Dynamical Downscaling in the Western U.S.

Quarterly Review (June 7, 2001)

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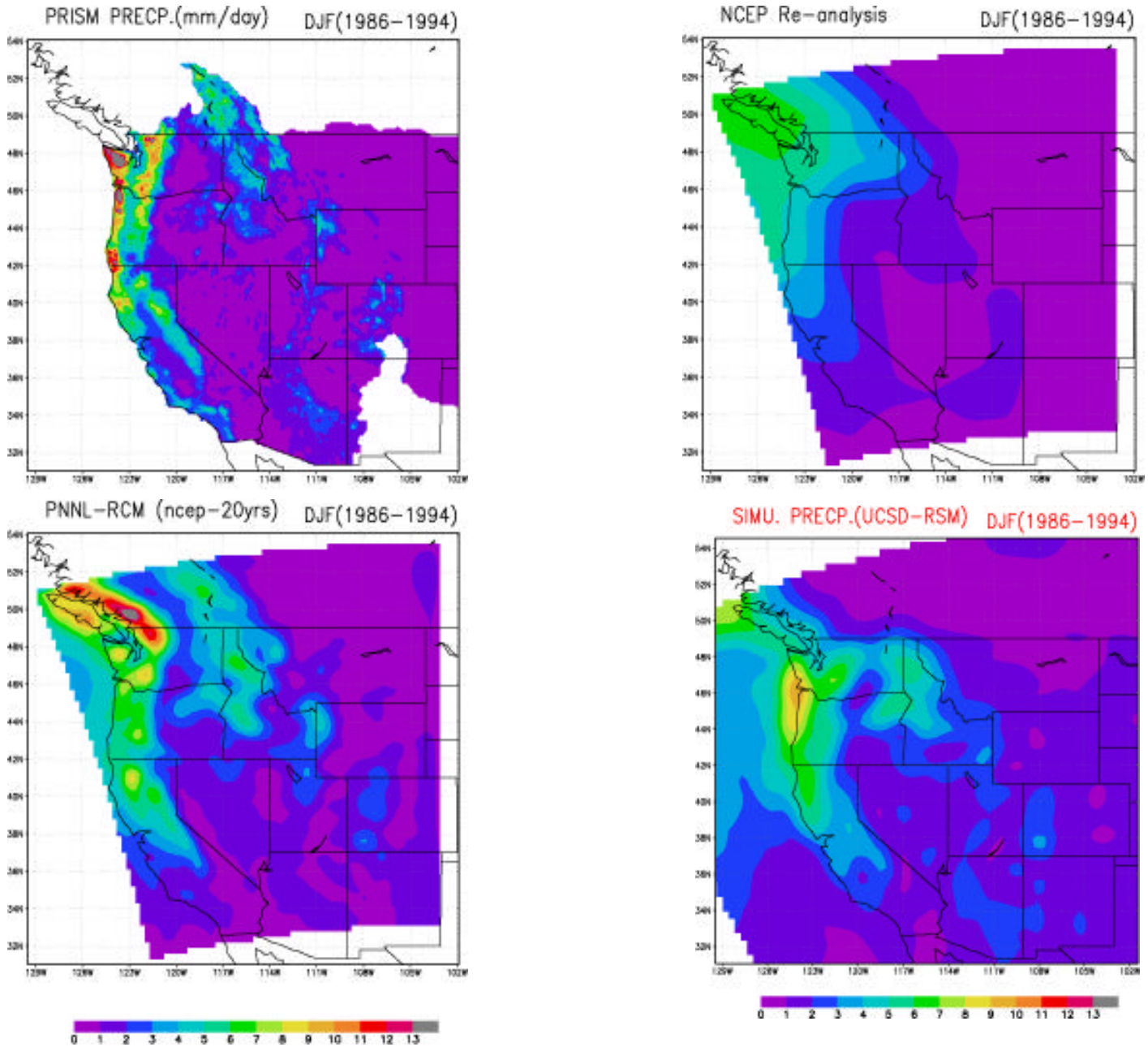
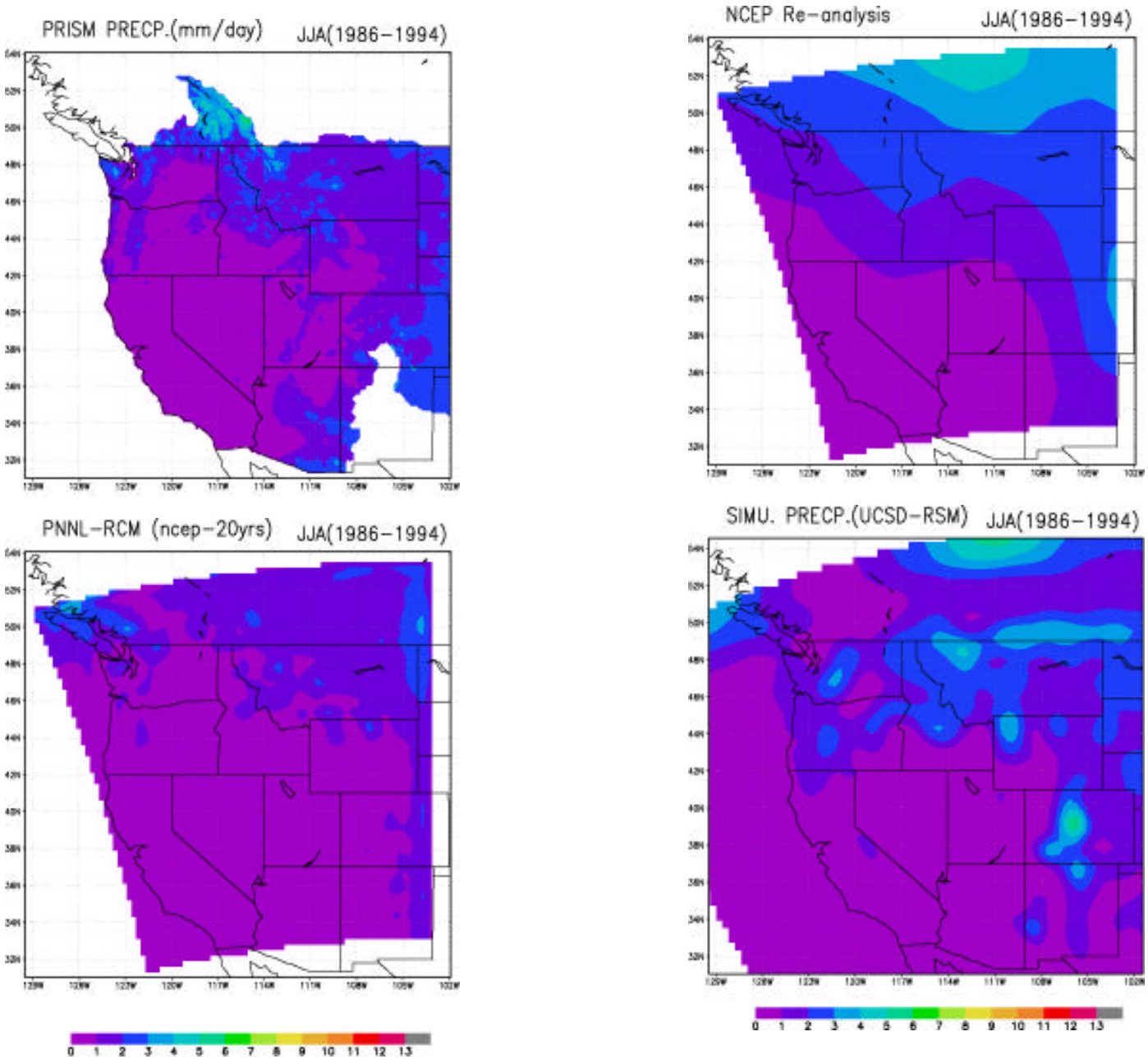
Simulations Driven by NCEP/NCAR Reanalyses

- Evaluation of a Regional Climate Model (RCM) based on the Penn State/NCAR MM5 has been performed using large scale conditions from the NCEP/NCAR reanalyses for 1980-2000.
- Simulation (40 km resolution) has been compared with observations based on station data and PRISM climatology at 1/8 degree.
- For the period 1986-94, the MM5-based regional simulation has been compared with NCEP RSM simulation (50 km resolution) driven by the same reanalyses.
- Hourly simulation data has been provided to impact assessment team.

