# Moisture parameters of models and the North American Regional Reanalysis

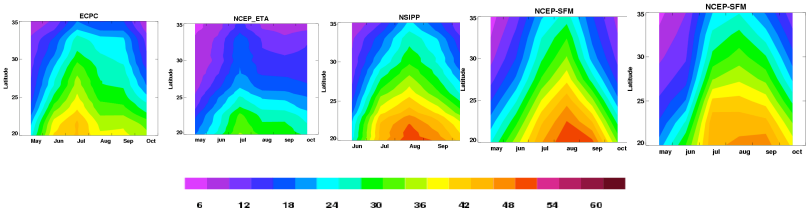
**David A. Salstein and Karen Cady-Pereira**

*Atmospheric and Environmental Research, Inc., Lexington, MA (salstein@aer.com)*

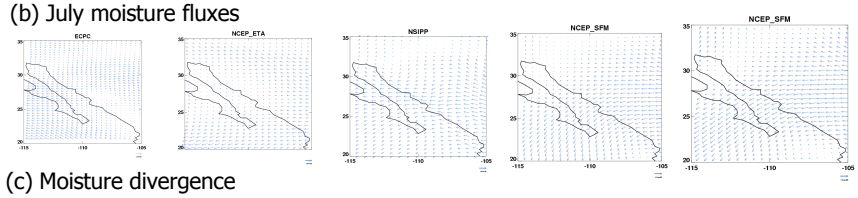
**ABSTRACT**. We analyzed a number of parameters including evaporation, precipitation, water vapor fluxes and divergence, and precipitable water for the warm seasons (May – Oct) of some focus years highlighted for studies of the North American Monsoon Region over the southwest US/ Mexico region. Various regional models that participated in the first NAMAP campaign were used, and budget differences were identified; these have a considerable spread. Also, comparison is made with similar parameters derived in the North American Regional Reanalysis (NARR. The NARR was used as well to note the characteristics of the latter year, and later will be used too to compare model results for 2004.

NAMAP-1 results (NAME Tier 1) - 1990 -- To show spread in atmospheric models, monthly values

