1 Appendix

1.1 Summary of Lysimeter Logbook

Selected from Field logbooks no. 6 and 7 by K. Báťková

Mass of collecting bottles:
A = 127.6 g
B = 129.4 g
C = 129.3 g
D = 102.6 g

Date (2017)	Time	Event description
11 Apr.	17:41 17:50-18:00	Regular check, modem off, logger temp. 14.3 °C, all other readings in ERROR New vacuum pump box installed, at about 18:10 readings started (except for MPS2); the original vacuum pump box was sent to Germany for reparation on 31 March 2017.
9 May	15:40	Water removal from seepage water tank (SWT): 1096.3 g (mass with bottle A) 1118.2 g (mass with bottle D) Grass was cut from the top of the lysimeter and close surroundings with scissors (mass of cut grass from the lysimeter – unknown?)
2 June	cca 10:30	Grass cutting on the whole exp.area and around the lysimeters with motor mower (not the top of the lysimeter)
8 June	cca 15:43	Grass cutting from the top of the lysimeters with the string trimmer (possible increase in noise and small mass reduction of the lysimeter), (mass of cut grass from the lysimeter – unknown?)
12 June	11:10	Raking of cut grass
21 June	after 9:00	Grass cutting on the whole exp.area and around the lysimeters with motor mower (not the top of the lysimeter)
7 July	after 14:00	Grass cutting on the whole exp.area and around the lysimeters with motor mower (not the top of the lysimeter)
14 Aug.	14:10	Grass cutting on the whole exp.area and around the lysimeters with motor mower (not the top of the lysimeter)
31 Aug.	after 11:00	Grass cutting on the whole exp.area and around the lysimeters with motor mower (not the top of the lysimeter) Grass cutting from the top of the lysimeters with the string trimmer (possible increase in noise and small mass reduction of the lysimeter), (mass of cut grass from the lysimeter – unknown?)
Sept.	-	Just regular checks - nothing special causing disturbance to the lysimeter readings

1.2 Nighttime Oscillations

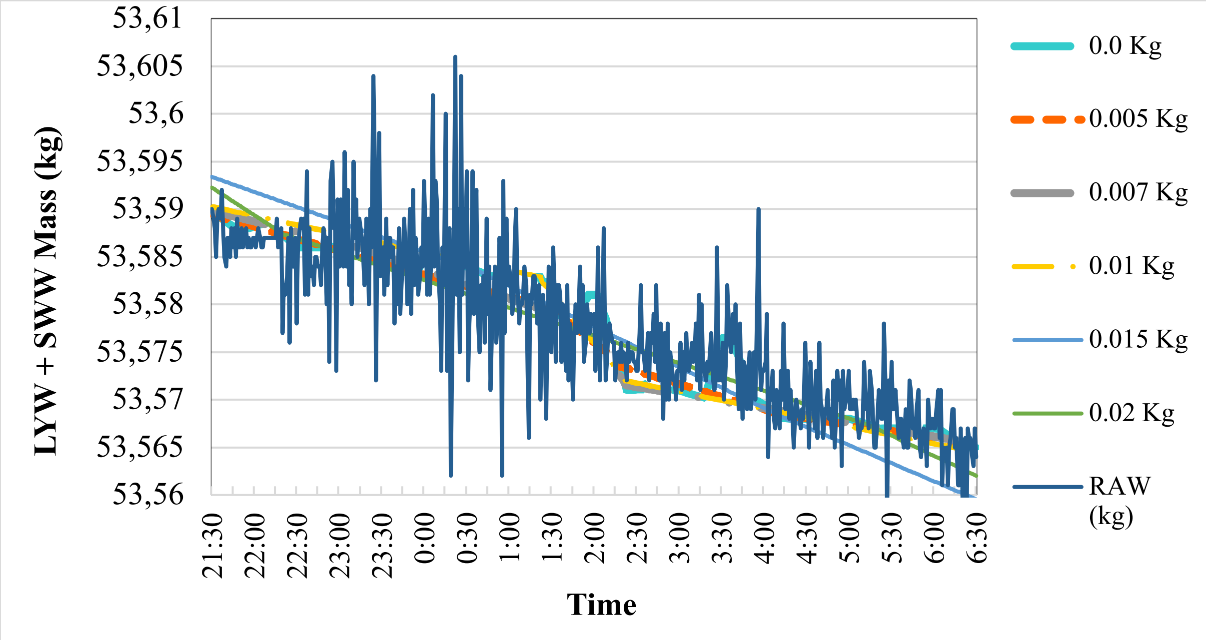

Figure 1: : Investigating the maximum oscillation threshold value based on filtering the data with increasing oscillation threshold steps until the disappearance of nighttime oscillations. 19-20/05/2017 21:30 – 06:30.

