

# Additional NARCCAP Results

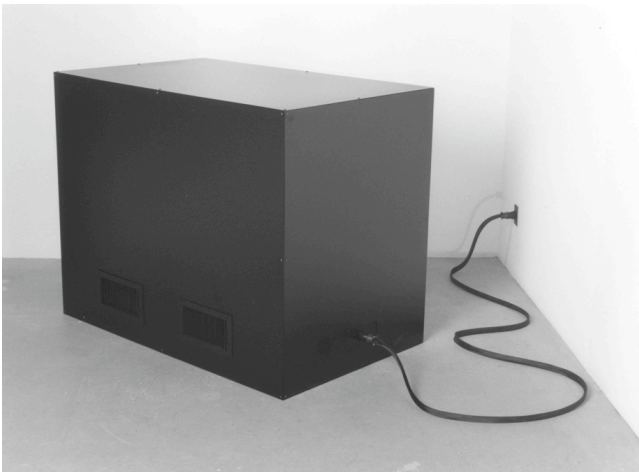
Melissa Bukovsky

NARCCAP



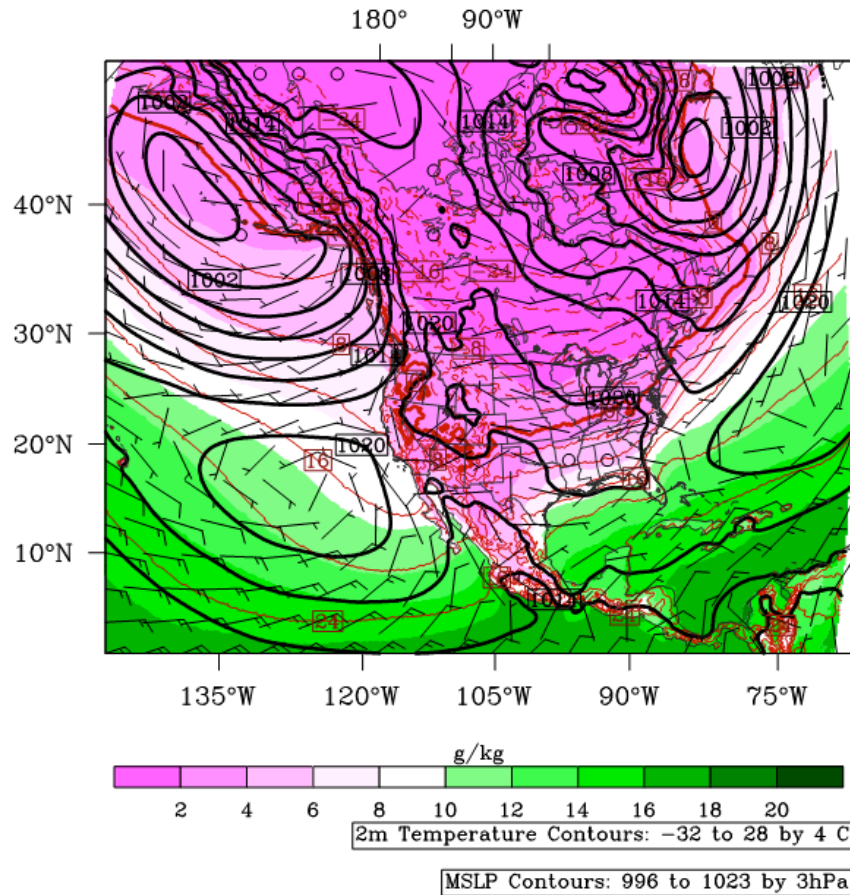
No Model Is Perfect

Some Models Are Useful

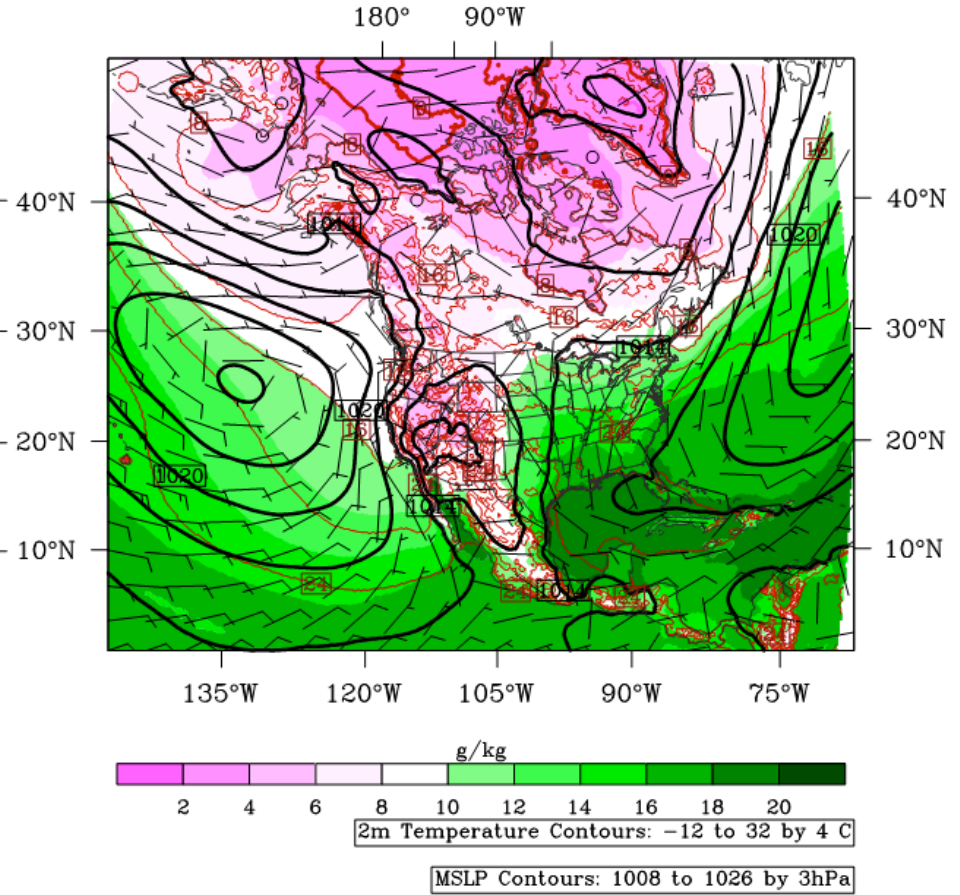


# Surface Overview

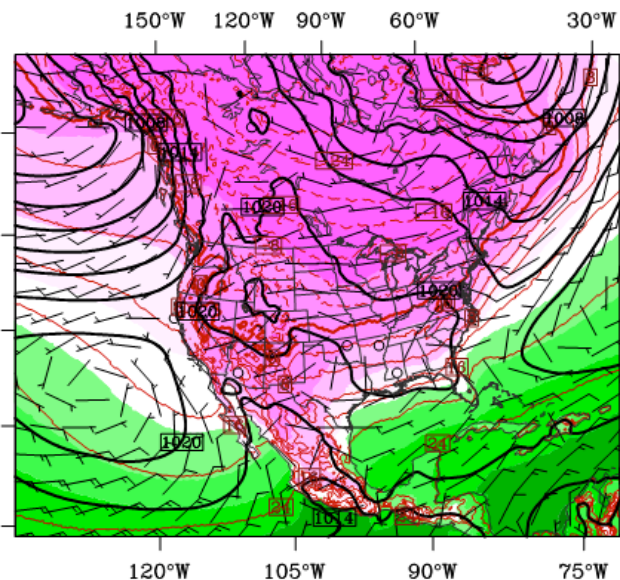
NARRMON DJF 1980 to 2000



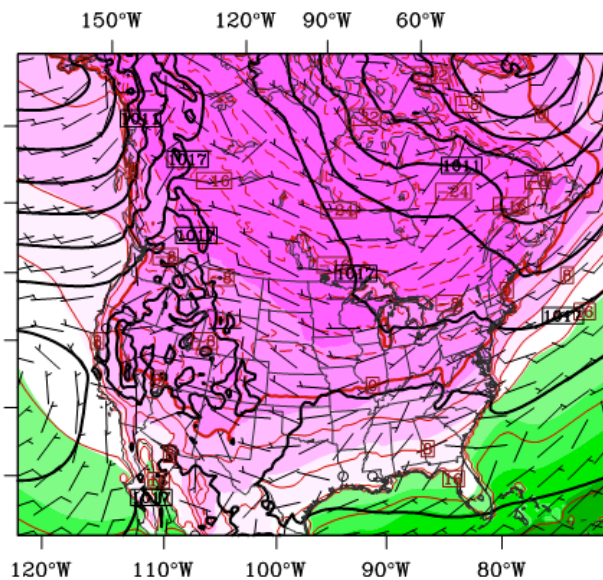
NARRMON JJA 1980 to 2000



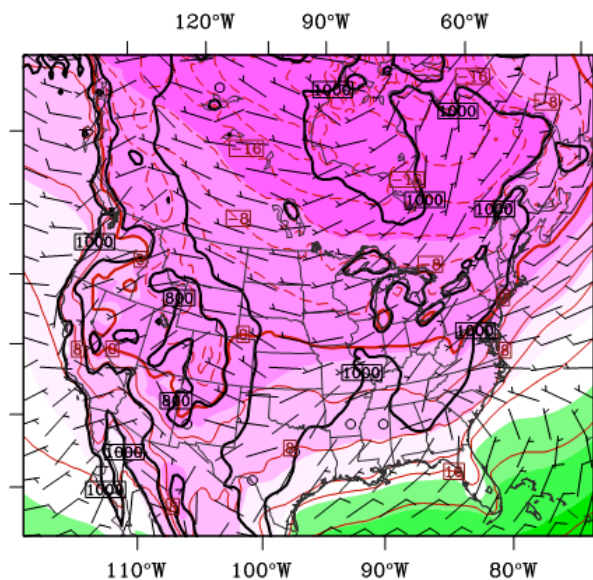
NARRMON DJF 1980 to 2000



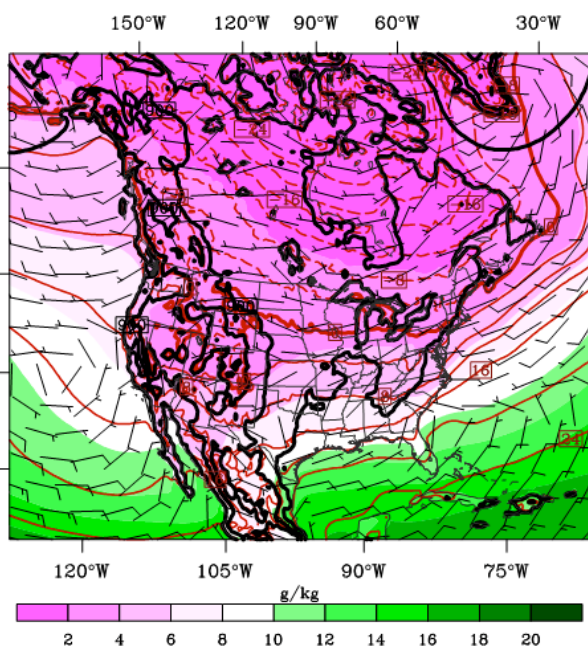
CRCM ncep DJF 1979 to 2004



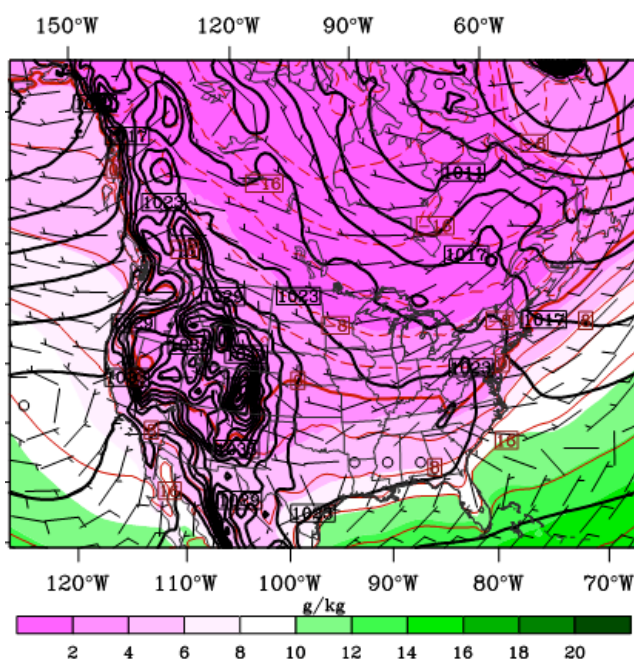
ECPC ncep DJF 1979 to 2004



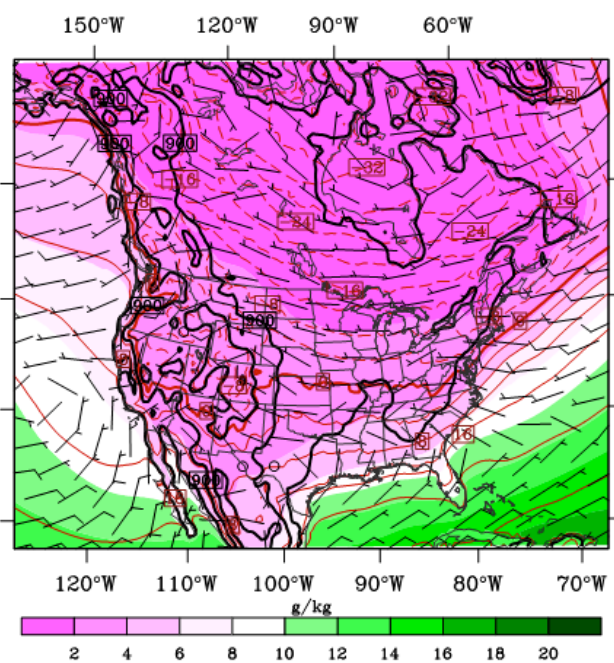
HRM3 ncep DJF 1979 to 2004



RCM3 ncep DJF 1979 to 2004

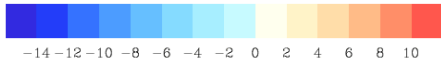
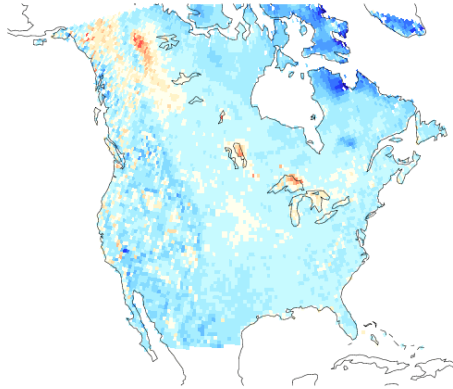