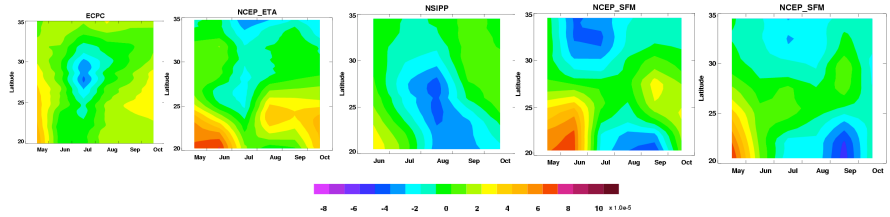
(a) Precipitable water



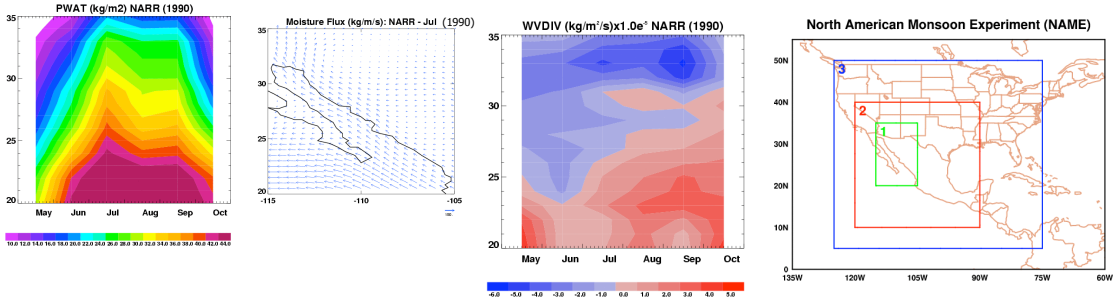

(b) July moisture fluxes



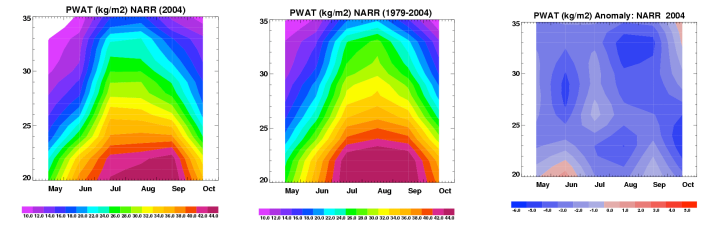

(c) Moisture divergence




Available NAMAP-1 models for 1990 are given above. For the different models' NAMAP simulations, we show the (1) vertically integrated moisture, (2) moisture fluxes for July, and (3) moisture divergence , averaged over longitudes in the NAME-1 region. Significant differences occur among models, as well as with the **North American Regional Reanalysis** results, below, for 1990. We plan analysis of 2004 model results from NAMAP-2 and comparisons with that year's NARR results.




2004 precipitable water and anomaly from long-term mean

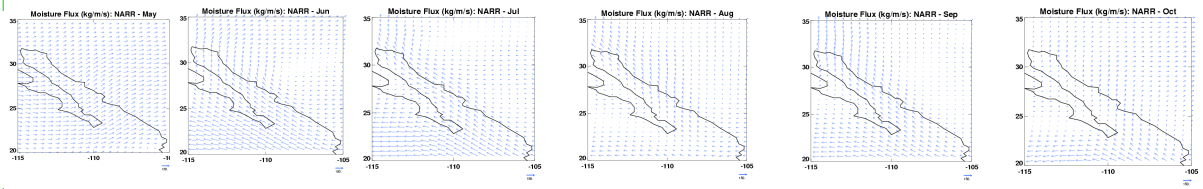



The warm-season in 2004 has less precipitable water than the long-term mean throughout most of the NAME region.

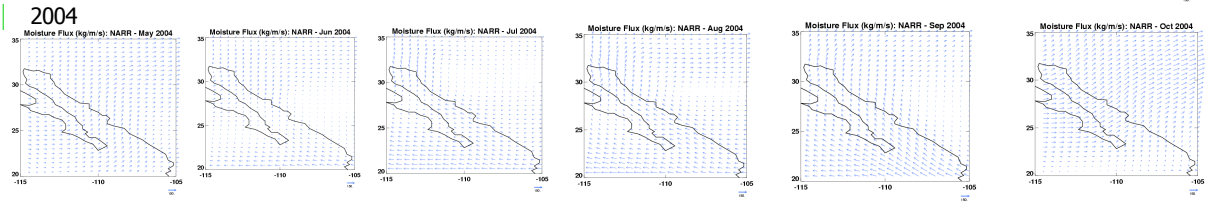
# North American Regional Reanalysis (NARR)