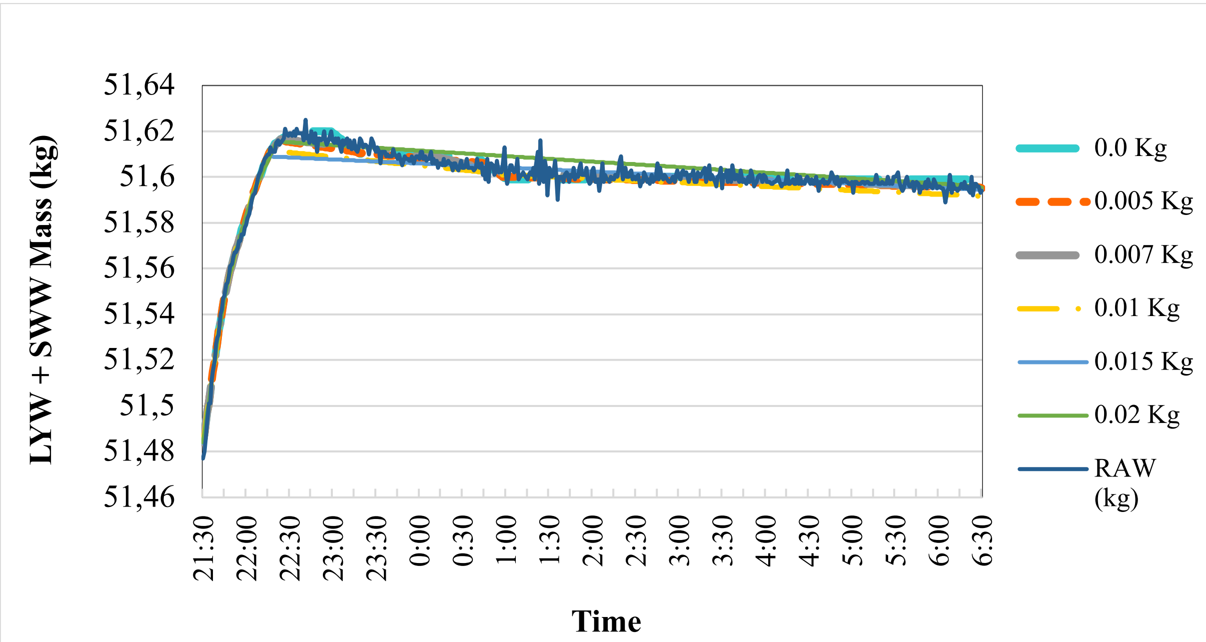

Figure 2: Investigating the maximum oscillation threshold value based on filtering the data with increasing oscillation threshold steps until the disappearance of nighttime oscillations. 06-07/06/2017 21:30 – 06:30.

1.3 Expanded Statistical Analysis

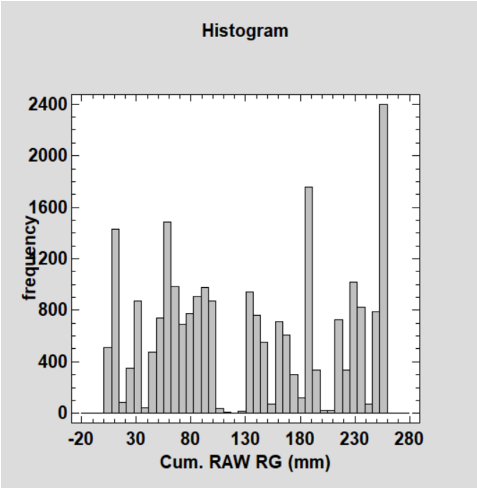

Figure 3: Frequency histogram for the untreated rain gauge cumulative precipitation.

