

NAMAP2

Integrating modeling and field activities in the North American Monsoon Experiment

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**... and participating modelers, many funded
on various NAME projects**



NAMAP2: simulations of 2004 NAME EOP now beginning its analysis phase

- *Link to model development research*
 - NAMAP2 is a component of the **NAME CPT effort**
 - special focus on simulating the **diurnal cycle (especially precip)**
 - NAMAP2 should take advantage of **enhanced observations** of precip, low-level wind, and surface fluxes
- *Participation is open*
- *Protocols developed in 2005 with participant input*
- *Common analysis will be carried out at UNM and NCEP*
 - as was done in NAMAP



NAMAP2: protocols

Simulation Period	15 May-30 September 2004
Domain of Interest	15°N-45°N 125°W-75°W
Lateral Boundary Conditions (for regional models)	NOAA CDAS2 (to be supplied)
Surface Boundary Conditions/ oceanic	Multiple-Platform-Merged Analysis (to be supplied; see description below)
Surface Boundary Conditions/ continental	Chosen by each modeling group

[from NAMAP2 web page at JOSS]

- possible interest in repeating this for 2005 season
- new in situ/satellite merged SST analysis (P. Xie)
- **two** sets of model output to be analyzed

NAMAP2: output archive

a) For spatial analysis:

Archive lat-lon fields covering the NAMAP2 domain every 3 hours (8/day) during the simulation period.

b) For high-resolution temporal analysis:

Archive "MOLTS"-style time series (at least hourly in time and full vertical resolution). We will consider surface fluxes and profiles of humidity, T , u , v , w , p , resolved and convective precipitation, cloud fraction, radiation, and turbulence at model grid points corresponding to the following NAME sounding sites:

site	lat	lon	site
NAME sounding sites			US, Cent Amer. raobs
Puerto Penasco (ISS 2)	31.18N	113.33W	Tucson (NWS)
Bahia Kino (ISS 3)	28.81N	111.93W	Las Vegas (NWS)
Los Mochis (ISS 4)	25.41N	109.05W	San Diego (NWS)
Loreto (GLASS)	26.01N	111.21W	Flagstaff (NWS)
RV Altair (CSU)	21.49N	106.07W	Albuquerque (NWS)
SMN sites			El Paso (NWS)
Empalme	27.95N	110.77W	Amarillo (NWS)
Mazatlan	23.20N	106.42W	Midland (NWS)
Chihuahua	28.63N	106.08W	Del Rio (NWS)
Torreon	25.53N	103.45W	Yuma (ARMY)
Monterrey	25.87N	100.23W	Phoenix (SRP)
Zacatecas/Guadalupe	22.75N	102.51W	Belize City, Belize
La Paz	24.17N	110.30W	
Mexico City	19.4N	99.2W	

[from NAMAP2 web page at JOSS]

NAMAP2: participants

Regional:

U MD / E. Berbery
U NM / E. Ritchie
Duke U / S. Roy
NOAA EMC / R. Yang
SIO / A Nunes et al.
IMTA / R Lobato

Global:

NOAA CPC / J. Schemm
NASA / M-I Lee, M. Bosilovich
NCAR / D. Lawrence
SIO / C Collier

→ a larger group than worked on NAMAP

NAMAP2

issues to consider in Mexico City (VPM8)

- *Establish baseline simulations of the 2004 summer monsoon season*
 - Period to simulate: **June-Sept 2004** (*special IOP runs later?*)
 - Extend analysis to examine **submonthly transient variability**
 - Define **specific indices or subregions** to examine ... for example, metrics defined in **NAMAP Atlas**:
 - ... **monsoon onset date**
 - ... **afternoon convective peak**
 - ... **amount of nocturnal precip**
 - ... **structure of Gulf of Calif LLJ**
 - ... **time-averaged surface fluxes (pre and post onset)**
 - **We seek an improved SST analysis along the Pacific coast, including the Sea of Cortés [*now done!*]**

