Figures and tables

a. *Table list*

b. *Figure list*

Table 1 Reanalysis or statistically downscaled observational datasets

Data source	Variables used	Spatial resolution	Temporal resolution
UW	Pr, Tmin, Tmax	0.125°	daily
PRISM	Pr, Tmin, Tmax, Tavg	4km	monthly/daily
DAYMET	Pr, Tmin, Tmax	1km	daily
NCEP CPC	Pr	0.25°	daily
NARR	Pr, Ts	32km	daily

Table 2 RMSE and Bias (annually)

RMSE	UW		PRISM			DAYMET	
	Tmax	Tmin	Tmax	Tmin	Tavg	Tmax	Tmin
varres CESM 0.25deg	1.605	3.035	2.098	2.393	1.753	2.109	3.170
varres CESM 0.125deg	1.226	2.804	1.772	2.227	1.501	1.871	2.884
uniform CESM 0.25deg	2.566	2.558	2.949	2.437	2.418	2.958	2.826
WRF 27km	1.710	2.506	2.240	1.729	1.721	2.105	2.691
WRF 9km	2.517	2.769	2.732	1.764	1.420	2.581	2.752

BIAS	UW		PRISM			DAYMET	
	Tmax	Tmin	Tmax	Tmin	Tavg	Tmax	Tmin
varres CESM 0.25deg	-0.082	2.385	-0.353	1.296	-0.269	-0.037	2.256
varres CESM 0.125deg	-0.241	2.229	-0.559	1.130	-0.438	-0.224	2.031
uniform CESM 0.25deg	-0.409	1.402	-0.672	0.312	-0.907	-0.361	1.272
WRF 27km	-0.379	1.409	-0.649	0.321	-0.729	-0.336	1.282
WRF 9km	-1.805	2.166	-2.123	1.067	-0.891	-1.786	1.967

Table 3 RMSE and BIAS for summer Tmax

Tmax	UW		PRISM		DAYMET	
	RMSE	Bias	RMSE	Bias	RMSE	Bias
varres CESM 0.25deg	2.324	0.982	2.932	0.631	2.810	1.177
varres CESM 0.125deg	1.903	0.651	2.452	0.233	2.477	0.824
uniform CESM 0.25deg	3.872	1.788	4.265	1.449	4.300	1.988
WRF 27km	2.311	-0.574	2.924	-0.925	2.511	-0.383
WRF 9km	3.319	-2.274	3.470	-2.693	3.203	-2.101

Table 4 RMSE and Bias for annual Pr

Pr	UW		NOAA		PRISM		DAYMET	
	RMSE	Bias	RMSE	Bias	RMSE	Bias	RMSE	Bias
varres CESM 0.25deg	0.604	0.265	0.590	0.370	0.726	0.171	0.560	0.169
varres CESM 0.125deg	0.534	0.126	0.481	0.220	0.634	0.050	0.510	0.043
WRF 27km	0.586	-0.315	0.424	-0.210	0.777	-0.409	0.650	-0.411
WRF 9km	2.026	1.368	2.204	1.462	1.858	1.292	1.986	1.286

Table 5 RMSE and Bias for DJF Pr

Pr	UW		NOAA		PRISM		DAYMET	
	RMSE	Bias	RMSE	Bias	RMSE	Bias	RMSE	Bias
varres CESM 0.25deg	1.401	0.883	1.409	0.558	1.636	0.465	1.310	0.404
varres CESM 0.125deg	1.273	0.666	1.236	0.362	1.436	0.307	1.210	0.234
WRF 27km	1.331	-0.396	0.918	-0.721	1.588	-0.815	1.389	-0.876
WRF 9km	3.801	2.562	4.244	2.257	3.538	2.203	3.782	2.132

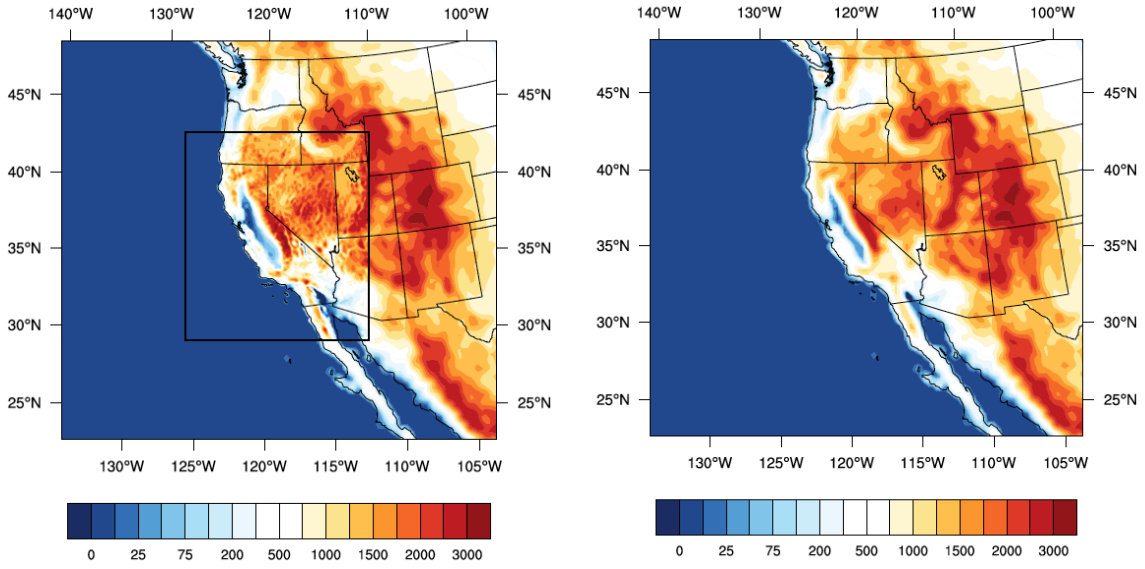

Figure 1 domains of WRF simulations (left: 9km, right: 27km) and topography (unit: m)

