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High-resolution land surface modelling over Africa: the role of uncertain soil properties in combination with forcing temporal resolution

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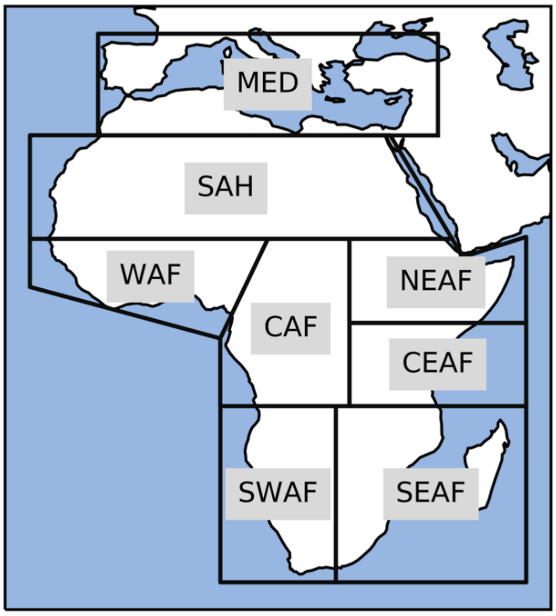

Figure S1: Modified classification of Africa into climate regions according to Iturbide et al. (2020).

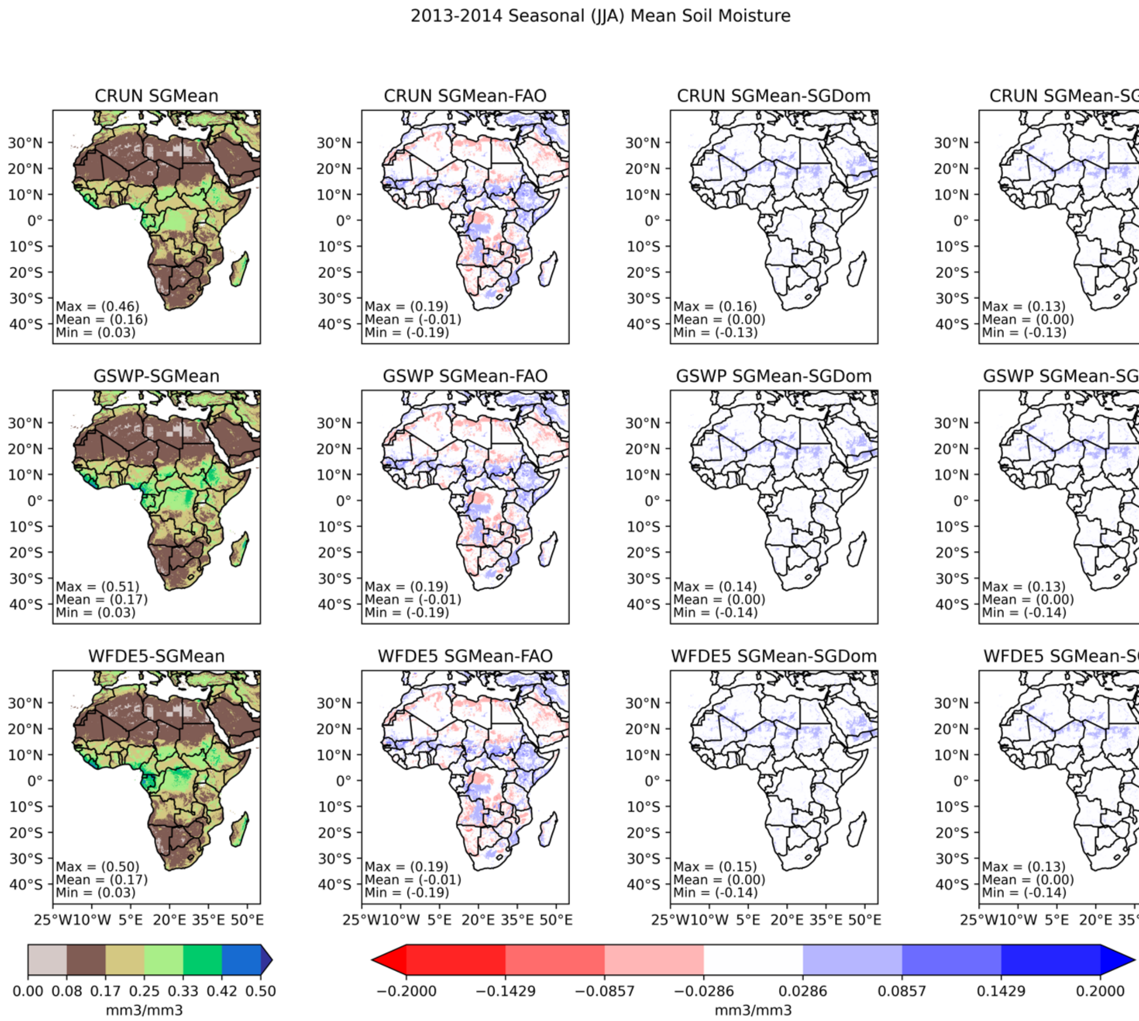

Figure S2 Difference maps showing the variation among the different soil texture maps for each atmospheric forcing in for the estimated soil moisture content in the JJA season. Rows: Atmospheric forcings. Columns: Soil texture maps

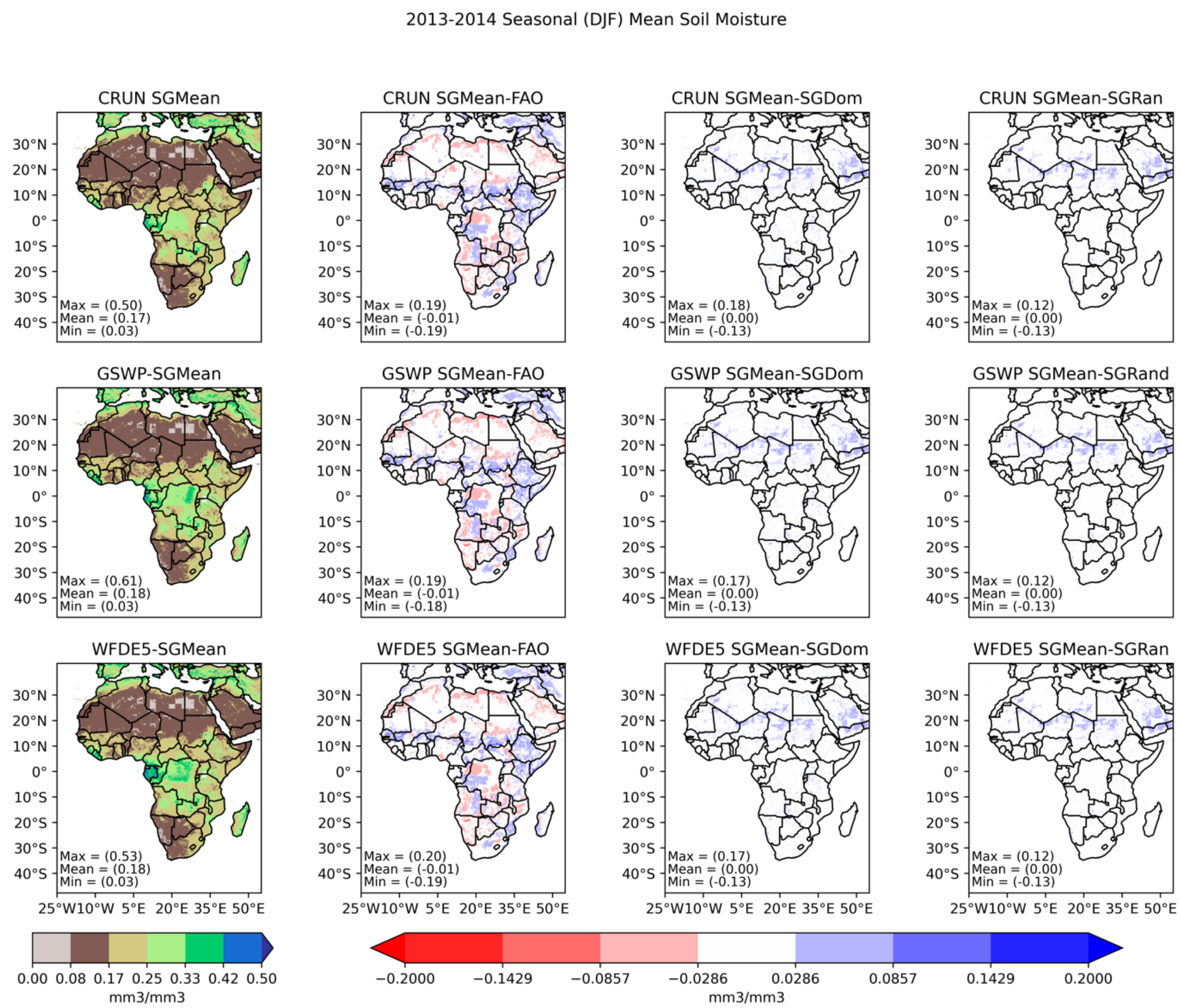

Figure S3 Difference maps showing the variation among the different soil texture maps for each atmospheric forcing in for the estimated soil moisture content in the DJF season. Rows: Atmospheric forcings. Columns: Soil texture maps

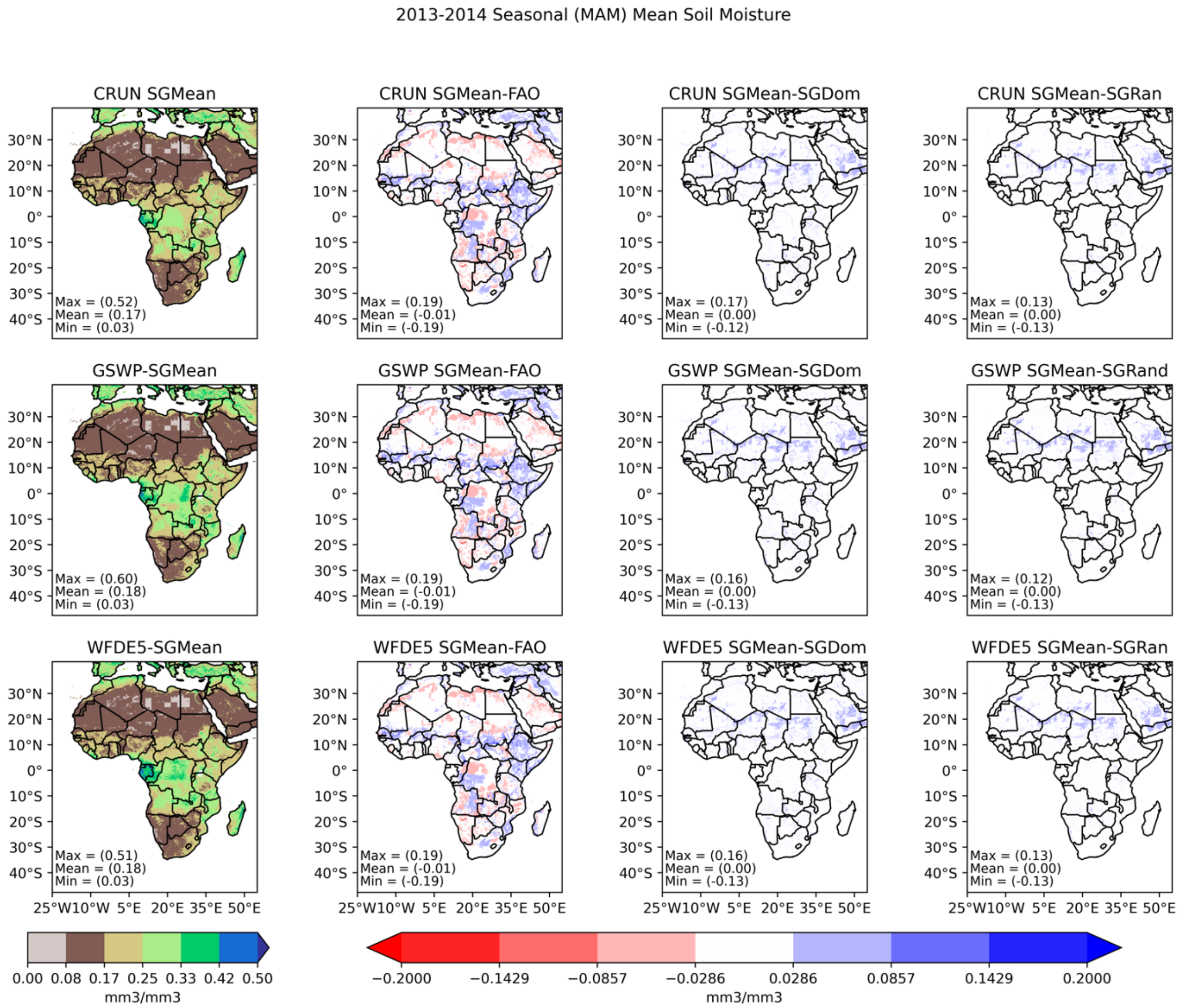

Figure S4 Difference maps showing the variation among the different soil texture maps for each atmospheric forcing in for the estimated soil moisture content in the MAM season. Rows: Atmospheric forcings. Columns: Soil texture maps

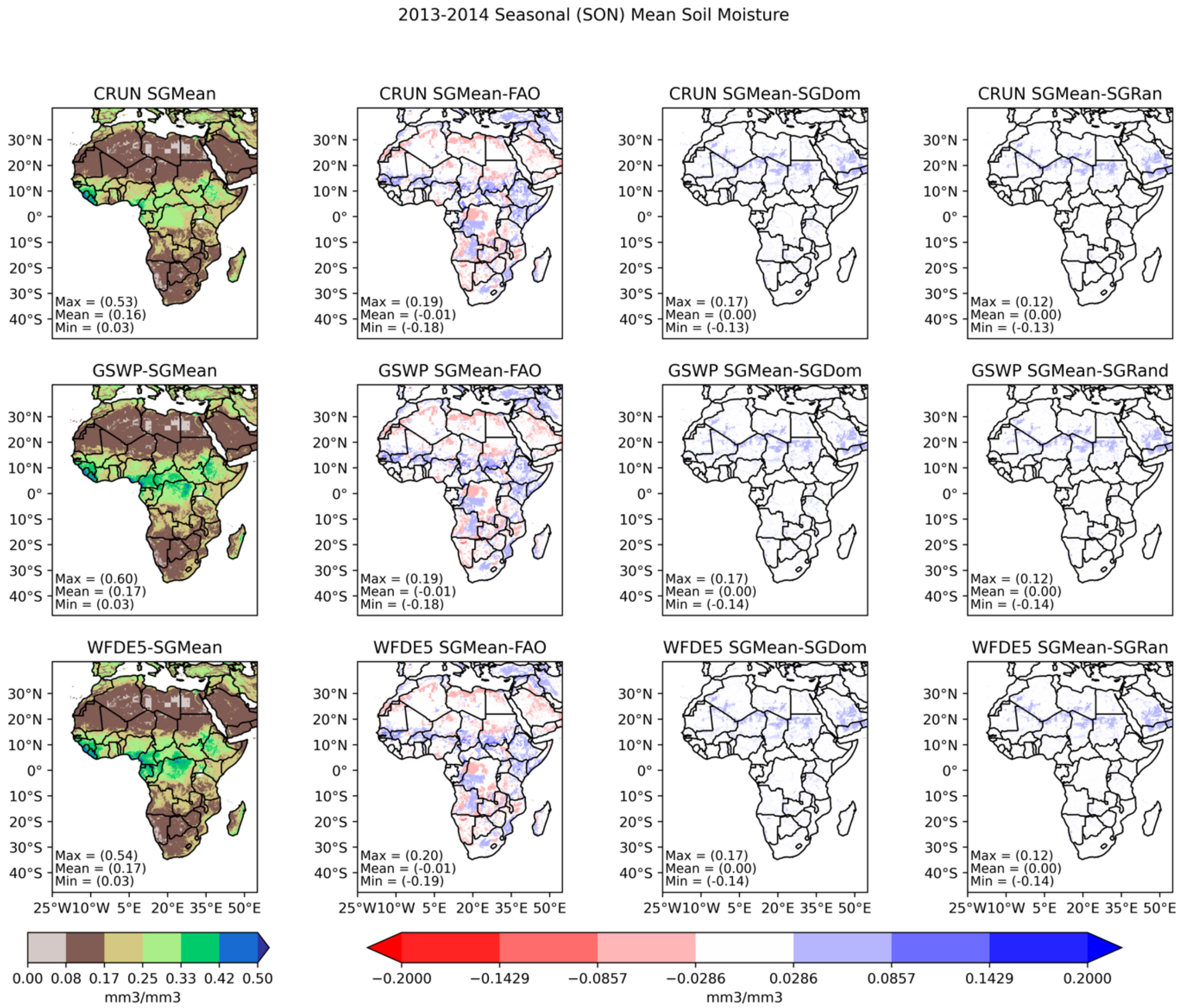

Figure S5 Difference maps showing the variation among the different soil texture maps for each atmospheric forcing in for the estimated soil moisture content in the SON season. Rows: Atmospheric forcings. Columns: Soil texture maps

DJF Mean Soil Moisture

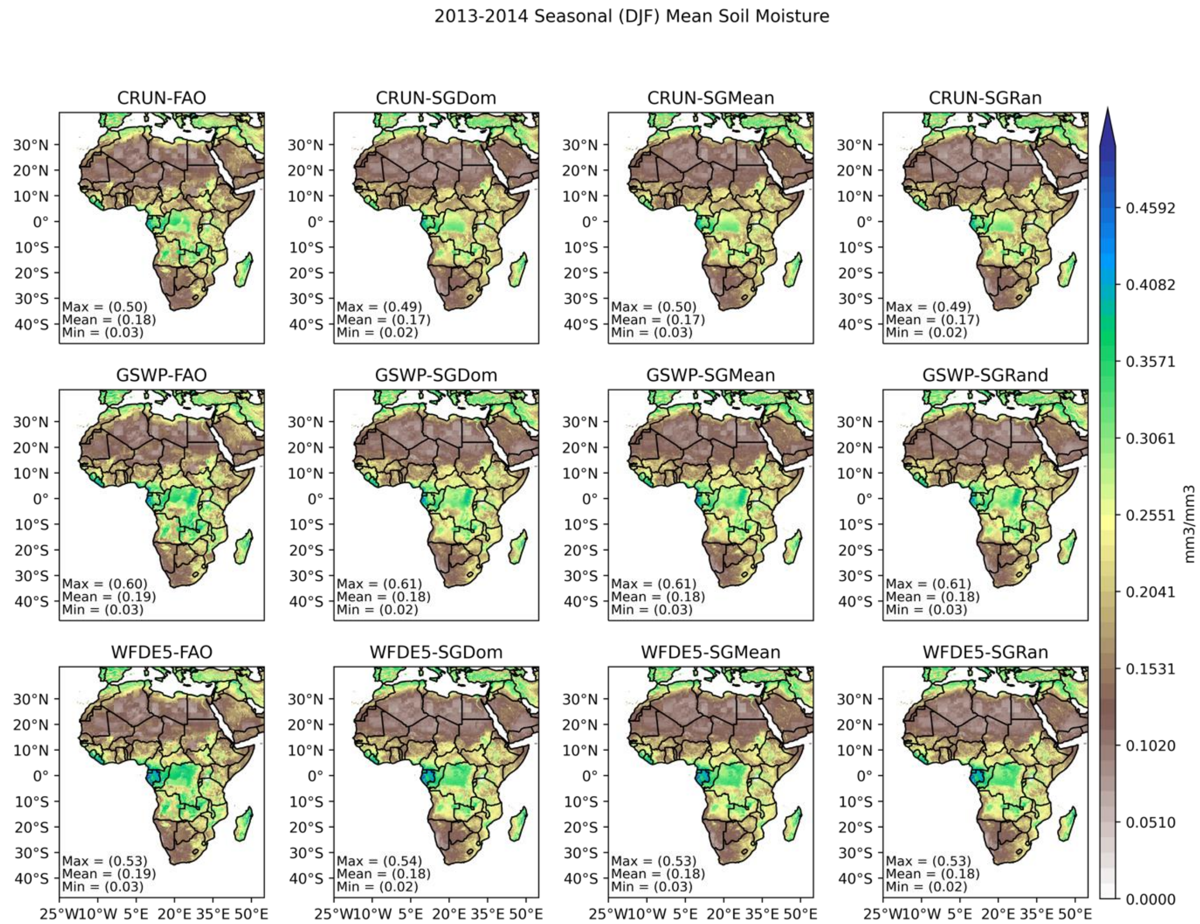

Figure S6: Spatial distribution of simulated soil water content in the DJF season over Africa. Row 1: CRUNCEP forced simulations with FAO, Dominant, Mean and Random upscaled soiltexture map inputs. Row 2: GSWP forced simulations with FAO, Dominant, Mean and Random upscaled soil texture map inputs. Row 3: WFDE5 forced simulations with FAO, Dominant, Mean and Random upscaled soil texture map inputs.

MAM Mean Soil Moisture

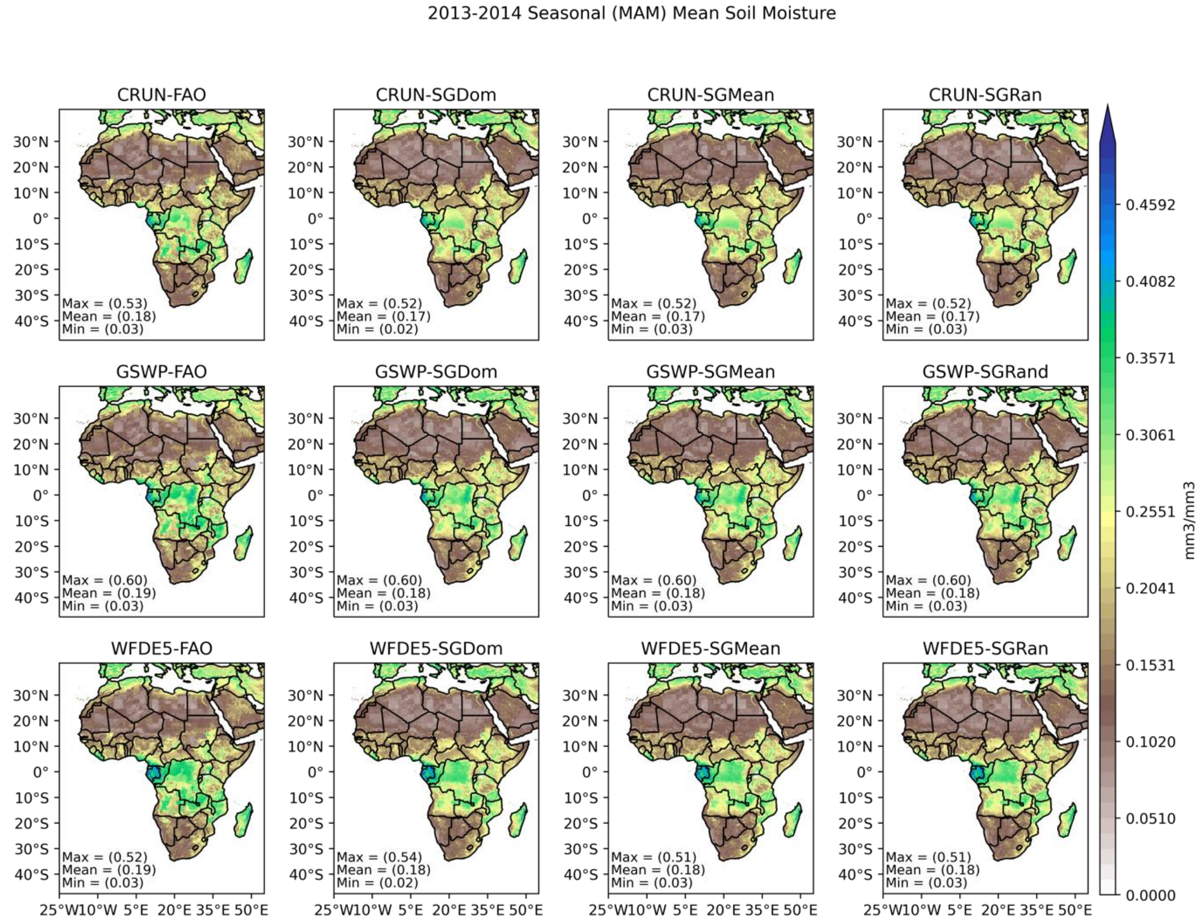

Figure S7: Spatial distribution of simulated soil water content in the MMA season over Africa. Row 1: CRUNCEP forced simulations with FAO, Dominant, Mean and Random upscaled soiltexture map inputs. Row 2: GSWP forced simulations with FAO, Dominant, Mean and Random upscaled soil texture map inputs. Row 3: WFDE5 forced simulations with FAO, Dominant, Mean and Random upscaled soil texture map inputs.

SON Mean Soil moisture

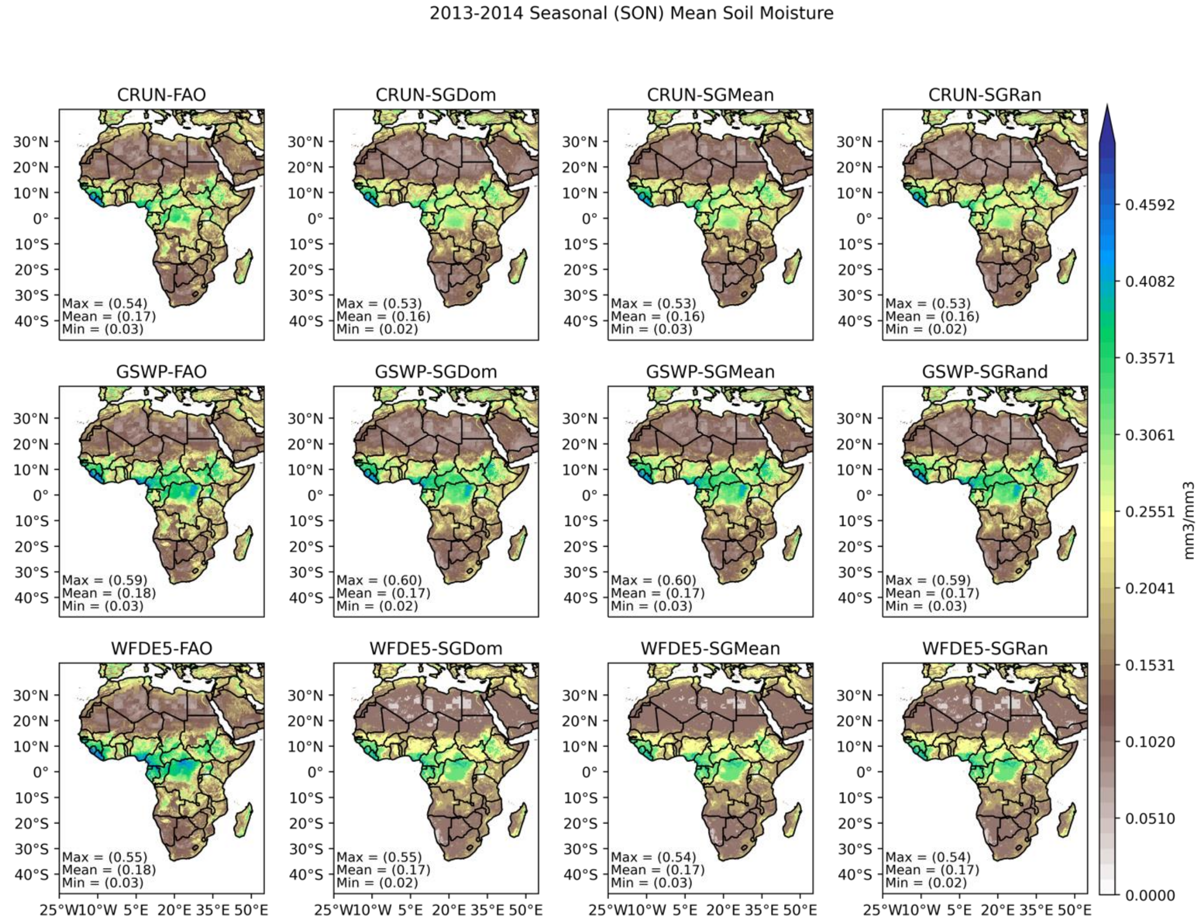

Figure S8: Spatial distribution of simulated soil water content in the SON season over Africa. Row 1: CRUNCEP forced simulations with FAO, Dominant, Mean and Random upscaled soiltexture map inputs. Row 2: GSWP forced simulations with FAO, Dominant, Mean and Random upscaled soil texture map inputs. Row 3: WFDE5 forced simulations with FAO, Dominant, Mean and Random upscaled soil texture map inputs.