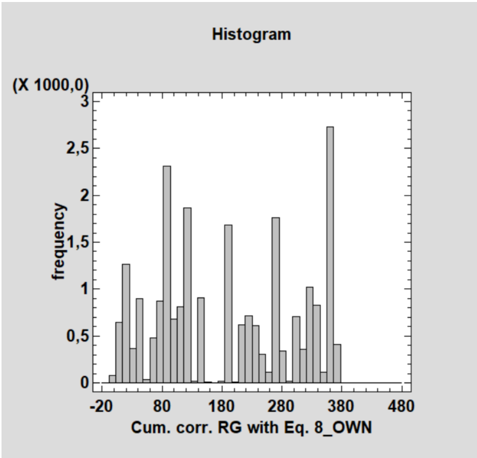

Figure 4: Frequency histogram for the corrected rain gauge with the optimized variables for 2017 based on Mekonnen et al. (2015).

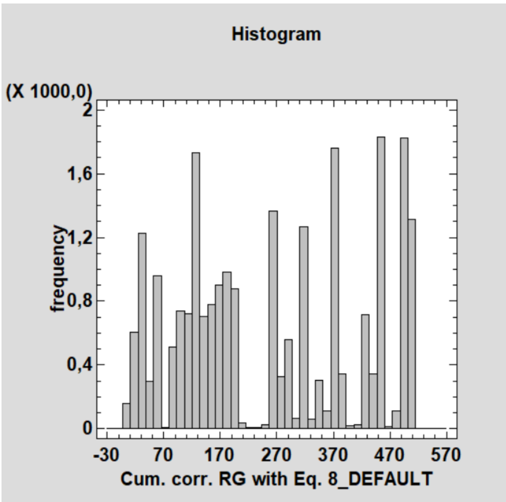

Figure 5: Frequency histogram for the corrected rain gauge with the default Mekonnen et al. (2015) optimized variables.

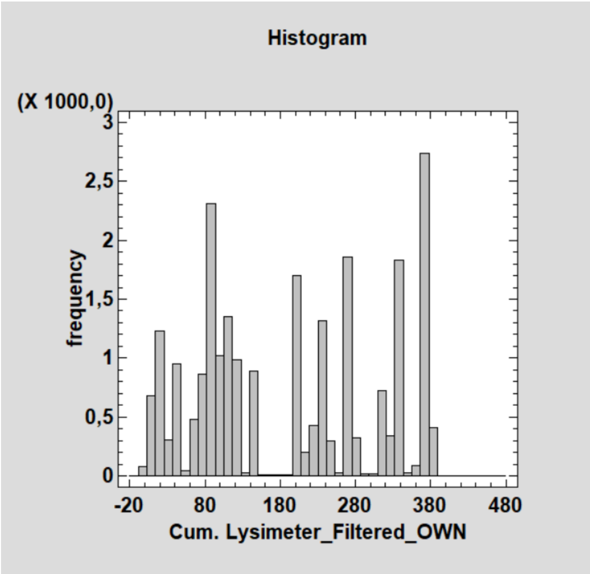

Figure 6: Frequency histogram for the calculated parameters' lysimeter cumulative precipitation.

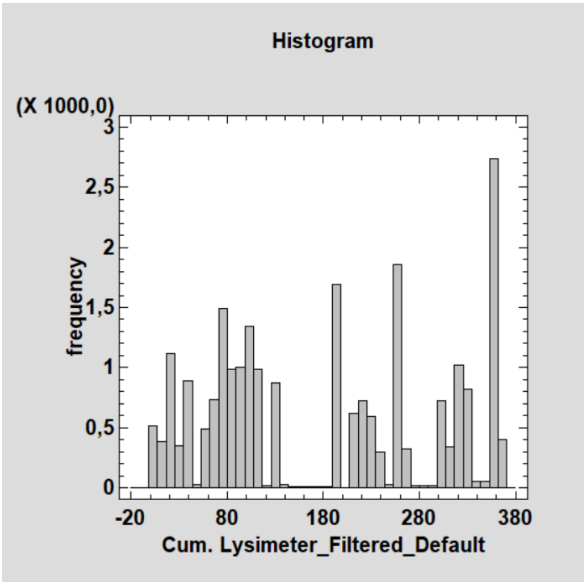

Figure 7: Frequency histogram for the calculated parameters' lysimeter cumulative precipitation.