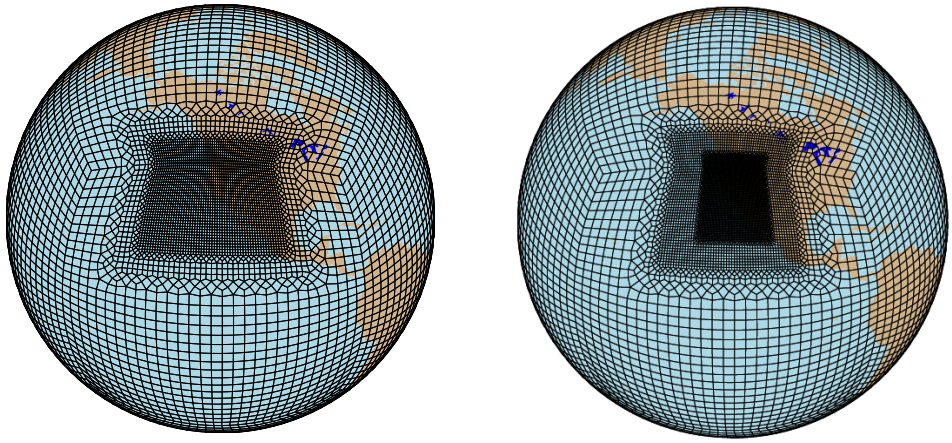

Figure 2 the grid mesh of varres-CESM (left:0.25 degree, right:0.125 degree)

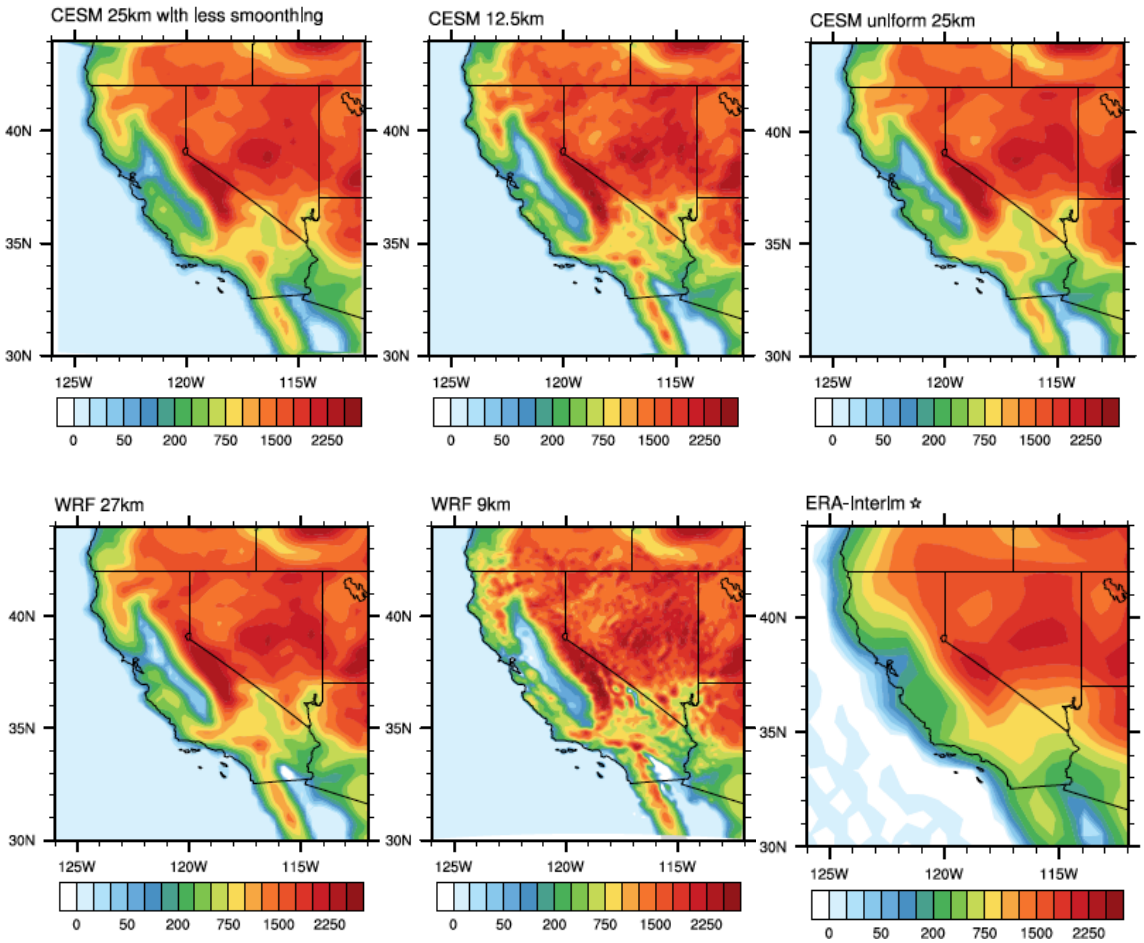

Figure 3 Topography representations of simulations and ERA-Interim (unit: m)

