Soil type distribution across different soil texture maps

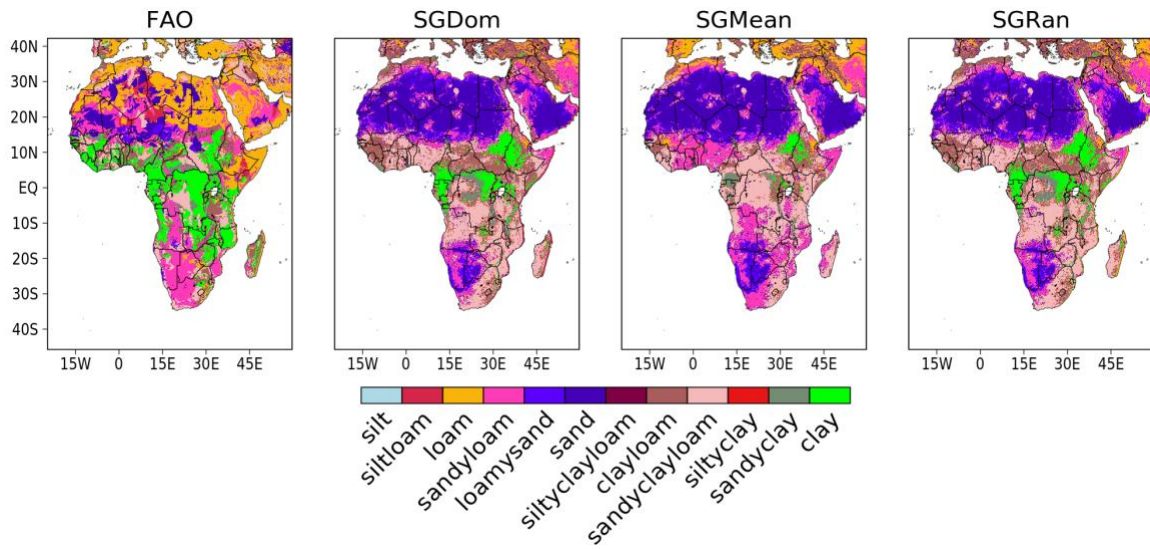



Figure S1: Soil type distribution over Africa according to the USDA soil triangle.

Saturated Hydraulic Conductivity

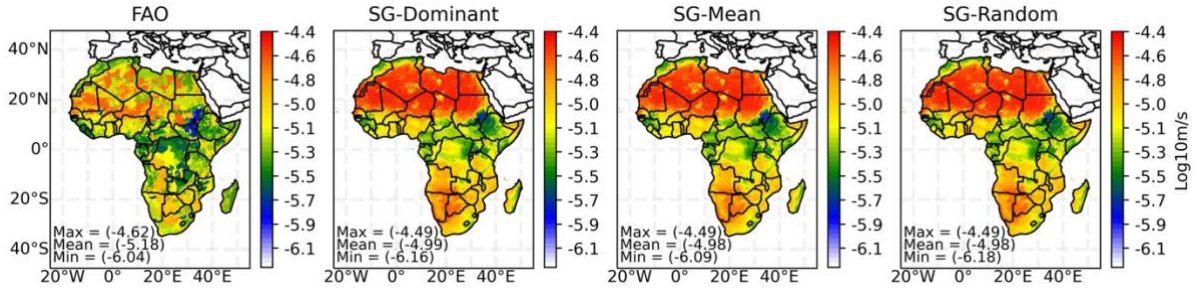



Figure S2: Saturated Hydraulic Conductivity over Africa for the FAO, Dominant, Mean and Random upscaled soil texture maps estimated from texture data with the Clapp-Hornberger formulation.

DJF Soil Moisture

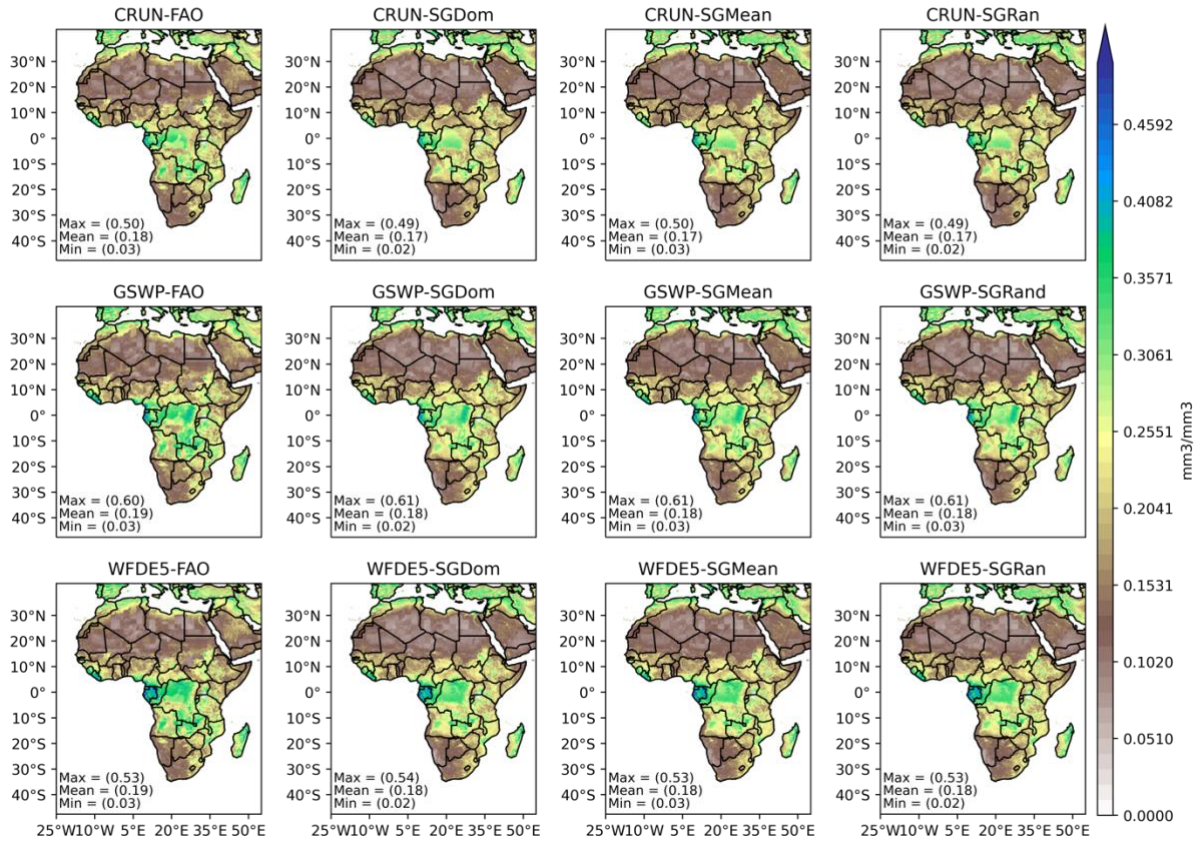



Figure S3: Spatial distribution of simulated soil water content in the DJF season over Africa. Row 1: CRUNCEP forced simulations with FAO, Dominant, Mean and Random upscaled soiltexture map inputs. Row 2: GSWP forced simulations with FAO, Dominant, Mean and Random upscaled soil texture map inputs. Row 3: WFDE5 forced simulations with FAO, Dominant, Mean and Random upscaled soil texture map inputs.

MAM Soil Moisture

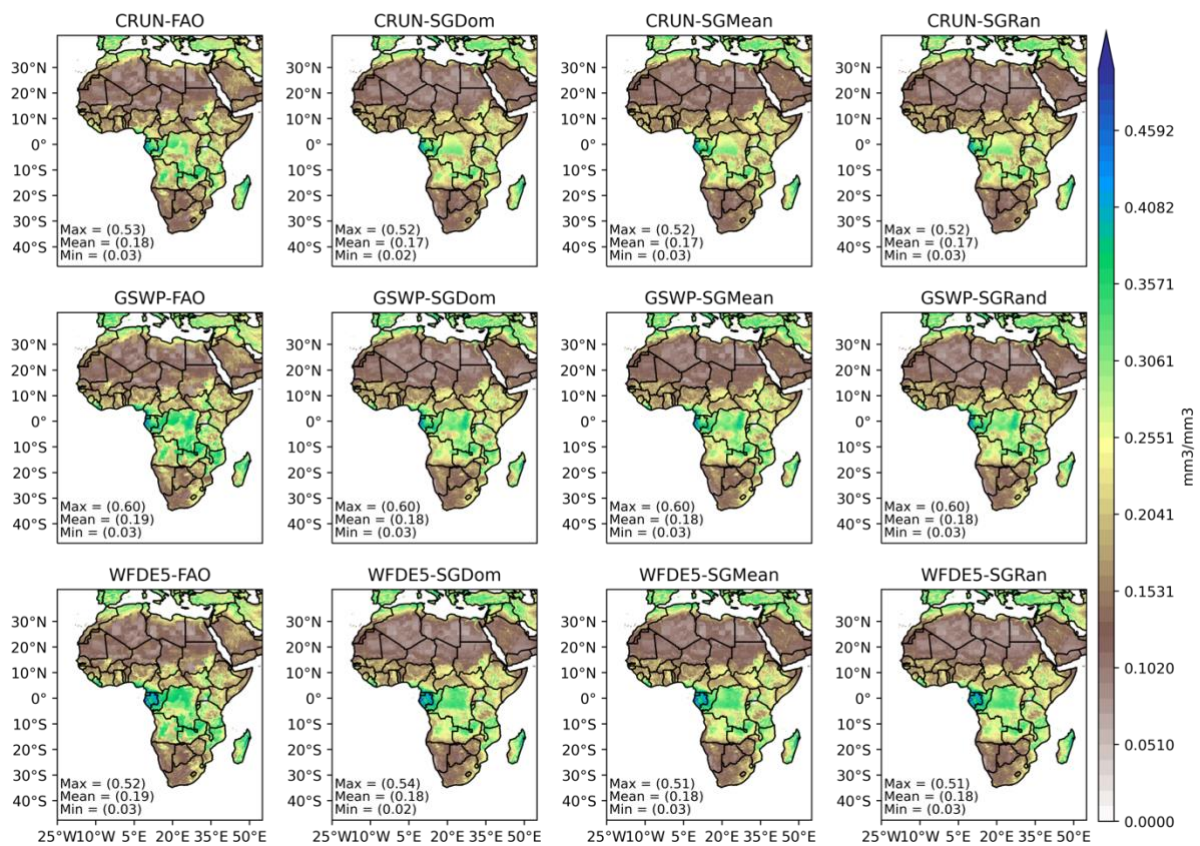



Figure S4: Spatial distribution of simulated soil water content in the MMA season over Africa. Row 1: CRUNCEP forced simulations with FAO, Dominant, Mean and Random upscaled soiltexture map inputs. Row 2: GSWP forced simulations with FAO, Dominant, Mean and Random upscaled soil texture map inputs. Row 3: WFDE5 forced simulations with FAO, Dominant, Mean and Random upscaled soil texture map inputs.

SON Soil moisture

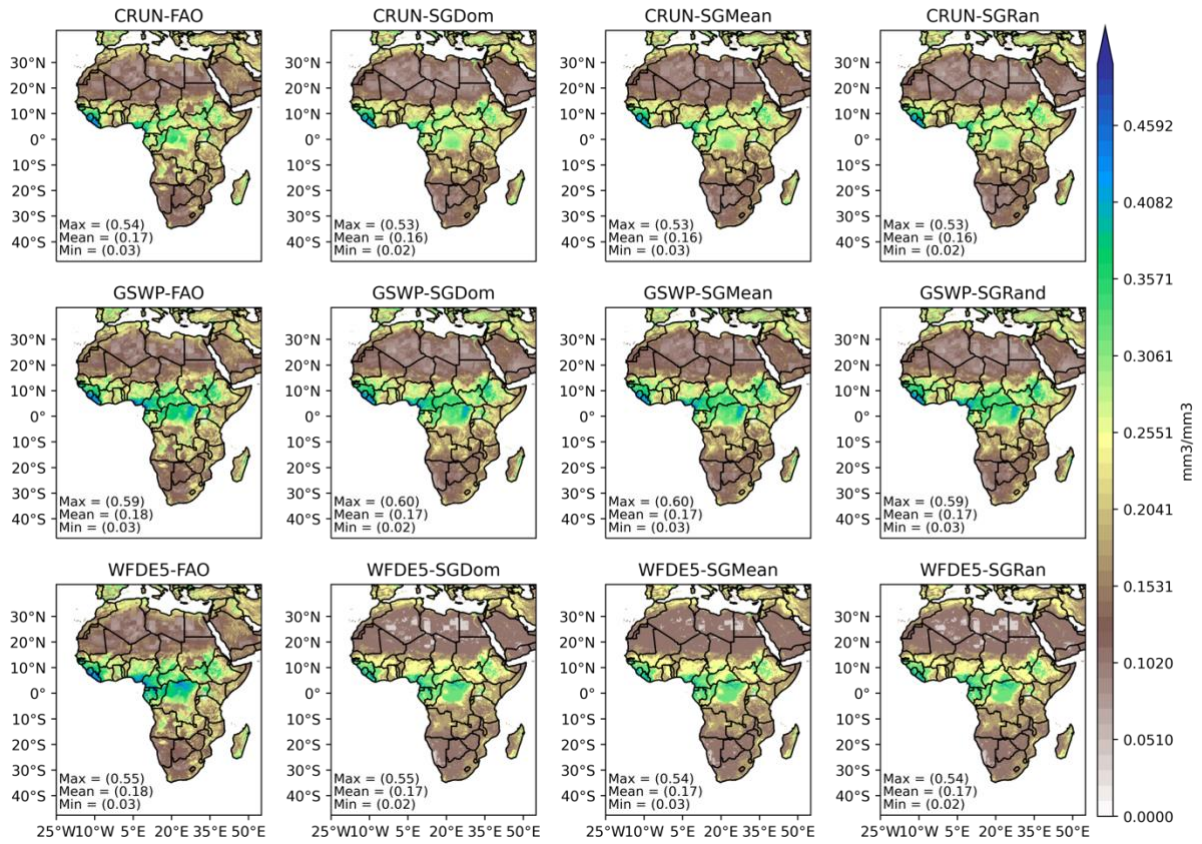



Figure S5: Spatial distribution of simulated soil water content in the SON season over Africa. Row 1: CRUNCEP forced simulations with FAO, Dominant, Mean and Random upscaled soiltexture map inputs. Row 2: GSWP forced simulations with FAO, Dominant, Mean and Random upscaled soil texture map inputs. Row 3: WFDE5 forced simulations with FAO, Dominant, Mean and Random upscaled soil texture map inputs.

Mediterranean Region

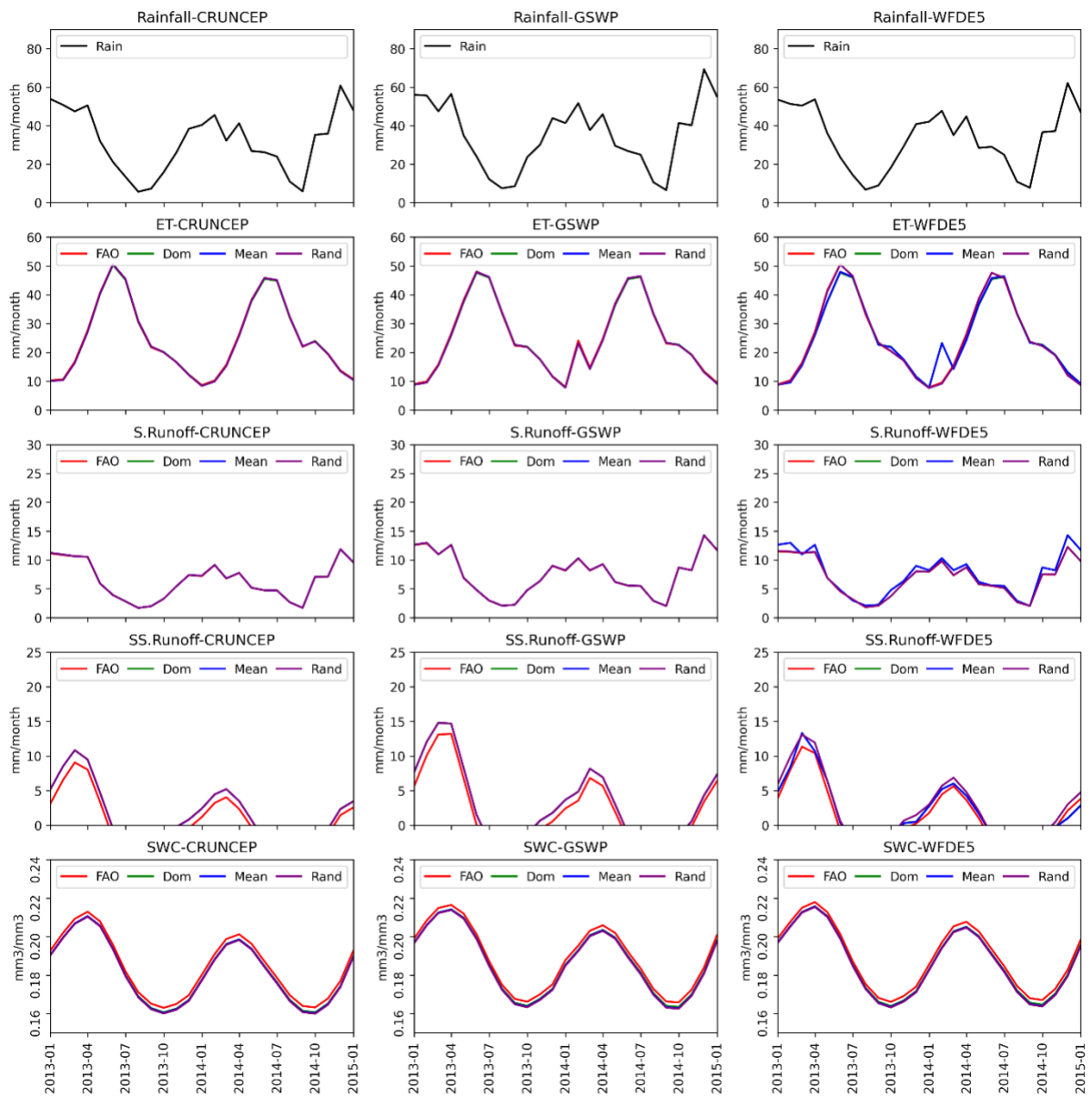



Figure S6: Monthly regional mean of water balance components over the Mediterranean. Rows 1-5 are rainfall, ET, surface runoff, subsurface runoff and soil water content. Columns 1-3 are CRUNCEP, GSWP and WFDE5 atmospheric forcings.

