National Climate Assessment

U.S. Global Change Research Program

Southwest Regional Climatology and Outlook

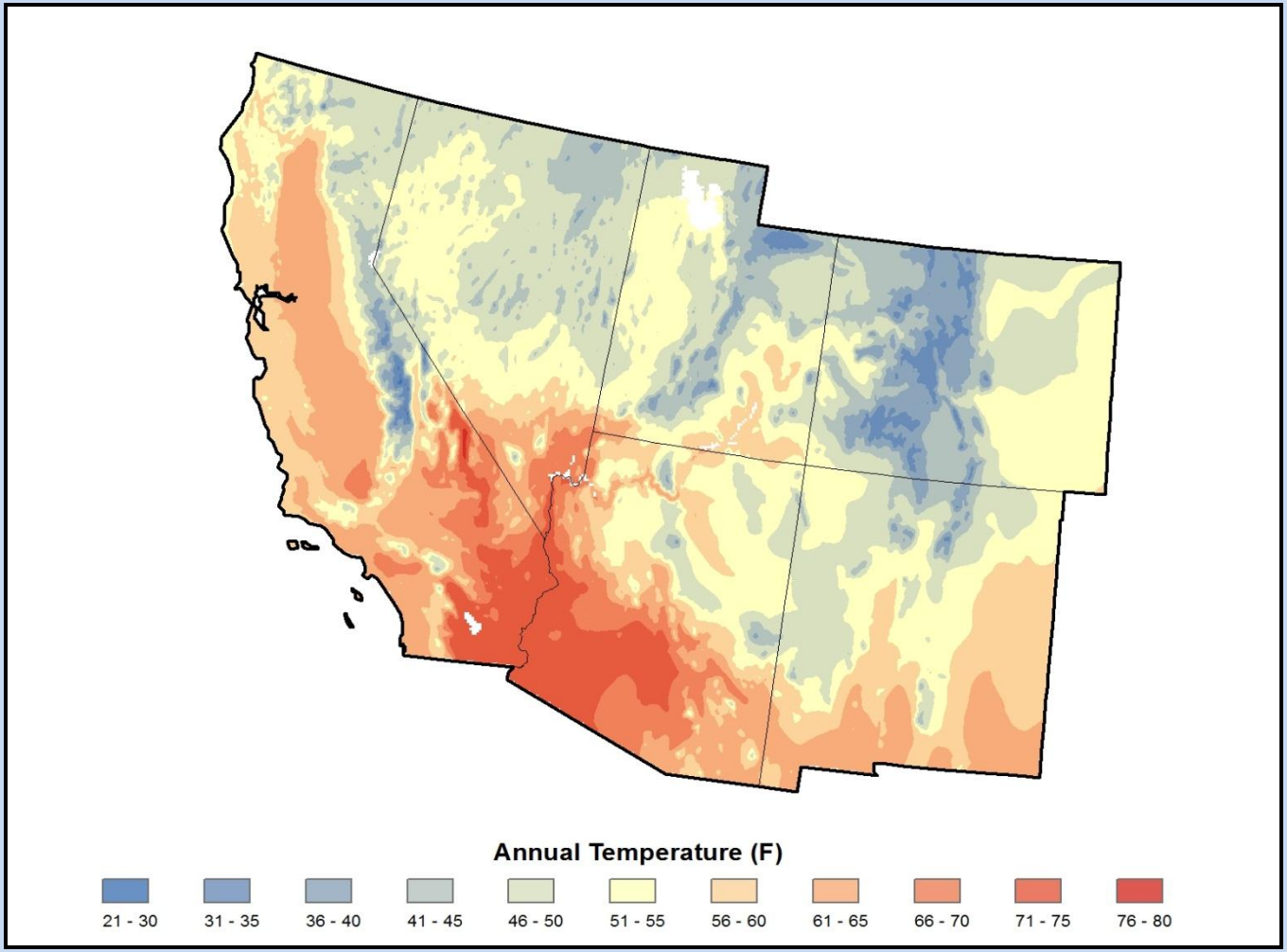
Kenneth Kunkel

NOAA Cooperative Institute for Climate and Satellites

L. Stevens, S. Stevens, L. Sun, E. Janssen, D. Wuebbles, K. Redmond, and G. Dobson

http://assessment.globalchange.gov

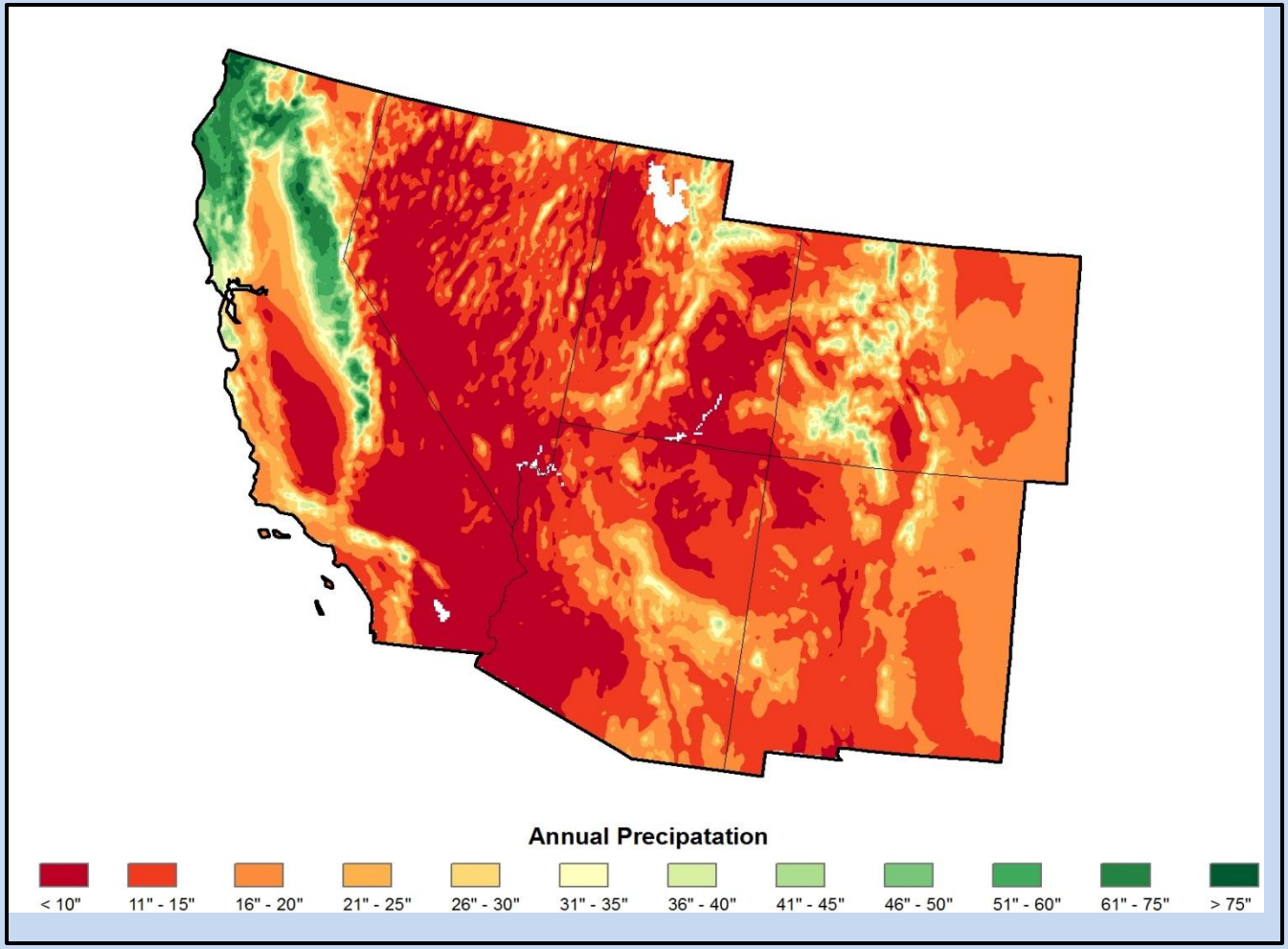
Annual Temperature Pattern



National Climate Assessment

U.S. Global Change Research Program

Annual Precipitation Pattern



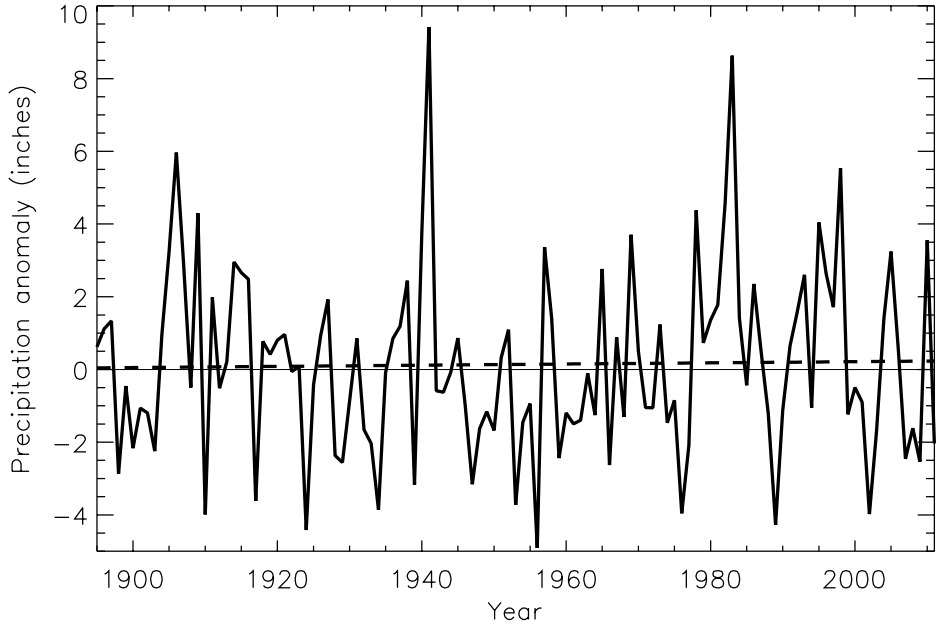
National Climate Assessment

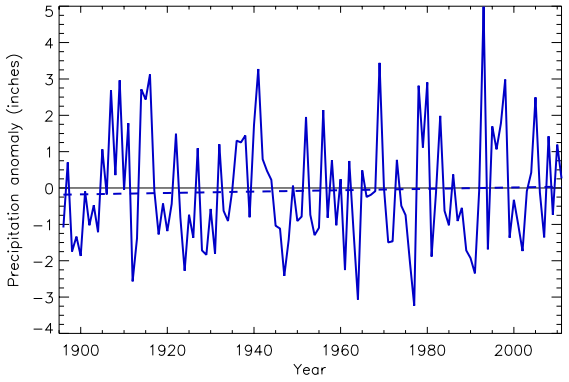
U.S. Global Change Research Program

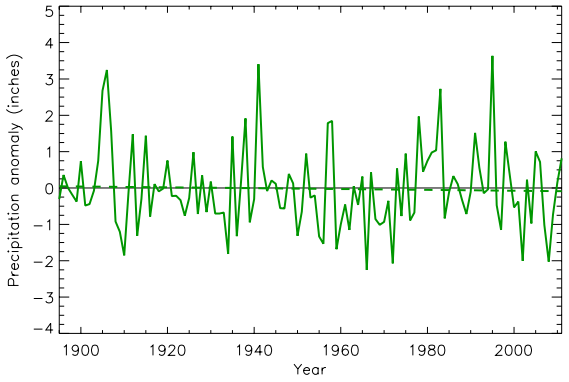
Important Climate Factors

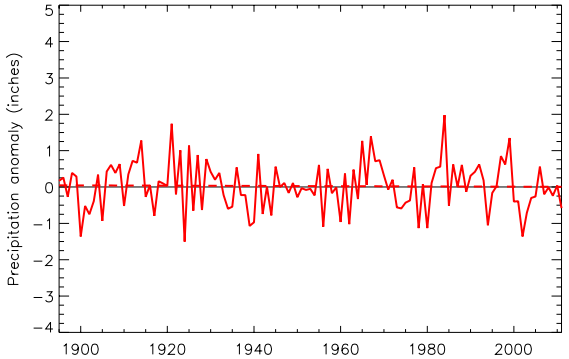
- Drought
- Heat Waves
- Winter Storms
- Floods
- Warm Downslope Winds

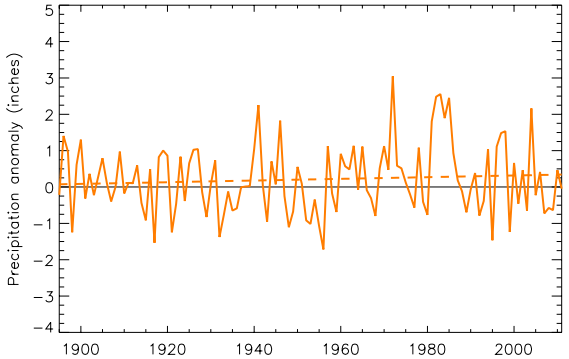
National Climate Assessment
U.S. Global Change Research Program



