Supplement of

Evaluating precipitation distributions at regional scales: a benchmarking framework and application to CMIP5 and 6 models

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Supplemental Material

Figure S1 shows the homogeneity of precipitation distribution characteristics with Perkins score over the original IPCC AR6 climate reference regions (top) and the modified ocean regions (bottom) for different seasons with IMERG. Although the region modification is based on the clustering regions with annual data, the homogeneity is consistently improved across different seasons in the modified ocean region. Figure S2 shows the percentage of CMIP5 models fallen in the observational range. The observational range is between the minimum and maximum values of satellite-based observations. Figure S3 shows the evaluation of improvement from CMIP 5 to 6 in the percentage of models fallen in the observational range using a subset of models that participated in both CMIP 5 and 6. Figure S4 shows the percentage of CMIP5 models that are underestimating or overestimating observations. Figure S5 shows the evaluation of improvement from CMIP 5 to 6 in the percentage of underestimated or overestimated models using a subset of models that participated in both CMIP 5 and 6.
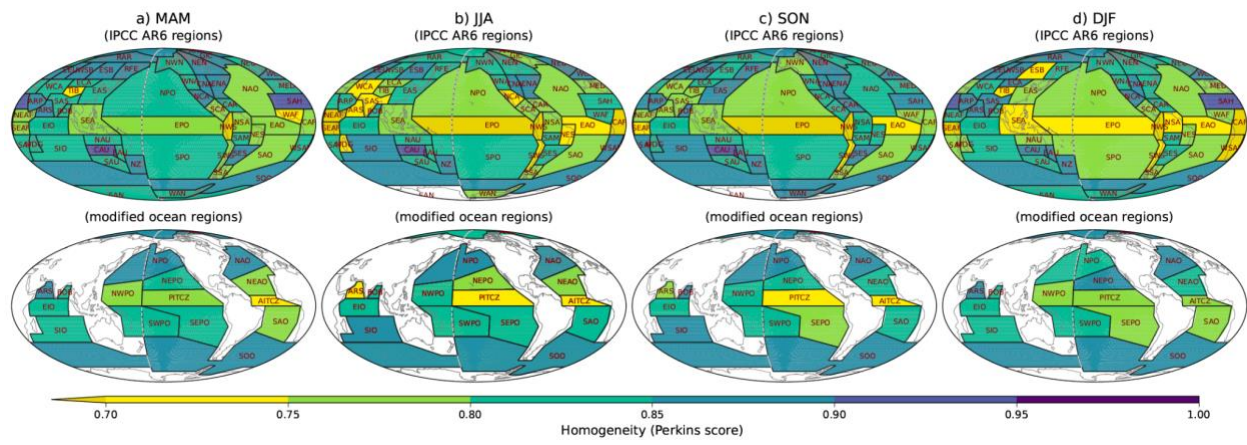
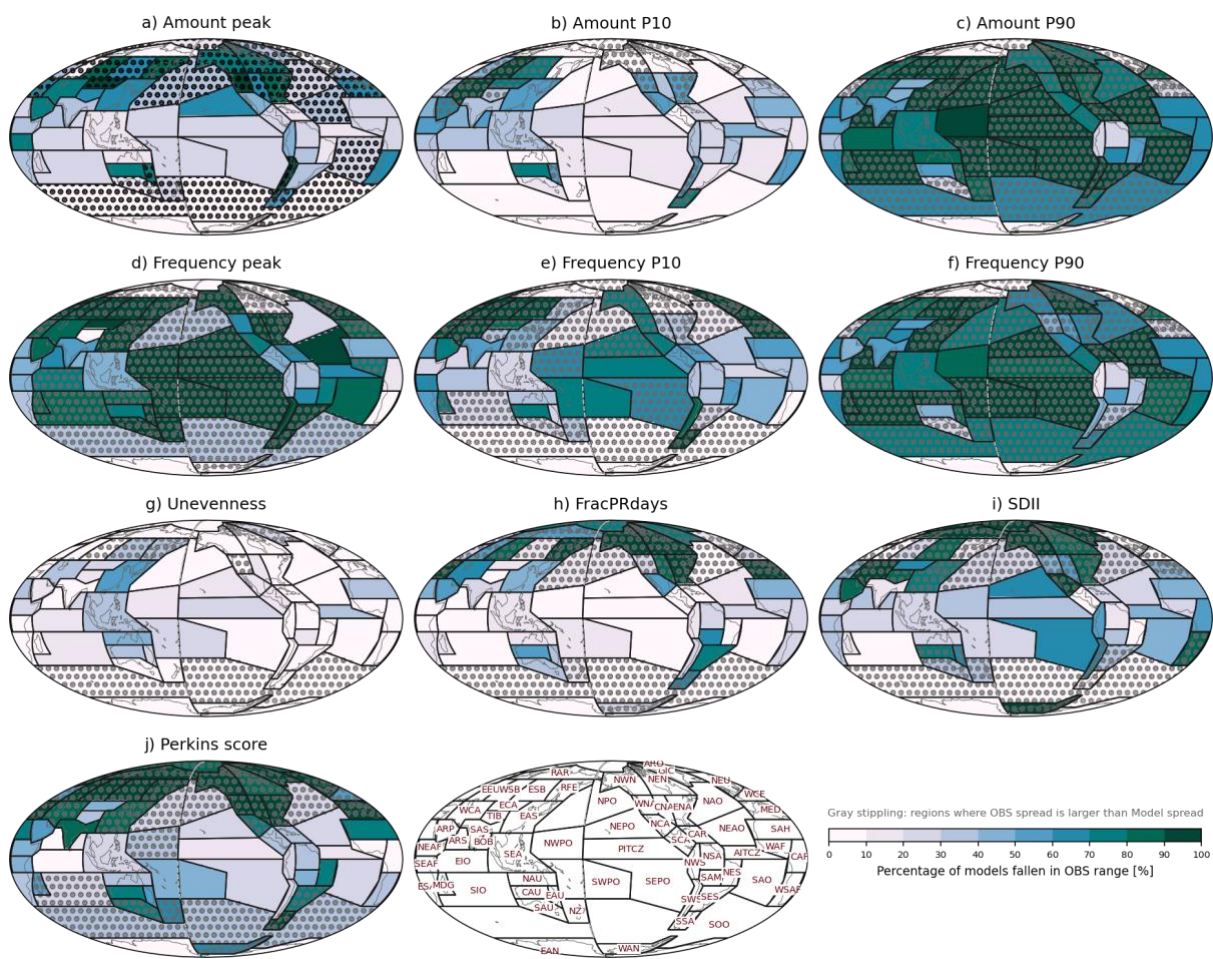Figure S1. As in Fig. 4, but for different seasons with Perkins score.