West Africa Regional Results

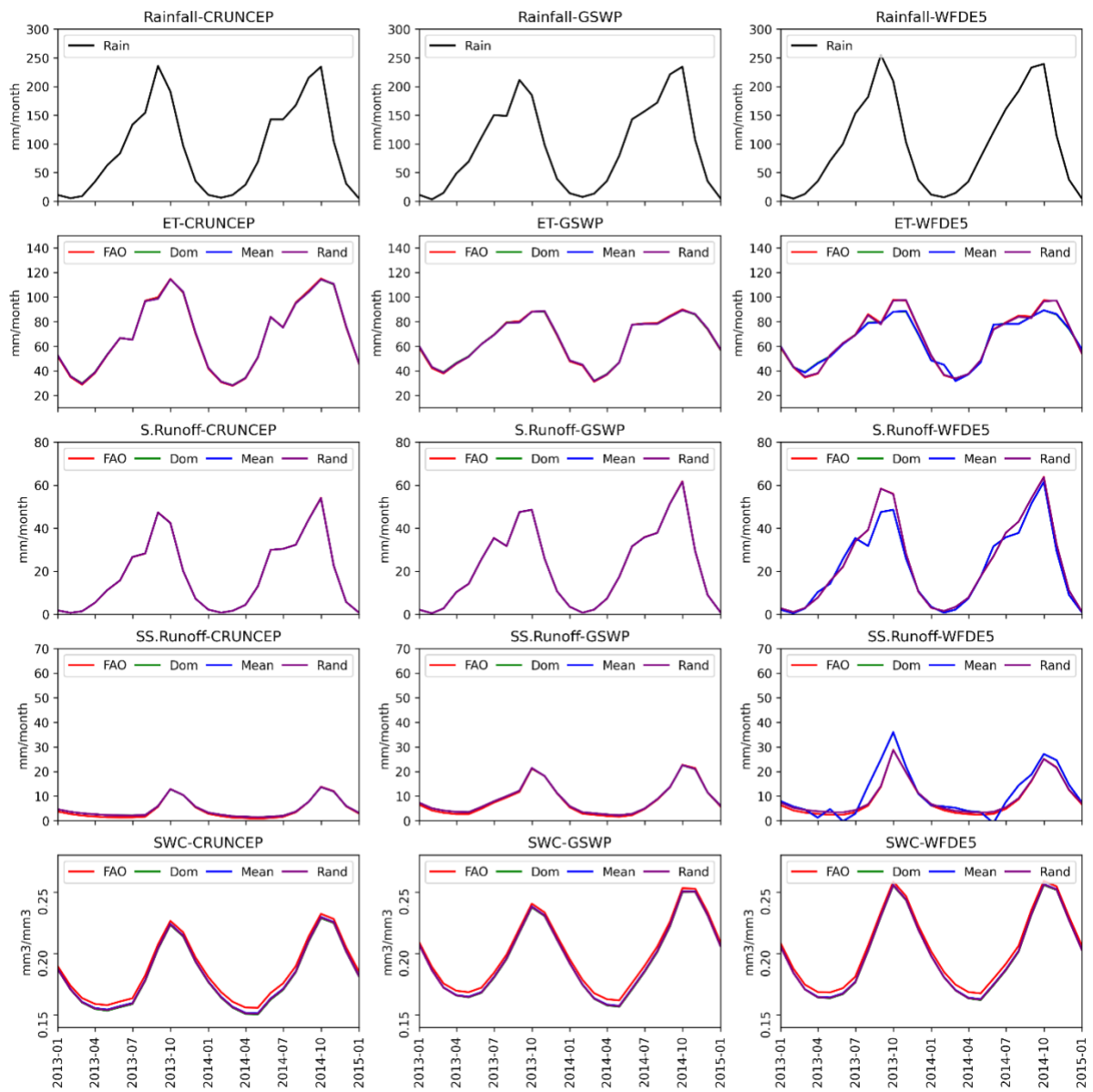



Figure S7: Monthly regional mean of water balance components over the West Africa. Rows 1-5 are rainfall, ET, surface runoff, subsurface runoff and soil water content. Columns 1-3 are CRUNCEP, GSWP and WFDE5 atmospheric forcings.

North-East Africa Regional results

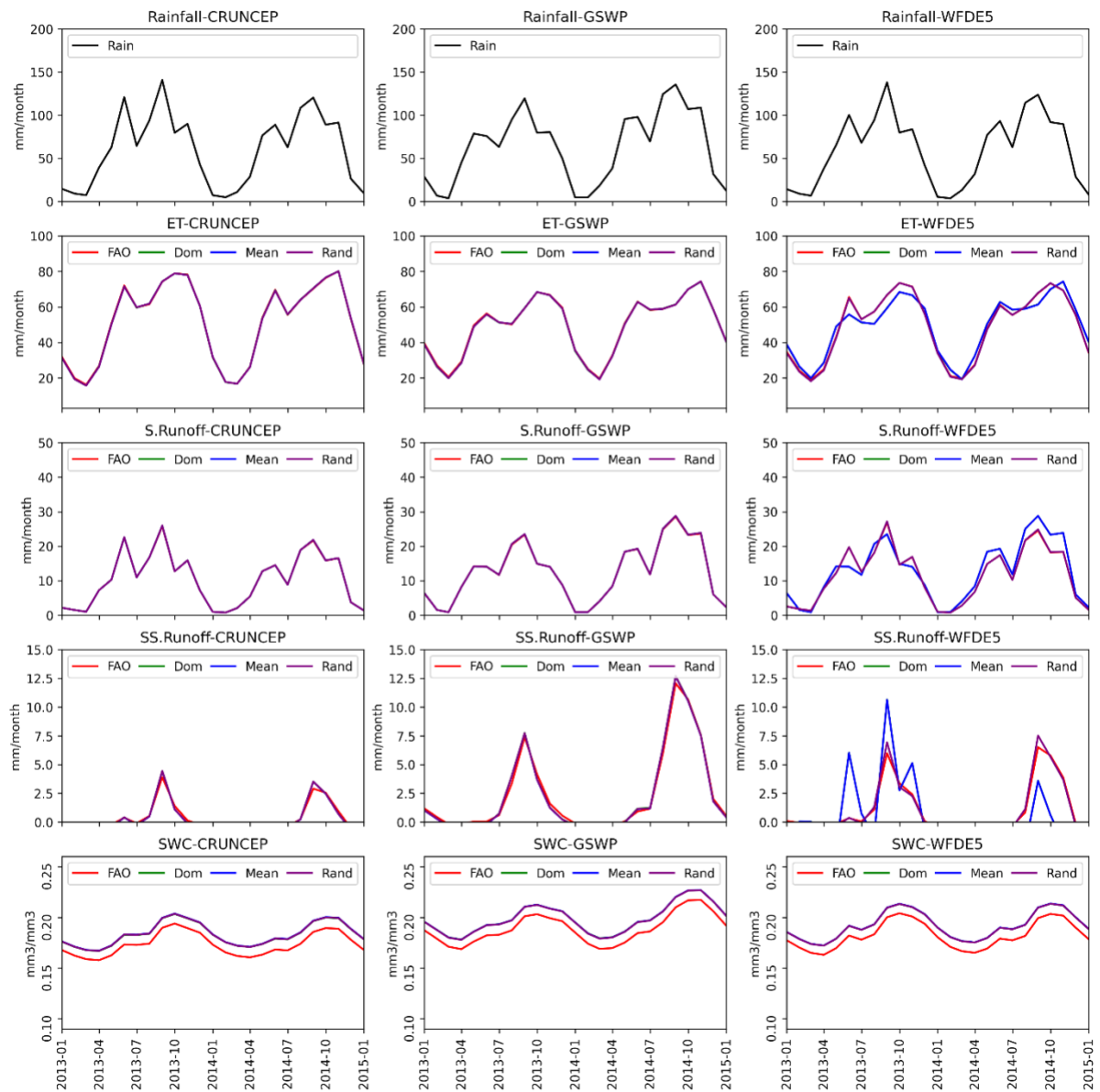



Figure S8: Monthly regional mean of water balance components over North-East Africa. Rows 1-5 are rainfall, ET, surface runoff, subsurface runoff and soil water content. Columns 1-3 are CRUNCEP, GSWP and WFDE5 atmospheric forcings.

Central East Africa Regional Results

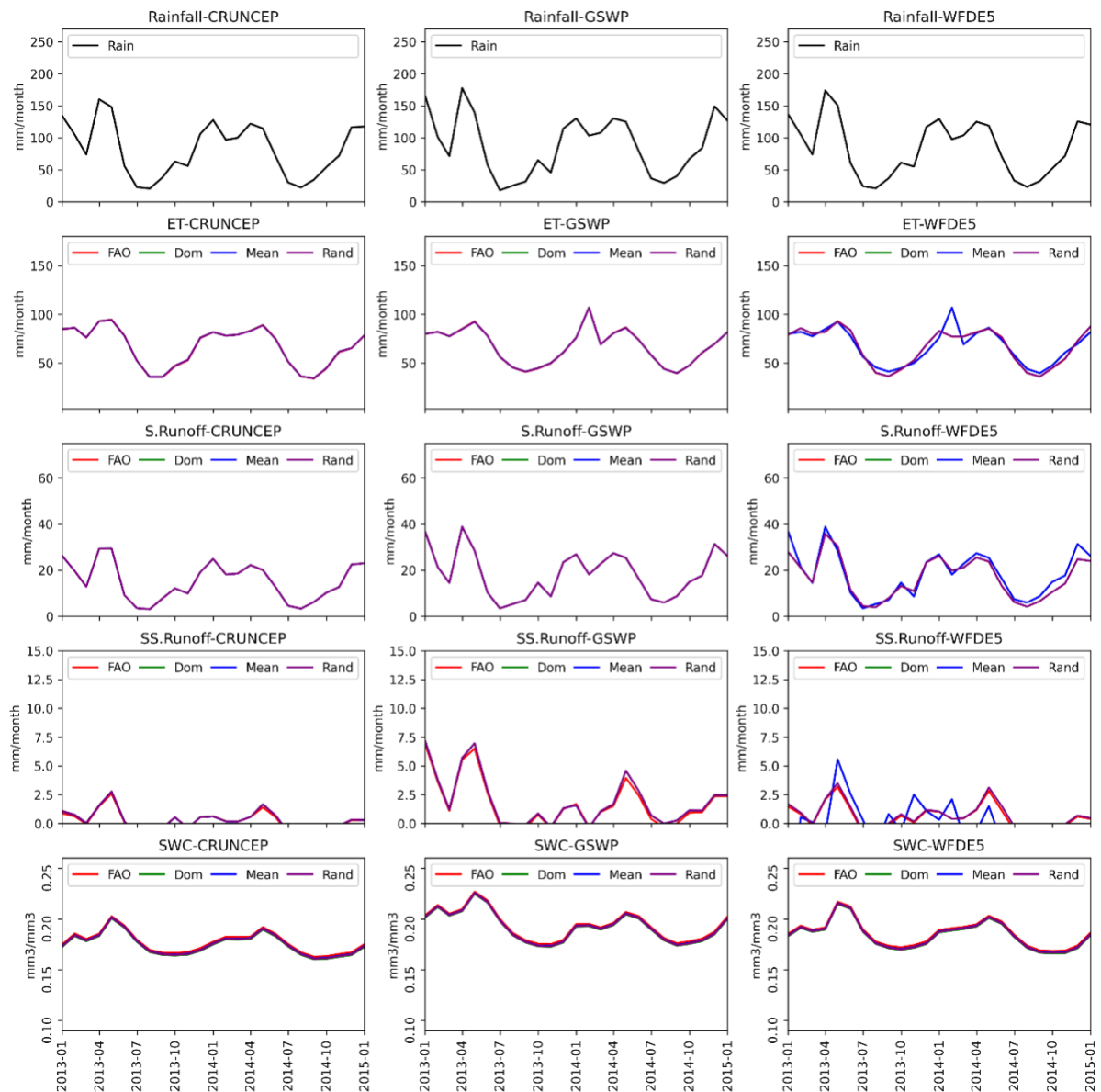



Figure S9: Monthly regional mean of water balance components over Central-East Africa. Rows 1-5 are rainfall, ET, surface runoff, subsurface runoff and soil water content. Columns 1-3 are CRUNCEP, GSWP and WFDE5 atmospheric forcings.

South-West Africa regional results

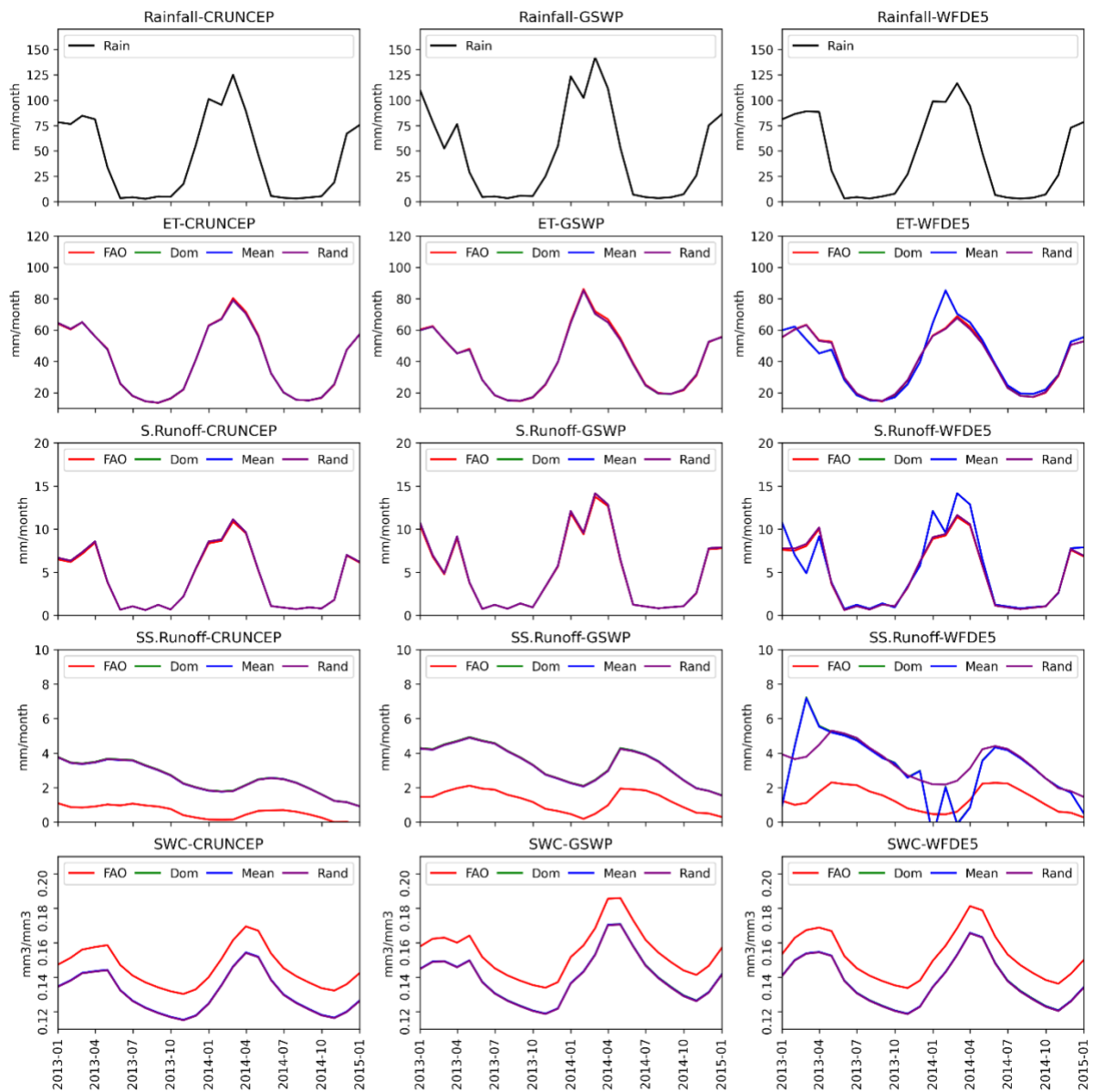



Figure S10: Monthly regional mean of water balance components over South-West Africa. Rows 1-5 are rainfall, ET, surface runoff, subsurface runoff and soil water content. Columns 1-3 are CRUNCEP, GSWP and WFDE5 atmospheric forcings.