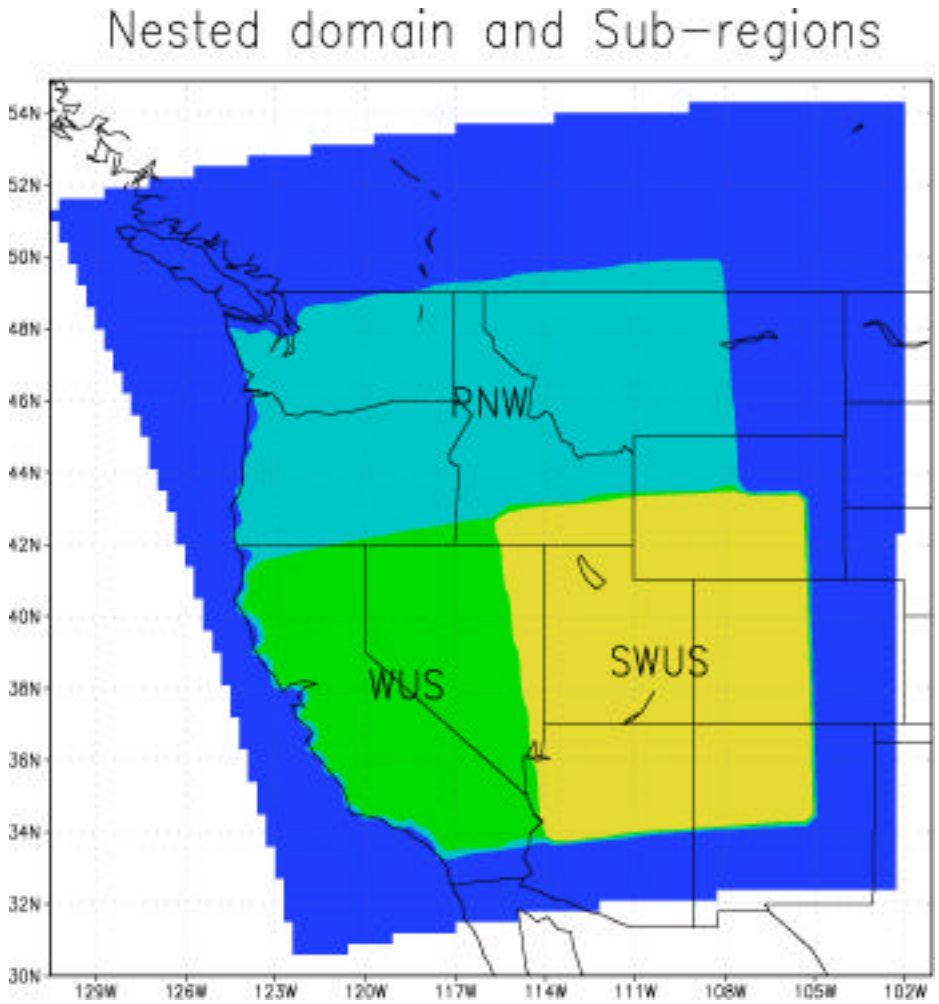
Seasonal (DJF) Mean Precipitation (mm/day)



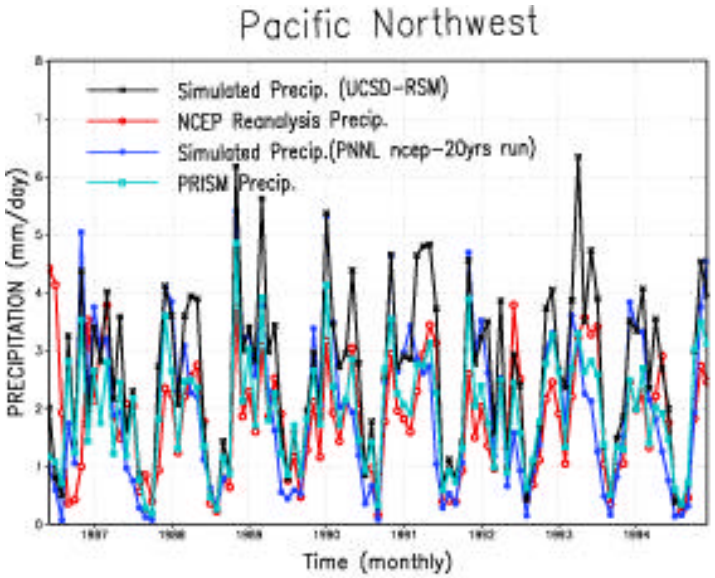
Seasonal (JJA) Mean Precipitation (mm/day)