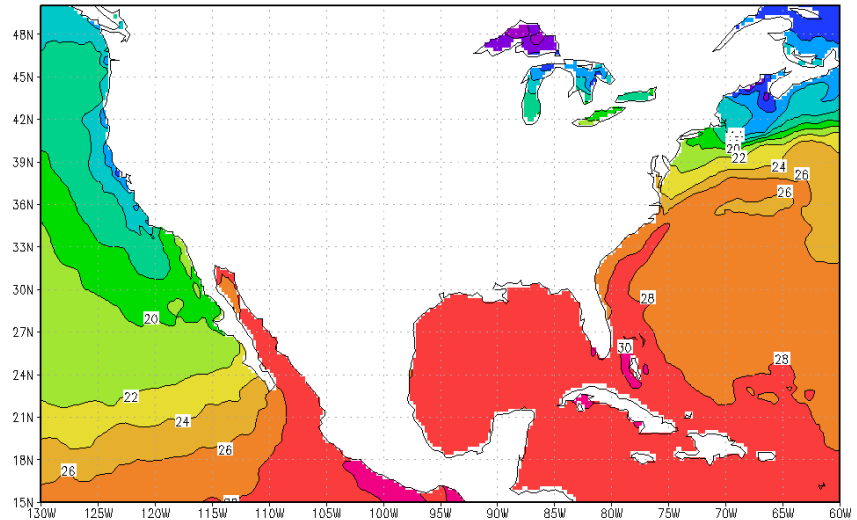
Observed SST prescription for NAMAP2

High resolution SST analyses ([Xie and Wang, 2006](#)) for the NAMAP2 project.

- Composed of two data sets:

a) A *3-hourly* Multi-Platform-Merged [MPM] SST analysis on a 0.25 deg lat/lon grid *over the NAME domain* [180-30W;30S-60N]; and

b) A *daily* SST analysis on a 0.25 deg lat/lon grid over the *entire globe* by taking the MPM over its regional domain and using the Reynolds OI SST elsewhere.



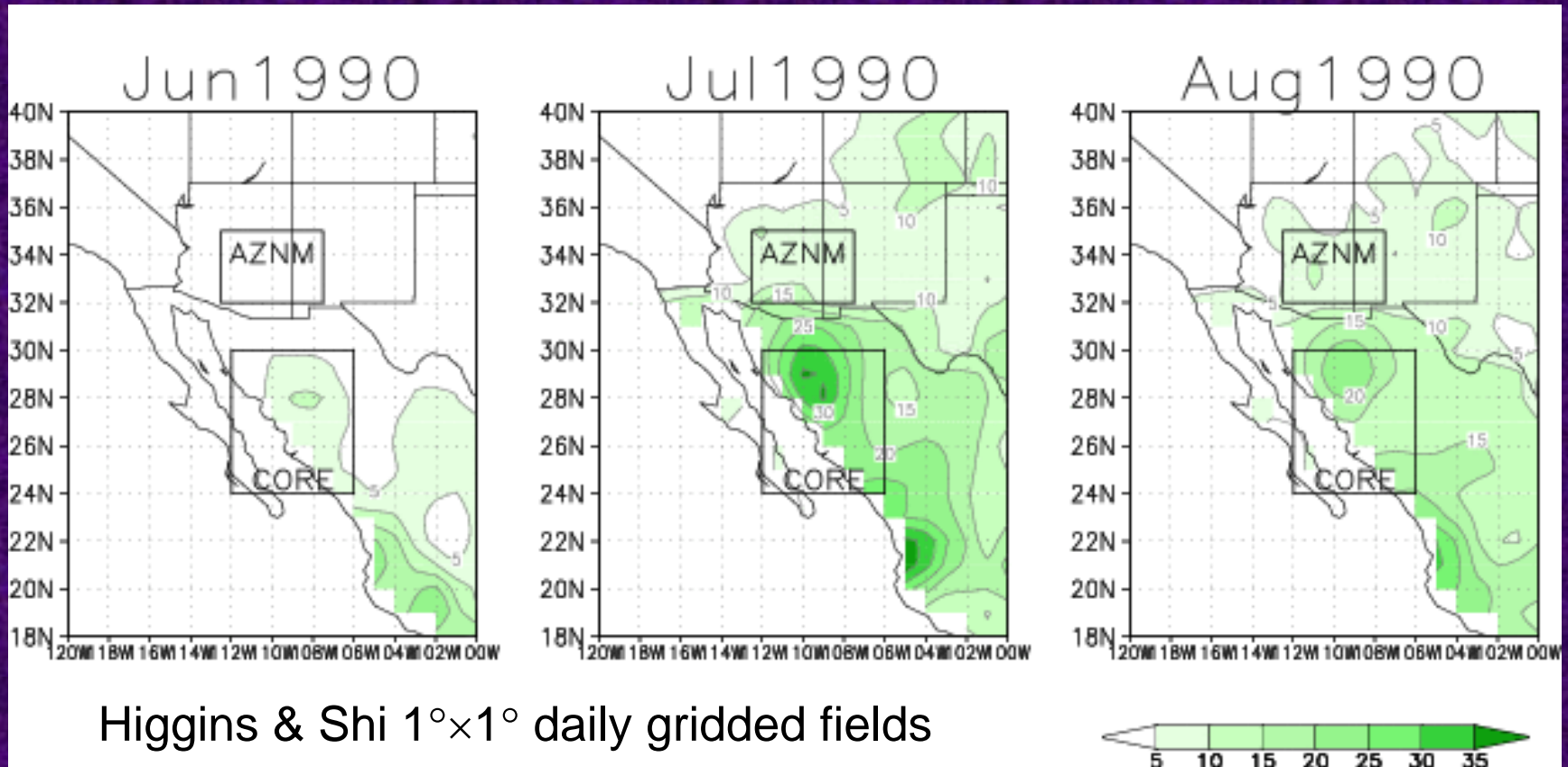
Data URL: <ftp://ftpprd.ncep.noaa.gov/pub/precip/SST/>

