Diurnal Cycle
  - Predicting the Pan-American Monsoon, Onset, Mature and Demise Stages
  - Modeling and Predicting SST Variability in the Pan-American Seas
  - Improving the Prediction of Droughts and Floods
- **Data Assimilation, Analysis and Assessing Observing Systems**
- **Prediction and Global-Scale Linkages**


Solar Radiation
Monsoon
Deep
Convection
Subsidence
Subsidence
Water Vapor
Transport
LLJ
Sierra Madre
Occidental
LLJ
Water Vapor
Transport
Eastern Pacific
Gulf of CA
Gulf of Mexico
125W
120W
115W
110W
105W
100W
95W
90W
85W
80W
W
E

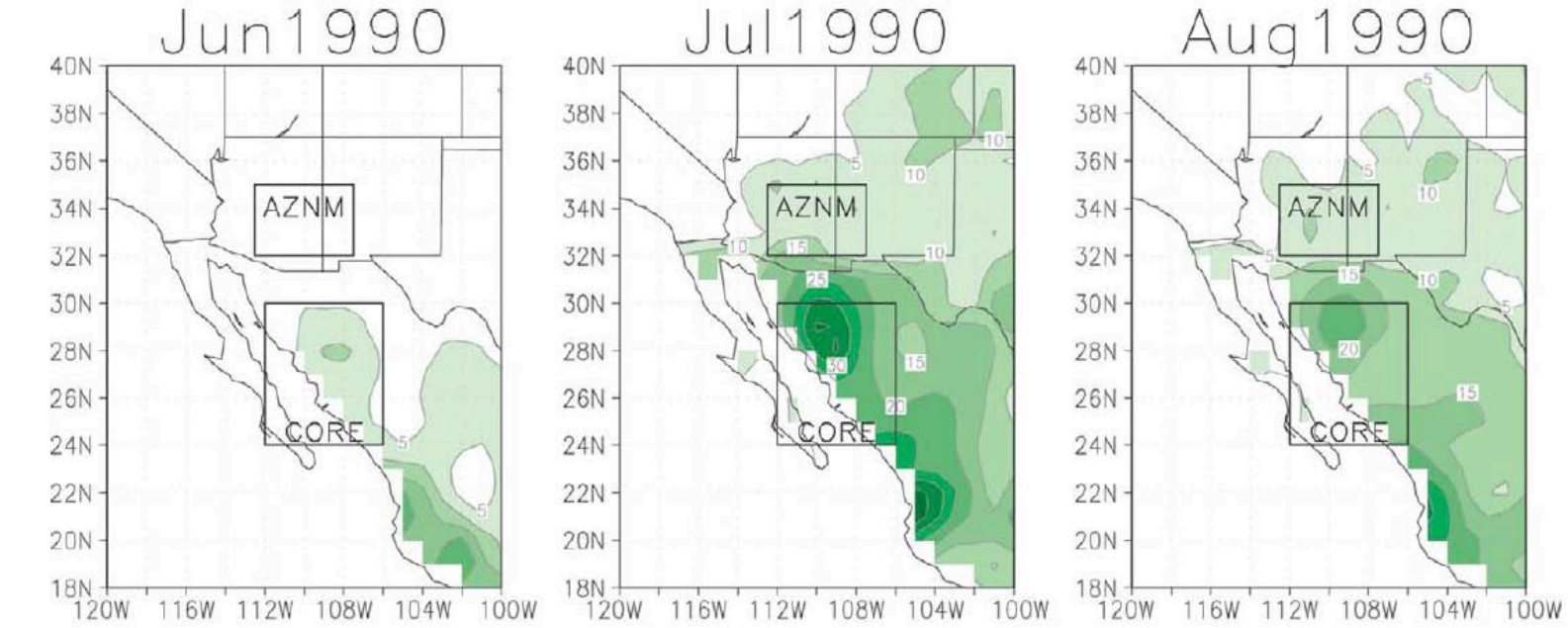

Solar Radiation
Bolivian High
Amazone
Deep Convection
Water Vapor
Transport
Subsidence
Radiative Balance
Inversion Layer
Slope Wind
Stratus
LLJ
ALTIPLANO
Cold Water
Pacific
Atlantic
SW
NE