1990

*Monthly moisture fluxes*



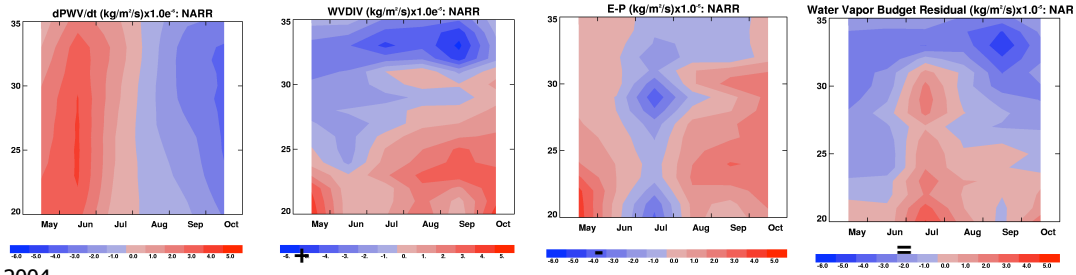

2004



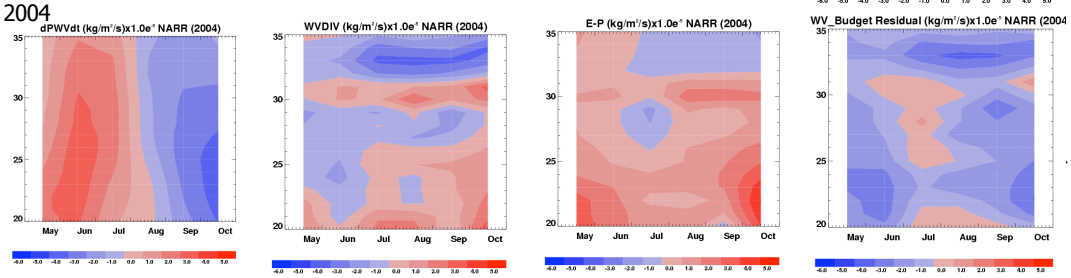

The origin of the moisture in the NAME area is generally from the Pacific, with fluxes directly along the Gulf of California (Sea of Cortez) in some months. The flow was weaker in 2004 than 1990 during June and July, but stronger in August.

1990

## Budget components for 1990 and 2004 in the NAME-1 region



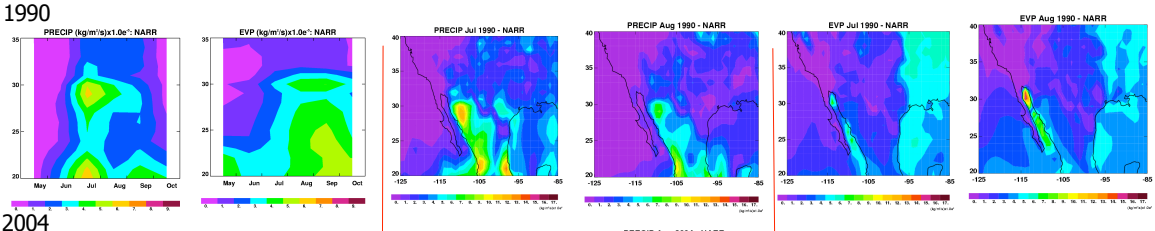

2004



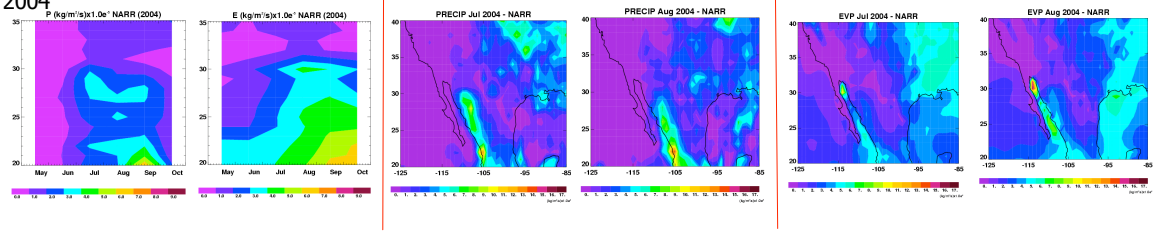

Residual exists from storage change, water vapor divergence, and evap-precip. The budget residual in is maximum in July 1990 across latitudes south of 32, and of other sign further north in Aug and Sep.

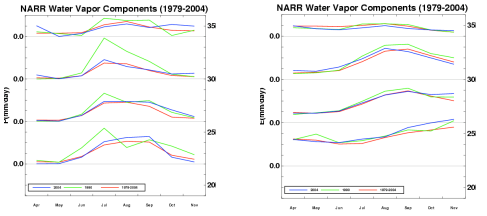
## Precipitation and evaporation components separately

1990




2004




PRECIP is maximized in July, in 1990, with a center as far north as 30 degrees, but lesser residual in 2004. EVP appears to be maximum in September and October in both years after the ground has absorbed the moisture. July PRECIP similar, but different magnitude in two years at its max in northern Mexico. August also has weaker magnitude of PRECIP there. EVP maximizes in northern Sea of Cortez, esp in August. Plots also show the high value of July 1990 PRECIP.