a) Amount peak

b) Amount P10

c) Amount P90

d) Frequency peak

e) Frequency P10

f) Frequency P90

g) Unevenness

h) FracPRdays

i) SDII

j) Perkins score

Gray stippling: regions where OBS spread is larger than Model spread

0 10 20 30 40 50 60 70 80 90 100
Percentage of models fallen in OBS range [%]

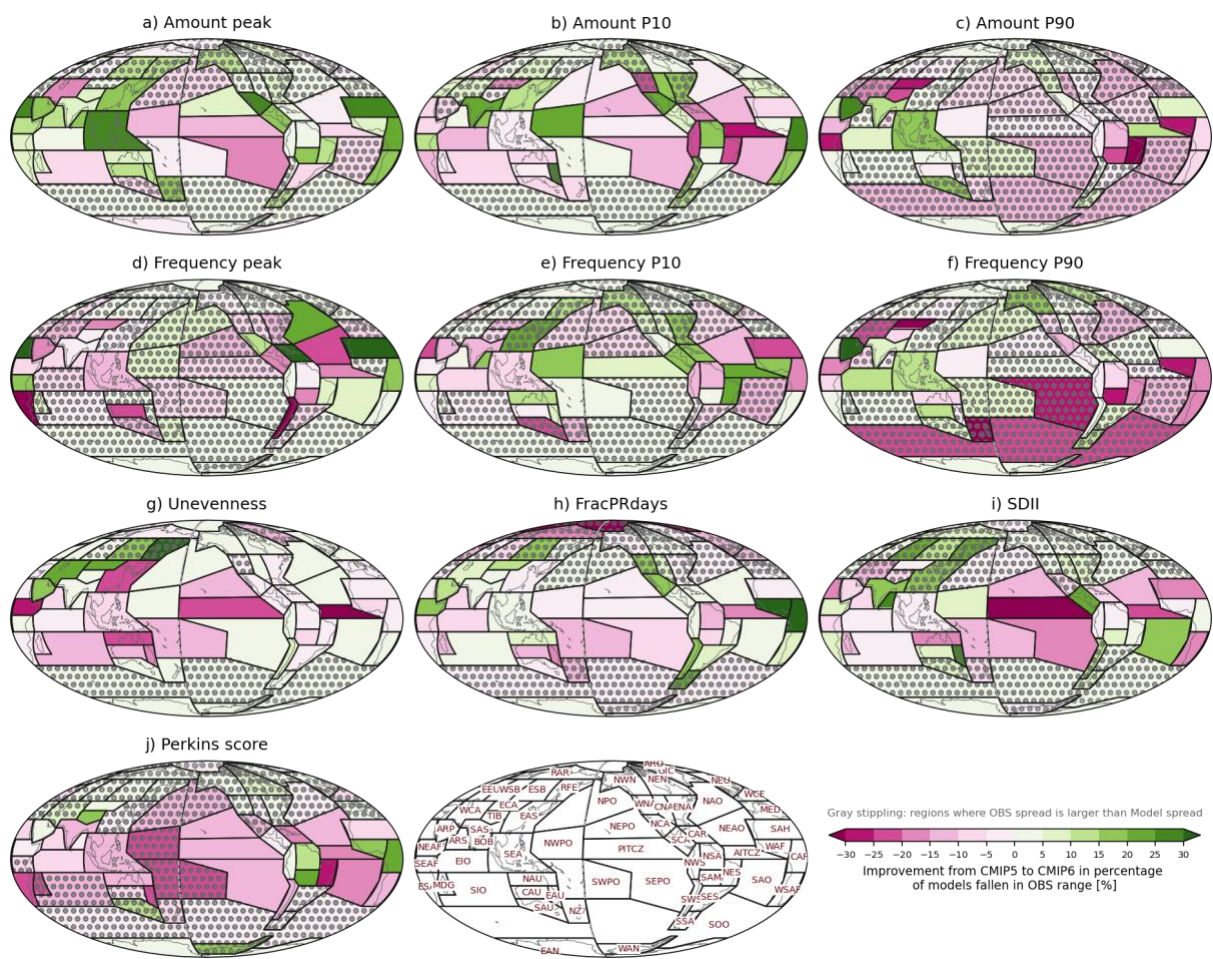Figure S2. As in Fig. 9, but for CMIP5 models.