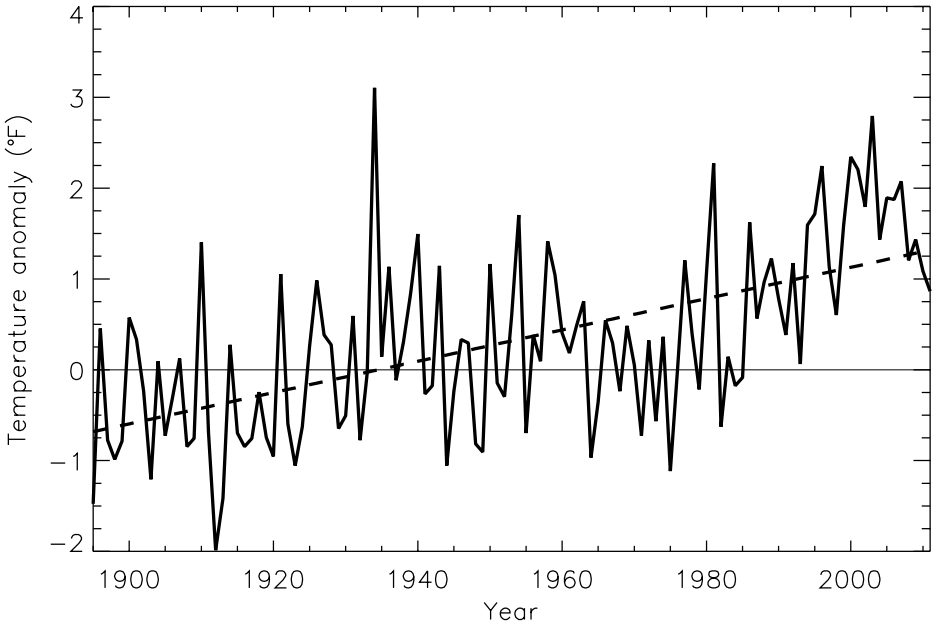


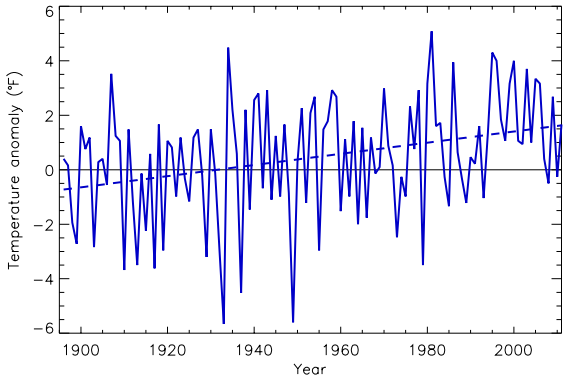


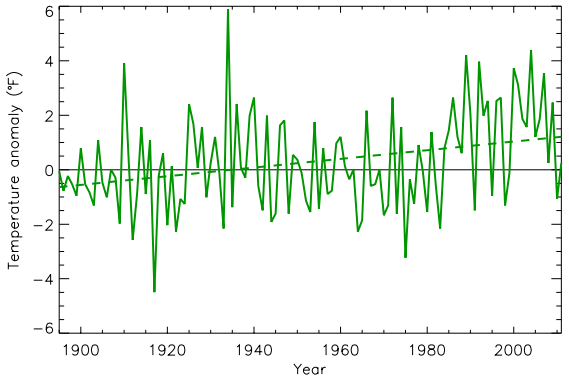


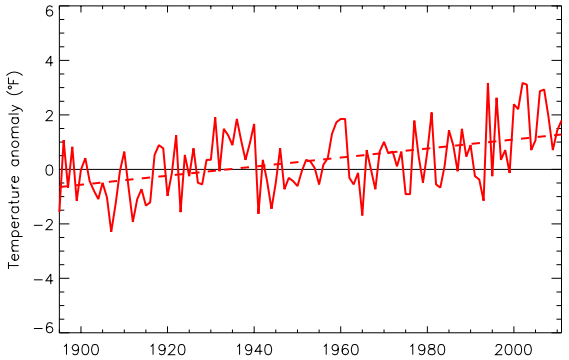


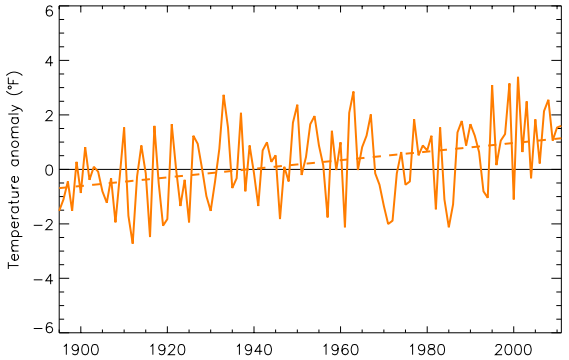
Nati
Clim
Asse
U.S. Global Change Re


Temperature anomaly (°F)
Year
4
3
2
1
0
−1
−2
1900
1920
1940
1960
1980
2000

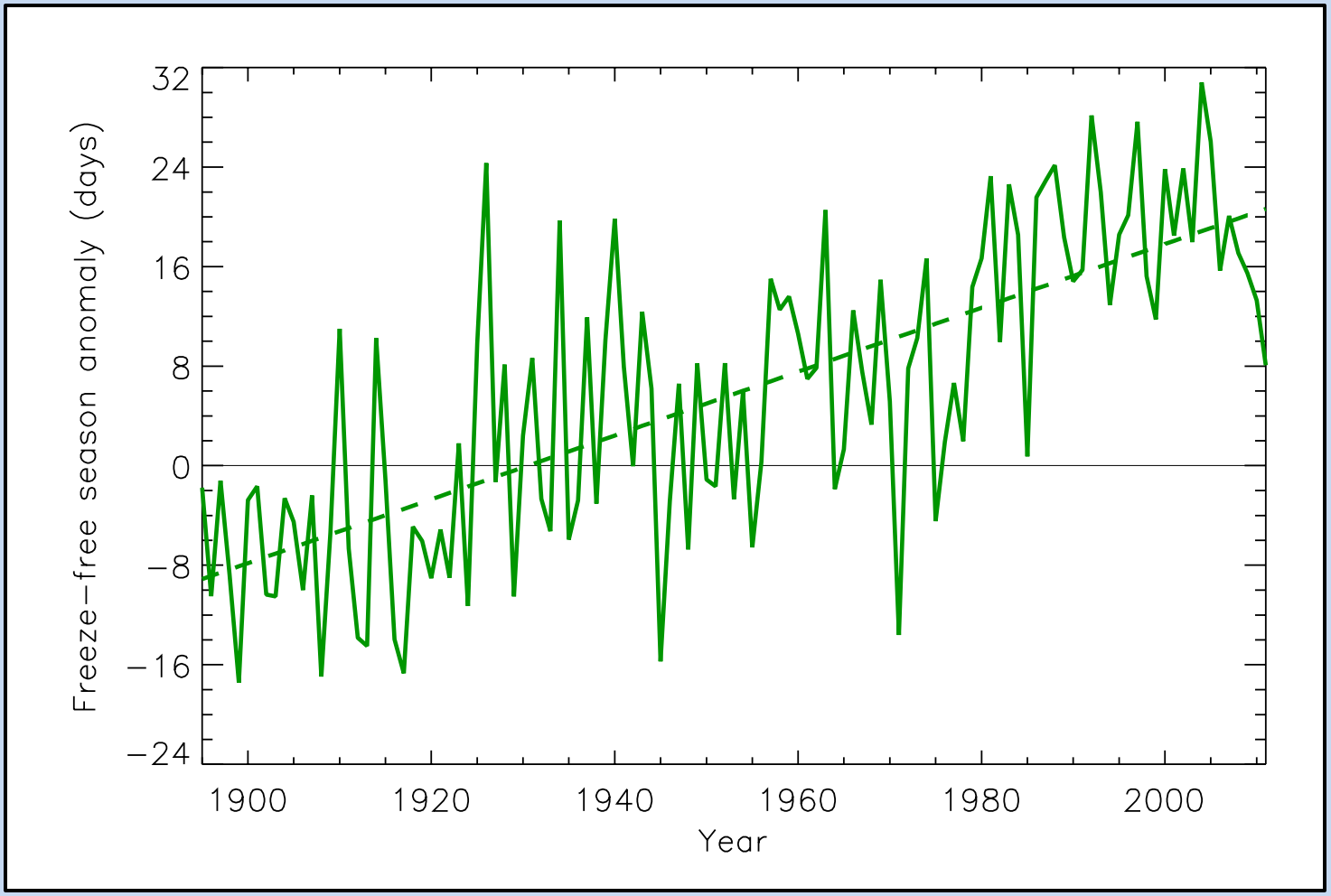

Temperature anomaly (°F)
Year
6
4
2
0
−2
−4
−6
1900
1920
1940
1960
1980
2000


Temperature anomaly (°F)
Year
6
4
2
0
−2
−4
−6
1900
1920
1940
1960
1980
2000


Temperature anomaly (°F)
6
4
2
0
−2
−4
−6
1900
1920
1940
1960
1980
2000


Temperature anomaly (°F)
6
4
2
0
−2
−4
−6
1900
1920
1940
1960
1980
2000

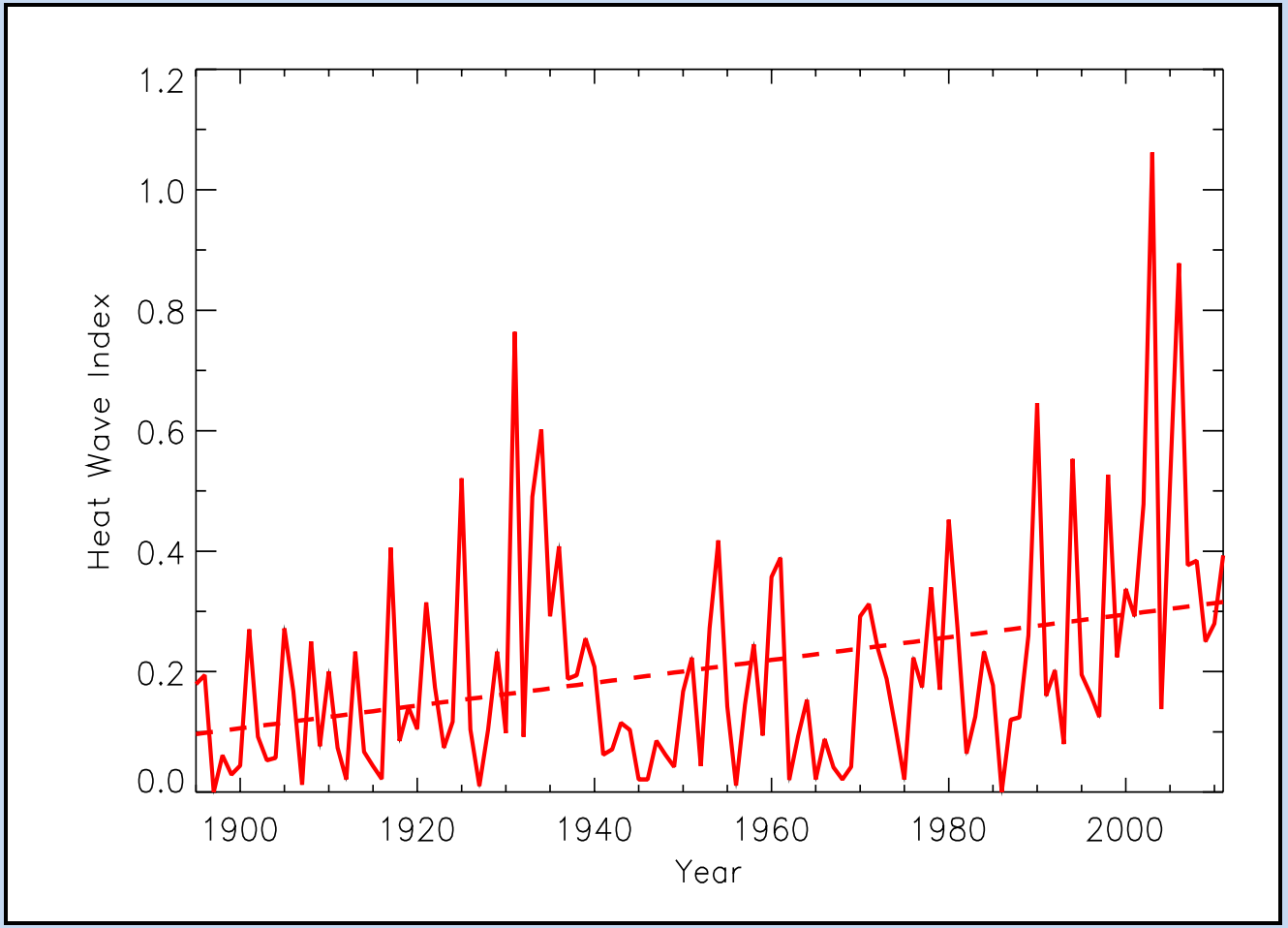
Freeze-Free Season



National Climate Assessment

U.S. Global Change Research Program

Heat Wave (5-yr recurrence)