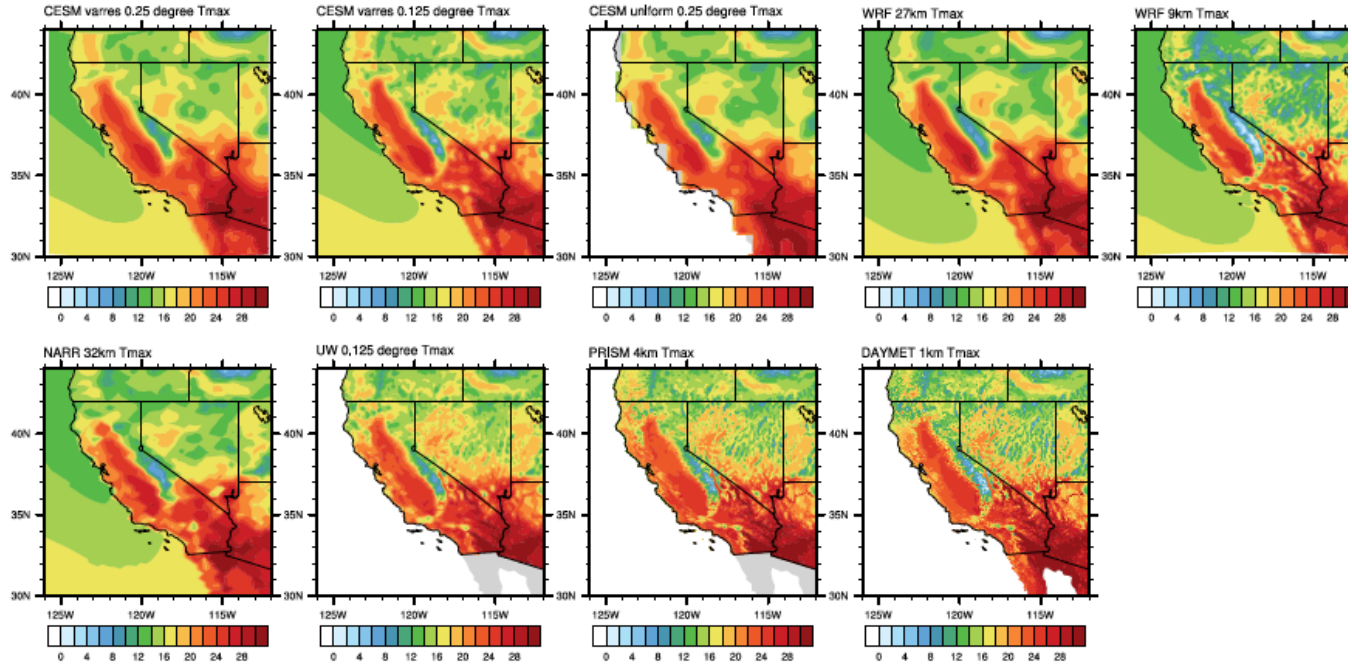

Figure 4 Annual average daily maximum 2m temperatures (Tmax) from models and reference datasets (unit: ℃)

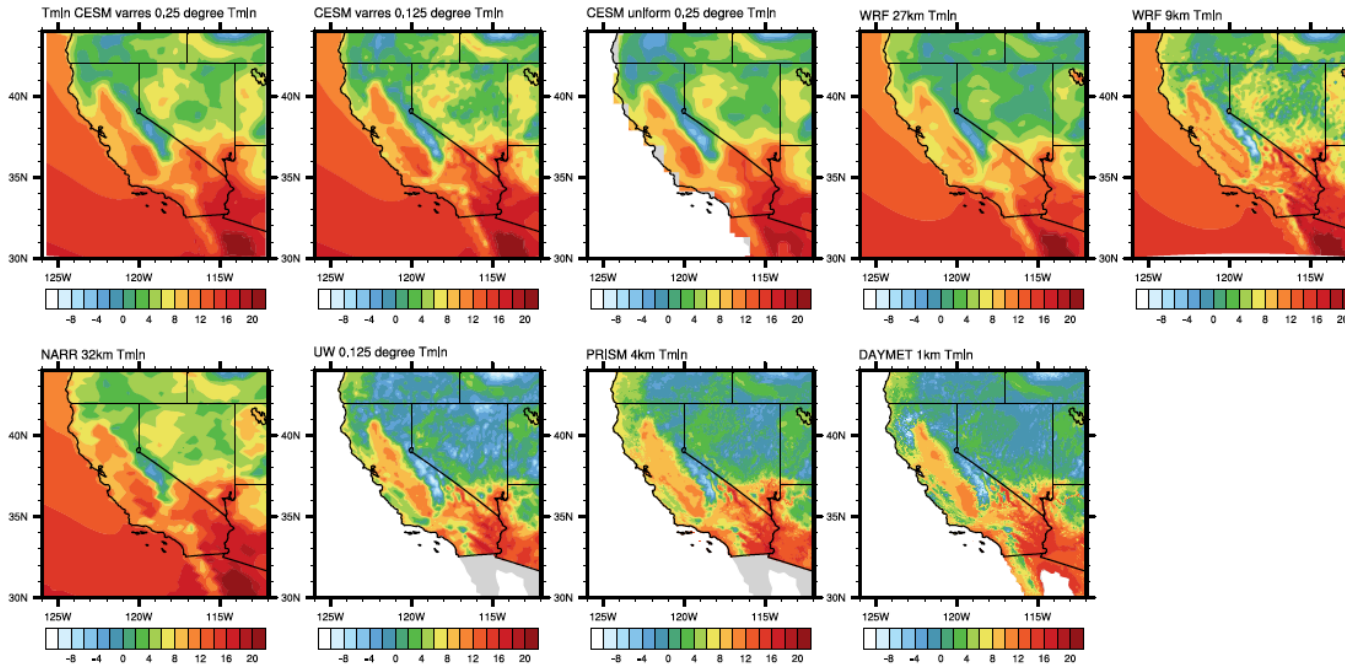

Figure 5 Similar as Fig. 4, but for daily minimum 2m temperatures (Tmin)

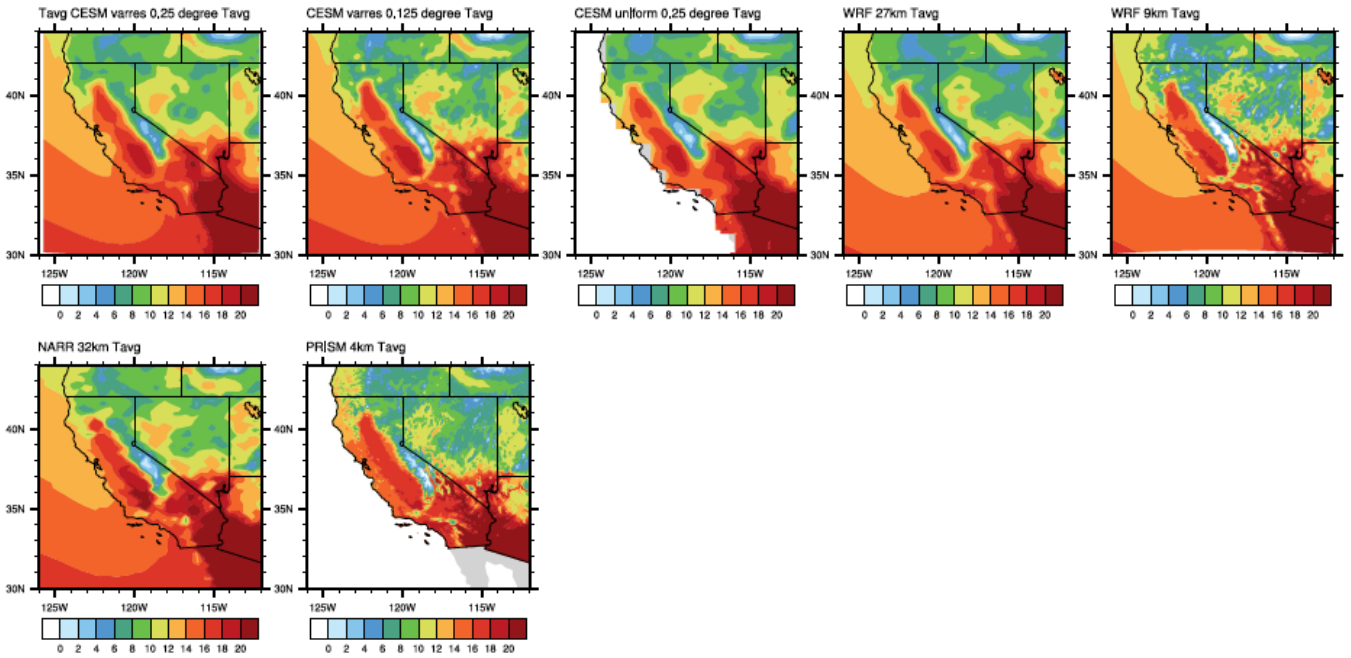

Figure 6 Similar as Fig.4, but for daily mean 2m temperatures (Tavg)