South-East Africa regional results

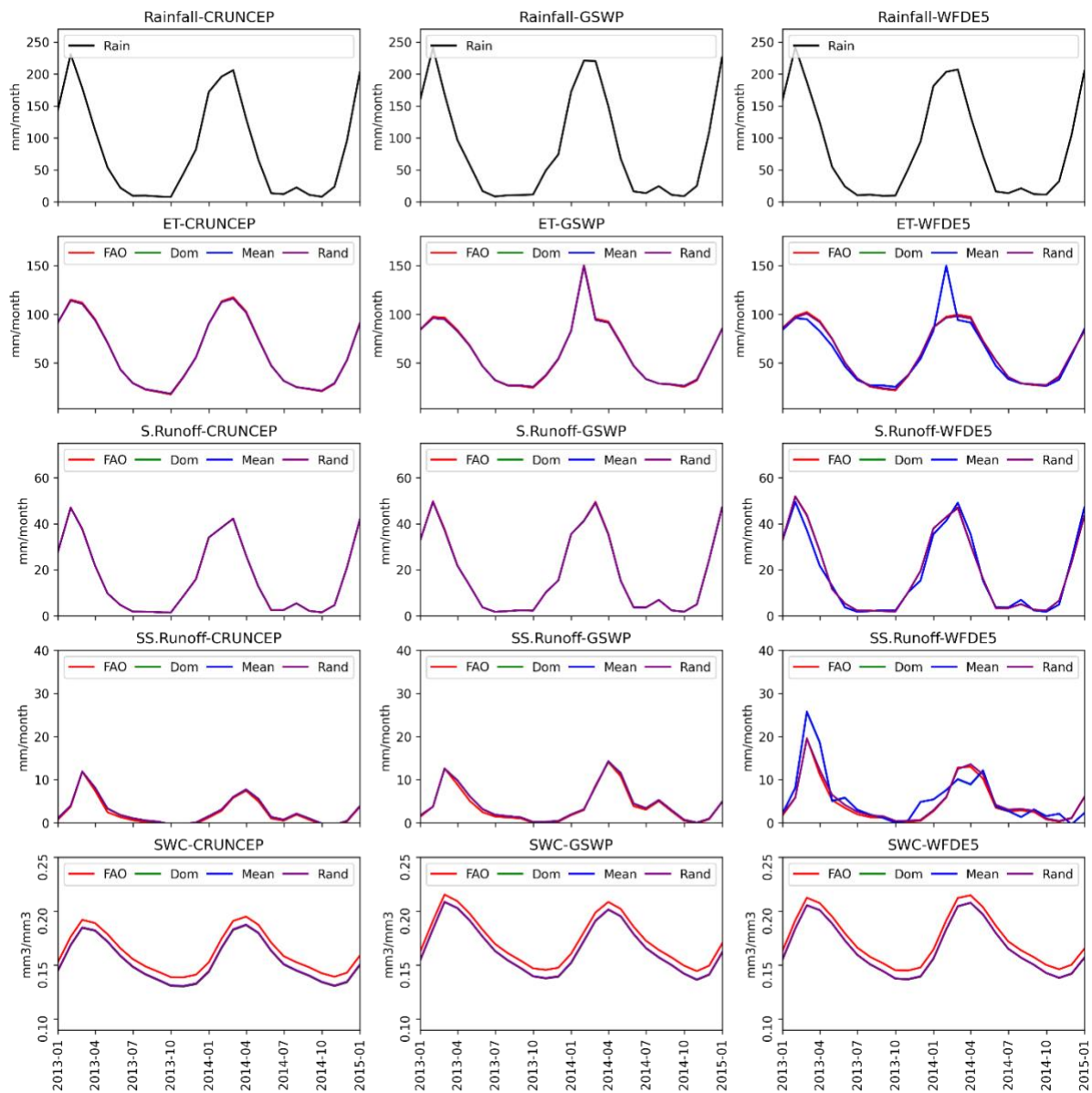
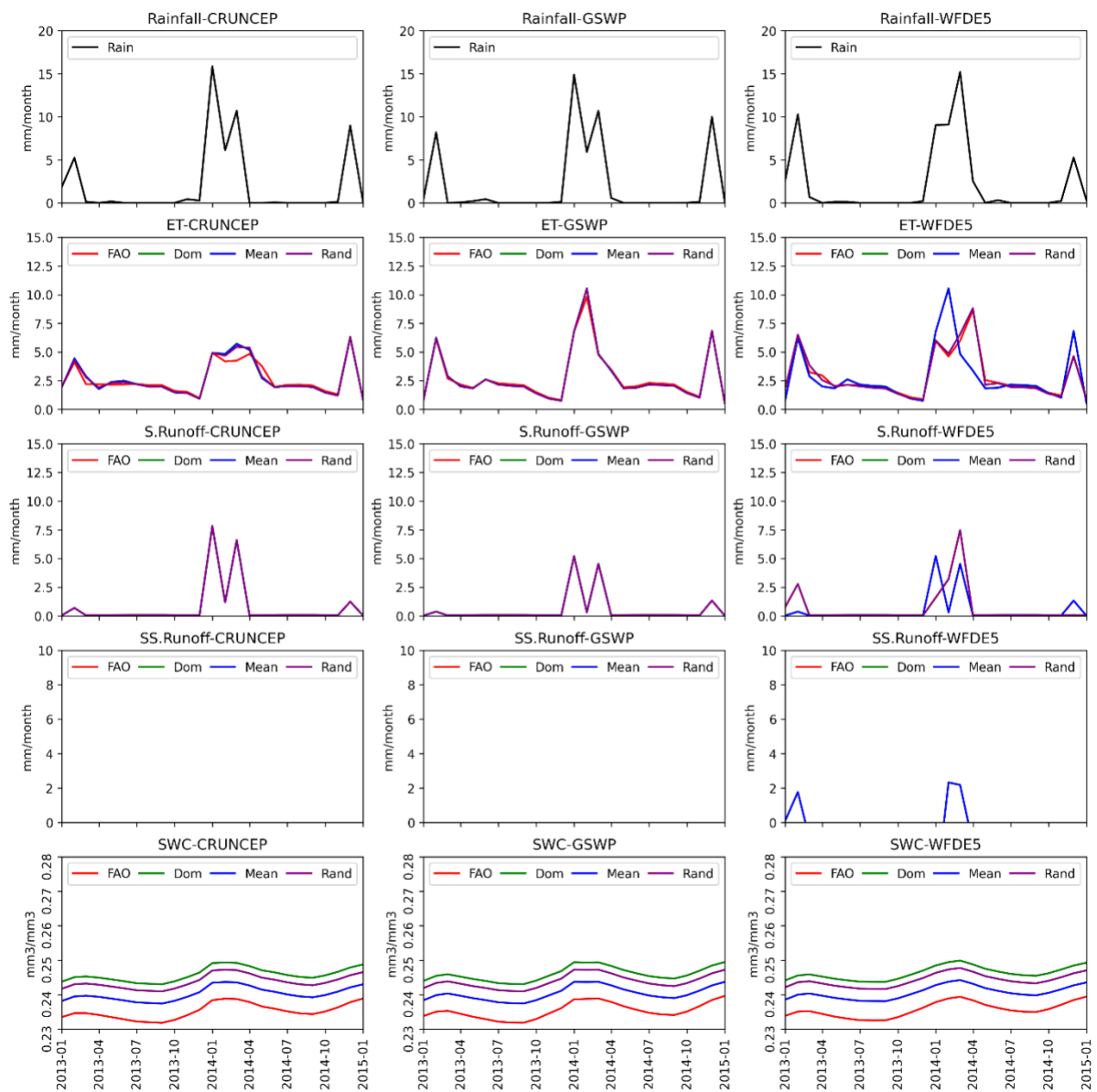



Figure S11: Monthly regional mean of water balance components over South-East Africa. Rows 1-5 are rainfall, ET, surface runoff, subsurface runoff and soil water content. Columns 1-3 are CRUNCEP, GSWP and WFDE5 atmospheric forcings.

Cairo Local results

Abuja Local results

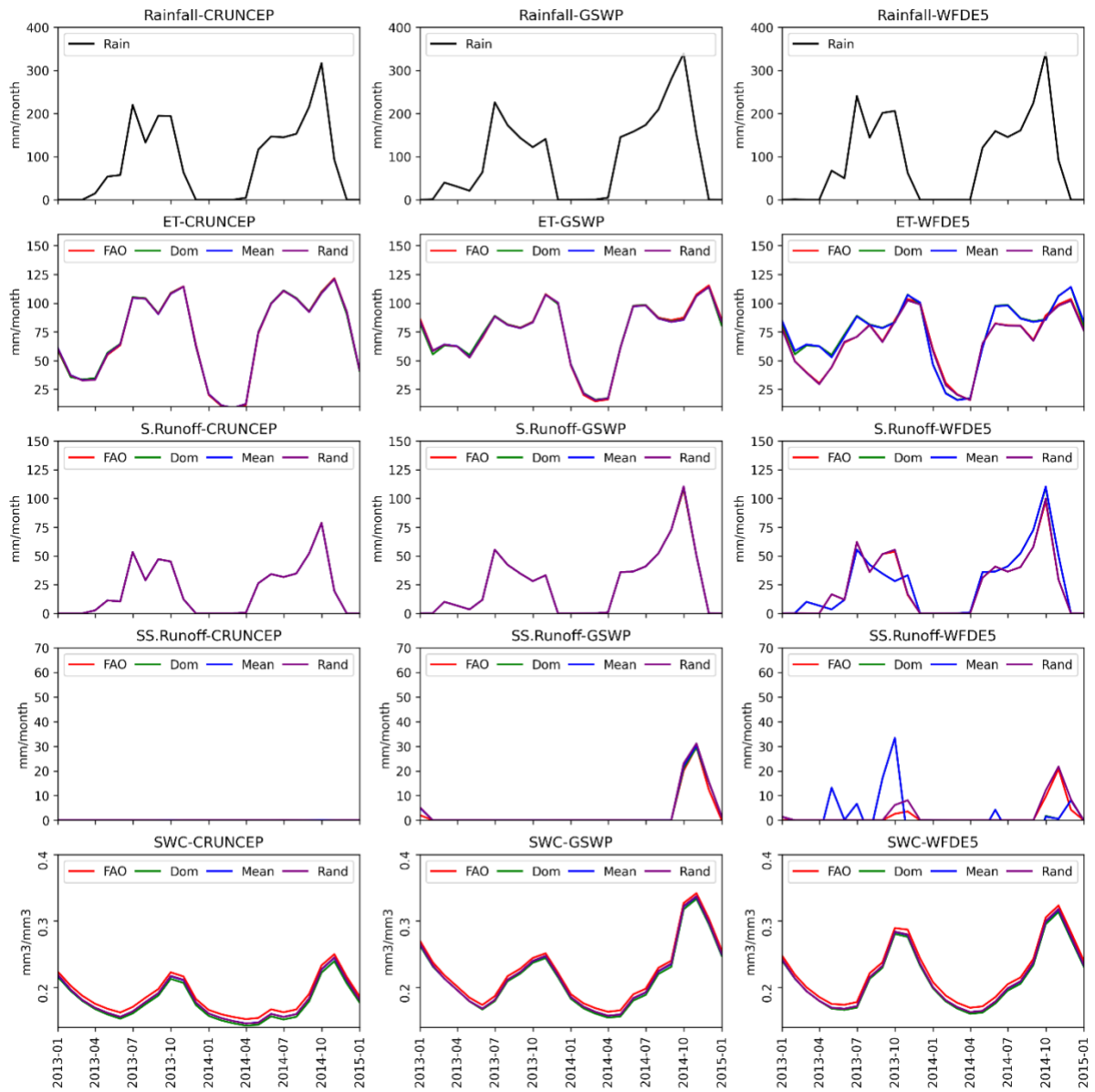



Figure S13: Local estimates of water balance components in Abuja, Nigeria. Rows 1-5 are rainfall, ET, surface runoff, subsurface runoff and soil water content. Columns 1-3 are CRUNCEP, GSWP and WFDE5 atmospheric forcings.

Addis Ababa local results

Addis-Ababa (lon=38.75, lat=8.98)

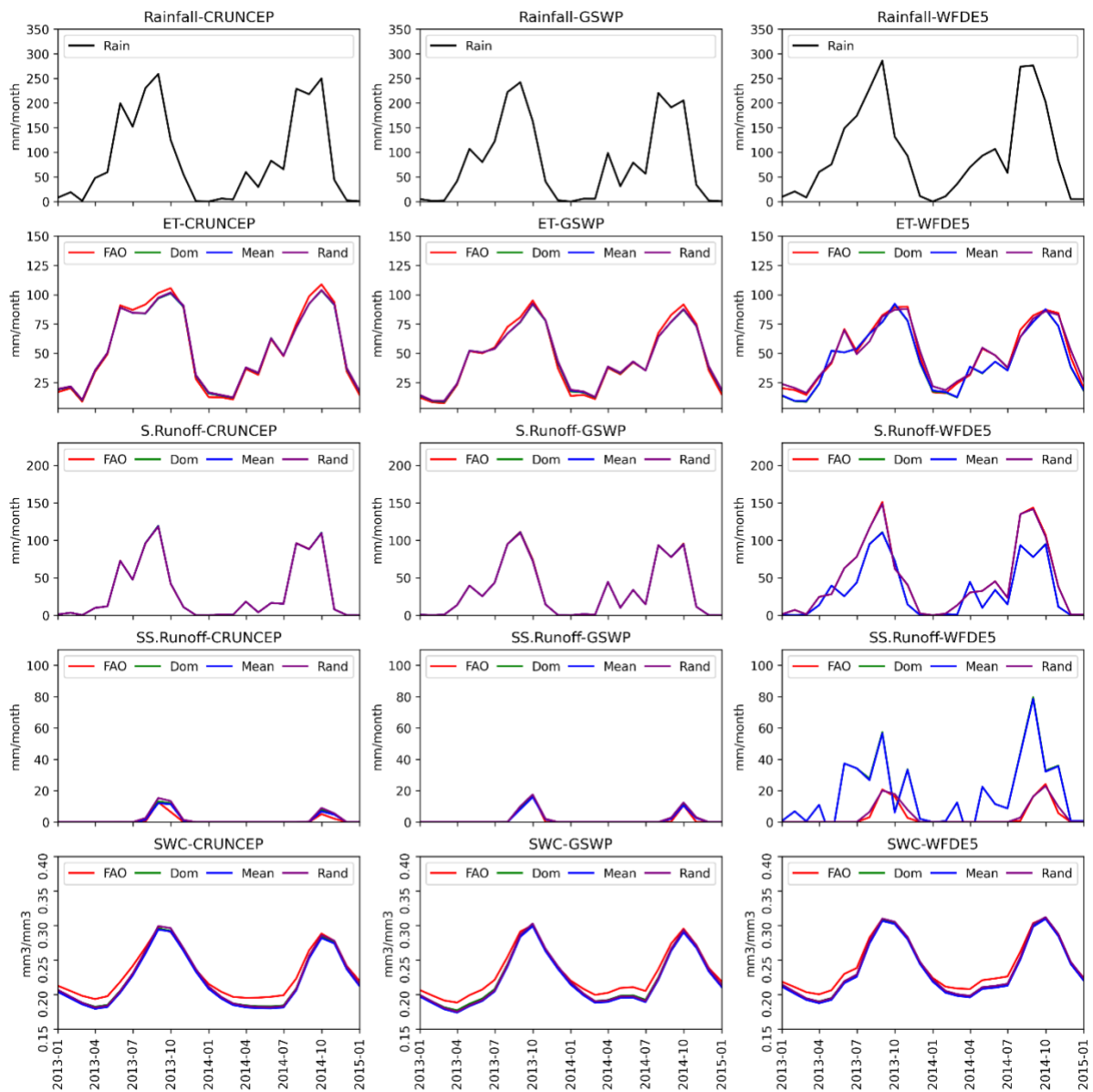



Figure S14: Local estimates of water balance components Addis-Ababa, Ethiopia. Rows 1-5 are rainfall, ET, surface runoff, subsurface runoff and soil water content. Columns 1-3 are CRUNCEP, GSWP and WFDE5 atmospheric forcings.

Salong local results

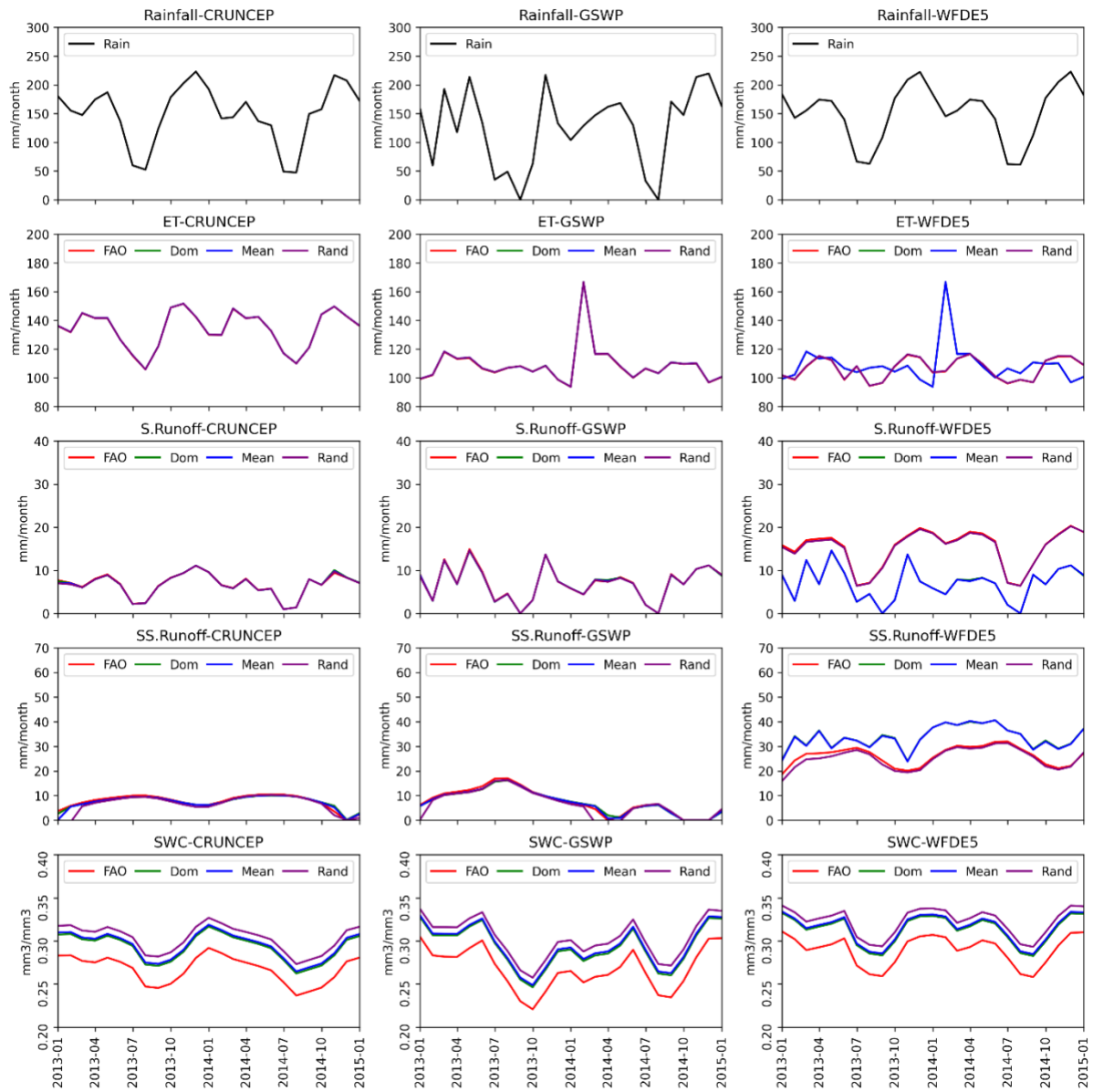



Figure S15: Local estimates of water balance components Salong, Central Africa Republic. Rows 1-5 are rainfall, ET, surface runoff, subsurface runoff and soil water content. Columns 1-3 are CRUNCEP, GSWP and WFDE5 atmospheric forcings.