National Climate Assessment

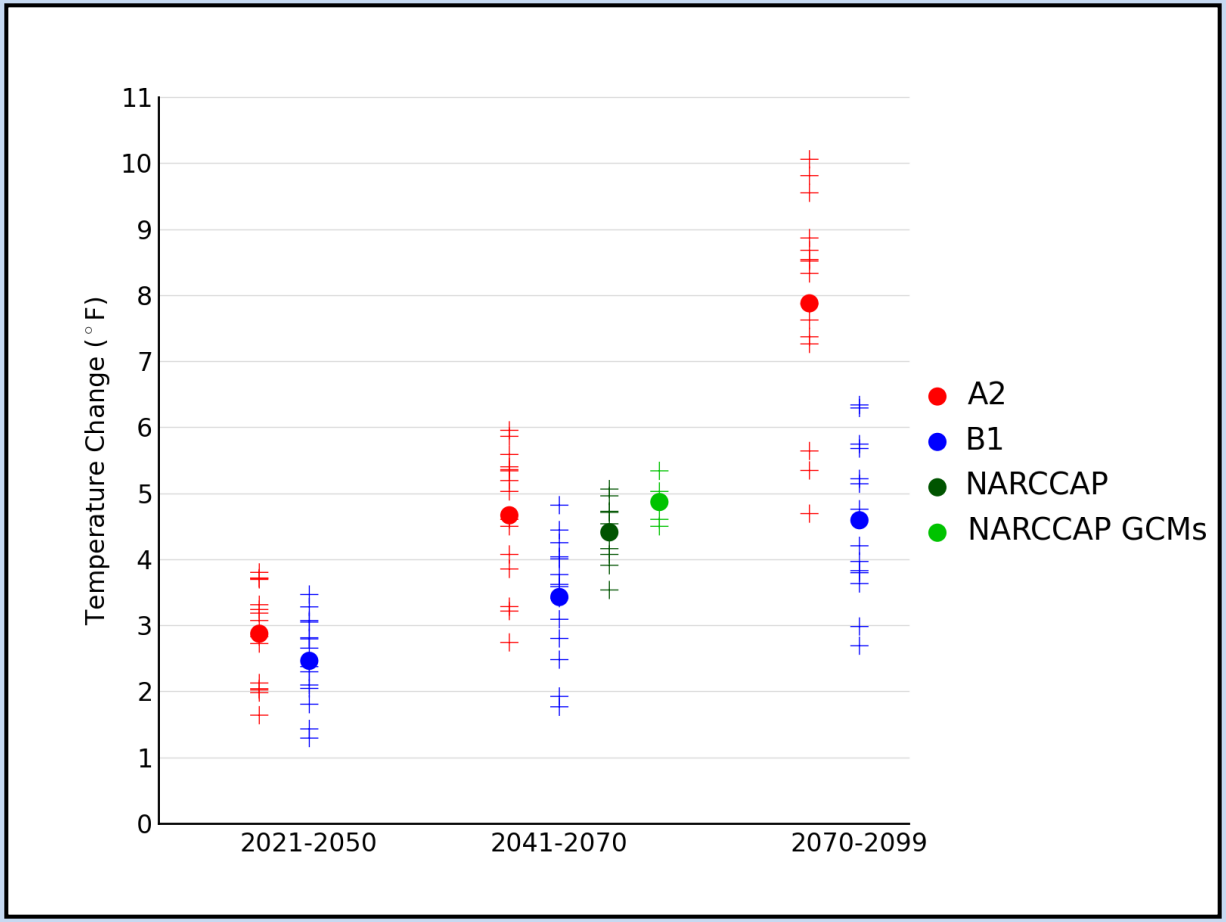
U.S. Global Change Research Program

National Climate Assessment

U.S. Global Change Research Program

Temperature Changes

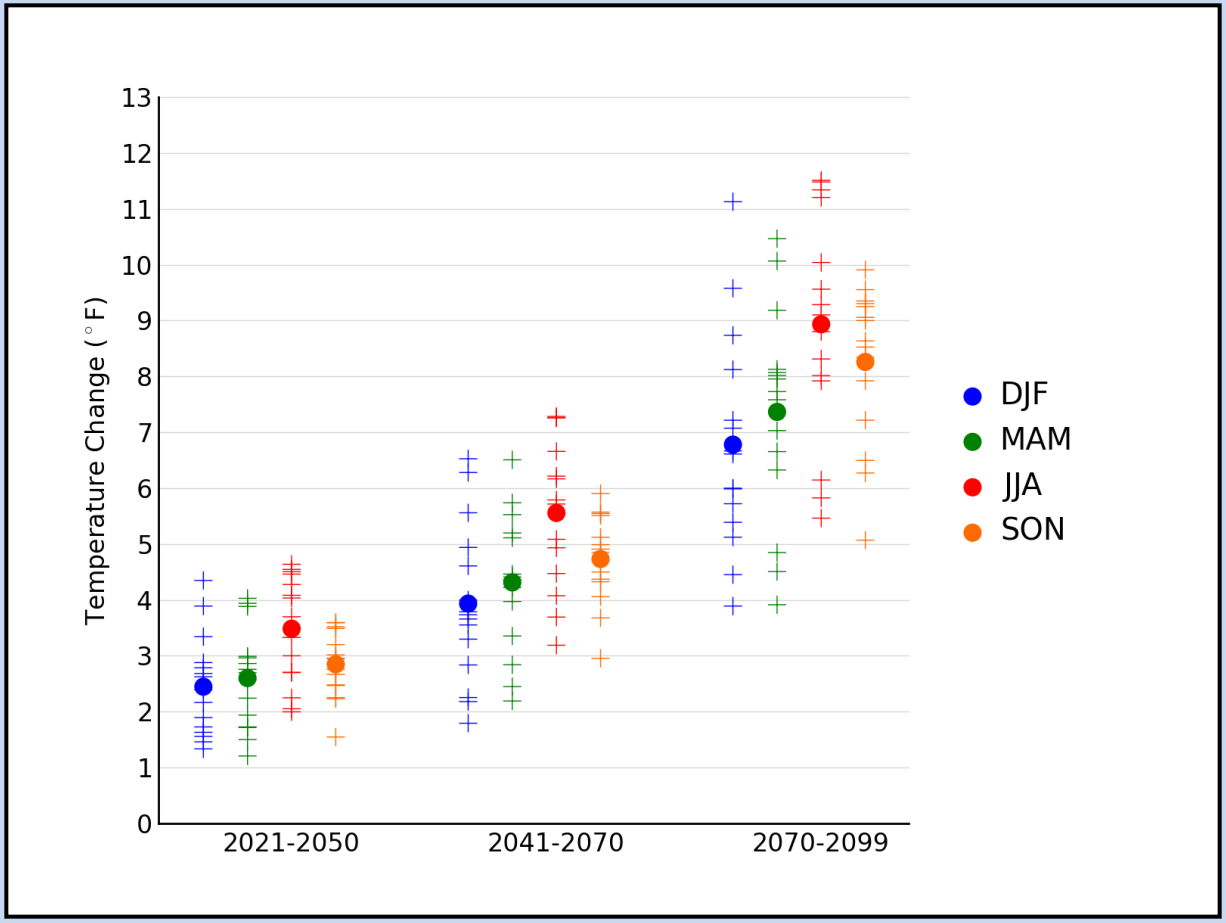
Summary of model simulations



National Climate Assessment

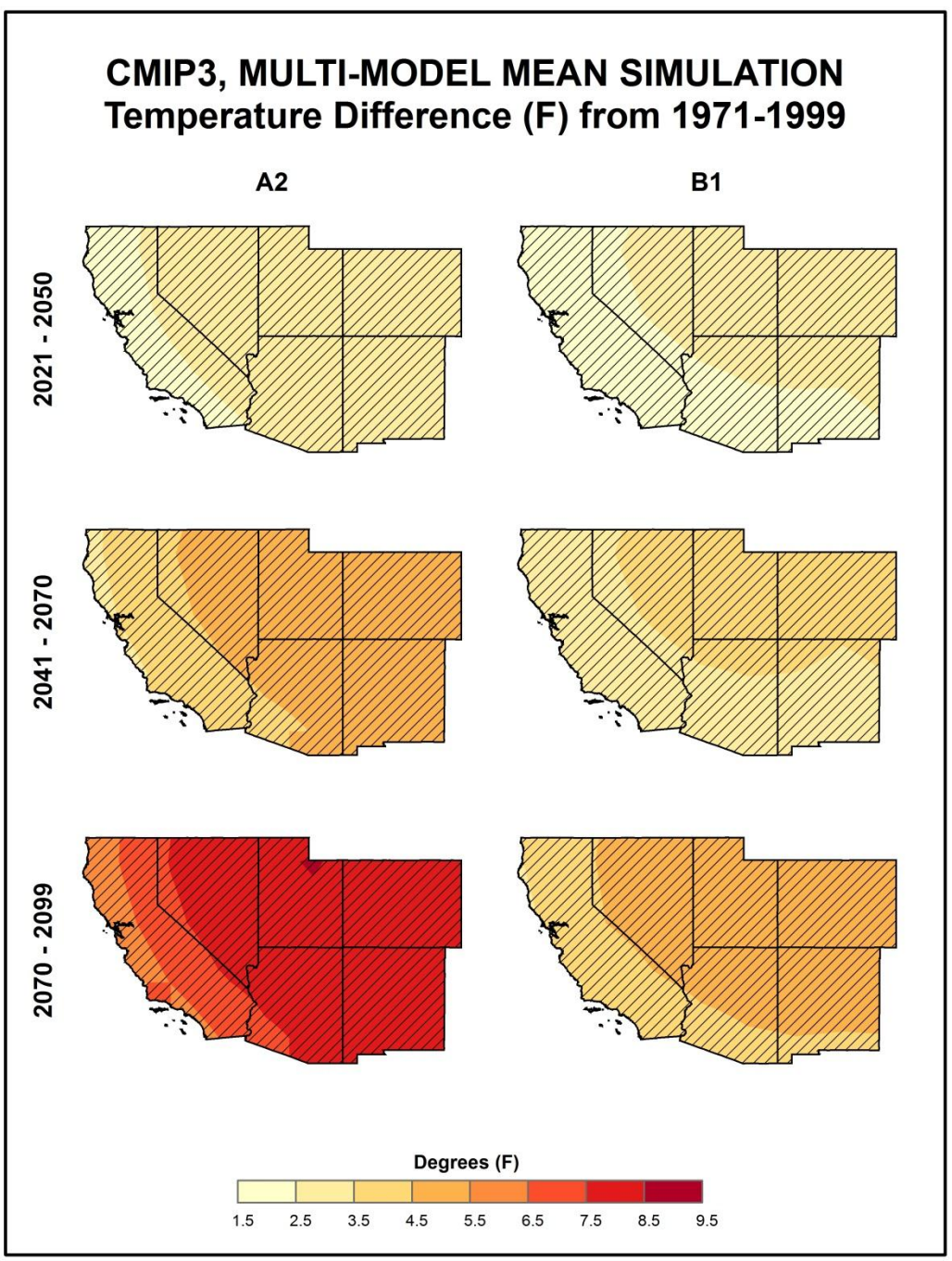
U.S. Global Change Research Program

Seasonal Temperature Changes



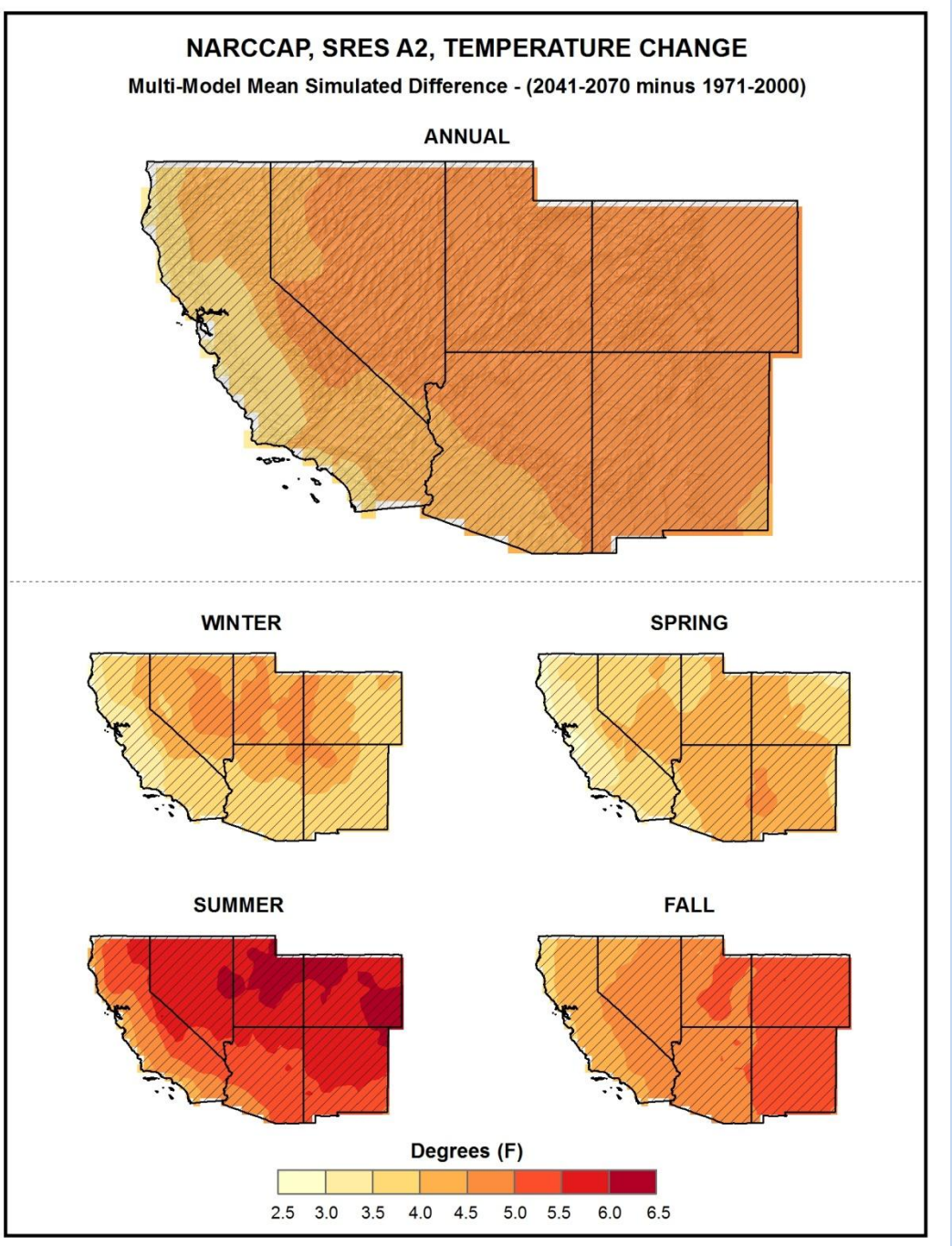
