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Supplementary table 1: Results of the Mann–Kendall trend test for annual rainfall (1981–2020) across 13 meteorological stations in Eswatini

Period	Big Bend	Khubutha	Malkerns	Mananga	Mankayane	Matsapha	Mbabane	Mhlume	Mpisi	Nhlangano	Pigg's Peak	Siphofaneni	Sithobelweni
January	-0.024	0.032	0.008	-0.079	-0.055	0.141	0.197	-0.103	0.240*	-0.079	0.082	0.027	0.143
February	0.015	0.117	-0.035	-0.072	0.023	0.062	0.038	-0.085	-0.011	-0.003	-0.005	-0.094	0.1
March	0.013	0.086	-0.123	-0.018	-0.074	-0.017	-0.046	-0.078	0.157	-0.006	0.028	0.003	0.039
April	-0.026	-0.06	0.205	0.09	0.06	0.068	0.195	0.06	-0.104	0.192	0.17	0.08	-0.1
May	0.027	-0.12	0.018	-0.084	-0.013	-0.041	-0.141	-0.064	-0.159	0.012	-0.117	0.02	-0.042
June	-0.237*	-0.175	-0.107	-0.157	-0.135	-0.206	-0.106	-0.181	-0.252*	-0.209	-0.178	-0.103	-0.256*
July	-0.088	-0.12	-0.131	0.008	-0.08	-0.096	-0.016	0.072	-0.02	-0.051	-0.136	0.056	-0.215
August	-0.052	-0.094	-0.135	-0.112	-0.078	-0.157	-0.141	-0.132	-0.071	-0.159	0.021	-0.163	-0.158
September	0.175	-0.028	0.049	-0.012	0.091	0.03	0.01	-0.022	0.025	0.009	0.021	0.165	0.106
October	-0.139	-0.126	-0.122	-0.04	-0.057	-0.203*	-0.219*	-0.094	-0.041	-0.190**	-0.141	0.098	-0.14
November	-0.033	0.004	0.073	-0.066	-0.012	0.024	-0.056	0.013	0.111	-0.053	-0.031	-0.086	-0.075
December	0.176	0.205	0.047	-0.063	0.08	-0.036	0.018	-0.078	0.153	0.054	0.106	0.159	0.061
Dry season	-0.028	-0.128	0.103	-0.023	-0.086	-0.056	-0.097	-0.149	-0.182	-0.033	-0.004	0.111	-0.102
Wet season	0.015	0.038	0.013	-0.109	-0.1	-0.144	-0.026	-0.182	0.141	-0.118	-0.072	-0.07	0.08
Annual	-0.026	-0.185	0.005	-0.077	-0.138	-0.095	-0.041	-0.179	-0.033	-0.133	-0.038	-0.032	0.014

Supplementary table 2: Sen's slope estimator results for annual rainfall trends (1981–2020) across 13 meteorological stations in Eswatini

Period	Big Bend	Khubutha	Malkerns	Mananga	Mankayane	Matsapha	Mbabane	Mhlume	Mpisi	Nhlangano	Pigg's Peak	Siphofaneni	Sithobelweni
January	-0.065	0.22	0.545	-0.768	-0.586	0.824	2.535	-0.846	1.865	-0.694	0.99	0.126	0.721
February	0.065	0.875	-0.086	-0.551	0.136	0.556	0.51	-0.58	-0.058	-0.009	-0.022	-0.711	0.559
March	0.052	0.484	-0.665	-0.14	-0.411	-0.154	-0.311	-0.479	0.9	-0.055	0.255	0.021	0.286
April	-0.08	-0.335	0.992	0.339	0.238	0.232	1.028	0.193	-0.597	0.741	0.765	0.305	-0.419
May	0	-0.173	0	-0.015	0	0	-0.303	-0.055	-0.042	0.005	-0.118	0	0
June	-0.093	0	-0.1	-0.061	-0.026	-0.115	-0.142	-0.129	0	-0.157	-0.362	0	-0.364
July	0	-0.02	-0.031	0	0	-0.02	-0.002	0.015	0	0	-0.451	0	0
August	0	-0.401	-0.2	-0.021	-0.064	-0.243	-0.288	-0.087	0	-0.226	0.047	-0.125	-0.1
September	0.198	-0.098	0.125	-0.035	0.239	0.08	0.108	-0.046	0	0.02	0.301	0.306	0.132
October	-0.406	-0.656	-0.55	-0.193	-0.3	-1.24	-1.373	-0.347	-0.108	-1.195	-1.149	0.567	-0.676
November	-0.148	0.007	1.003	-0.369	-0.097	0.022	-0.461	0.092	0.618	-0.362	-0.285	-0.66	-0.43
December	1.242	1.597	0.269	-0.438	0.53	-0.208	0.213	-0.525	1.128	0.571	0.895	1.21	0.654
Dry season	-0.285	-2.276	0.752	-0.206	-0.574	-0.567	-1.319	-1.074	-2.592	-0.3	-0.047	1.06	-0.7
Wet season	0.184	1.478	0.586	-2.295	-2.304	-4.208	-1.012	-3.165	3.828	-2.297	-2.283	-2.277	1.252
Annual	-0.585	-4.331	0.091	-3.025	-2.835	-3.09	-1.275	-4.2	-0.868	-3.162	-0.948	-0.752	0.265

