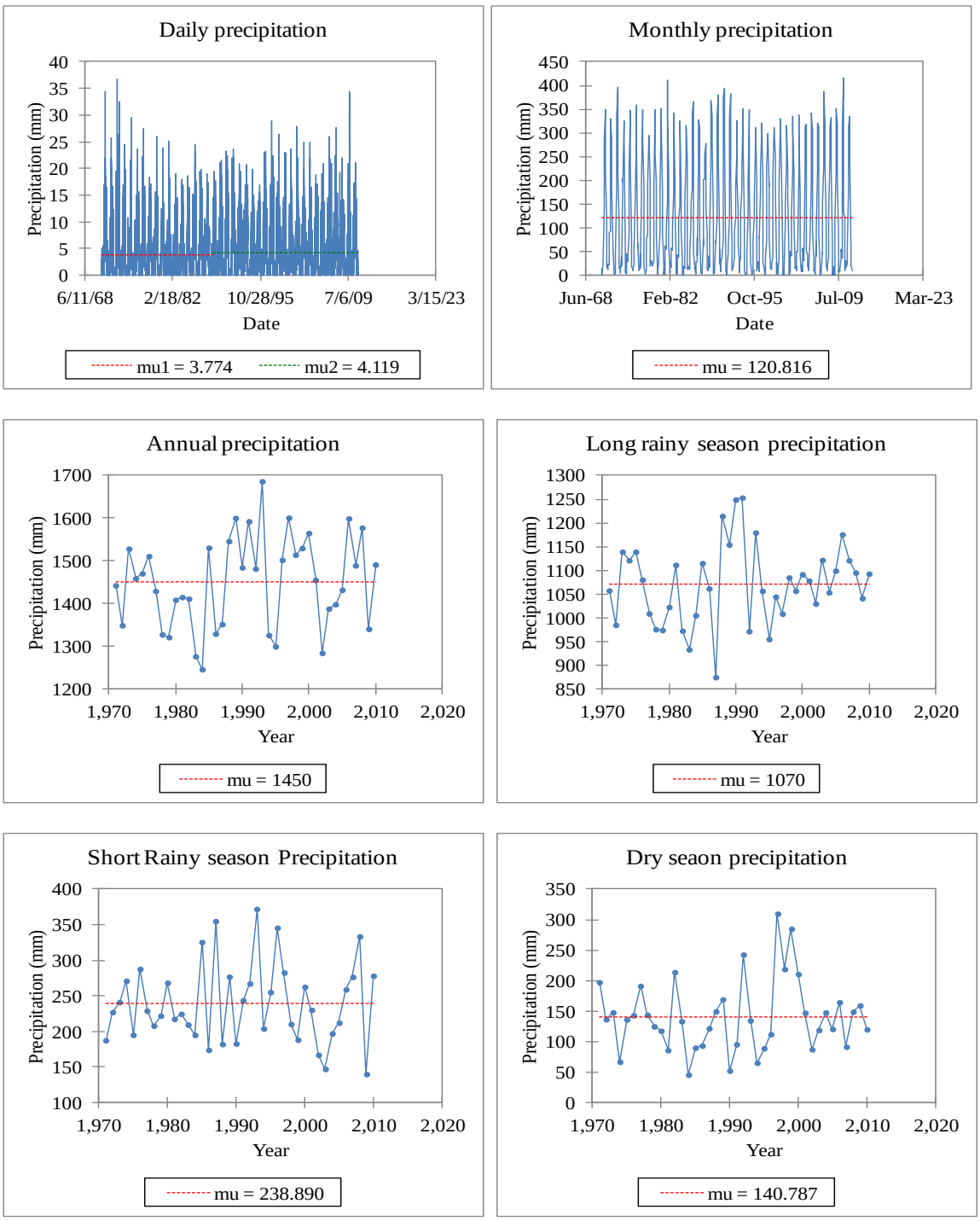

Figure S01: Pettitt change point detection test for precipitation at different time scales

