WIMEA-ICT RC1

Davies Rain Collector Tests

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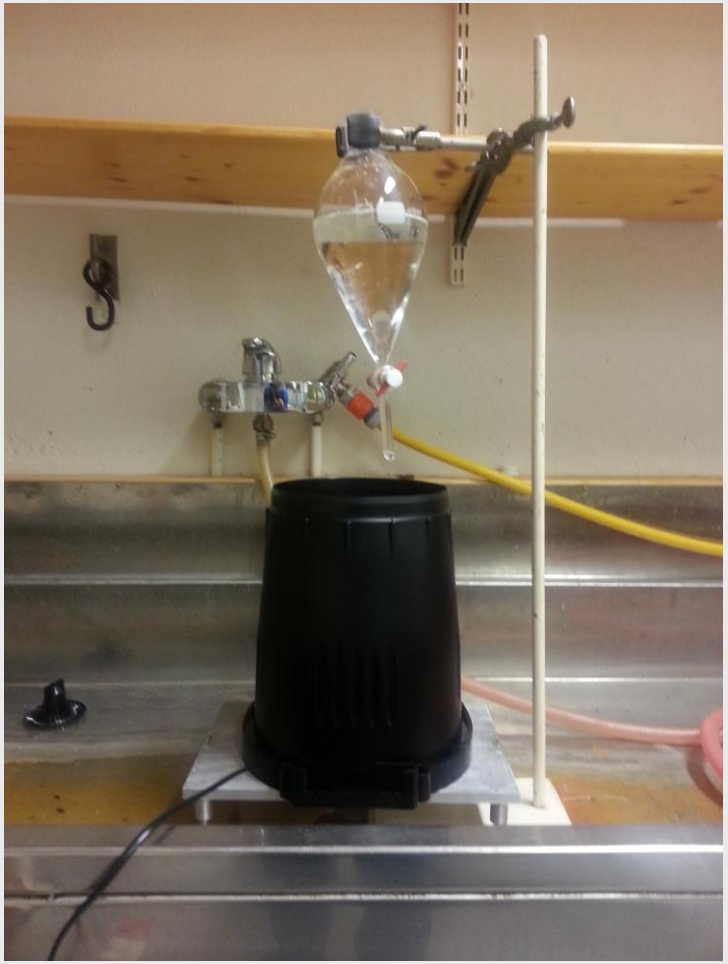
Verification



Tested for accuracy at the Geophysical Institute (GFI)

Done by passing a calculated volume of water through the collector, which will give an expected number of tips

- Depends on collector tipping rate (0.2 mm) and collector diameter (0.165 m)

Deployed collector

- Registered average of 95 tips out of an expected 100 (95%)

Experimental Setup

Deployed on afternoon of 11 July 2016 in front of GFI

Installed as close as possible to official rain collector operated by the Norwegian Meteorological Institute

Placed as low to the ground as possible to minimize influence of wind

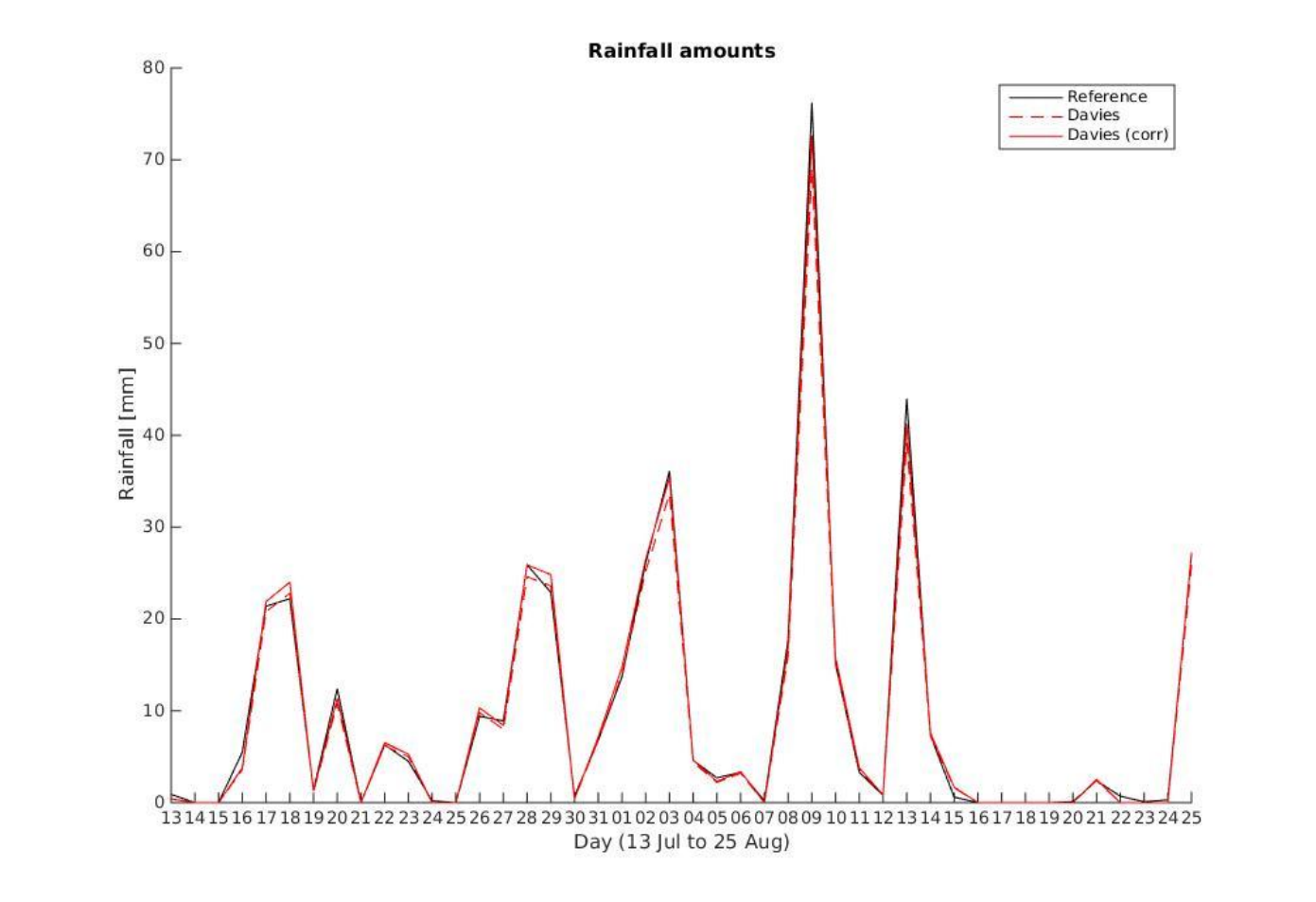
Has been exposed to some of the rainiest weather Bergen has experienced in decades!