Daar-es-Salaam local results

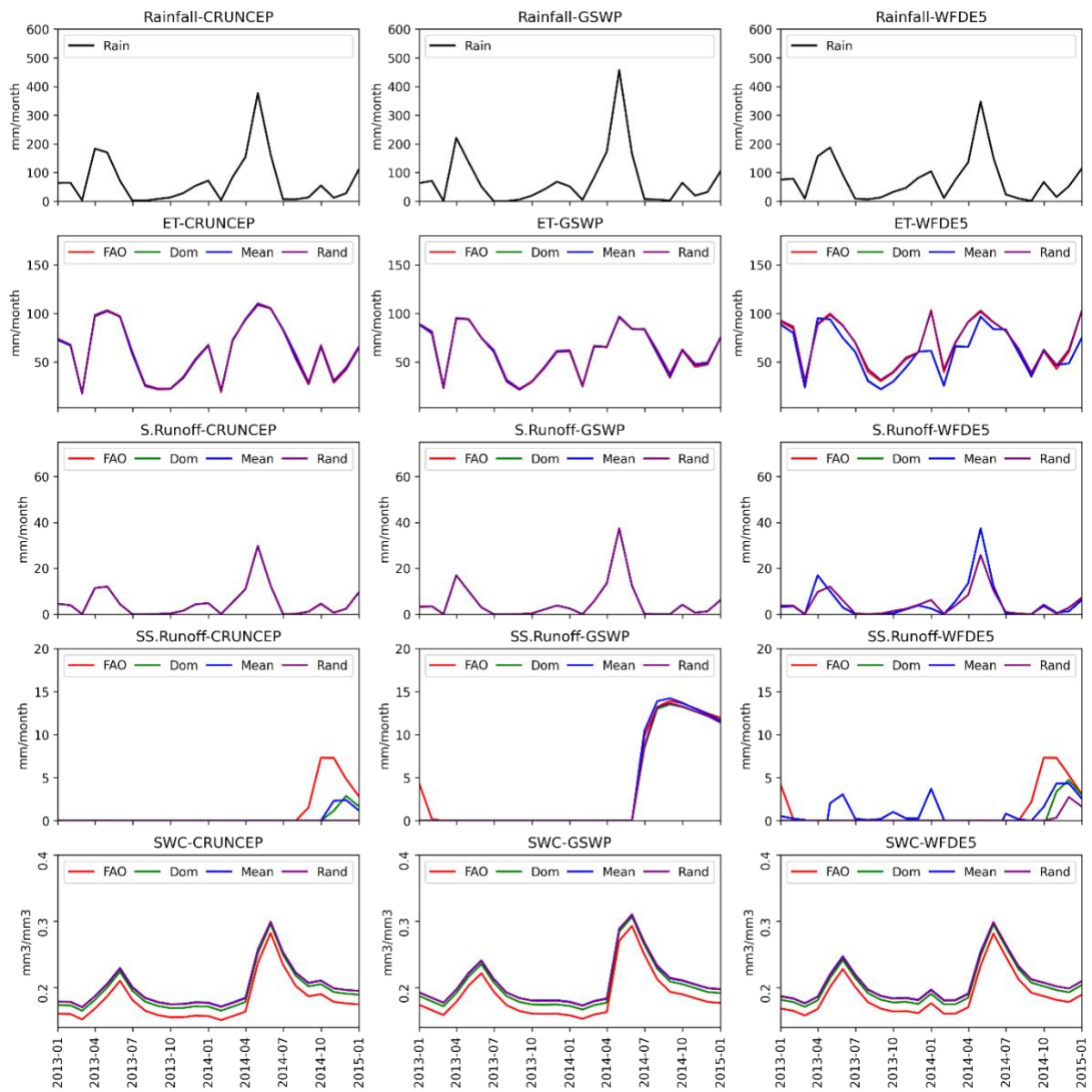



Figure S16: Local estimates of water balance components in Daar-es-Salaam, Tanzania. Rows 1-5 are rainfall, ET, surface runoff, subsurface runoff and soil water content. Columns 1-3 are CRUNCEP, GSWP and WFDE5 atmospheric forcings.

Windhoek local results

Windhoek (lat=-22.57, lon=17.06)

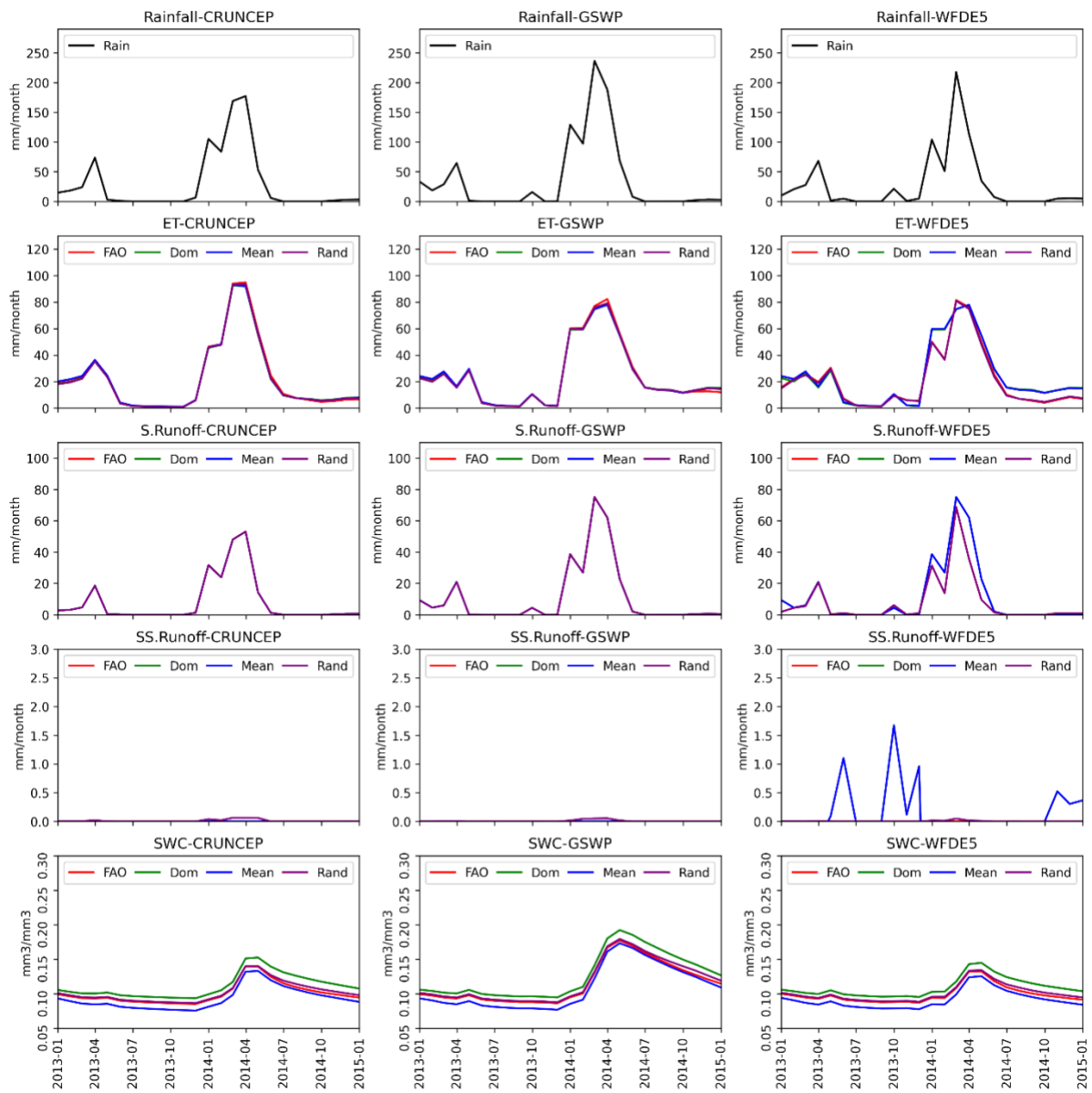



Figure S17: Local estimates of water balance components in Windhoek, Namibia. Rows 1-5 are rainfall, ET, surface runoff, subsurface runoff and soil water content. Columns 1-3 are CRUNCEP, GSWP and WFDE5 atmospheric forcings.

Maseru local results

Maseru (lon=27.48, lat=-29.31)

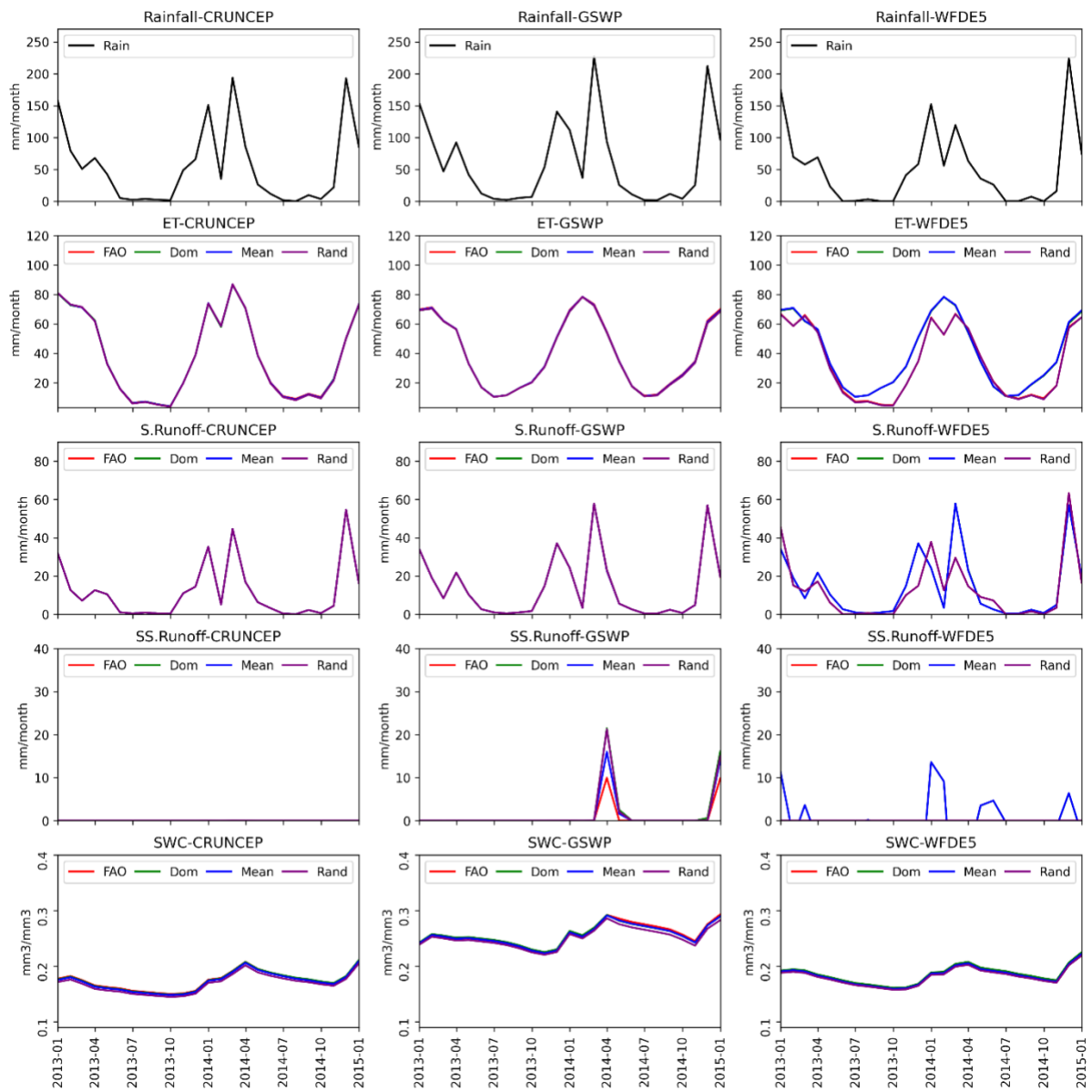



Figure S18: Local estimates of water balance components in Maseru, Lesotho. Rows 1-5 are rainfall, ET, surface runoff, subsurface runoff and soil water content. Columns 1-3 are CRUNCEP, GSWP and WFDE5 atmospheric forcings.

Local Incoming Shortwave Radiation

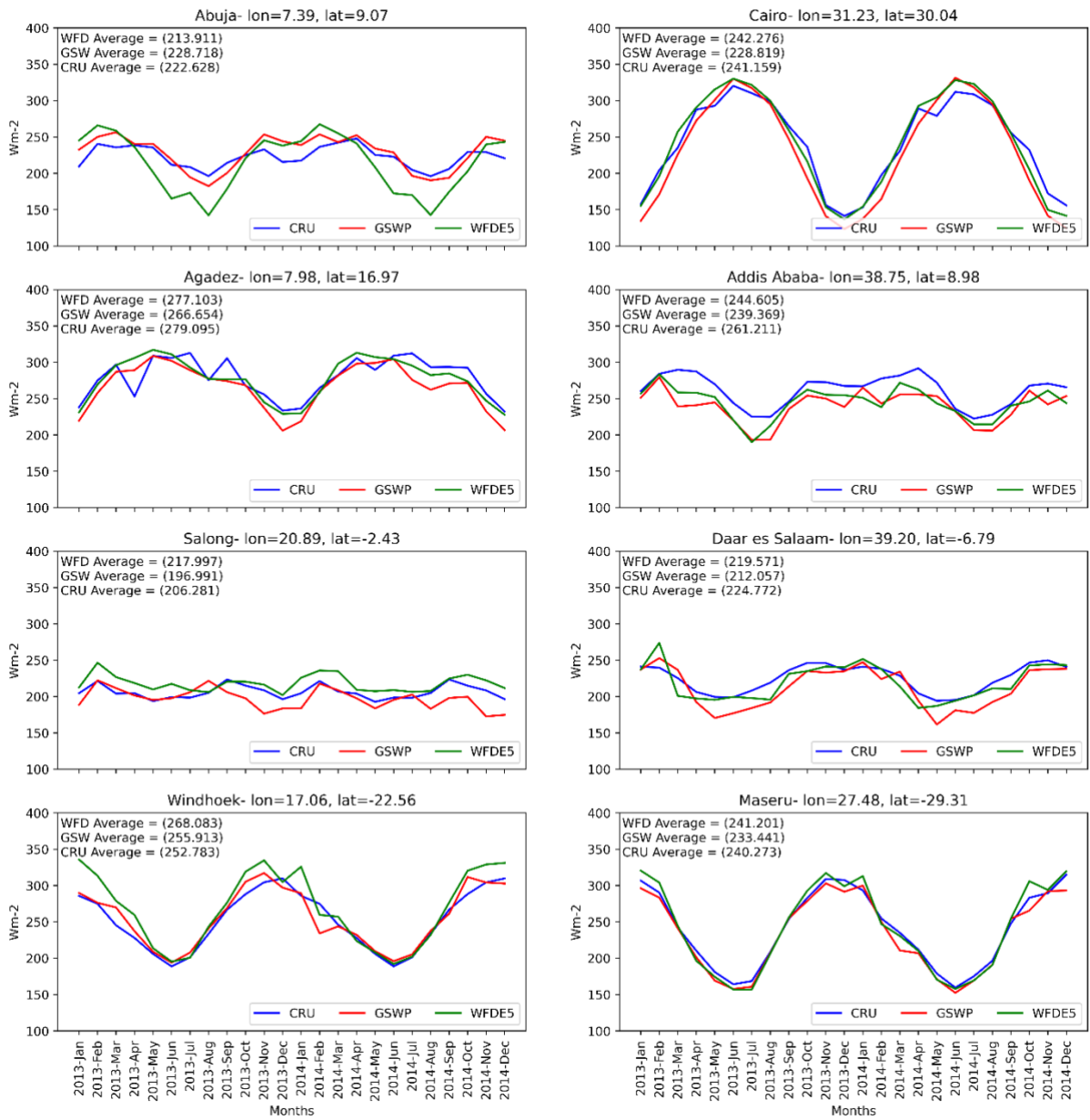



Figure S19: Incoming shortwave radiation from CRUNCEP, GSWP and WFD5 for all locations.

