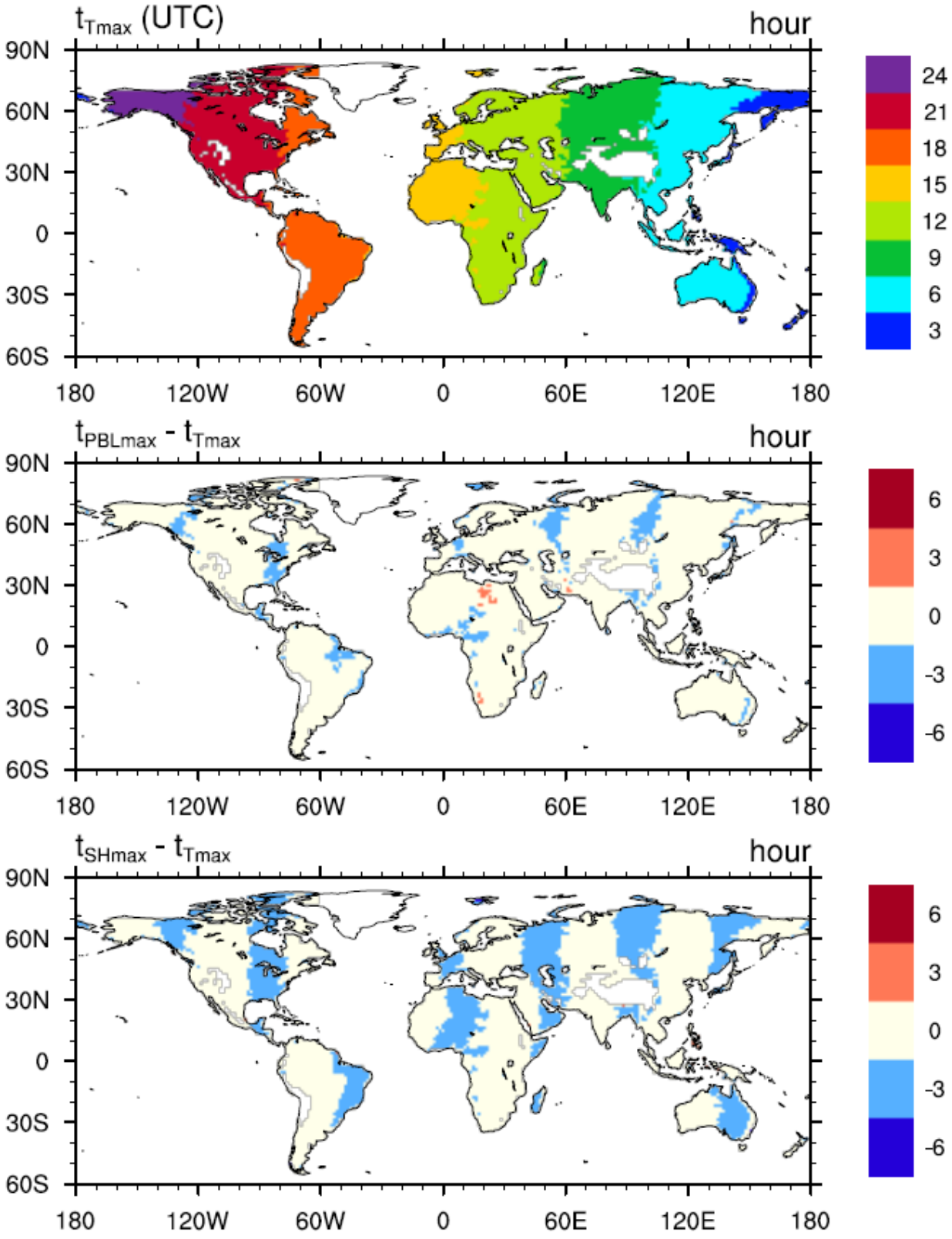

Figure SI1. Geographical distribution of the time when T_{max} appears (in UTC hour) and the corresponding differences from the time when PBL_{max} and SH_{max} occur. The plots are derived from the 3-hourly ERA-Interim reanalysis.