Table 1:Table of minimums, maximums, and coefficients of variation (CV = SD/ mean)

	Coeff. of variation	*Minimum*	*Maximum*
Cum. RAW RG (mm)	61.3717%	0.1	258.4
Cum. corr. RG with Eq. 8_OWN	61.2012%	0.163588	367.071
Cum. corr. RG with Eq. 8_DEFAULT	61.1046%	0.28	507.4
Cum. RAW RG x K = 1.46565)	61.3715%	0.15	378.72
Cum. Lysimeter_Filtered_OWN	62.8925%	0.003	378.725
Cum. Lysimeter_Filtered_Default	63.7018%	0.003	361.897
Total	65.9333%	0.003	507.4

Table 2: Table of Means with 95.0 percent LSD intervals

			Stnd. error
	Count	*Mean*	*(pooled s)*
Cum. RAW RG (mm)	23635	133.468	0.79052
Cum. corr. RG with Eq. 8_OWN	23635	189.647	0.79052
Cum. corr. RG with Eq. 8_DEFAULT	23635	261.976	0.79052
Cum. RAW RG x K = 1.46565)	23635	195.617	0.79052
Cum. Lysimeter_Filtered_OWN	23635	193.064	0.79052
Cum. Lysimeter_Filtered_Default	23635	183.458	0.79052
Total	141810	192.872	

Table 15 shows the mean for each column of data. It also shows the standard error of each mean, which is a measure of its sampling variability. The standard error is formed by dividing the pooled standard deviation by the square root of the number of observations at each level.

As the means did not show any statistical relationships in terms of accordance, tests of medians is conducted.

Table 3: Kruskal-Wallis Test

	Sample Size	*Average Rank*
Cum. RAW RG (mm)	23635	51957.7
Cum. corr. RG with Eq. 8_OWN	23635	70906.4
Cum. corr. RG with Eq. 8_DEFAULT	23635	88839.8
Cum. RAW RG x K = 1.46565)	23635	73544.2
Cum. Lysimeter_Filtered_OWN	23635	72277.6
Cum. Lysimeter_Filtered_Default	23635	67907.4

Test statistic = 9851.19 P-Value = 0

Table 4: 95.0 percent Bonferroni intervals

Contrast	*Sig.*	*Difference*	*+/- Limits*
Cum. RAW RG (mm) - Cum. corr. RG with Eq. 8_OWN	*	-18948.7	1105.33
Cum. RAW RG (mm) - Cum. corr. RG with Eq. 8_DEFAULT	*	-36882.1	1105.33
Cum. RAW RG (mm) - Cum. RAW RG x K = 1.46565)	*	-21586.4	1105.33
Cum. RAW RG (mm) - Cum. Lysimeter_Filtered_OWN	*	-20319.9	1105.33
Cum. RAW RG (mm) - Cum. Lysimeter_Filtered_Default	*	-15949.7	1105.33
Cum. corr. RG with Eq. 8_OWN - Cum. corr. RG with Eq. 8_DEFAULT	*	-17933.4	1105.33
Cum. corr. RG with Eq. 8_OWN - Cum. RAW RG x K = 1.46565)	*	-2637.77	1105.33
Cum. corr. RG with Eq. 8_OWN - Cum. Lysimeter_Filtered_OWN	*	-1371.21	1105.33

Cum. corr. RG with Eq. 8_OWN - Cum. Lysimeter_Filtered_Default	*	2999.02	1105.33
Cum. corr. RG with Eq. 8_DEFAULT - Cum. RAW RG x K = 1.46565)	*	15295.6	1105.33
Cum. corr. RG with Eq. 8_DEFAULT - Cum. Lysimeter_Filtered_OWN	*	16562.2	1105.33
Cum. corr. RG with Eq. 8_DEFAULT - Cum. Lysimeter_Filtered_Default	*	20932.4	1105.33
Cum. RAW RG x K = 1.46565) - Cum. Lysimeter_Filtered_OWN	*	1266.56	1105.33
Cum. RAW RG x K = 1.46565) - Cum. Lysimeter_Filtered_Default	*	5636.79	1105.33
Cum. Lysimeter_Filtered_OWN - Cum. Lysimeter_Filtered_Default	*	4370.22	1105.33

* denotes a statistically significant difference.

The Kruskal-Wallis test tests the null hypothesis that the medians within each of the 6 columns is the same. The data from all the columns is first combined and ranked from smallest to largest, then calculating their individual ranks. Since the P-value is less than 0.5, the same statistical difference seen when examining the means is also registered for the medians.