WRFP ncep DJF 1979 to 2004

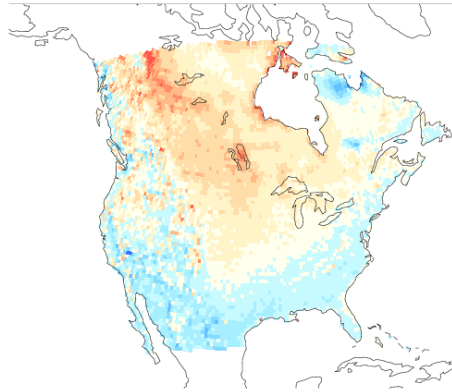


# NCEP Driven Winter Temperature Bias

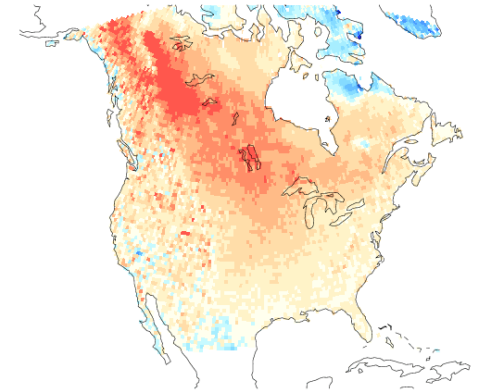
**CRCM-UDEL Winter Temps Regrided .5 degree**



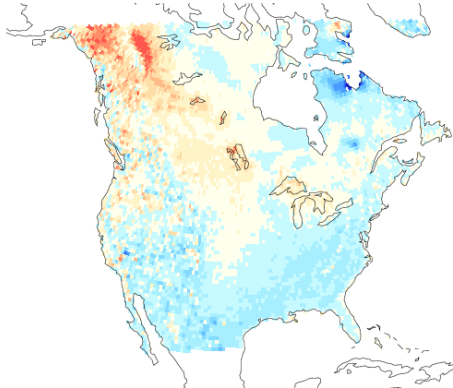
**ECPC-UDEL Winter Temps Regrided .5 degree**



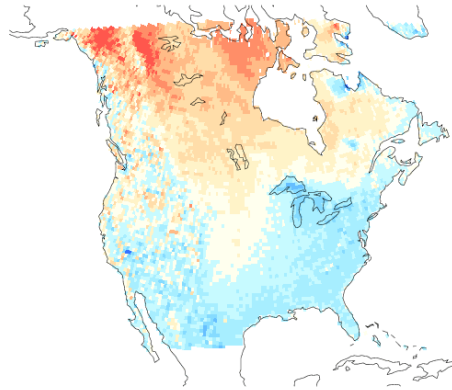
**HRM3-UDEL Winter Temps Regrided .5 degree**



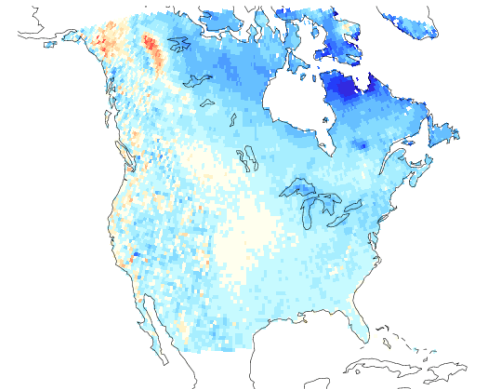
**MM5I-UDEL Winter Temps Regrided .5 degree**



**RCM3-UDEL Winter Temps Regrided .5 degree**

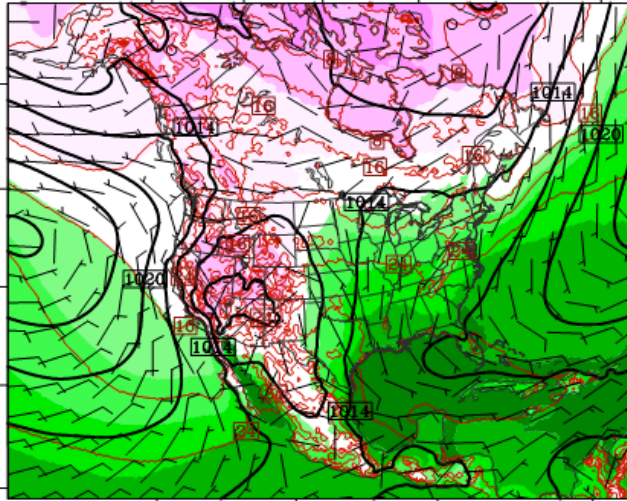


**WRFP-UDEL Winter Temps Regrided .5 degree**



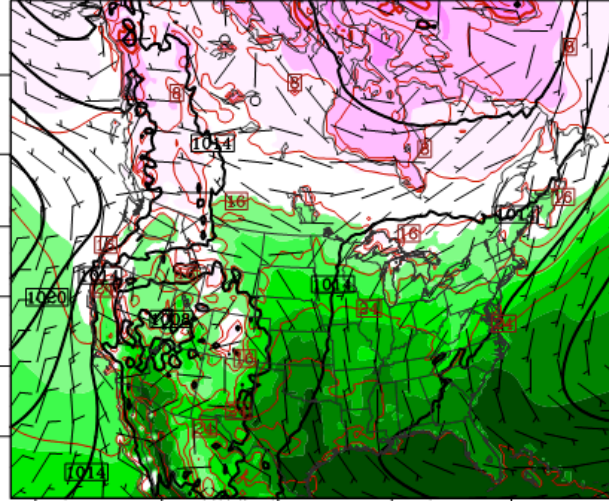
NARRMON JJA 1980 to 2000

150°W 120°W 90°W 60°W 30°W



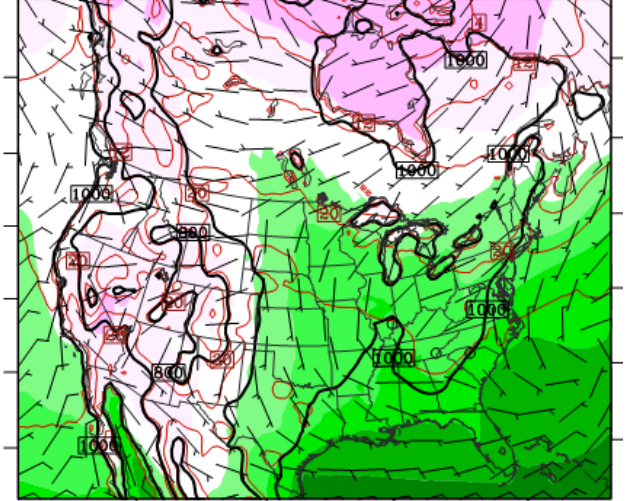
CRCM ncep JJA 1979 to 2004

150°W 120°W 90°W 60°W



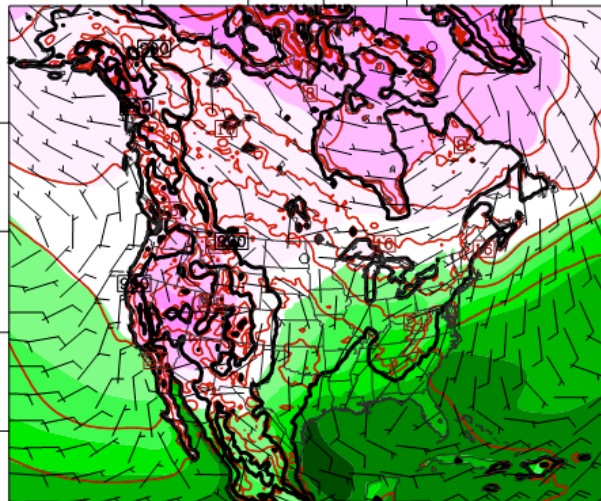
ECPC ncep JJA 1979 to 2004

120°W 90°W 60°W



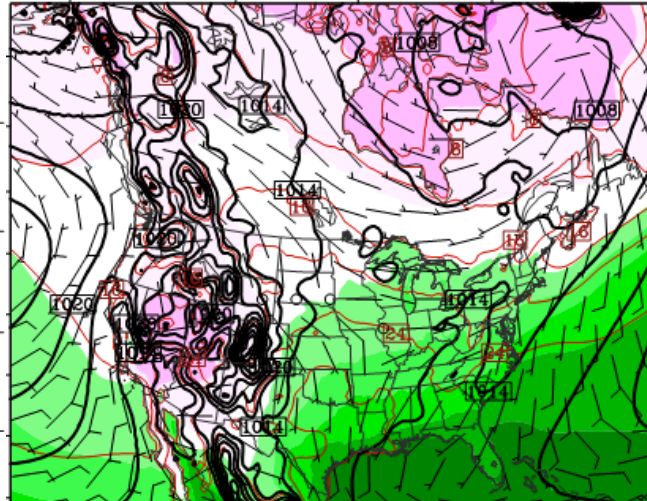
HRM3 ncep JJA 1979 to 2004

150°W 120°W 90°W 60°W 30°W



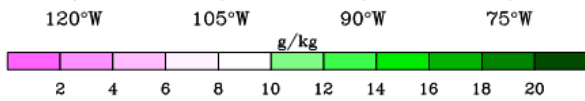
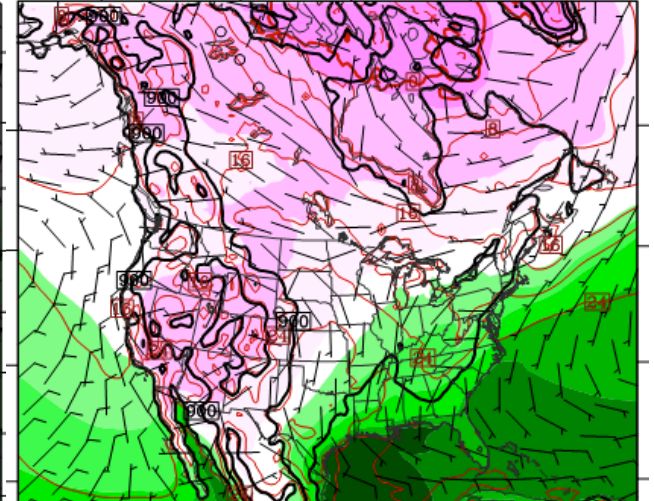
RCM3 ncep JJA 1979 to 2004

150°W 120°W 90°W 60°W



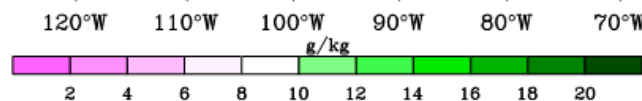
WRFP ncep JJA 1979 to 2004

150°W 120°W 90°W 60°W



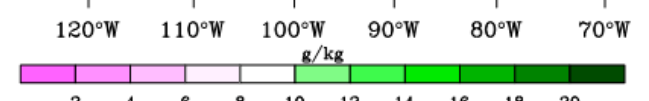
2m Temperature Contours: -8 to 36 by 4 C

Surface pressure Contours: 700 to 1000 by 100hPa



2m Temperature Contours: -4 to 28 by 4 C

Sea Level Pressure Contours: 1008 to 1038 by 3hPa

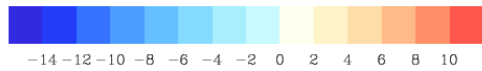
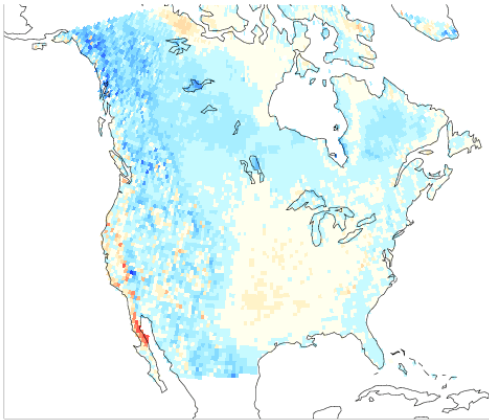


2m Temperature Contours: -8 to 32 by 4 C

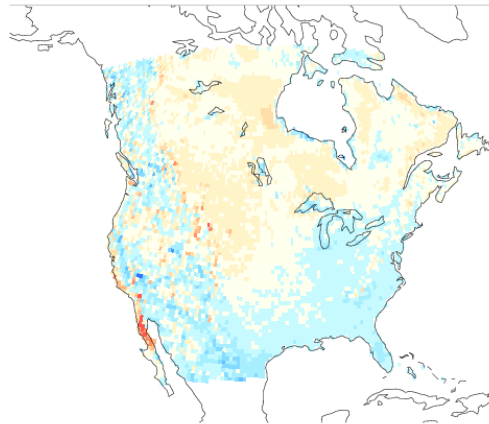
Surface Pressure Contours: 700 to 1000 by 100hPa

# NCEP Driven Summer Temperature Bias

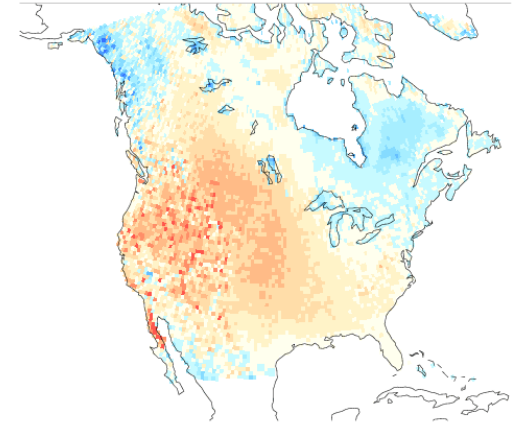
**CRCM-UDEL Summer Temps Regrided .5 degree**



