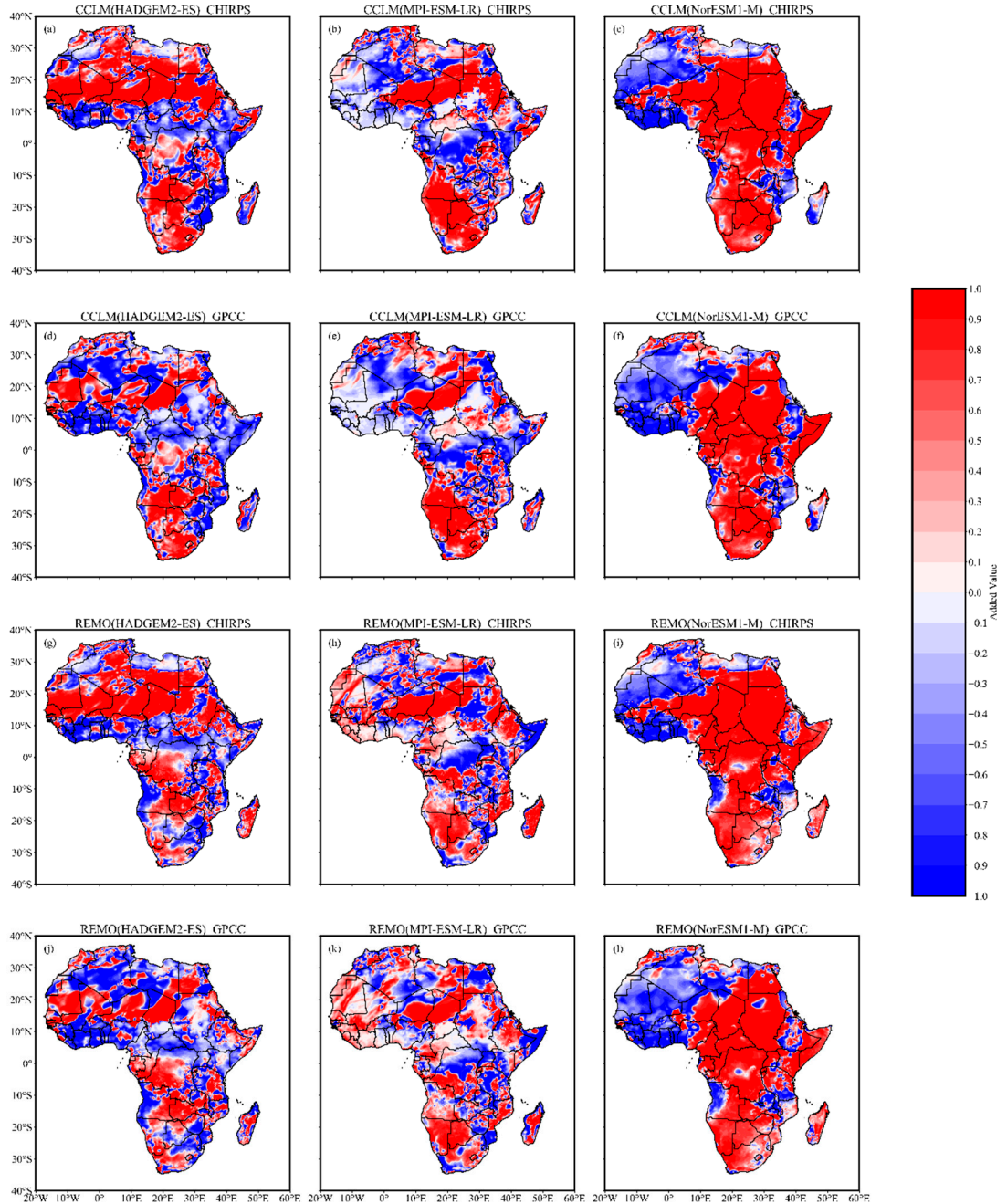
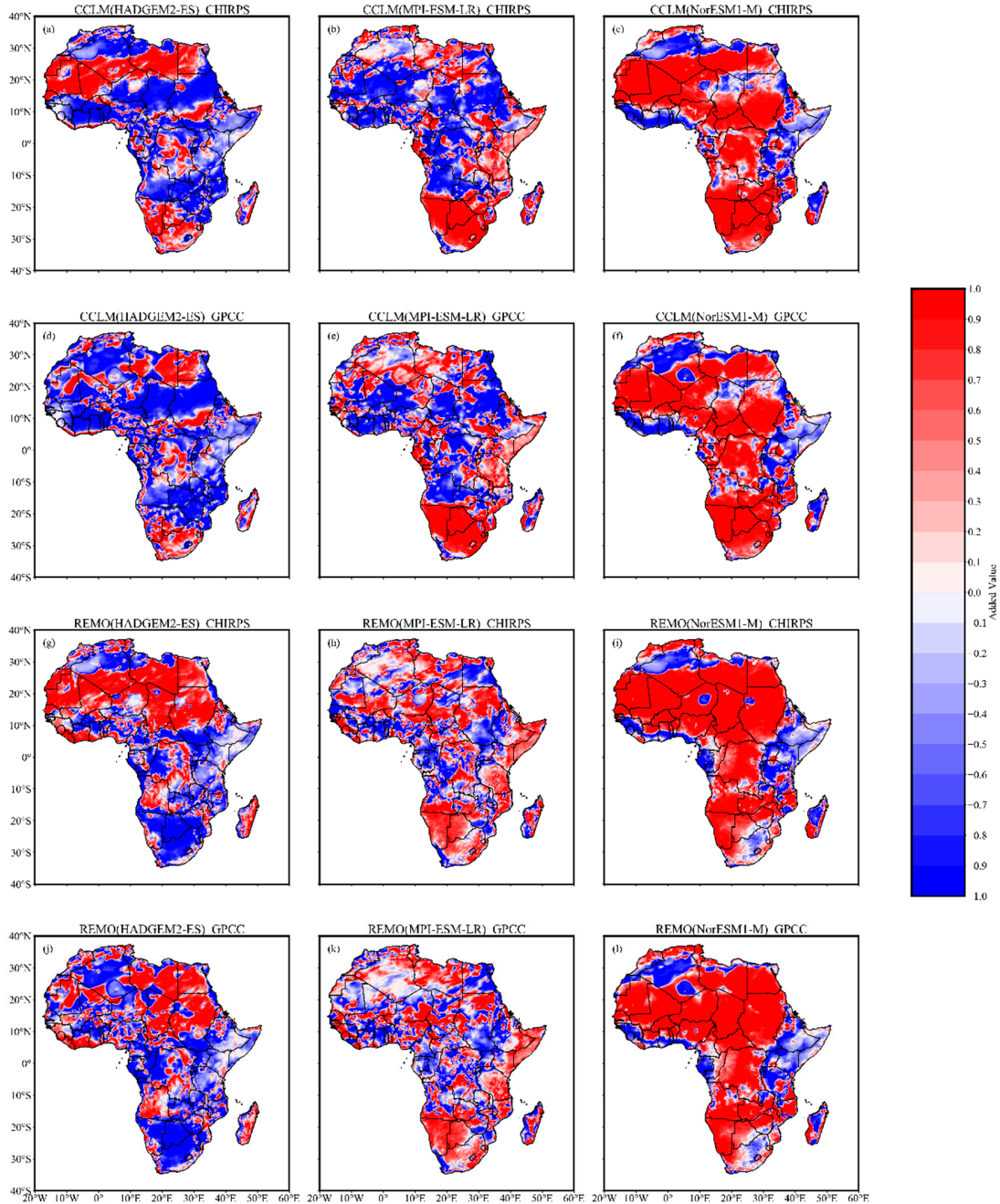


## Supplementary

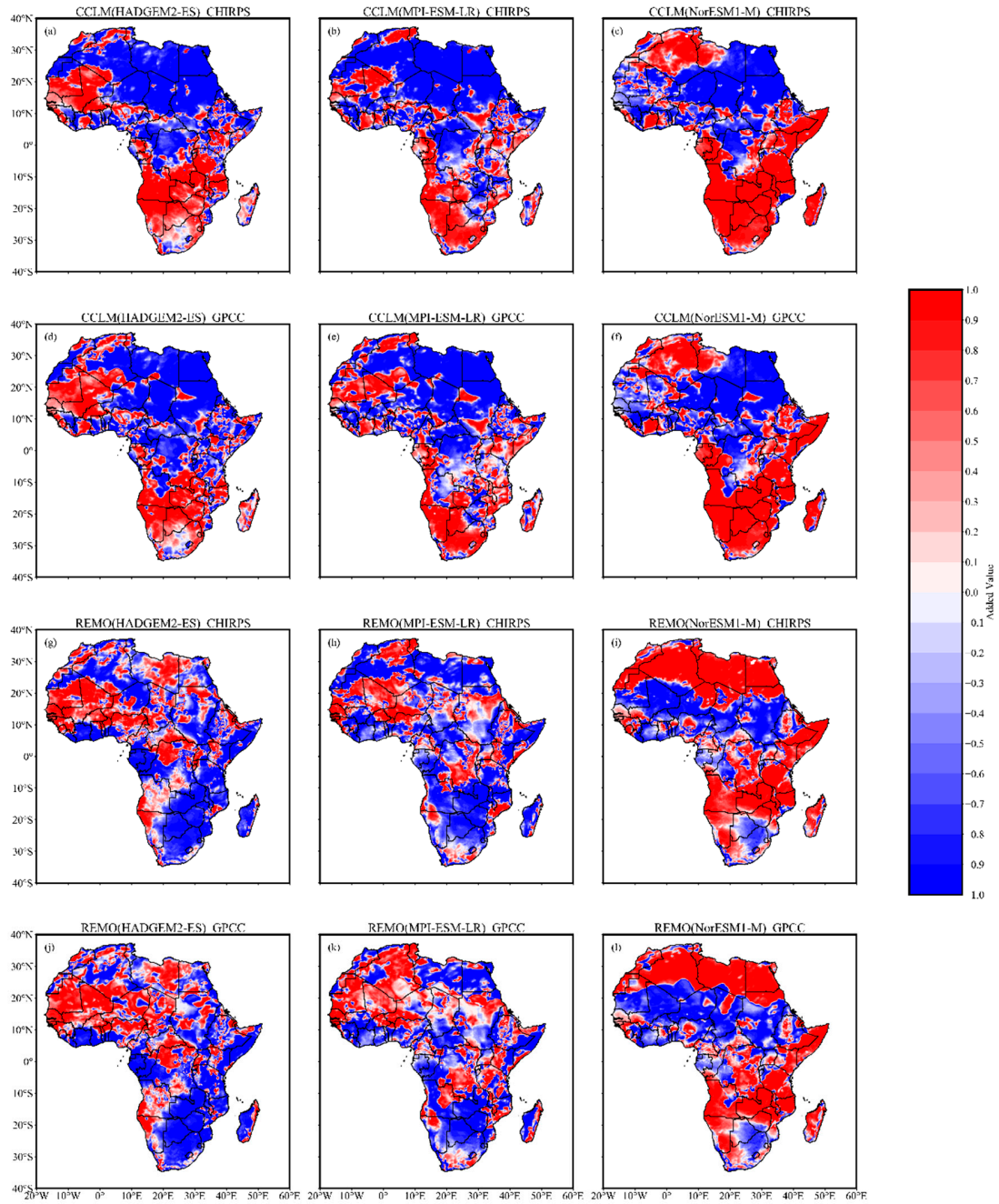


**Figure S1.** Added Value of monthly precipitation in DJF, by CCLM and REMO, with GPCC and CHIRPS, as observational reference. : (a) CCLM (HadGEM2-ES)-CHIRPS, (b) CCLM (MPI-ESM-LR)-CHIRPS, (c) CCLM (NorESM1-M)-CHIRPS, (d) CCLM (HadGEM2-ES)-GPCC, (e) CCLM (MPI-ESM-LR)-GPCC, (f) CCLM (NorESM1-M)-GPCC (g) REMO (HadGEM2-ES)-CHIRPS, (h)

REMO (MPI-ESM-LR)- CHIRPS, (i) REMO (NorESM1-M)-CHIRPS, (j) REMO (HadGEM2-ES)- GPCC, (k) REMO (MPI-ESM-LR)- GPCC, (l) REMO (NorESM1-M)-GPCC.