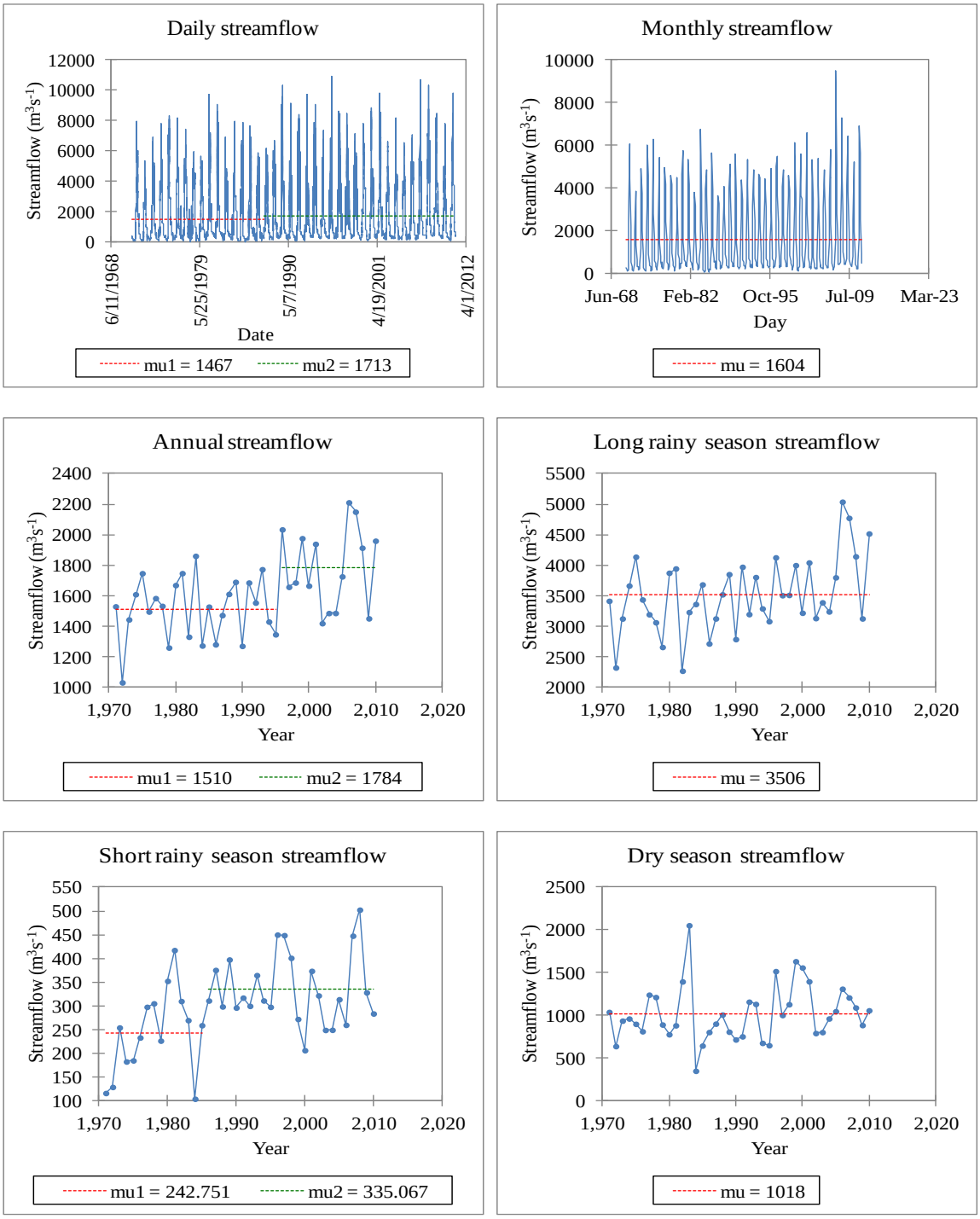

Figure S02: Pettitt change point detection test for streamflow at different time scales

Table3: MK and Pettitt test for the rainfall and streamflow of UBNRB after TFPW at different time scale

	Flow					Rainfall				
	p-value					p-value				
Time scale	After*	Before*	Sen's slope:	Change point	Pettit test	After*	Before*	Sen's slope:	Change point	Pettit test
Daily	< 0.0001	< 0.0001	0.013	1987	Increasing	0.387	0.953	0.000	1988	Increasing
Monthly	< 0.0001	0.031	0.378	1987	No change	0.010	0.640	0.009	1988	No change
annually	< 0.0001	0.009	9.619	1995	Increasing	0.006	0.260	1.886	1987	No change
Kiremit	< 0.0001	0.014	20.30	1995	Increasing	0.010	0.348	1.364	1987	No change
Belg	< 0.0001	0.004	3.593	1985	Increasing	0.822	0.935	0.068	1997	No change
Bega	0.000	0.214	4.832	1995	No change	0.527	0.755	0.169	1996	No change

Table6: Statistical performance measure values of the SWAT model

Period		R^2	NSE	RVE (%)
	Calibration (1973-1977)	0.79	0.74	-3.41
1970s	Validation (1978-1980)	0.84	0.83	7.18
	Calibration (1983-1987)	0.80	0.74	-0.72
1980s	Validation (1988-19909	0.86	0.82	0.73
	Calibration (1993-1997)	0.91	0.91	1.79
1990s	Validation (1998-2000)	0.87	0.84	-3.56
	Calibration (2003-2007)	0.86	0.86	3.99
2000s	Validation (2008-2010)	0.94	0.92	-7.51

Table8: Water balance components analysis in the Upper Blue Nile River Basin (mm/year) by considering LULC and climate change over respective periods. All streamflow estimates are for El Diem station.

Water balance components	1970s	1980s	1990s	2000s
Surface flow (Qs)	112.8	143.4	168.6	141.4
Lateral flow (Ql)	116.8	113.35	125.9	117.6
Base flow (Qb)	47.3	29.6	9.8	64.7
Revap	269.2	257.2	310.6	241
PET	1615.1	1627.3	1614.7	1732.9
Ea	871.6	852.6	904.3	885
Precipitation (P)	1428.1	1397.1	1522.2	1462.5
Recharge	16.7	15	16.7	16.3
Qt	276.9	286.3	304.3	323.7
Qs/Qt (%)	40.7	50.1	55.4	43.7
Qb/Qt (%)	17.1	10.3	3.2	20.0
Ea/P (%)	61.0	61.0	59.4	60.5
Qt/P (%)	19.4	20.5	20.0	22.1