Supplementary table 3: Results of the Mann–Kendall trend test for annual minimum temperature across eight meteorological stations in Eswatini

Period	Big Bend	Malkerns	Mananga	Matsapha	Mbabane	Mhlume	Nhlangano	Pigg's Peak
January	-0.083	0.053	-0.081	0.047	0.320*	-0.103	-0.356*	-0.068
February	0.257*	-0.011	0.078	0.065	0.363*	-0.164	-0.371*	-0.139
March	0.316*	0.183	0.035	-0.331	0.379*	-0.096	-0.404*	-0.027
April	0.241*	-0.053	0.059	0.03	0.457*	-0.033	-0.094	-0.138
May	0.219	0.3	0.198	0.236	0.447*	0.112	0.069	0.079
June	0.259*	0.053	0.300*	0.024	0.683*	0.296*	-0.096	-0.007
July	0.17	0.048	0	0.285	0.440*	0.07	0.212	0.045
August	0.093	0.118	0.051	0.033	0.448*	0.117	-0.035	-0.14
September	0.15	0.226	0.031	0.073	0.580*	0.007	0.293	0.075
October	0.106	-0.119	0.027	-0.23	0.223*	-0.064	-0.195	-0.107
November	0.165	0.172	0.048	0.02	0.343*	-0.146	-0.201	0.022
December	-0.104	-0.133	0.028	0.133	0.432*	-0.151	-0.282	0.085
Dry season	0.263*	0.305	0.185	0.241	0.712*	0.161	0.095	0.026
Wet season	0.163	0.053	0.024	0.059	0.551*	-0.284*	-0.400*	-0.047
Annual	0.318*	0.116	0.161	0.07	0.700*	-0.068	-0.142	0.032

Supplementary table 4: Sen's slope estimator results for annual minimum temperature trends across eight meteorological stations in Eswatini