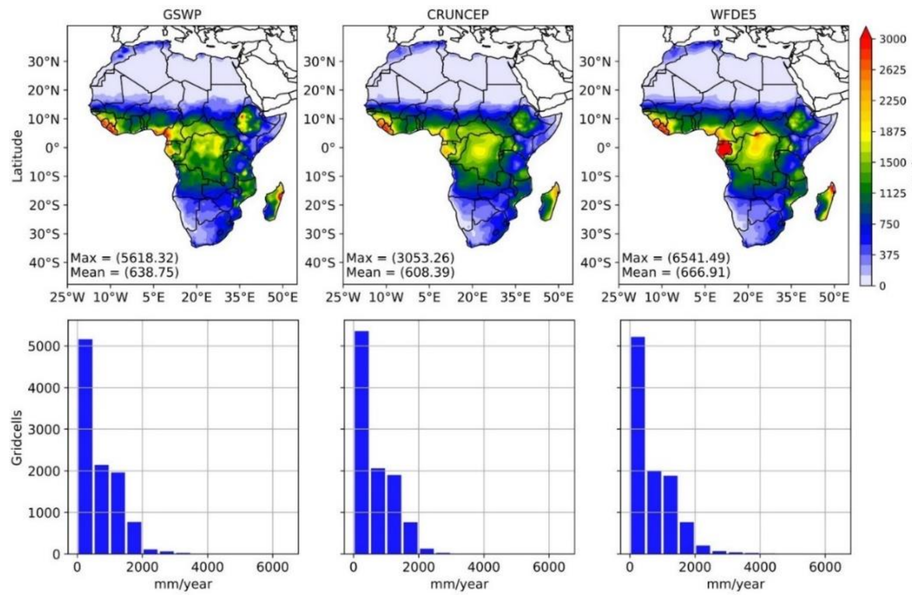

Figure S9: Mean annual rainfall (2013-2014) distribution of CRUNCEP, GSWP and WFDE5 datasets over Africa. Row 1: spatial representation. Row 2: rainfall distribution into bins of 500mm/year.

Soil type distribution across different soil texture maps

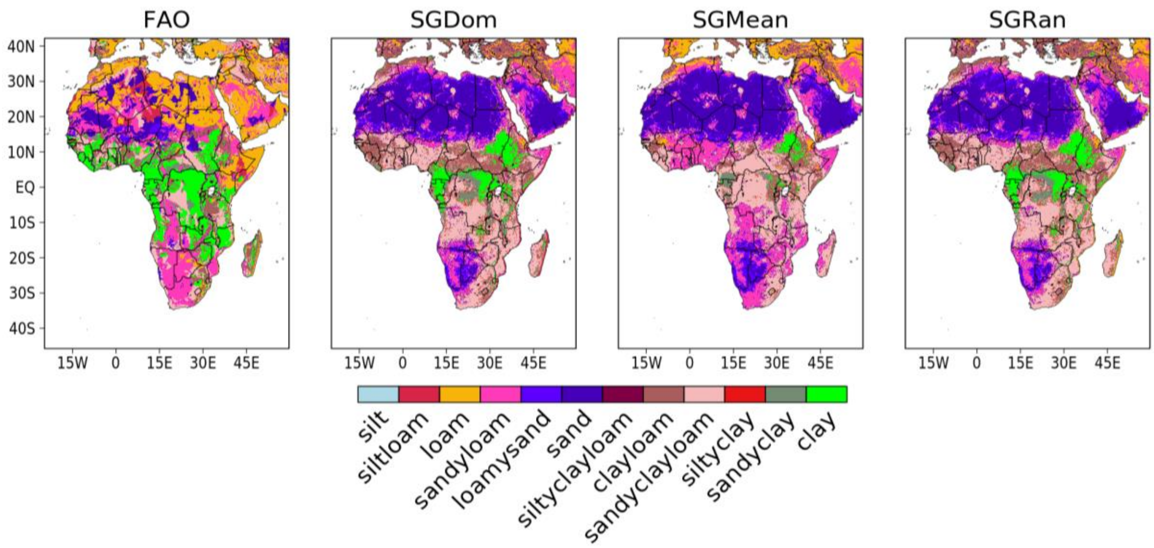

Figure S10: Soil type distribution over Africa according to the USDA soil triangle.

Saturated Hydraulic Conductivity

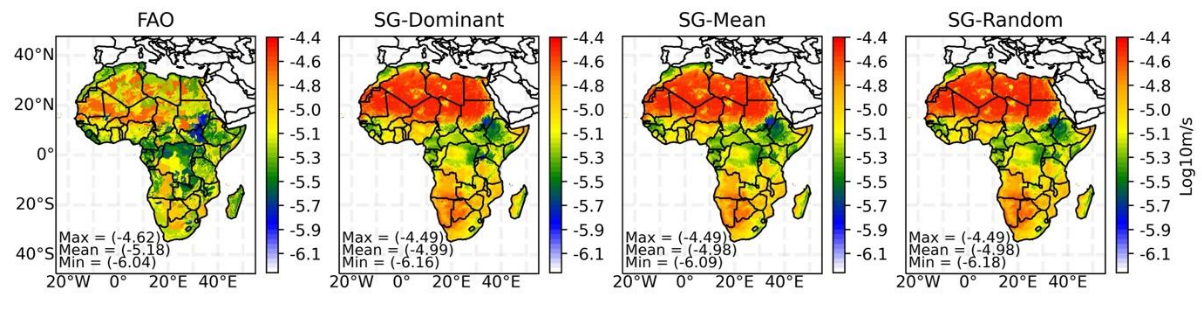

Figure S11: Saturated Hydraulic Conductivity over Africa for the FAO, Dominant, Mean and Random upscaled soil texture maps estimated from texture data with the Clapp-Hornberger formulation.

Mediterranean Region

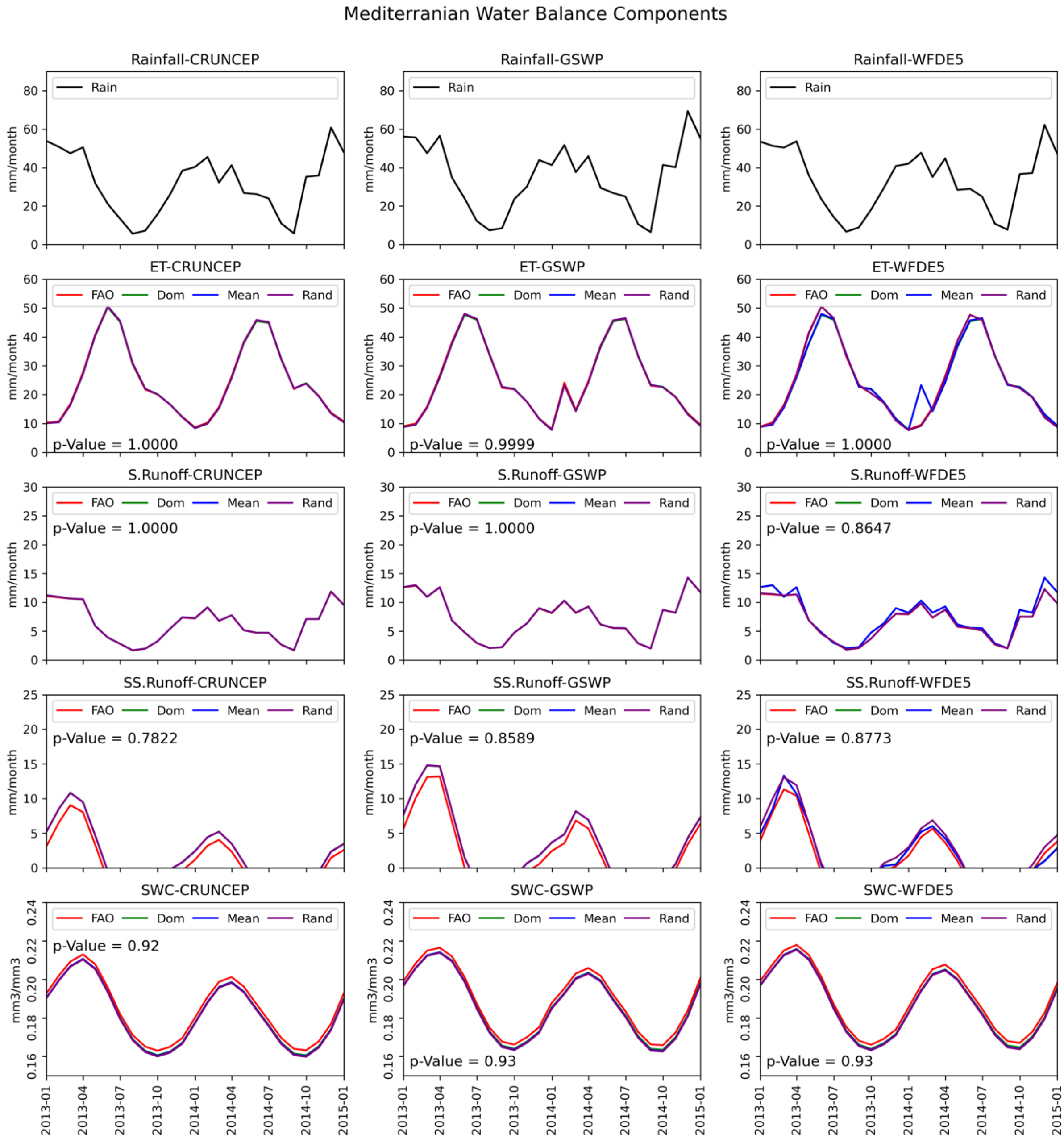

Figure S12: Monthly regional mean of water balance components over the Mediterranean. Rows 1-5 are rainfall, ET, surface runoff, subsurface runoff and soil water content. Columns 1-3 are CRUNCEP, GSWP and WFDE5 atmospheric forcings.

West Africa Regional Results

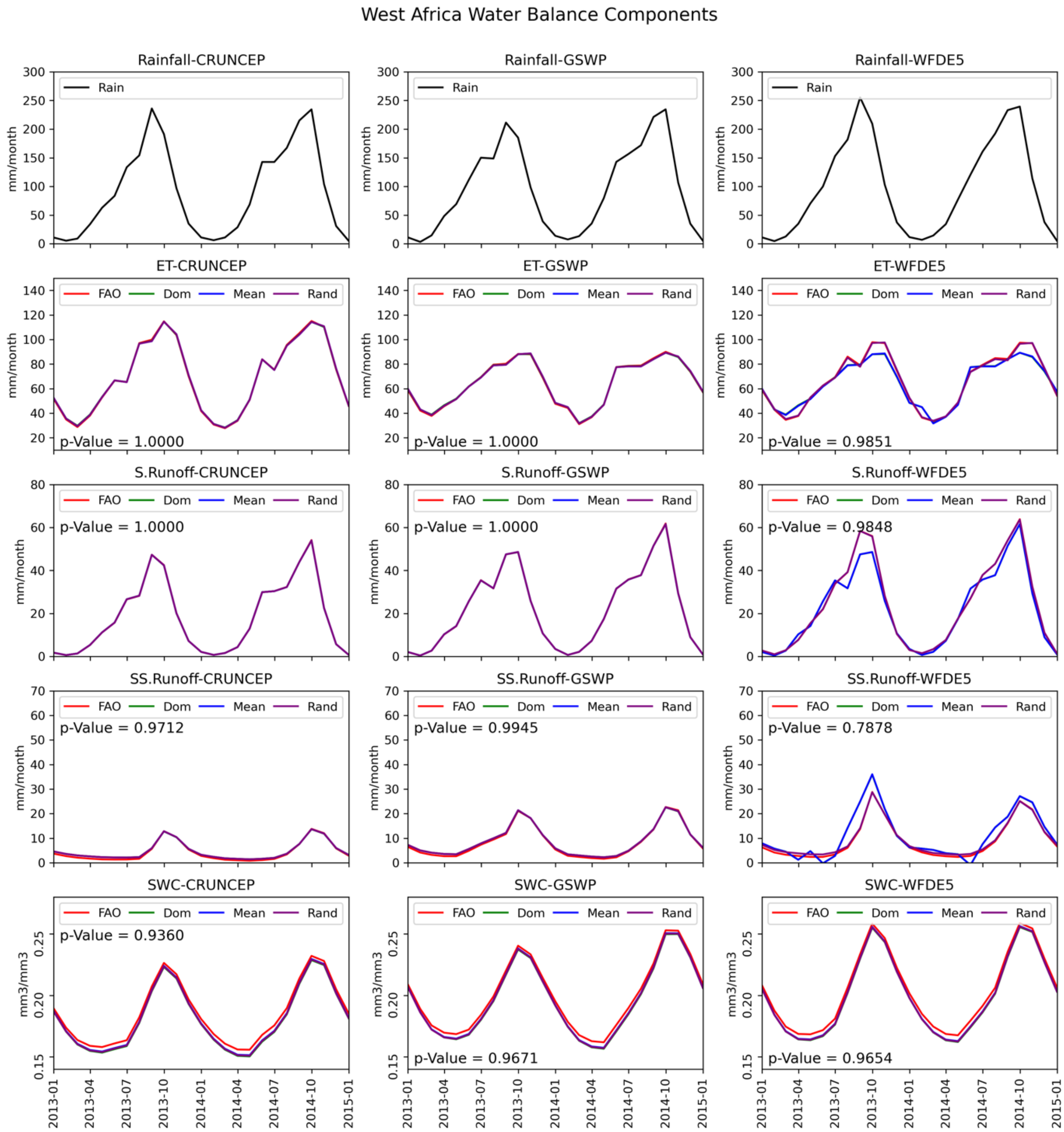

Figure S13: Monthly regional mean of water balance components over the West Africa. Rows 1-5 are rainfall, ET, surface runoff, subsurface runoff and soil water content. Columns 1-3 are CRUNCEP, GSWP and WFDE5 atmospheric forcings.

North-East Africa Regional results

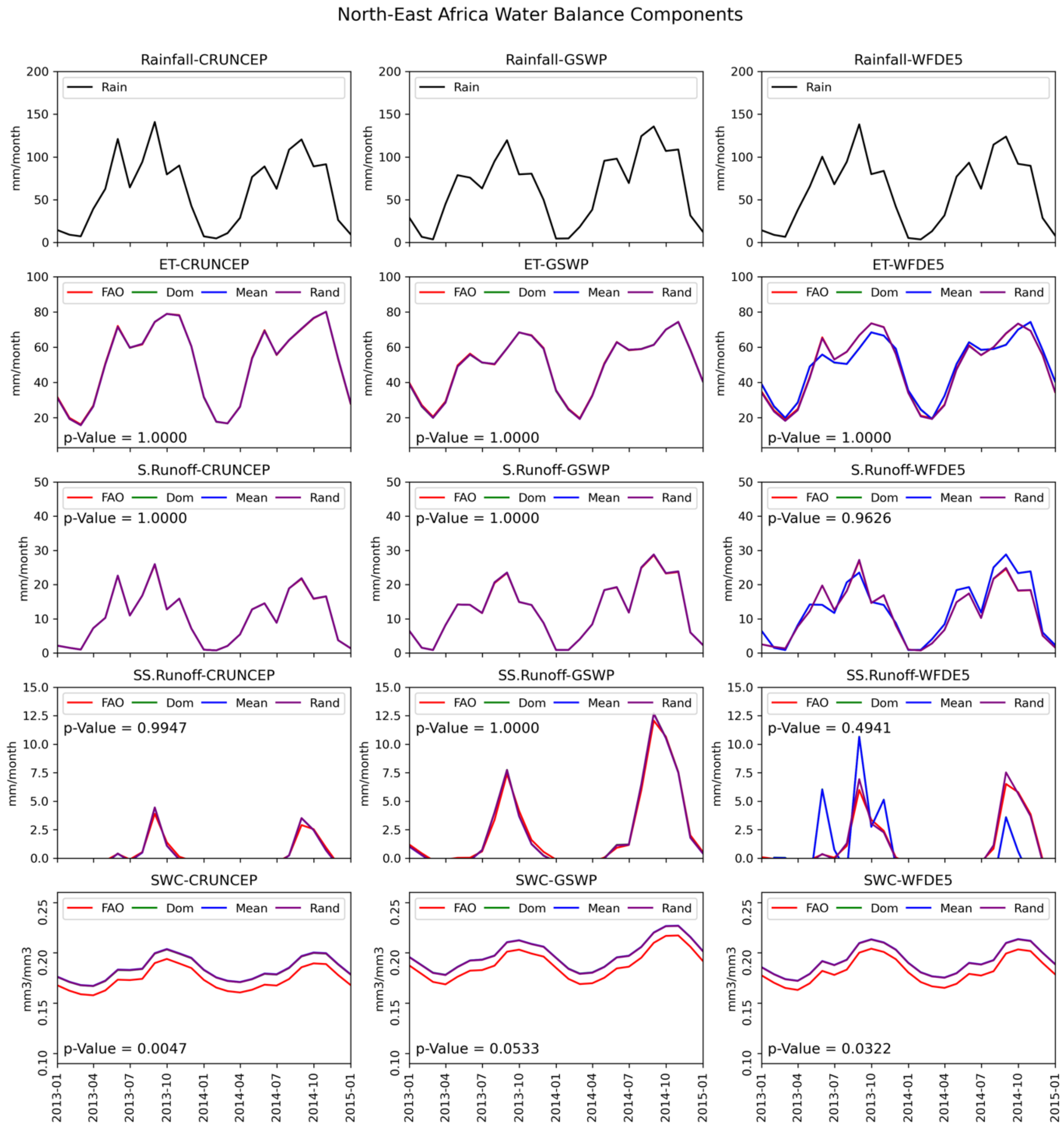

Figure S14: Monthly regional mean of water balance components over North-East Africa. Rows 1-5 are rainfall, ET, surface runoff, subsurface runoff and soil water content. Columns 1-3 are CRUNCEP, GSWP and WFDE5 atmospheric forcings.

Central East Africa Regional Results

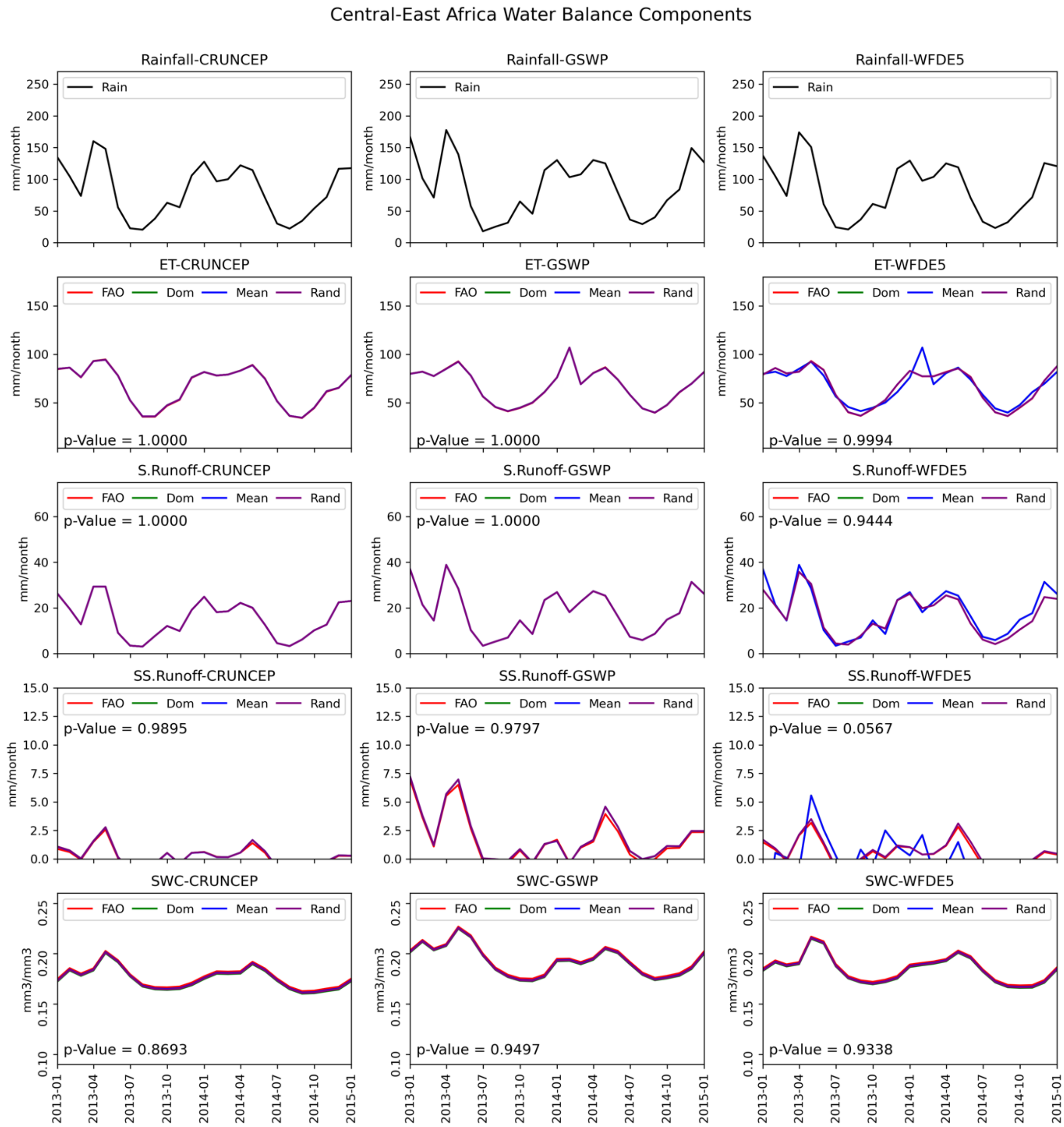

Figure S15: Monthly regional mean of water balance components over Central-East Africa. Rows 1-5 are rainfall, ET, surface runoff, subsurface runoff and soil water content. Columns 1-3 are CRUNCEP, GSWP and WFDE5 atmospheric forcings.

South-West Africa regional results

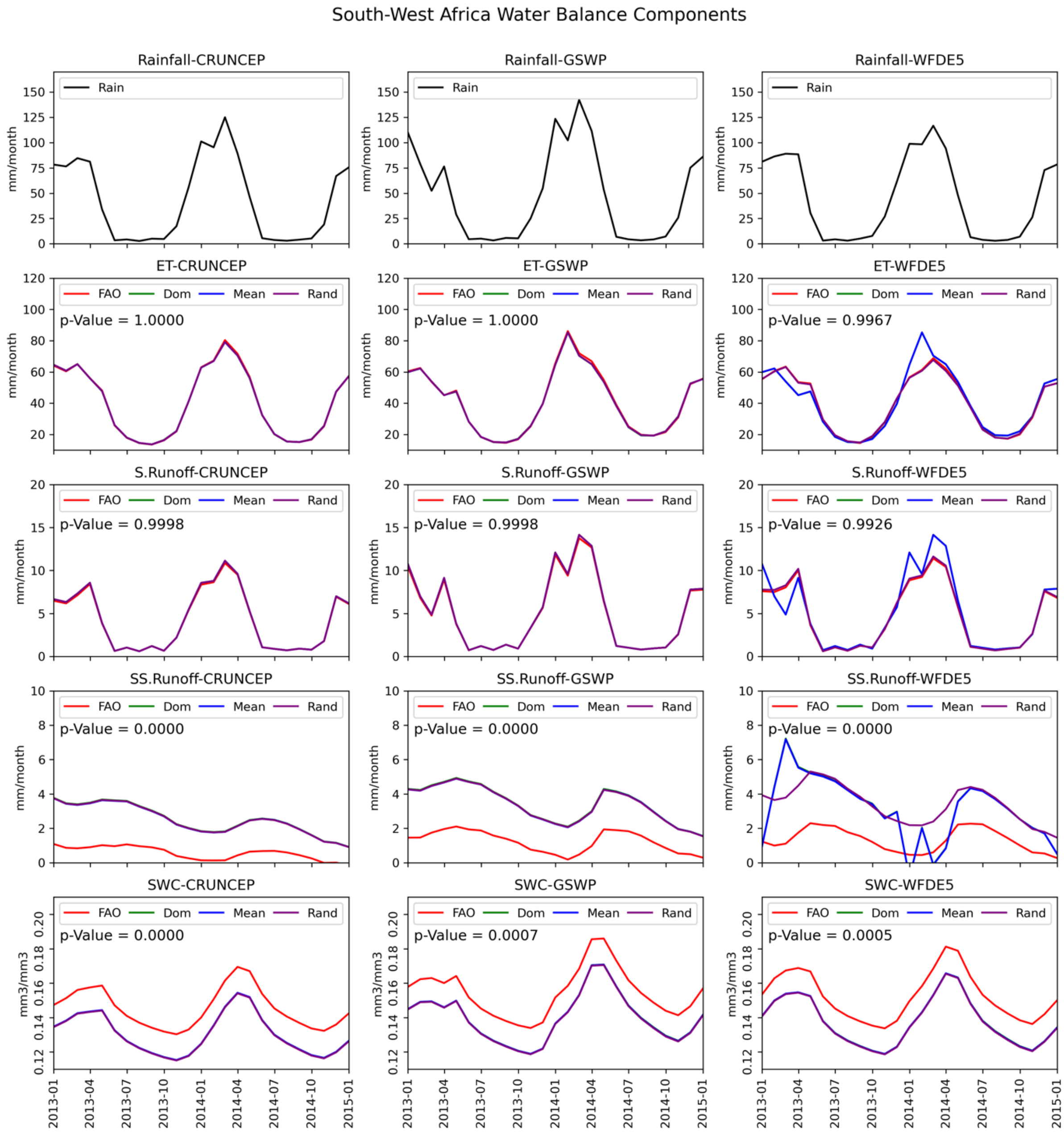

Figure S16: Monthly regional mean of water balance components over South-West Africa. Rows 1-5 are rainfall, ET, surface runoff, subsurface runoff and soil water content. Columns 1-3 are CRUNCEP, GSWP and WFDE5 atmospheric forcings.