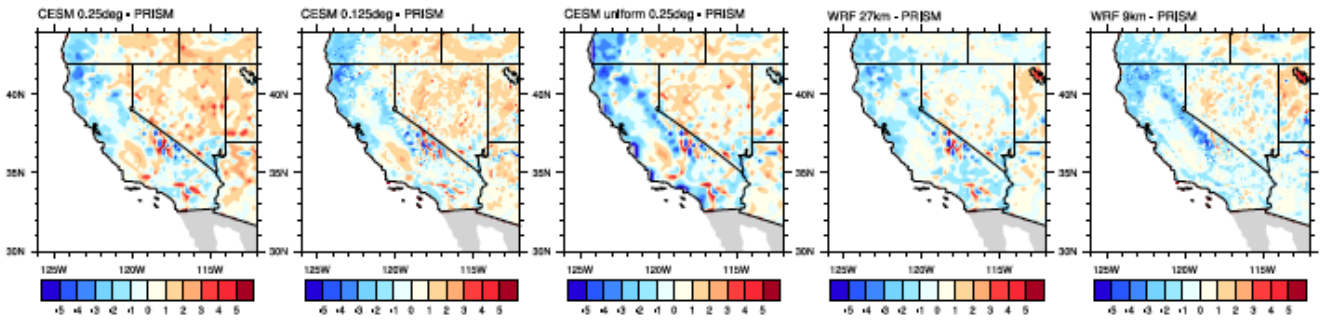

Figure 7 Difference between simulations and reference data for daily Tavg

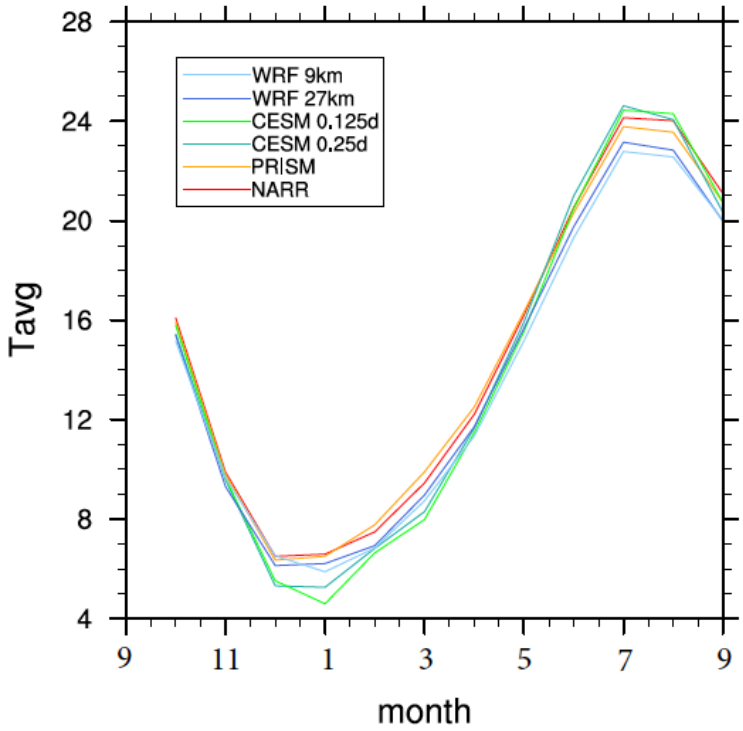

Figure 8 Seasonal cycle of monthly-average Tavg for CA (unit: ℃)