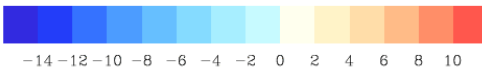
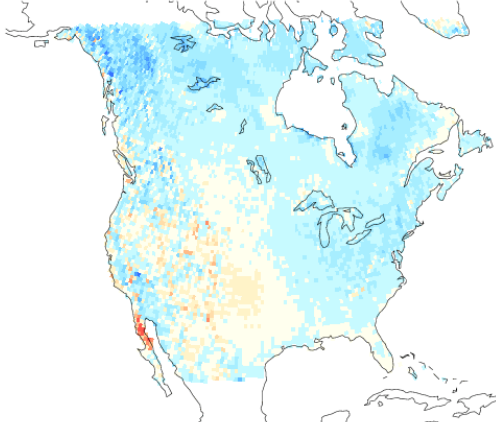
**ECPC-UDEL Summer Temps Regrided .5 degree**



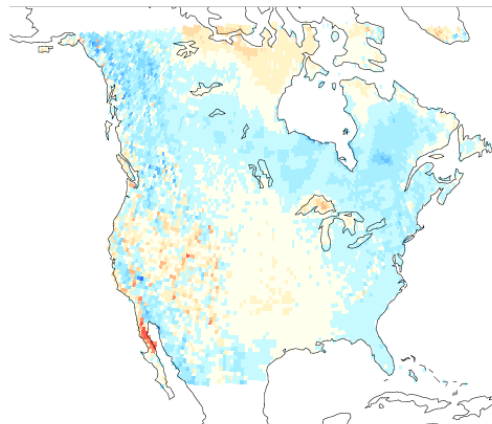
**HRM3-UDEL Summer Temps Regrided .5 degree**



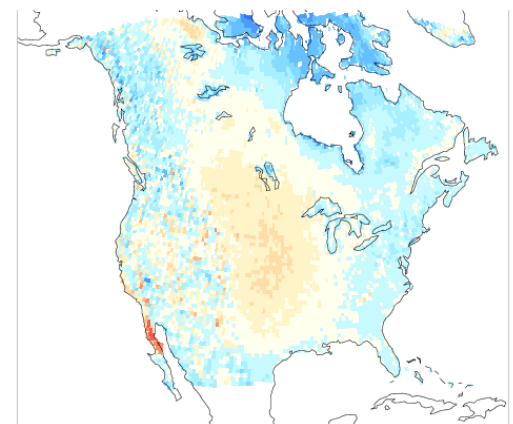
**MM5I-UDEL Summer Temps Regrided .5 degree**



**RCM3-UDEL Summer Temps Regrided .5 degree**

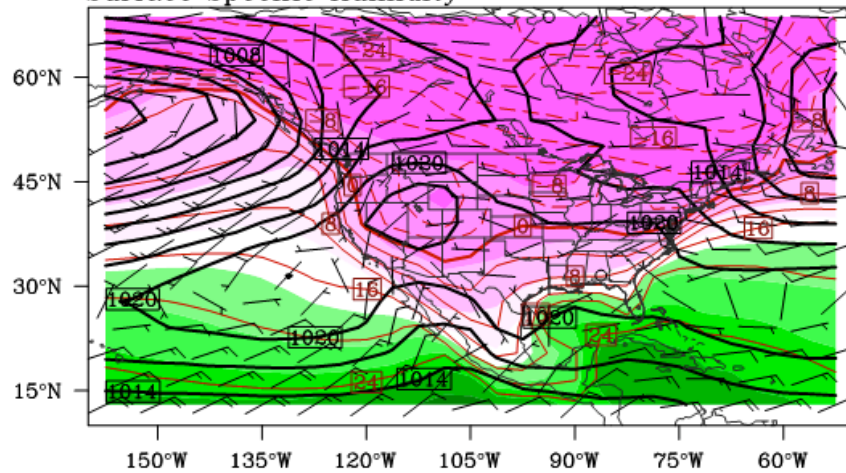


**WRFP-UDEL Summer Temps Regrided .5 degree**



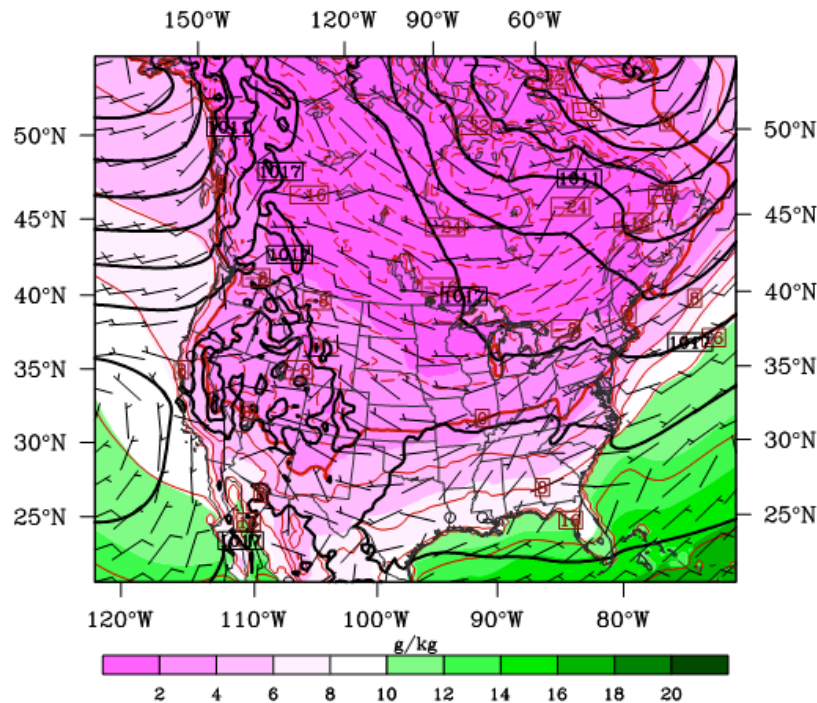
cgcm3 1 1980 to 1999: mons 01,02,12

Surface Specific Humidity

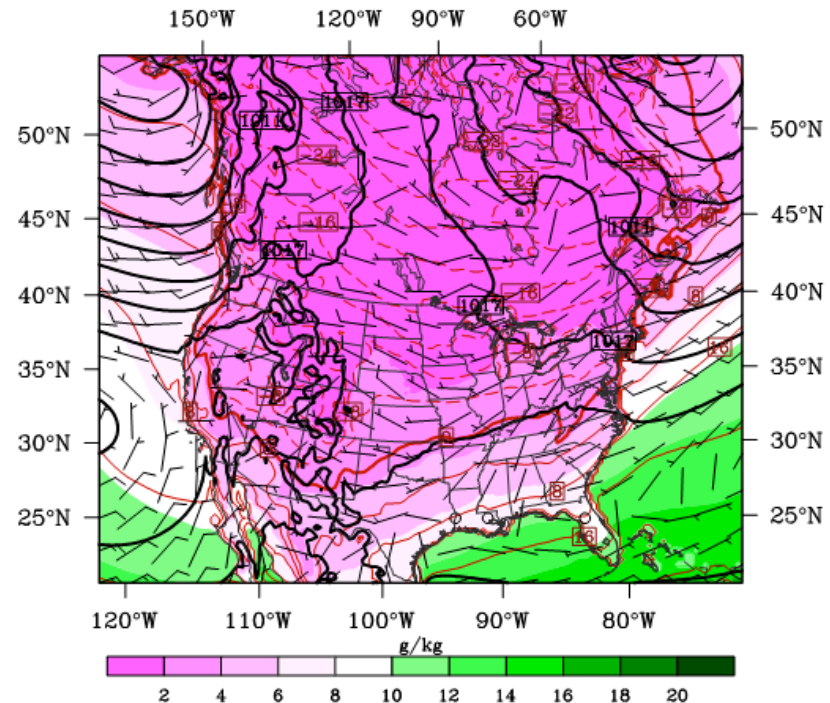


CGCM, CRCM-ncep,  
CRCM-cgcm Winter

CRCM ncep DJF 1979 to 2004



CRCM cgcm3-current DJF 1971 to 2000



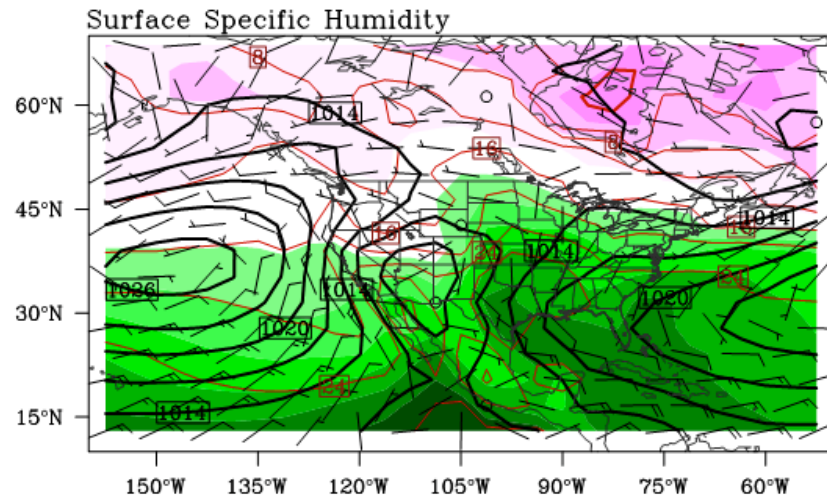
2m Temperature Contours: -36 to 24 by 4 C  
Sea Level Pressure Contours: 999 to 1023 by 3hPa

2m Temperature Contours: -40 to 24 by 4 C  
Sea Level Pressure Contours: 999 to 1023 by 3hPa