National Climate Assessment

U.S. Global Change Research Program



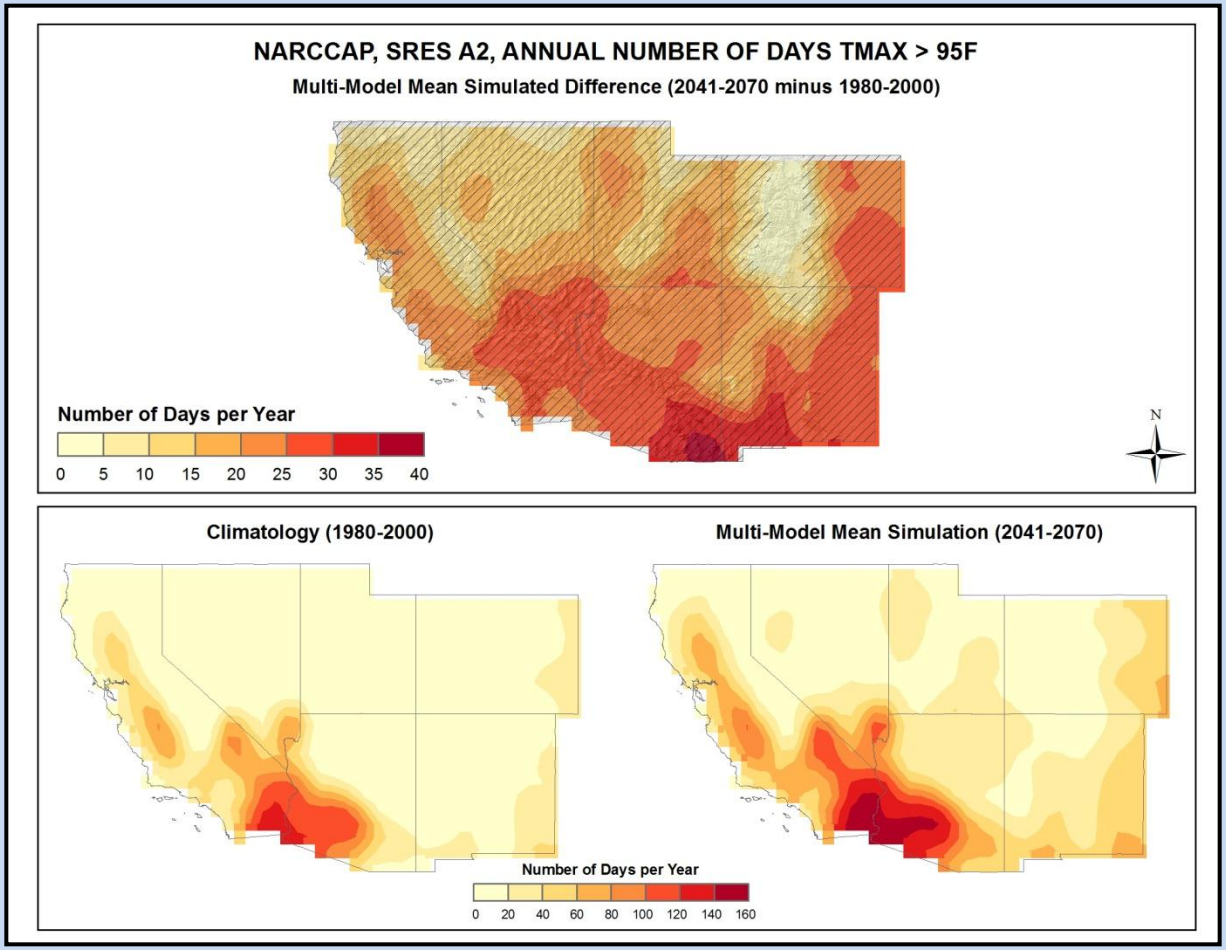
National Climate Assessm

U.S. Global Change Research Program



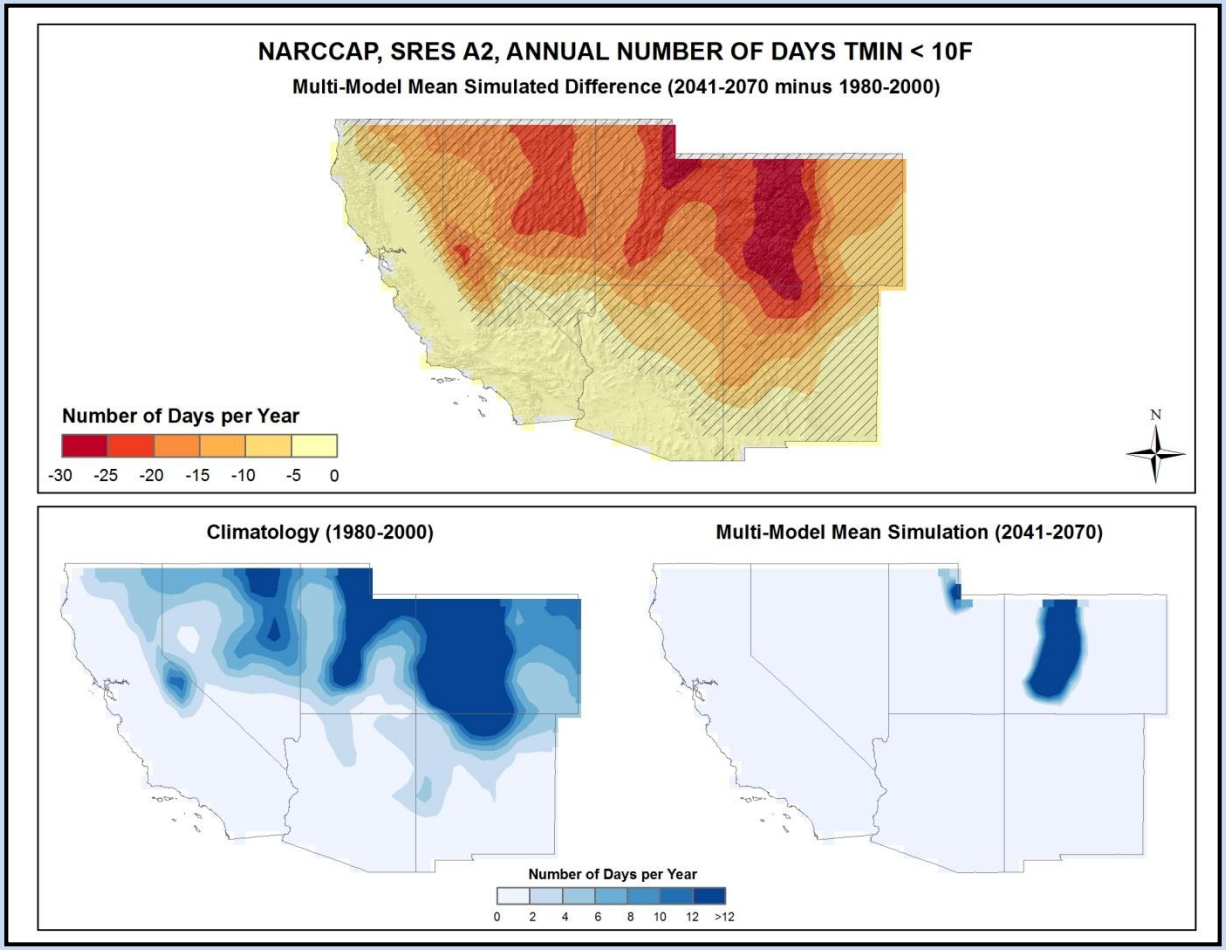
National Climate Assessm

U.S. Global Change Research Program



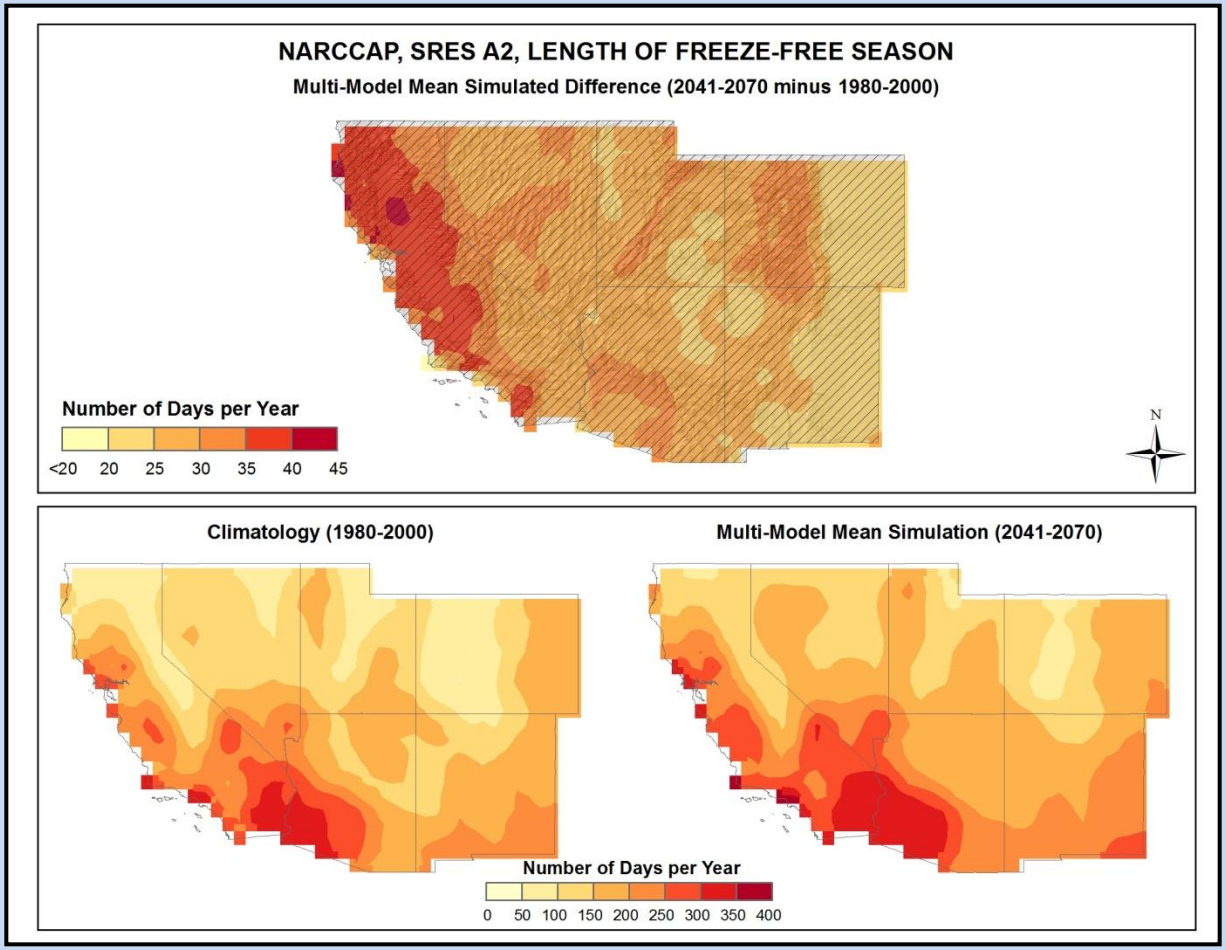
National Climate Assessment

U.S. Global Change Research Program



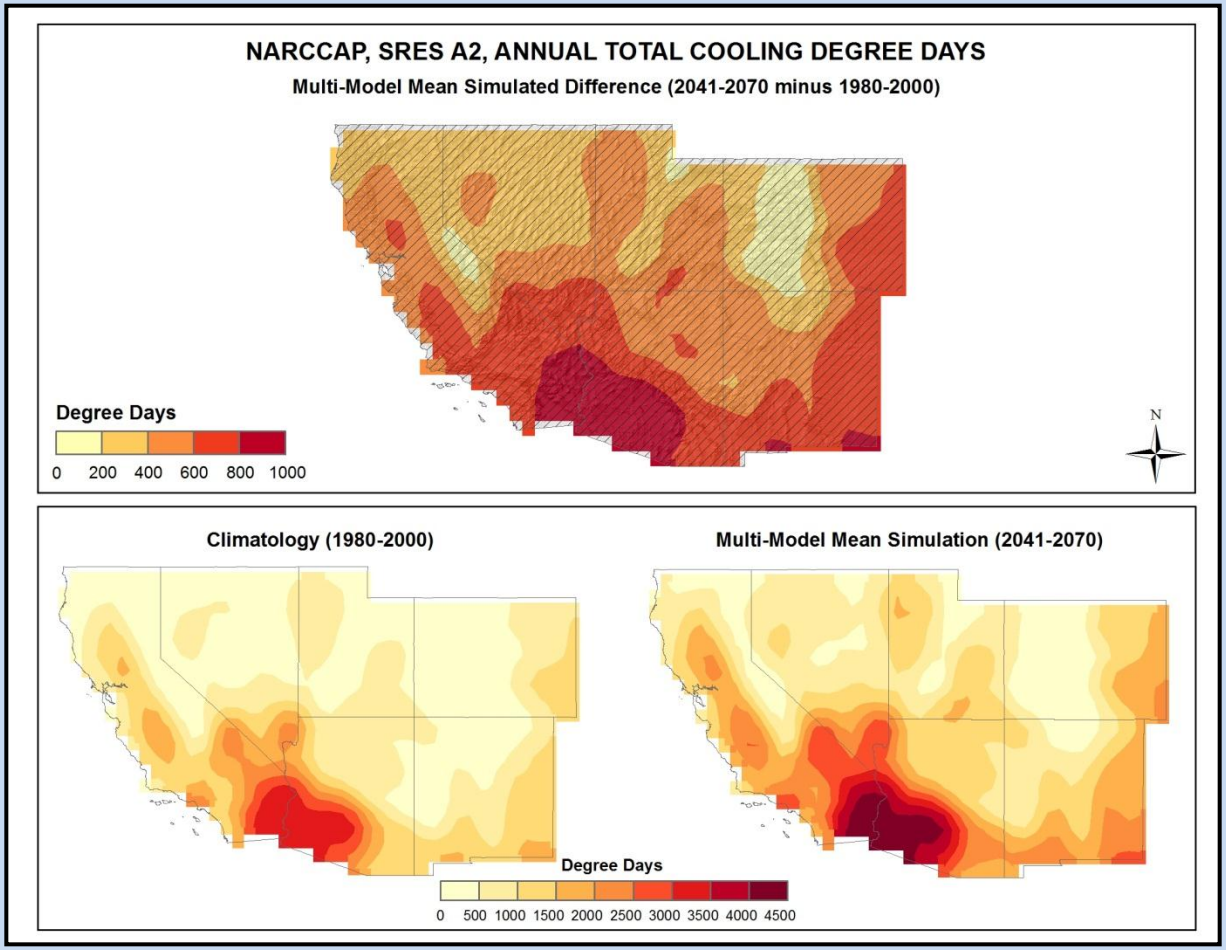
National Climate Assessment