South-East Africa regional results

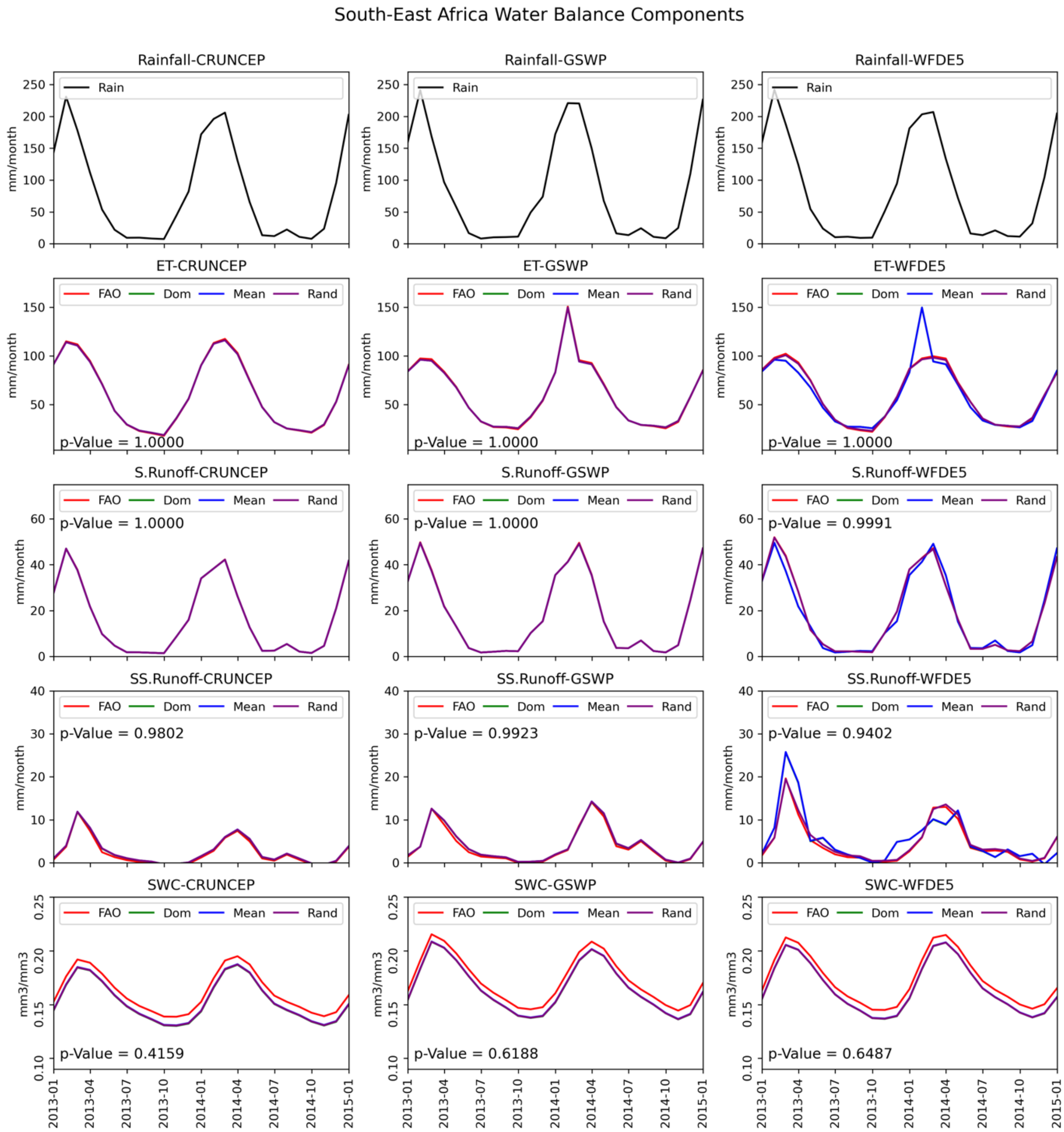

Figure S17: Monthly regional mean of water balance components over South-East Africa. Rows 1-5 are rainfall, ET, surface runoff, subsurface runoff and soil water content. Columns 1-3 are CRUNCEP, GSWP and WFDE5 atmospheric forcings.

Cairo Local results

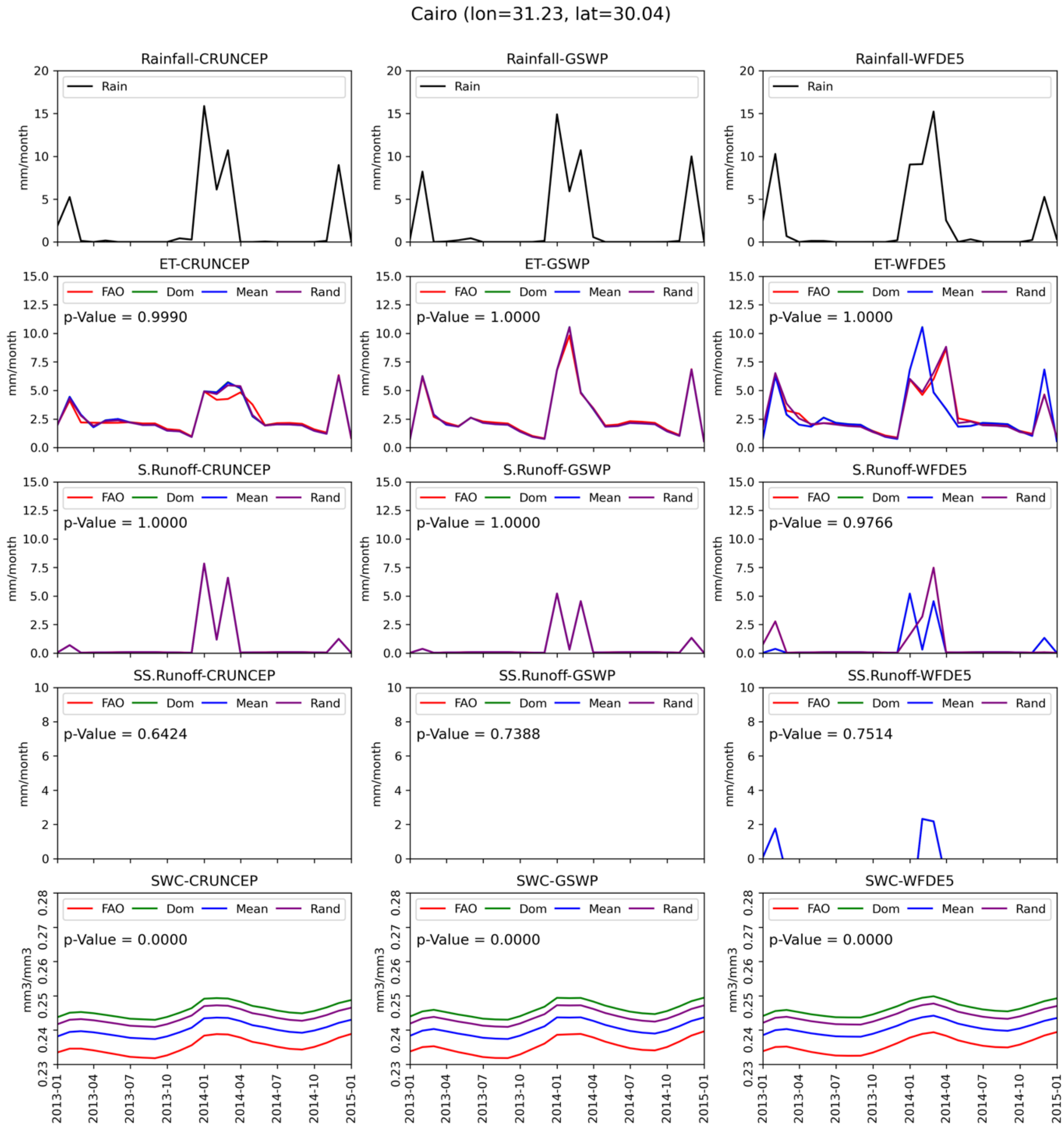

Figure S18: local estimates of water balance components in Cairo, Egypt. Rows 1-5 are rainfall, ET, surface runoff, subsurface runoff and soil water content. Columns 1-3 are CRUNCEP, GSWP and WFDE5 atmospheric forcings.

Addis Ababa local results

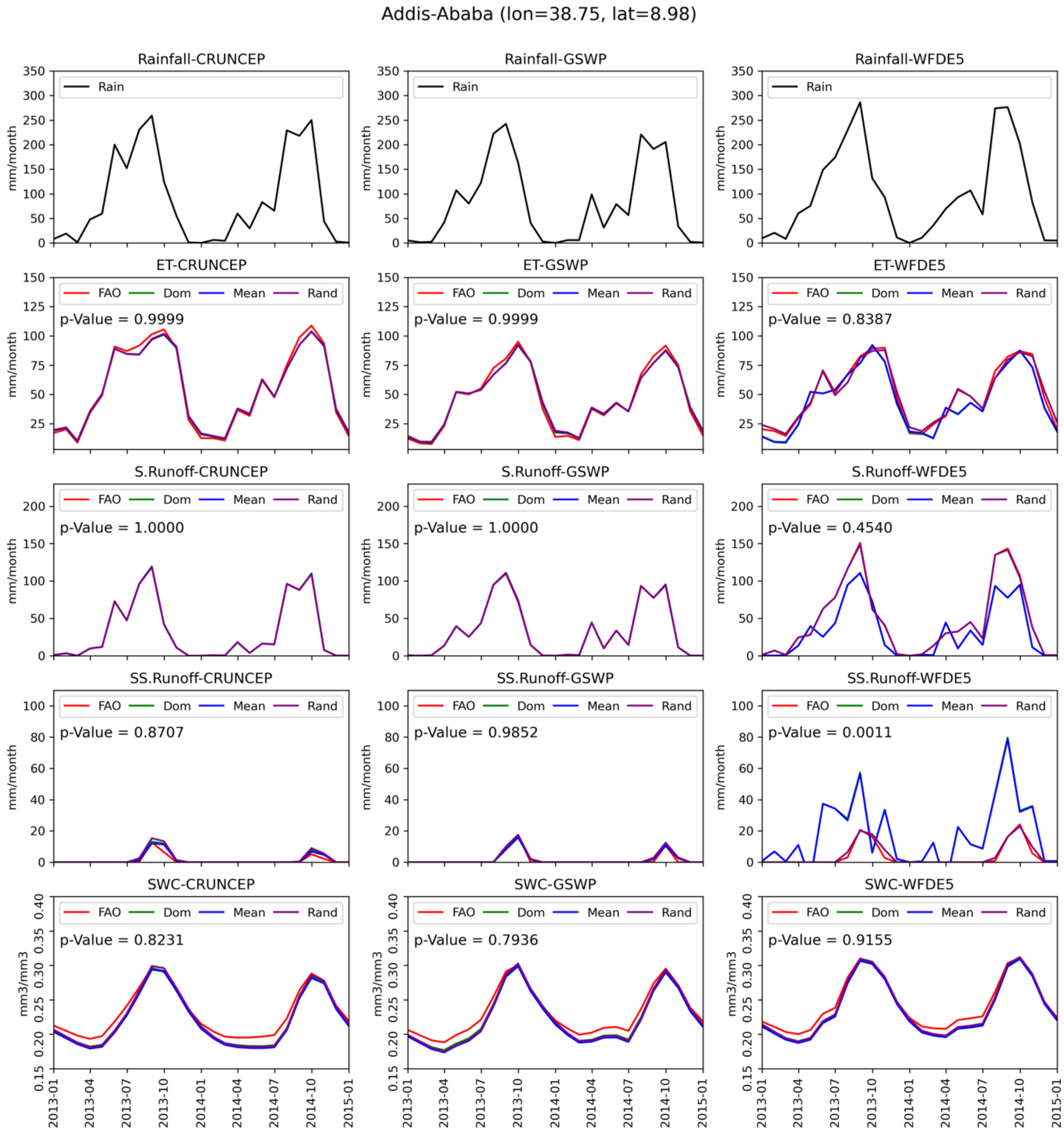

Figure S19: Local estimates of water balance components Addis-Ababa, Ethiopia. Rows 1-5 are rainfall, ET, surface runoff, subsurface runoff and soil water content. Columns 1-3 are CRUNCEP, GSWP and WFDE5 atmospheric forcings.

Salong local results

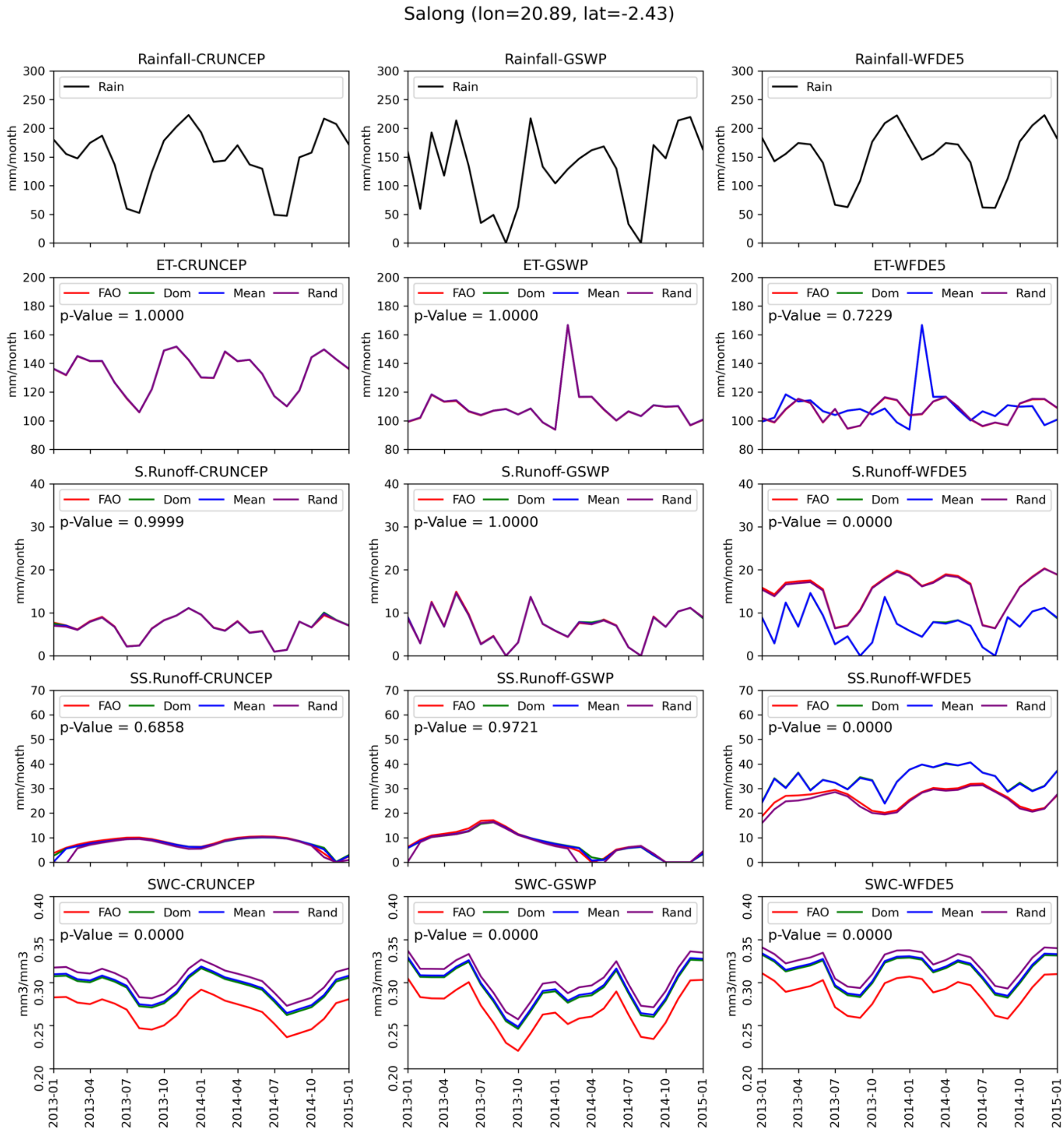

Figure S20: Local estimates of water balance components Salong, Central Africa Republic. Rows 1-5 are rainfall, ET, surface runoff, subsurface runoff and soil water content. Columns 1-3 are CRUNCEP, GSWP and WFDE5 atmospheric forcings.

Daar-es-Salaam local results

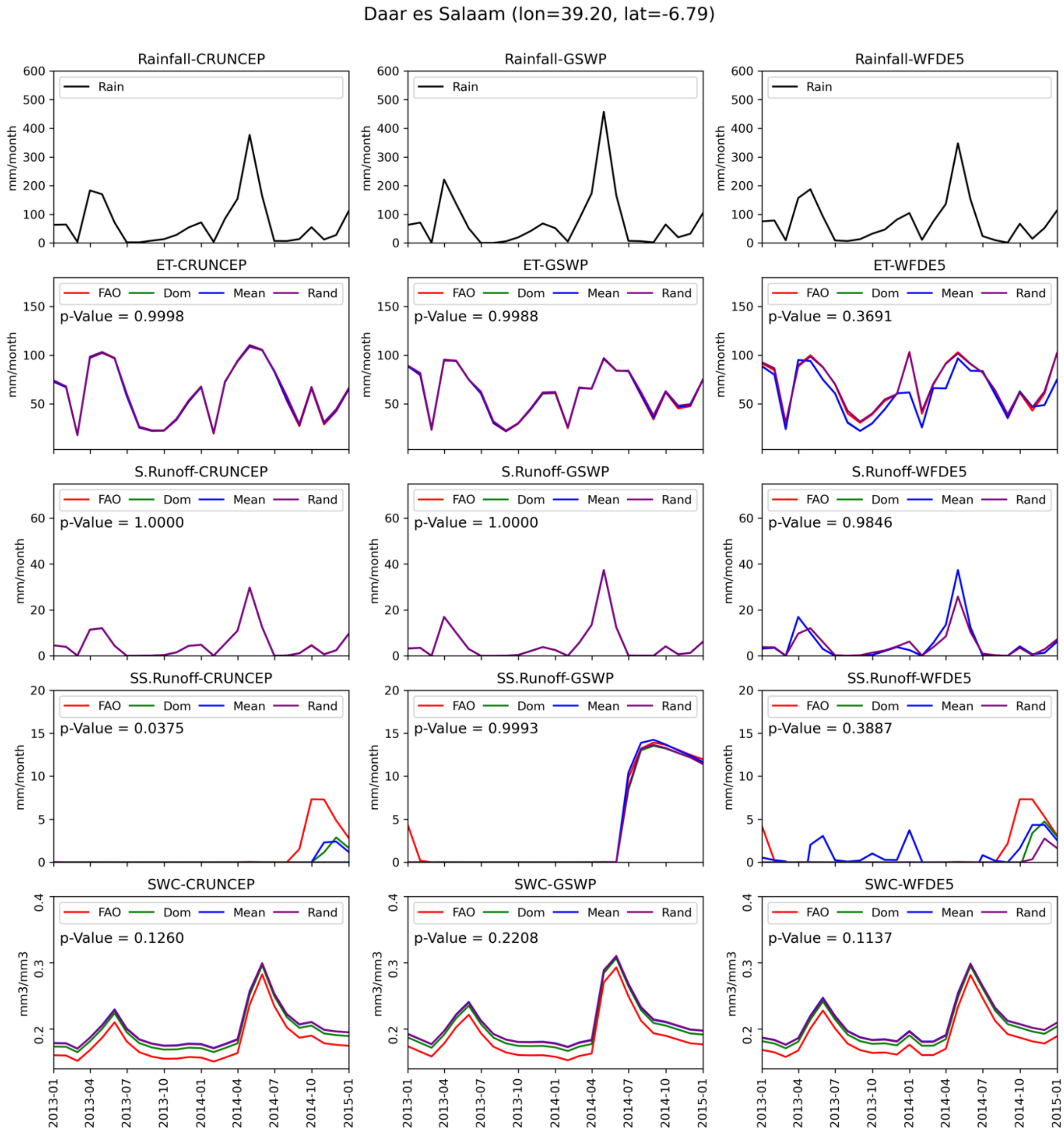

Figure S21: Local estimates of water balance components in Daar-es-Salaam, Tanzania. Rows 1-5 are rainfall, ET, surface runoff, subsurface runoff and soil water content. Columns 1-3 are CRUNCEP, GSWP and WFDE5 atmospheric forcings.

Windhoek local results

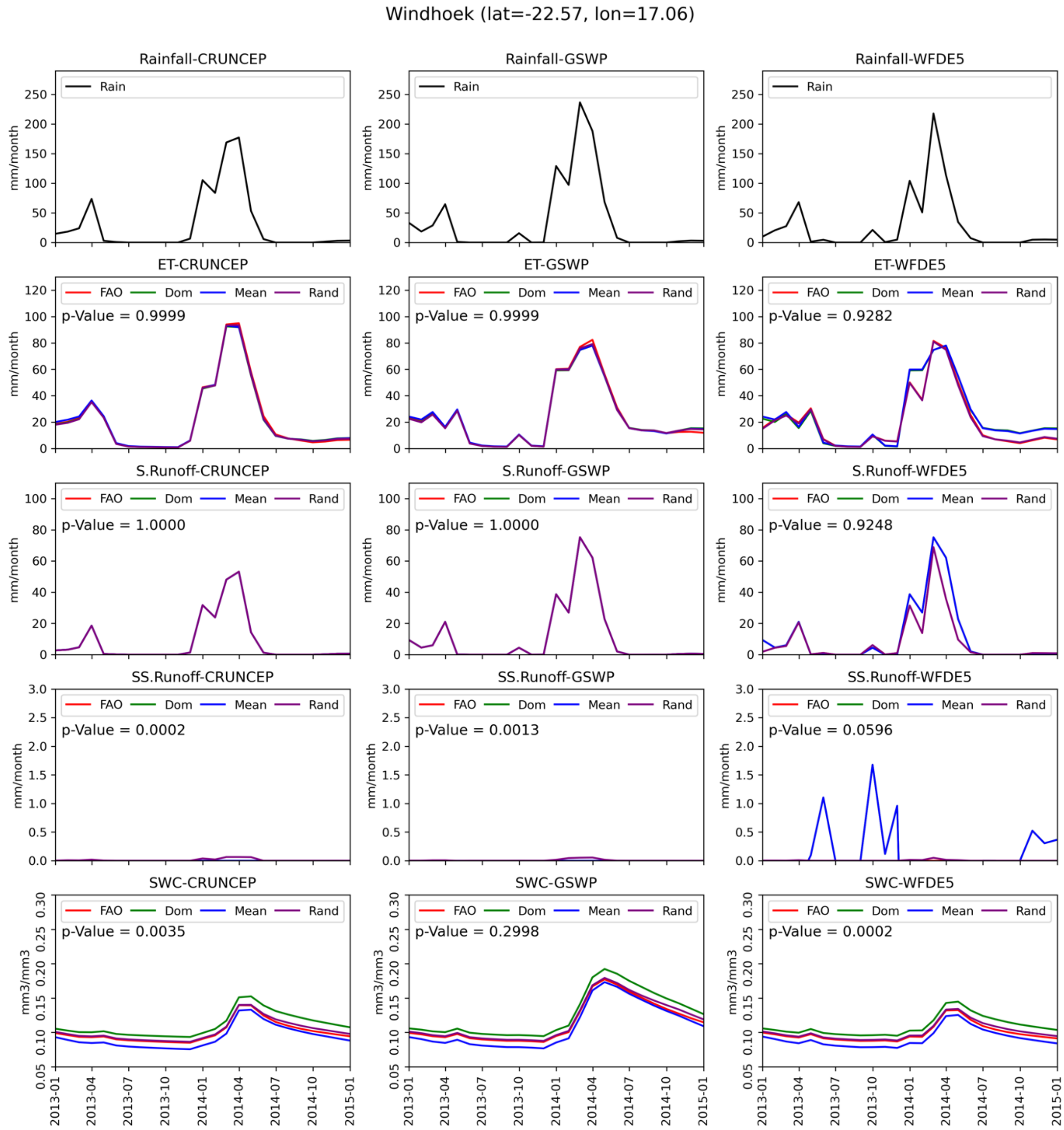

Figure S22: Local estimates of water balance components in Windhoek, Namibia. Rows 1-5 are rainfall, ET, surface runoff, subsurface runoff and soil water content. Columns 1-3 are CRUNCEP, GSWP and WFDE5 atmospheric forcings.

Maseru local results

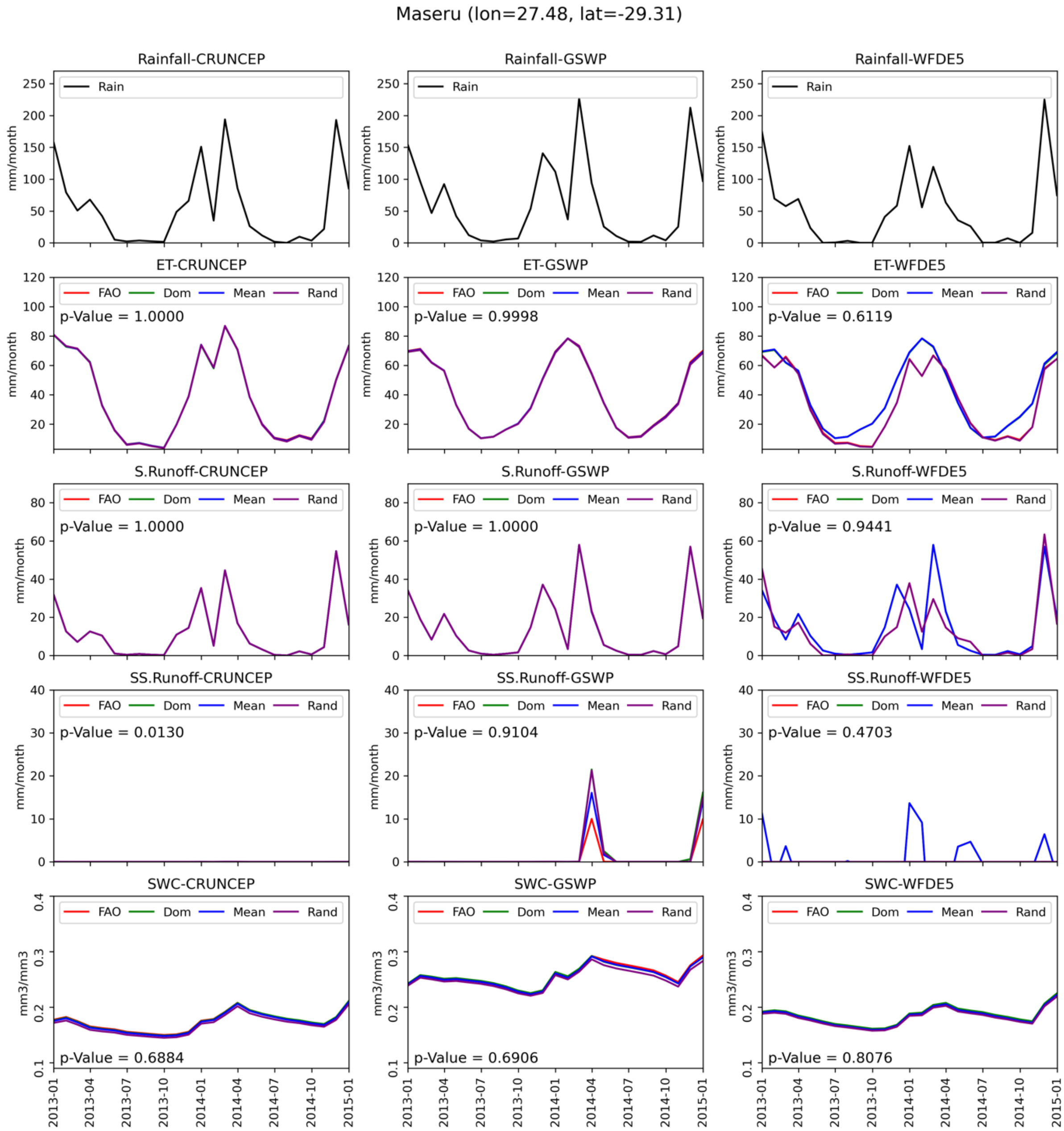

Figure S23: Local estimates of water balance components in Maseru, Lesotho. Rows 1-5 are rainfall, ET, surface runoff, subsurface runoff and soil water content. Columns 1-3 are CRUNCEP, GSWP and WFDE5 atmospheric forcings.