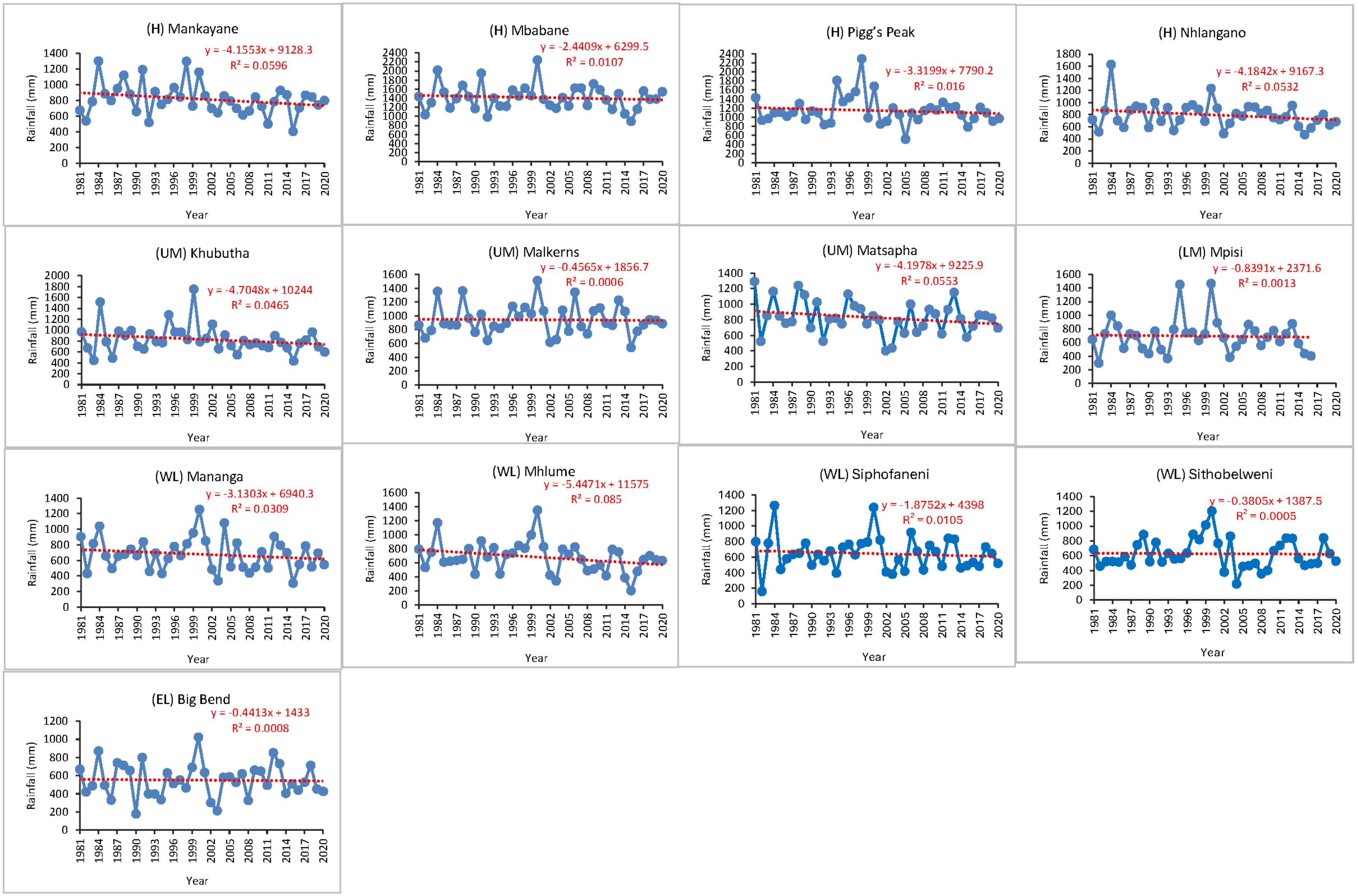
Period	Big Bend	Malkerns	Mananga	Matsapha	Mbabane	Mhlume	Nhlangano	Pigg's Peak
January	-0.008	0.009	-0.008	0.009	0.033	-0.01	-0.116	-0.013
February	0.02	0	0.005	0.014	0.042	-0.015	-0.083	-0.031
March	0.031	0.017	0.003	-0.036	0.044	-0.012	-0.056	0
April	0.047	-0.011	0.012	0	0.063	-0.005	-0.043	-0.087
May	0.042	0.067	0.027	0.079	0.064	0.013	0.019	0.033
June	0.054	0.03	0.045	0	0.1	0.047	-0.028	0
July	0.029	0.048	0	0.094	0.067	0.008	0.038	0.016
August	0.017	0.03	0.008	0.005	0.074	0.015	-0.009	-0.039
September	0.018	0.044	0.006	0.007	0.083	0	0.045	0.019
October	0.016	-0.023	0.003	-0.043	0.036	-0.007	-0.061	-0.042
November	0.025	0.033	0.005	0	0.033	-0.019	-0.072	0
December	-0.014	-0.021	0.002	0.025	0.053	-0.017	-0.1	0.04
Dry season	0.03	0.038	0.016	0.042	0.079	0.014	0.012	0.014
Wet season	0.012	0.006	0.003	0.008	0.05	-0.02	-0.075	-0.01
Annual	0.027	0.013	0.011	0.02	0.06	-0.004	-0.025	0.003