Table 17 compares the average ranks of the data sets. Using the Bonferroni procedure, 15 of the comparisons are statistically significant at the 95.0% confidence level.

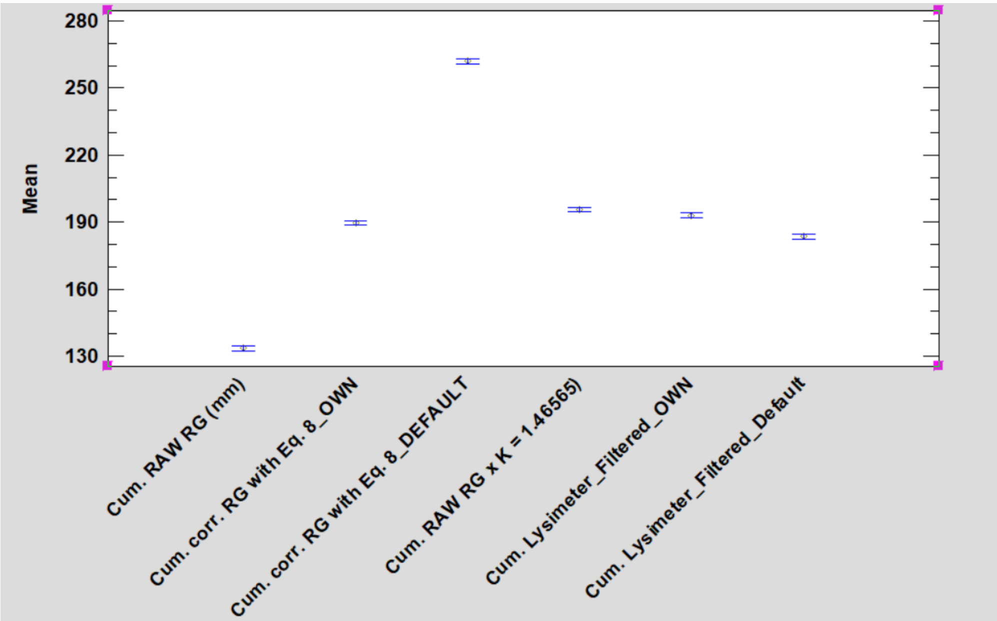

Figure 8: Means and 95.0 percent LSD intervals for each of the 6 sets. Illustrating that the original correction equation of Mekonnen et al. (2015) have the highest mean values, further from the rest. The same behavior can be seen for the raw cumulative precipitation of the rain gauge. Which results in an underestimation of cumulative precipitation.

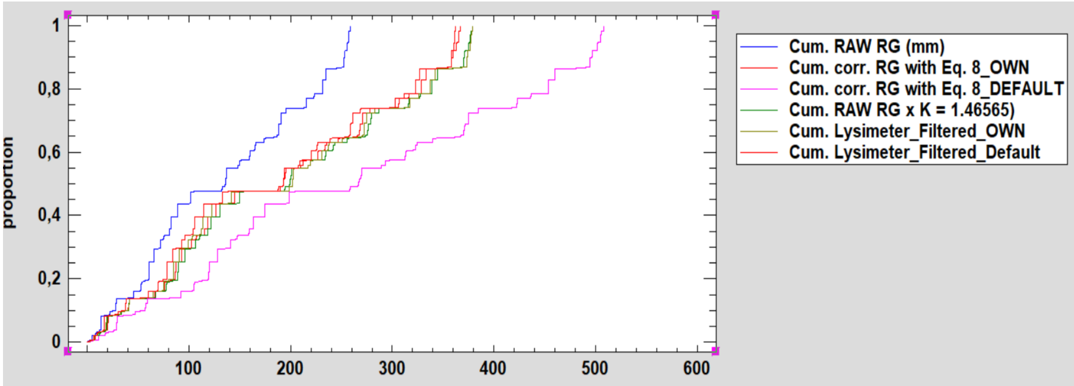

Figure 9: Quantile plot

The quantile plots are used to determine whether different data sets have common distributions. If the samples come from the same population, the quantile plot should be close together. A shift of one series whether to the right or left from the other ones indicate different distribution. On the other hand, different slopes indicate varying standard deviation between the sets.