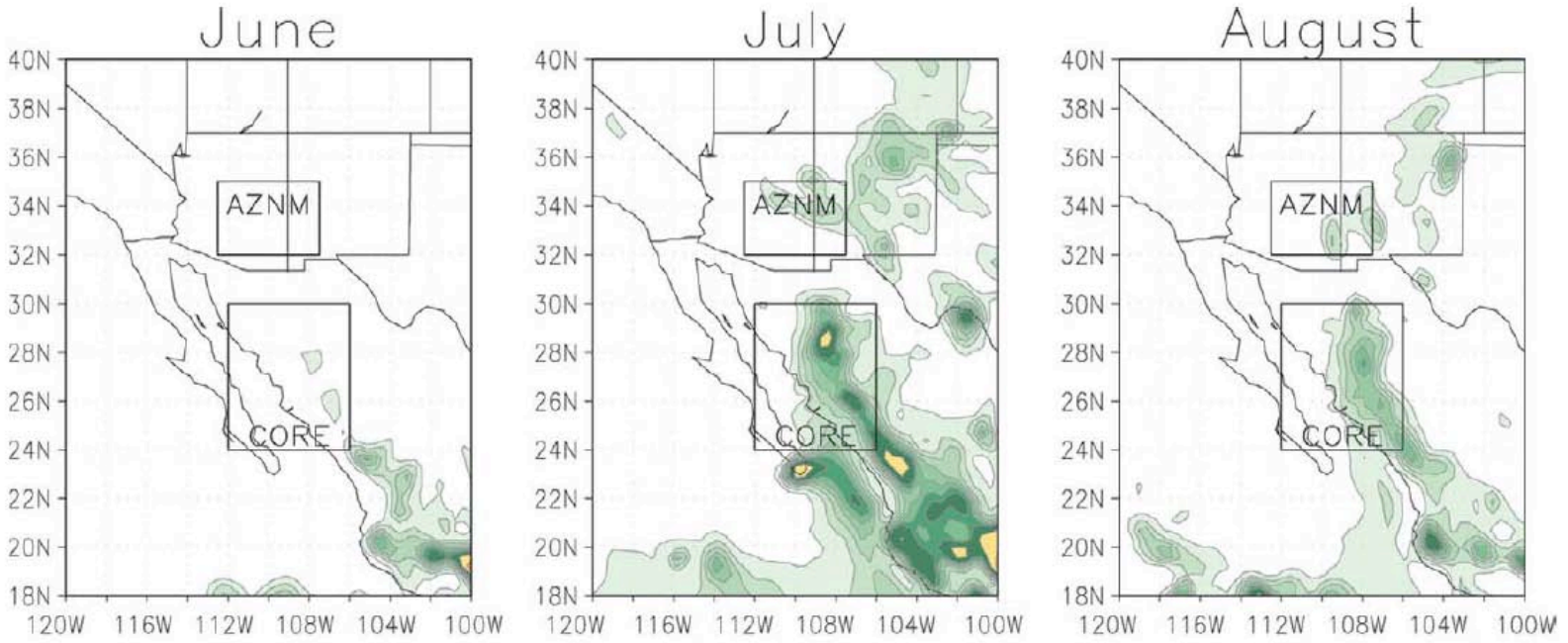
Obs

Regional Model

Gutzler et al. 2006

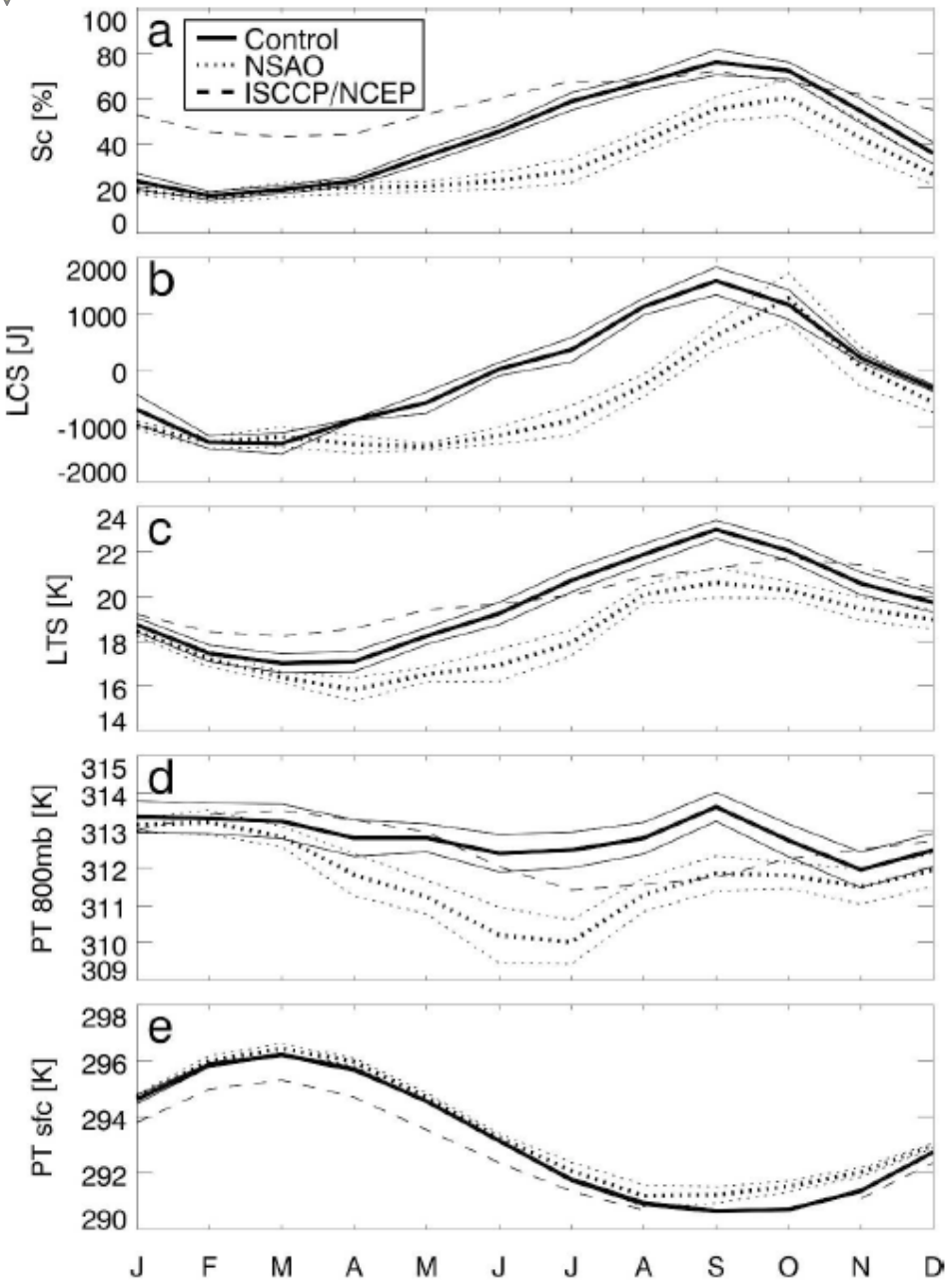


Obs

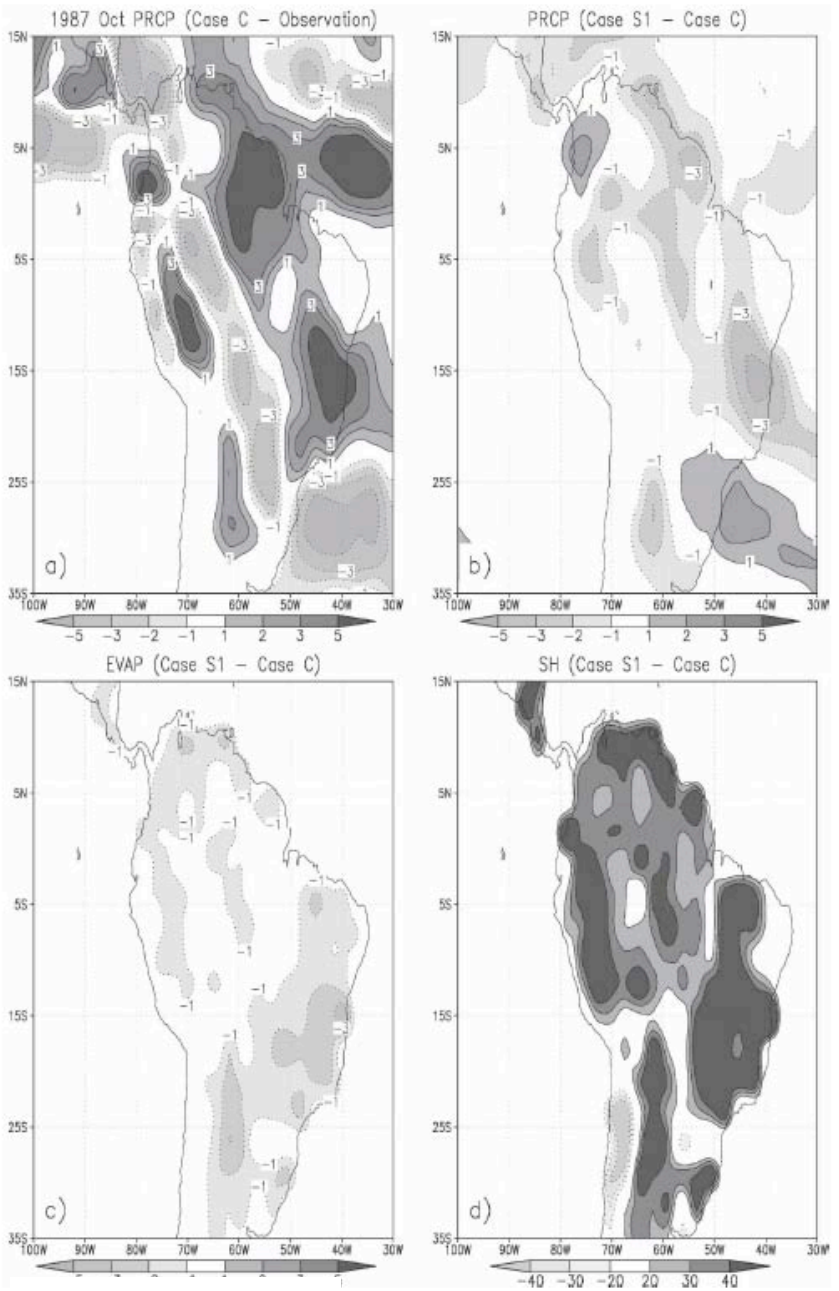


AGCM Model

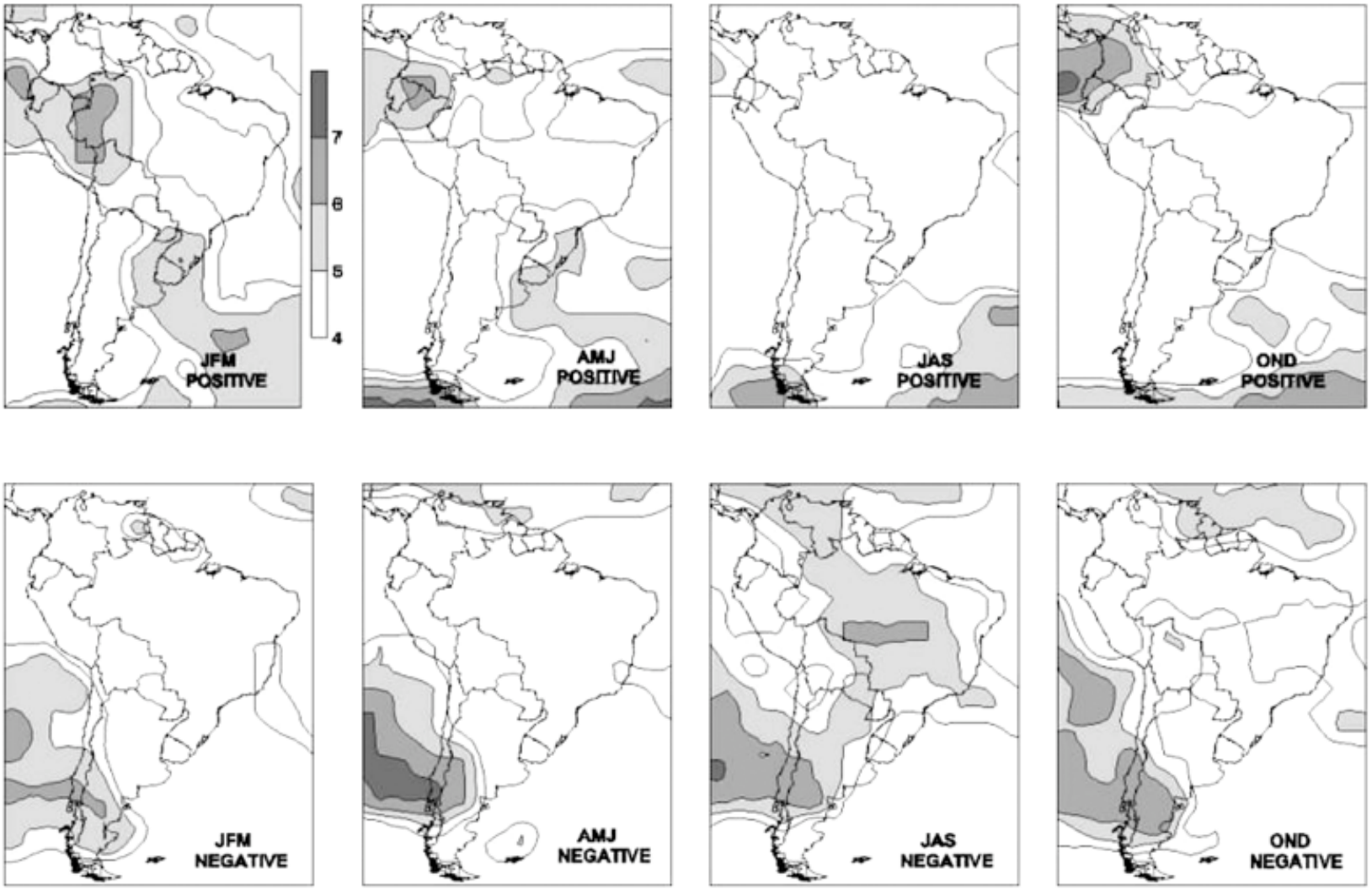