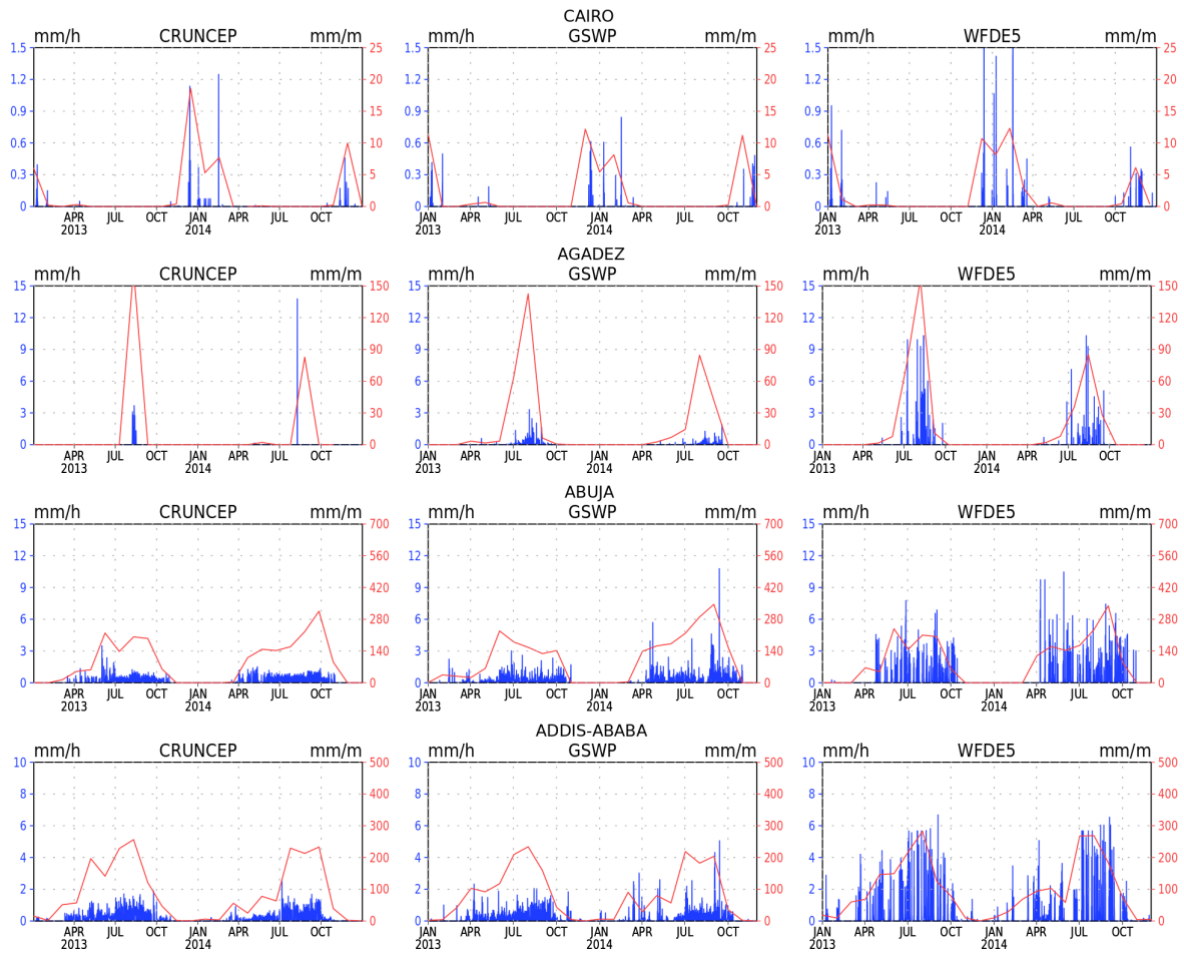



Figure S20: Rainfall intensity and rainfall amount for Cairo, Agadez, Abuja and Addis-Ababa. Left column: CRUNCEP; middle column: GSWP and right column: WFDE5. Red lines represent monthly rainfall intensity while blue lines represent hourly rainfall intensity.

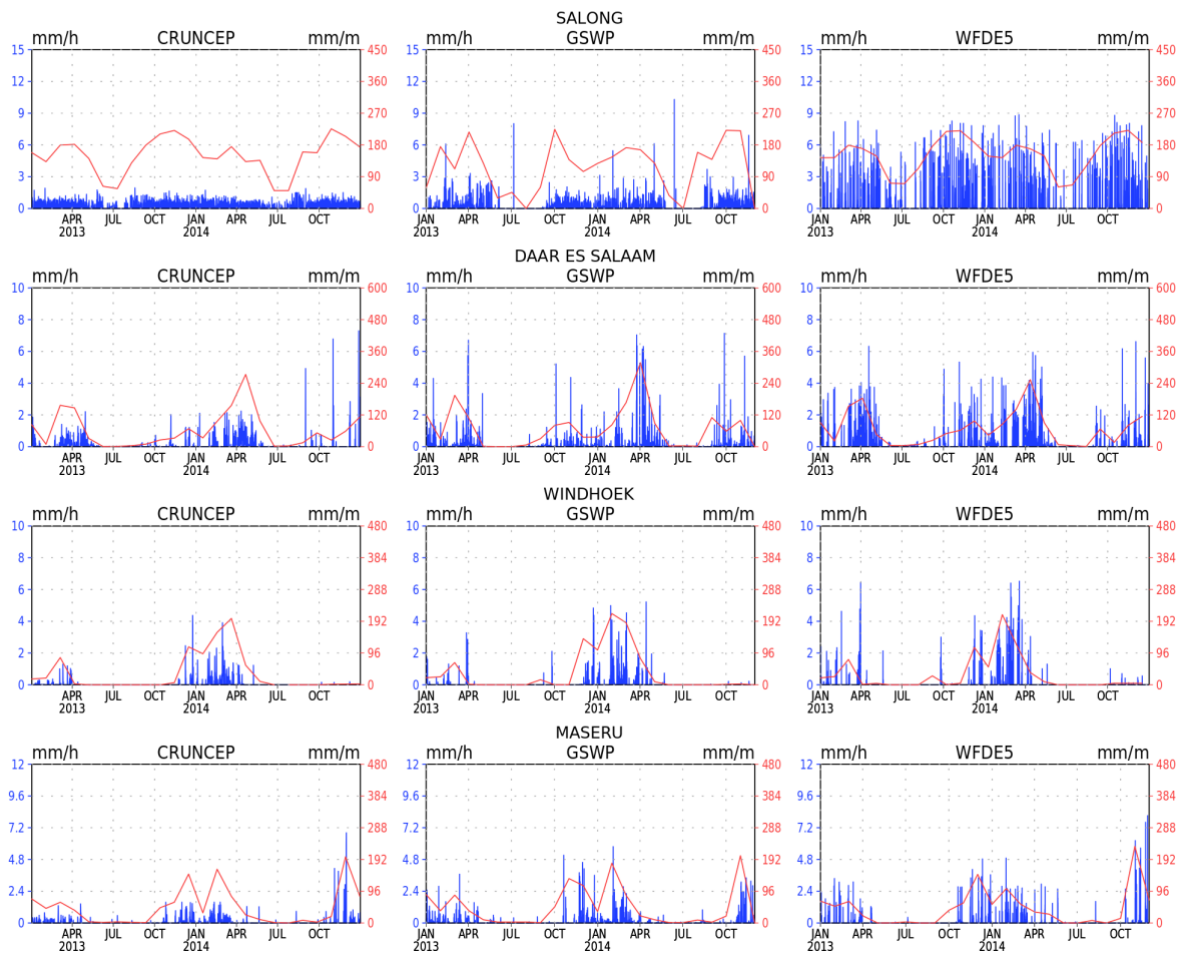



Figure S21: Rainfall intensity and rainfall amount for Salong, Daar es Salaam, Windhoek and Maseru. Left column: CRUNCEP; middle column: GSWP and right column: WFDE5. Red lines represent monthly rainfall intensity while blue lines represent hourly rainfall intensity.

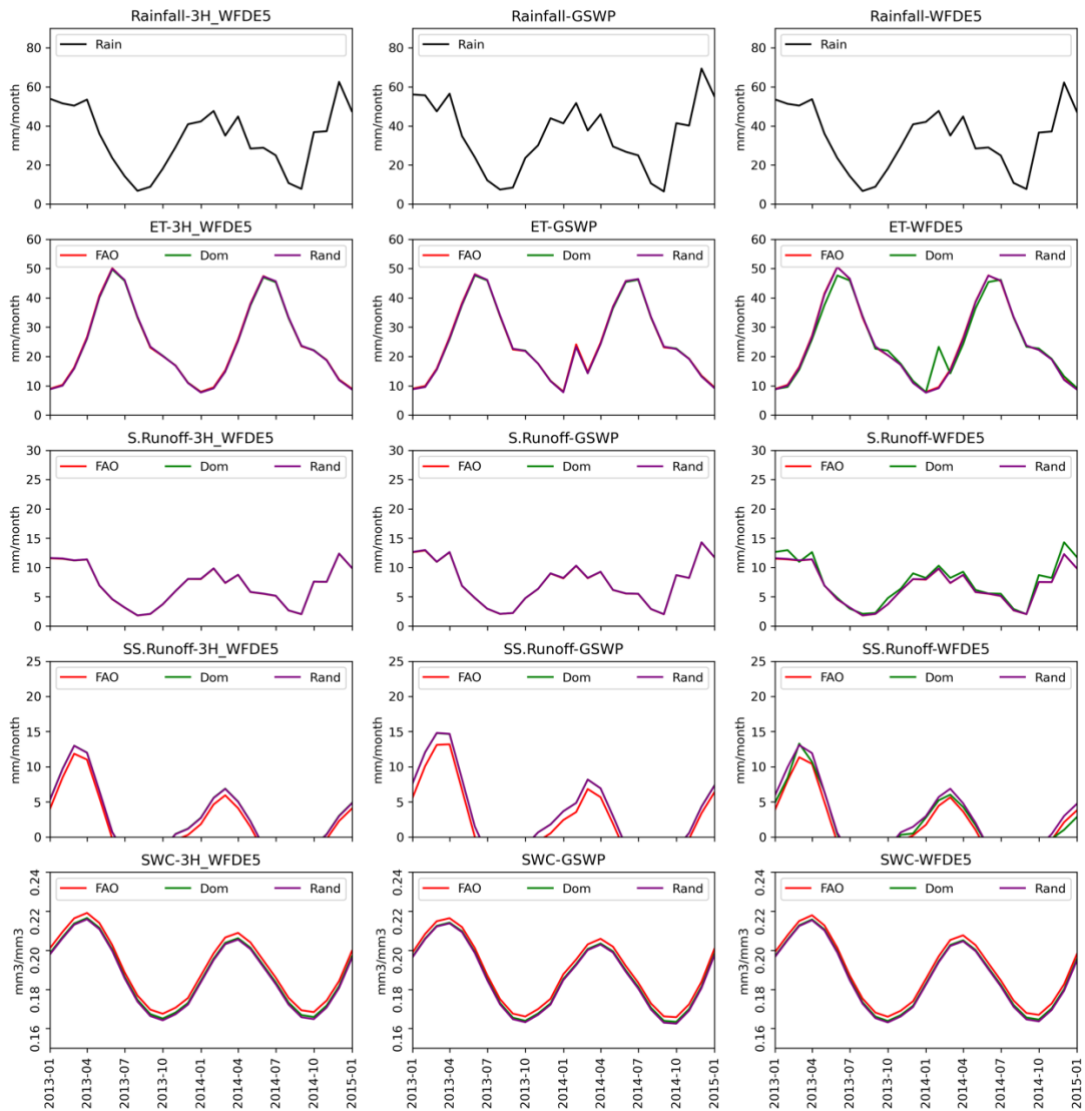



Figure S22: Mediterranean Region estimates of water balance components. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff and soil water content respectively while each column (left to right) represents 3H-WFDE5, GSWP and WFDE5 forcings respectively.

Component	3H-WFDE5	GSWP	WFDE5
Evapotranspiration	0.34	0.36	1.69
Surface Runoff	0.03	0.03	0.65
Subsurface Runoff	0.87	1.23	1.31
Soil Moisture	0.00	0.00	0.00

Table T1: Average margin between soil texture maps for each atmospheric forcing over Mediterranean region (mm/month).

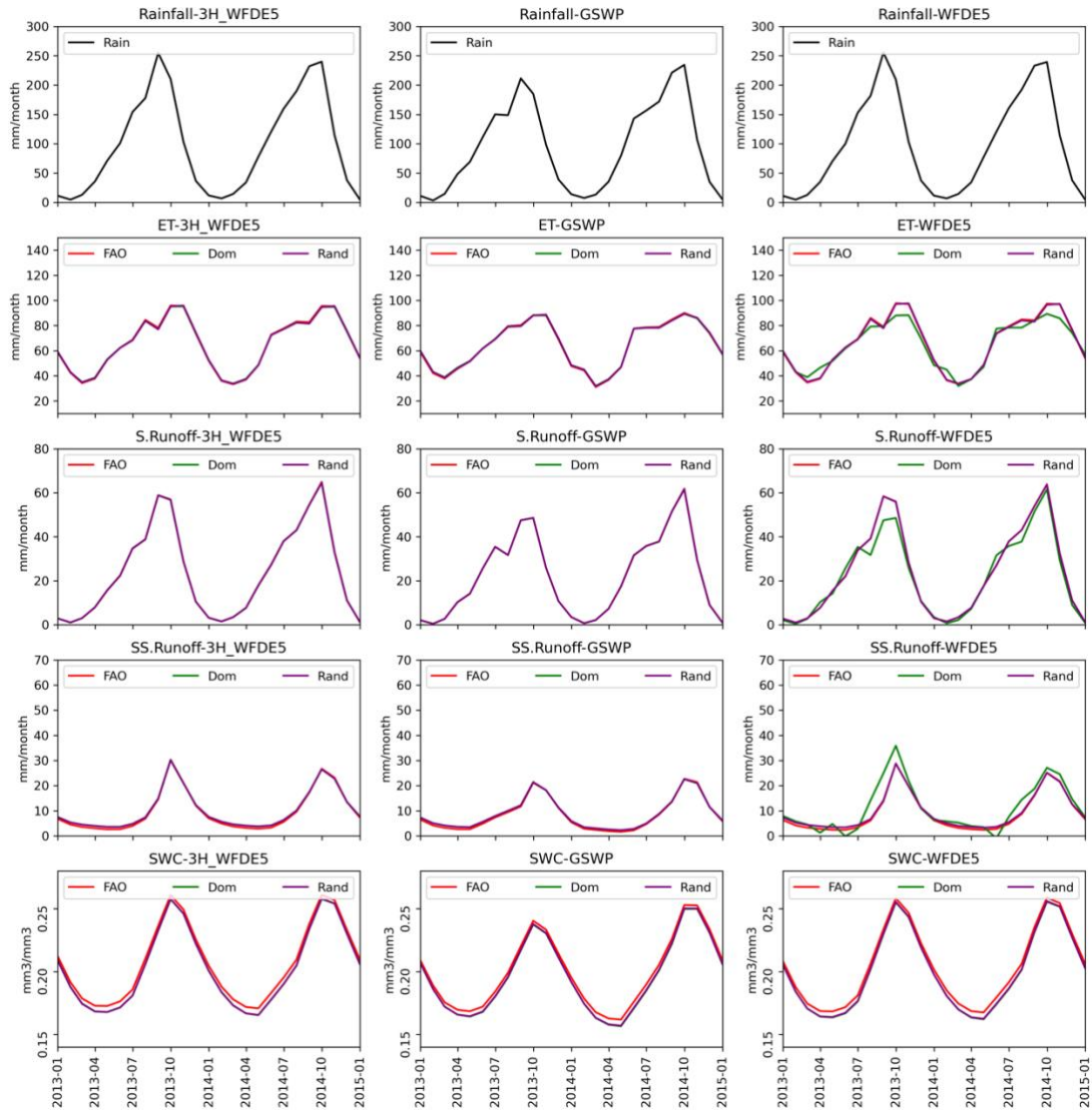



Figure S23: West Africa Region estimates of water balance components. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents 3H-WFDE5, GSWP and WFDE5 forcings respectively.

Component	3H-WFDE5	GSWP	WFDE5
Evapotranspiration	0.61	0.60	4.34
Surface Runoff	0.09	0.07	2.68
Subsurface Runoff	0.59	0.48	3.00
Soil Moisture	0.00	0.00	0.00

Table T2: Average margin between soil texture maps for each atmospheric forcing over West. Africa (mm/month).

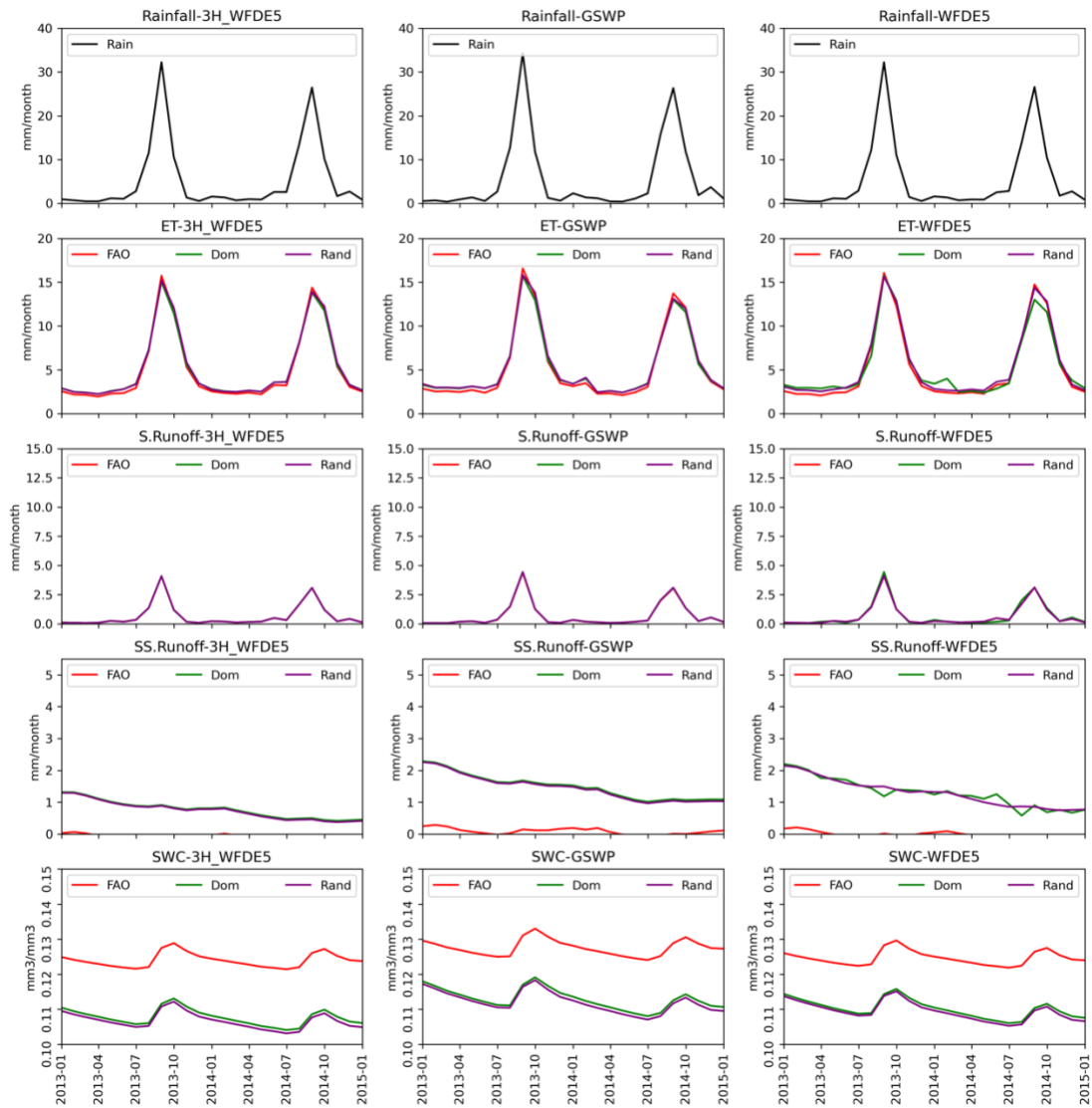



Figure S24: Sahara Region estimates of water balance components. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents 3H-WFDE5, GSWP and WFDE5 forcings respectively.