For GEOS-5,

- Daily SST interpolated onto model grids (half-degree)
- Weekly sea ice fraction (from Reynolds OISST)

slide courtesy
M-I Lee

NAMAP: 1990 precipitation observations



- Jun: dry north of 30°N
- Jul: month of maximum precipitation
- Aug: somewhat diminished continuation of monsoon



NAMAP2: 2004 precipitation observations

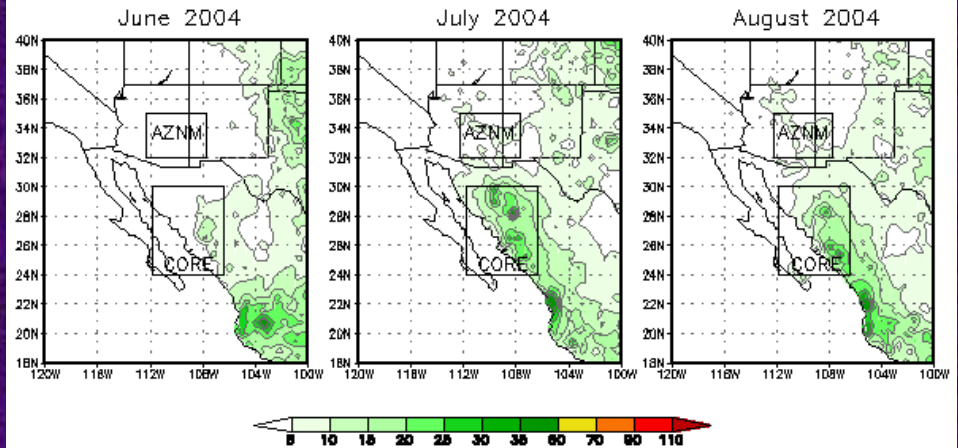
Summer 2004 was not as wet as summer 1990

We'll compare uncertainty in observations to the envelope of uncertainty expressed in models (CMORPH >> URD)