Gutzler et al. 2006



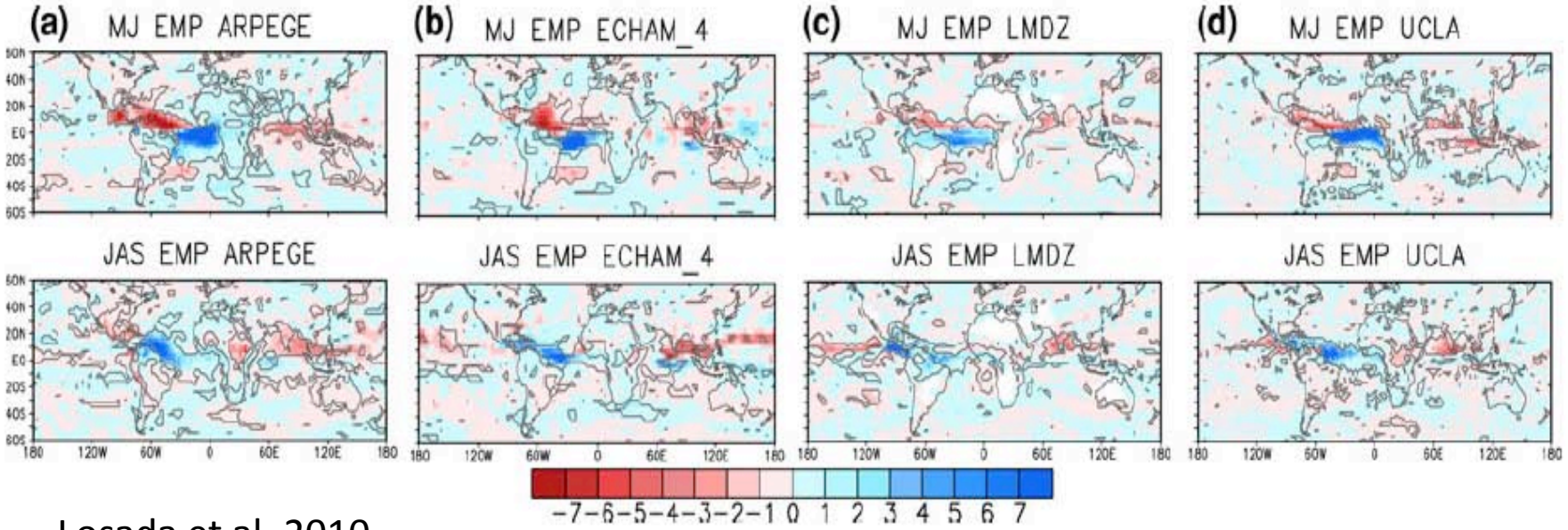
Richter and Mechoso 2006



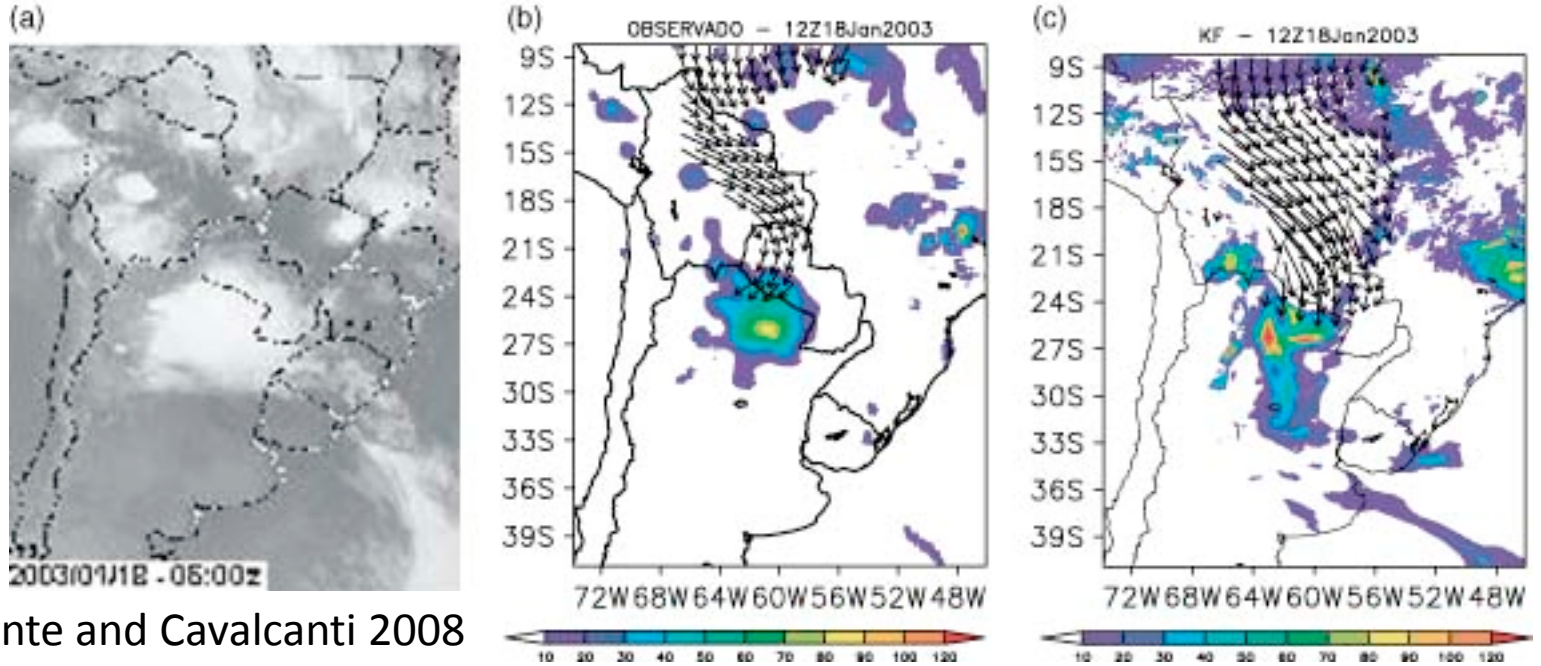
Xue et al. 2006



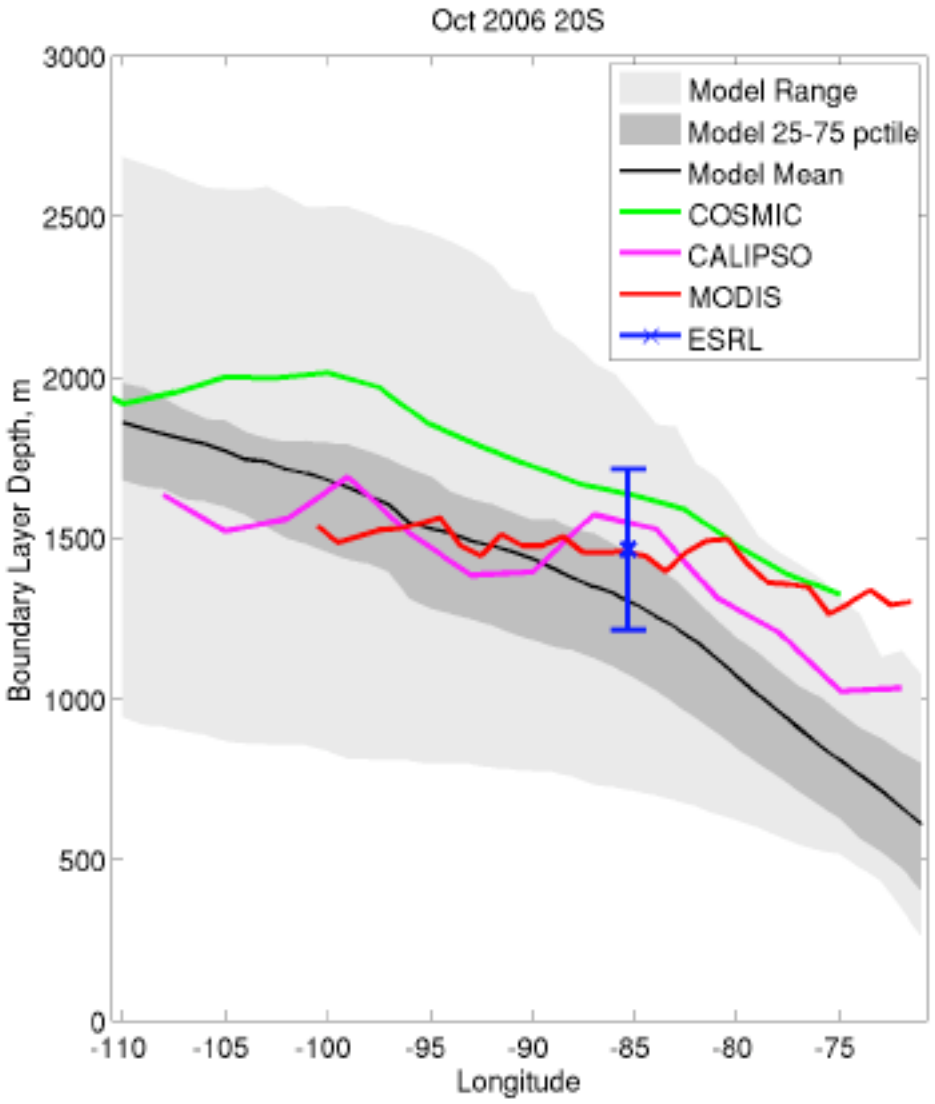
Vera et al. 2006