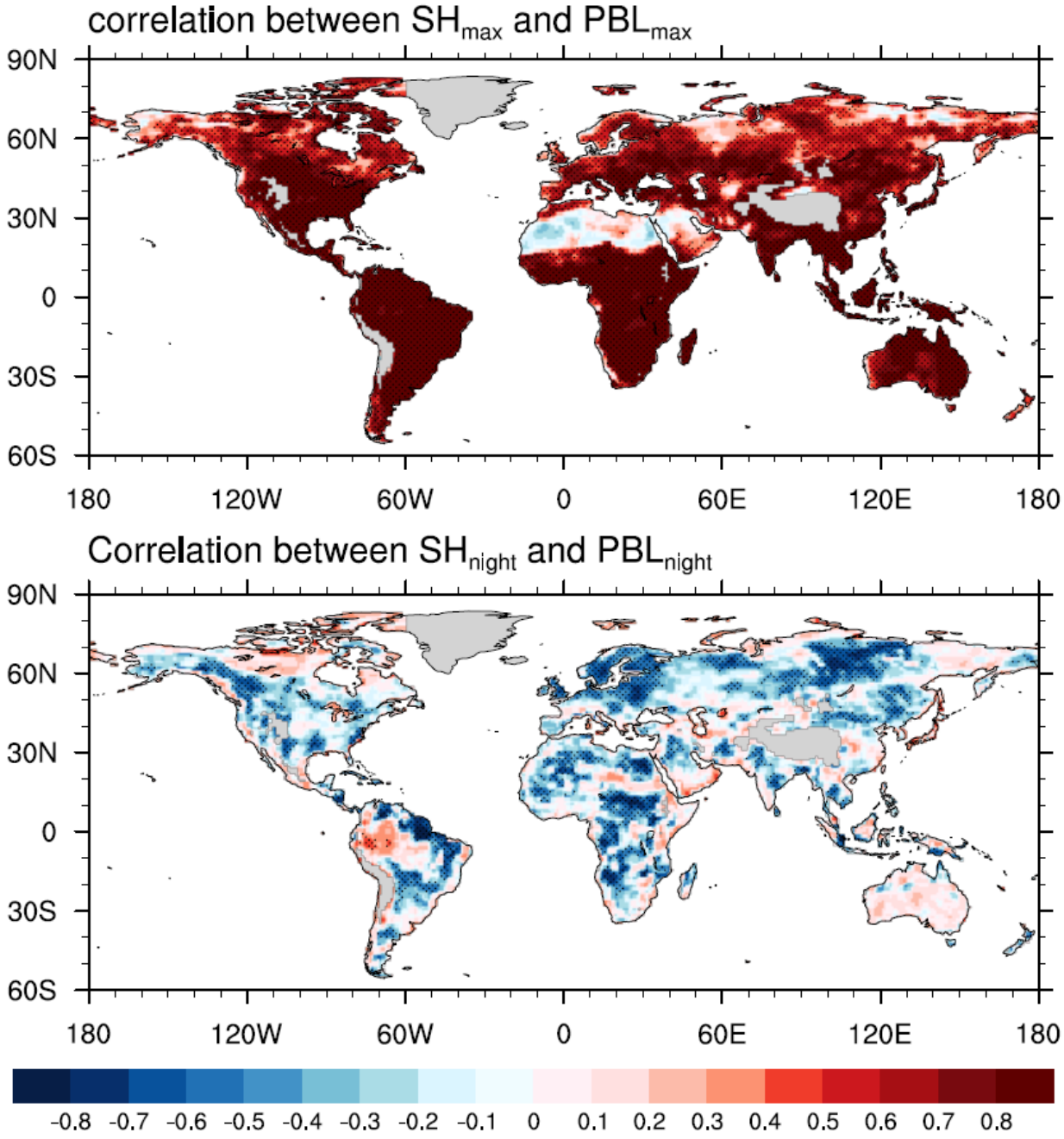

Figure SI2. Geographical distribution of the inter-annual correlations between SH_{max} and PBL_{max} (top panel), and between SH_{night} and PBL_{night} (bottom panel) from the ERA-Interim reanalysis