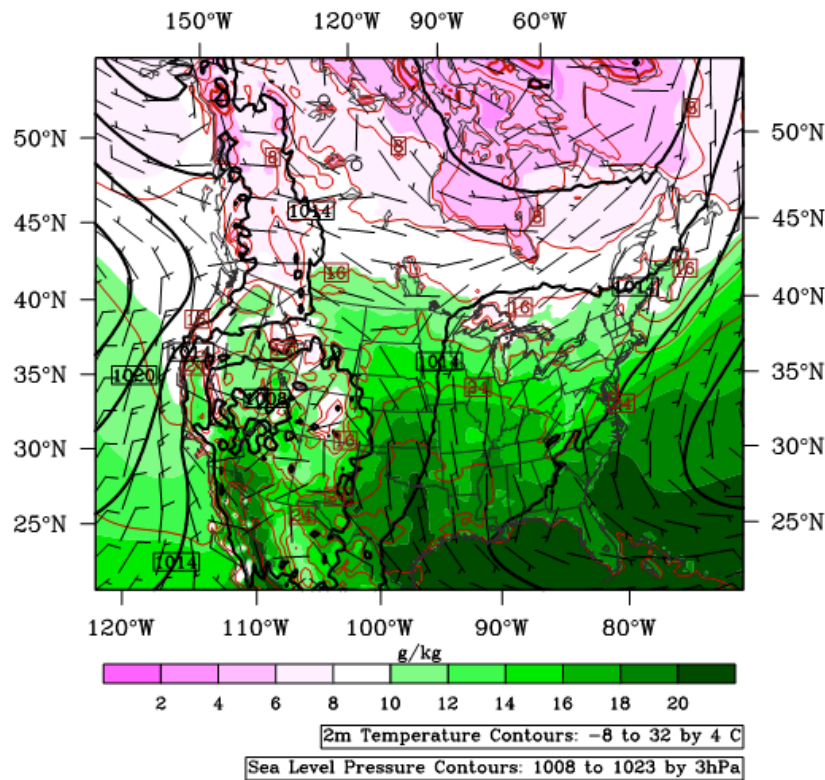


cgcm3 1 1980 to 1999: mons 06,07,08

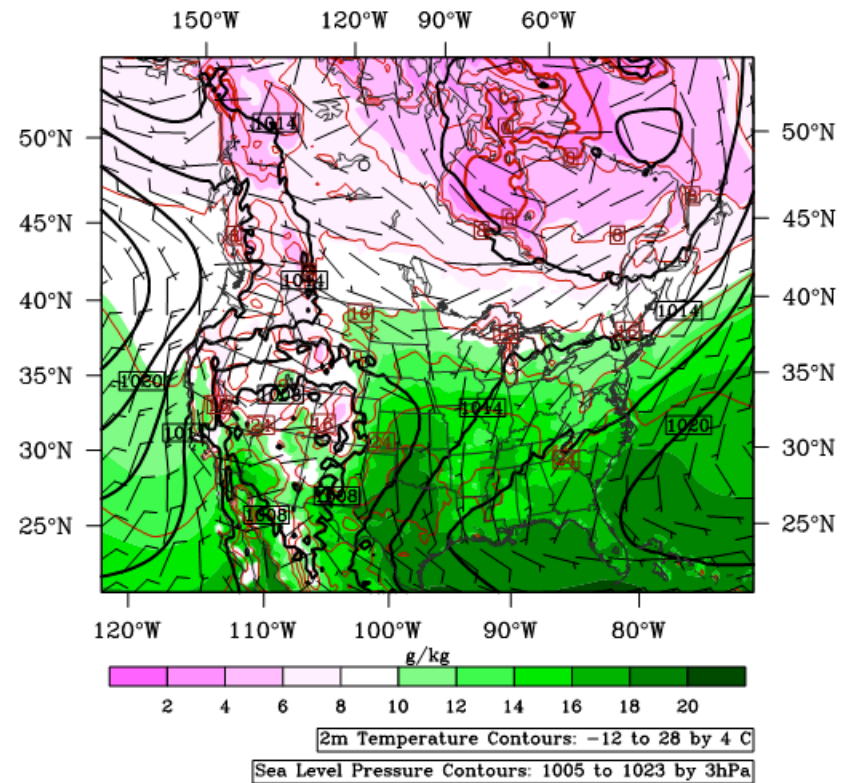
# CGCM, CRCM-ncep, CRCM-cgcm Summer



CRCM ncep JJA 1979 to 2004

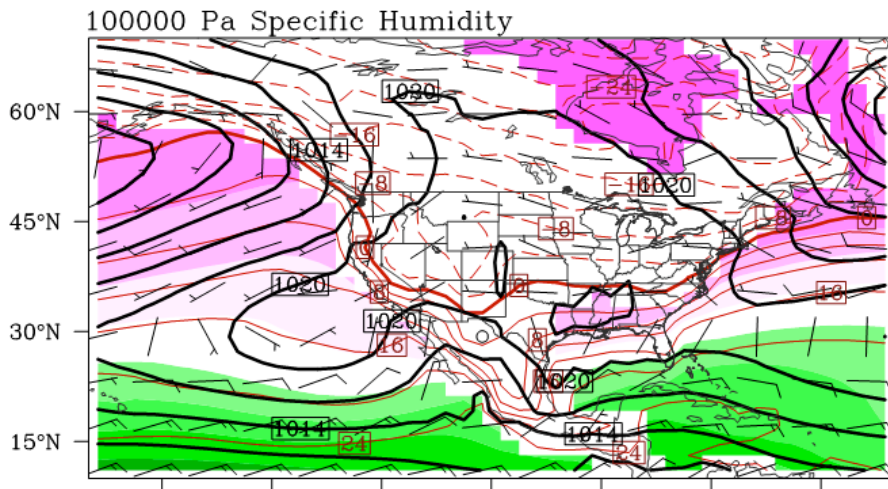


CRCM cgcm3-current JJA 1971 to 2000

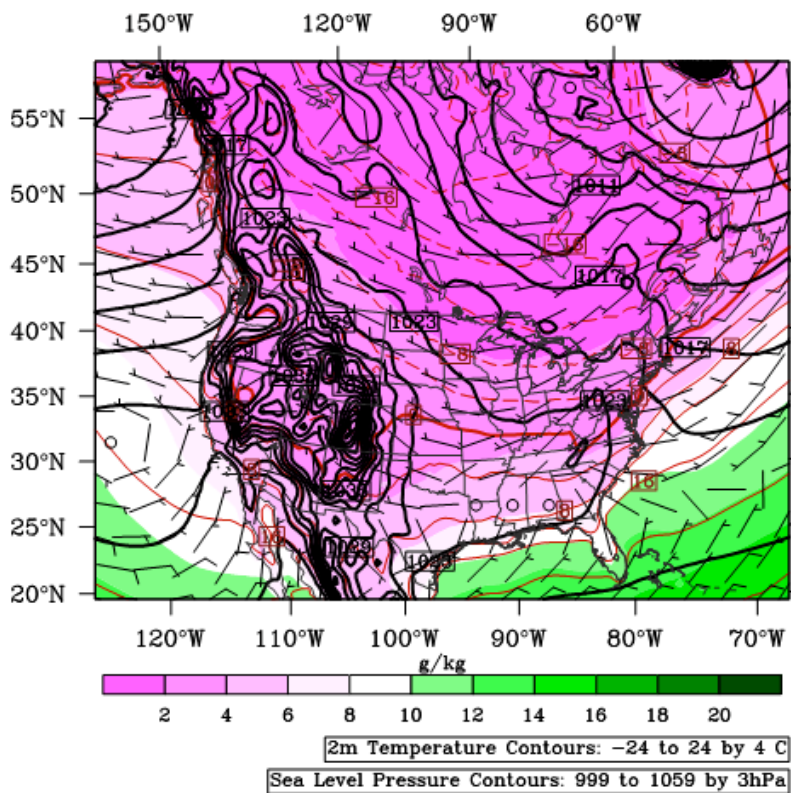


gfdl2 1 1980 to 1999: mons 01,02,12

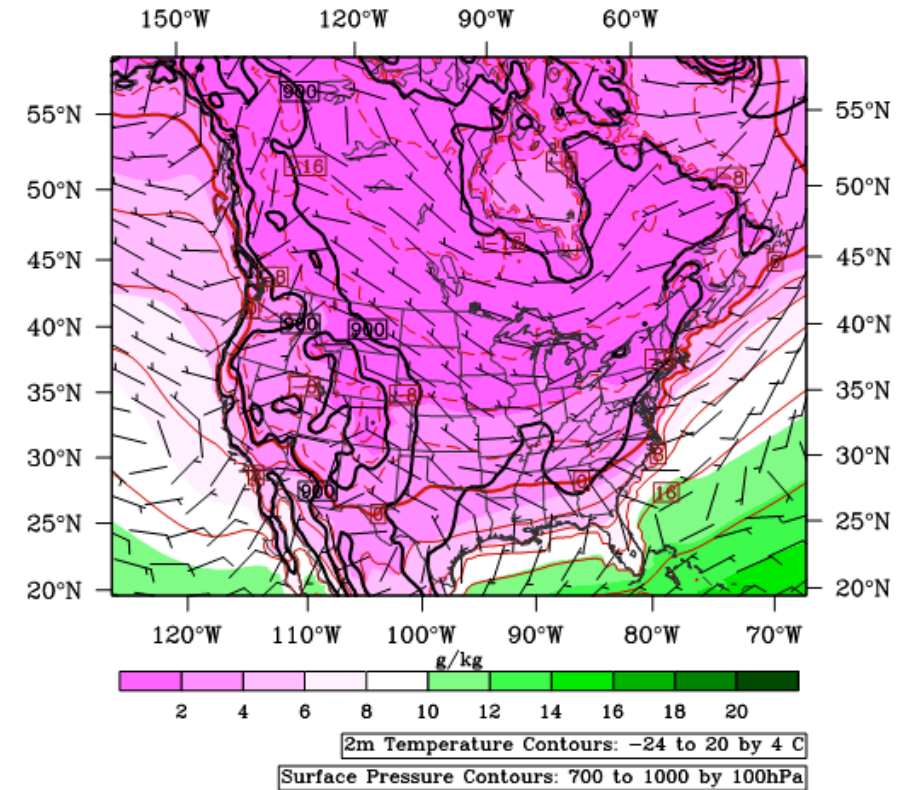
# GFDL, RCM3-ncep, RCM3-gfdl Winter



RCM3 ncep DJF 1979 to 2004

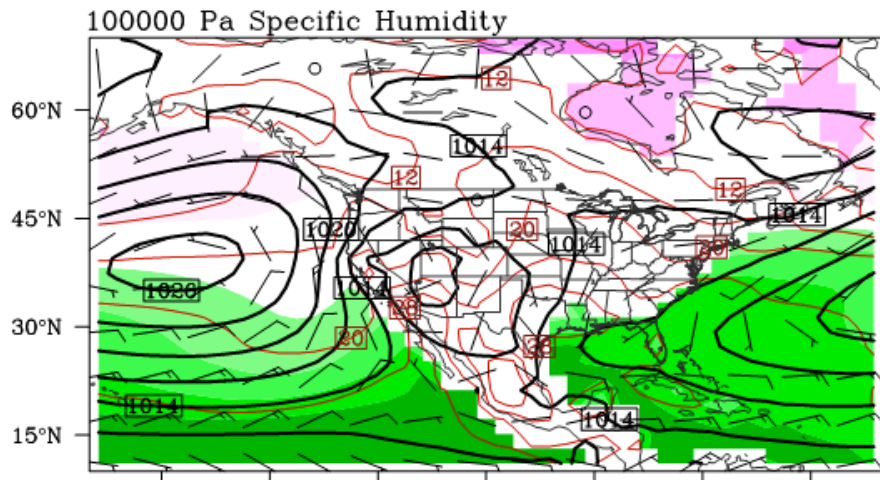


RCM3 gfdl-current DJF 1971 to 2000

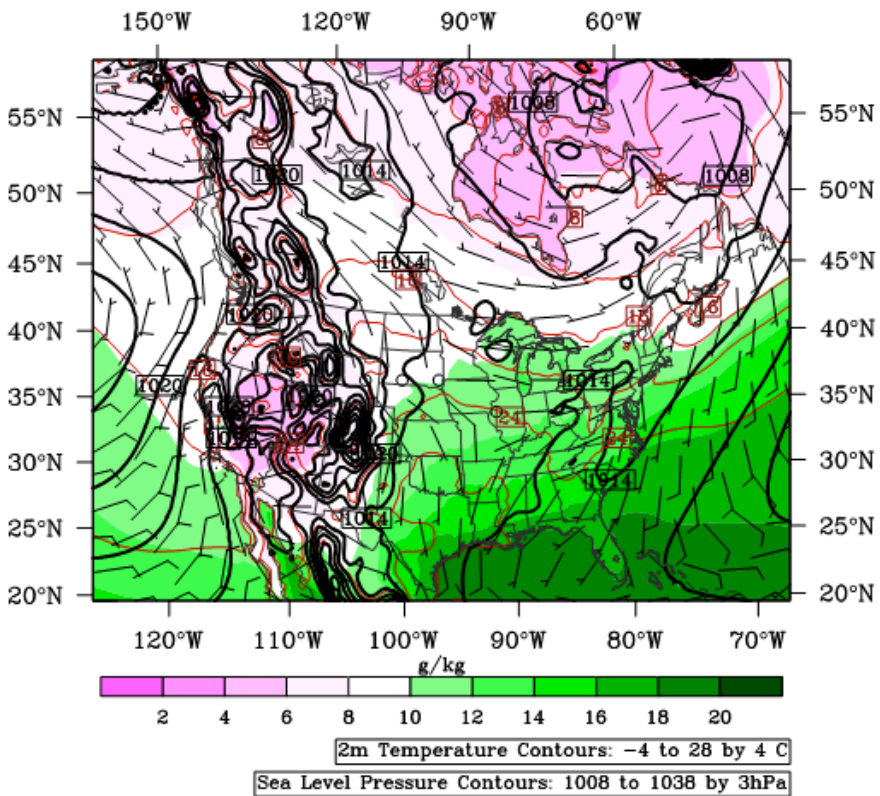


gfdl2 1 1980 to 1999: mons 06,07,08

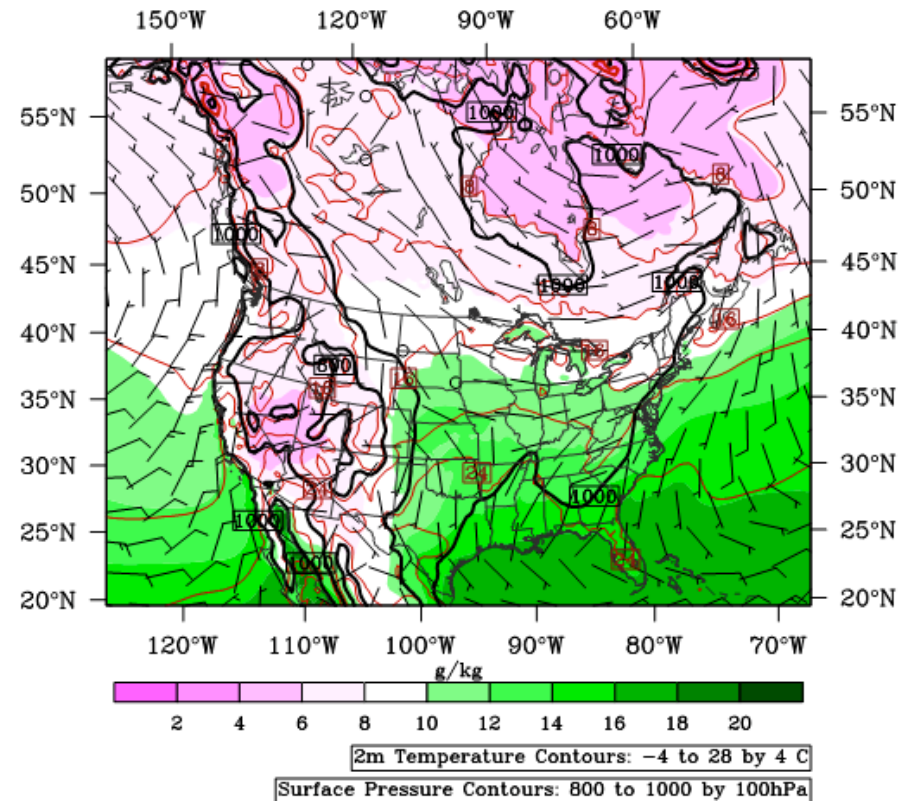