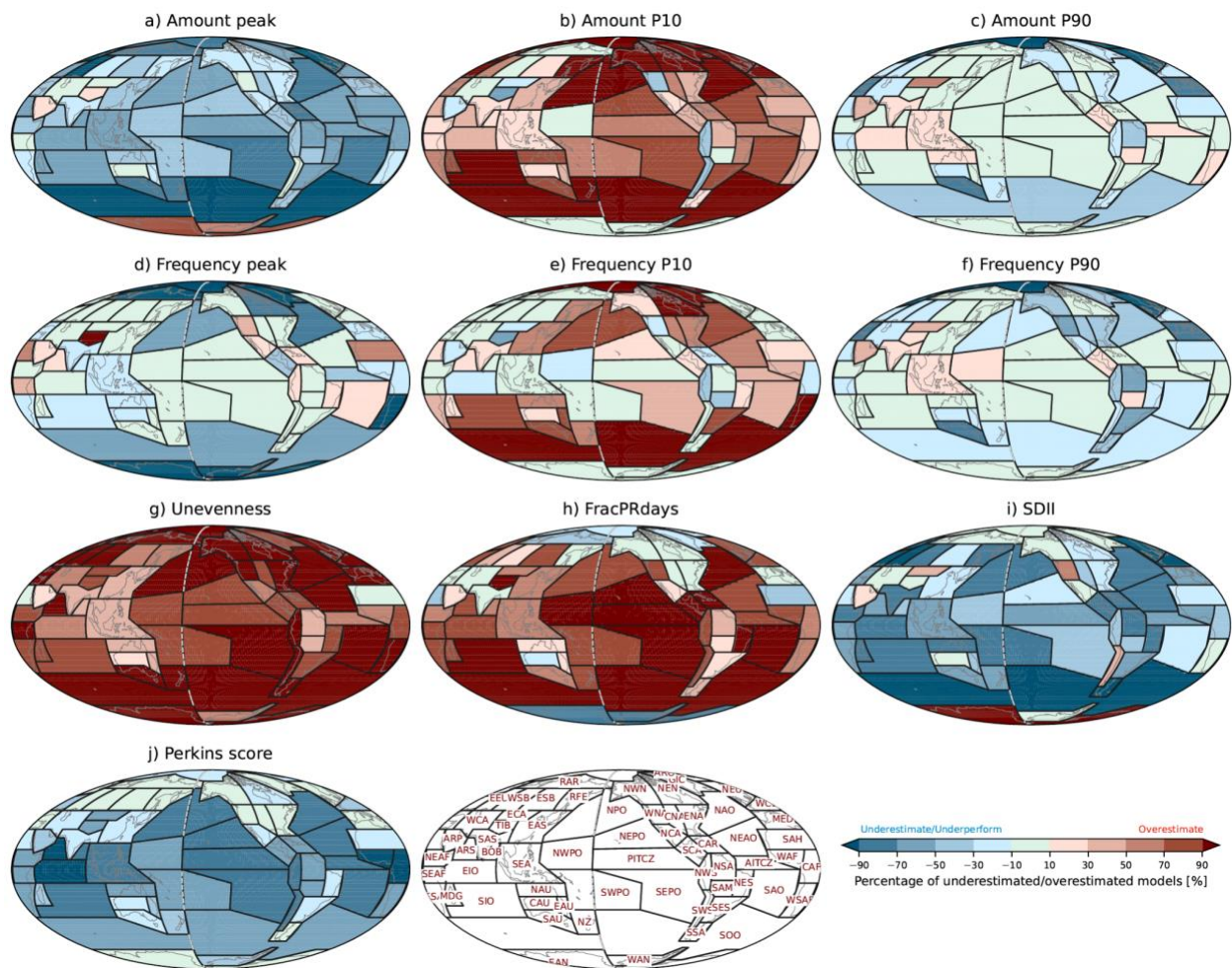Figure S3. As in Fig. 10, but for a subset of models that participated in both CMIP 5 and 6.