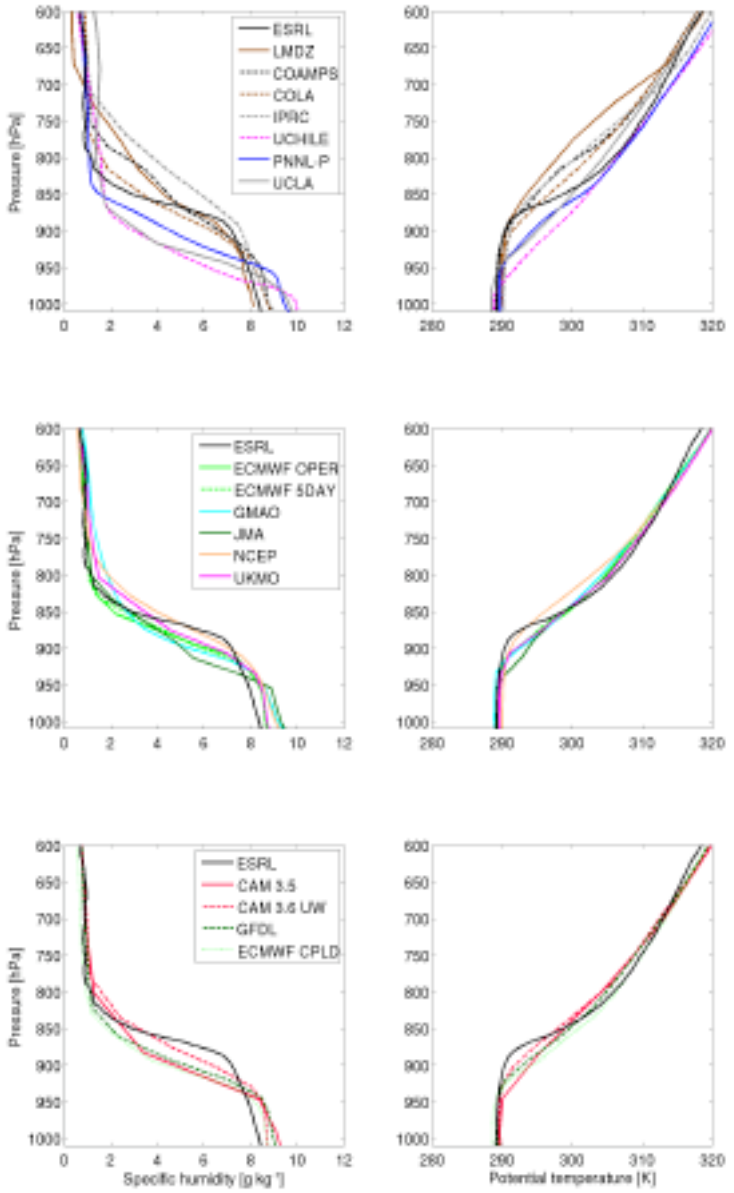


Losada et al. 2010

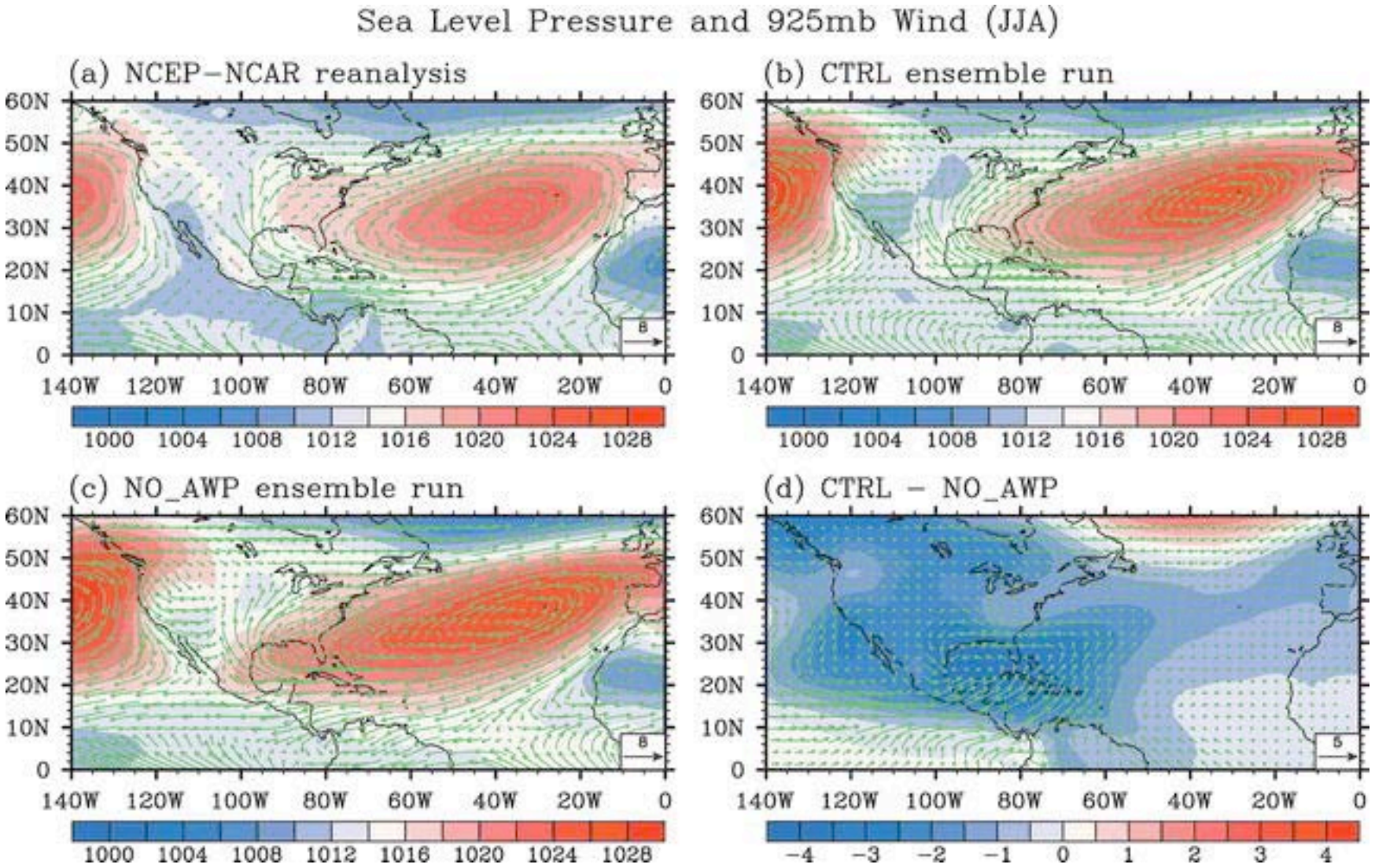


Rozante and Cavalcanti 2008

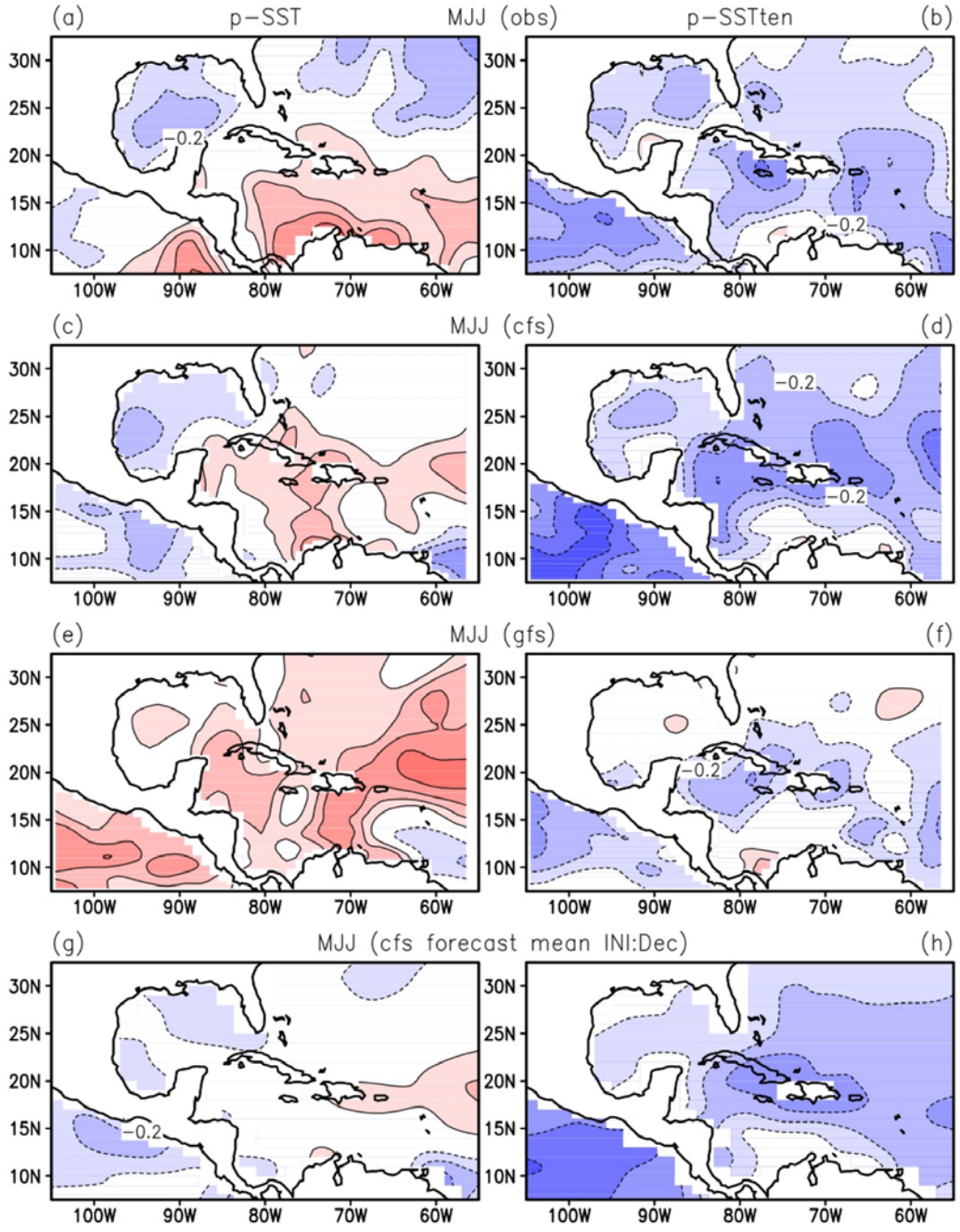

Oct 2006 20S
Model Range
Model 25-75 pctile