Component	3H-WFDE5	GSWP	WFDE5
Evapotranspiration	0.35	0.43	0.71
Surface Runoff	0.00	0.01	0.09
Subsurface Runoff	0.86	0.38	0.34
Soil Moisture	0.02	0.02	0.02

Table T3:Average margin between soil texture maps for each atmospheric forcing over Sahara (mm/month).

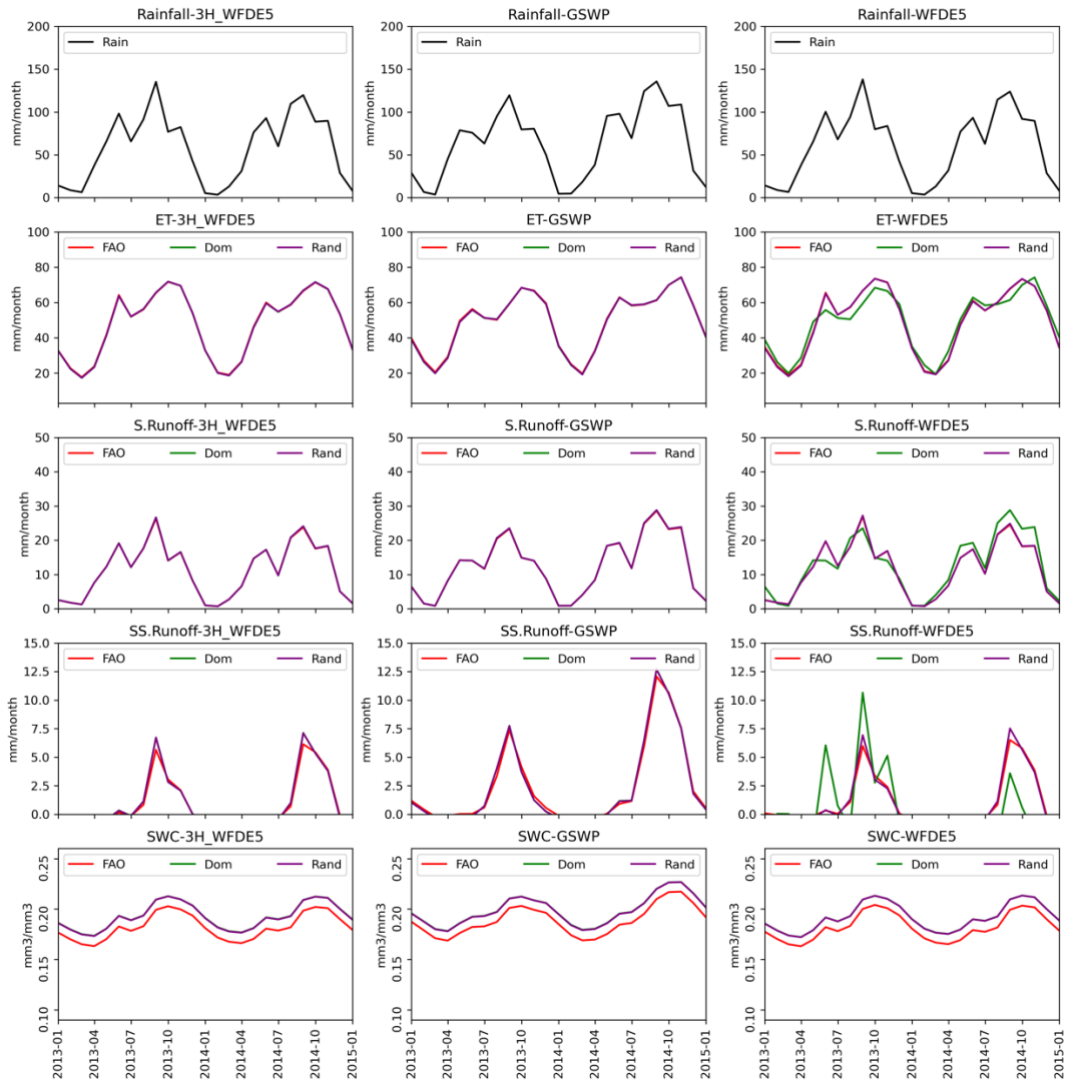



Figure S25: North-East Africa Region estimates of water balance components. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents 3H-WFDE5, GSWP and WFDE5 forcings respectively.

Component	3H-WFDE5	GSWP	WFDE5
Evapotranspiration	0.28	0.37	4.09
Surface Runoff	0.05	0.06	2.09
Subsurface Runoff	0.19	0.25	2.20
Soil Moisture	0.01	0.01	0.01

Table T4: Average margin between soil texture maps for each atmospheric forcing over North-East Africa (mm/month).

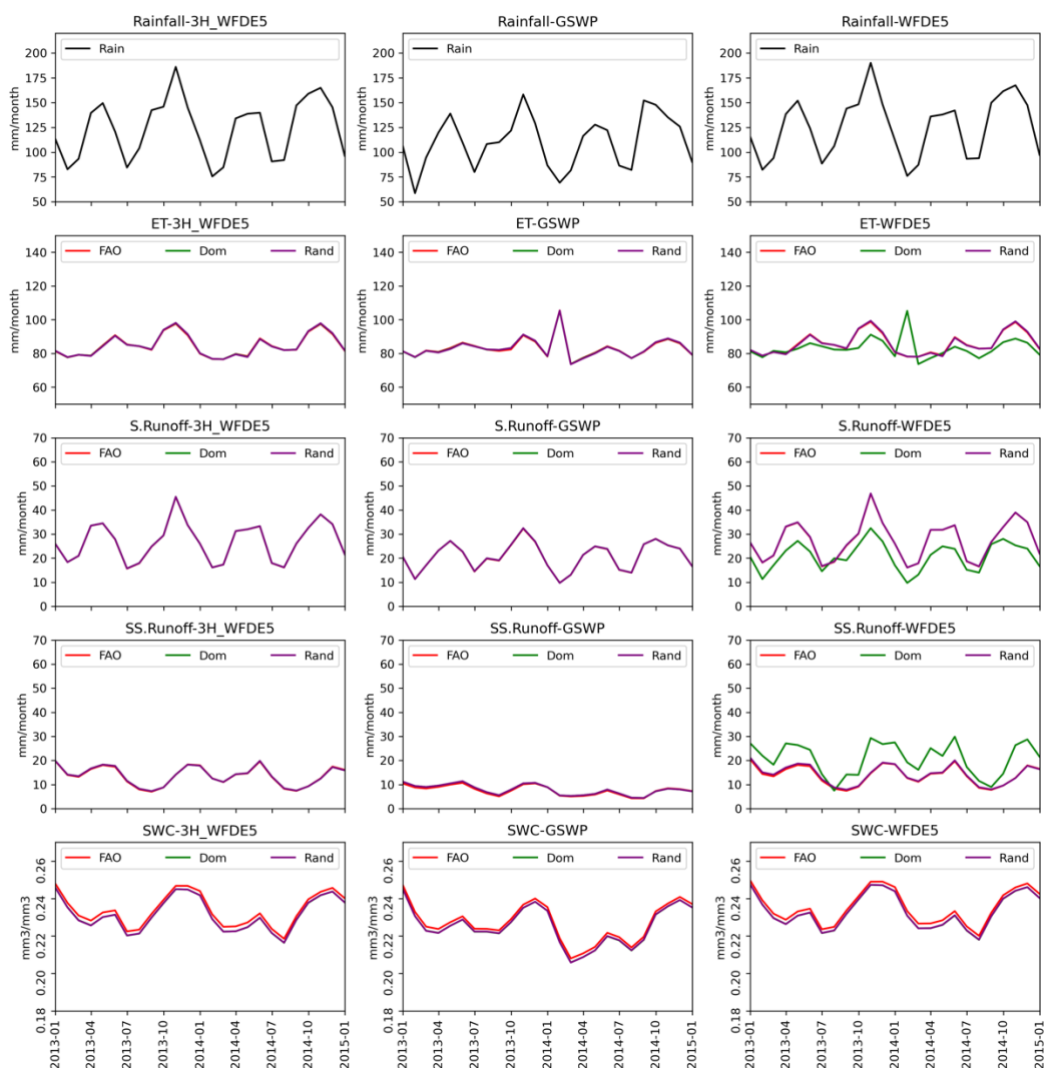



Figure S26: Central Africa Region estimates of water balance components. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents 3H-WFDE5, GSWP and WFDE5 forcings respectively.

Component	3H-WFDE5	GSWP	WFDE5
Evapotranspiration	0.28	0.34	5.23
Surface Runoff	0.04	0.07	6.70
Subsurface Runoff	0.16	0.35	6.97
Soil Moisture	0.00	0.00	0.00

Table T5: Average margin between soil texture maps for each atmospheric forcing over Central Africa (mm/month).

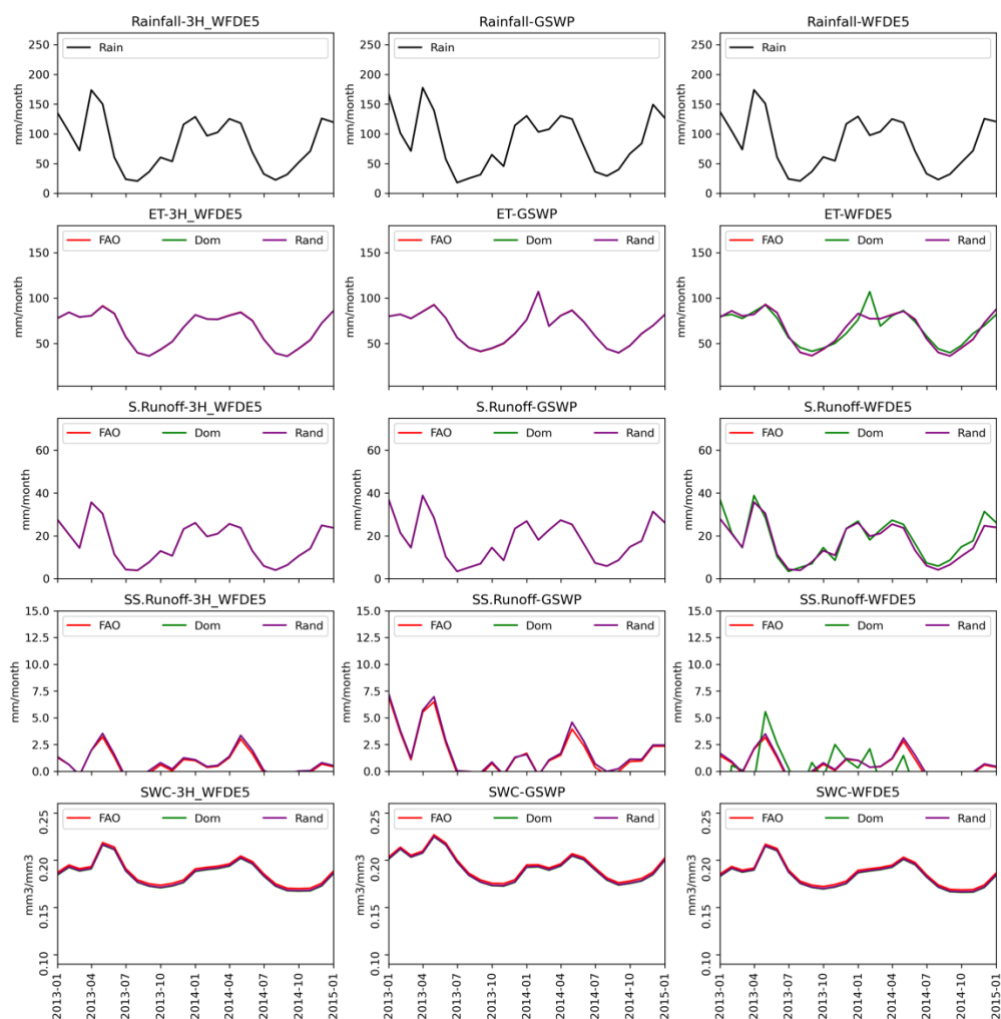



Figure S27: Central-East Africa Region estimates of water balance components. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents 3H-WFDE5, GSWP and WFDE5 forcings respectively.

Component	3H-WFDE5	GSWP	WFDE5
Evapotranspiration	0.20	0.20	4.98
Surface Runoff	0.20	0.20	1.94
Subsurface Runoff	0.17	0.21	1.98
Soil Moisture	0.00	0.00	0.00

Table T6: Average margin between soil texture maps for each atmospheric forcing over Central-East Africa (mm/month).

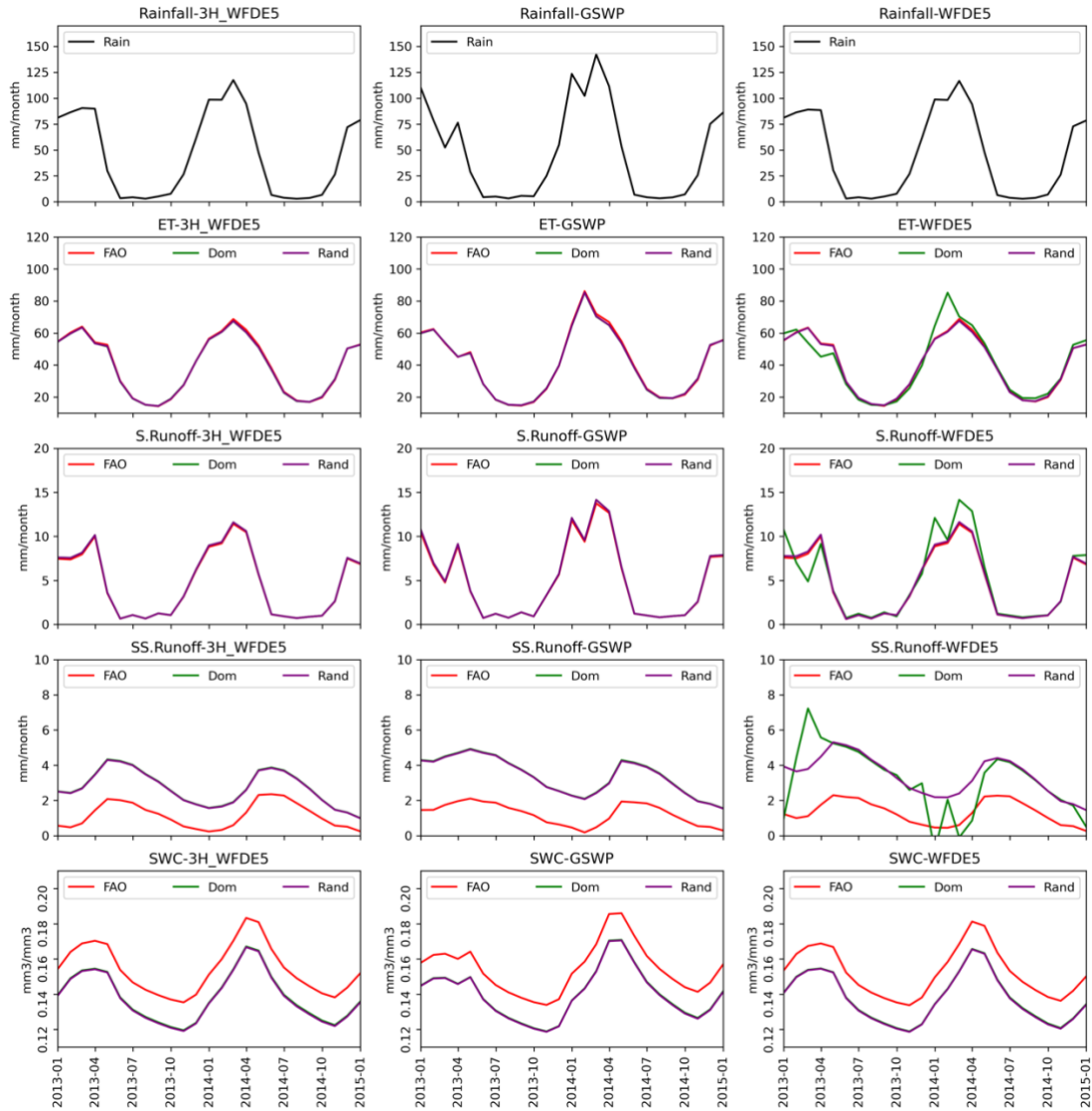



Figure S28: South-West Africa Region estimates of water balance components. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents 3H-WFDE5, GSWP and WFDE5 forcings respectively.

Component	3H-WFDE5	GSWP	WFDE5
Evapotranspiration	0.32	0.58	3.90
Surface Runoff	0.07	0.09	0.75
Subsurface Runoff	1.92	2.14	2.42
Soil Moisture	0.00	0.00	0.00

Table T7: Average margin between soil texture maps for each atmospheric forcing over South-West Africa (mm/month).