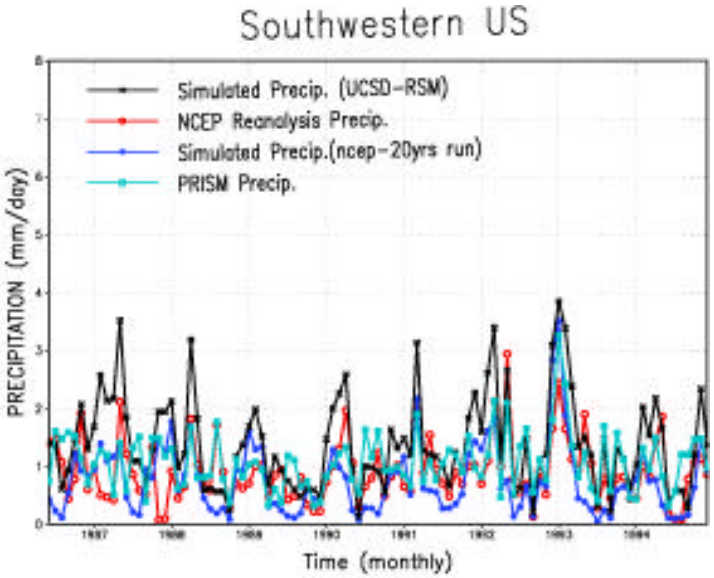


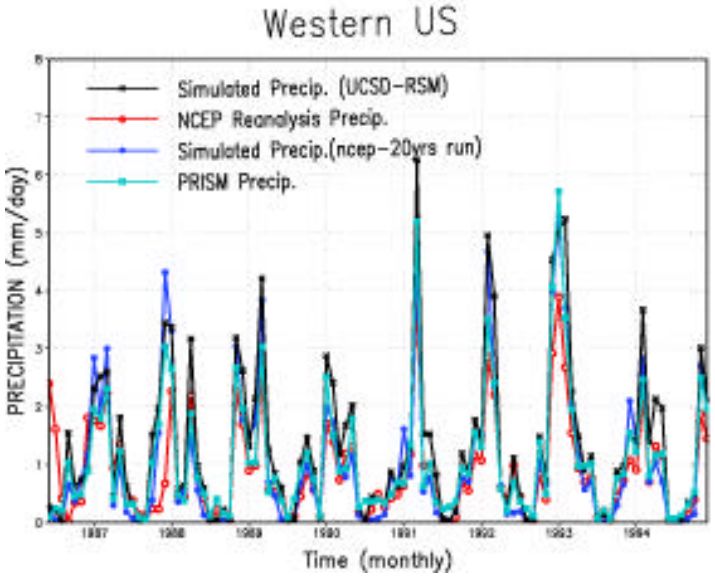
Sub-regions Used in Analyses

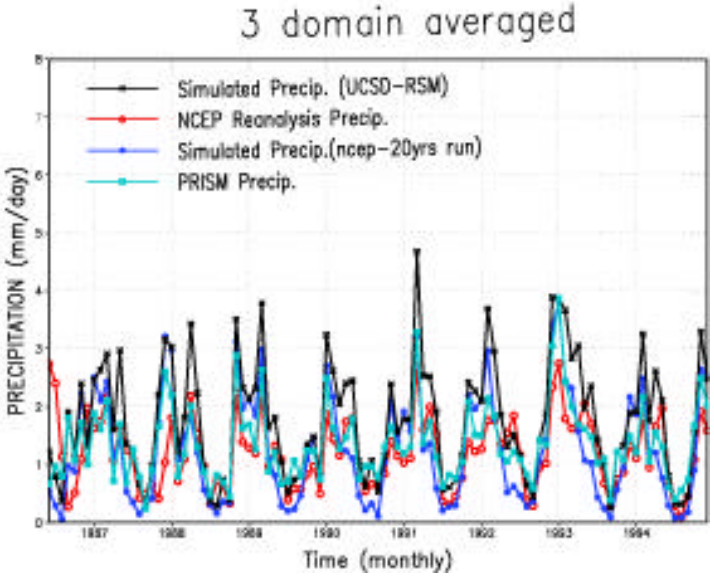


Monthly Mean Precipitation (mm/day)









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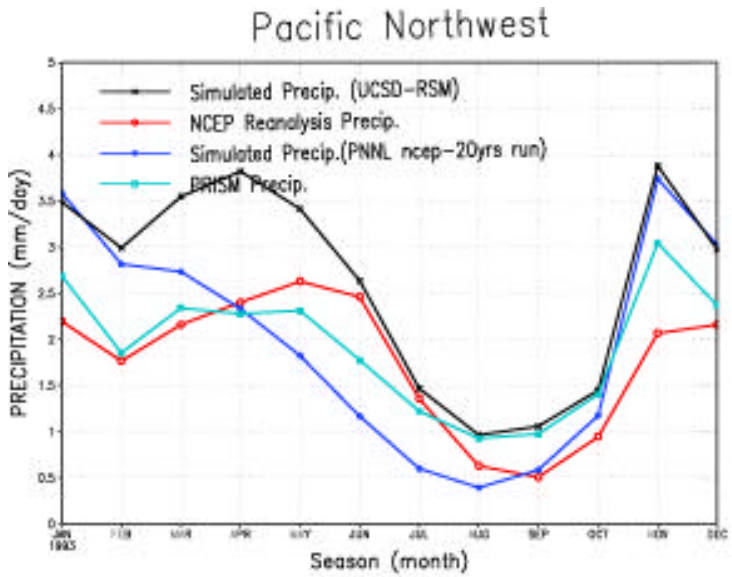
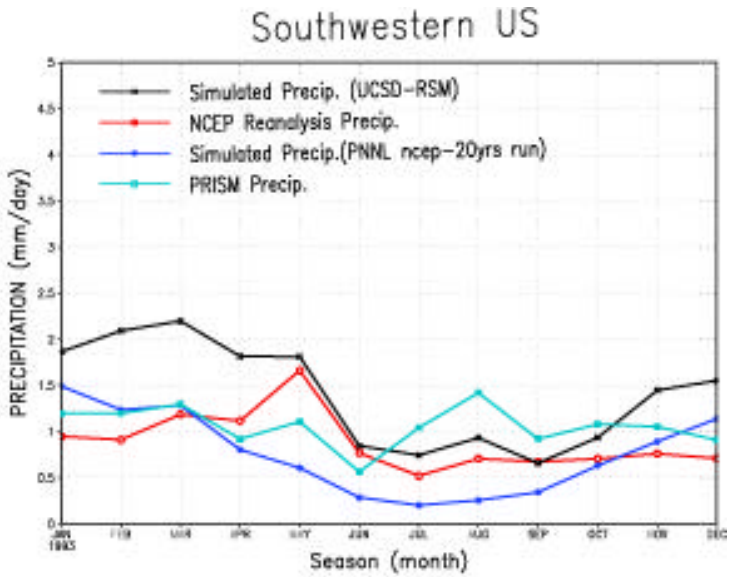
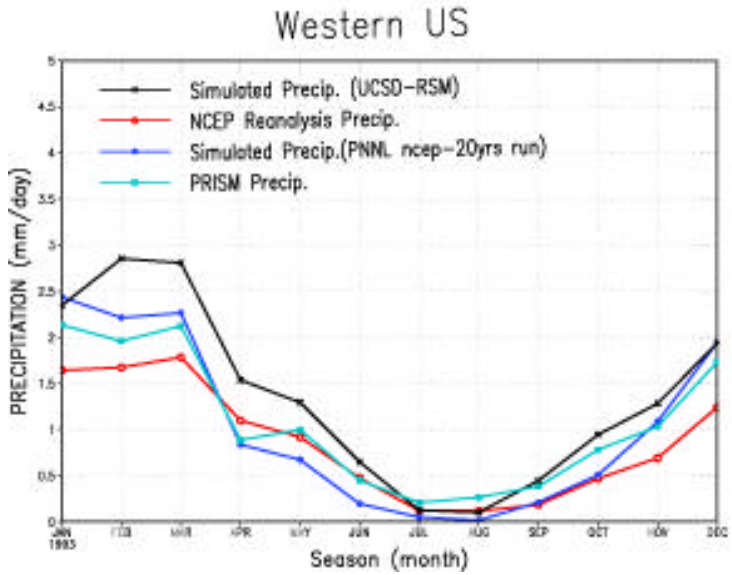
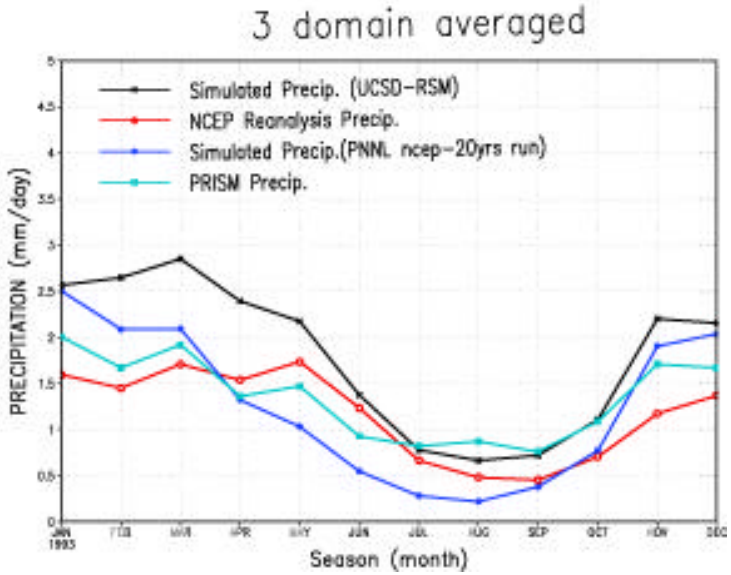
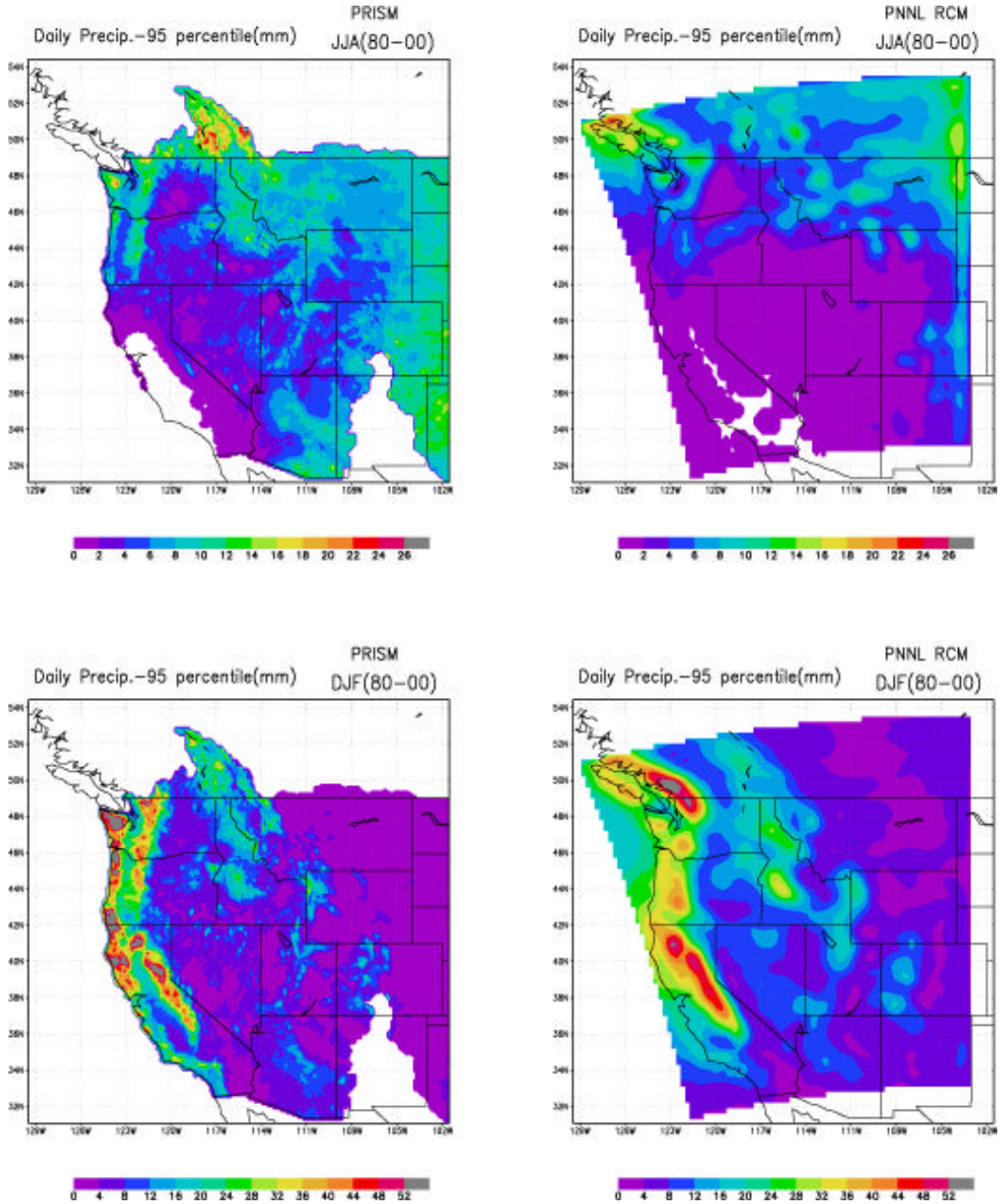