Model Mean
COSMIC
CALIPSO
MODIS
ESRL
Boundary Layer Depth, m
Longitude
3000
2500
2000
1500
1000
500
0
-110
-105
-100
-95
-90
-85
-80
-75


ESRL
LMDZ
COAMPS
COLA
IPRC
UCHILE
PNNL-P
UCLA
ESRL
ECMWF OPER
ECMWF 5DAY
GMAO
JMA
NCEP
UKMO
ESRL
CAM 3.5
CAM 3.6 UW
GFDL
ECMWF CPLD
Pressure [hPa]
Specific humidity [g kg⁻¹]
Potential temperature [K]

Pre-VOCA

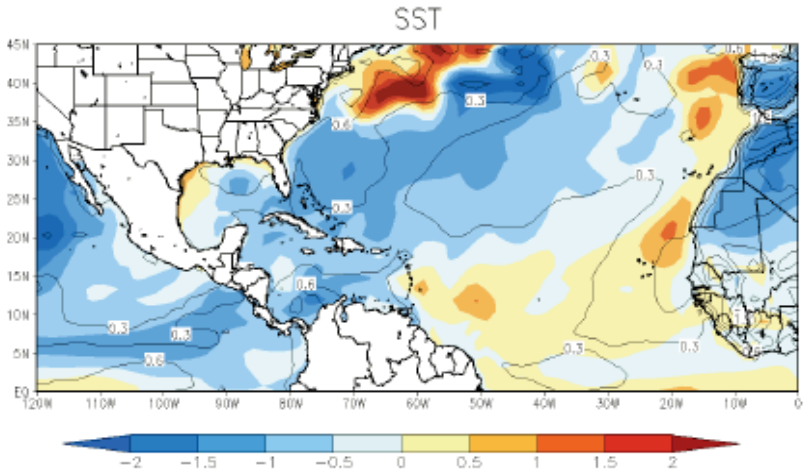


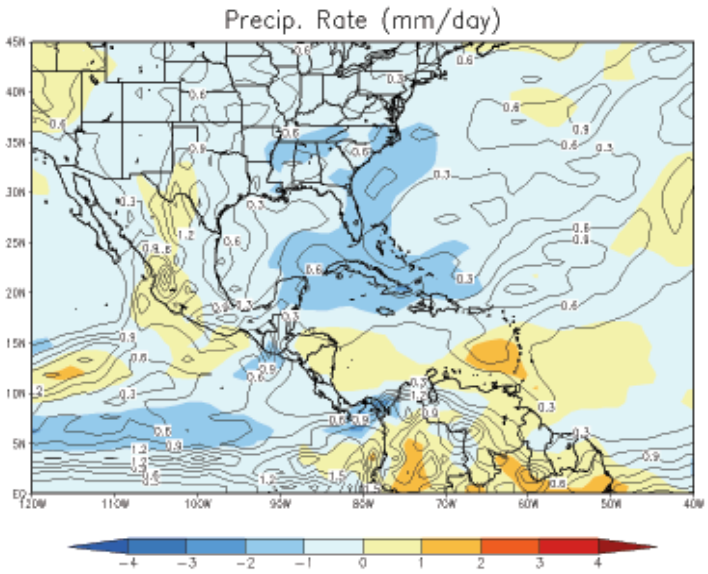