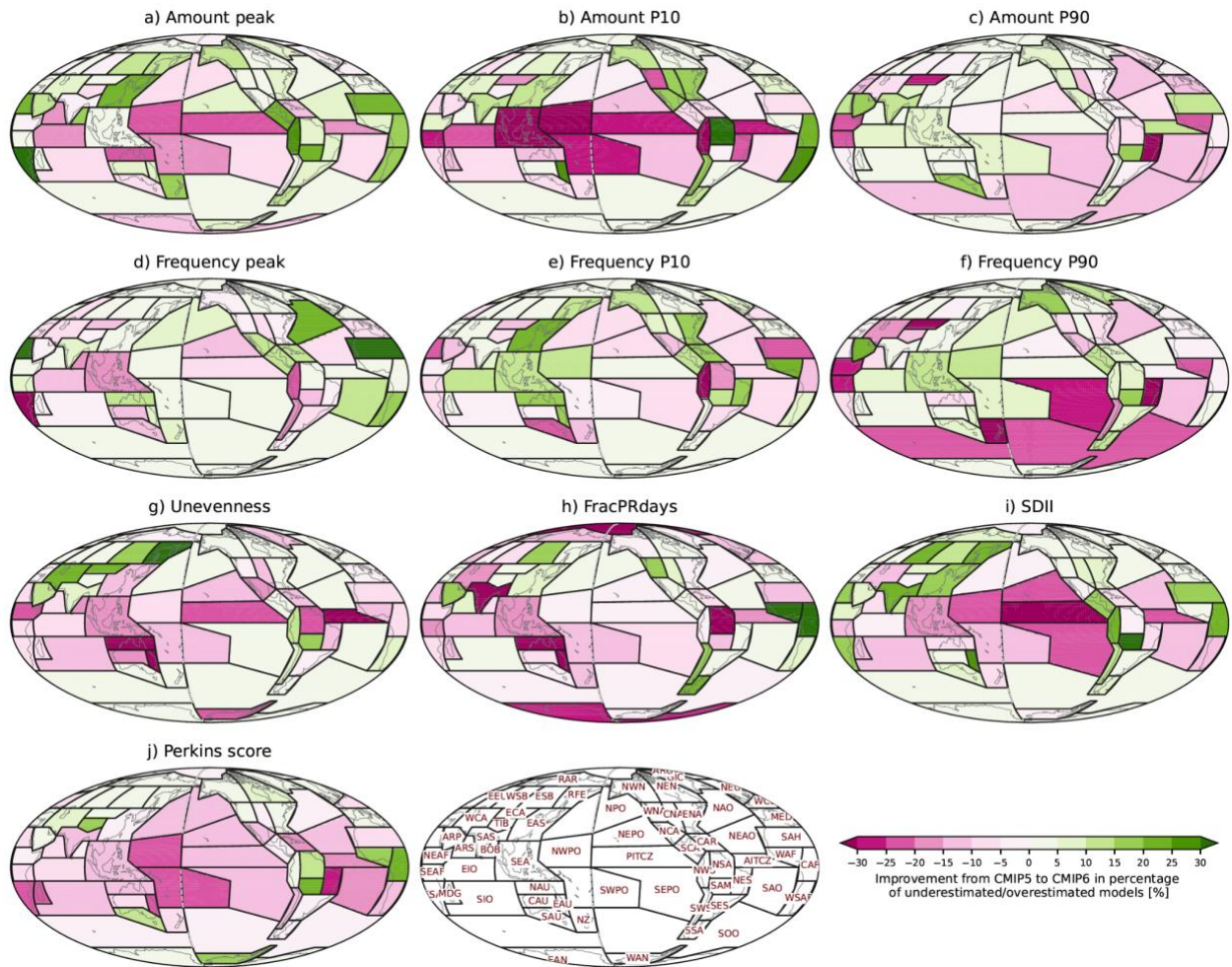Figure S4. As in Fig. 11, but for CMIP5 models.

Figure S5. As in Fig. 12, but for a subset of models that participated in both CMIP 5 and 6.