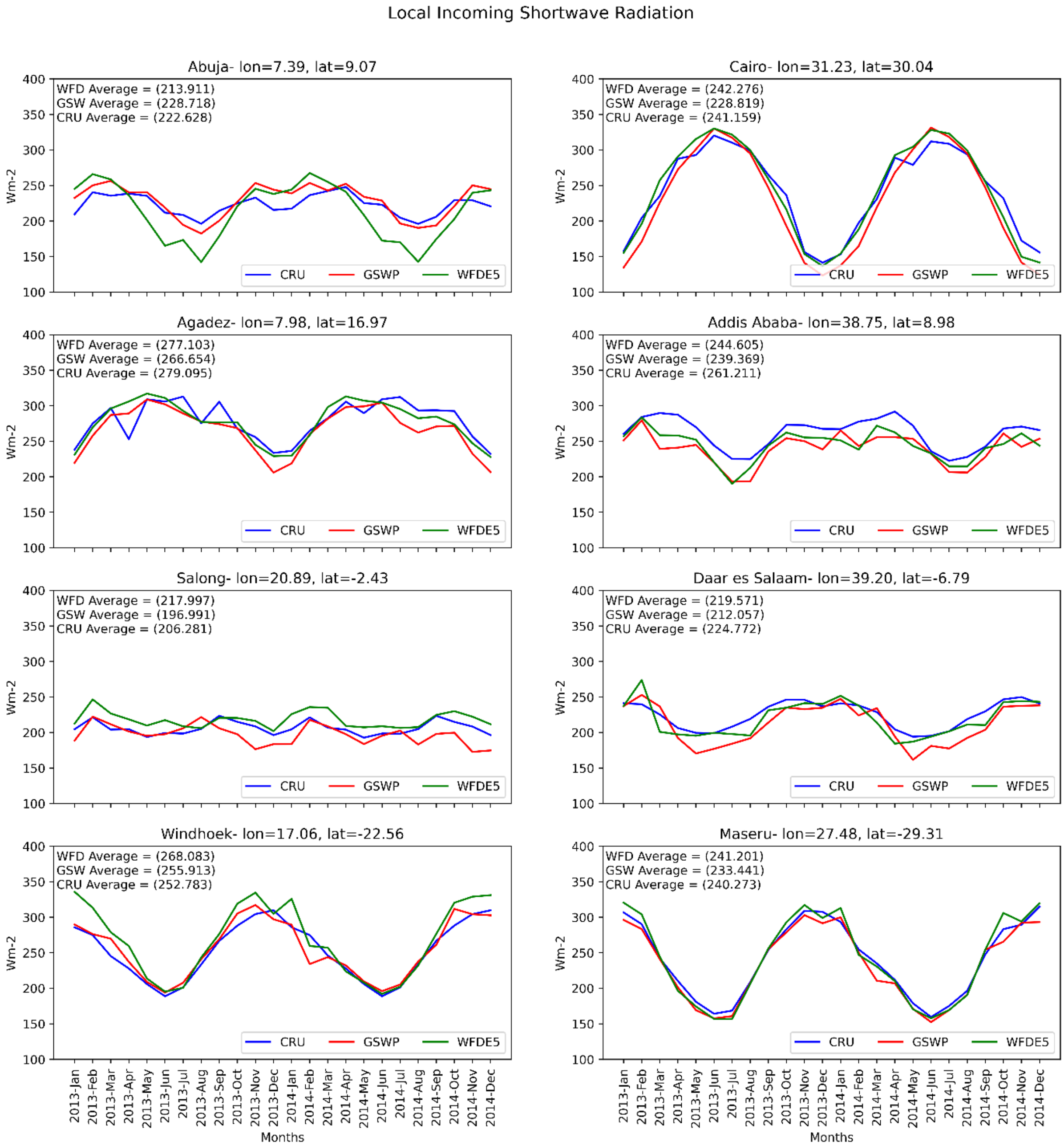

Figure S24: Incoming shortwave radiation from CRUNCEP, GSWP and WFD5 for all locations.

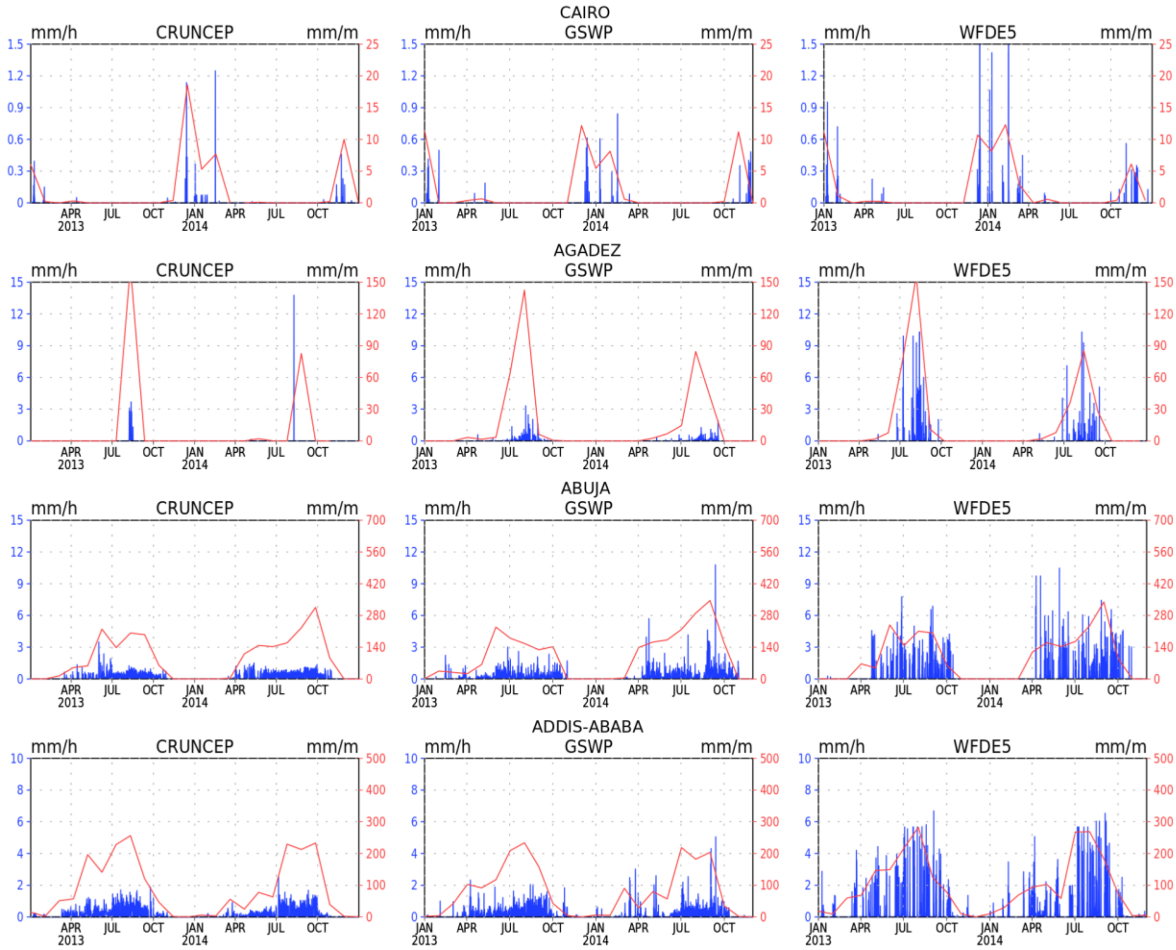

Figure S25: Rainfall intensity and rainfall amount for Cairo, Agadez, Abuja and Addis-Ababa. Left column: CRUNCEP; middle column: GSWP and right column: WFDE5. Red lines represent monthly rainfall intensity while blue lines represent hourly rainfall intensity.

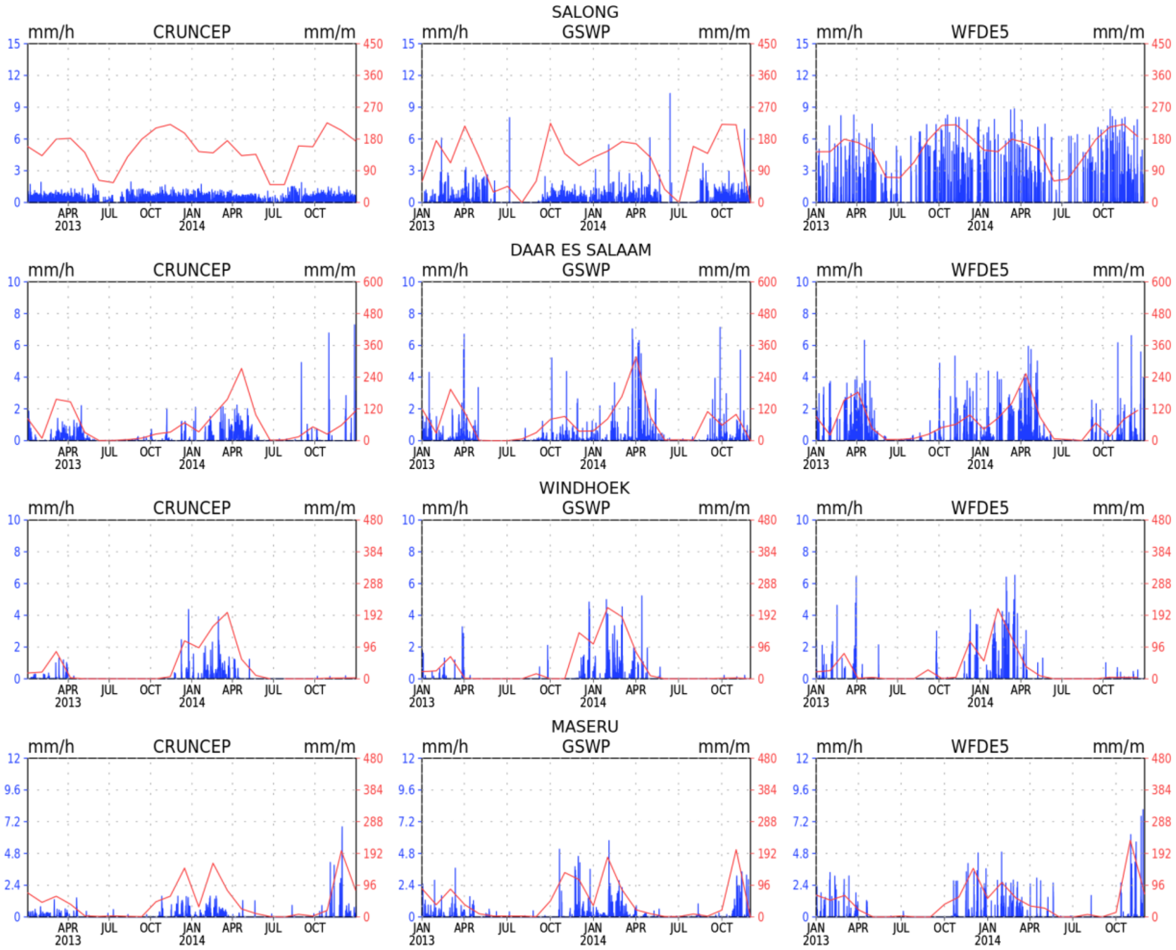

Figure S26: Rainfall intensity and rainfall amount for Salong, Daar es Salaam, Windhoek and Maseru. Left column: CRUNCEP; middle column: GSWP and right column: WFDE5. Red lines represent monthly rainfall intensity while blue lines represent hourly rainfall intensity.

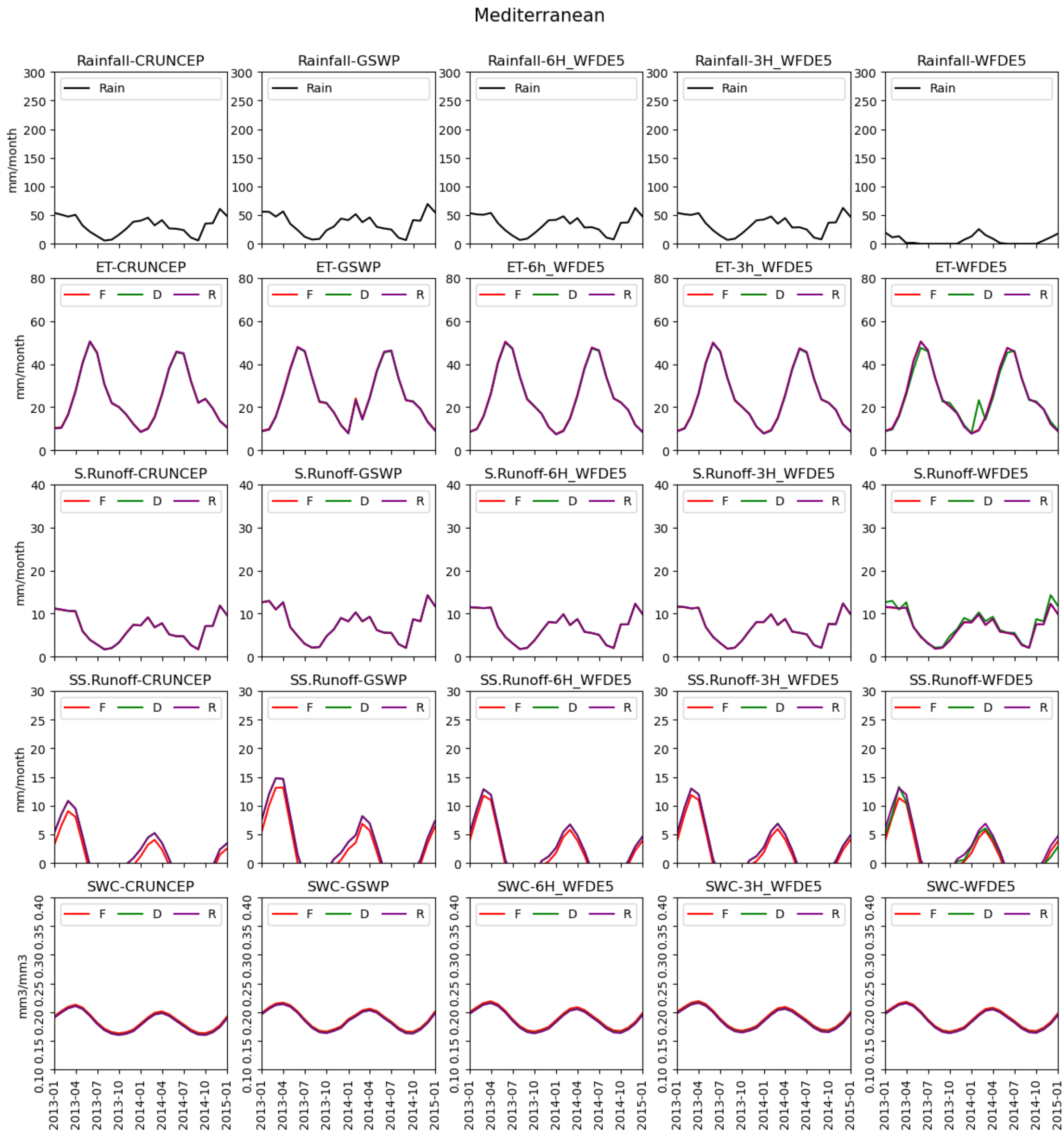

Figure S27: Mediterranean Region estimates of water balance components. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff and soil water content respectively while each column (left to right) represents CRUNCEP, GSWP, 6H-WFDE5, 3H-WFDE5 and WFDE5 forcings respectively.

Component	CRUNCEP	GSWP	6H-WFDE5	3H-WFDE5	WFDE5
Evapotranspiration	0.30	0.36	0.33	0.34	1.69
Surface Runoff	1.69	0.03	0.03	0.03	0.65
Subsurface Runoff	1.19	1.23	0.86	0.87	1.31
Soil Moisture	0.00	0.00	0.00	0.00	0.00

Table S1: Average margin between soil texture maps for each atmospheric forcing over Mediterranean region (mm/month).

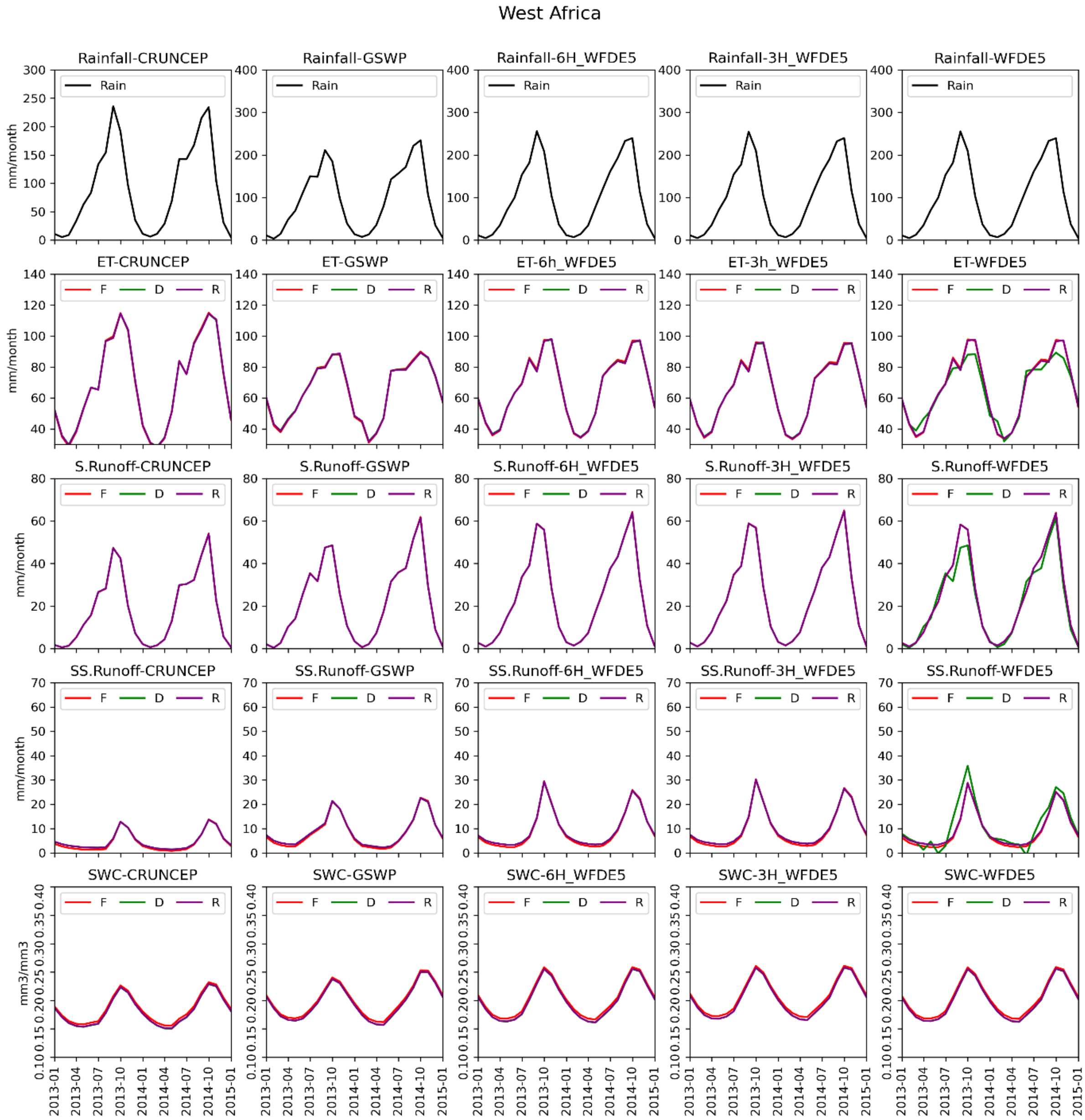

Figure S28: West Africa Region estimates of water balance components. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents CRUNCEP, GSWP, 6H-WFDE5, 3H-WFDE5 and WFDE5 forcings respectively

Component	CRUNCEP	GSWP	6H-WFDE5	3H-WFDE5	WFDE5
Evapotranspiration	0.59	0.60	0.61	0.61	4.34
Surface Runoff	0.06	0.07	0.08	0.09	2.68
Subsurface Runoff	0.49	0.48	0.56	0.59	3.00
Soil Moisture	0.00	0.00	0.00	0.00	0.00

Table S2: Average margin between soil texture maps for each atmospheric forcing over West. Africa (mm/month).

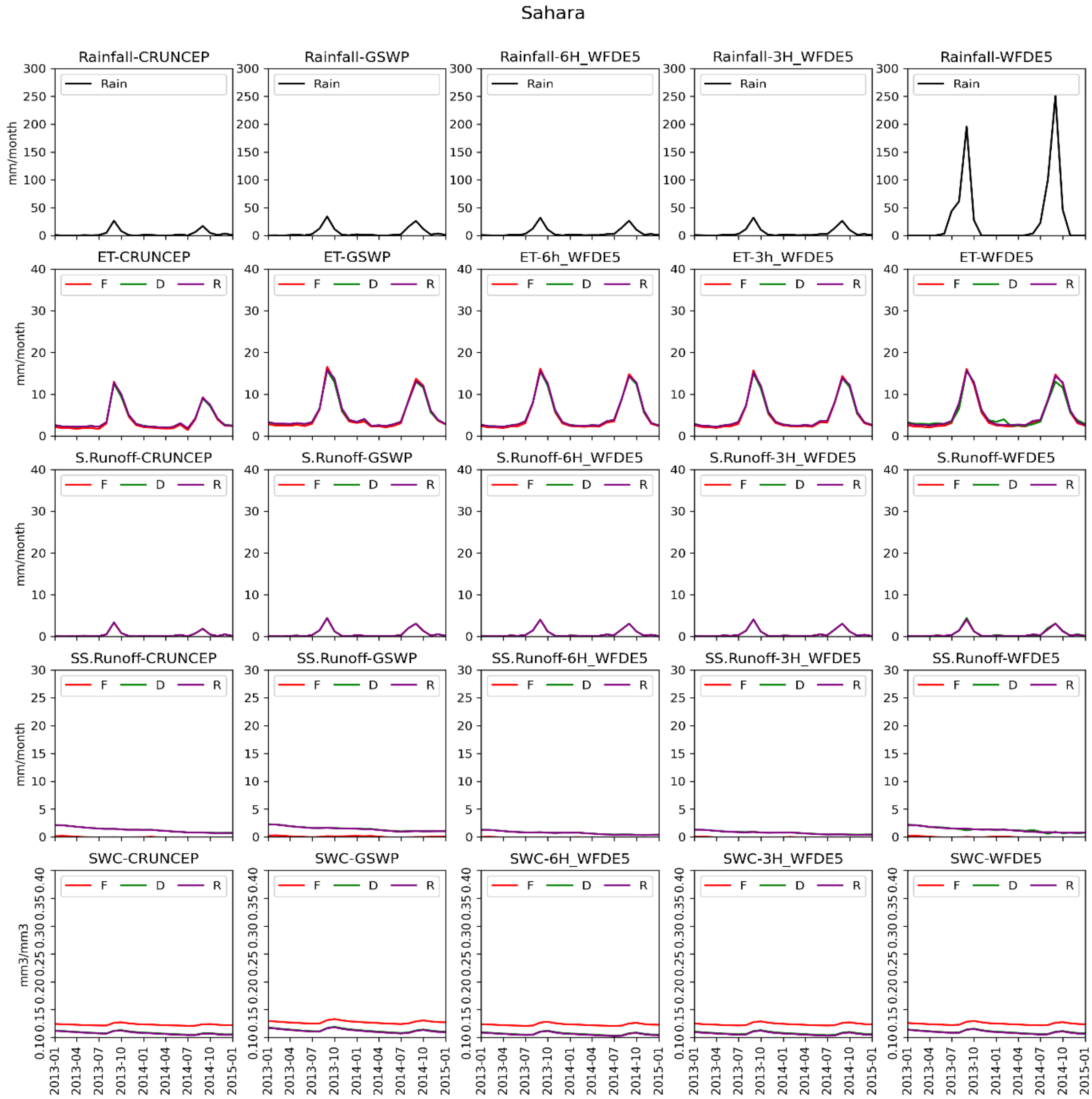

Figure S29: Sahara Region estimates of water balance components. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents CRUNCEP, GSWP, 6H-WFDE5, 3H-WFDE5 and WFDE5 forcings respectively.

Component	CRUNCEP	GSWP	6H-WFDE5	3H-WFDE5	WFDE5
Evapotranspiration	0.36	0.43	0.34	0.35	0.71
Surface Runoff	0.00	0.01	0.00	0.00	0.09
Subsurface Runoff	1.33	1.38	0.86	0.86	1.34
Soil Moisture	0.02	0.02	0.02	0.02	0.02

Table S3:Average margin between soil texture maps for each atmospheric forcing over Sahara (mm/month).