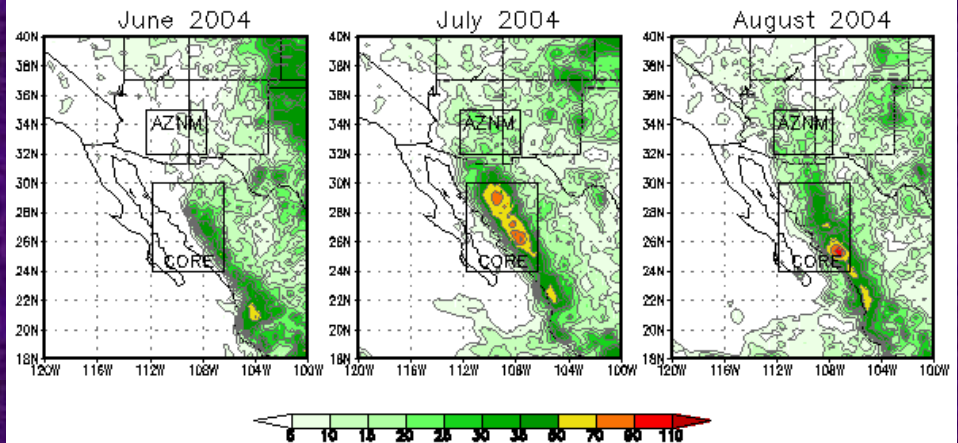


2004 Total Monthly Precipitation Maps [cm], Tier 1

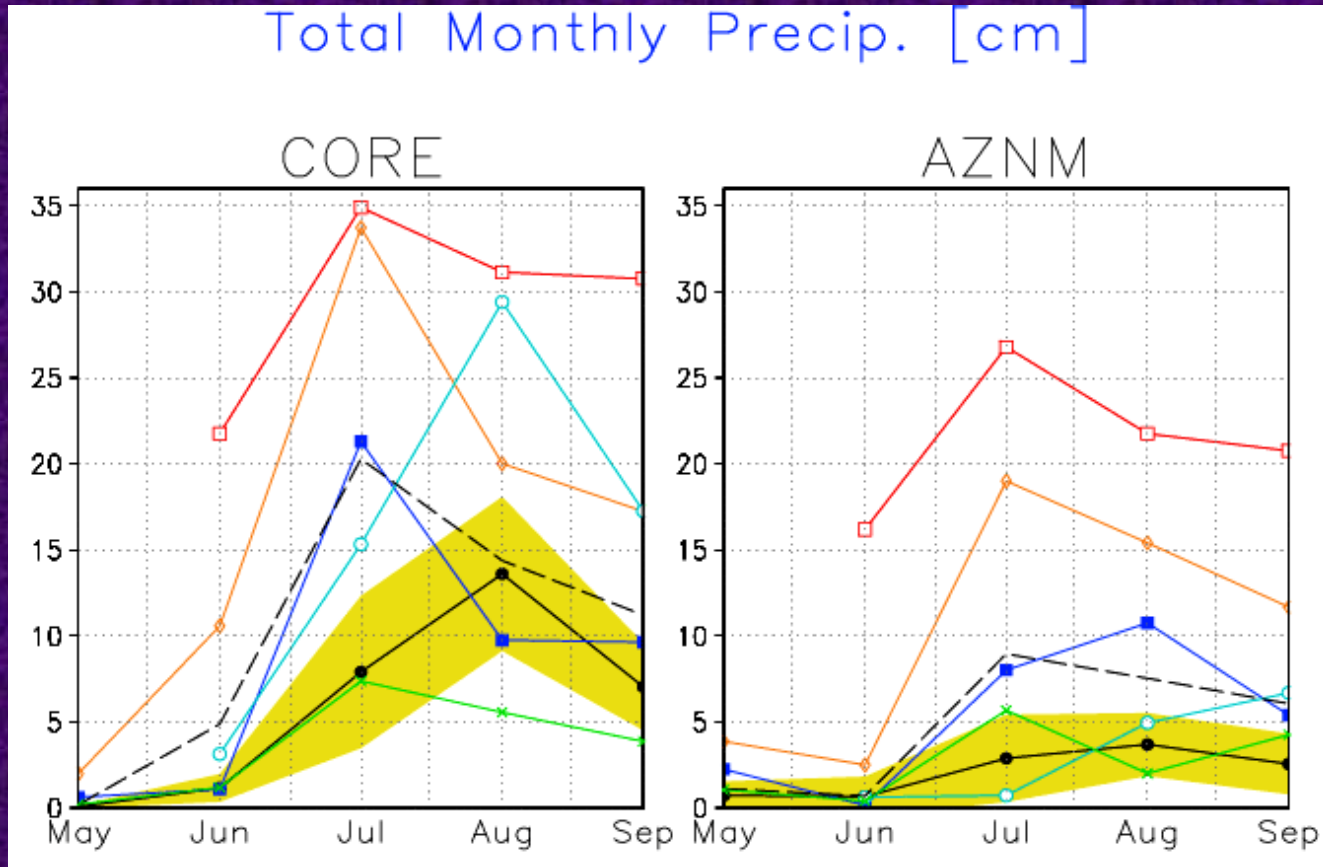
0.25x0.25 NCEP "Unified" Raingauge Dataset (URD)