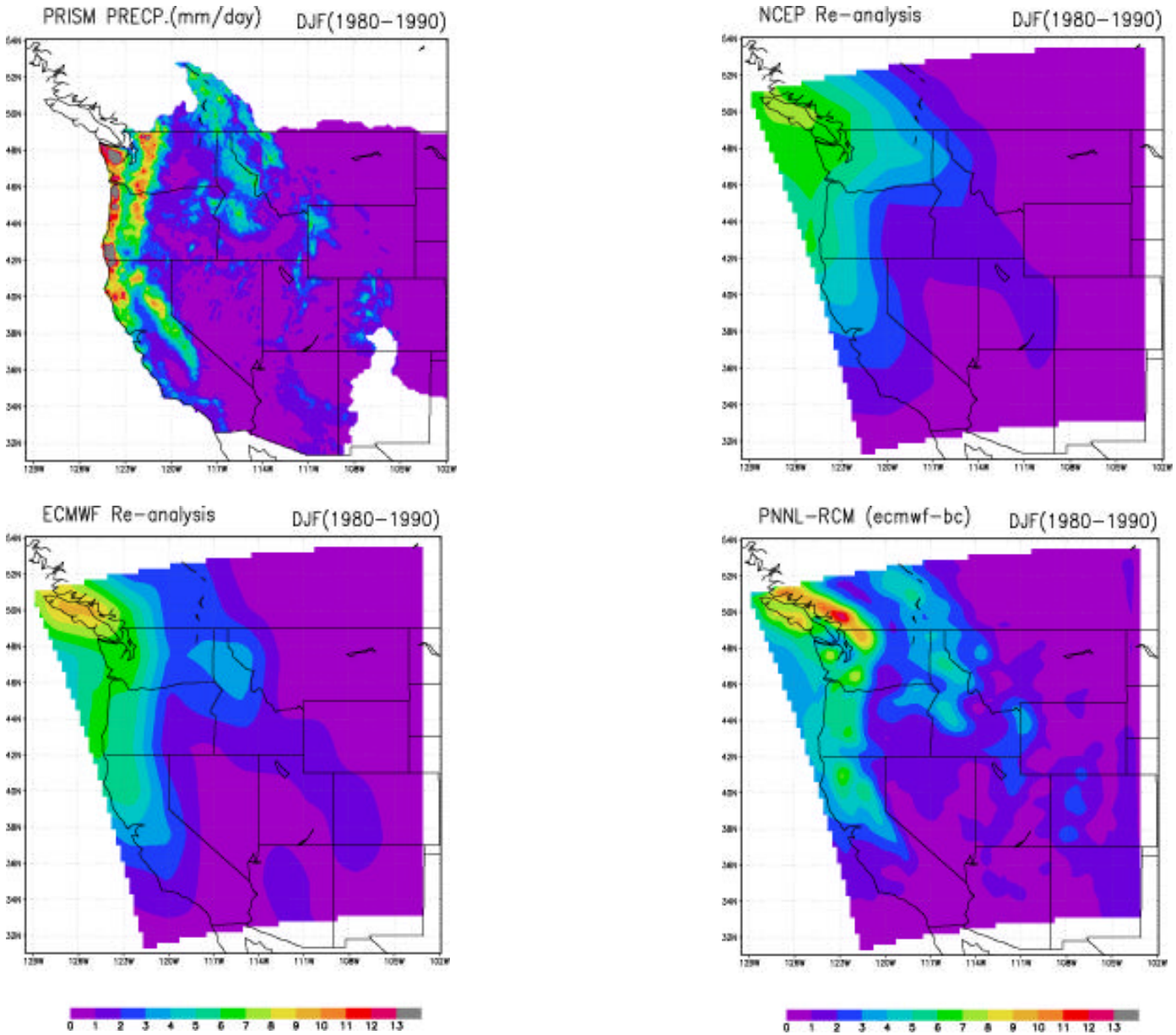
Seasonal Mean Daily Precipitation at 95 Percentile (mm)