U.S. Global Change Research Program



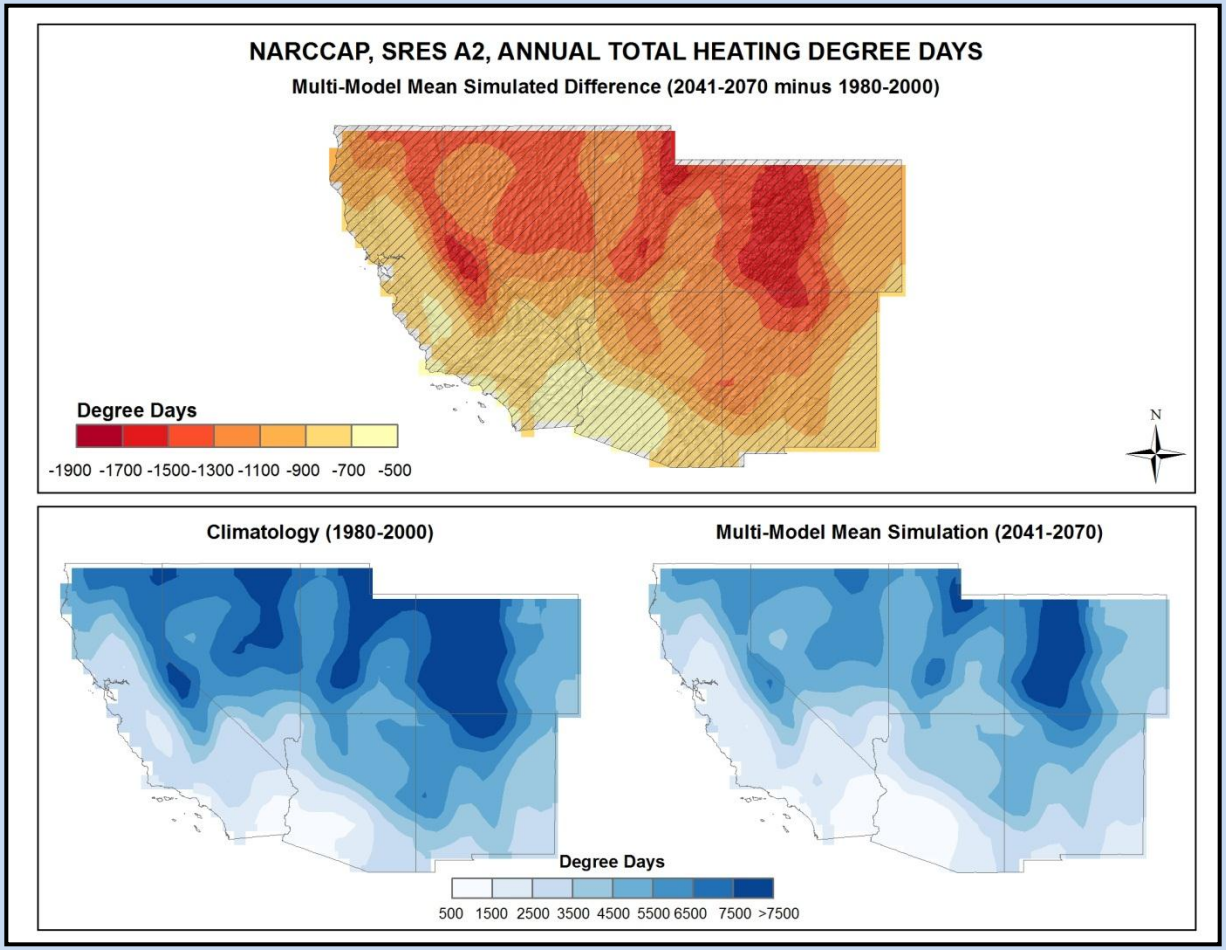
National Climate Assessment

U.S. Global Change Research Program



National Climate Assessment

U.S. Global Change Research Program



National Climate Assessment

U.S. Global Change Research Program

Derived Temperature Variables

Variable	NARCCAP	SD
Freeze-free period	+30(+/-3) days	+31 days
#days Tmax>90˚ F	+24(+/-4) days	+31 days
#days Tmax>95˚ F	+20(+/-7) days	+24 days