0.25x0.25 Hourly CMORPH



Seasonal cycle of precip: NAMAP (1990)

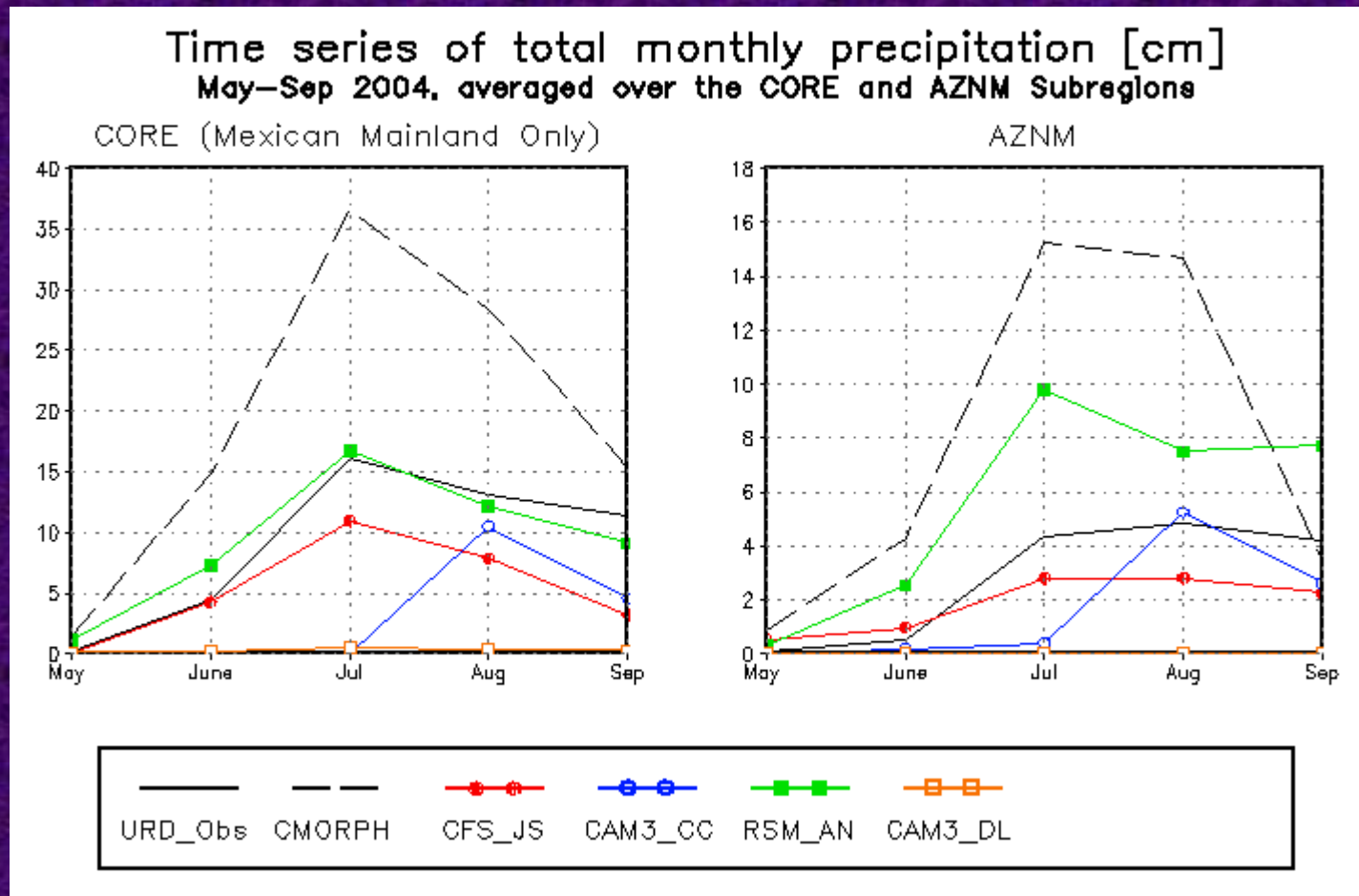


All models generate a summer (Jul or Aug) precip max in both averaging areas

Both global models initiate monsoon rainfall later in the season (Aug max instead of July)
... Sensitive to soil moisture?