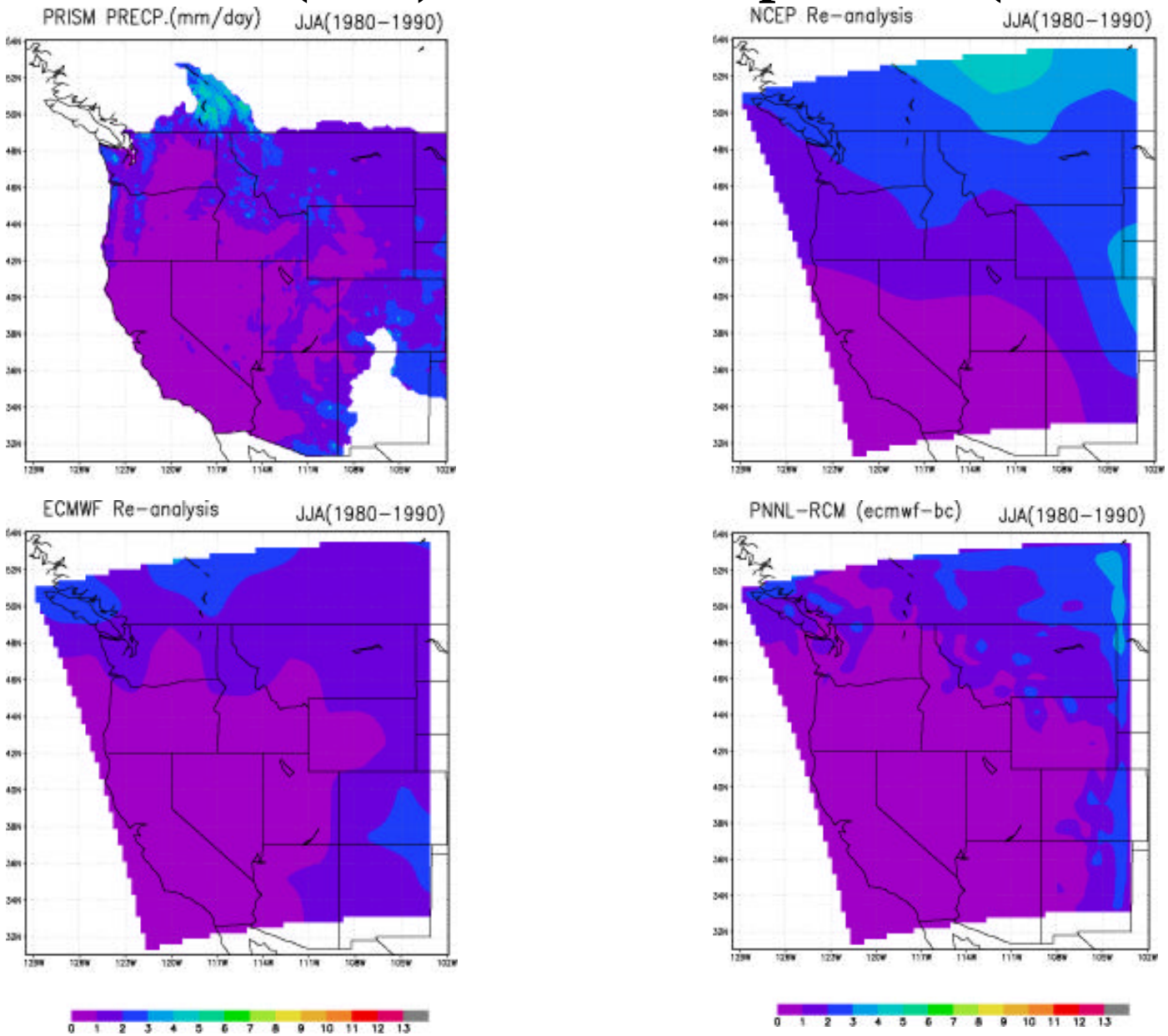
Simulations Driven by ECMWF Reanalyses

- To estimate the sensitivity of regional simulations to different large scale conditions, the MM5-based RCM has been used to simulate regional climate for 1980-1993 using large scale conditions from the ECMWF reanalyses.
- Simulation was compared with the ECMWF and NCEP/NCAR reanalyses and observations.

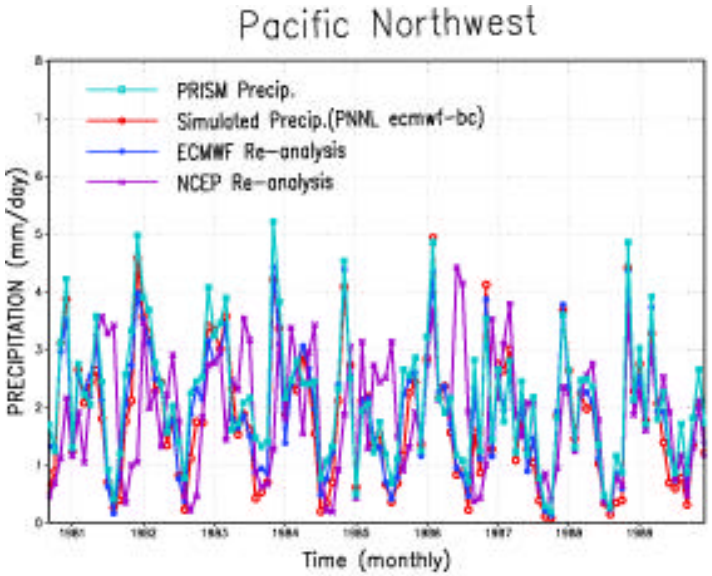
Seasonal (DJF) Mean Precipitation (mm/day)