# GFDL, RCM3-ncep, RCM3-gfdl Summer

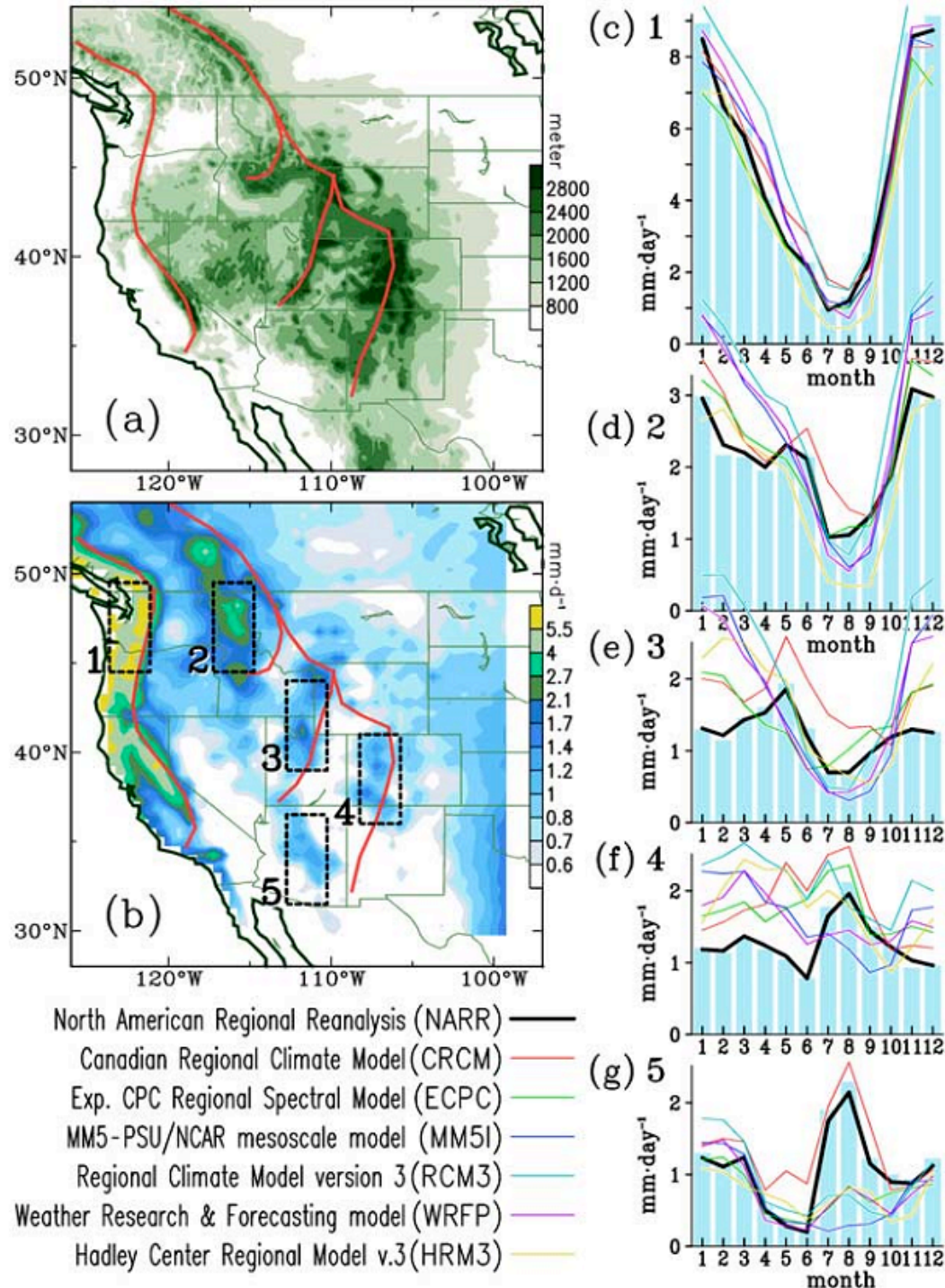


RCM3 ncep JJA 1979 to 2004



RCM3 gfdl-current JJA 1971 to 2000

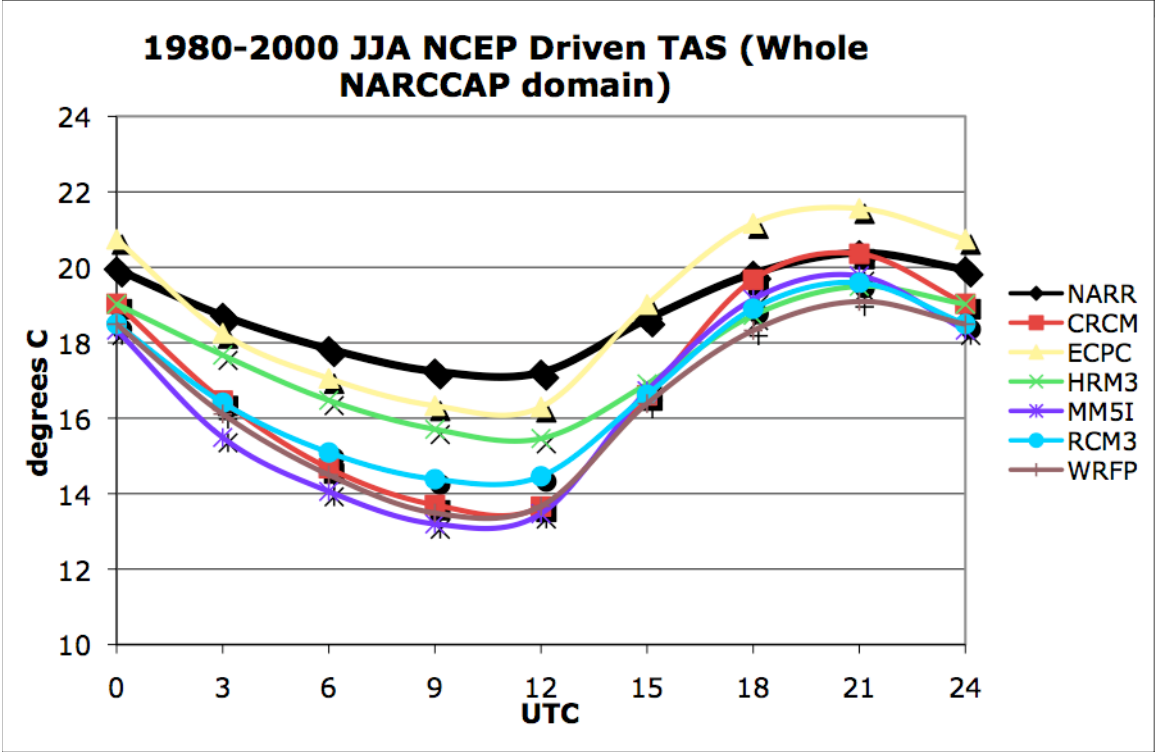
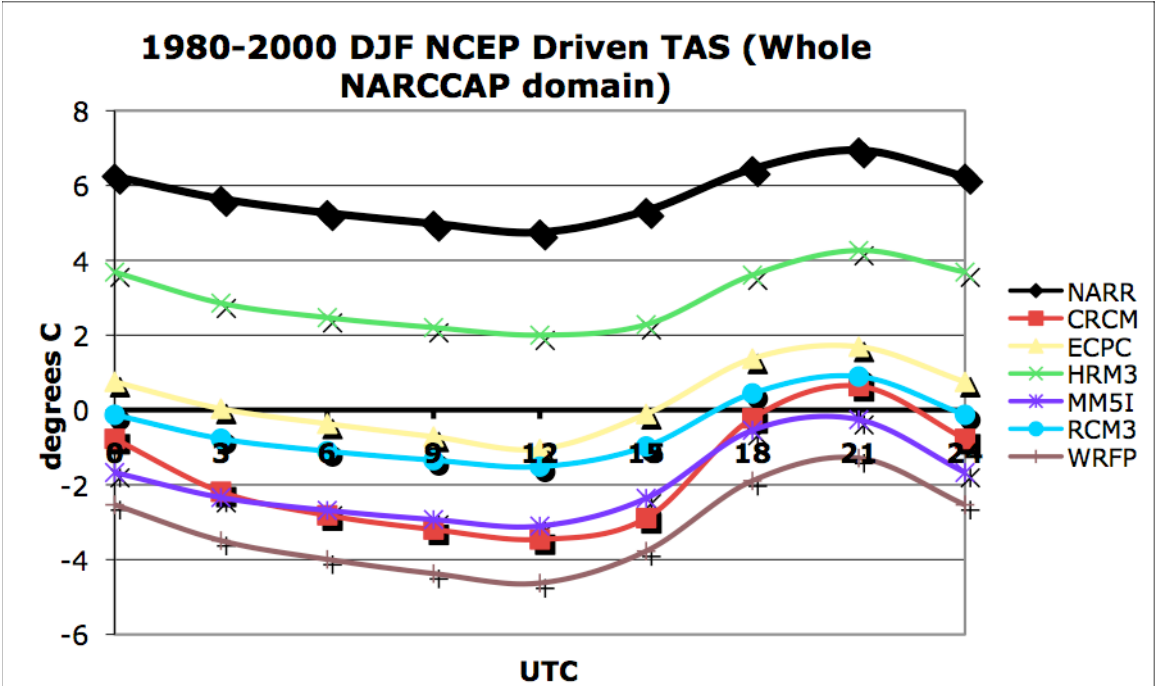




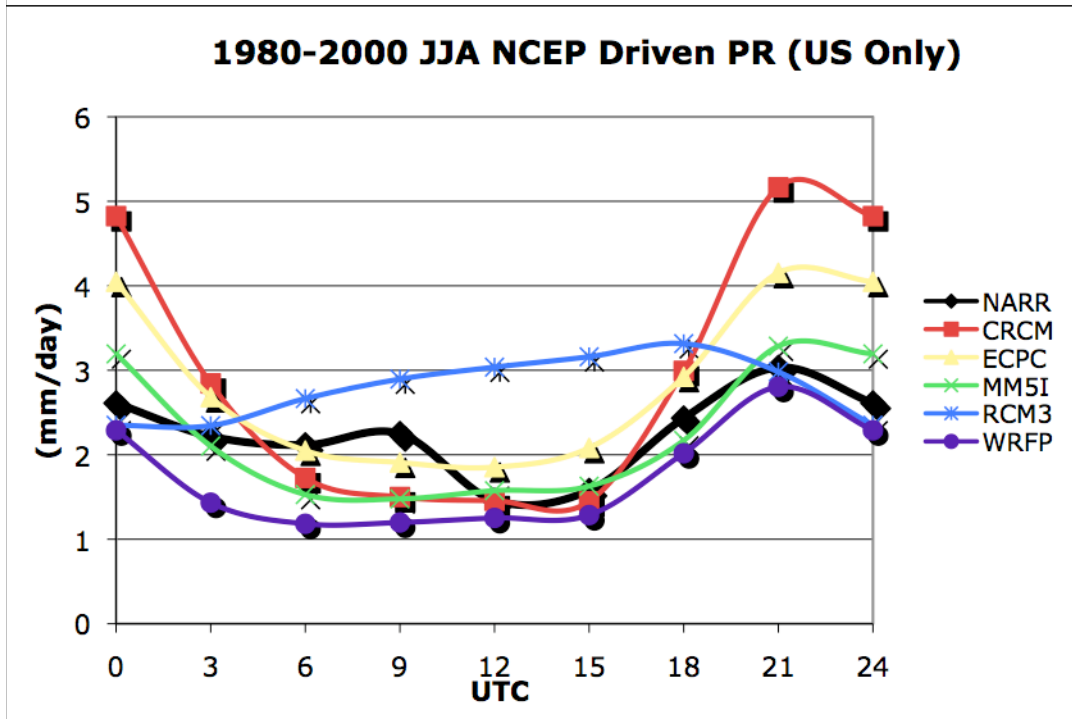
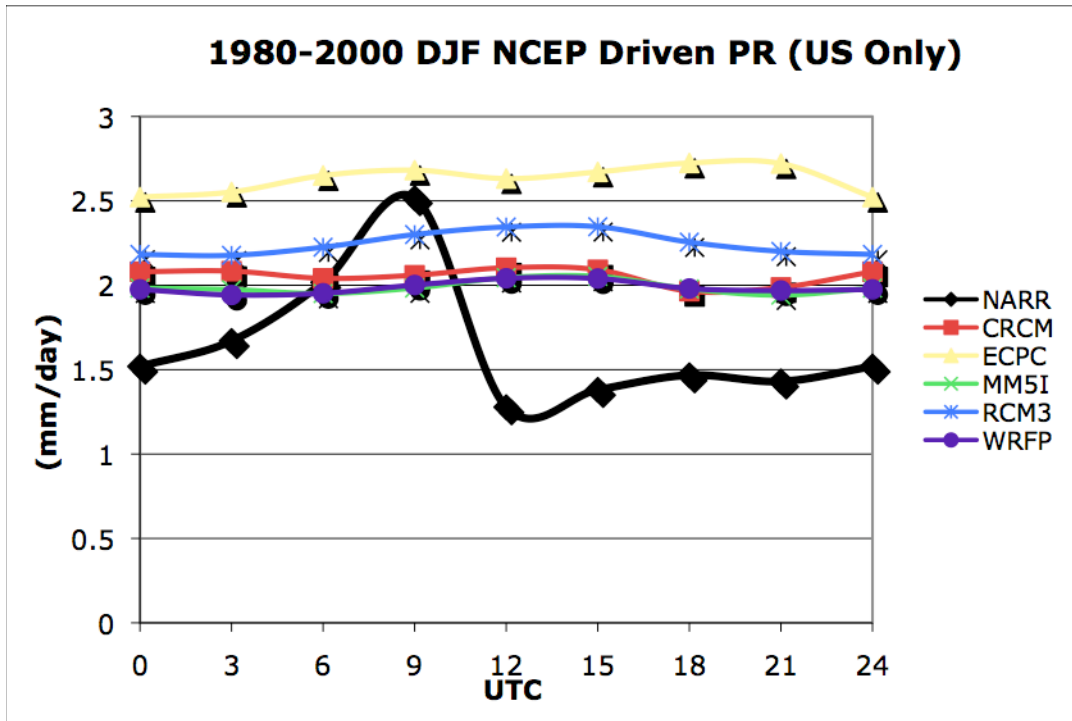
# Monthly Precipitation

- From Wang et al. 2009 (JRL)
- Fig. 1. (a) Orography and (b) cold-season rainfall (Nov-May, Udel) of the Intermountain Region. The major mountain ranges are outlined by red lines. (c)-(g) Monthly rainfall histograms of Udel, averaged from the five regions indicated in Fig. 1b, superimposed with the corresponding precipitation of the NARR (thick black line) and all RCMs (color lines).