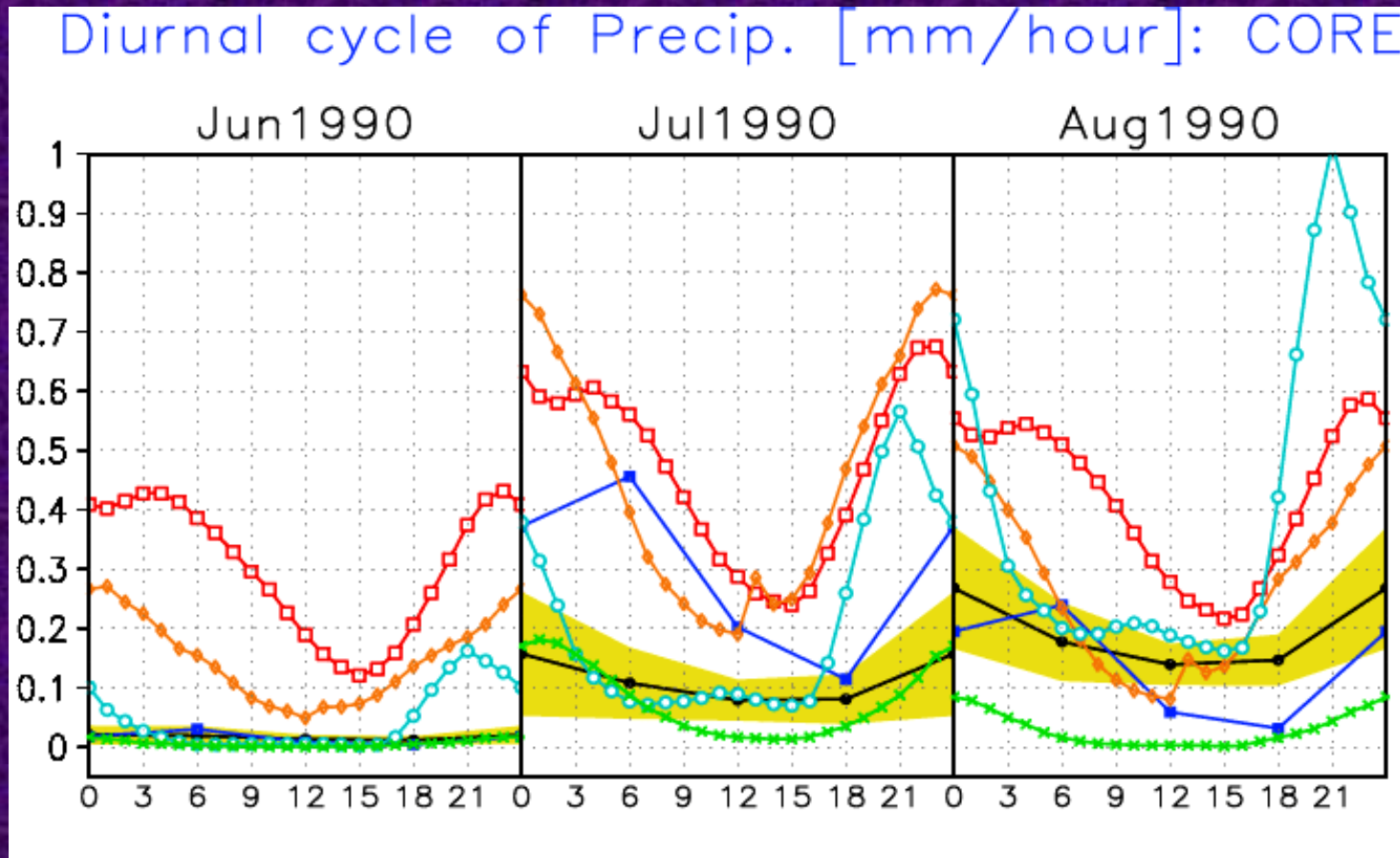
Seasonal cycle of precip: NAMAP2 (2004)



Note huge difference between
URD and CMORPH



Diurnal cycle of precip: NAMAP (1990)



- **No obs here! What is the “true” diurnal cycle?**
- All models show convective max between 21Z-04Z
- How much nocturnal rain should be falling?