Wang et al. 2009

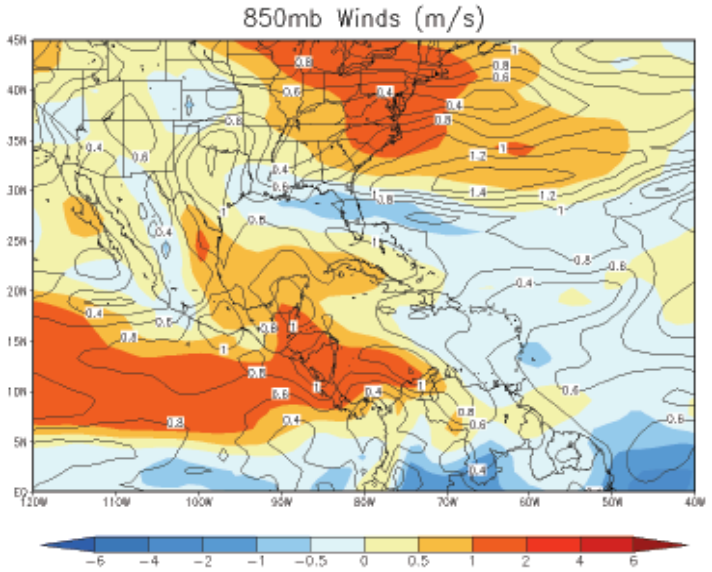

(a) p−SST MJJ (obs) p−SSTten (b)
(c) MJJ (cfs) (d)
(e) MJJ (gfs) (f)
(g) MJJ (cfs forecast mean INI:Dec) (h)
−0.2
30N
25N
20N
15N
10N
100W
90W
80W
70W
60W