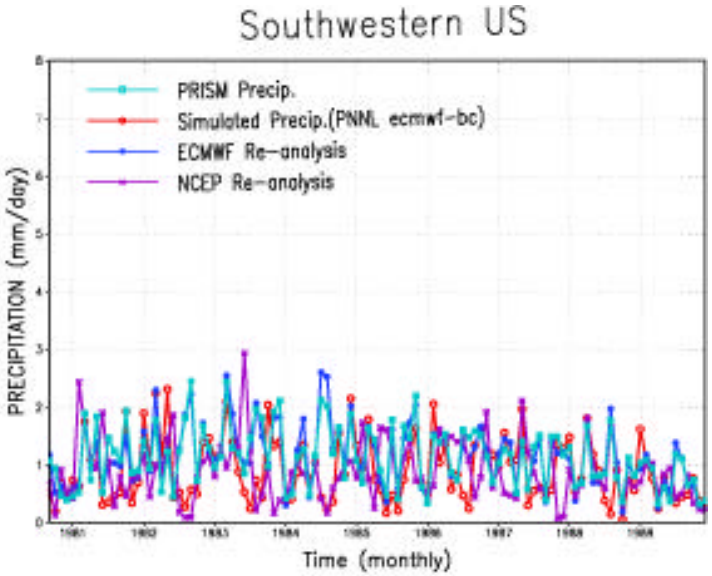


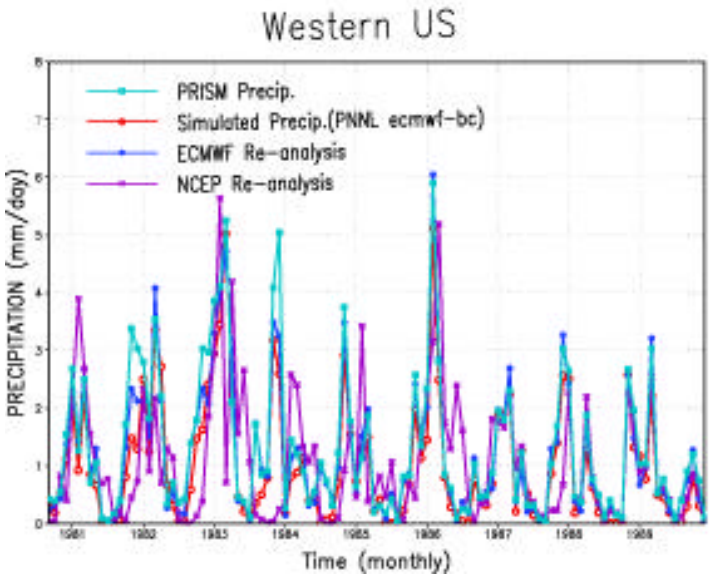
Seasonal (JJA) Mean Precipitation (mm/day)

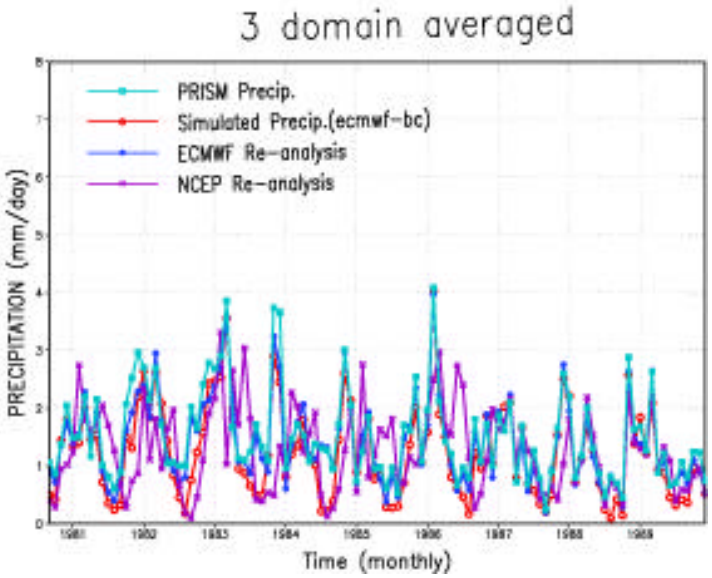


Monthly Mean Precipitation (mm/day)









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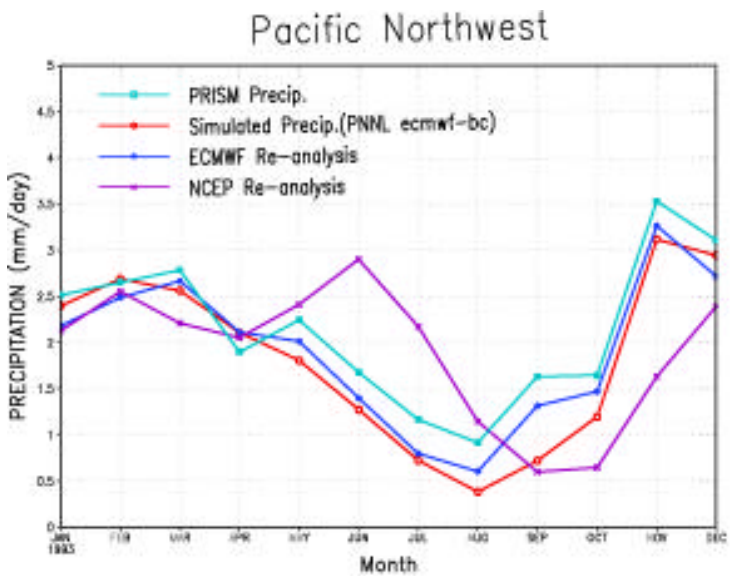
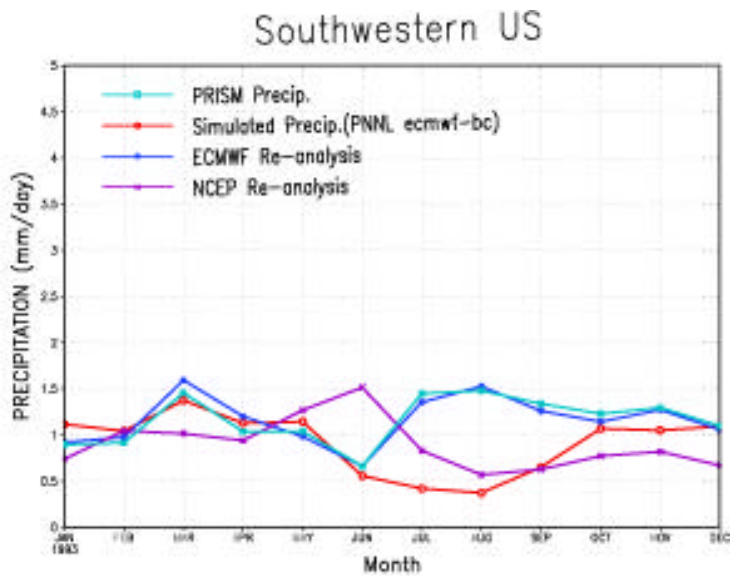
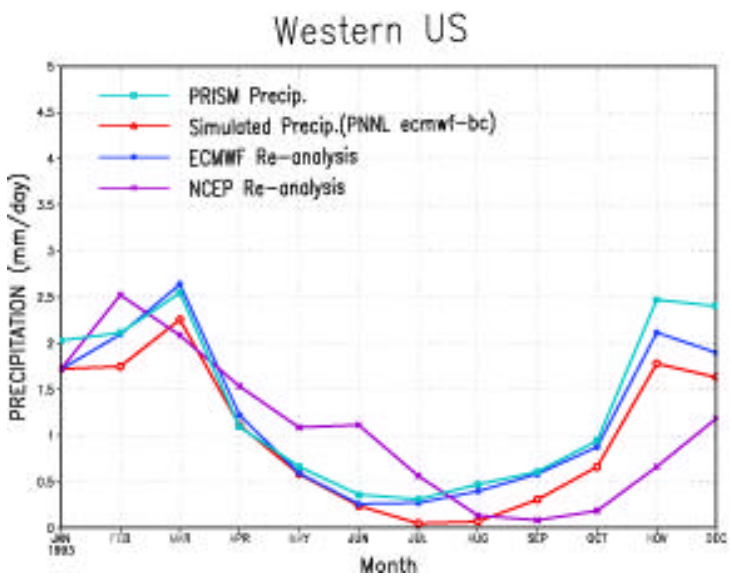
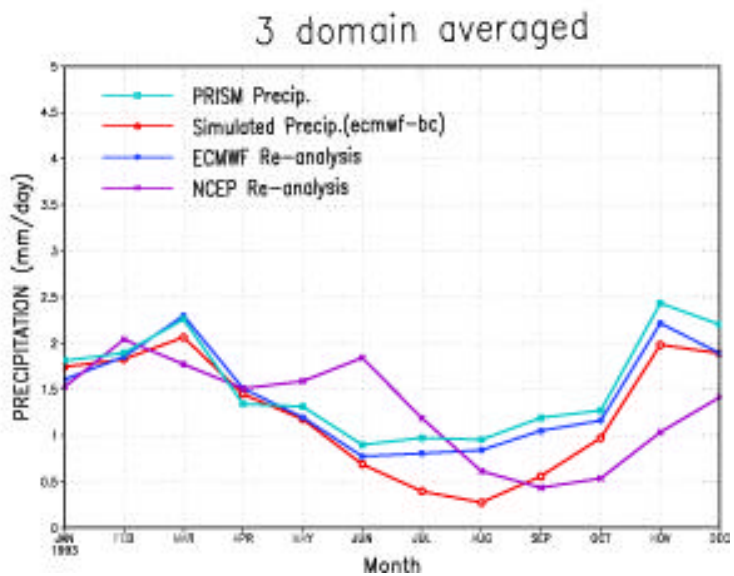




