Note

Raingauges: Quality Pays

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Figure 1
Rainfall from a standard raingauge being measured. Standard and plastic raingauges randomly arranged in 1,5 m x 3 m x 5 raingauges/row

Introduction

Due to the spatial variability of rainfall, especially in the summer rainfall area of South Africa, a dense network of raingauges is required whenever hydrological research is conducted in a catchment.

To comply with research requirements and to remain within the budget allowance, researchers are often tempted to use cheaper, non-standard plastic raingauges. Therefore a study was conducted to evaluate the accuracy of such cheaper gauges.

Methods

Five standard* and five commercially available plastic raingauges were erected in a random pattern in a fully equipped weather station (40 m^2) at the Hydrological Research Institute. The raingauge rims were installed at a height of 1,22 m and no trees or other obstacles were within 30 m of the gauges nor did they protrude above 30° with respect to the horizontal funnel level. (Fig. 1)

Rainfall, observed on a daily basis at 08h00 S.A.S.T. for

*According to Plan WB321, 1973 from the South African Weather Bureau, Department of Transport.

TABLE 1
AVERAGE RAINFALL AND ANALYSIS OF VARIANCE OF RESULTS OBTAINED FROM STANDARD (X_1) AND PLASTIC (X_2) RAINGAUGES
Average Rainfall in mm/d
(N = 5)

X_1	X_2
October 1979	
0,5	0,4
2,0	1,9
31,0	25,6*
0,5	0,2
27,9	25,5*
9,5	8,9
17,9	17,1*
Monthly Totals:	
89,2	79,8
November 1979	
3,5	3,3
7,4	7,5
41,3	38,4*
4,4	4,2
0,5	0,3
6,4	6,7
6,5	6,1*
7,6	7,0*
27,2	25,7*
1,9	2,0
17,7	17,2
18,9	18,7
22,6	21,0*
Monthly Totals:	
183,9	174,6

*Difference significant at the 1% level.

20 storms during October and November 1979, was subjected to a 2-way analysis of variance.

Results

The results are given in Table 1.

For eight out of twenty rain days, the plastic gauges measured a lower rainfall (statistically significant at the 1% level) resulting in a total difference of 18,7 mm over a two month period. The effects of rainfall intensity (based on hourly rainfall) and wind speed during the storms on these differences could not be detected by means of multiple linear regression analysis. No significant correlation was found, not even if only days with a significant difference were considered.

In the case where plastic raingauges have been used, a correlation could be considered. The linear regression for standard (Y) and plastic raingauges (X) was calculated to be:

$$Y = 1{,}09\ X - 0{,}17;\ (r = 0{,}977;\ d.f.\ 99).$$

Discussion and Conclusions

Differences in rainfall amounts measured with standard and plastic raingauges can be mainly attributed to the shallowness of the plastic raingauge's receiving funnel and a tendency for the plastic material to retain the raindrops on its surface. The differing degrees of splash-out of raindrops from the two types of raingauges during high intensity storms appears to be an important factor in this respect.

Plastic raingauges are therefore not recommended where rainfall totals play an important role in hydrological research. Any non-standard gauge's results must therefore be treated with caution where statistical inference is a requirement.

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ERRATUM

A Proposed Technique to Measure Evapotranspiration Using Micrometeorological Methods

K.L. BRISTOW and J.M. DE JAGER

Water SA 7(1) 49 – 53.

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Column 1 line 13 should read:

γ is the psychrometric constant (mbar °C^{-1}).

Column 2 line 3 should read:

$$r_{aM} = r_{aV} = r_{aH} = \frac{\left[\ln(\frac{z-d}{z_o}) \right]^2}{k^2 u\ (z)}$$

Column 2 line 11 should read:

d is the zero plane displacement level (m), and

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Column 1 line 8 should read:

$$e_s(T_o) = 6{,}11 \exp \left[5347{,}61 \quad (\frac{1}{273{,}16} - \frac{1}{273{,}26 + T_o}) \right] \text{(mbar)}$$

Column 2 line 22 should read:

tions above the canopy surface at height $z = (d + z_o + 0{,}5)$ m.

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Column 2 line 26 should read:

double r_{aH}. If $r_{sT} = 2r_{aV} = 2r_{aH}$ then λE_p would decrease by ap-

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