#days Tmax>100˚ F	+15 (+/-9) days	14 days
#days Tmin<32˚ F	-29 (+/-3) days	-29 days
#days Tmin< 10˚ F	-11 (+/-5) days	-8 days
#days Tmin<0˚ F	-5 (+/-3) days	-3 days
Max run days > 95˚ F	+82% (+/-44%)	+114%
Max run days > 100˚ F	+103% (+/-74)	+158%
Heating degree days	-18% (+/-1)	-19%
Cooling degree days	+64% (+/-19)	+65%
Growing degree days (base 50F)	+34%(+/-5)	+34%

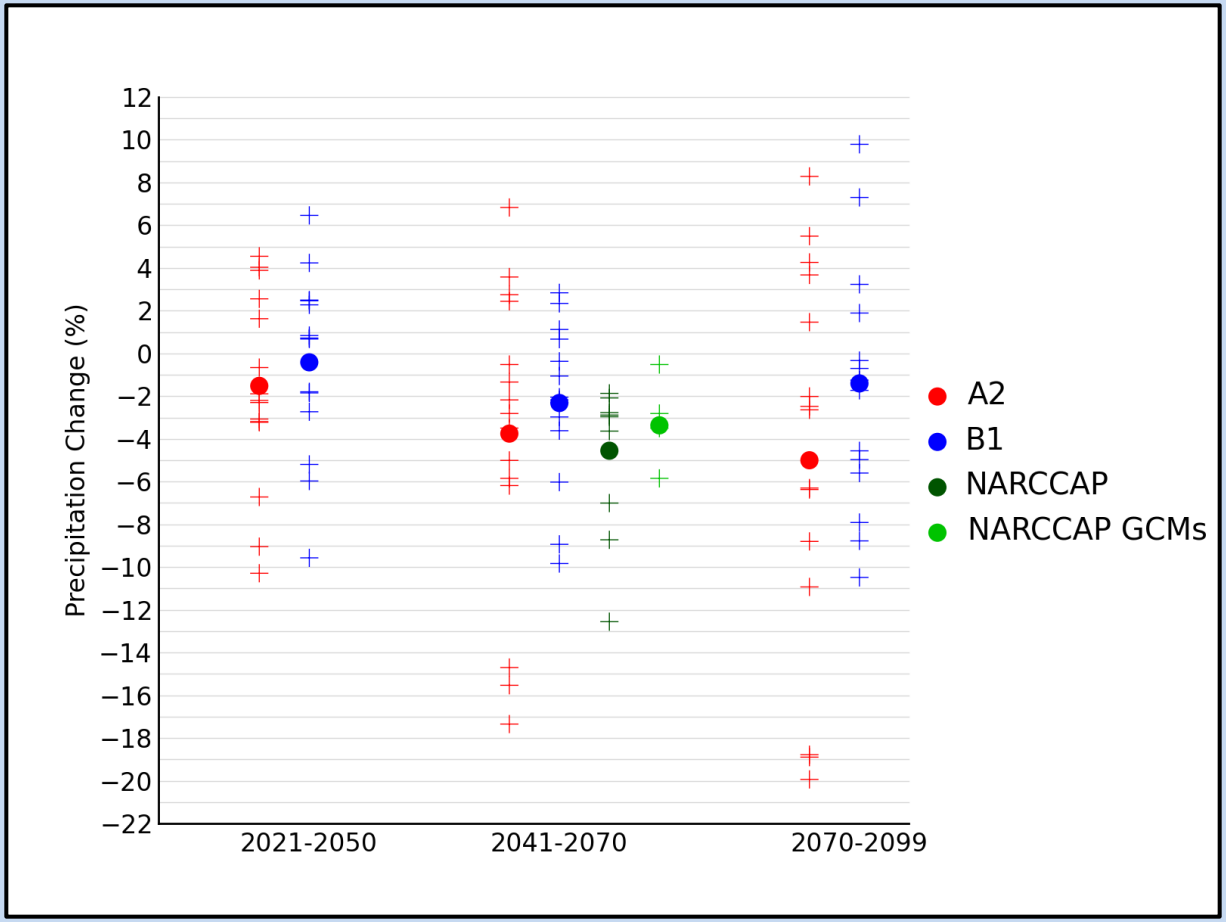
National Climate Assessment
U.S. Global Change Research Program