Supplementary table 5: Results of the Mann-Kendall trend test for annual maximum temperature across eight meteorological stations in Eswatini

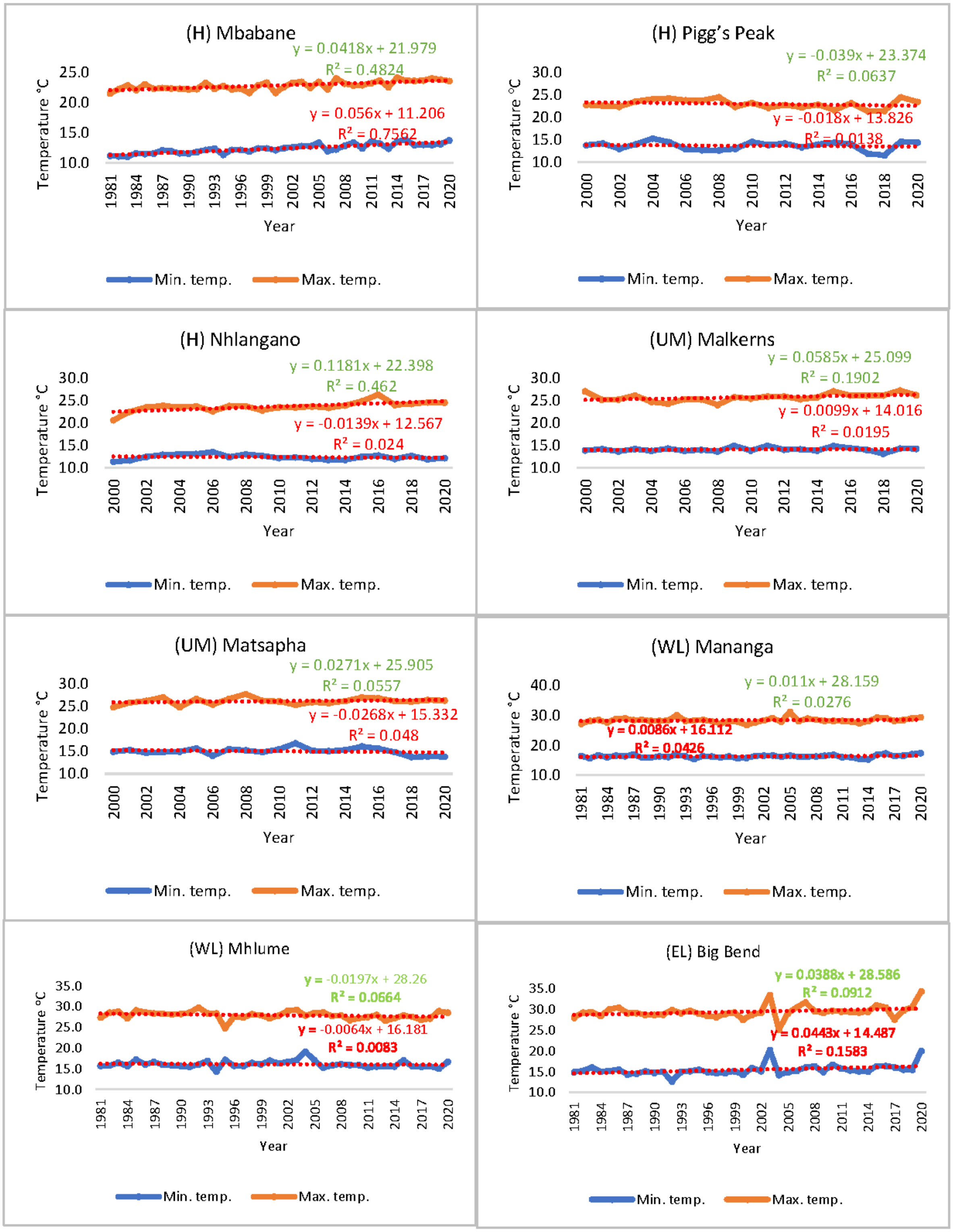
Period	Big Bend	Malkerns	Mananga	Matsapha	Mbabane	Mhlume	Nhlangano	Pigg's Peak
January	-0.034	-0.117	-0.13	0.19	0.008	-0.257*	-0.238	-0.224
February	0.175	0.246	0.133	0.106	0.149	-0.096	0.151	-0.191
March	0.131	0.366*	0.067	0.086	0.19	-0.244*	0.224	-0.08
April	-0.087	0.048	-0.11	0.033	-0.119	-0.227*	0.045	-0.214
May	0.068	0.266	0.01	0.264	0.21	-0.156	0.341	-0.151
June	0.362*	0.379*	0.249*	0.358*	0.104	0.02	0.477*	0.037
July	0.015	0.254	-0.067	0.193	0.538*	-0.161	0.046	-0.17
August	0.257*	0.460*	0.128	0.349*	0.197	0.029	0.124	-0.072
September	0.318*	0.129	0.287*	0.378*	0.206	-0.016	0.477*	0.066
October	0.074	0.201	0.014	0.144	0.101	-0.074	0.059	-0.039
November	0.265*	-0.018	0.055	0.096	0.424*	-0.041	0.166	0.099
December	-0.018	0.106	-0.034	-0.191	0.086	-0.136	-0.072	-0.168
Dry season	0.249	0.476*	0.159	0.453*	0.534*	-0.113	0.544*	-0.147
Wet season	0.102	0.242	0.024	0.011	0.277*	-0.268*	0.116	-0.053
Annual	0.241*	0.417*	0.11	0.158	0.500*	-0.221*	0.484*	-0.153