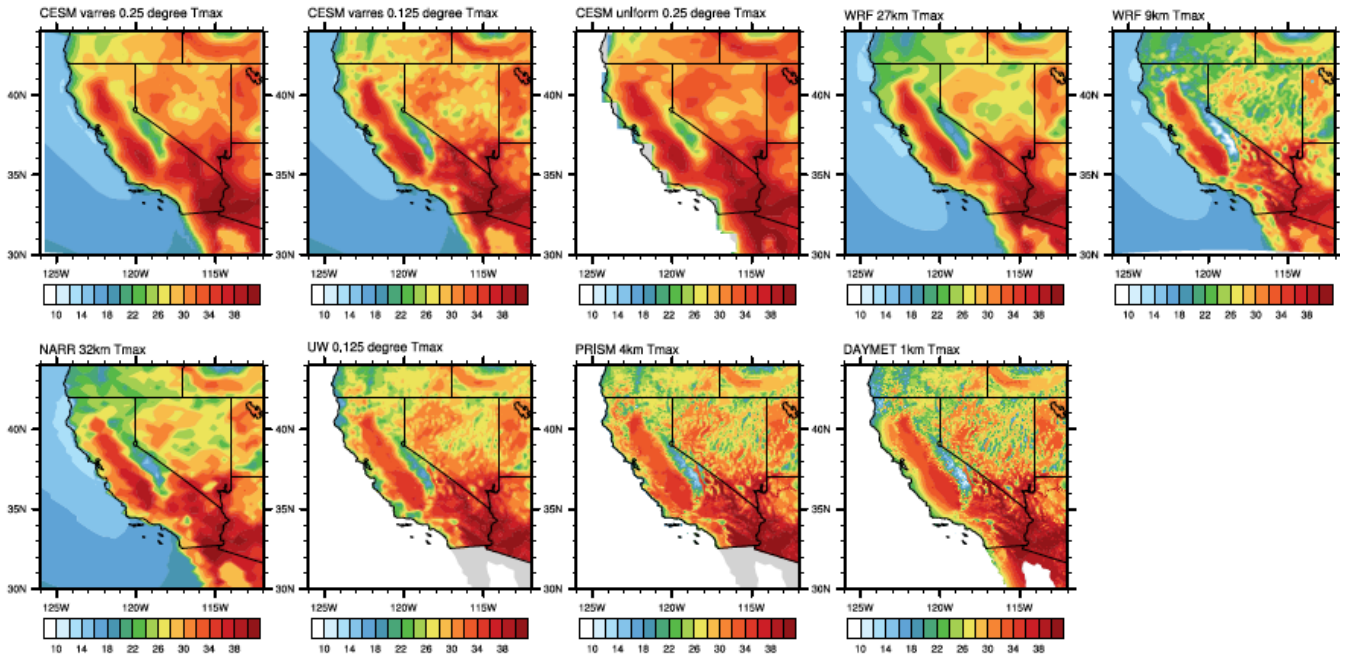

Figure 9 Similar as Fig.4, but for summer Tmax

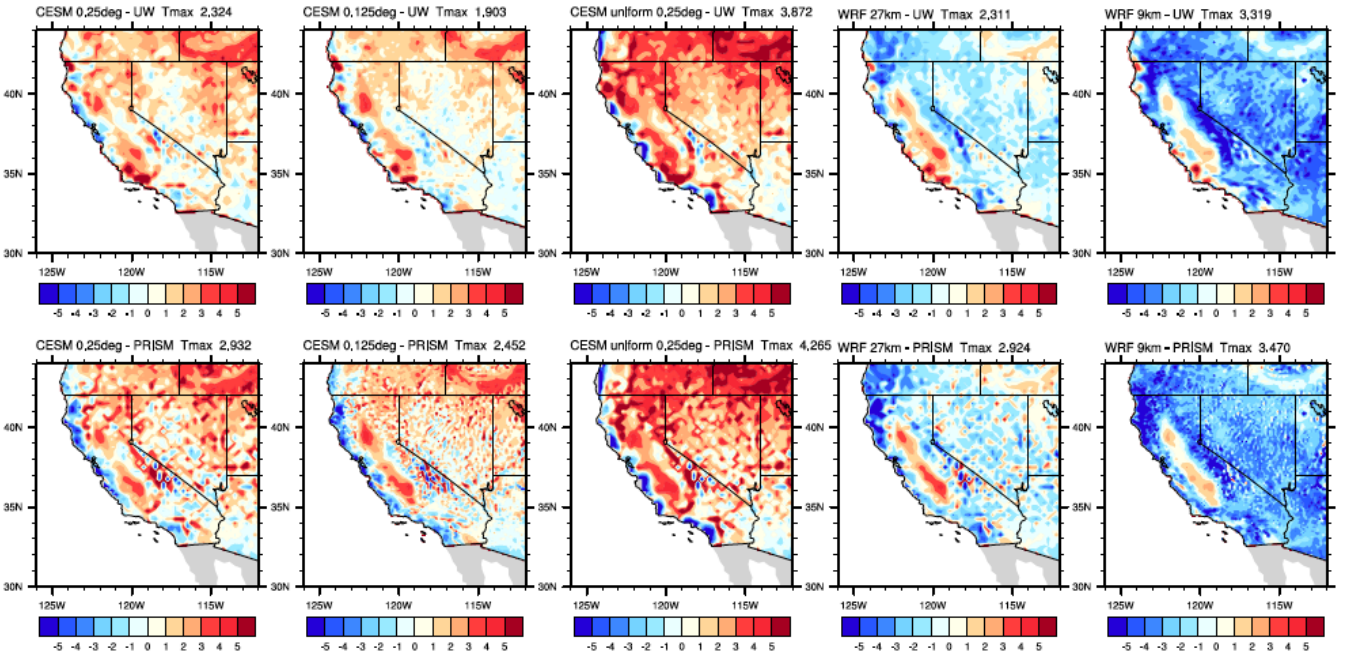

Figure 10 Similar as Fig. 7 but for summer Tmax (the number is RMSE value)

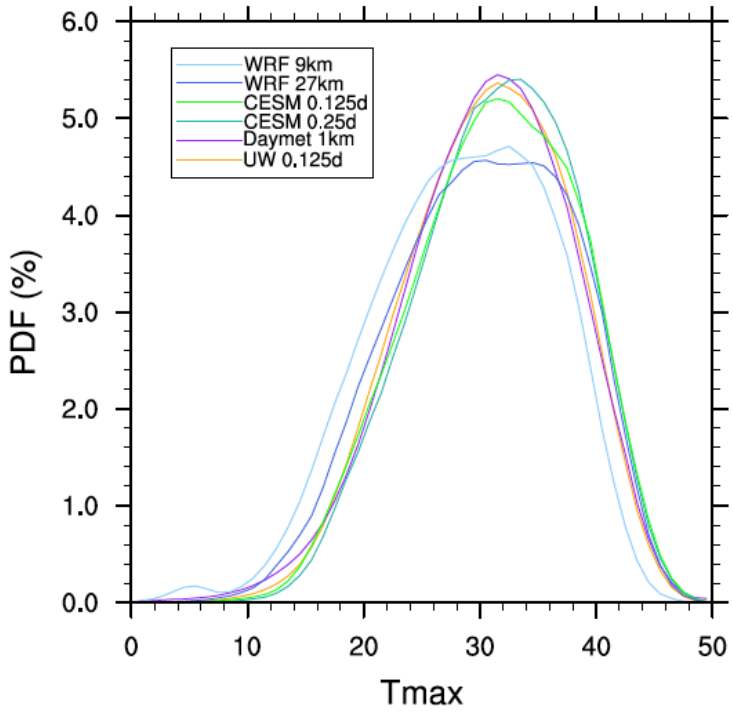

Figure 11 Frequency distribution of summer Tmax constructed from 26 years daily data (unit: ℃)