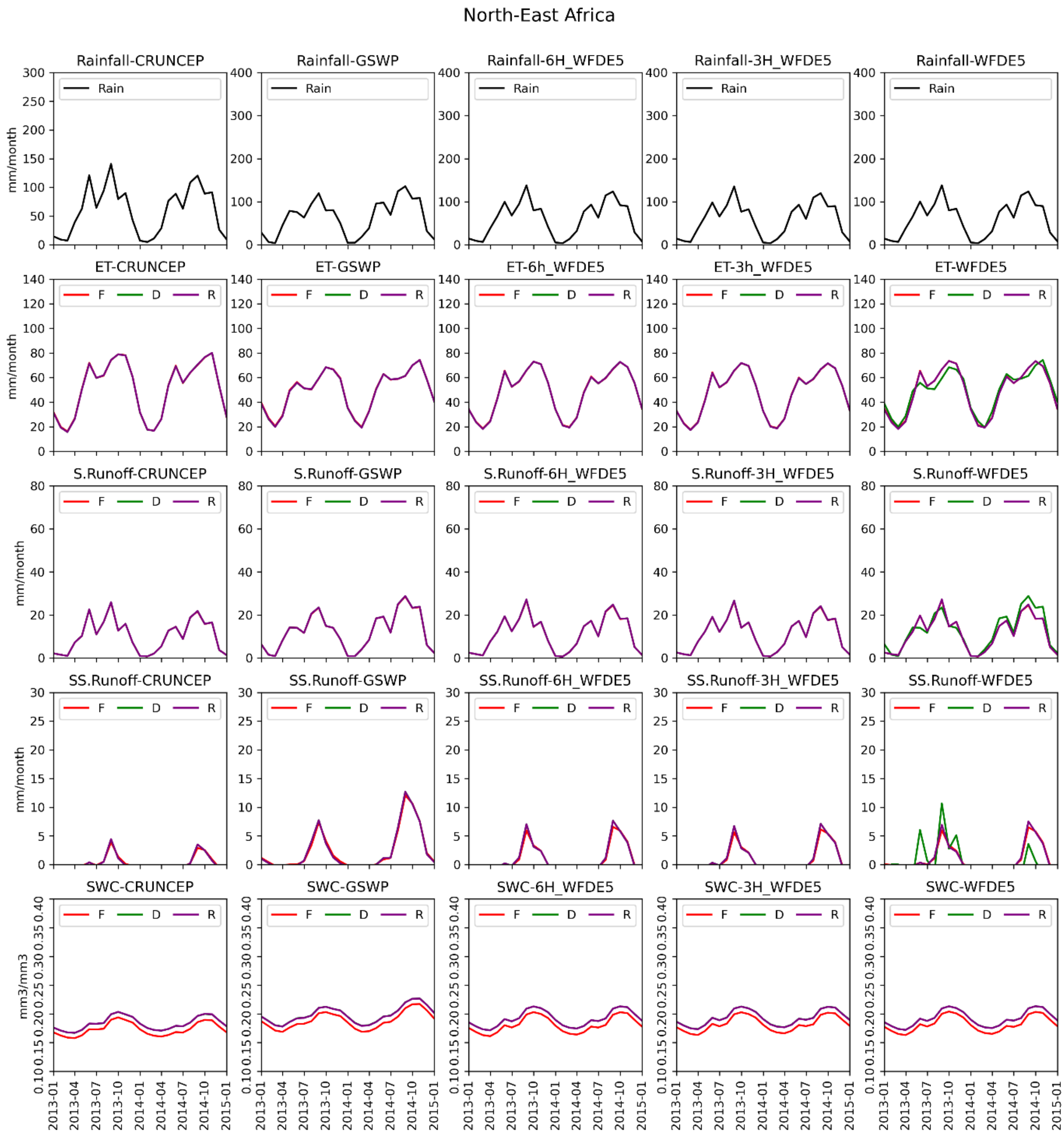

Figure S30: North-East Africa Region estimates of water balance components. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents CRUNCEP, GSWP, 6H-WFDE5, 3H-WFDE5 and WFDE5 forcings respectively.

Component	CRUNCEP	GSWP	6H-WFDE5	3H-WFDE5	WFDE5
Evapotranspiration	0.30	0.37	0.27	0.28	4.09
Surface Runoff	0.03	0.06	0.06	0.05	2.09
Subsurface Runoff	0.18	0.25	0.21	0.19	2.20
Soil Moisture	0.01	0.01	0.01	0.01	0.01

Table S4: Average margin between soil texture maps for each atmospheric forcing over North-East Africa (mm/month).

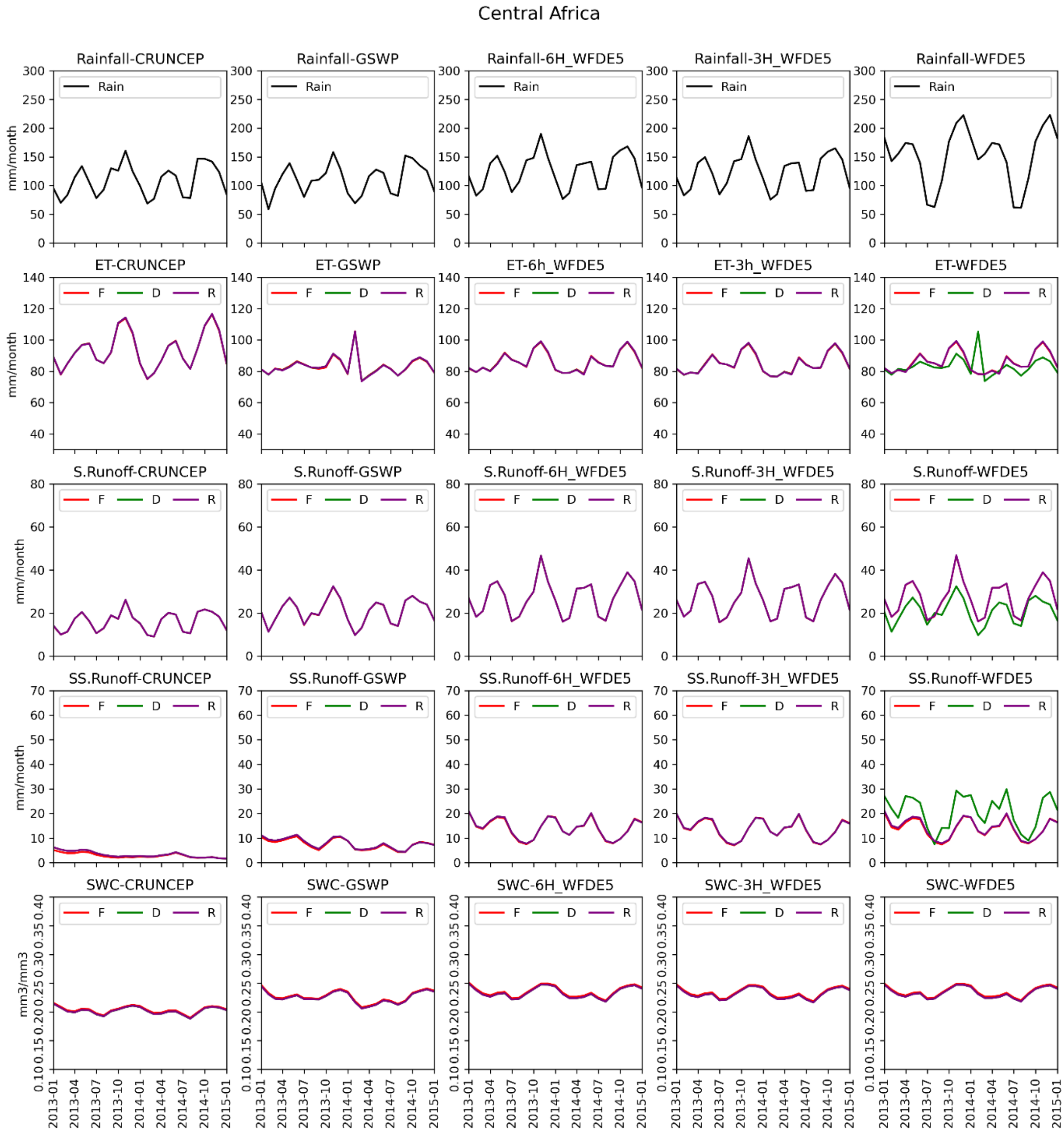

Figure S31: Central Africa Region estimates of water balance components. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents CRUNCEP, GSWP, 6H-WFDE5, 3H-WFDE5 and WFDE5 forcings respectively.

Component	CRUNCEP	GSWP	6H-WFDE5	3H-WFDE5	WFDE5
Evapotranspiration	0.25	0.34	0.28	0.28	5.23
Surface Runoff	0.04	0.07	0.04	0.04	6.70
Subsurface Runoff	0.38	0.35	0.19	0.16	6.97
Soil Moisture	0.00	0.00	0.00	0.00	0.00

Table S5: Average margin between soil texture maps for each atmospheric forcing over Central Africa (mm/month).

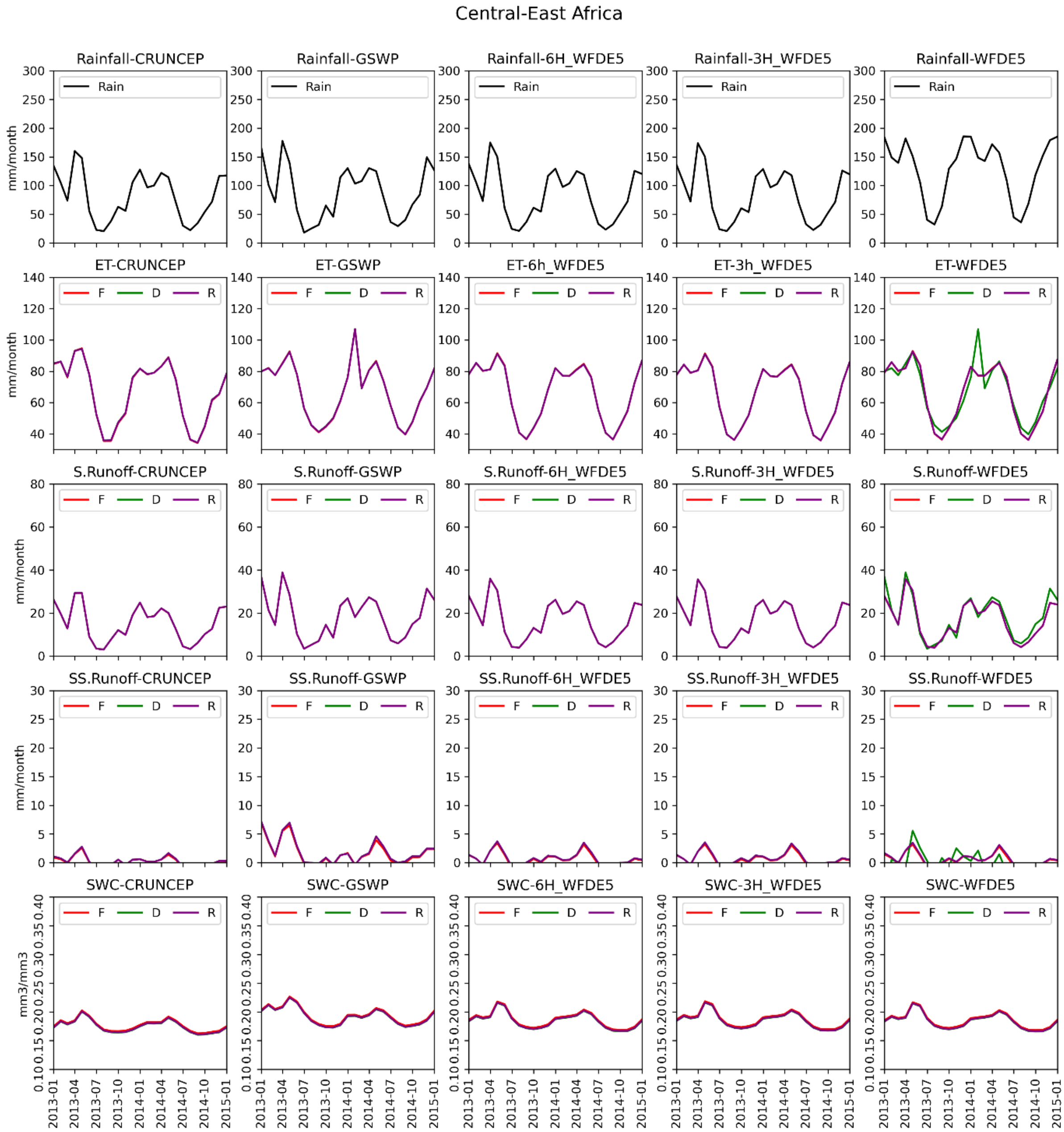

Figure S32: Central-East Africa Region estimates of water balance components. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents CRUNCEP, GSWP, 6H-WFDE5, 3H-WFDE5 and WFDE5 forcings respectively.

Component	CRUNCEP	GSWP	6H-WFDE5	3H-WFDE5	WFDE5
Evapotranspiration	0.26	0.20	0.21	0.20	4.98
Surface Runoff	0.01	0.02	0.02	0.02	1.94
Subsurface Runoff	0.08	0.21	0.16	0.17	1.98
Soil Moisture	0.00	0.00	0.00	0.00	0.00

Table S6: Average margin between soil texture maps for each atmospheric forcing over Central-East Africa (mm/month).

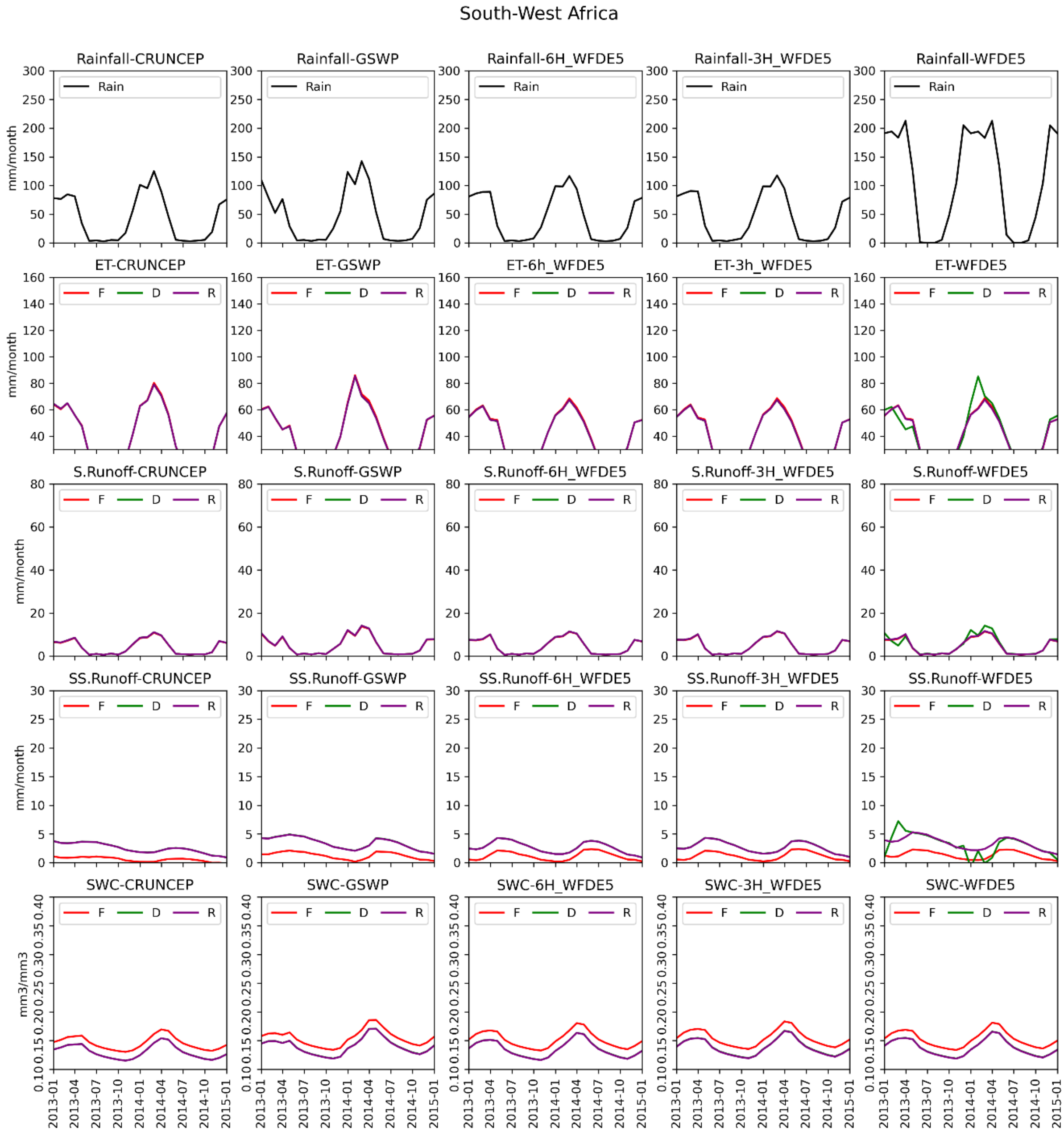

Figure S33: South-West Africa Region estimates of water balance components. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents CRUNCEP, GSWP, 6H-WFDE5, 3H-WFDE5 and WFDE5 forcings respectively.

Component	CRUNCEP	GSWP	6H-WFDE5	3H-WFDE5	WFDE5
Evapotranspiration	0.32	0.58	0.50	0.54	3.82
Surface Runoff	0.07	0.09	0.06	0.07	0.75
Subsurface Runoff	1.92	2.14	1.49	1.54	2.42
Soil Moisture	0.02	0.01	0.02	0.02	0.02

Table S7: Average margin between soil texture maps for each atmospheric forcing over South-West Africa (mm/month).

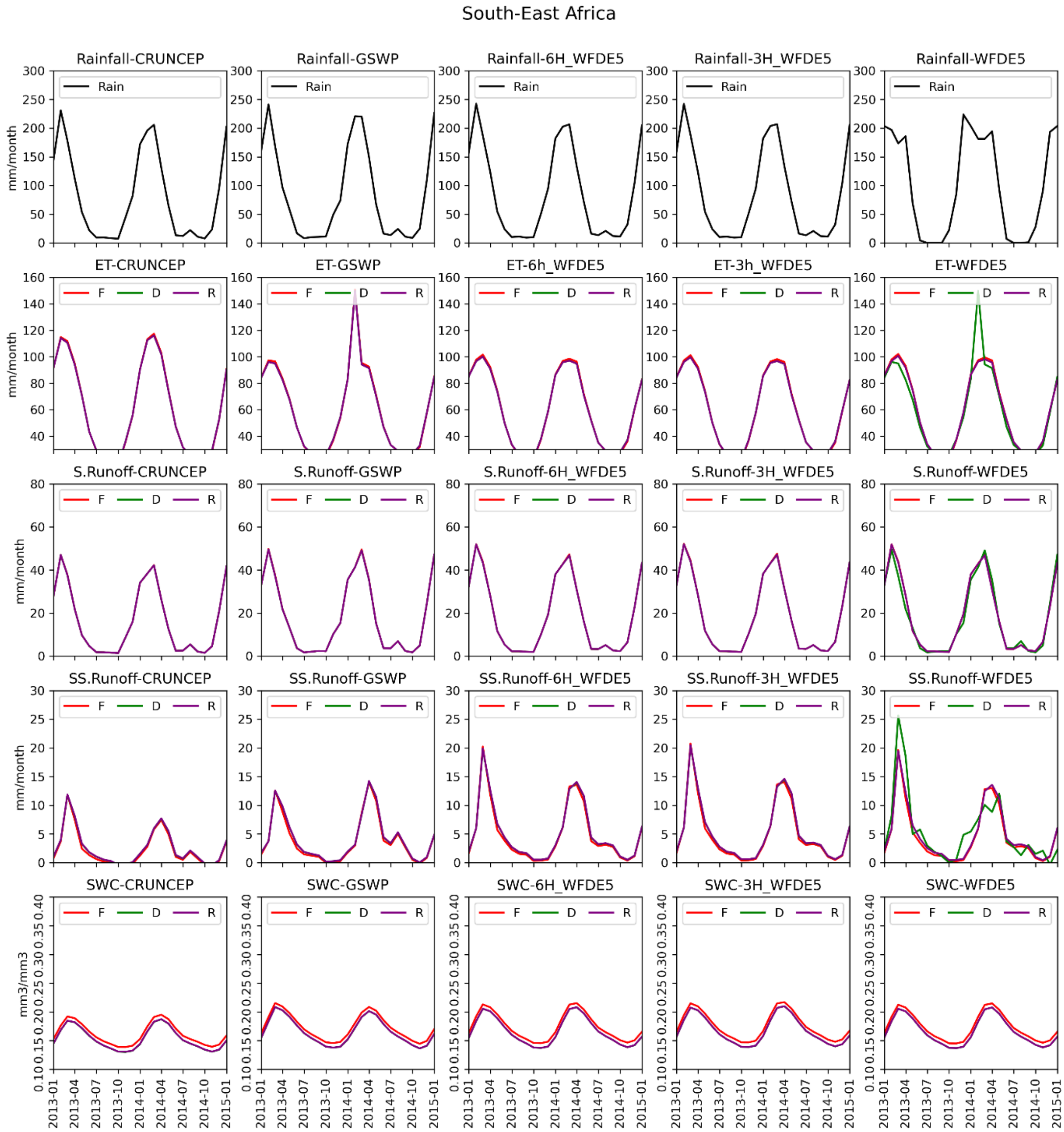

Figure S34: South-East Africa Region estimates of water balance components. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents CRUNCEP, GSWP, 6H-WFDE5, 3H-WFDE5 and WFDE5 forcings respectively.

Component	CRUNCEP	GSWP	6H-WFDE5	3H-WFDE5	WFDE5
Evapotranspiration	0.56	0.71	0.76	0.75	5.57
Surface Runoff	0.03	0.08	0.07	0.07	1.95
Subsurface Runoff	0.03	0.34	0.37	0.37	2.16
Soil Moisture	0.01	0.01	0.01	0.02	0.02

Table S8: Average margin between soil texture maps for each atmospheric forcing over South-East Africa (mm/month).

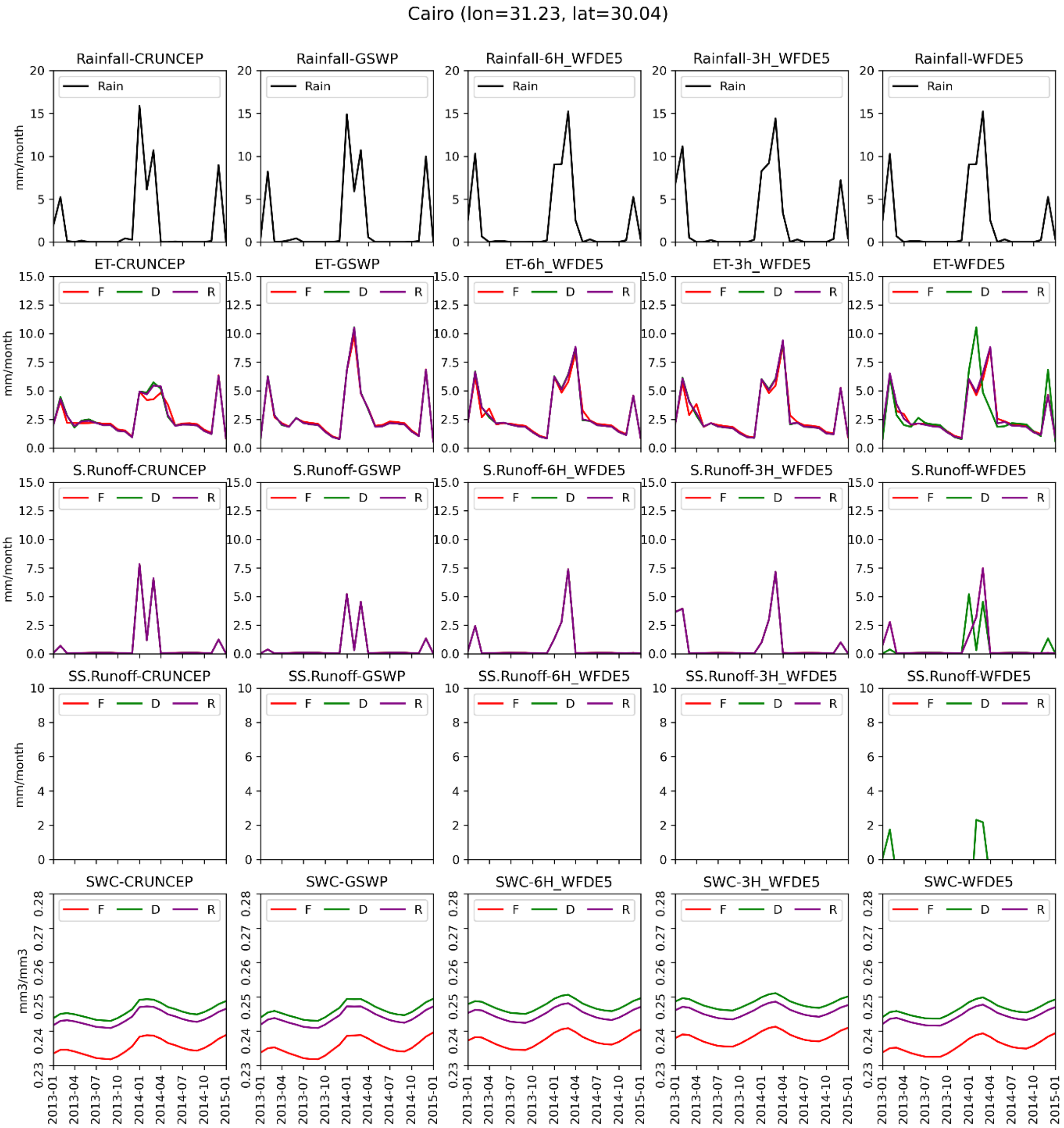

Figure S36: Estimates of water balance components in Cairo. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents CRUNCEP, GSWP, 6H-WFDE5, 3H-WFDE5 and WFDE5 forcings respectively.

Component	CRUNCEP	GSWP	6H-WFDE5	3H-WFDE5	WFDE5
Evapotranspiration	0.29	0.12	0.24	0.26	0.93
Surface Runoff	0.01	0.01	0.01	0.01	0.55
Subsurface Runoff	0.19	0.18	0.16	0.16	0.72
Soil Moisture	0.01	0.01	0.01	0.01	0.01

Table S9: Average margin between soil texture maps for each atmospheric forcing over Cairo (mm/month).