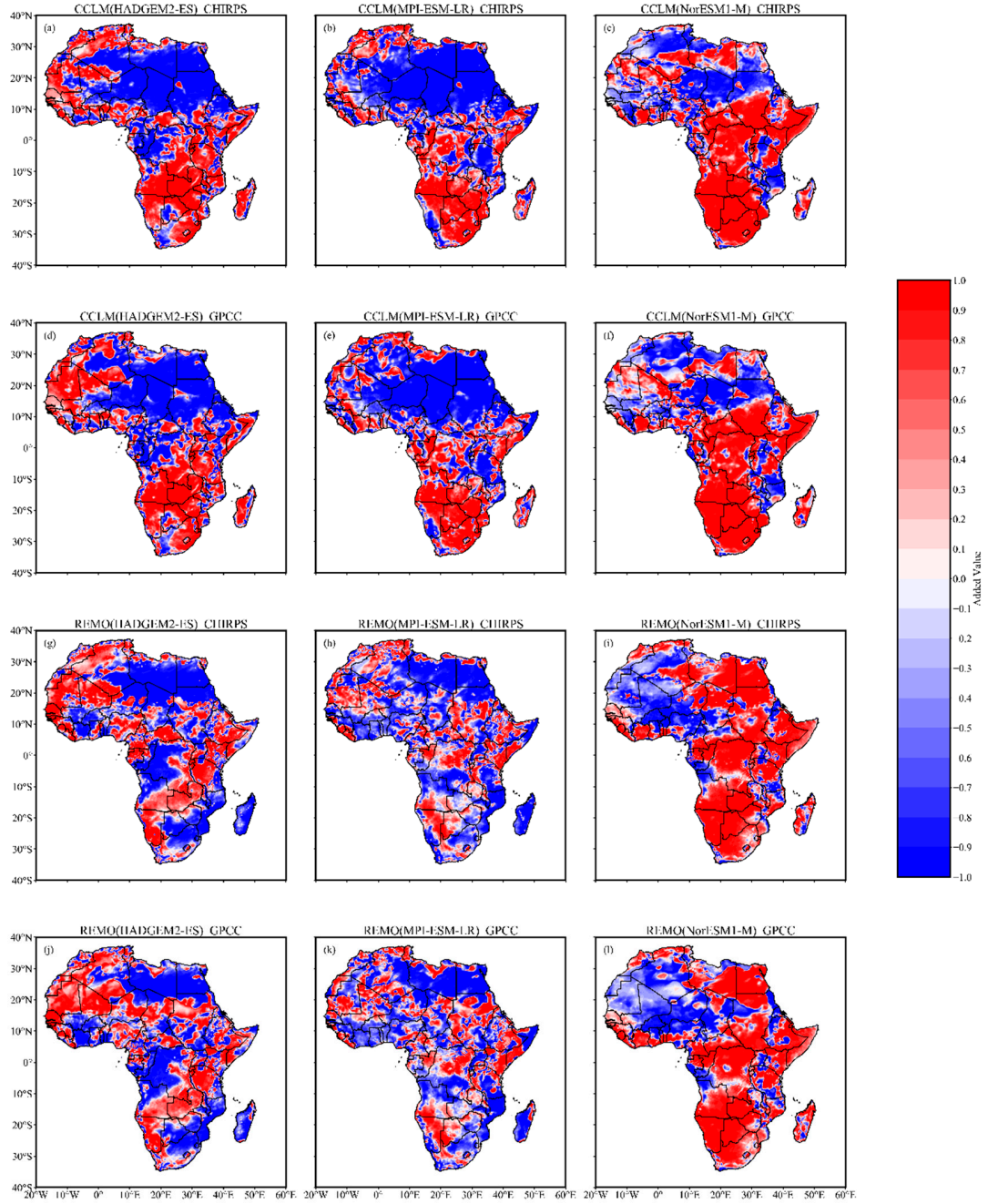


**Figure S2.** Added Value of monthly precipitation in MAM, by CCLM and REMO, with GPCC and CHIRPS, as observational reference: (a) CCLM (HadGEM2-ES)-CHIRPS, (b) CCLM (MPI-ESM-LR)-CHIRPS, (c) CCLM (NorESM1-M)-CHIRPS, (d) CCLM (HadGEM2-ES)-GPCC, (e) CCLM (MPI-ESM-LR)-GPCC, (f) CCLM (NorESM1-M)-GPCC (g) REMO (HadGEM2-ES)-CHIRPS, (h) REMO (MPI-ESM-LR)- CHIRPS, (i) REMO (NorESM1-M)-CHIRPS, (j) REMO (HadGEM2-ES)-GPCC, (k) REMO (MPI-ESM-LR)- GPCC, (l) REMO (NorESM1-M)-GPCC.



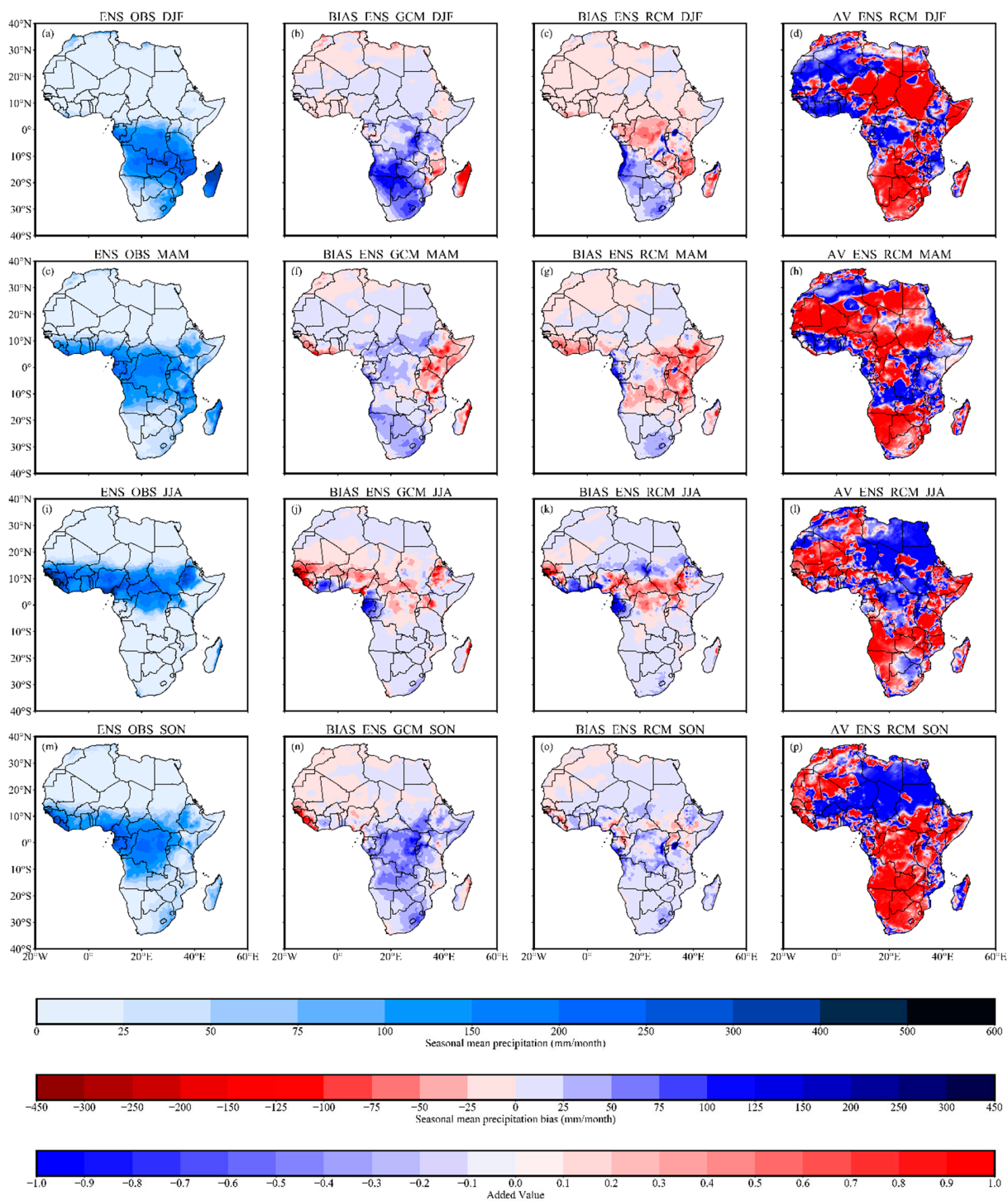
**Figure S3.** Added Value of monthly precipitation in JJA, by CCLM and REMO, with GPCC and CHIRPS, as observational reference. : (a) CCLM (HadGEM2-ES)-CHIRPS, (b) CCLM (MPI-ESM-LR)-CHIRPS, (c) CCLM (NorESM1-M)-CHIRPS, (d) CCLM (HadGEM2-ES)-GPCC, (e) CCLM (MPI-ESM-LR)-GPCC, (f) CCLM (NorESM1-M)-GPCC (g) REMO (HadGEM2-ES)-CHIRPS, (h) REMO (MPI-ESM-LR)- CHIRPS, (i) REMO (NorESM1-M)-CHIRPS, (j) REMO (HadGEM2-ES)-GPCC, (k) REMO (MPI-ESM-LR)- GPCC, (l) REMO (NorESM1-M)-GPCC.





**Figure S4.** Added Value of monthly precipitation in SON, by CCLM and REMO, with GPCC and CHIRPS, as observational reference. : (a) CCLM (HadGEM2-ES)–CHIRPS, (b) CCLM (MPI-ESM-LR)–CHIRPS, (c) CCLM (NorESM1-M)–CHIRPS, (d) CCLM (HadGEM2-ES)–GPCC, (e) CCLM (MPI-ESM-LR)–GPCC, (f) CCLM (NorESM1-M)–GPCC (g) REMO (HadGEM2-ES)–CHIRPS, (h) REMO (MPI-ESM-LR) – CHIRPS, (i) REMO (NorESM1-M)–CHIRPS, (j) REMO (HadGEM2-ES) –GPCC, (k) REMO (MPI-ESM-LR) – GPCC, (l) REMO (NorESM1-M)–GPCC.





**Figure S5.** Bias and Added Value of seasonal monthly precipitation, compared to the ensemble of observations (CHIRPS and GPCC), for GCMs and RCMs' simulations. (a) ENSEMBLE of OBSERVATION-DJF (b) ENSEMBLE of GCMs-DJF (c) ENSEMBLE of RCMs-DJF (d) AV of RCMs to GCMs-DJF (e) ENSEMBLE of OBSERVATION-MAM (f) ENSEMBLE of GCMs-MAM (g) ENSEMBLE of RCMs-MAM (h) AV of RCMs to GCMs-MAM (i) ENSEMBLE of OBSERVATION-JJA (j) ENSEMBLE of GCMs-JJA (k) ENSEMBLE of RCMs-JJA (l) AV of RCMs to GCMs-JJA, (m)

ENSEMBLE of OBSERVATION-SON (n) ENSEMBLE of GCMs-SON (o) ENSEMBLE of RCMs-SON  
(p) AV of RCMs to GCMs-SON