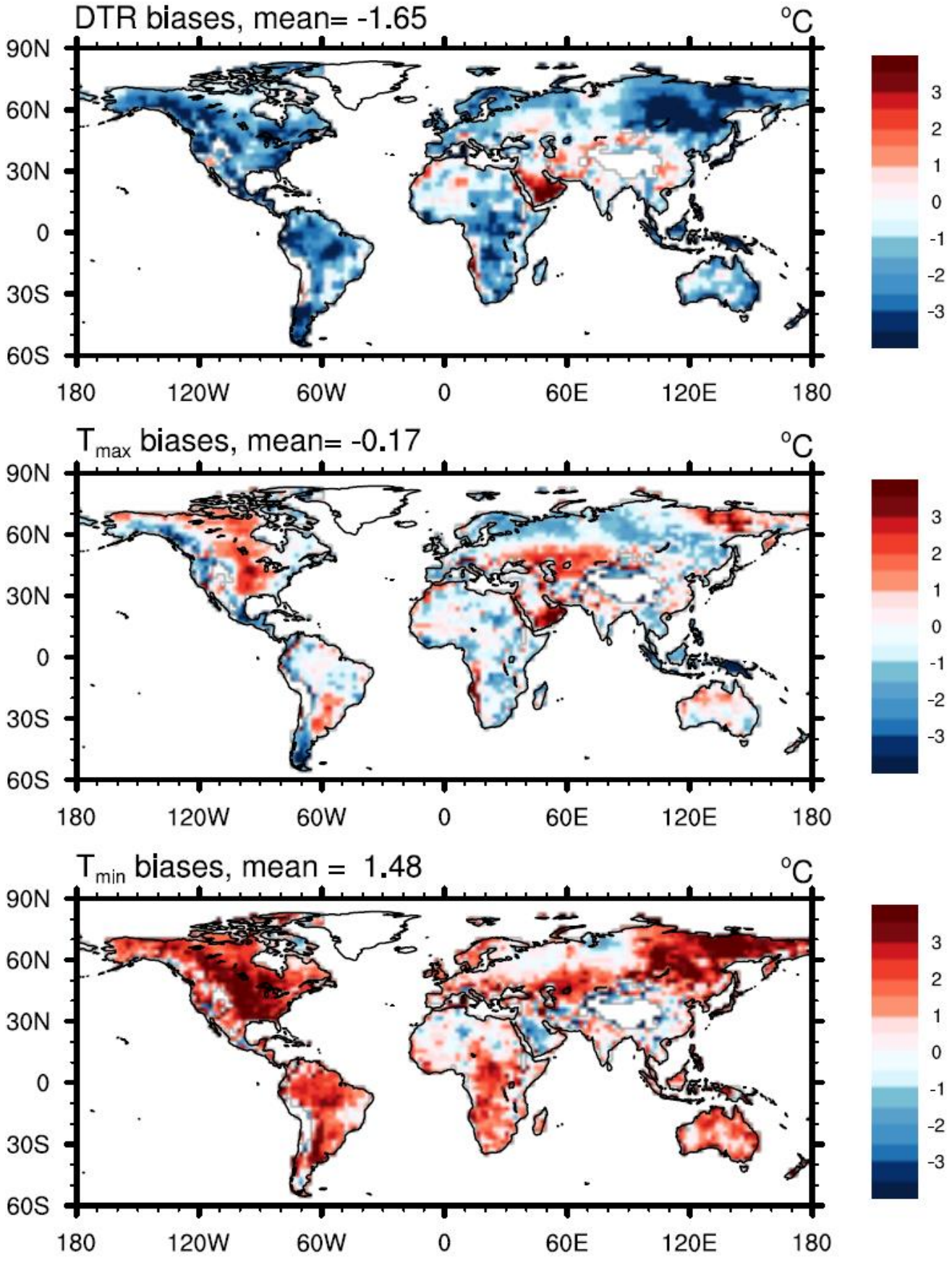
DTR biases, mean= -1.65
°C
90N
60N
30N
0
30S
60S
180
120W
60W
0
60E
120E
180
3
2
1
0
-1
-2
-3
T max biases, mean= -0.17
°C
90N
60N
30N
0
30S
60S
180
120W
60W
0
60E
120E
180
3
2
1
0
-1
-2
-3
T min biases, mean = 1.48
°C
90N
60N
30N
0
30S
60S
180
120W
60W
0
60E
120E
180
3
2
1
0
-1
-2
-3

Figure SI3. Geographical distribution of the CFMIP2-simulated multi-model ensemble mean biases of DTR, T_{max} and T_{min} (°C) against the CRU observations