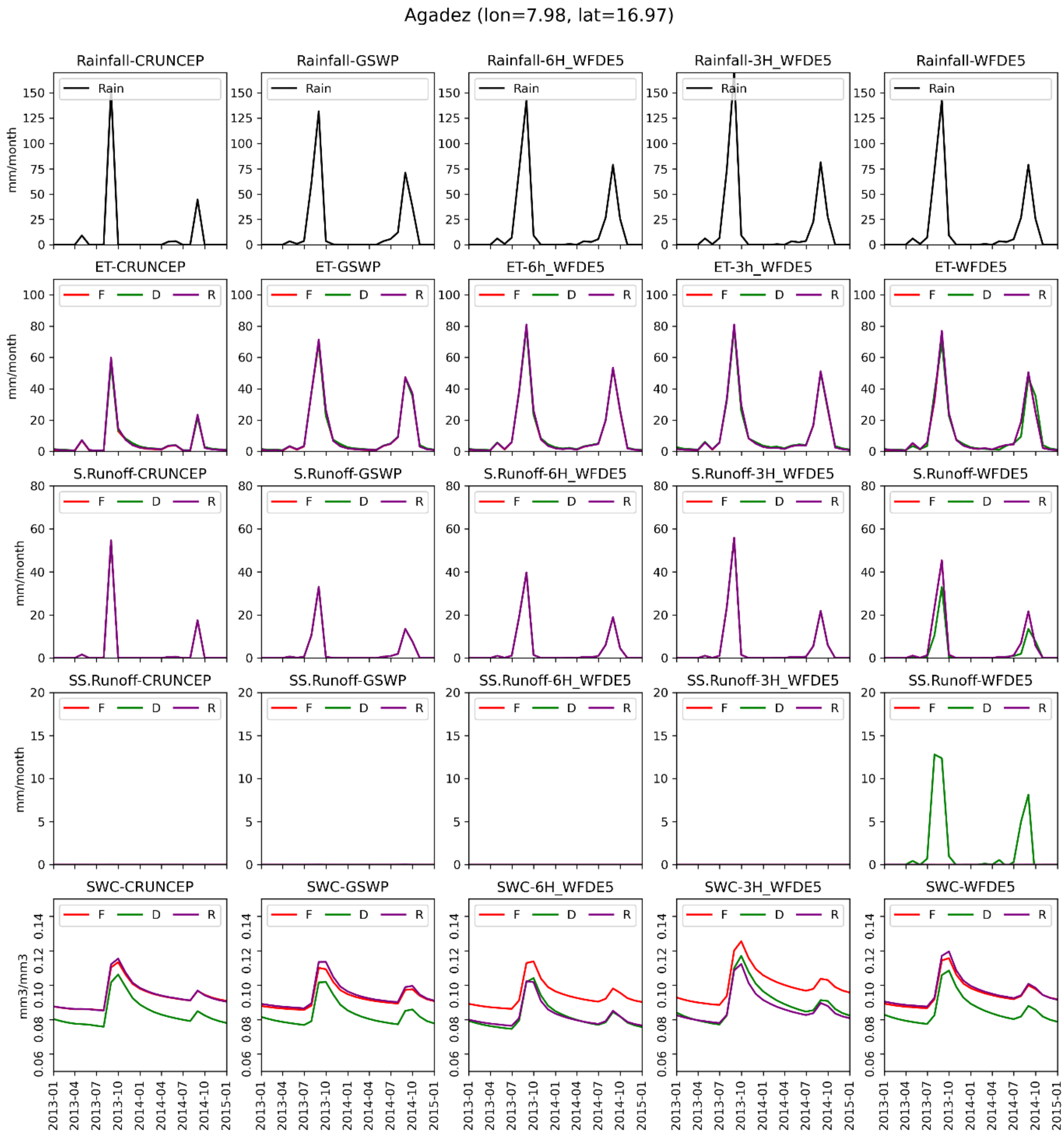

Figure S37: Estimates of water balance components in Agadez. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents CRUNCEP, GSWP, 6H-WFDE5, 3H-WFDE5 and WFDE5 forcings respectively.

Component	CRUNCEP	GSWP	6H-WFDE5	3H-WFDE5	WFDE5
Evapotranspiration	0.69	0.81	0.62	0.81	2.22
Surface Runoff	0.00	0.00	0.00	0.00	1.82
Subsurface Runoff	0.00	0.00	0.00	0.00	1.82
Soil Moisture	0.01	0.01	0.01	0.01	0.01

Table S10: Average margin between soil texture maps for each atmospheric forcing over Agadez (mm/month)

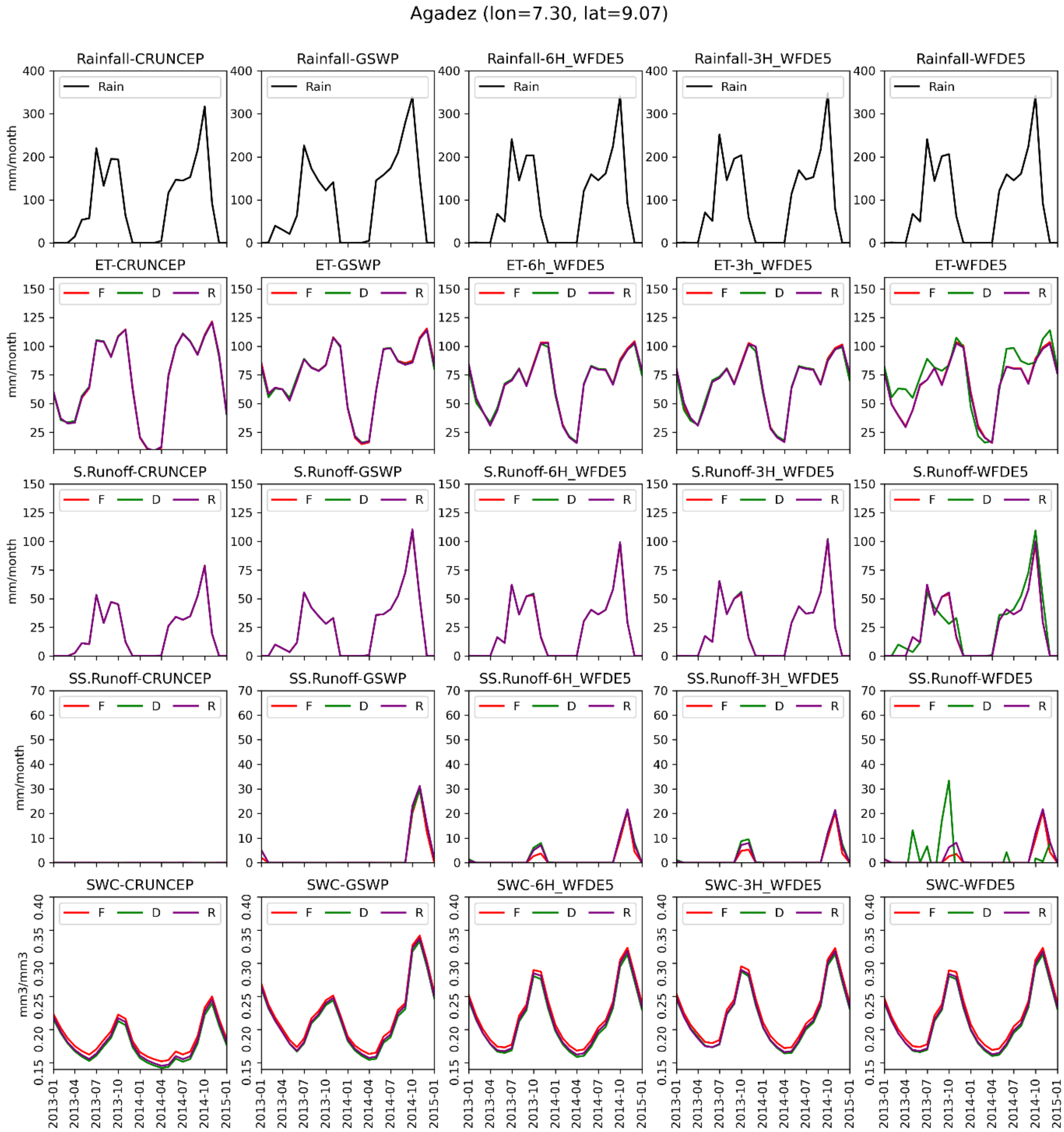

Figure S38: Estimates of water balance components in Abuja. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents CRUNCEP, GSWP, 6H-WFDE5, 3H-WFDE5 and WFDE5 forcings respectively.

Component	CRUNCEP	GSWP	6H-WFDE5	3H-WFDE5	WFDE5
Evapotranspiration	0.91	1.33	1.70	2.00	9.93
Surface Runoff	0.03	0.15	0.19	0.21	7.43
Subsurface Runoff	0.02	0.41	0.59	0.63	7.70
Soil Moisture	0.01	0.01	0.01	0.01	0.01

Table S11: Average margin between soil texture maps for each atmospheric forcing over Abuja (mm/month).

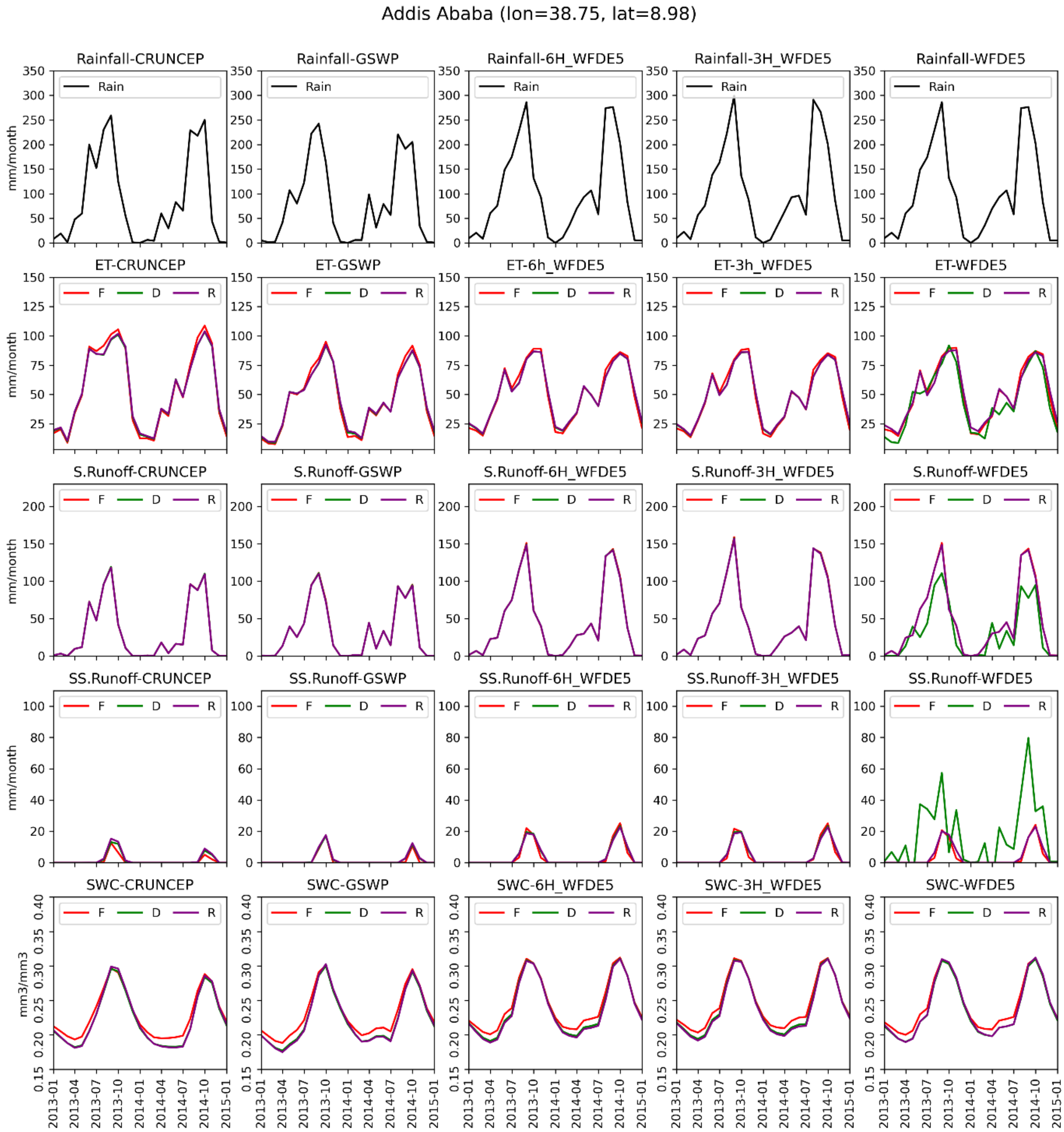

Figure S39: Estimates of water balance components in Addis-Ababa. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents CRUNCEP, GSWP, 6H-WFDE5, 3H-WFDE5 and WFDE5 forcings respectively.

Component	CRUNCEP	GSWP	6H-WFDE5	3H-WFDE5	WFDE5
Evapotranspiration	2.87	2.66	2.52	2.48	8.60
Surface Runoff	0.18	0.25	0.40	0.36	17.56
Subsurface Runoff	0.88	0.48	0.93	0.86	17.76
Soil Moisture	0.01	0.01	0.01	0.01	0.01

Table S12: Average margin between soil texture maps for each atmospheric forcing over Addis-Ababa (mm/month).

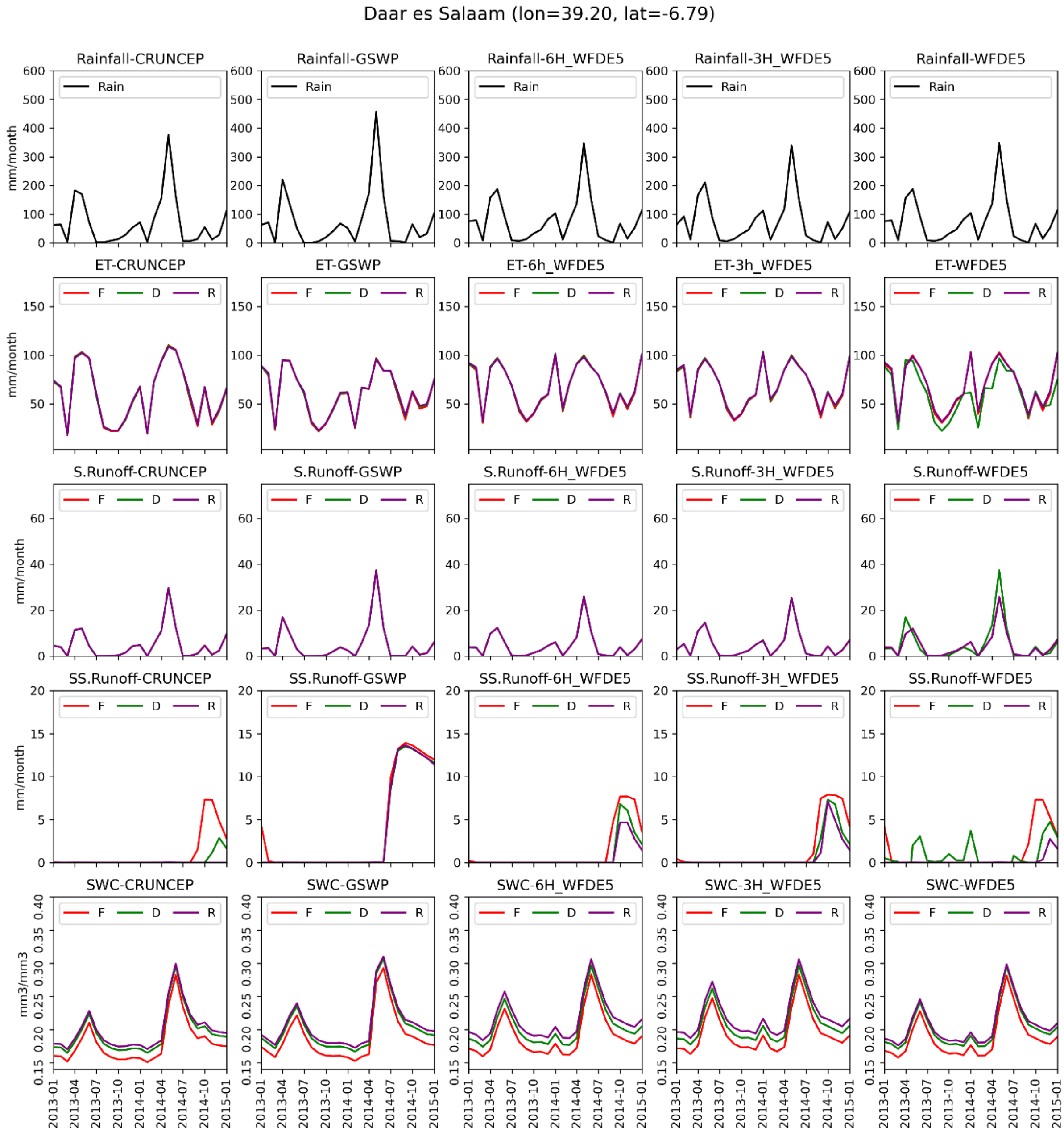

Figure S40: Estimates of water balance components in Daar es Salaam. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents CRUNCEP, GSWP, 6H-WFDE5, 3H-WFDE5 and WFDE5 forcings respectively.

Component	CRUNCEP	GSWP	3H-WFDE5	6H-WFDE5	WFDE5
Evapotranspiration	1.31	1.38	1.32	1.38	10.43
Surface Runoff	0.02	0.01	0.01	0.01	1.82
Subsurface Runoff	1.00	0.16	0.16	0.73	2.55
Soil Moisture	0.02	0.02	0.03	0.02	0.02

Table S13: Average margin between soil texture maps for each atmospheric forcing over Daar es Salaam (mm/month).

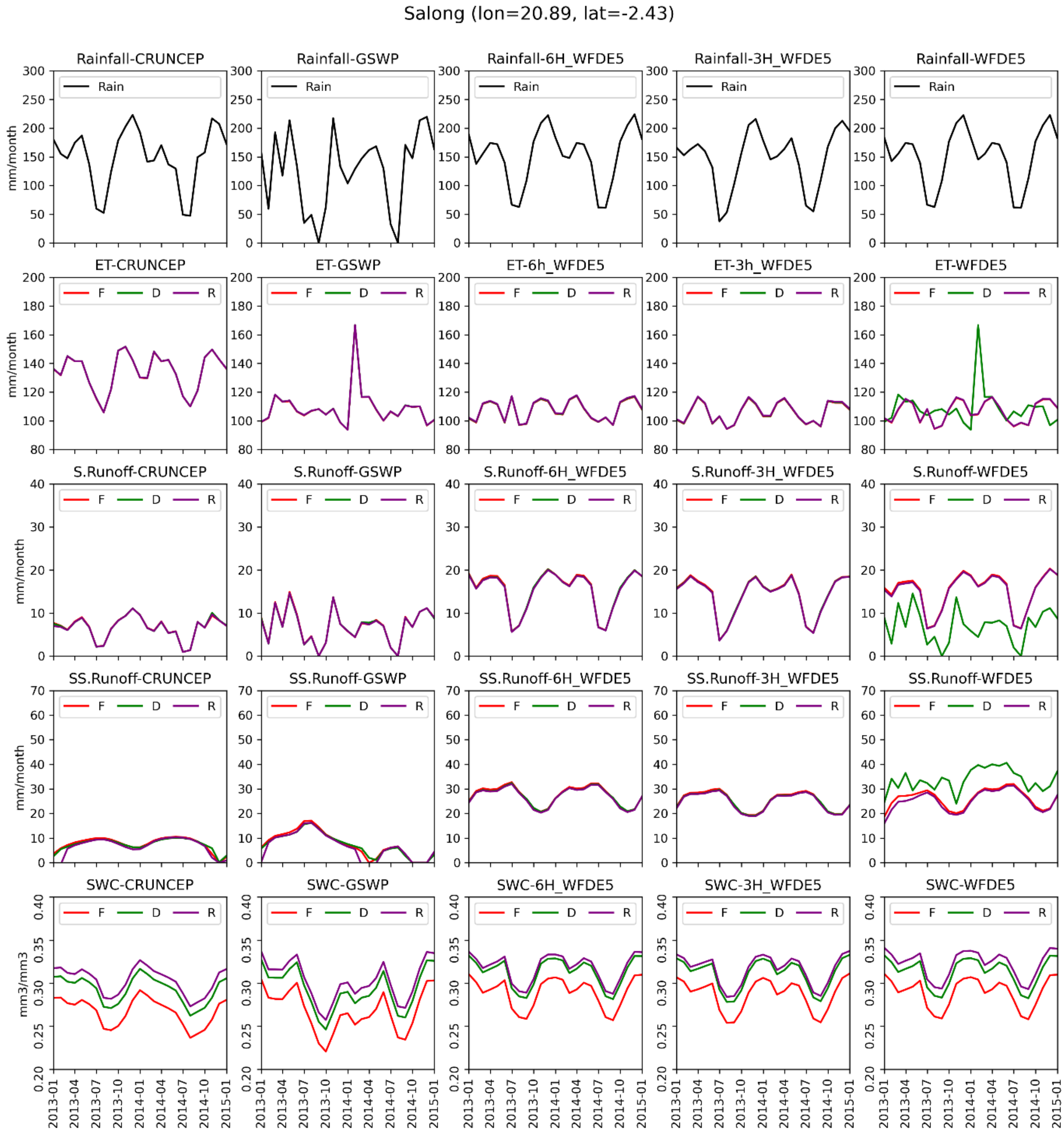

Figure S41: Estimates of water balance components in Salong. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents CRUNCEP, GSWP, 6H-WFDE5, 3H-WFDE5 and WFDE5 forcings respectively.

Component	CRUNCEP	GSWP	6H-WFDE5	3H-WFDE5	WFDE5
Evapotranspiration	0.12	0.17	0.41	0.40	9.32
Surface Runoff	0.10	0.13	0.22	0.17	8.27
Subsurface Runoff	1.09	1.04	0.54	0.48	8.53
Soil Moisture	0.04	0.04	0.03	0.03	0.03

Table S14: Average margin between soil texture maps for each atmospheric forcing over Salong (mm/month).

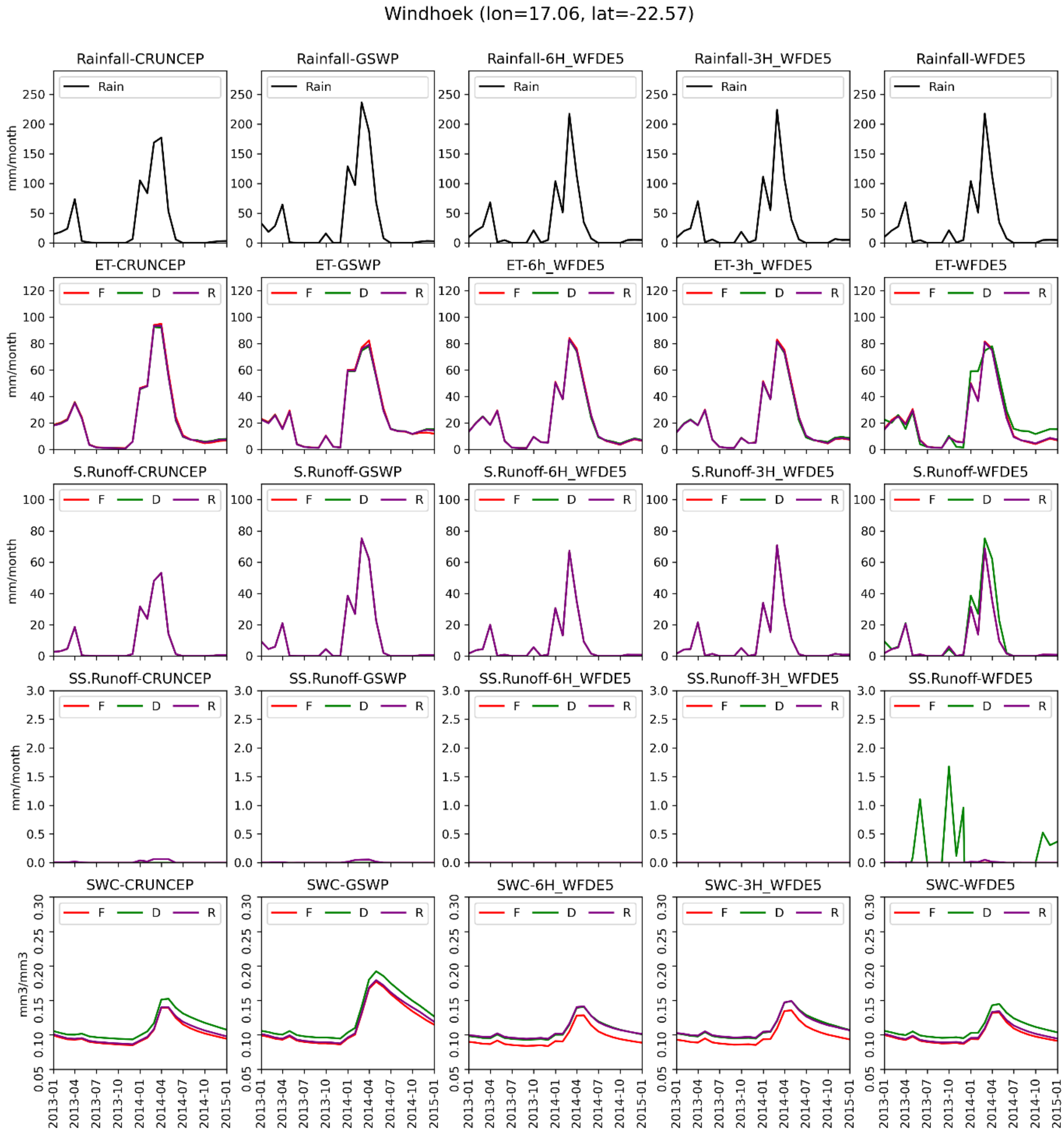

Figure S42: Estimates of water balance components in Windhoek. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents CRUNCEP, GSWP, 6H-WFDE5, 3H-WFDE5 and WFDE5 forcings respectively.

Component	CRUNCEP	GSWP	6H-WFDE5	3H-WFDE5	WFDE5
Evapotranspiration	0.96	1.02	0.66	0.83	5.38
Surface Runoff	0.01	0.01	0.01	0.01	3.04
Subsurface Runoff	0.01	0.01	0.00	0.00	3.04
Soil Moisture	0.01	0.01	0.01	0.01	0.01

Table S15: Average margin between soil texture maps for each atmospheric forcing over Windhoek (mm/month).

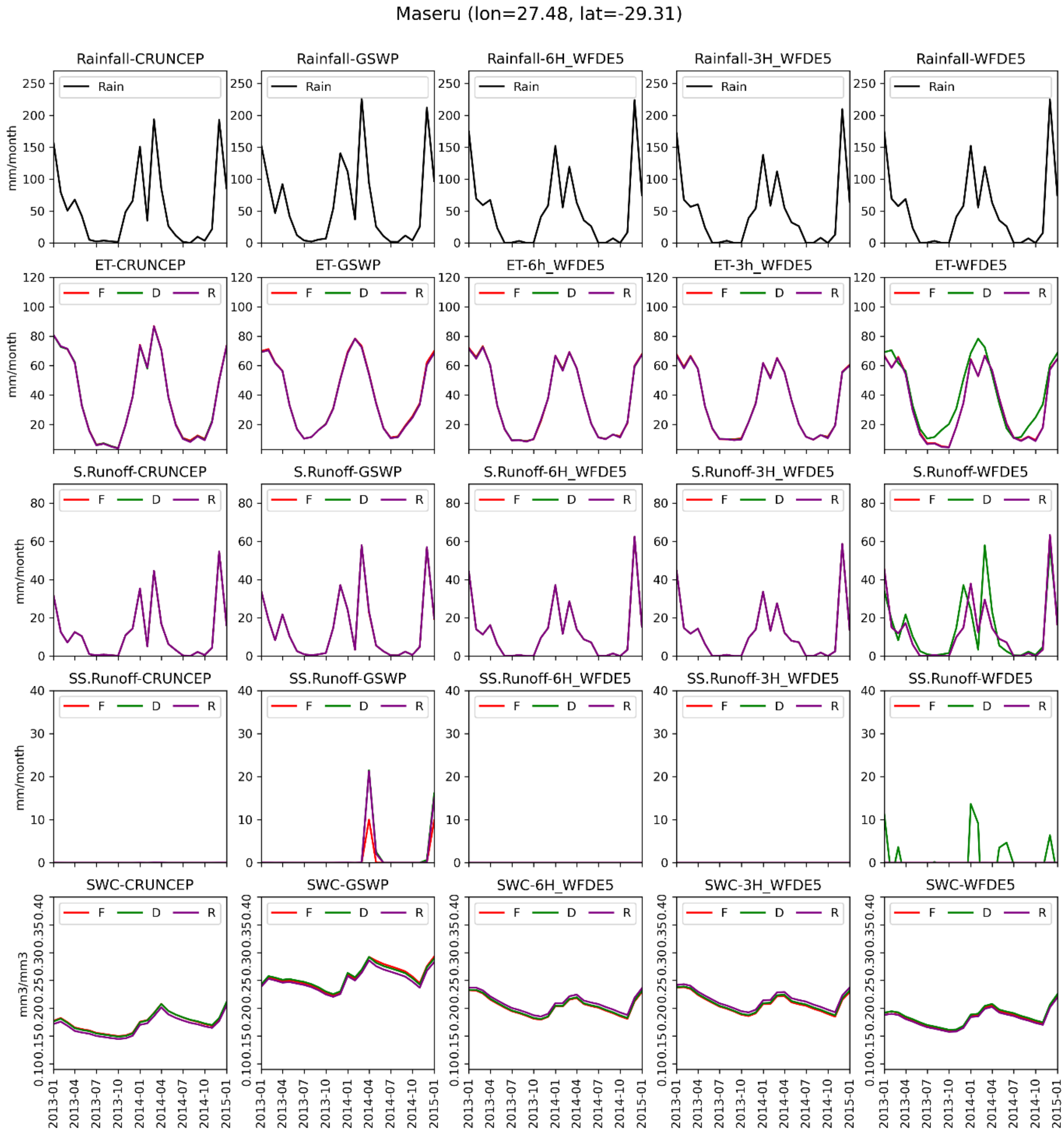

Figure S43: Estimates of water balance components in Maseru. Rows (top to bottom) represent rainfall, ET, surface runoff, subsurface runoff, and soil water content respectively while each column (left to right) represents CRUNCEP, GSWP, 6H-WFDE5, 3H-WFDE5 and WFDE5 forcings respectively.