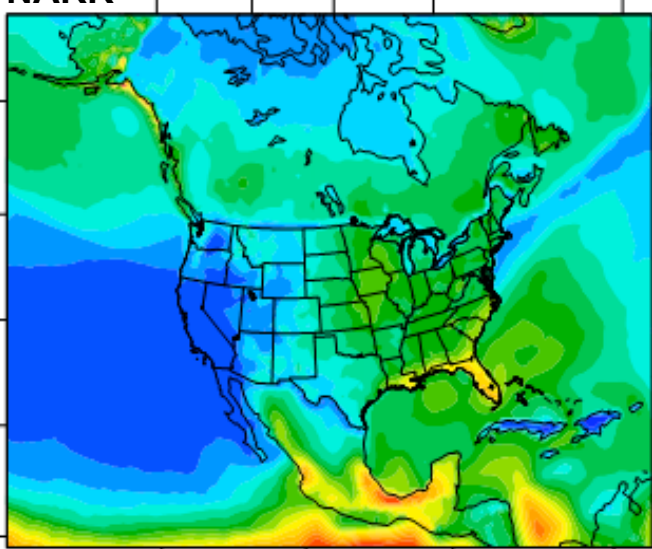
# Diurnal Cycle: Temperature



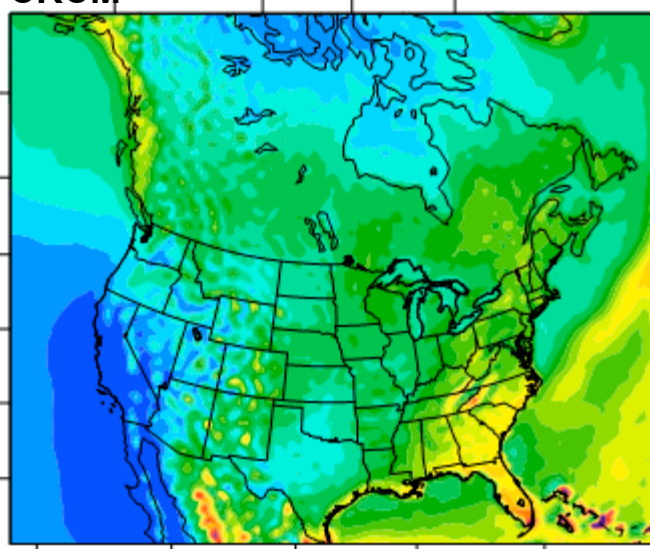
# Diurnal Cycle: Precipitation



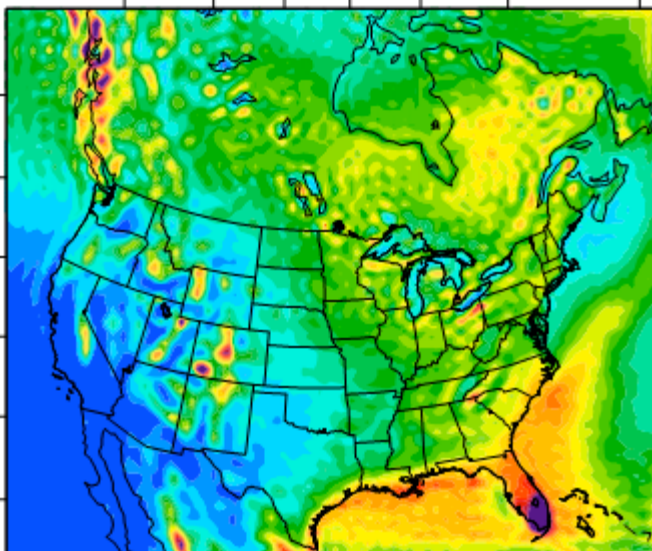
NARR



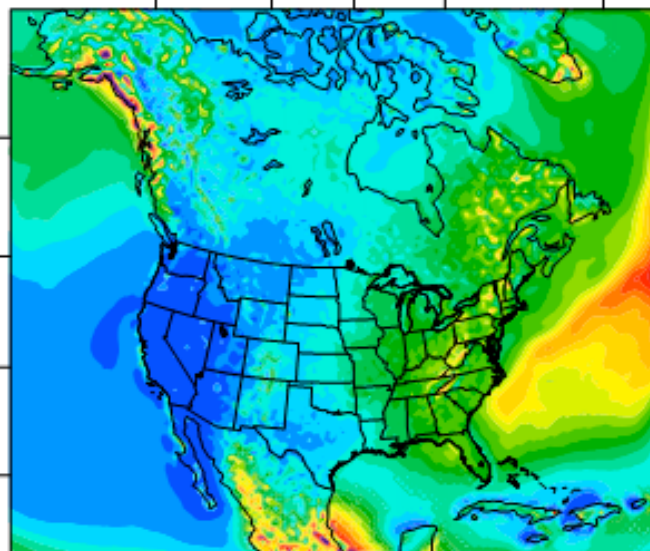
CRCM



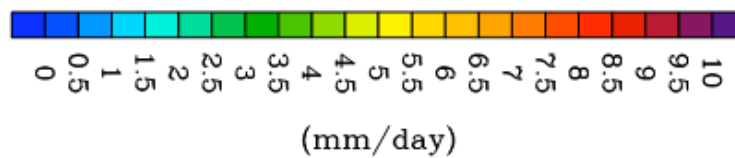
ECPC



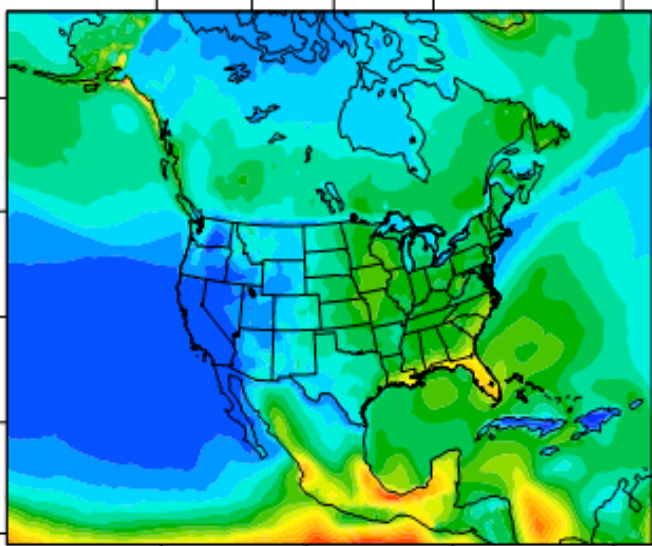
HRM3



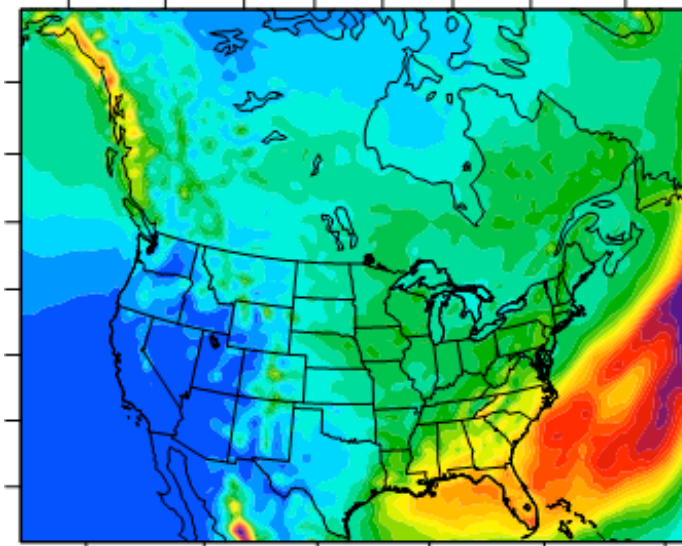
Summer Precipitation  
NCEP Driven Runs



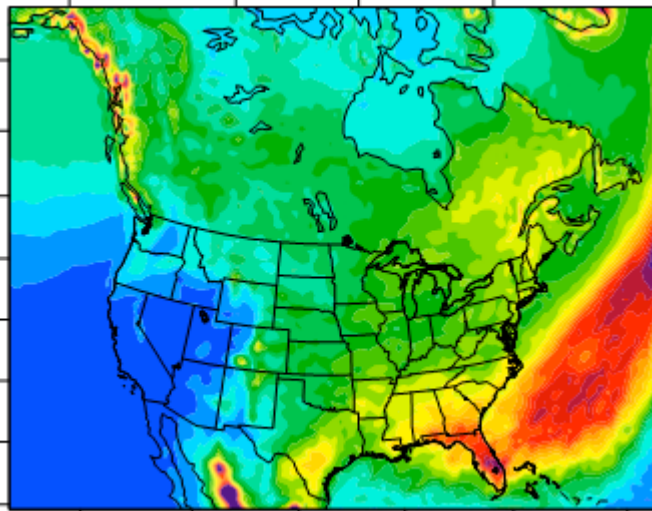
**NARR**



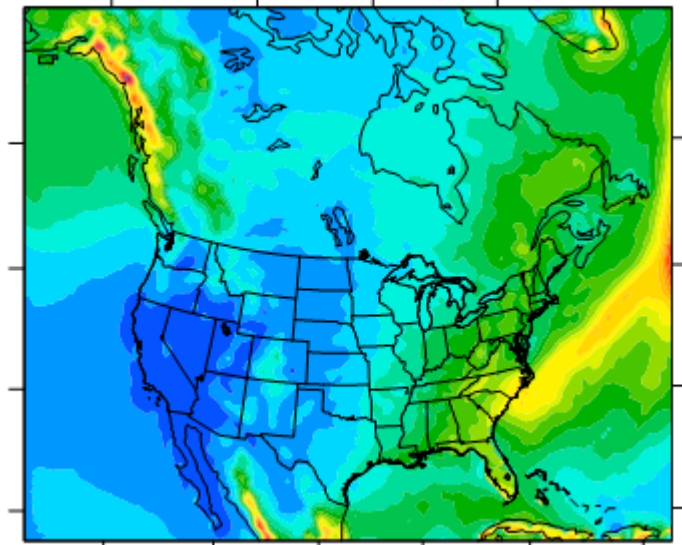
**MM5I**



**RCM3**



**WRFP**

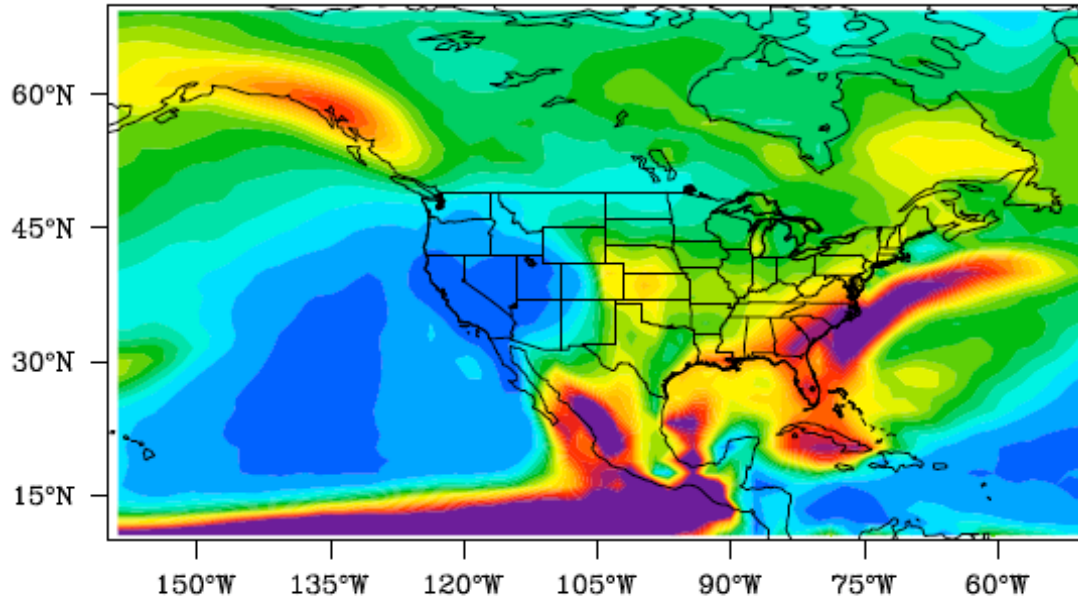


Summer Precipitation  
NCEP Driven Runs



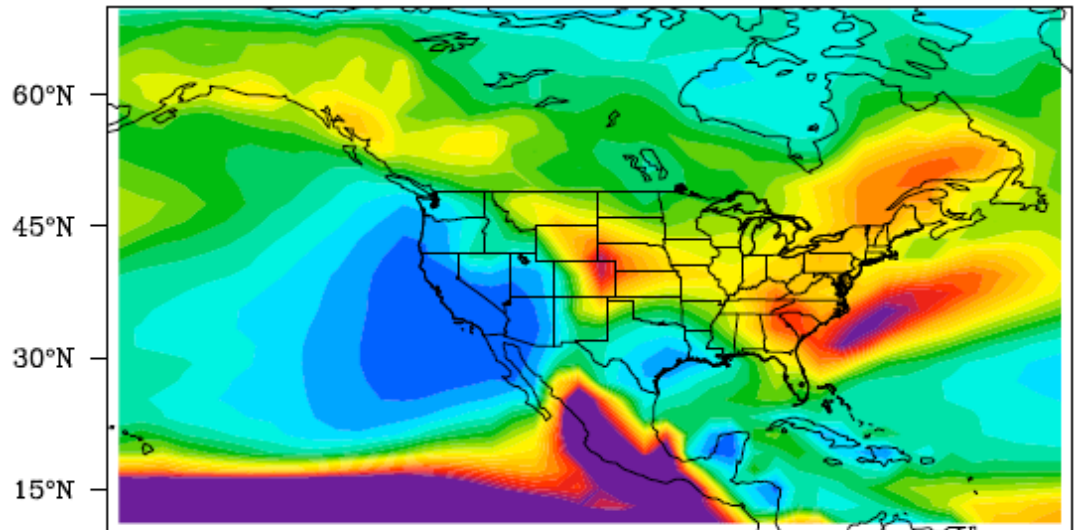


### CCSM

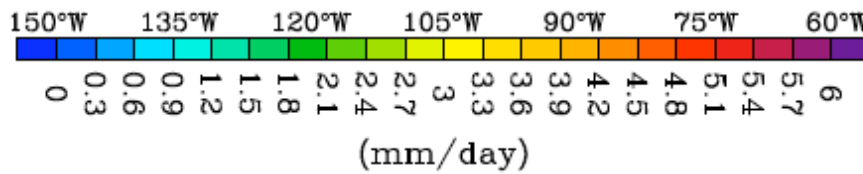
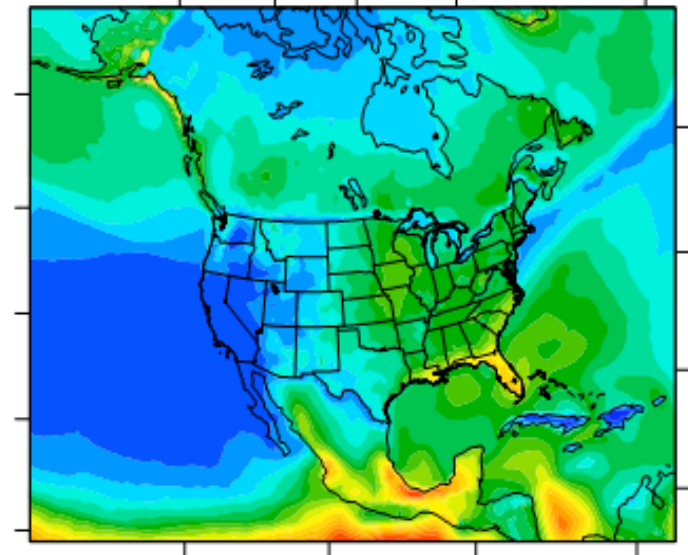