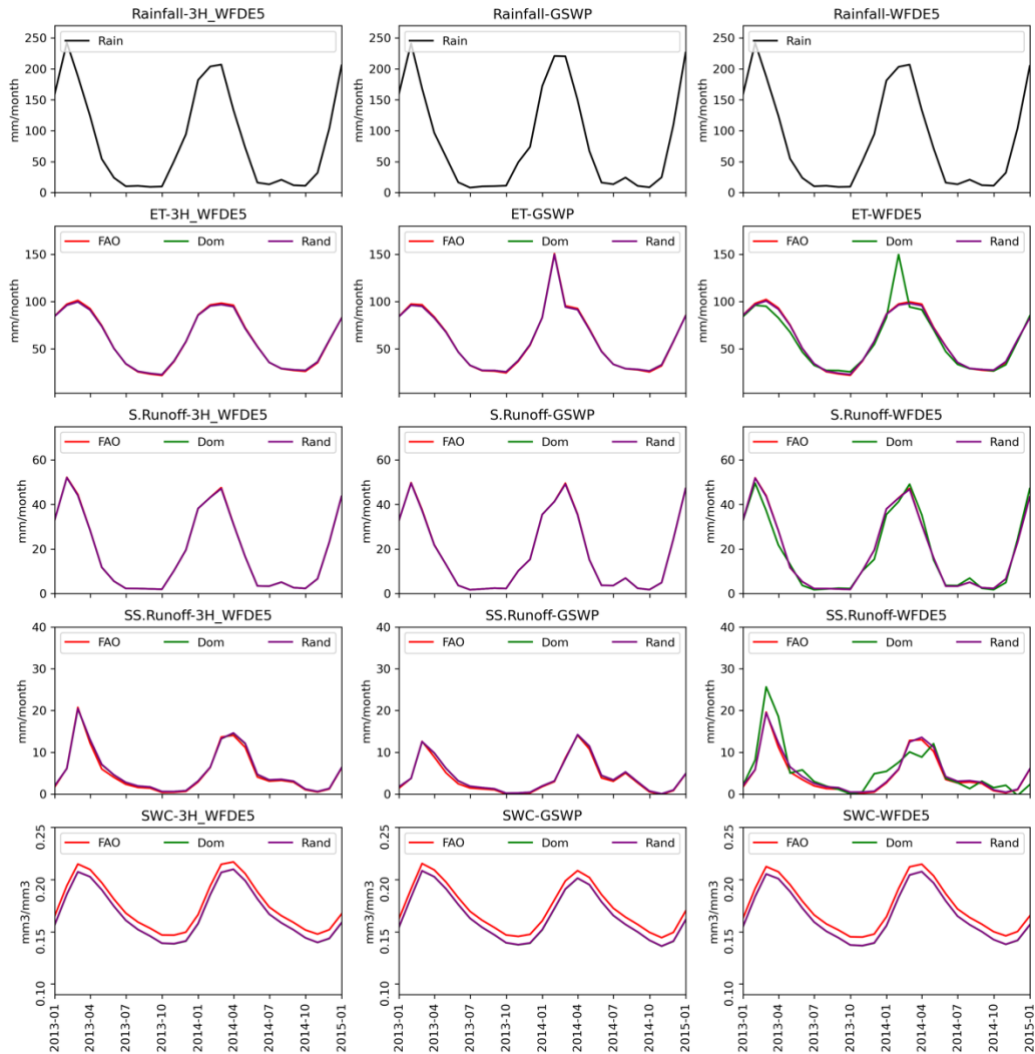



Figure S29: South-East Africa Region estimates of water balance components. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents 3H-WFDE5, GSWP and WFDE5 forcings respectively.

Component	3H-WFDE5	GSWP	WFDE5
Evapotranspiration	0.32	0.58	3.90
Surface Runoff	0.07	0.09	0.75
Subsurface Runoff	1.92	2.14	2.42
Soil Moisture	0.02	0.01	0.02

Table T8: Average margin between soil texture maps for each atmospheric forcing over South-East Africa (mm/month).

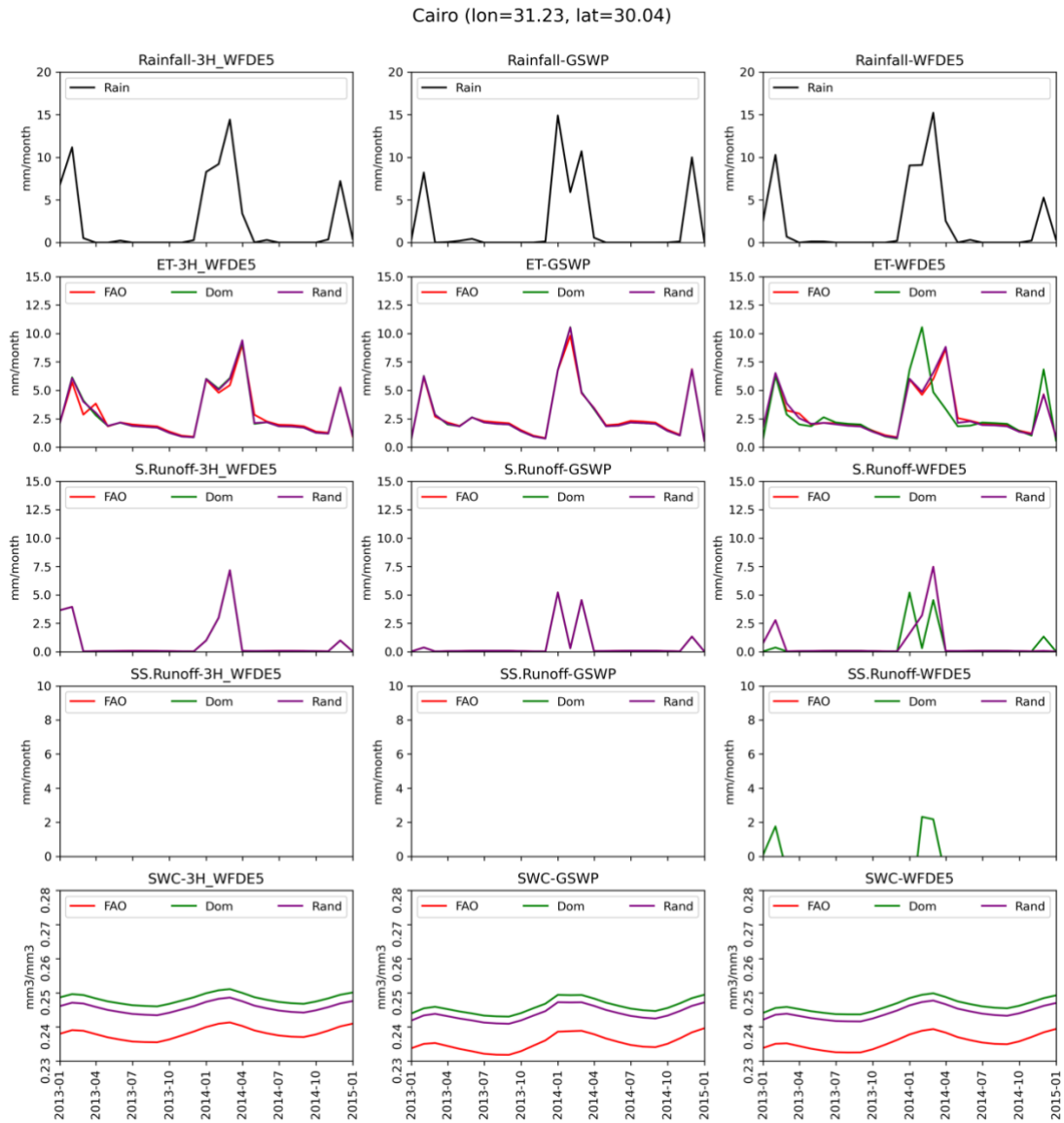



Figure S30: Estimates of water balance components in Cairo. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents 3H-WFDE5, GSWP and WFDE5 forcings respectively.

Component	3H-WFDE5	GSWP	WFDE5
Evapotranspiration	0.26	0.12	0.93
Surface Runoff	0.01	0.01	0.55
Subsurface Runoff	0.16	0.18	0.72
Soil Moisture	0.01	0.01	0.01

Table T9: Average margin between soil texture maps for each atmospheric forcing over Cairo (mm/month).

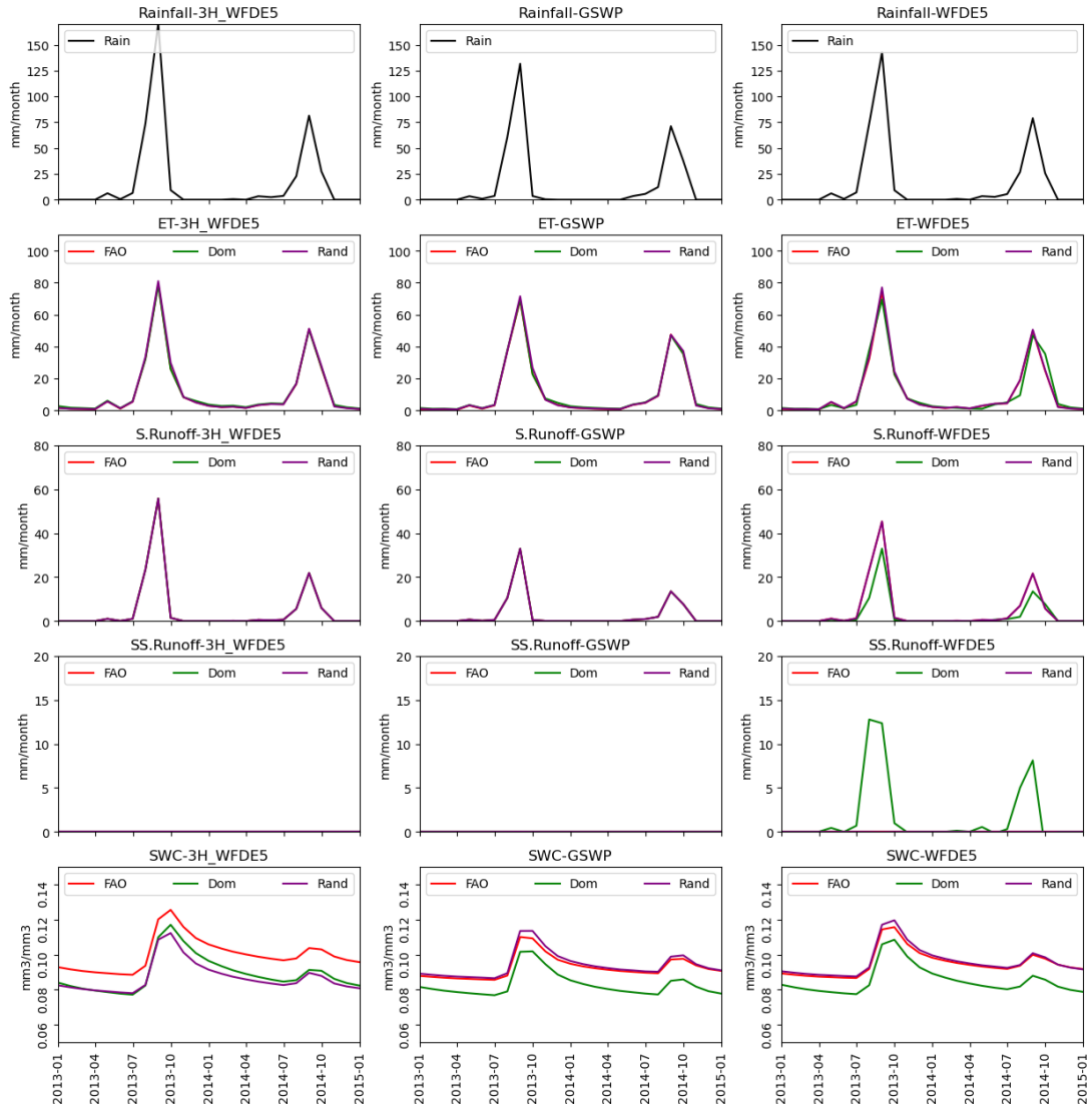



Figure S31: Estimates of water balance components in Agadez. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents 3H-WFDE5, GSWP and WFDE5 forcings respectively.

Component	3H-WFDE5	GSWP	WFDE5
Evapotranspiration	0.81	0.81	2.22
Surface Runoff	0.00	0.00	1.82
Subsurface Runoff	0.00	0.00	1.82
Soil Moisture	0.01	0.01	0.01

Table T10: Average margin between soil texture maps for each atmospheric forcing over Agadez (mm/month)

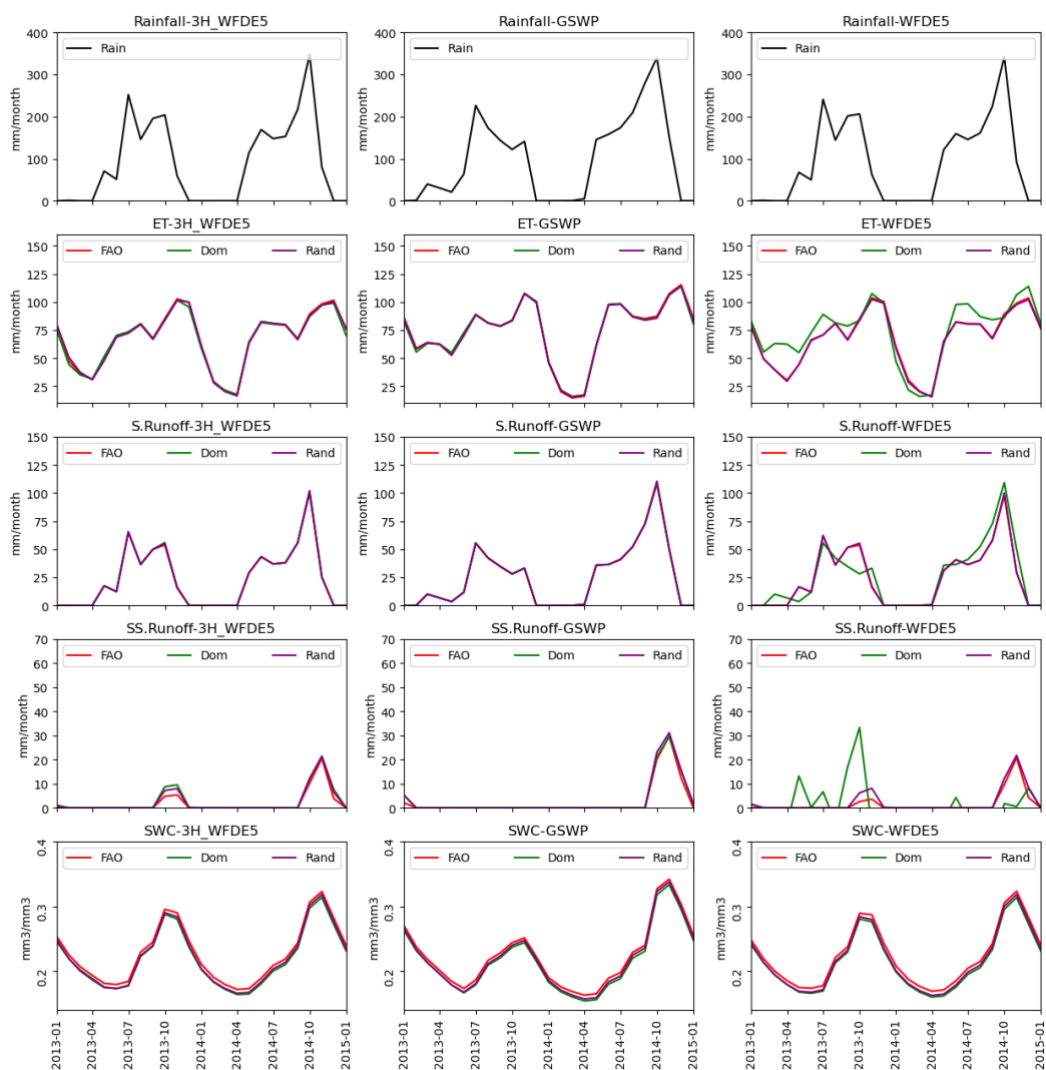



Figure S32: Estimates of water balance components in Abuja. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents 3H-WFDE5, GSWP and WFDE5 forcings respectively.

Component	3H-WFDE5	GSWP	WFDE5
Evapotranspiration	2.00	1.33	9.93
Surface Runoff	0.21	0.15	7.43
Subsurface Runoff	0.63	0.41	7.70
Soil Moisture	0.01	0.01	0.01

Table T11: Average margin between soil texture maps for each atmospheric forcing over Abuja (mm/month).

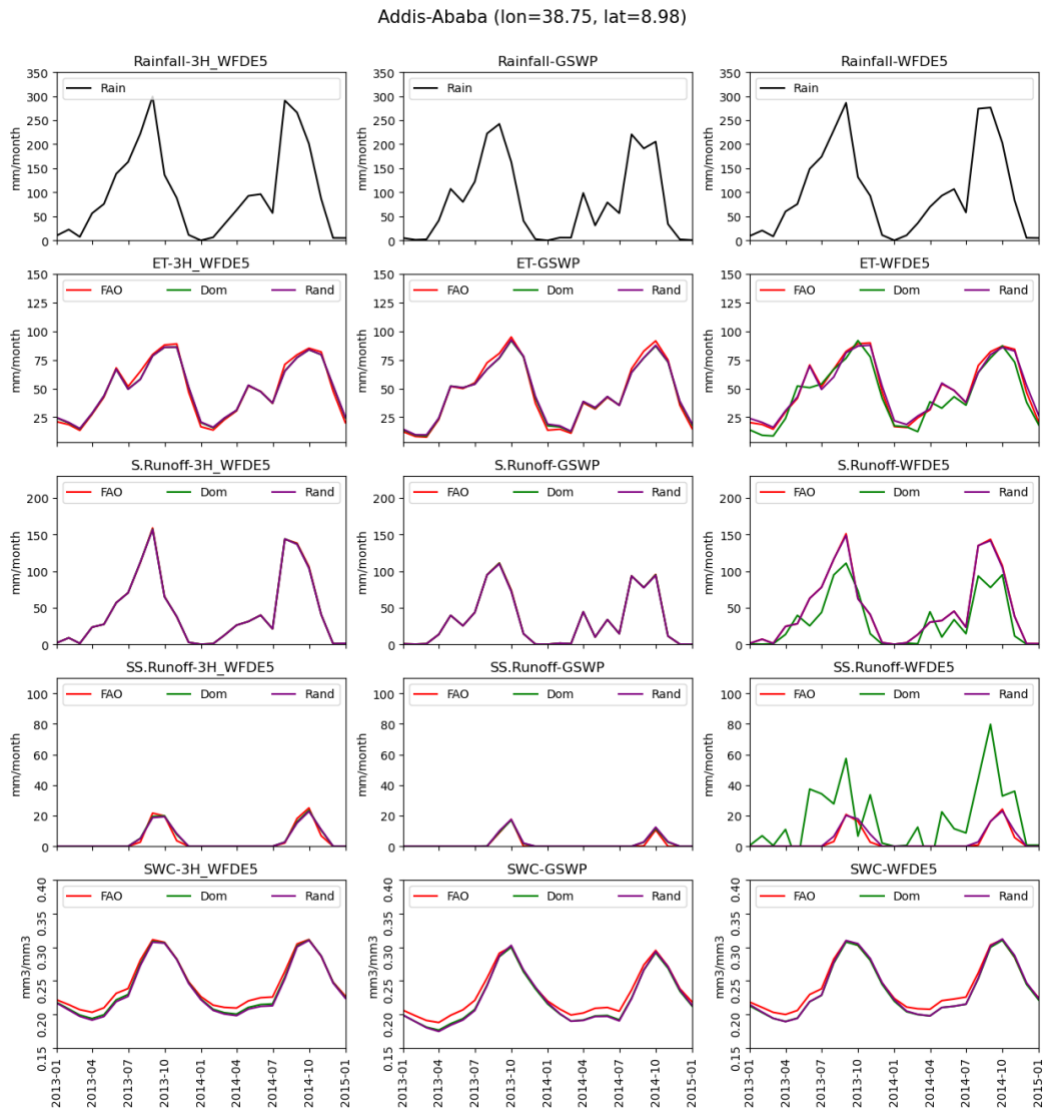



Figure S33: Estimates of water balance components in Addis-Ababa. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents 3H-WFDE5, GSWP and WFDE5 forcings respectively.