Component	CRUNCEP	GSWP	6H-WFDE5	3H-WFDE5	WFDE5
Evapotranspiration	0.48	0.54	0.42	0.37	7.70
Surface Runoff	0.00	0.04	0.00	0.00	5.44
Subsurface Runoff	0.01	0.87	0.00	0.00	5.44
Soil Moisture	0.01	0.01	0.01	0.01	0.00

Table S16: Average margin between soil texture maps for each atmospheric forcing over Maseru (mm/month).

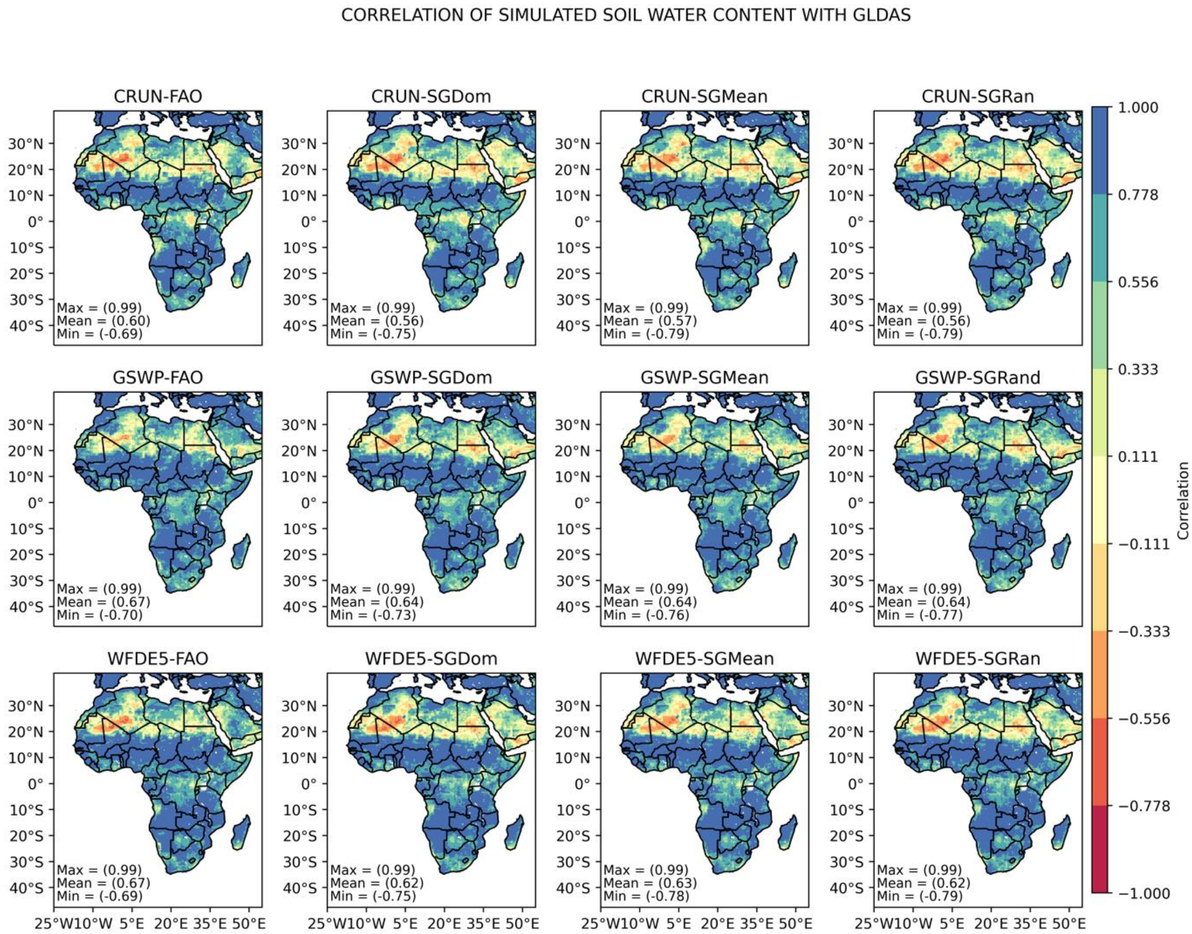

Figure S45: Temporal correlation maps of simulated soil moisture content compared with the Global Land Data Assimilation System (GLDAS-2.1) dataset over Africa for three different atmospheric forcing datasets (CRUN, GSWP, and WFDE5) and four soil texture maps (FAO, SGDom, SGMean, and SGRan). Top Row: Correlation maps for the CRUNCEP dataset using the FAO, SGDom, SGMean, and SGRan soil texture maps. Middle Row: Correlation maps for the GSWP dataset using the same four soil texture maps. Bottom Row: Correlation maps for the WFDE5 dataset using similar maps.

Locations	Lon	Lat	CRUN	GSWP	WFDE5	FAO	SGDom	SGMean	SGRand
Salong	20.89	-2.43	0	39	387	SCL	SC	SC	SC
Abuja	7.39	9.07	1	25	234	SL	SCL	SCL	SCL
D. Salaam	39.2	-6.79	7	67	217	L	S	L	L
Maseru	27.48	-29.31	4	23	122	L	CL	CL	CL
Addis	38.75	8.98	4	23	122	C	C	C	C
Windhoek	17.06	-22.56	4	24	75	L	SCL	SCL	SCL
Agadez	7.98	16.97	4	4	37	SL	LS	LS	SL
Cairo	31.23	30.04	0	0	4	L	SL	SL	SCL

Table S17: Total number of precipitation events above 3mm/hour according to CRUNCEP, GSWP and WFDE5 forcings. Also the soil type is provided at each location (gridcell) for FAO, Soilgrids upscaled by dominant selection, SoilGrids upscaled by averaging and SoilGrids upscaled by random selection. SL: sandyloam, SCL: sandyclayloam, L: loam, CL: clayloam, SC: sandyclay, S: sand, C: clay, LS: sandyloam.

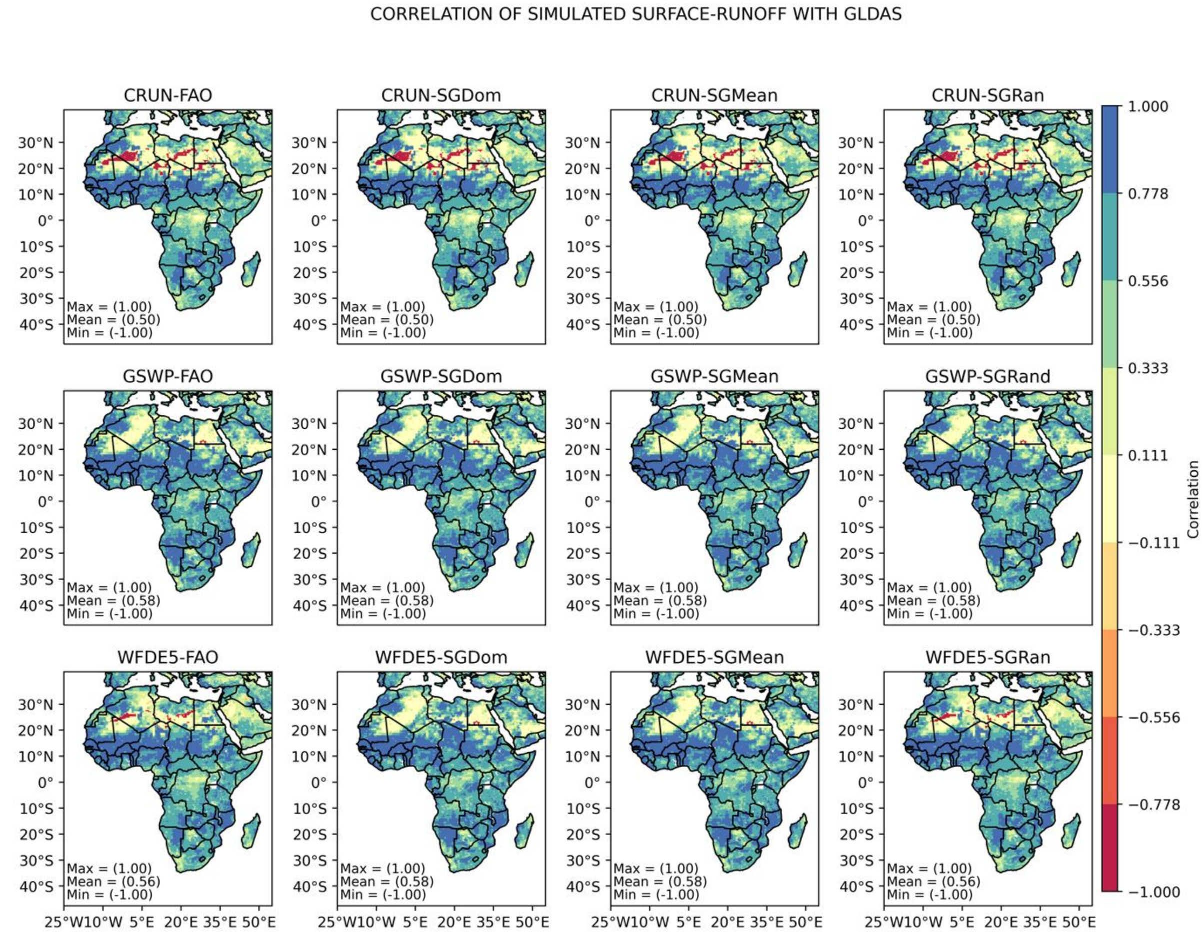

Figure S46: Temporal correlation maps of simulated surface runoff compared with the Global Land Data Assimilation System (GLDAS-2.1) dataset over Africa for three different atmospheric forcing datasets (CRUN, GSWP, and WFDE5) and four soil texture maps (FAO, SGDom, SGMean, and SGRan). Top Row: Correlation maps for the CRUNCEP dataset using the FAO, SGDom, SGMean, and SGRan soil texture maps. Middle Row: Correlation maps for the GSWP dataset using the same four soil texture maps. Bottom Row: Correlation maps for the WFDE5 dataset using similar maps.

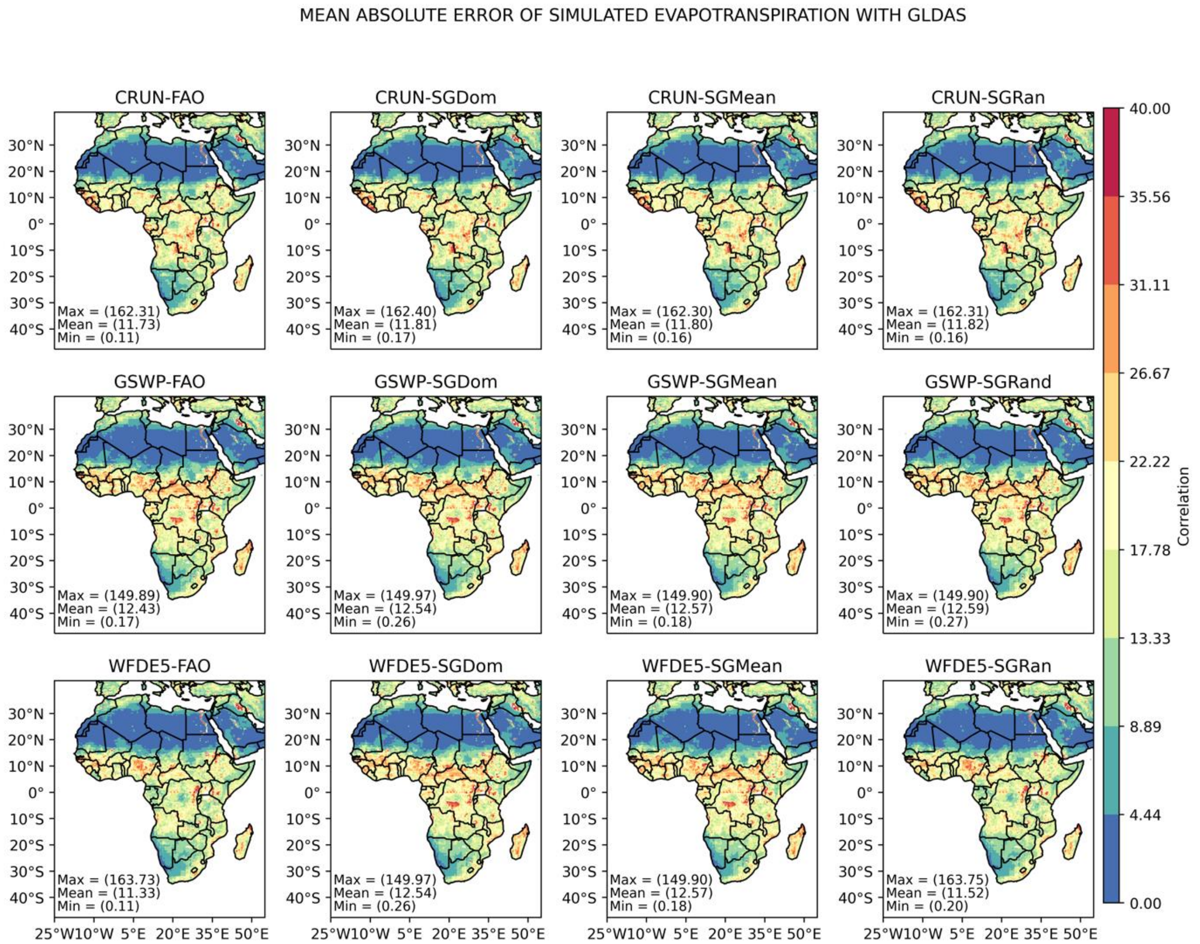

Figure S47: Temporal MAE maps of simulated ET compared with the Global Land Data Assimilation System (GLDAS-2.1) dataset over Africa for three different atmospheric forcing datasets (CRUN, GSWP, and WFDE5) and four soil texture maps (FAO, SGDom, SGMean, and SGRan). Top Row: Correlation maps for the CRUNCEP dataset using the FAO, SGDom, SGMean, and SGRan soil texture maps. Middle Row: Correlation maps for the GSWP dataset using the same four soil texture maps. Bottom Row: Correlation maps for the WFDE5 dataset using similar maps.

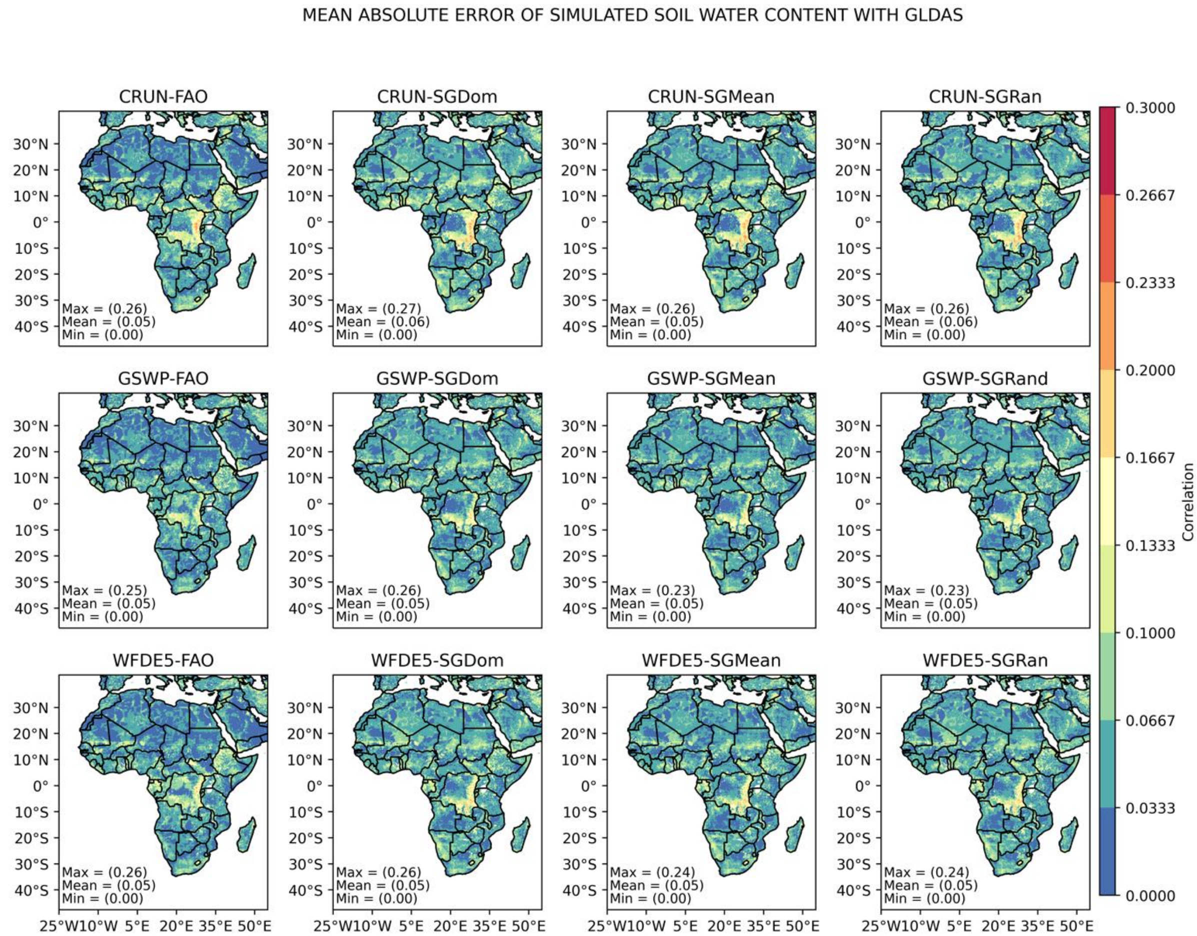

Figure S48: Temporal MAE maps of simulated soil water content compared with the Global Land Data Assimilation System (GLDAS-2.1) dataset over Africa for three different atmospheric forcing datasets (CRUN, GSWP, and WFDE5) and four soil texture maps (FAO, SGDom, SGMean, and SGRan). Top Row: Correlation maps for the CRUNCEP dataset using the FAO, SGDom, SGMean, and SGRan soil texture maps. Middle Row: Correlation maps for the GSWP dataset using the same four soil texture maps. Bottom Row: Correlation maps for the WFDE5 dataset using similar maps.

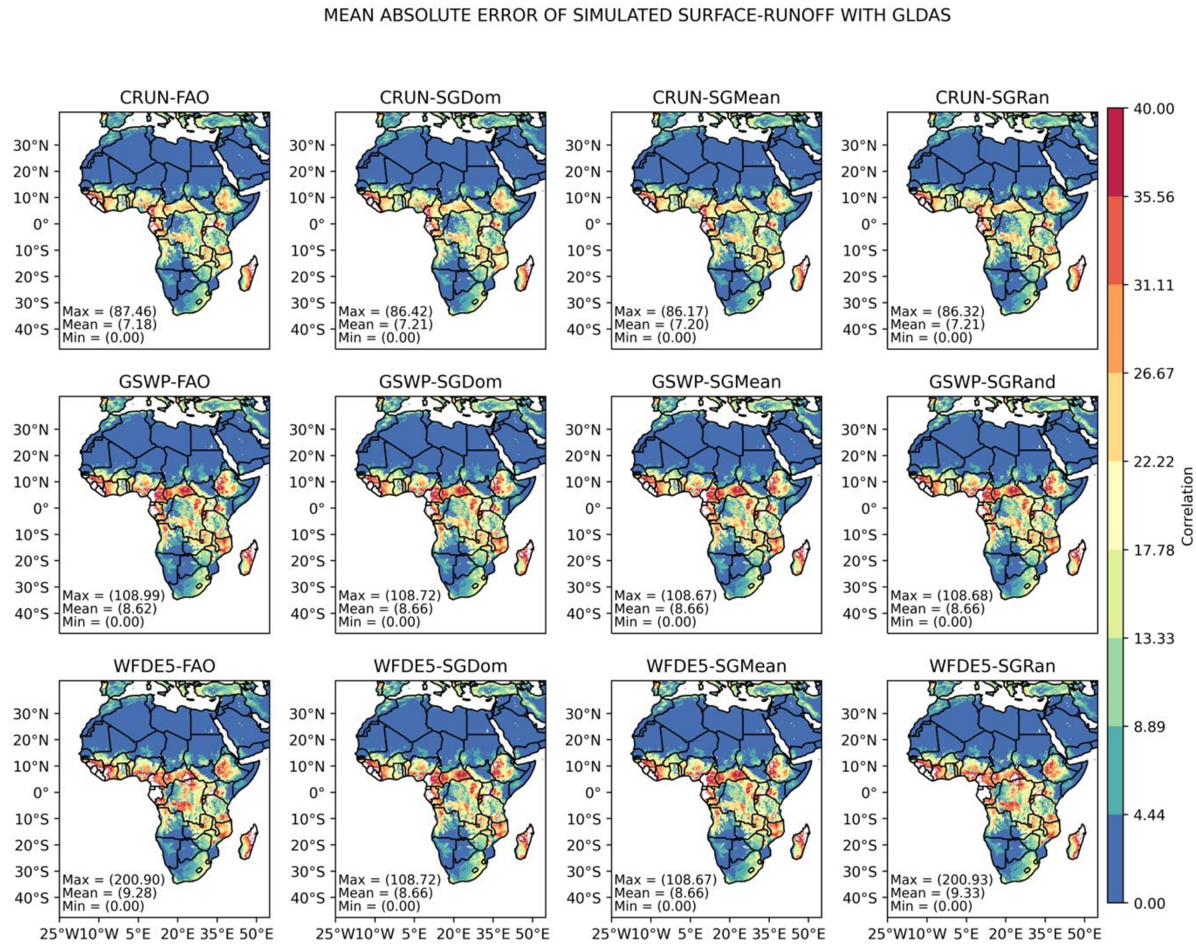

Figure S49: Temporal MAE maps of simulated surface runoff compared with the Global Land Data Assimilation System (GLDAS-2.1) dataset over Africa for three different atmospheric forcing datasets (CRUN, GSWP, and WFDE5) and four soil texture maps (FAO, SGDom, SGMean, and SGRan). Top Row: Correlation maps for the CRUNCEP dataset using the FAO, SGDom, SGMean, and SGRan soil texture maps. Middle Row: Correlation maps for the GSWP dataset using the same four soil texture maps. Bottom Row: Correlation maps for the WFDE5 dataset using similar maps.

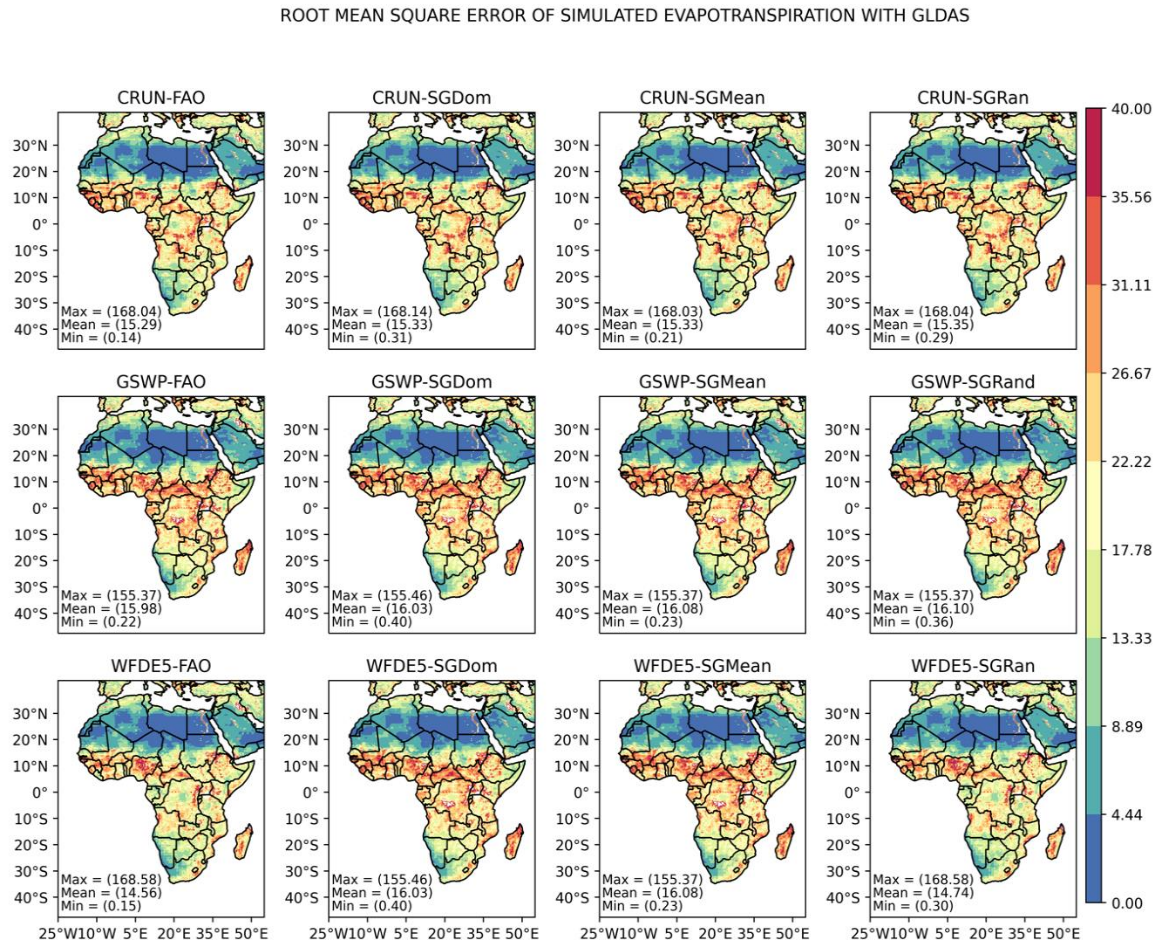

Figure S50: Temporal RMSE maps of simulated evapotranspiration compared with the Global Land Data Assimilation System (GLDAS-2.1) dataset over Africa for three different atmospheric forcing datasets (CRUN, GSWP, and WFDE5) and four soil texture maps (FAO, SGDom, SGMean, and SGRan). Top Row: Correlation maps for the CRUNCEP dataset using the FAO, SGDom, SGMean, and SGRan soil texture maps. Middle Row: Correlation maps for the GSWP dataset using the same four soil texture maps. Bottom Row: Correlation maps for the WFDE5 dataset using similar maps.