### 1980-1999 JJA GCM Precipitation

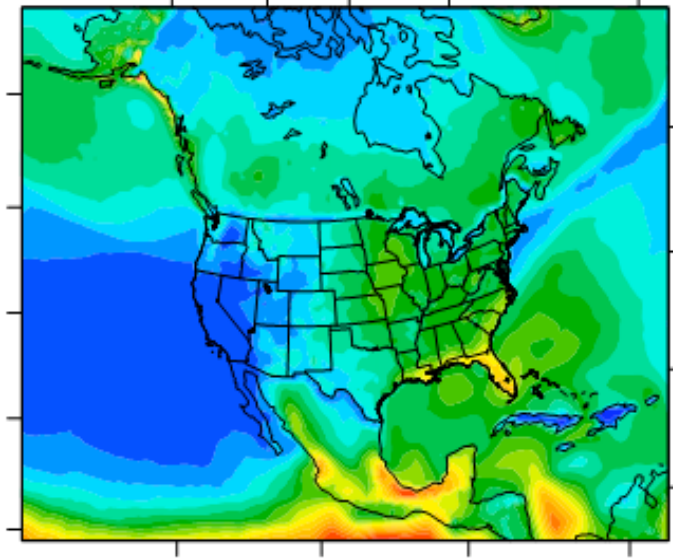
### GFDL



### NARR

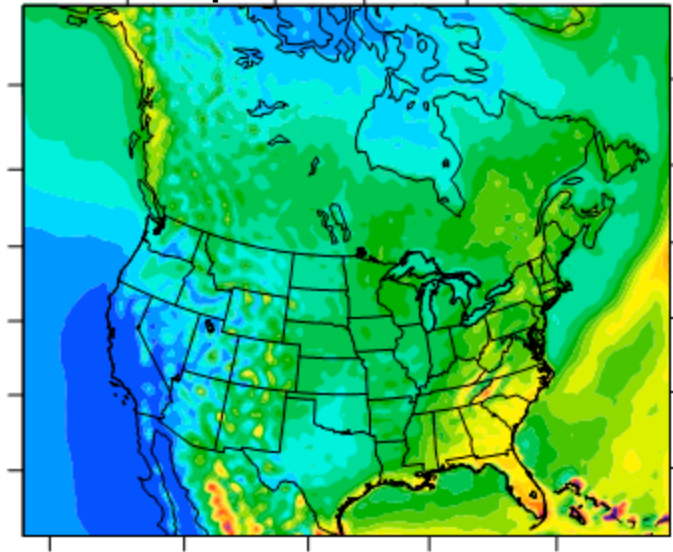


**NARR**

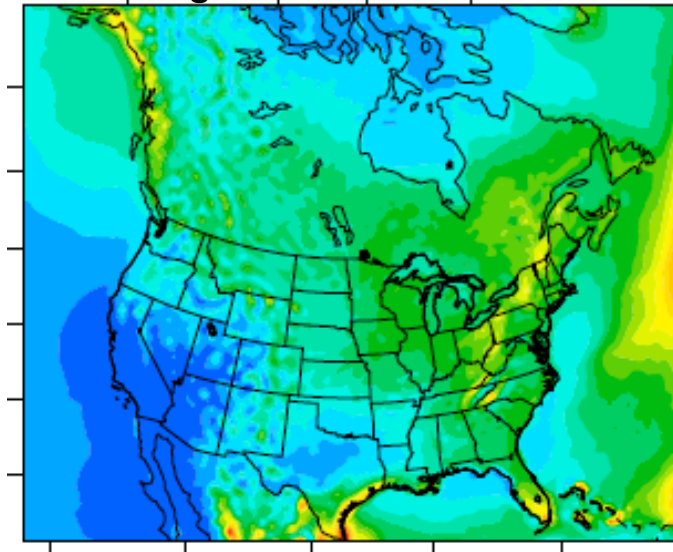


1980-2000 JJA  
Precipitation w/ GCM  
Driven Run: CRCM and  
CGCM

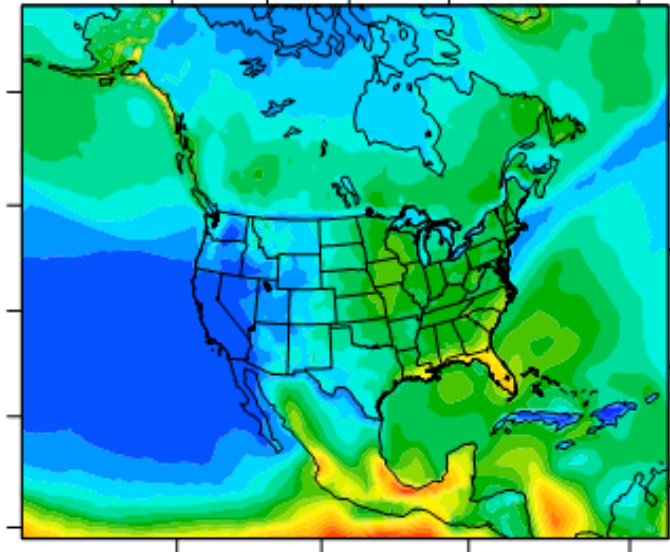
**CRCM-ncep**



**CRCM-cgcm**

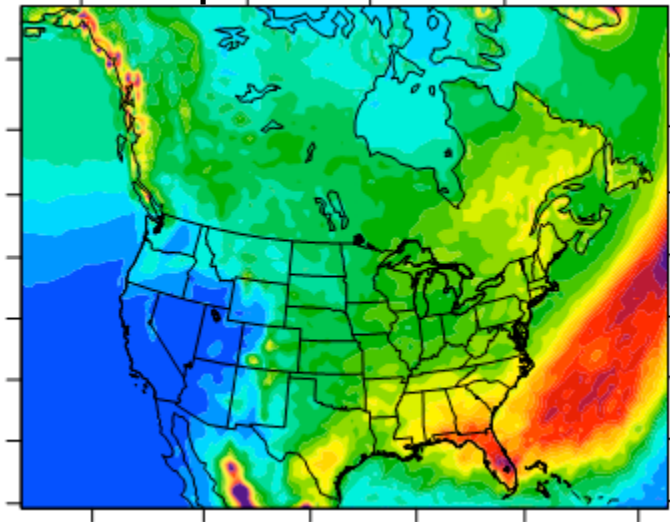


**NARR**

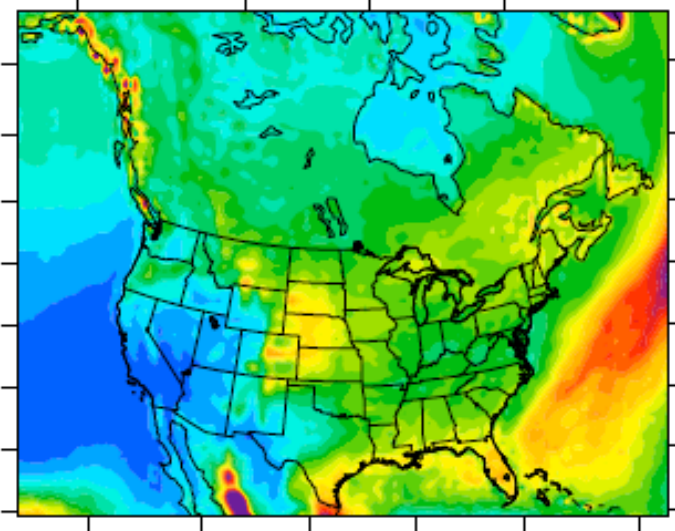


1980-2000 JJA  
Precipitation w/ GCM  
Driven Run: RCM3 and  
GFDL

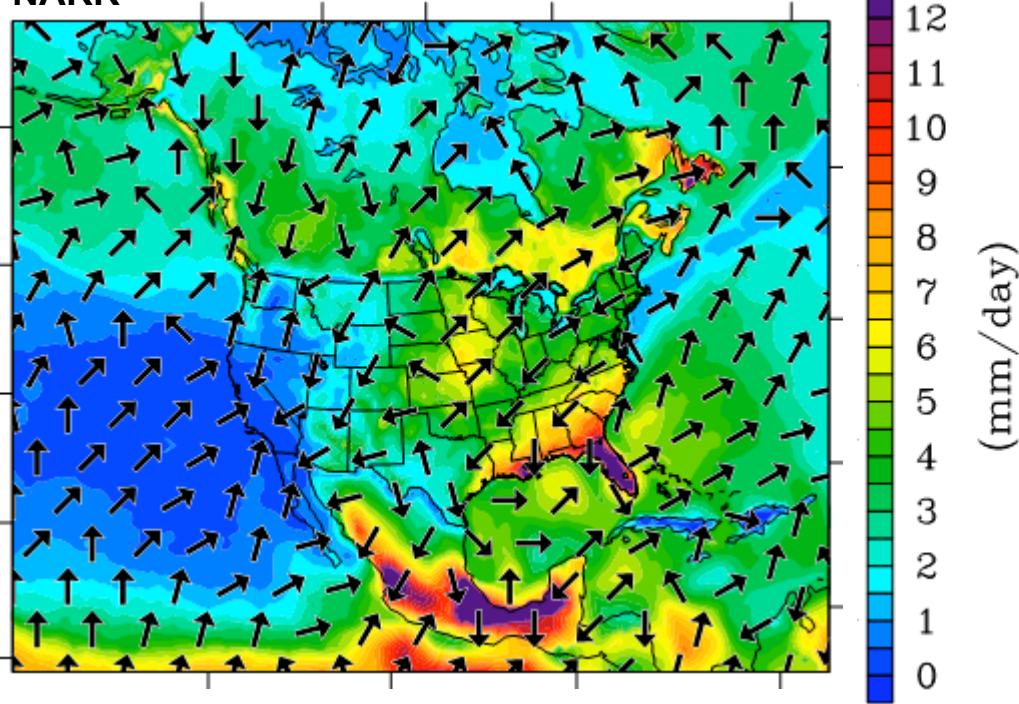
**RCM3-ncep**



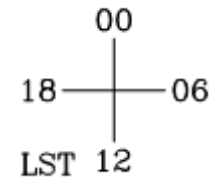
**RCM3-gfdl**



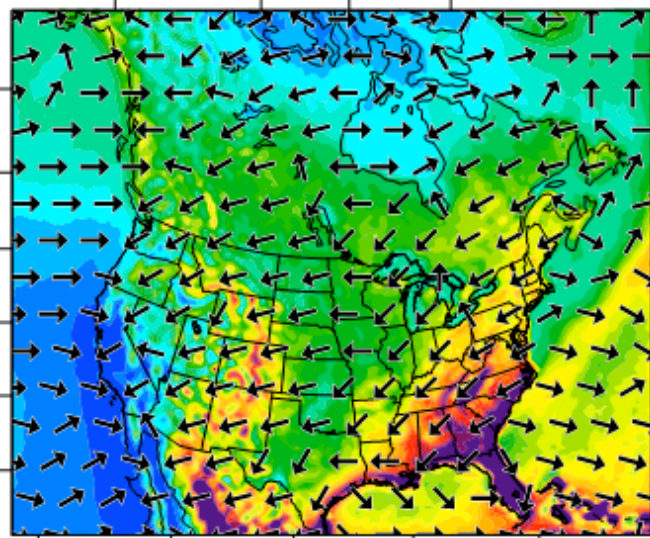
NARR



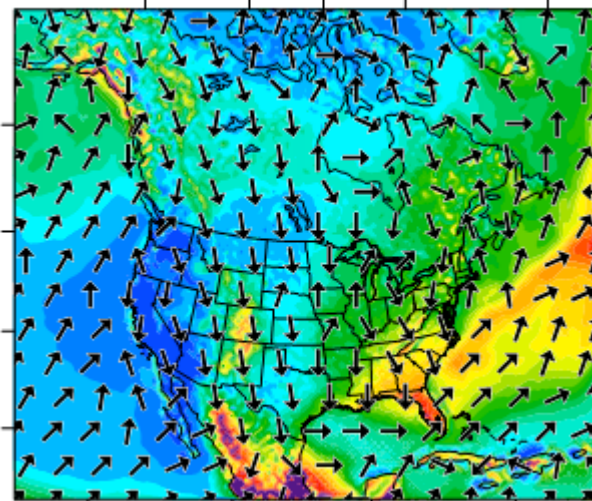
JJA 1980-2000  
Precipitation Maximum  
Amplitude and Time of  
Maximum