Wu et al. 2009

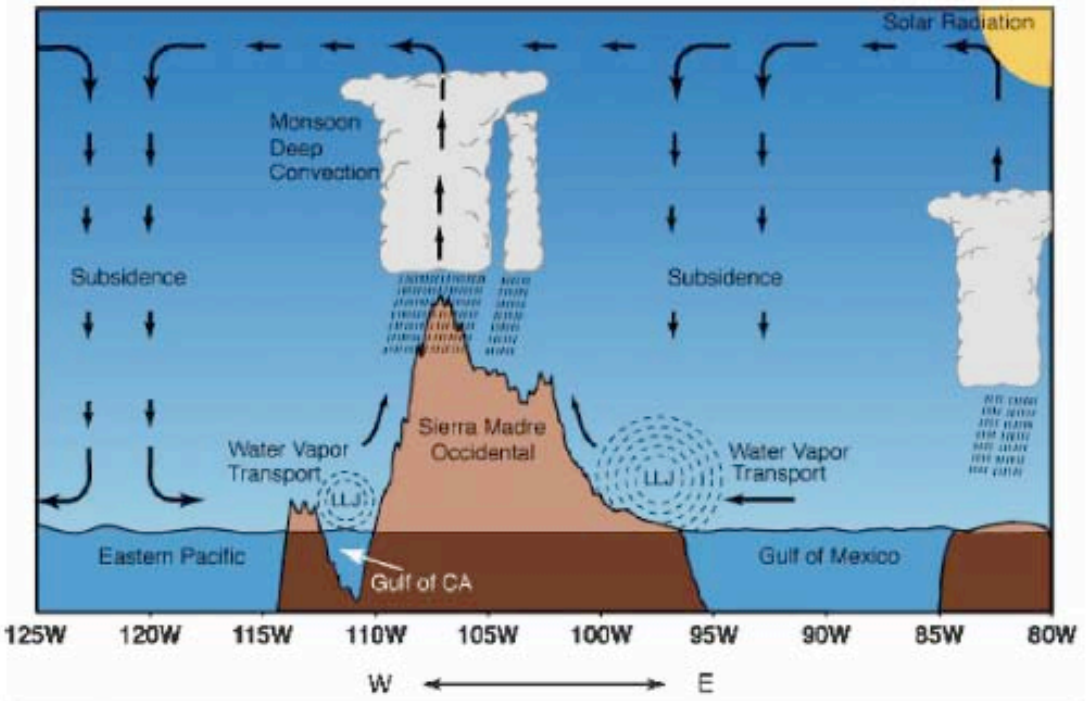
CCSM3.0 model forecasts: Anomalies for MAM2011 (RSMAS, University of Miami)







This is a coupled ocean-atmosphere forecast from CCSM3.0 initialized in January 2011. There are 4 ensemble members. The climatology is based on similar seasonal hindcasts for the period from 1981-1998. The contours show one standard deviation of the ensemble spread while the shaded values are the ensemble mean. There are 6 ensemble members.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Monsoon
Deep
Convection
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Subsidence
Water Vapor
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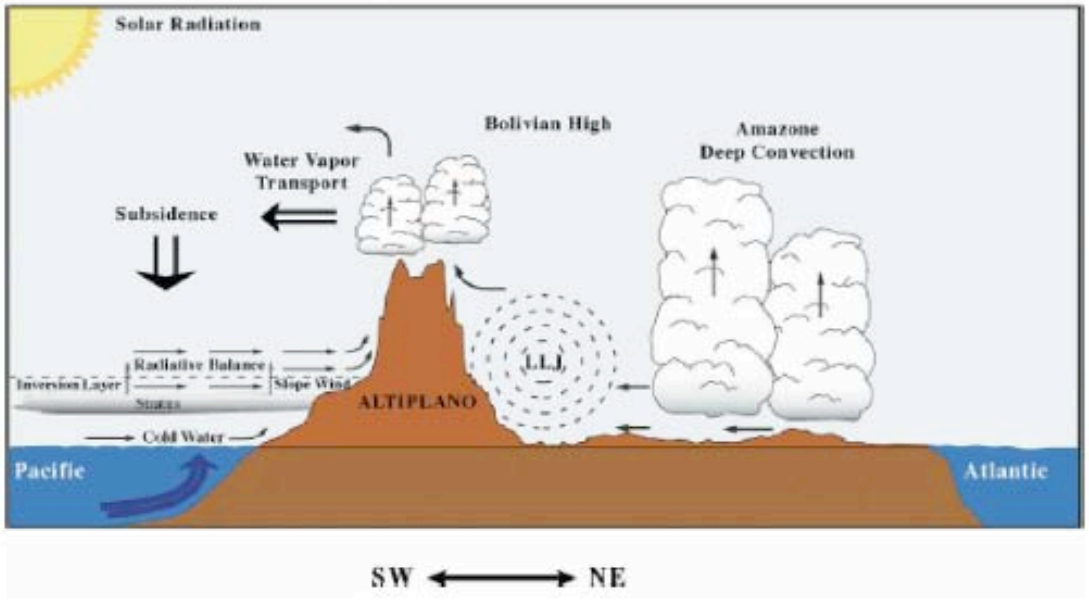
LLJ
Sierra Madre
Occidental
LLJ
Water Vapor
Transport
Eastern Pacific
Gulf of CA
Gulf of Mexico
125W
120W
115W
110W
105W
100W
95W
90W
85W
80W
W
E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Stratus
LLJ
ALTIPLANO
Cold Water
Pacific
Atlantic
SW
NE

Implementing the Modeling Plan

- **Leveraging**
  - WGSIP
  - VAMOS
  - CHFP, CMIP5, VOCALS, IASCLIP, NAME, MESA, LPB, CLARIS, CORDEX …
- **How To Coordinate Ongoing Activities into a Coherent Narrative?**
- **Enabling/Facilitating Collaborative Science?**
  - Exchange of Ideas

VAMOS Modeling Survey: Is Coordination Needed?

- **Current Activities:**
  - Key Results – Promote VAMOS
  - Model Developments
  - Who to Survey?
- **Pressing Scientific Questions**
- **Pressing Needs**
  - Data? Field Campaigns? Workshops? Coordinated Modeling Activities?