National Climate Assessment

U.S. Global Change Research Program

Precipitation Changes

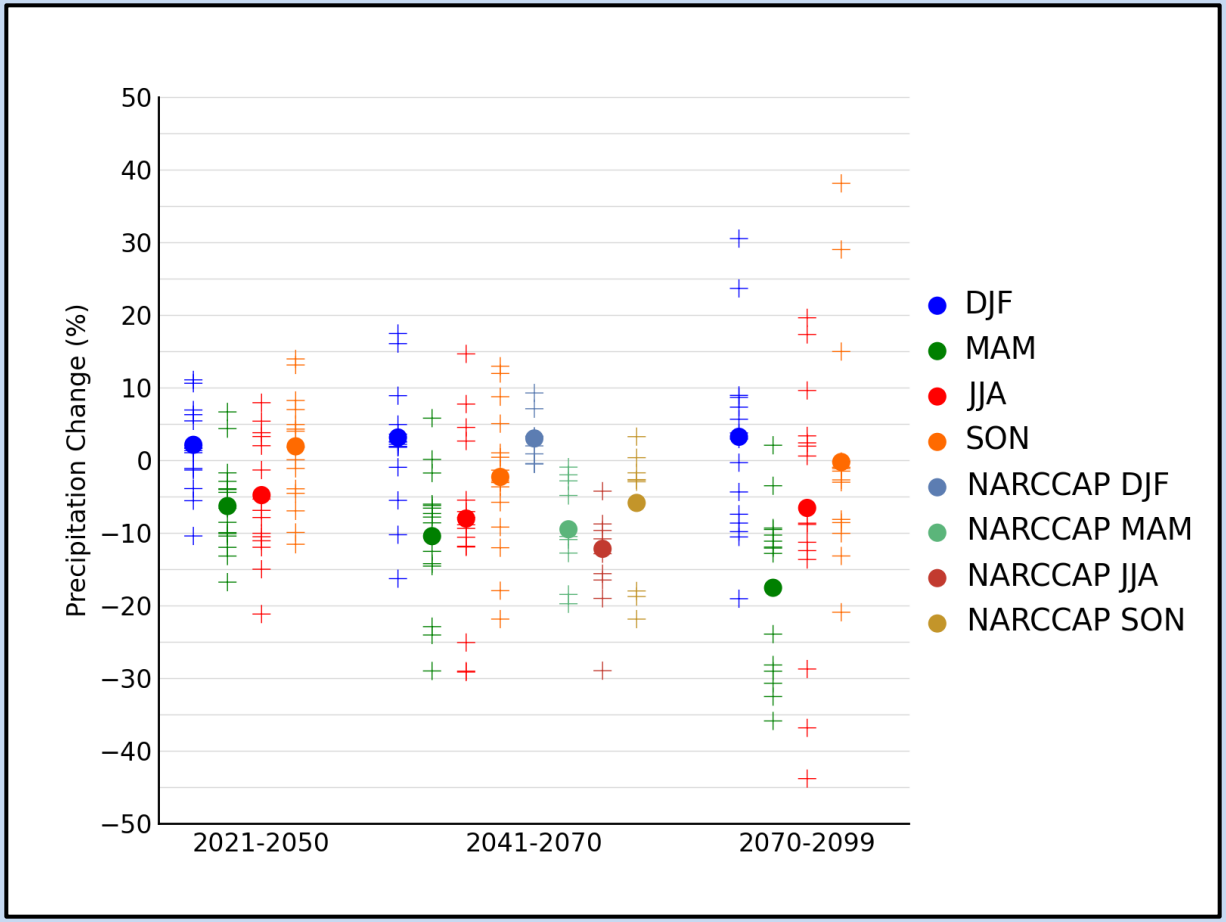
Model mean precipitation changes



National Climate Assessment

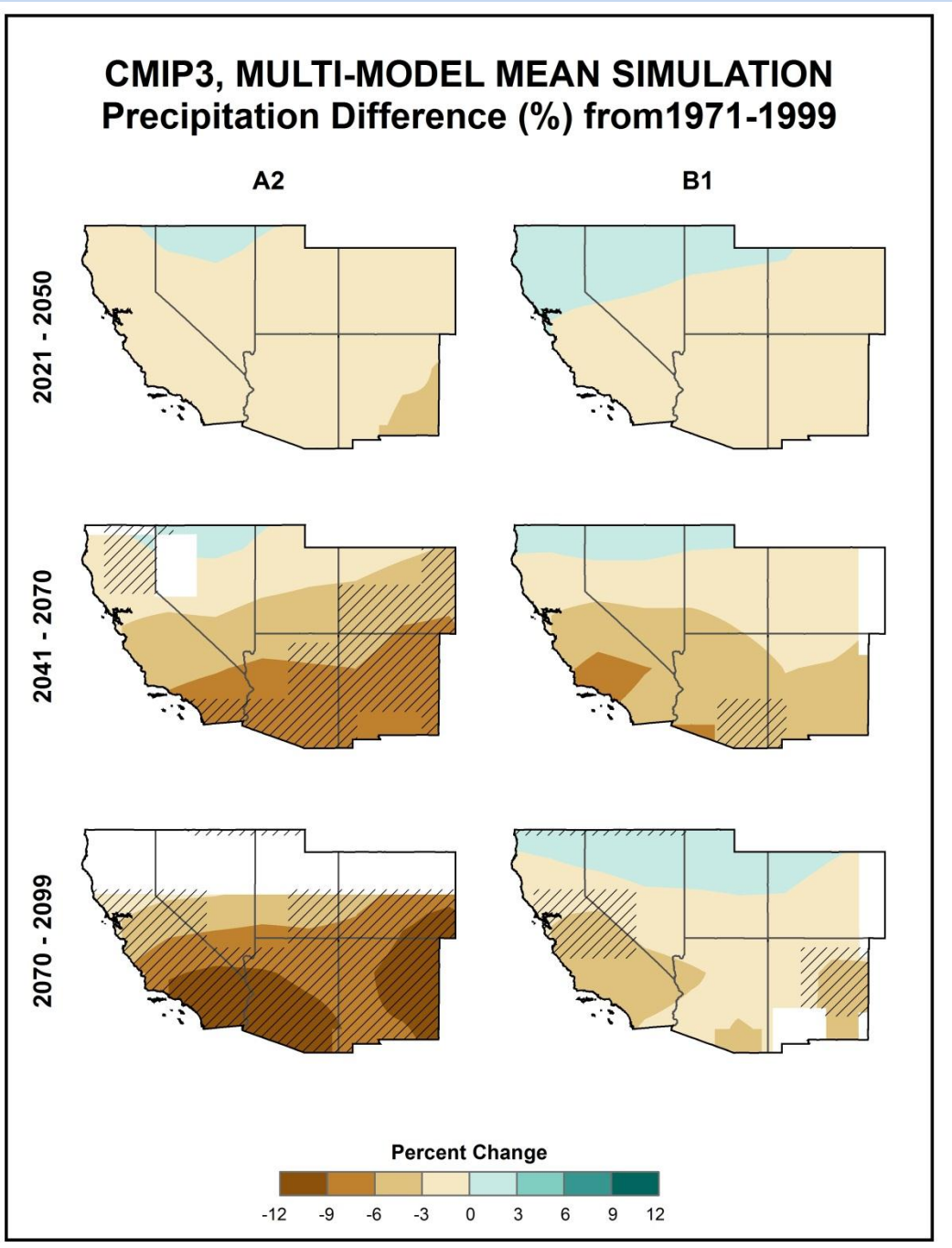
U.S. Global Change Research Program

Seasonal Precipitation Changes



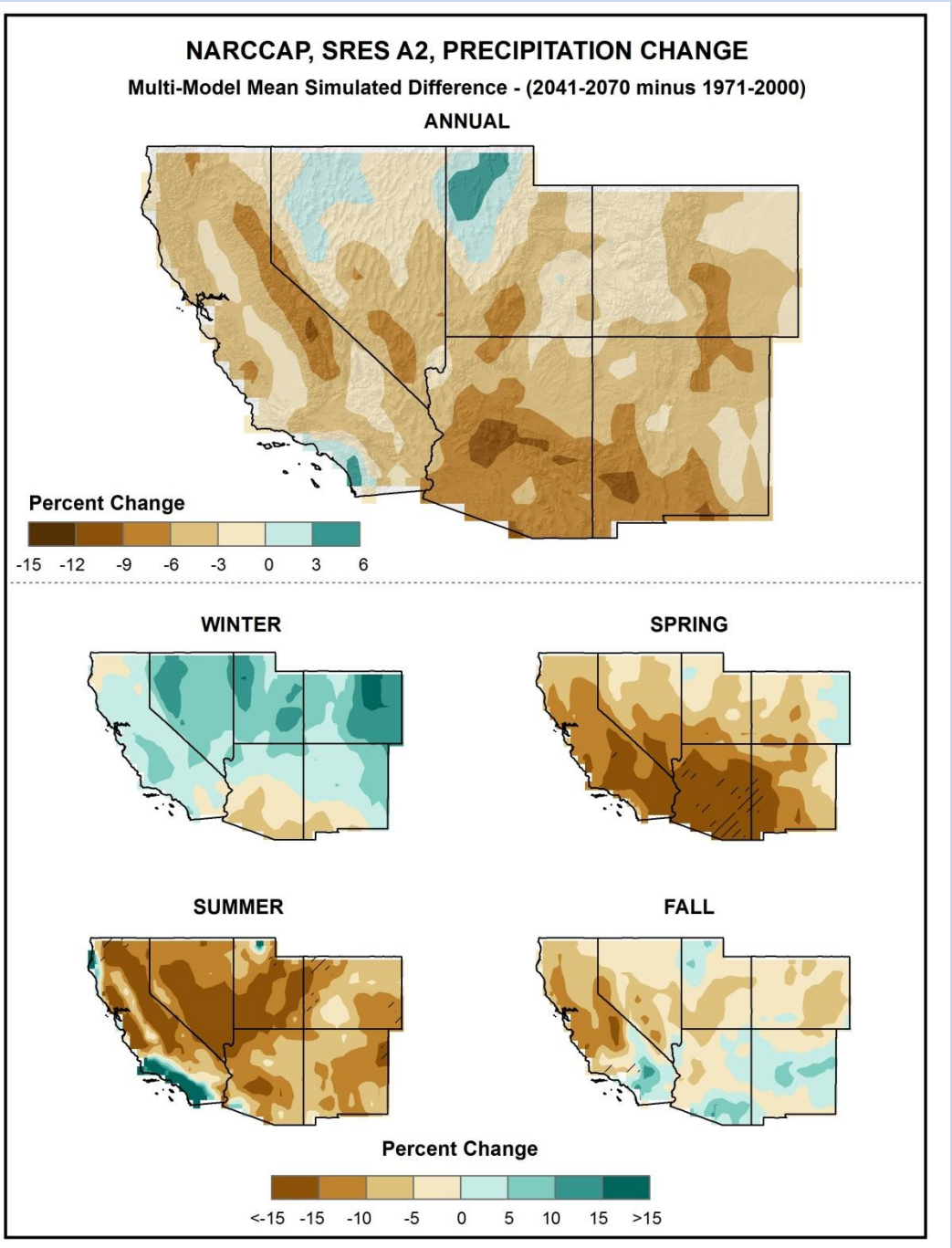
National Climate Assessment

U.S. Global Change Research Program



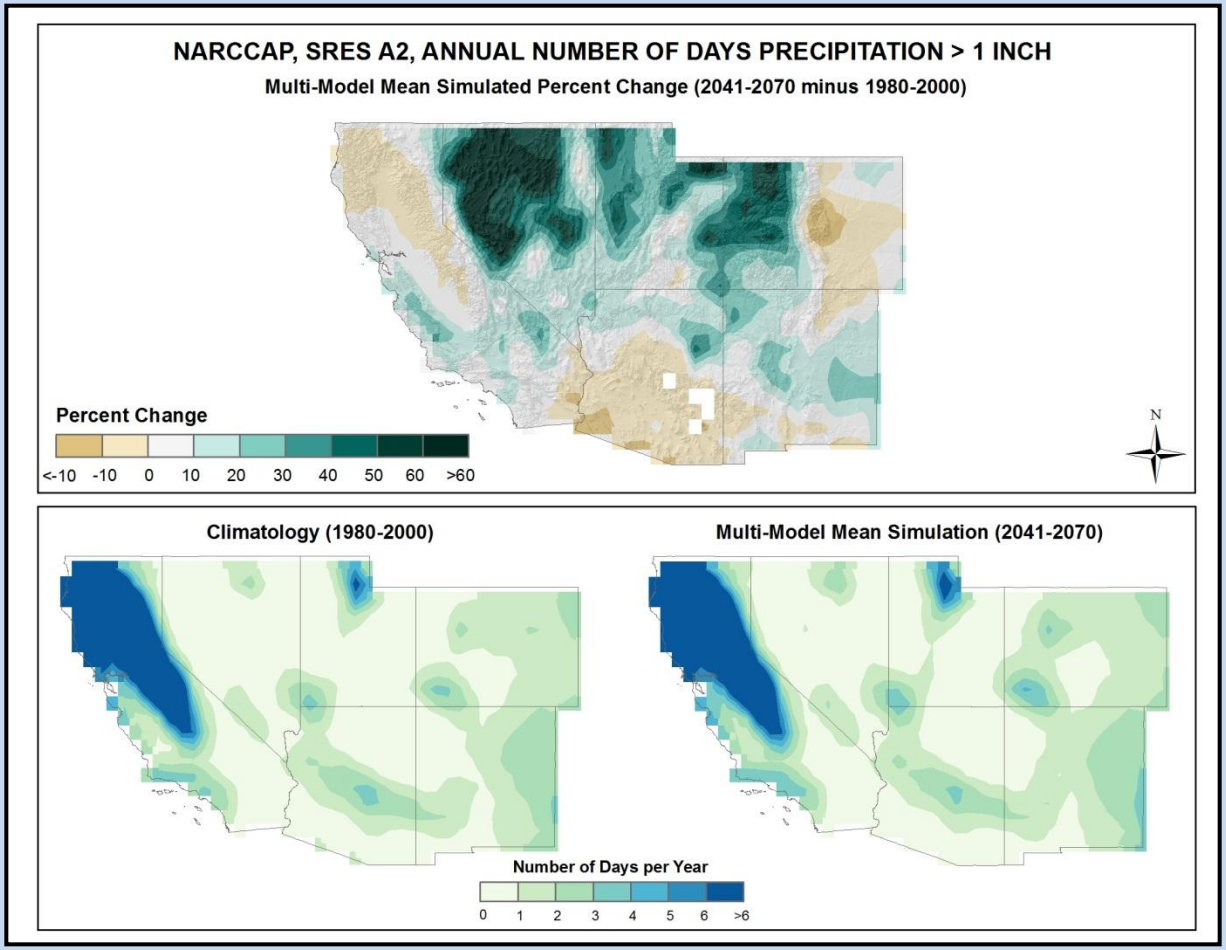
National Climate Assessm

U.S. Global Change Research Program



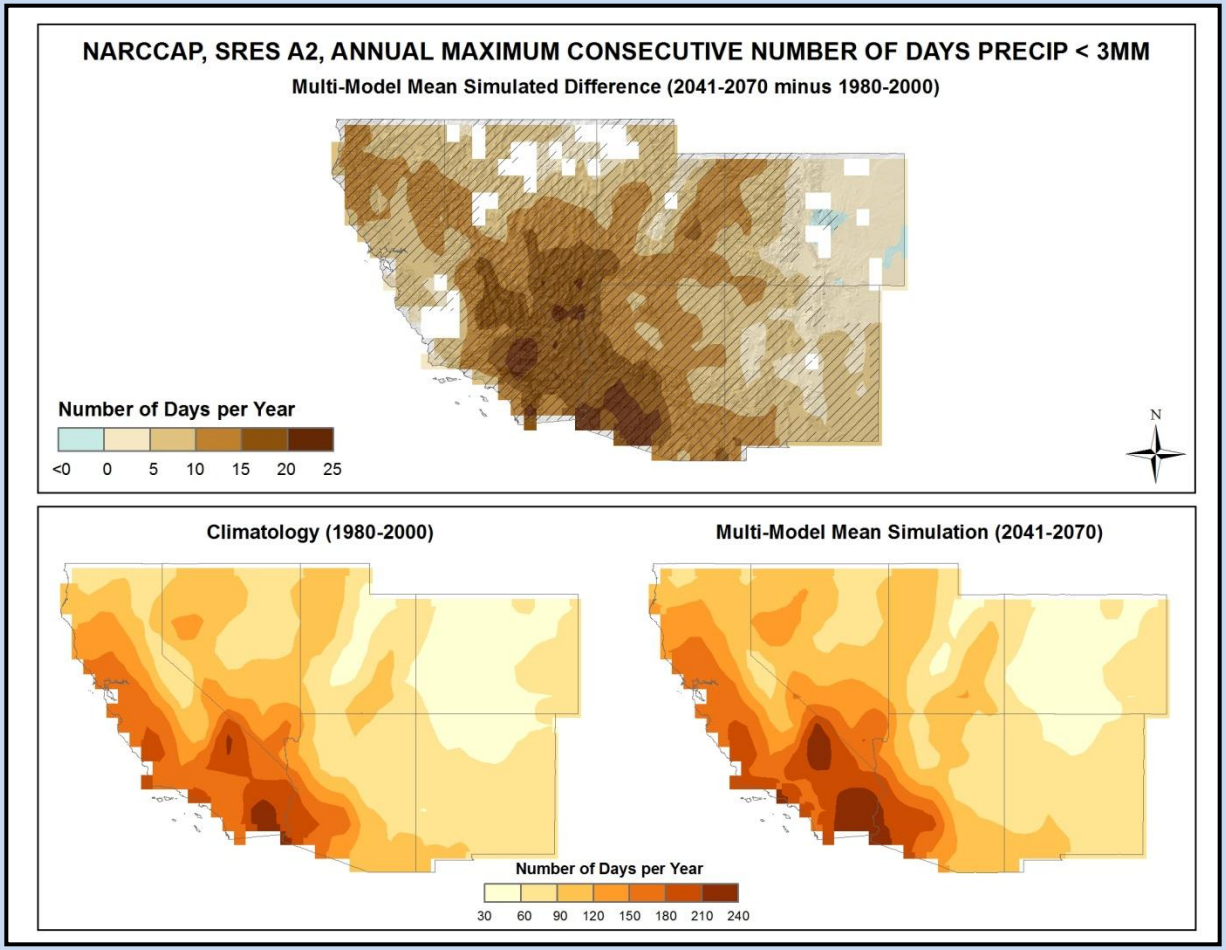
National Climate Assessm

U.S. Global Change Research Program



National Climate Assessment

U.S. Global Change Research Program



National Climate Assessment

U.S. Global Change Research Program

Derived Precipitation Variables

Variable	NARCCAP	SD
• #days > 1 inch	+3% (+/-9)	+12%
• #days > 2 inches	+11% (+/-8)	+22%
• #days > 3 inches	+20% (+/-10)	+32%
• #days > 4 inches	+33% (+/-21)	+44%
• Max run days < 0.1 inch	+10 days (+/-5)	+8 days

National Climate Assessment
U.S. Global Change Research Program

Acknowledgements

- Linda Mearns and Seth McGinnis – NARCCAP
- Art DeGaetano and Bill Noon – NARCCAP
- Michael Wehner – CMIP3
- Jay Hnilo – CMIP3
- Greg Dobson – maps
- Laura Stevens, Scott Stevens – BCSD daily

National Climate Assessment

U.S. Global Change Research Program