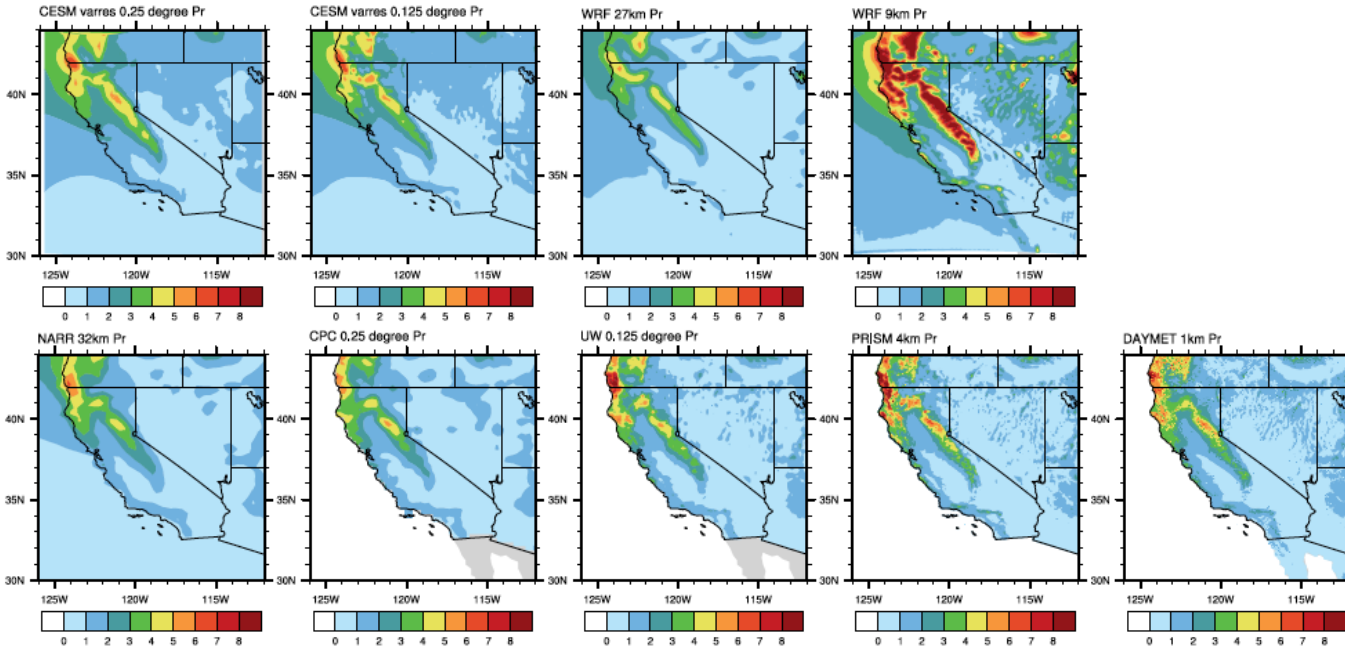

Figure 12 Annual average daily precipitation (Pr) from models and reference datasets (unit: mm/d)