Supplementary table 6: Sen's slope estimator results for annual maximum temperature trends across eight meteorological stations in Eswatini

Period	Big Bend	Malkerns	Mananga	Matsapha	Mbabane	Mhlume	Nhlangano	Pigg's Peak
January	-0.006	-0.039	-0.016	0.043	0	-0.043	-0.059	-0.071
February	0.033	0.064	0.015	0.029	0.028	-0.012	0.061	-0.073
March	0.027	0.091	0.013	0.026	0.024	-0.05	0.09	-0.044
April	-0.018	0.024	-0.017	0	-0.018	-0.043	0.007	-0.075
May	0.013	0.097	0.001	0.071	0.04	-0.02	0.14	-0.053
June	0.051	0.1	0.034	0.115	0.019	0.001	0.13	0.035
July	0.003	0.081	-0.008	0.044	0.2	-0.018	0.023	-0.066
August	0.045	0.138	0.018	0.051	0.04	0.004	0.039	-0.043
September	0.064	0.05	0.058	0.1	0.048	0	0.219	0.032
October	0.017	0.1	0.002	0.05	0.018	-0.017	0.021	-0.04
November	0.046	-0.01	0.008	0.029	0.068	-0.004	0.056	0.027
December	-0.002	0.059	-0.006	-0.057	0.011	-0.025	-0.027	-0.057
Dry season	0.03	0.091	0.012	0.069	0.064	-0.012	0.113	-0.033
Wet season	0.013	0.038	0.003	0.003	0.028	-0.031	0.016	-0.024
Annual	0.027	0.065	0.008	0.03	0.042	-0.021	0.096	-0.049



Supplementary figure 1: Annual rainfall trends for 13 meteorological stations across Eswatini (1981–2020). The graphs show annual total rainfall (blue line) and corresponding linear trend lines (dotted red line) for each station. The linear regression equations and coefficients of determination (R^2) are displayed in red. Station codes in parentheses refer to physiographic regions: H – Highveld, UM – Upper Middleveld, LM – Lower Middleveld, WL – Western Lowveld, EL – Eastern Lowveld.



Supplementary figure 2: Annual temperature trends for eight meteorological stations across Eswatini: 1981–2020 for Mbabane, Mananga, Big Bend and Mhlume and 2000–2020 for Pigg's Peak, Nhlangano, Malkerns and Matsapha. Linear regression equations and coefficients of determination (R^2) are also displayed. Station codes in parentheses refer to physiographic regions: H – Highveld, UM – Upper Middleveld, WL – Western Lowveld, EL – Eastern Lowveld.