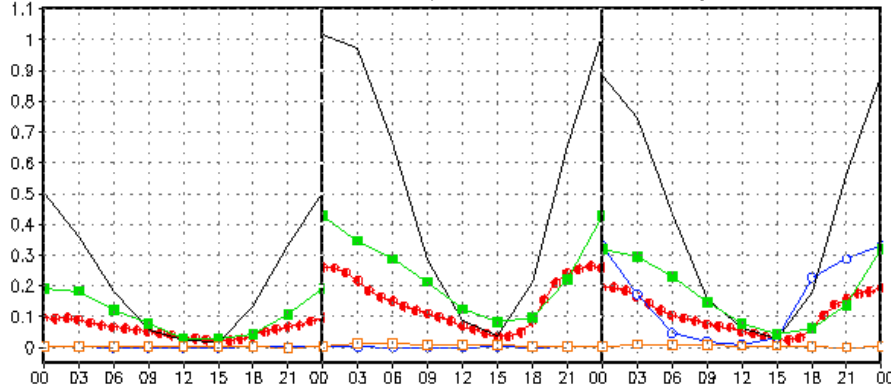


Diurnal cycle of precip: NAMAP2 (2004)

2004 Diurnal Cycle of Total Precipitation Rate [mm/hr]

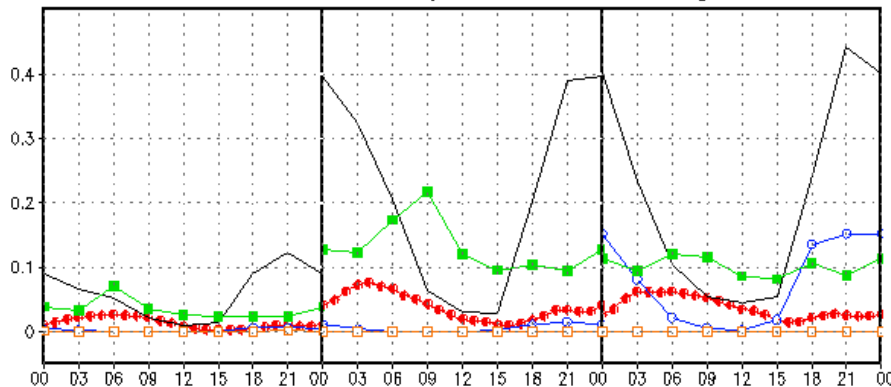
CORE Subregion (Mexican Mainland Only)

June 2004 July 2004 August 2004



AZNM Subregion

June 2004 July 2004 August 2004



— CMORPH_Obs ● CFS_JS ○ CAM3_CC ■ RSM_AN □ CAM3_DL

CMORPH estimate
far exceeds all model
estimates ... with a
very sharp diurnal peak
between 2100-0003Z



NAMAP2 timeline (Oct 2005)

Time Period	Event
Spring-Summer 2005	Solicit participation and develop NAMAP2 simulation protocols
Summer-Autumn 2005	Develop the prescribed global SST fields [activity at NOAA/CPC]
Autumn 2005	Individual modeling groups carry out NAMAP2 simulations
October 2005	Report on NAMAP2 progress at the Climate Diagnostics Workshop
Winter 2005/6	NAMAP2 analysis to be carried out at NOAA/CPC

This timeline has (inevitably) slipped since October 2005

- output is now being archived at NCEP
- analysis began two weeks ago; output still being collected
- **we'll work very hard on descriptive analysis now**
- **process-based analysis ongoing in parallel**

NAMAP / NAME CPT Analysis: Metrics for model development

- Improved simulation of **monsoon onset**, especially in global models
- Goals for improvement of **precipitation** (total amount and diurnal variability) and **surface flux** simulations, tied to improvements in ground truth to be achieved from NAME 2004 field observations
- Questions regarding the structure of **low-level jet** circulations and their importance for proper precipitation simulation



NAMAP Analysis: Some key points

- All models simulate a summer precip maximum; the two global models exhibit delayed monsoon onset (Aug instead of Jul)
- Precip diurnal cycle issues: magnitude of late-day convection, amount of nocturnal rainfall?
- Surface quantities (T, LH, SH fluxes) seem very poorly constrained; huge model differences (no validation data)
- Great Plains LLJ weakens after monsoon onset
- Low-level (slope?) jets occur -- but only weakly tied to NAME precip? Needs additional analysis, and close observation in 2004 field season