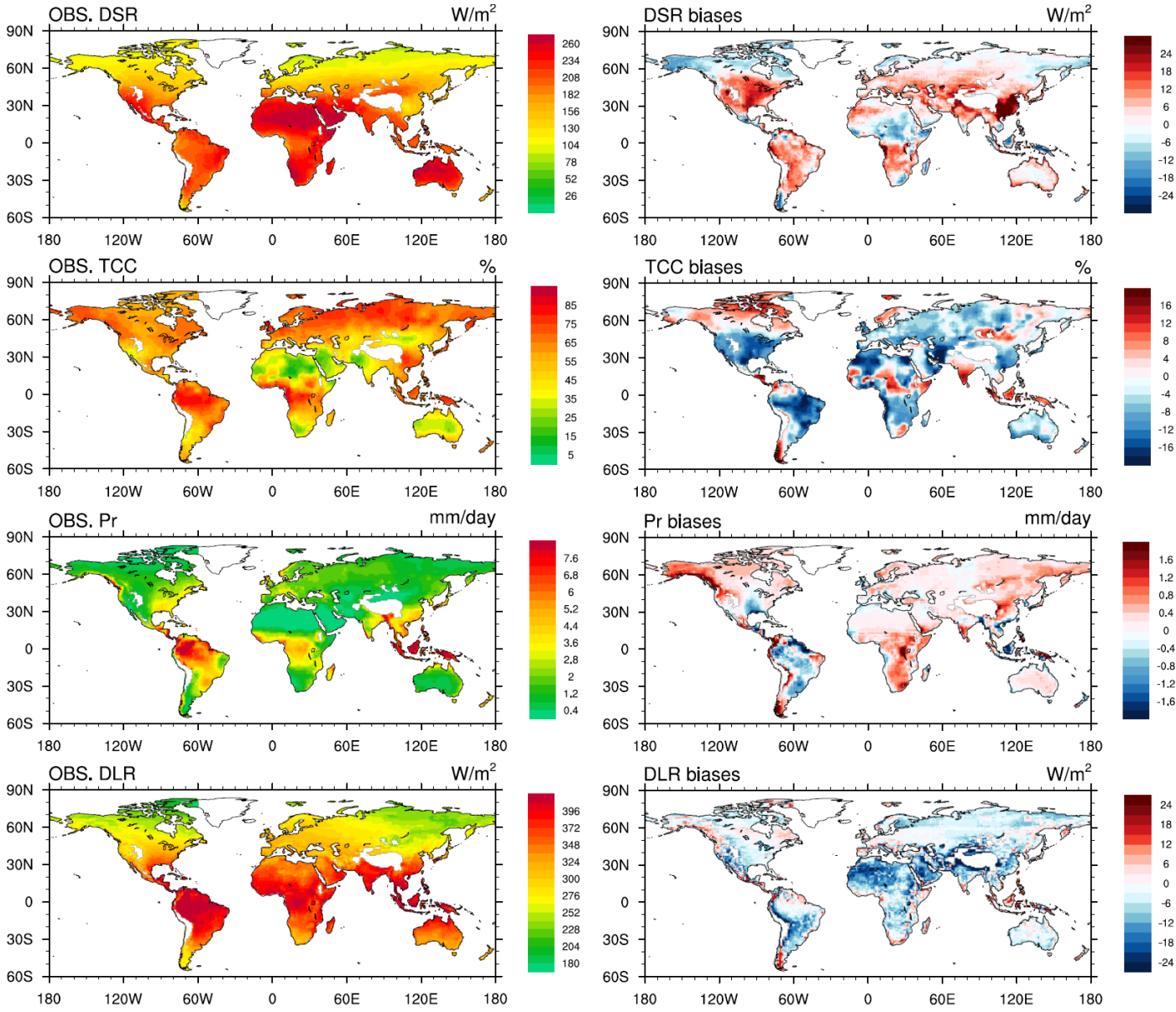

Figure SI4. Geographical distribution of (left panels) the observed climatological downward shortwave radiation (DSR, W/m^2) from the CERES-EBAF data, total cloud cover (TCC, %) from the CRU data, precipitation (Pr, mm/day) from the GPCP data, and downward longwave radiation (DLR, W/m^2) from the CERES-EBAF data, and (right panels) the corresponding CMIP5 multi-model ensemble mean biases