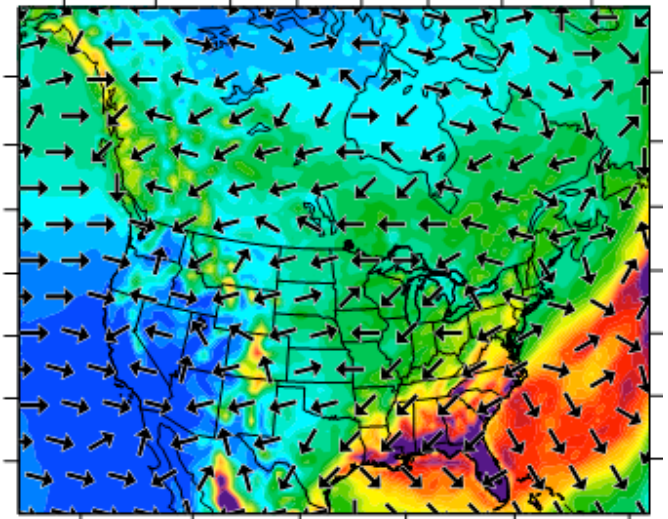
CRCM



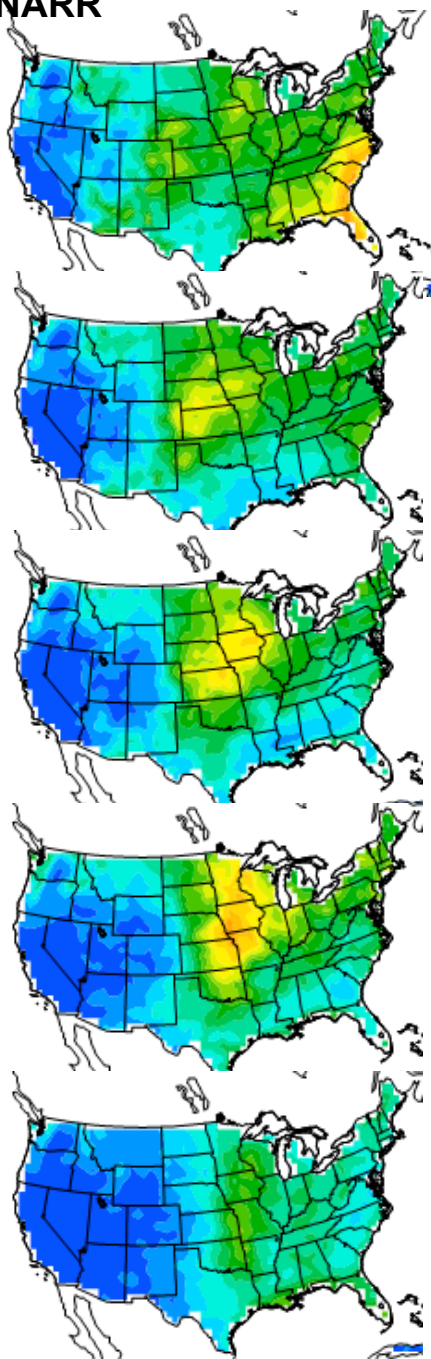
HRM3



MM5I



NARR



00 UTC

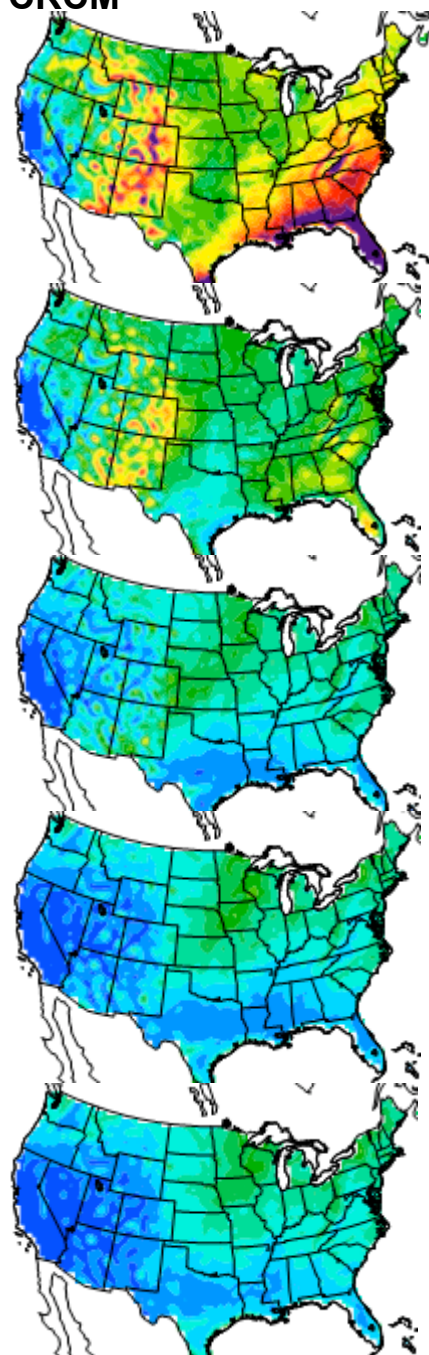
03 UTC

06 UTC

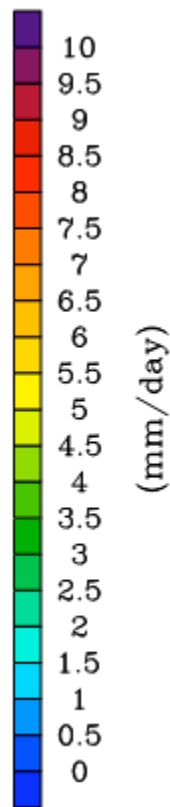
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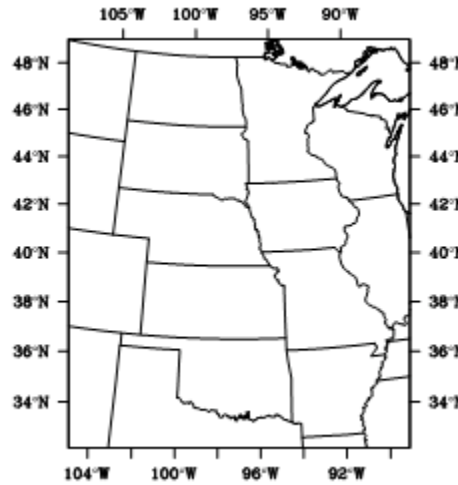
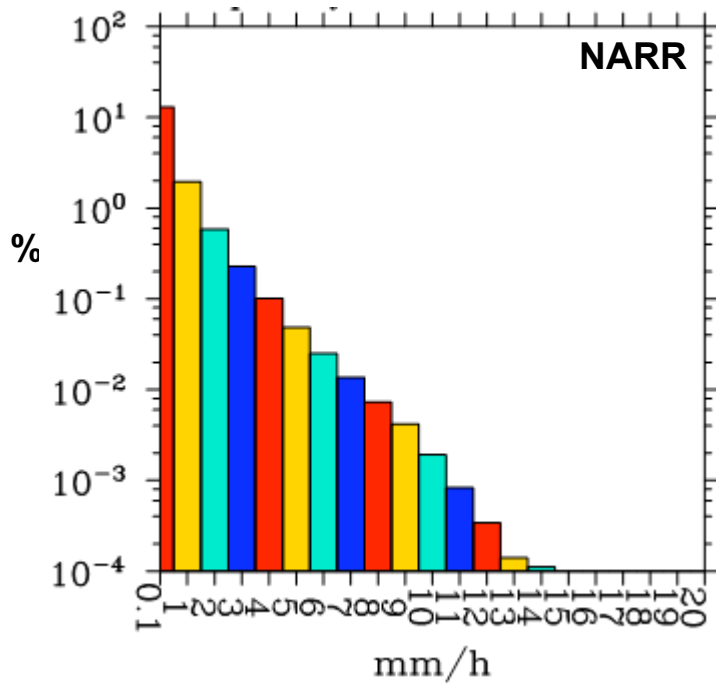
12 UTC

CRCM

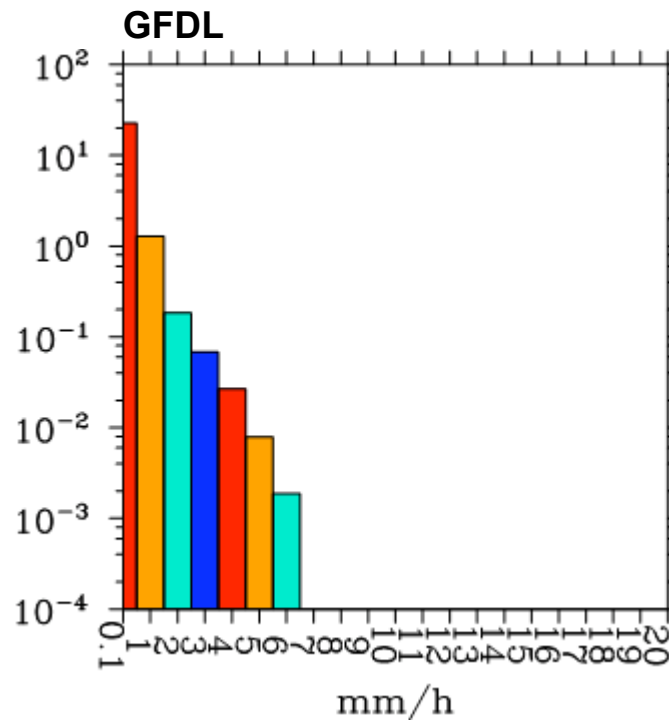
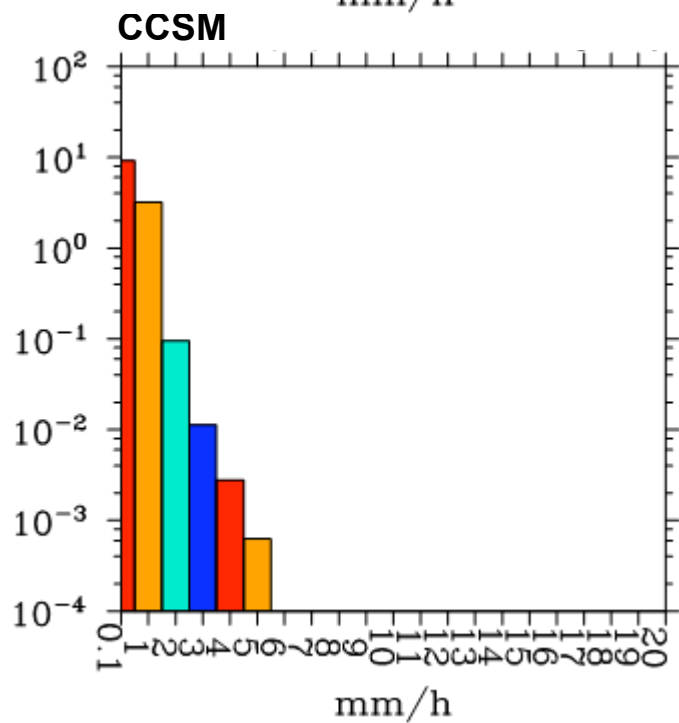


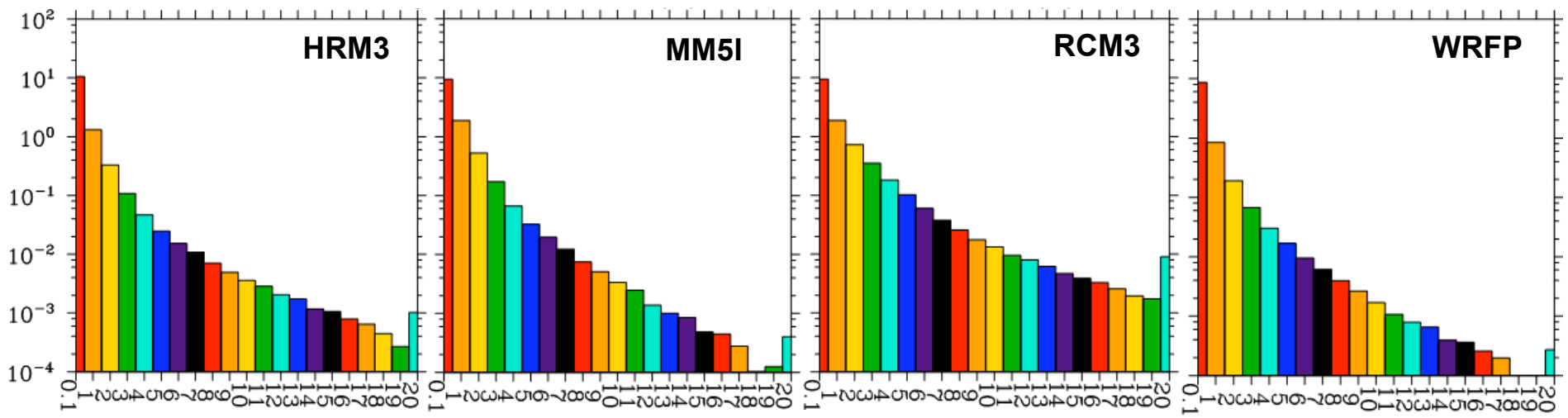
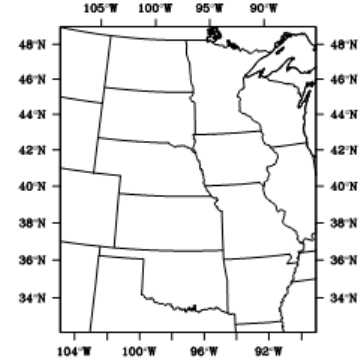
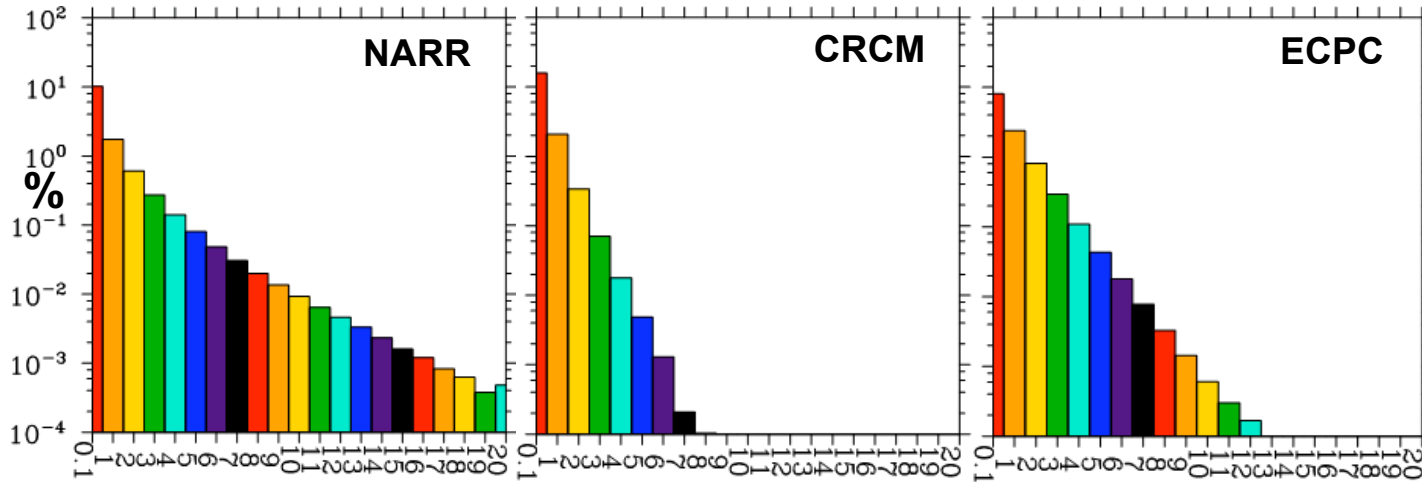
JJA 1980-2000  
3-hr Average Pr





6h Pr Frequency  
Distribution  
1980-1999/2000  
JJA  
GCMs





**3h Pr Frequency Distribution  
1980-1999/2000 JJA  
RCMs  
(mm/h)**

Questions?