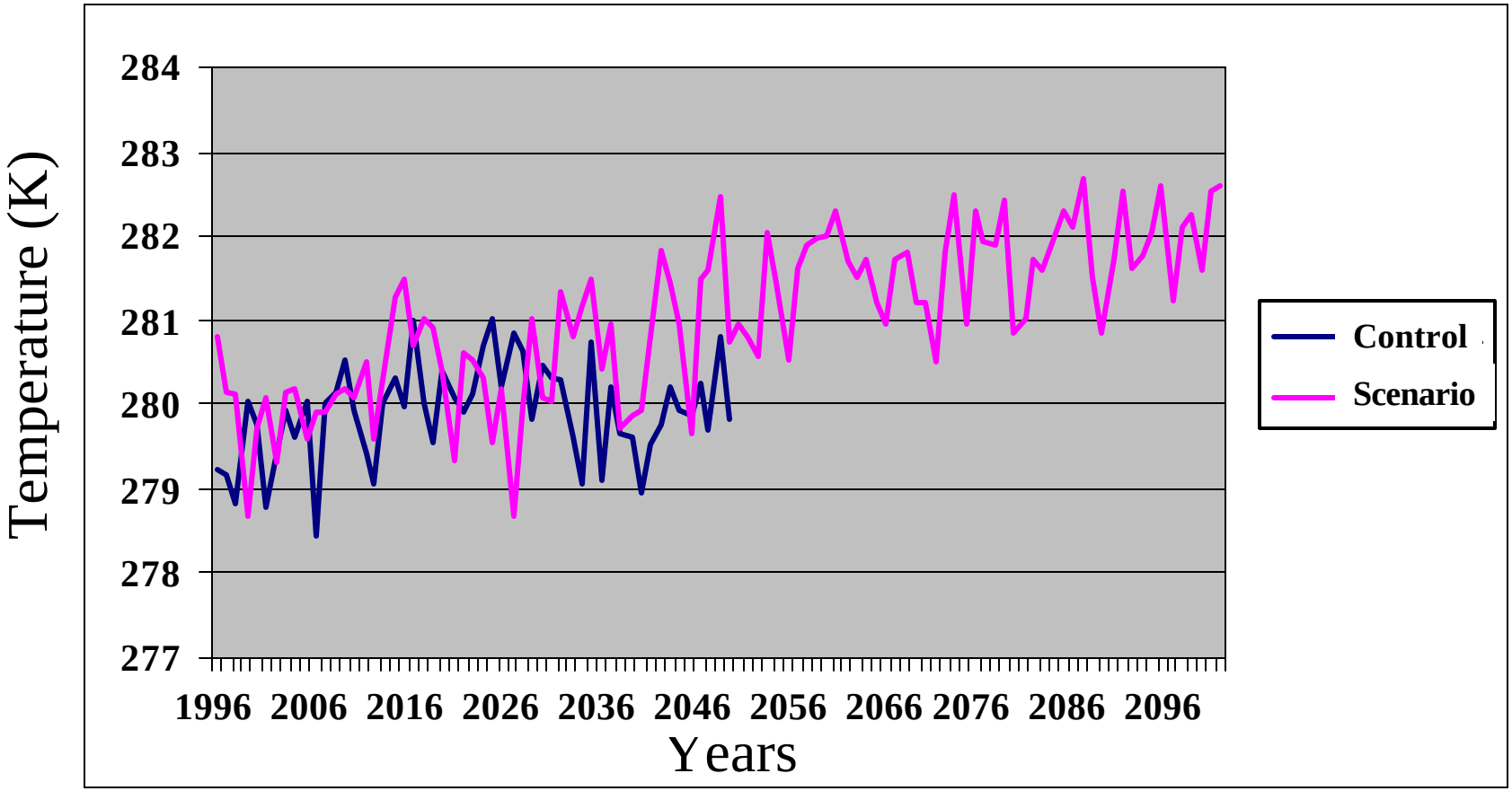




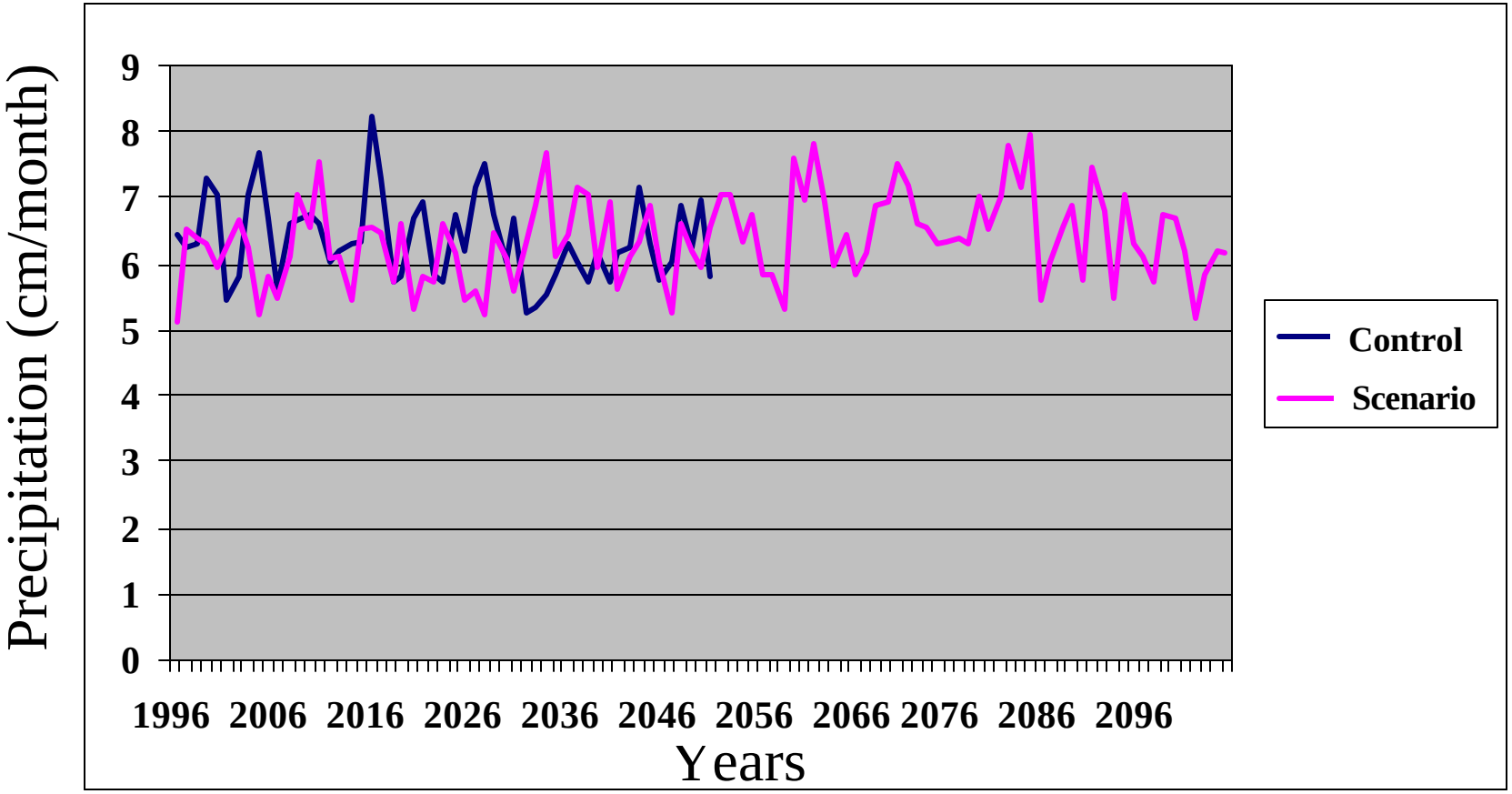
Downscaling of PCM Simulations

- Four sets of PCM simulations are available for downscaling:
- B06.45 – Control (1995-2048)
- B06.44, B06.46, B06.47 – BAU (1995-2099)
- Downscaling has been performed for one year in 2039.

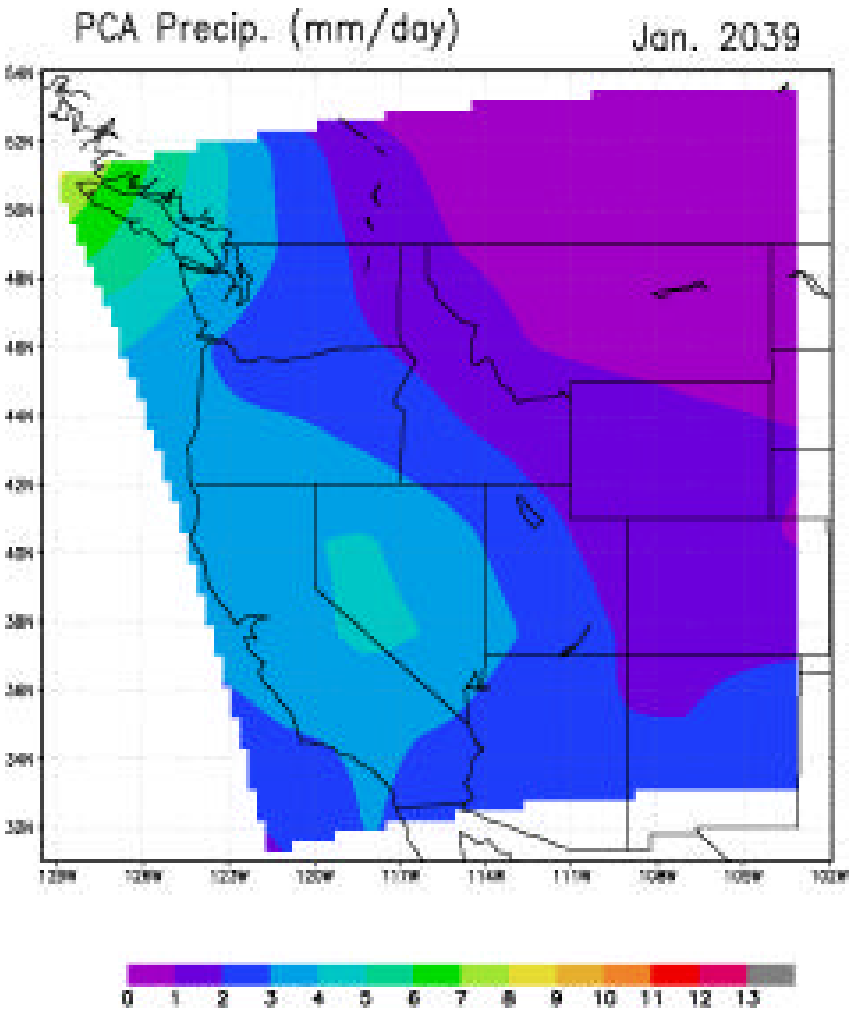
Temperature in Control and Climate Change Simulations

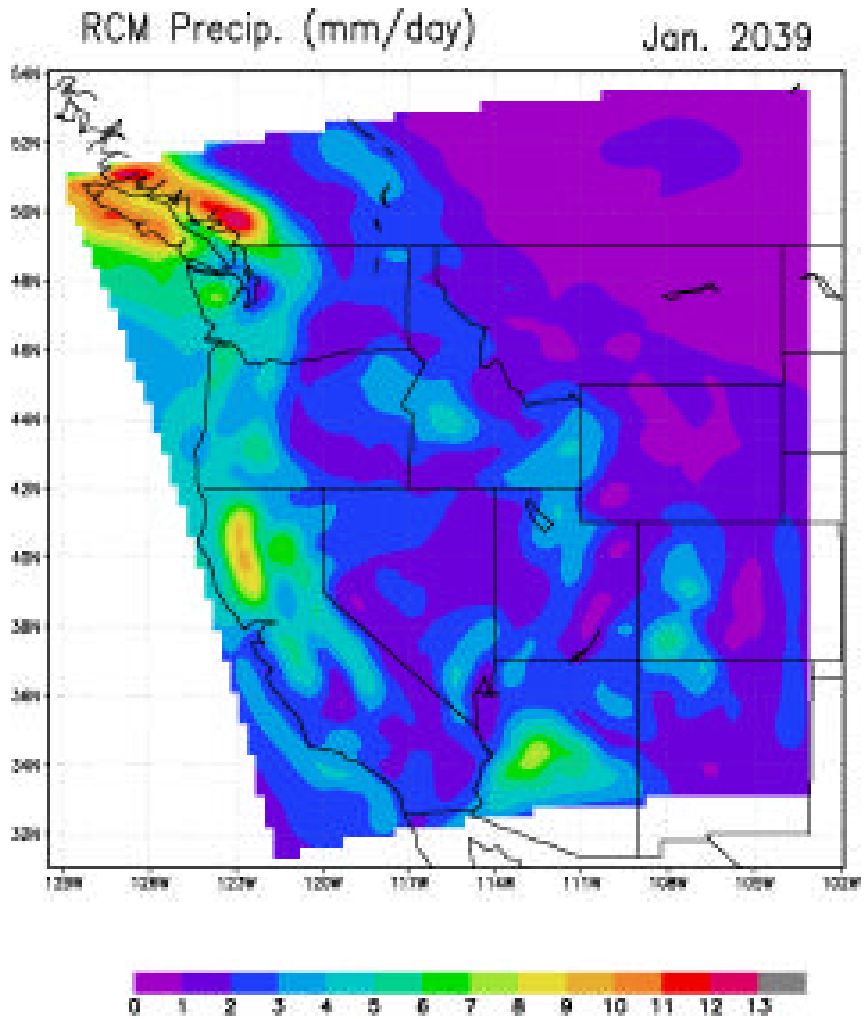


Precipitation in Control and Climate Change Simulations



Precipitation (Jan 2039)





Future Work

- Perform simulation with subgrid orographic precipitation parameterization using large scale conditions from ECMWF reanalyses.
- Continue to downscale PCM simulations for 20 years in the control and future scenarios, starting with the control run.
- Continue to analyze and intercompare regional simulations and PCM simulations.