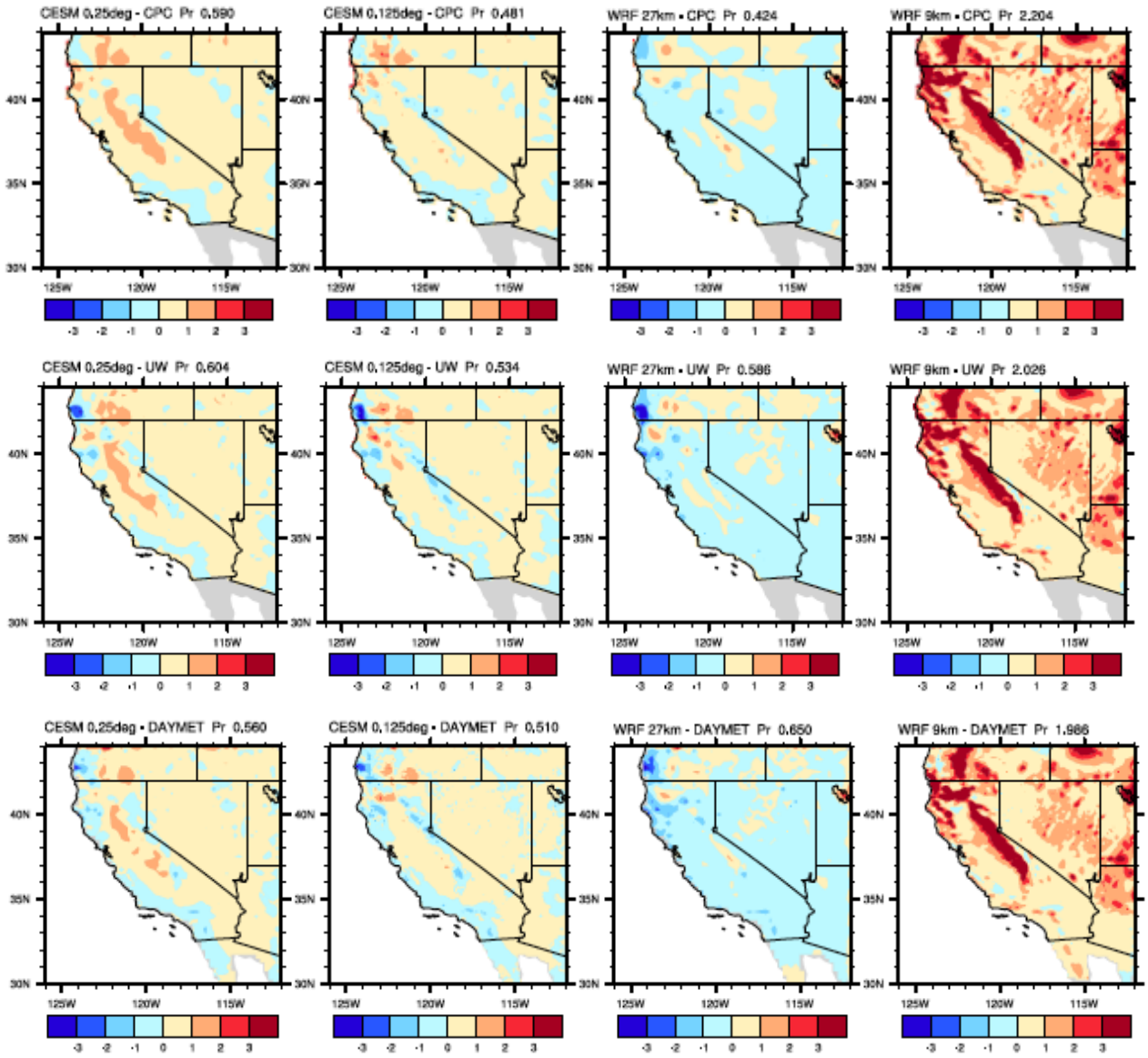

Figure 13 Difference between simulations and reference data for Pr

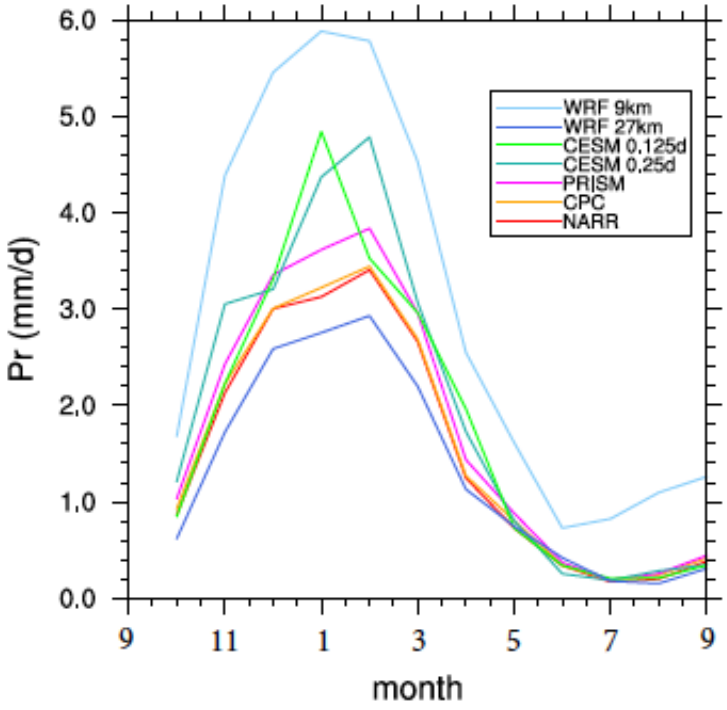

Figure 14 Seasonal cycle of monthly-average Pr for CA

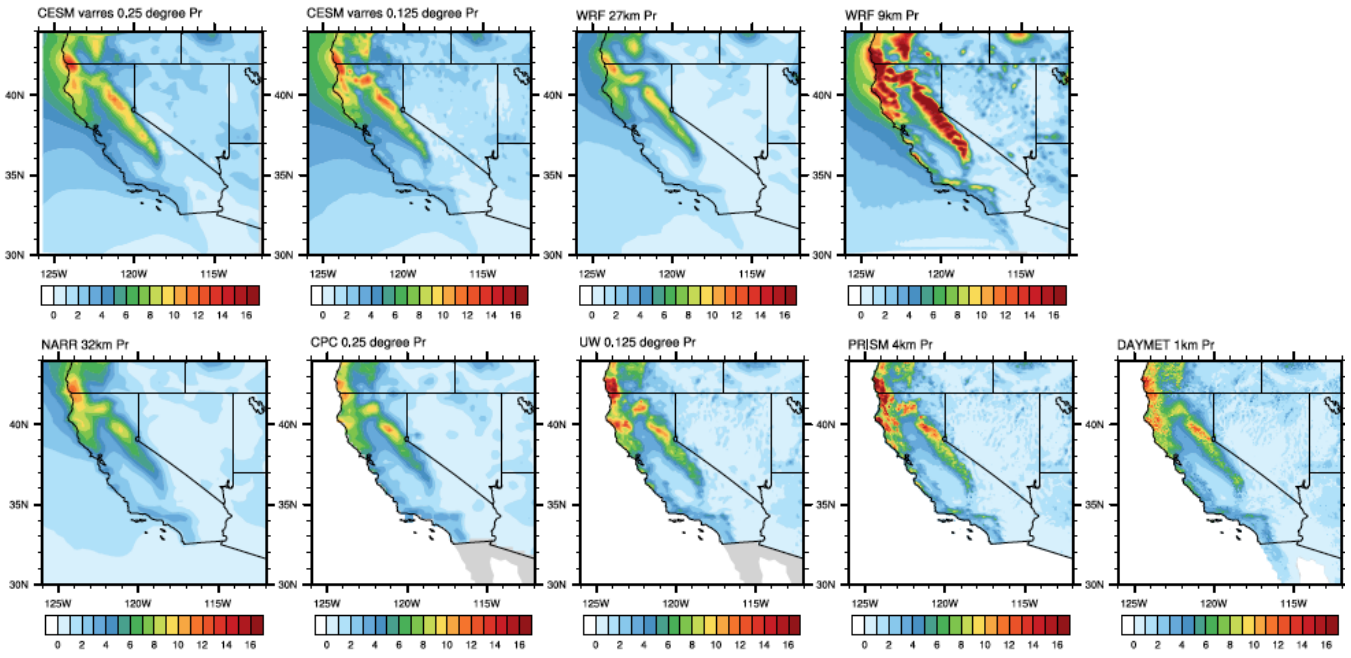

Figure 15 Similar as Figure 12, but for winter Pr

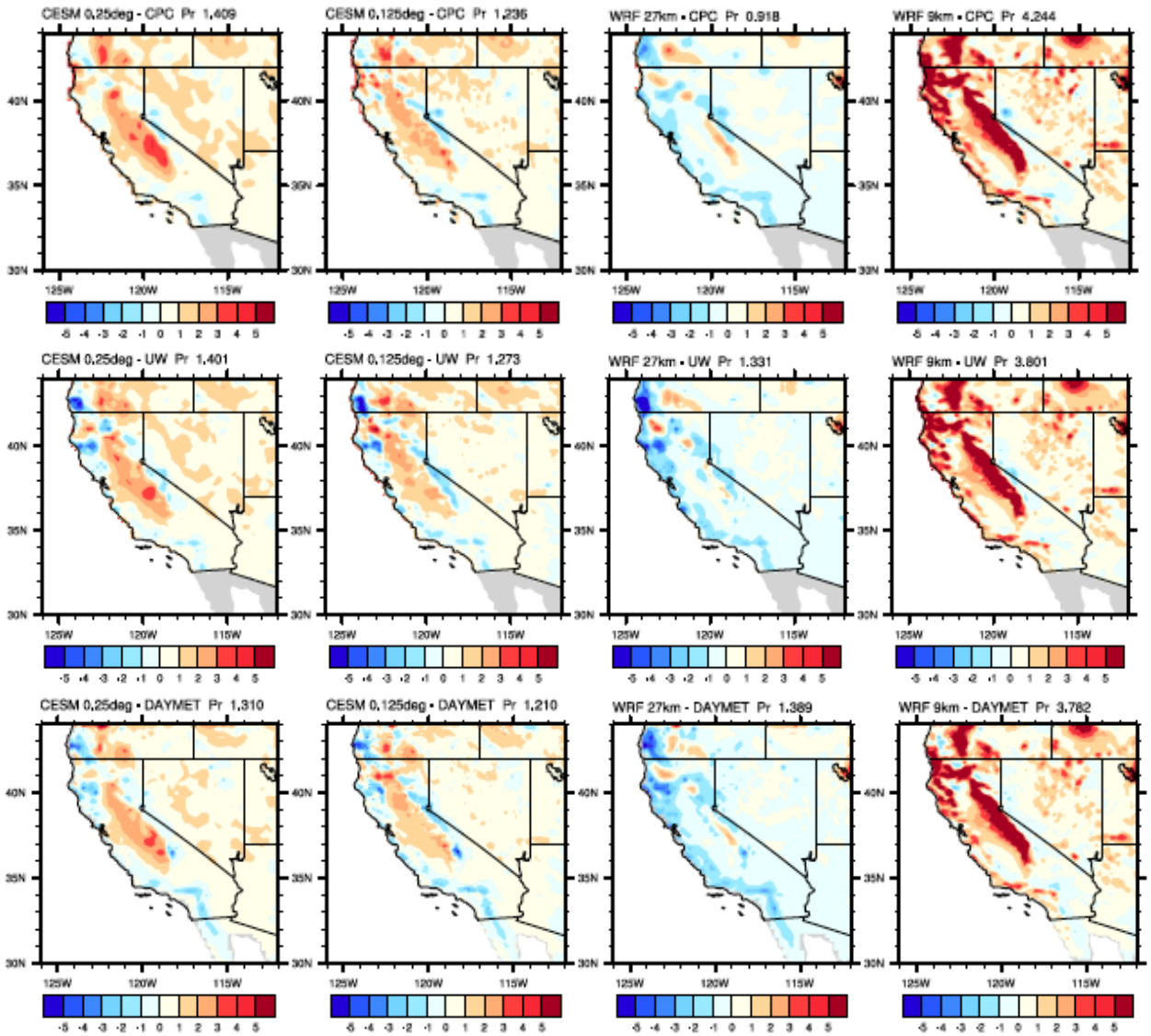