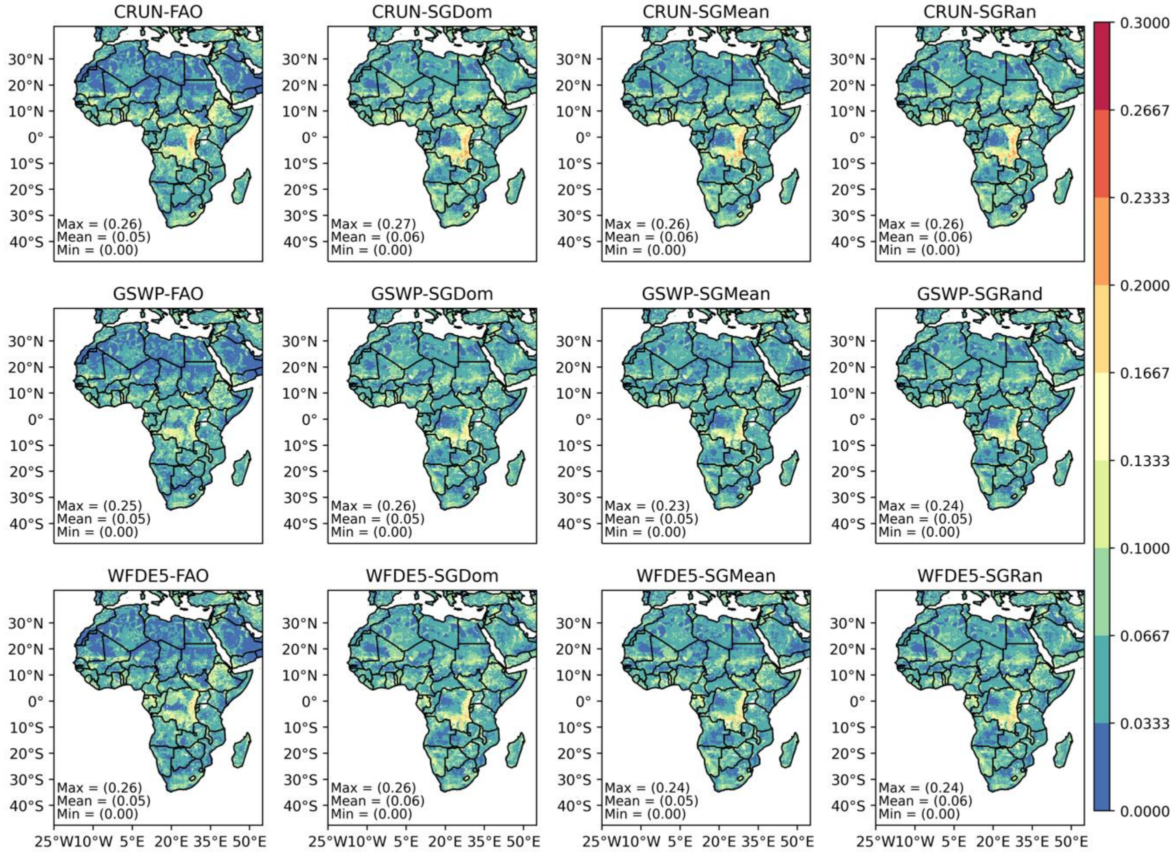

Figure S51: Temporal RMSE maps of simulated soil water content compared with the Global Land Data Assimilation System (GLDAS-2.1) dataset over Africa for three different atmospheric forcing datasets (CRUN, GSWP, and WFDE5) and four soil texture maps (FAO, SGDom, SGMean, and SGRan). Top Row: Correlation maps for the CRUNCEP dataset using the FAO, SGDom, SGMean, and SGRan soil texture maps. Middle Row: Correlation maps for the GSWP dataset using the same four soil texture maps. Bottom Row: Correlation maps for the WFDE5 dataset using similar maps.

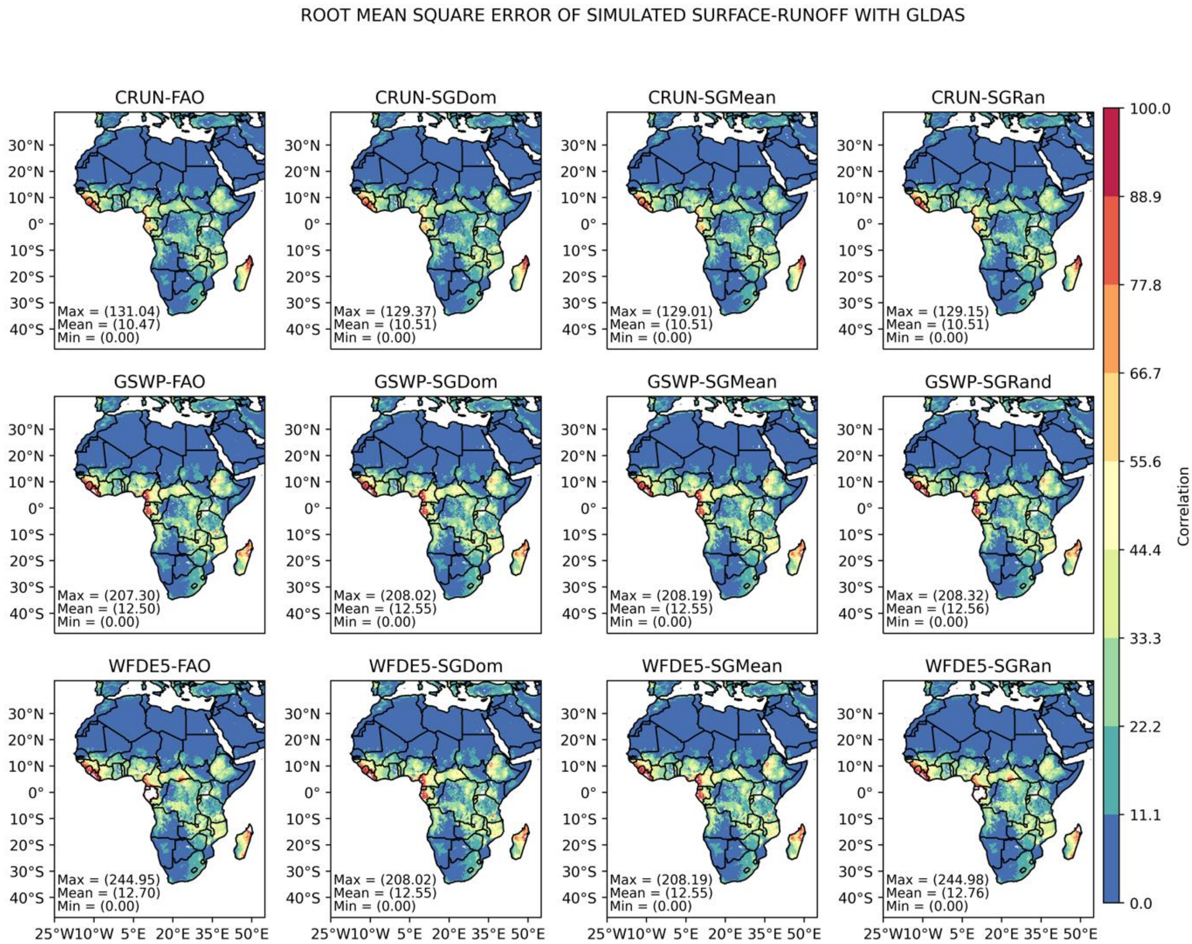

Figure S52: Temporal RMSE maps of simulated surface runoff compared with the Global Land Data Assimilation System (GLDAS-2.1) dataset over Africa for three different atmospheric forcing datasets (CRUN, GSWP, and WFDE5) and four soil texture maps (FAO, SGDom, SGMean, and SGRan). Top Row: Correlation maps for the CRUNCEP dataset using the FAO, SGDom, SGMean, and SGRan soil texture maps. Middle Row: Correlation maps for the GSWP dataset using the same four soil texture maps. Bottom Row: Correlation maps for the WFDE5 dataset using similar maps.

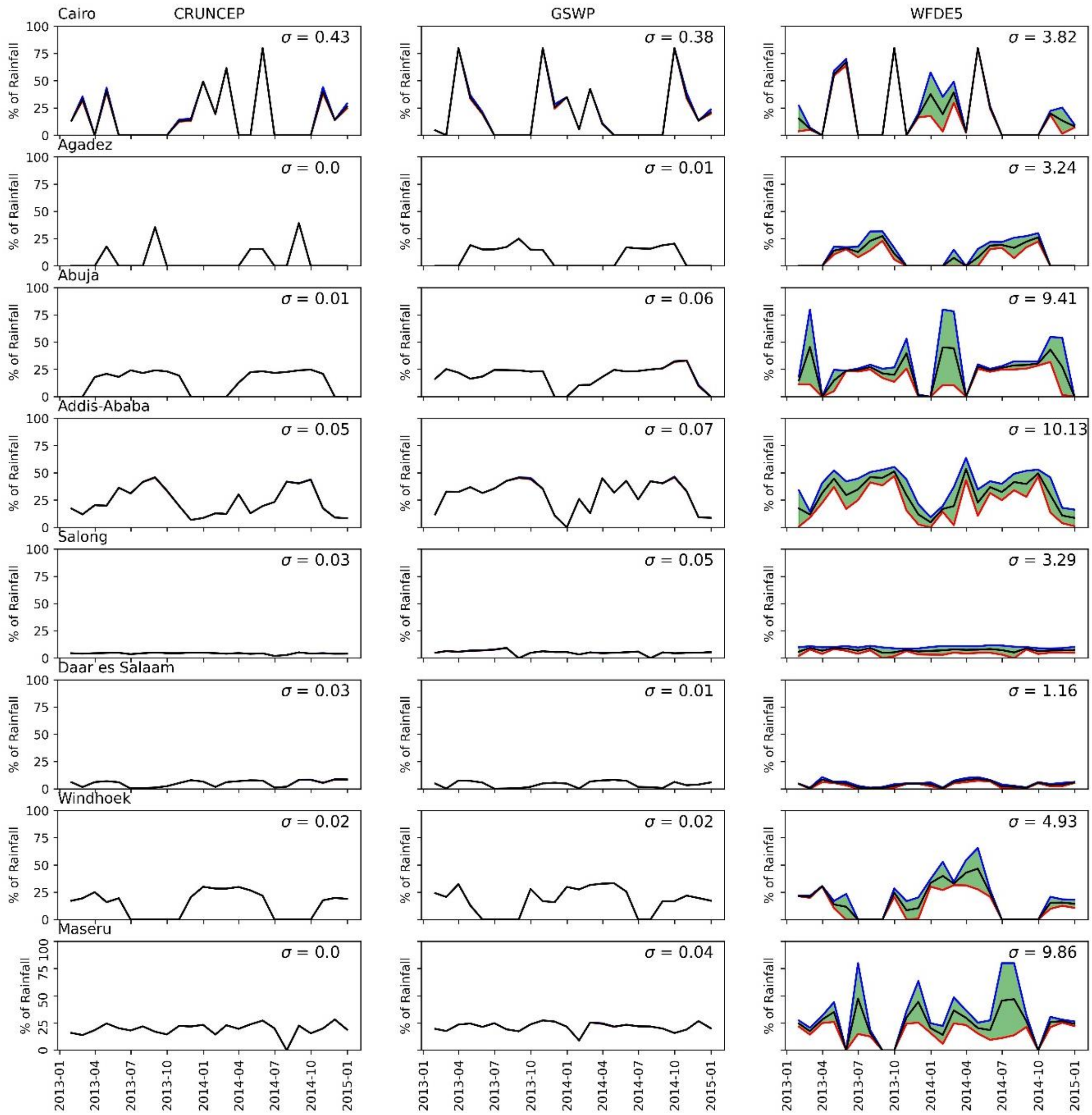

Figure S53: Time series of the standard deviation of percentage of precipitation which turns into surface runoff, across all soil texture maps for eight different locations and three atmospheric forcings. Left column: CRUNCEP, middle column: GSWP and right column: WFDE5. The black line represents the mean, the blue line the maximum percentage of surface runoff for the location, the red line the minimum while the green shade represents deviations from the mean.

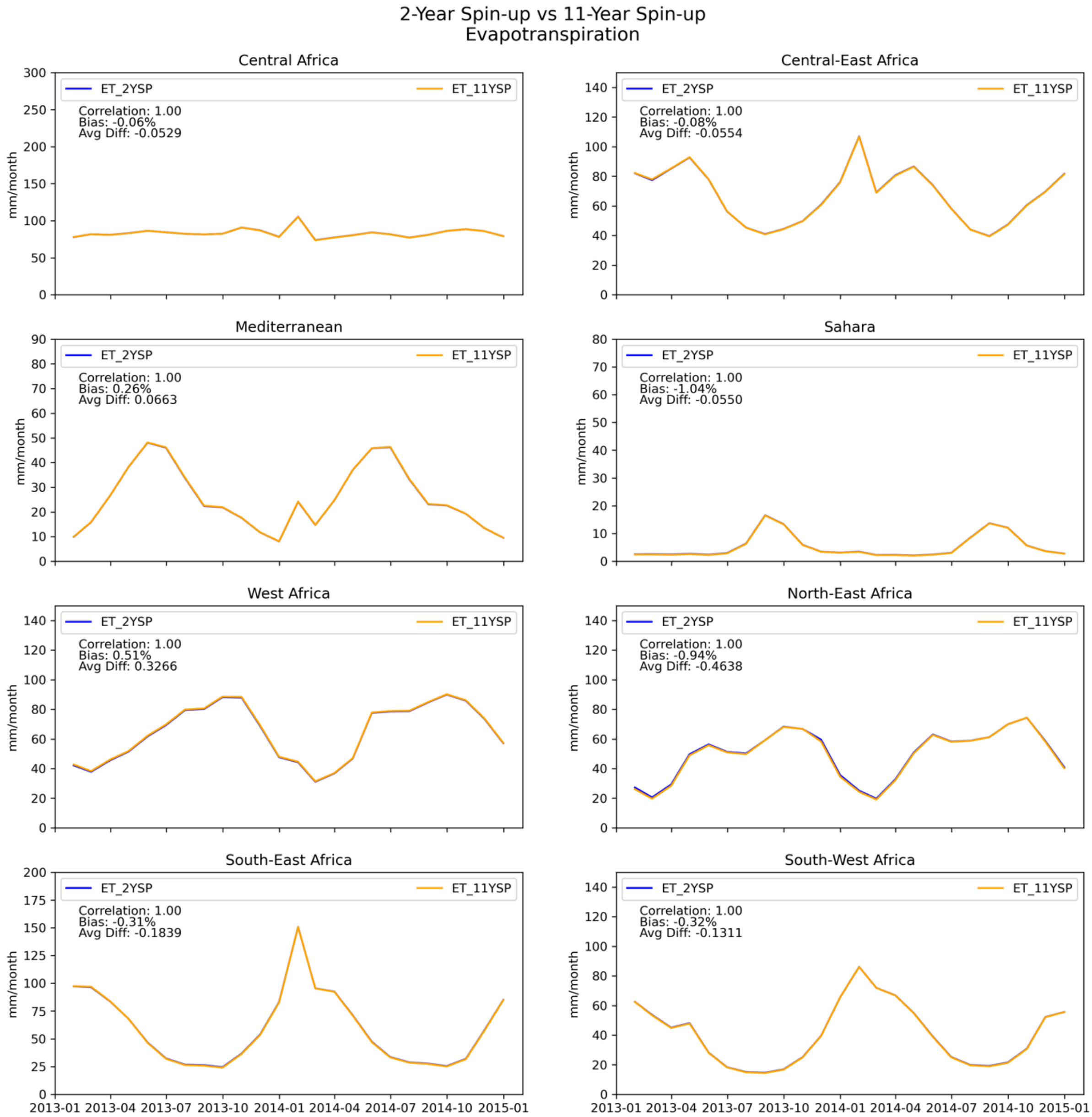

Figure S54: Comparison of 2-year spin up simulation as performed in this work with a 11 year (2002-2012) spin up simulation for evapotranspiration over the 8 African regions considered in this study. It shows correlation, percentage bias and quantified average difference in mm/month between the two simulations.

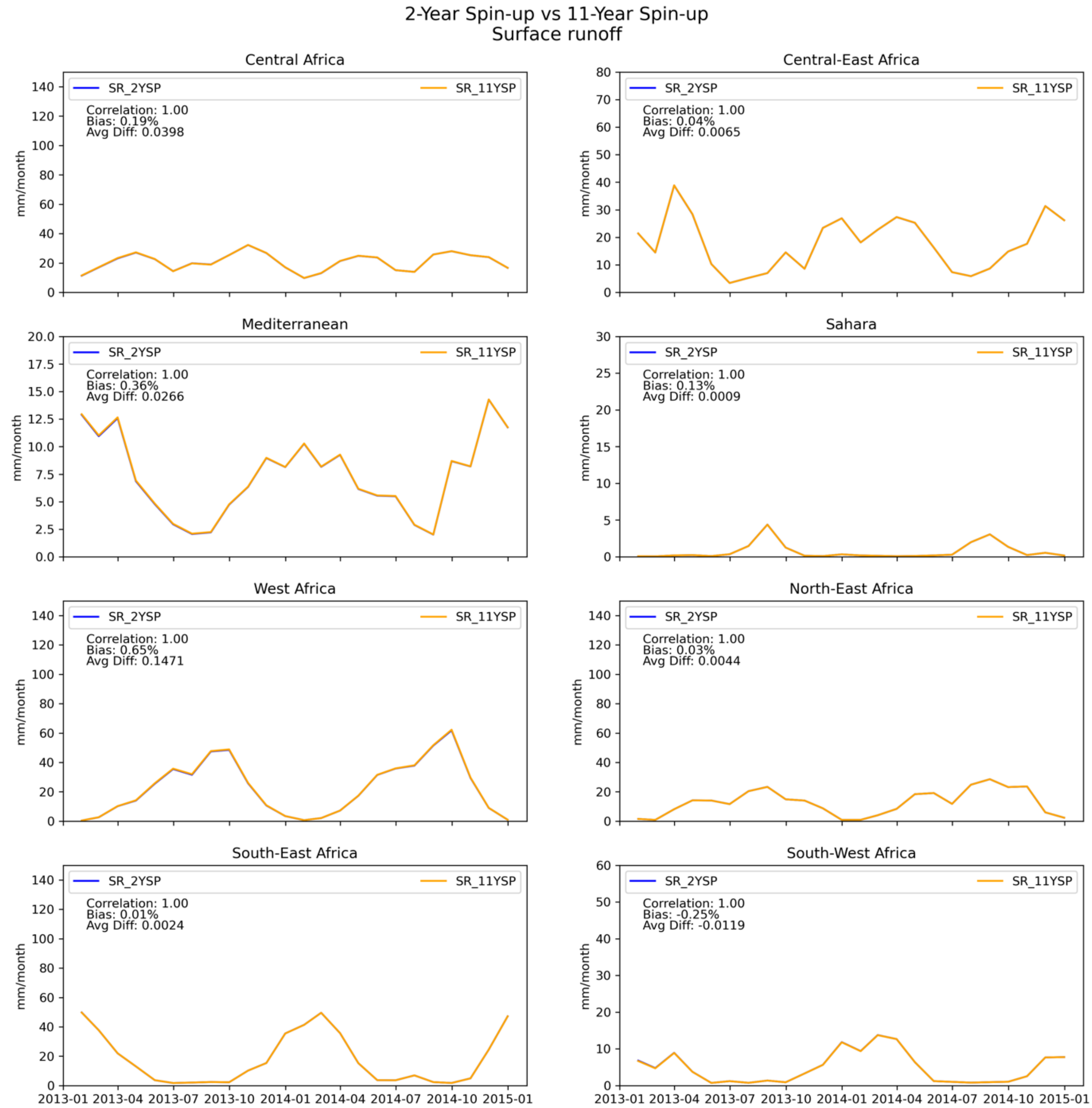

Figure S55: Comparison of 2-year spin up simulation as performed in this work with a 11 year (2002-2012) spin up simulation for surface runoff over the 8 African regions considered in this study. It shows correlation, percentage bias and quantified average difference in mm/month between the two simulations.

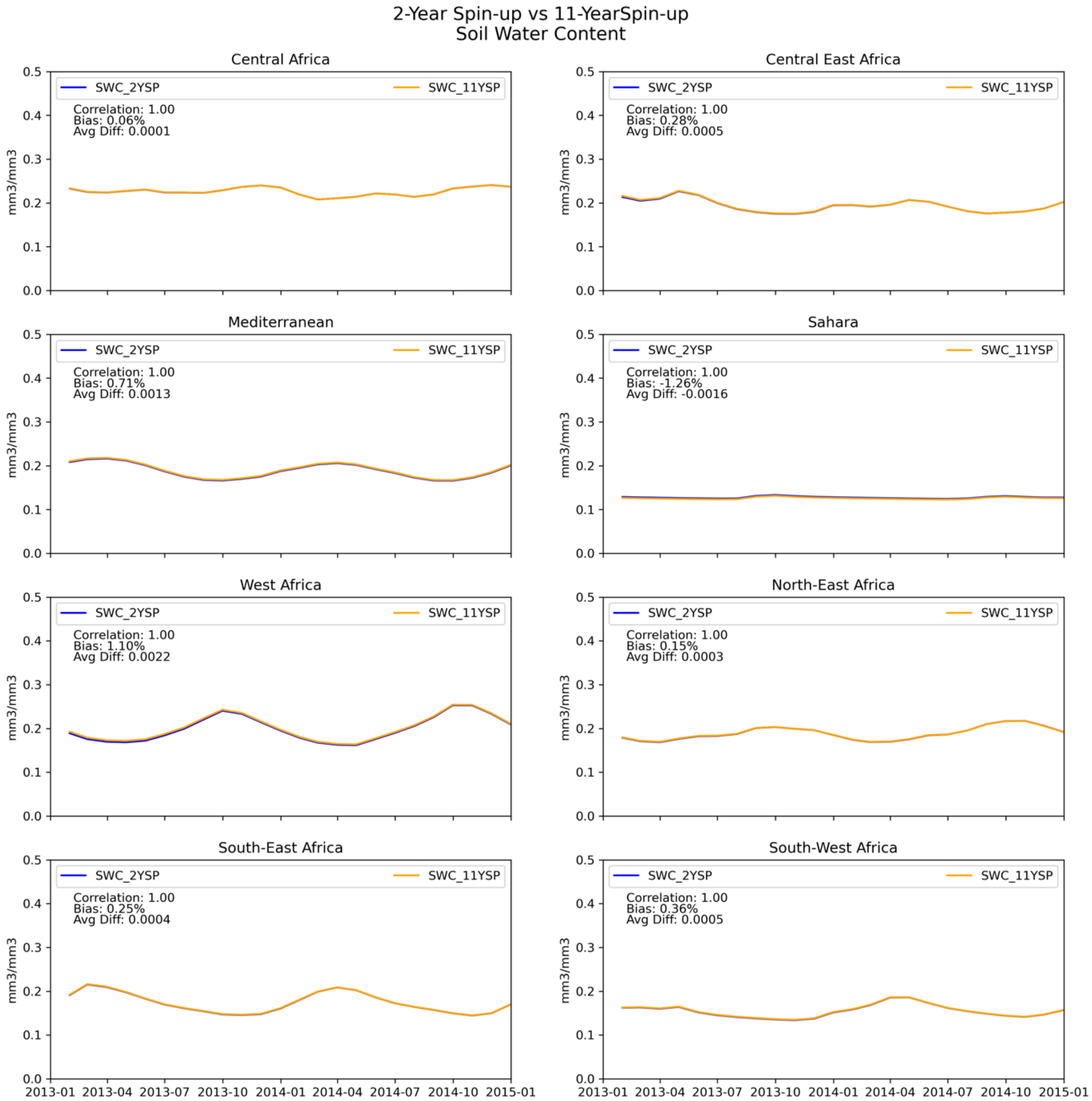

Figure S56: Comparison of 2-year spin up simulation as performed in this work with a 11 year (2002-2012) spin up simulation for Soil water content over the 8 African regions considered in this study. It shows correlation, percentage bias and quantified average difference in mm3/mm3 between the two simulations.

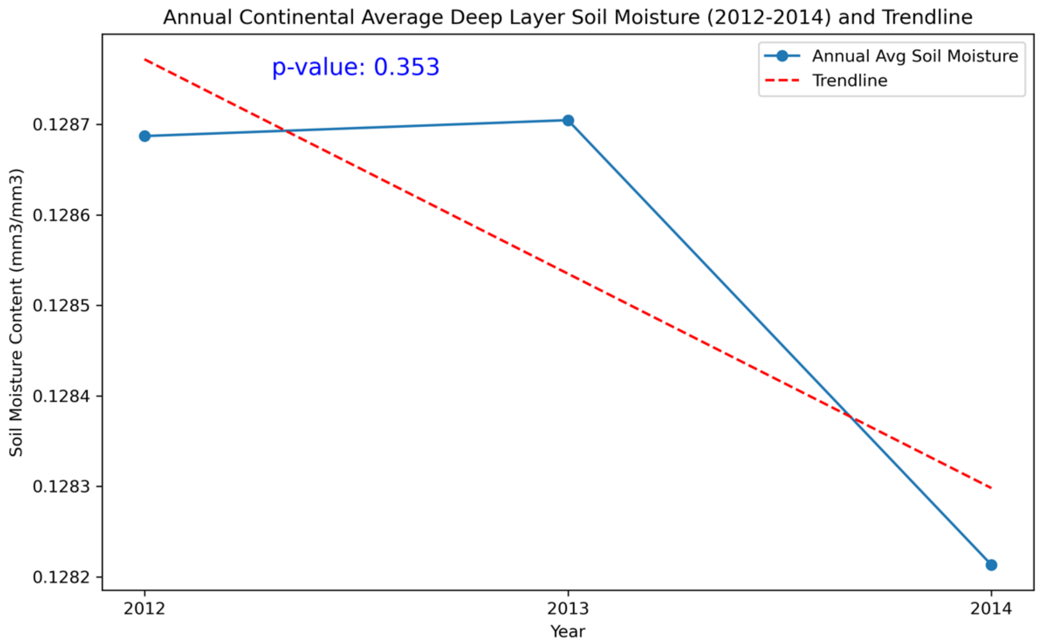

Figure S57: Continental average of CLM5's deepest soil moisture layer (2012-2014) showing its trend line and measure of statistical signficance.