Component	3H-WFDE5	GSWP	WFDE5
Evapotranspiration	2.48	2.66	8.60
Surface Runoff	0.36	0.25	17.56
Subsurface Runoff	0.86	0.48	17.76
Soil Moisture	0.01	0.01	0.01

Table T12: Average margin between soil texture maps for each atmospheric forcing over Addis-Ababa (mm/month).

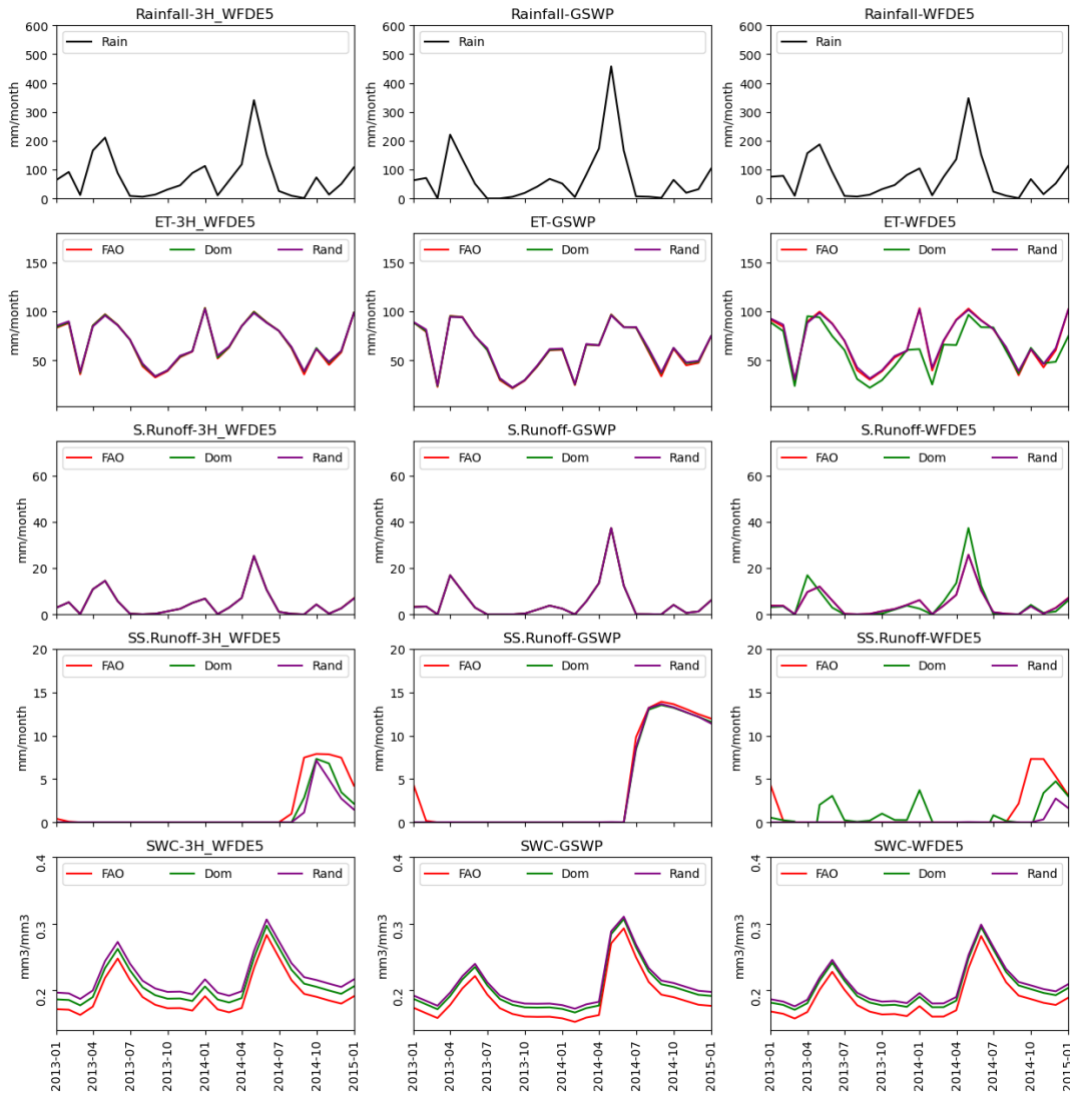



Figure S34: Estimates of water balance components in Daar es Salaam. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents 3H-WFDE5, GSWP and WFDE5 forcings respectively.

Component	3H-WFDE5	GSWP	WFDE5
Evapotranspiration	1.38	1.38	10.43
Surface Runoff	0.01	0.01	1.82
Subsurface Runoff	0.77	0.16	2.55
Soil Moisture	0.02	0.02	0.02

Table T13: Average margin between soil texture maps for each atmospheric forcing over Daar es Salaam (mm/month).

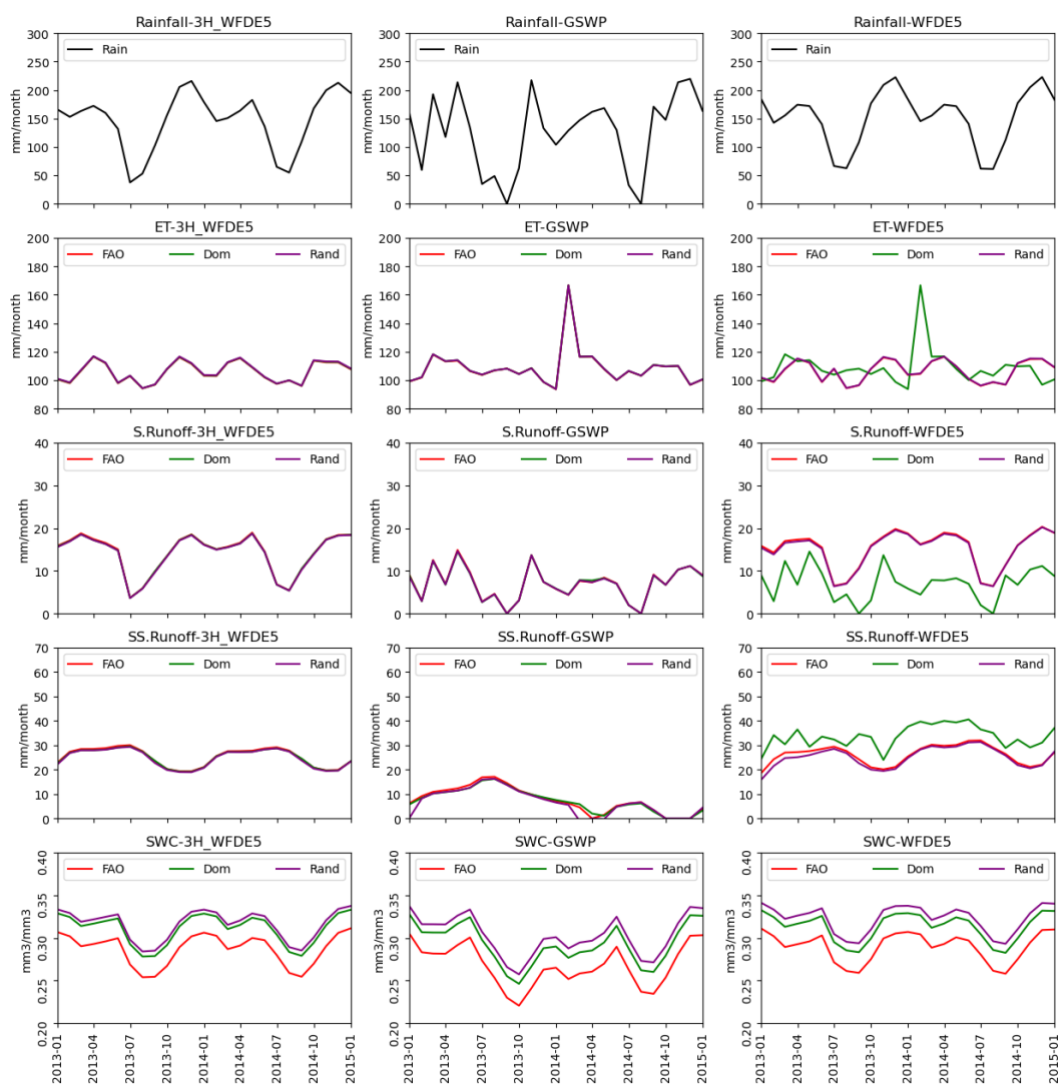



Figure S35: Estimates of water balance components in Salong. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents 3H-WFDE5, GSWP and WFDE5 forcings respectively.

Component	3H-WFDE5	GSWP	WFDE5
Evapotranspiration	0.40	0.17	9.32
Surface Runoff	0.17	0.13	8.27
Subsurface Runoff	0.48	1.04	8.53
Soil Moisture	0.03	0.04	0.03

Table T14: Average margin between soil texture maps for each atmospheric forcing over Salong (mm/month).

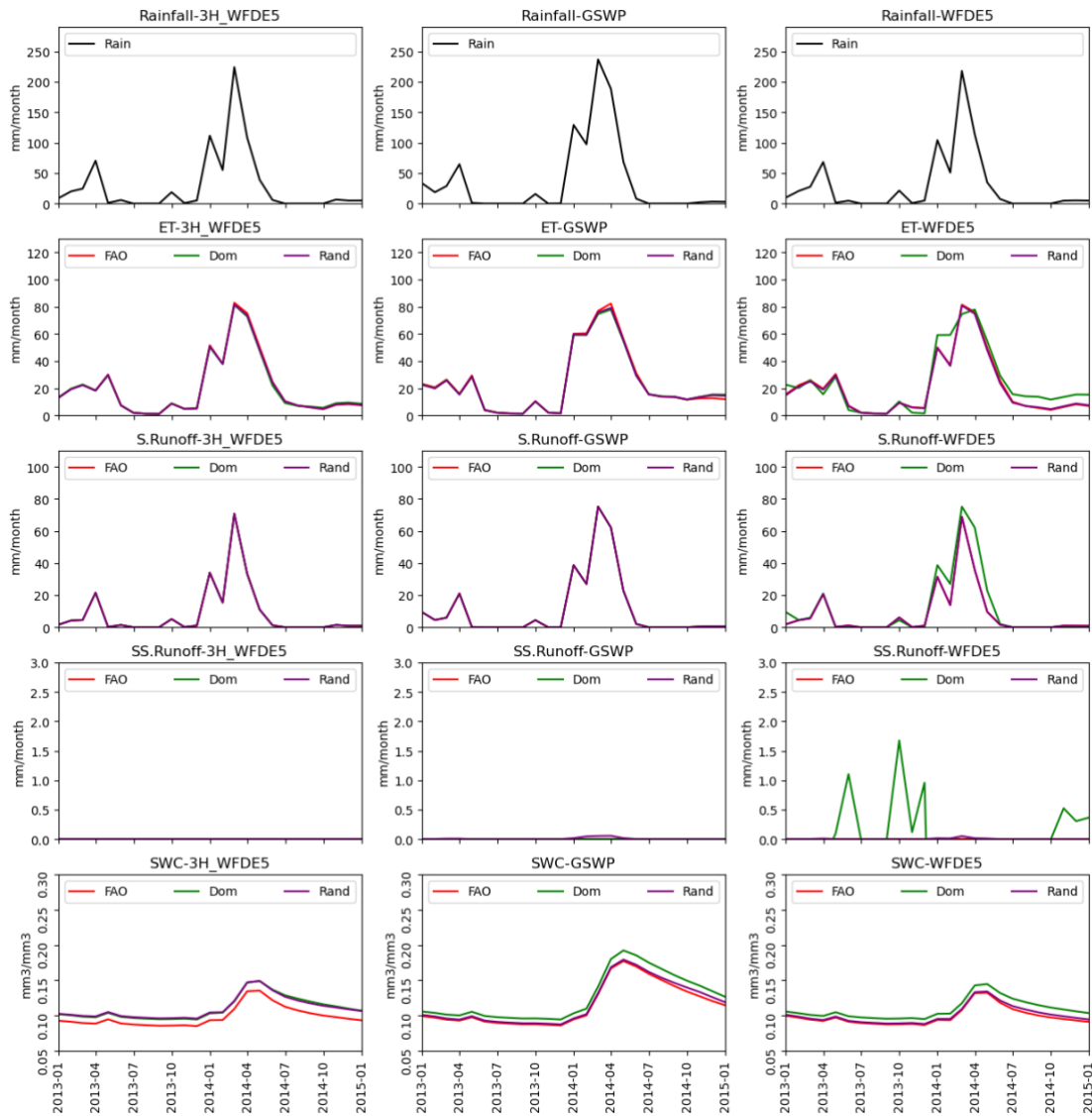



Figure S36: Estimates of water balance components in Windhoek. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents 3H-WFDE5, GSWP and WFDE5 forcings respectively.

Component	3H-WFDE5	GSWP	WFDE5
Evapotranspiration	0.83	1.02	5.38
Surface Runoff	0.01	0.01	3.04
Subsurface Runoff	0.00	0.01	3.04
Soil Moisture	0.01	0.01	0.01

Table T15: Average margin between soil texture maps for each atmospheric forcing over Windhoek (mm/month).

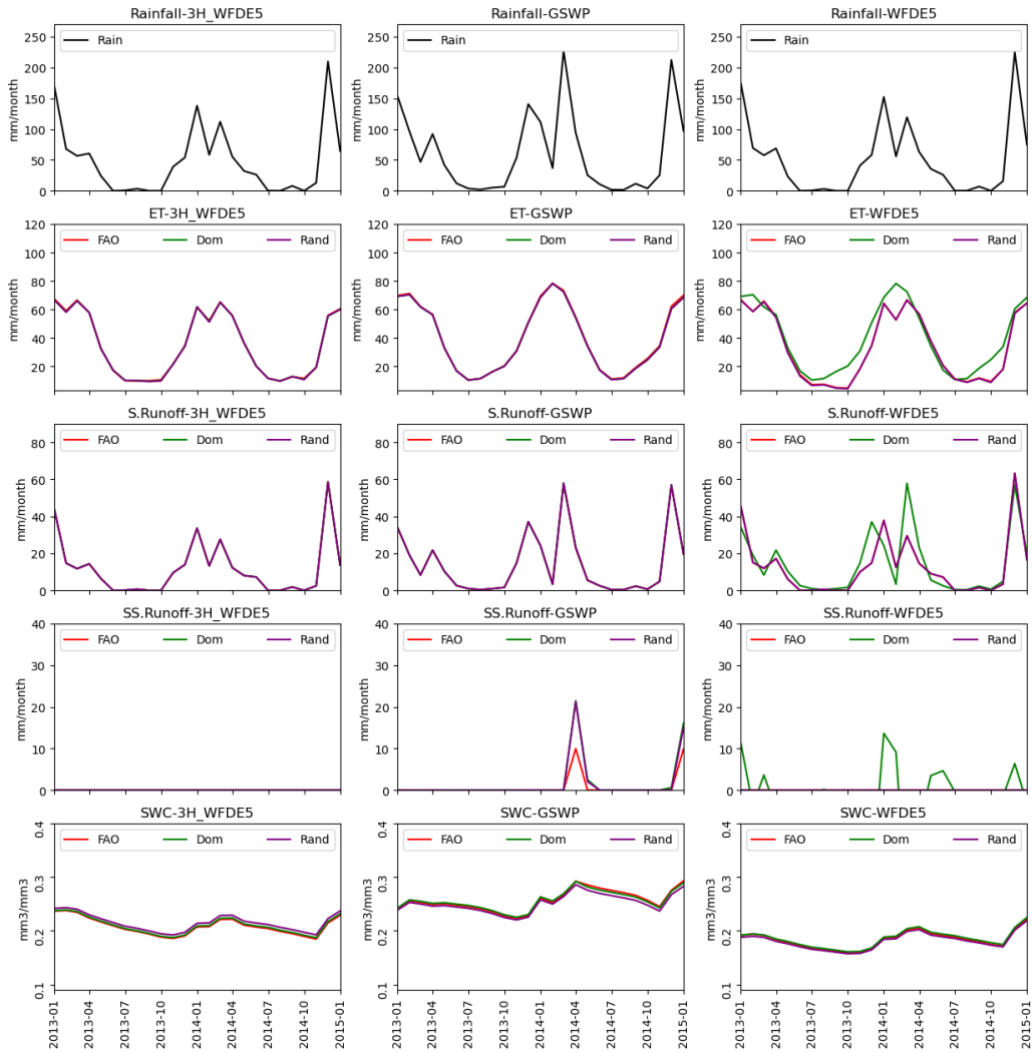



Figure S37: Estimates of water balance components in Maseru. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents 3H-WFDE5, GSWP and WFDE5 forcings respectively.

Component	3H-WFDE5	GSWP	WFDE5
Evapotranspiration	0.37	0.54	7.70
Surface Runoff	0.00	0.04	5.44
Subsurface Runoff	0.00	0.87	5.44
Soil Moisture	0.01	0.01	0.00

Table T16: Average margin between soil texture maps for each atmospheric forcing over Maseru (mm/month).