Figure 16 Similar as Figure 13, but for winter Pr

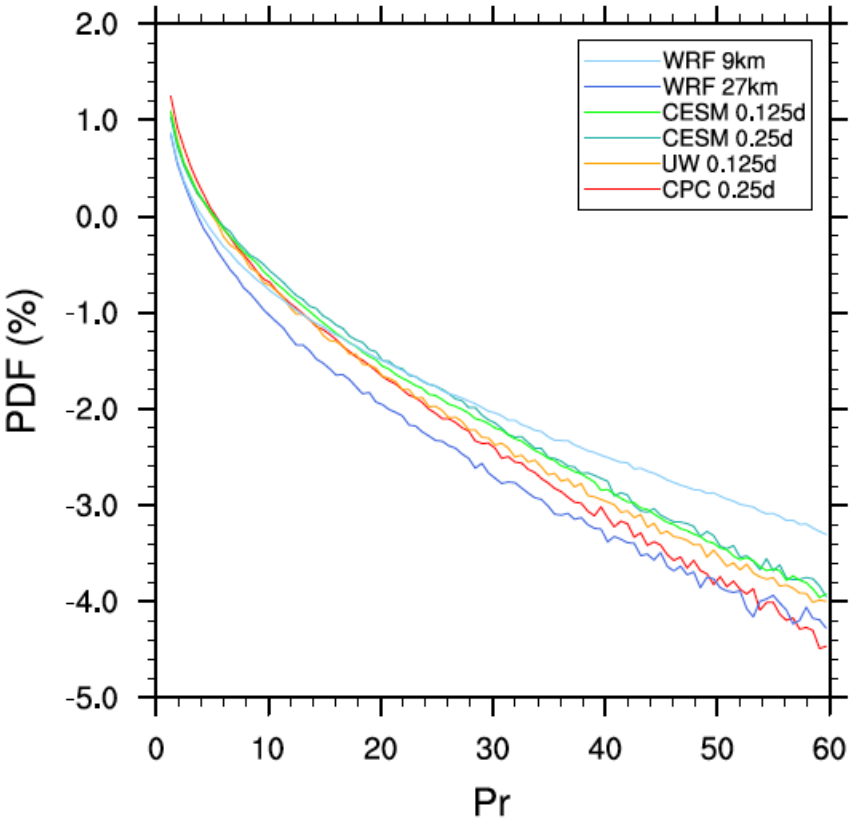

Figure 17 Frequency distribution of winter Pr constructed from 26 years daily data (unit: mm/d) (note: vertical scale is logarithmic)

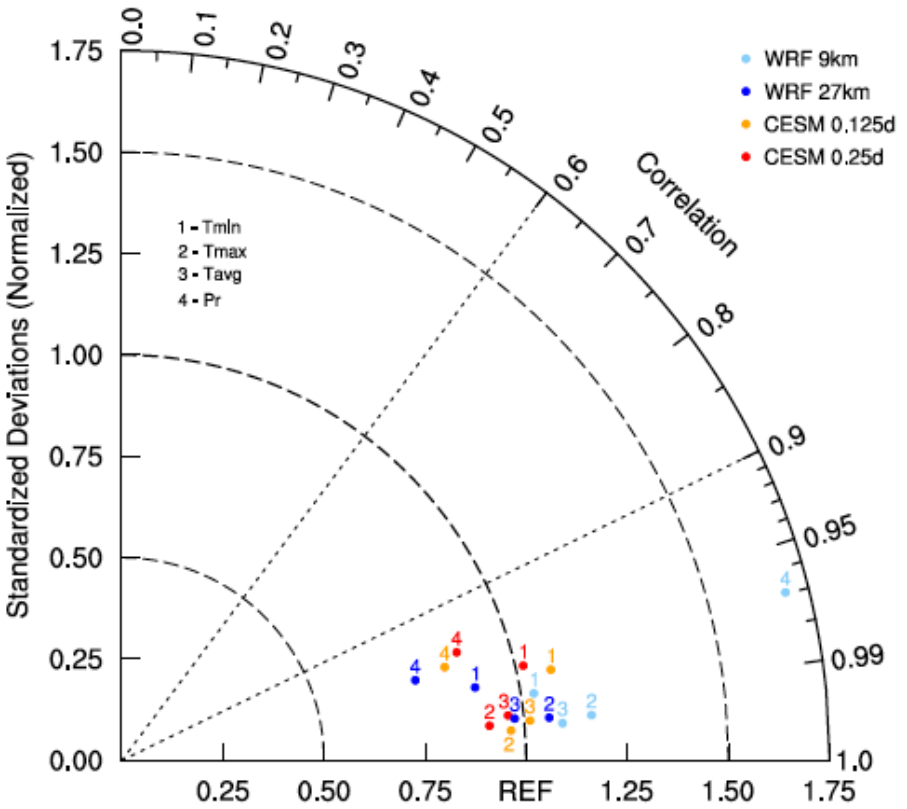

Figure 18 Taylor diagram of annual climatology for the region of CA, using PRISM dataset as reference