Datalogging

Two methods of tracking tips:

- Minutely tracking: Every minutely report indicates how many tips occurred during the last minute
  - Ex: 08:33 – 2 tips
    10:17 – 1 tip
    15:56 – 2 tips
    Total: 5 tips = 1 mm
- Absolute tracking: Total number of tips since the unit has been powered on
  - Ex: 30 tips at the start of the day
    35 tips at the end of the day
    Total: 5 tips = 1 mm
- This analysis used Absolute tracking

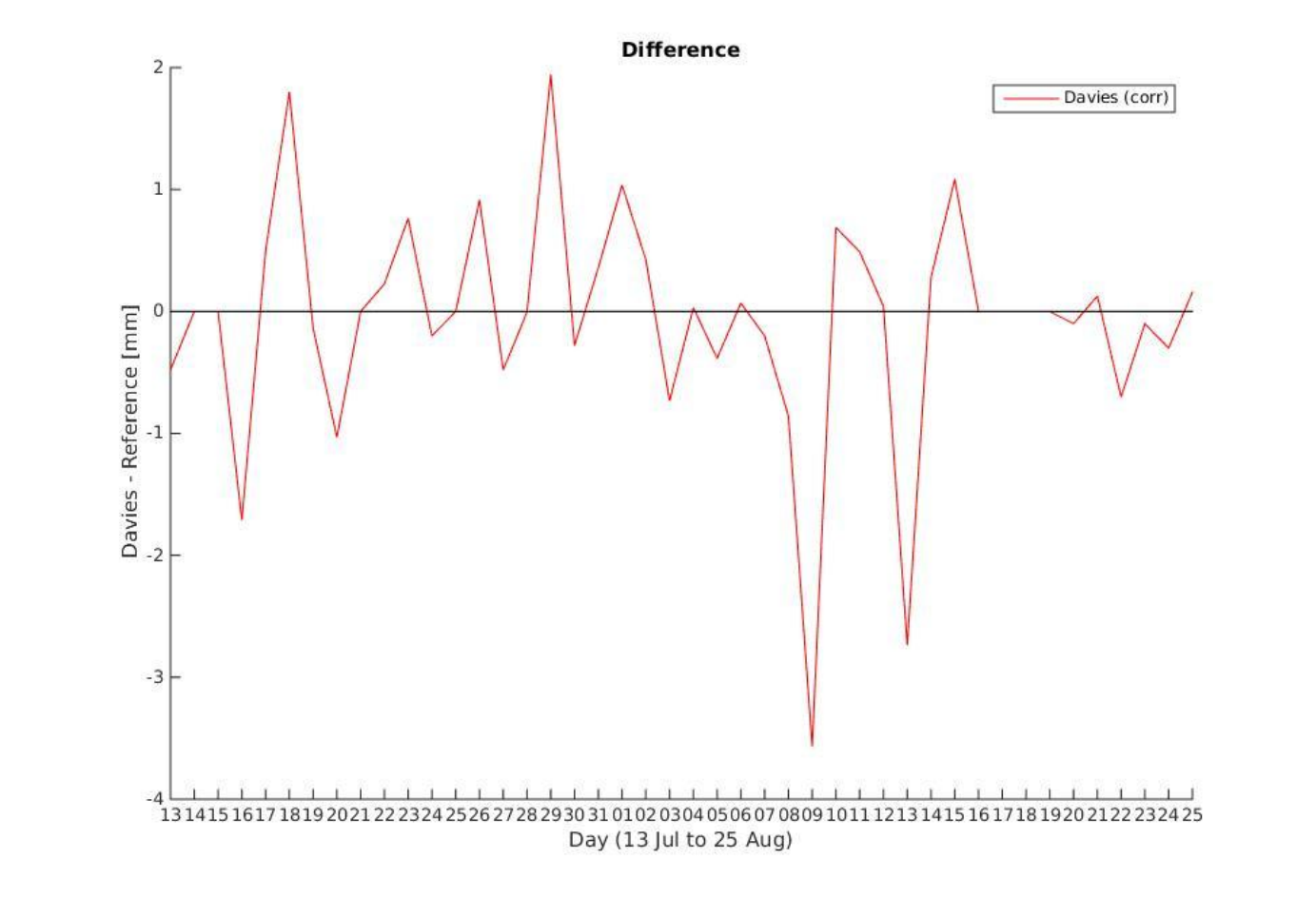
Results



Raw data 95% of expected values (as per testing)

- Solid red line is corrected data

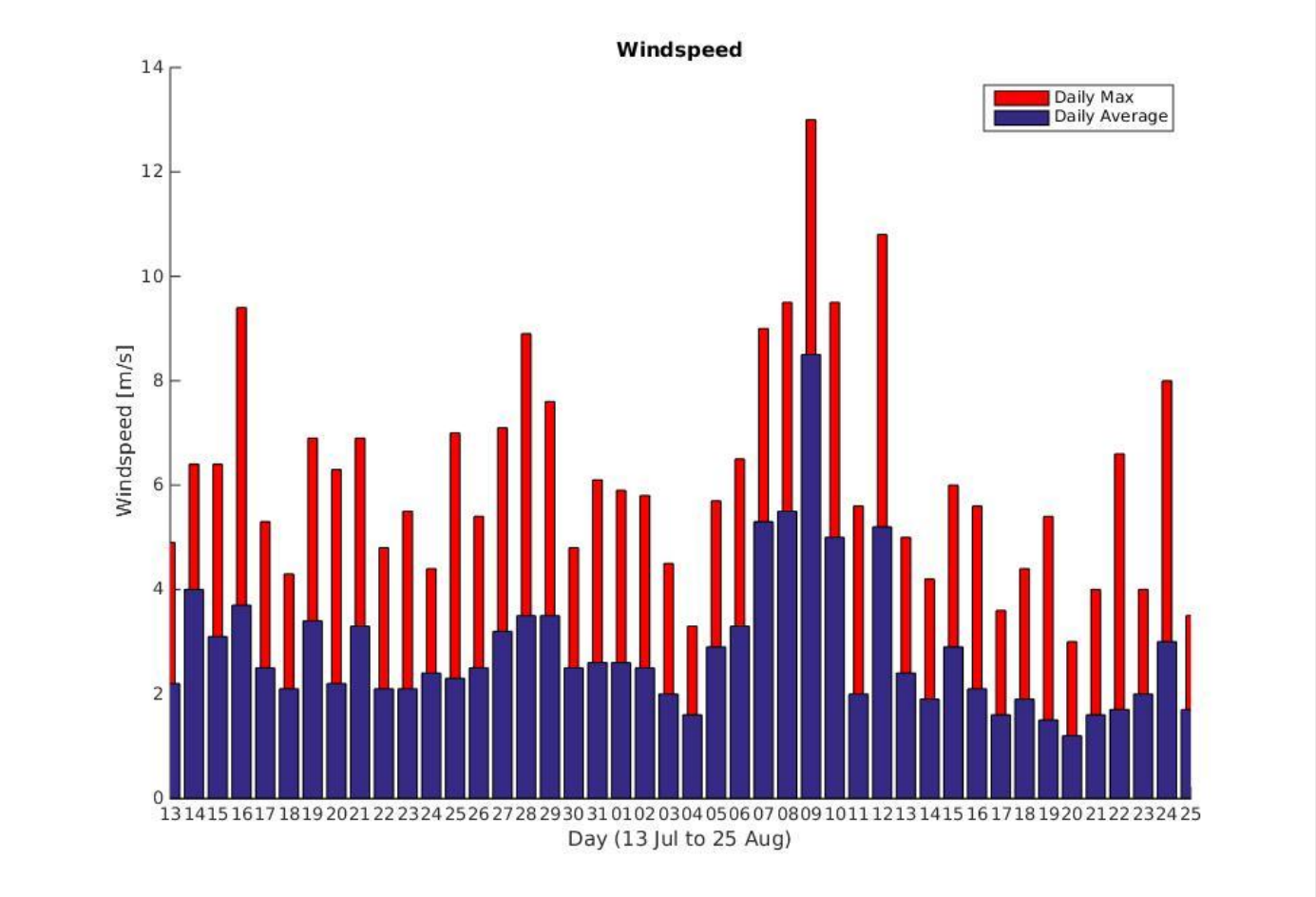
Results



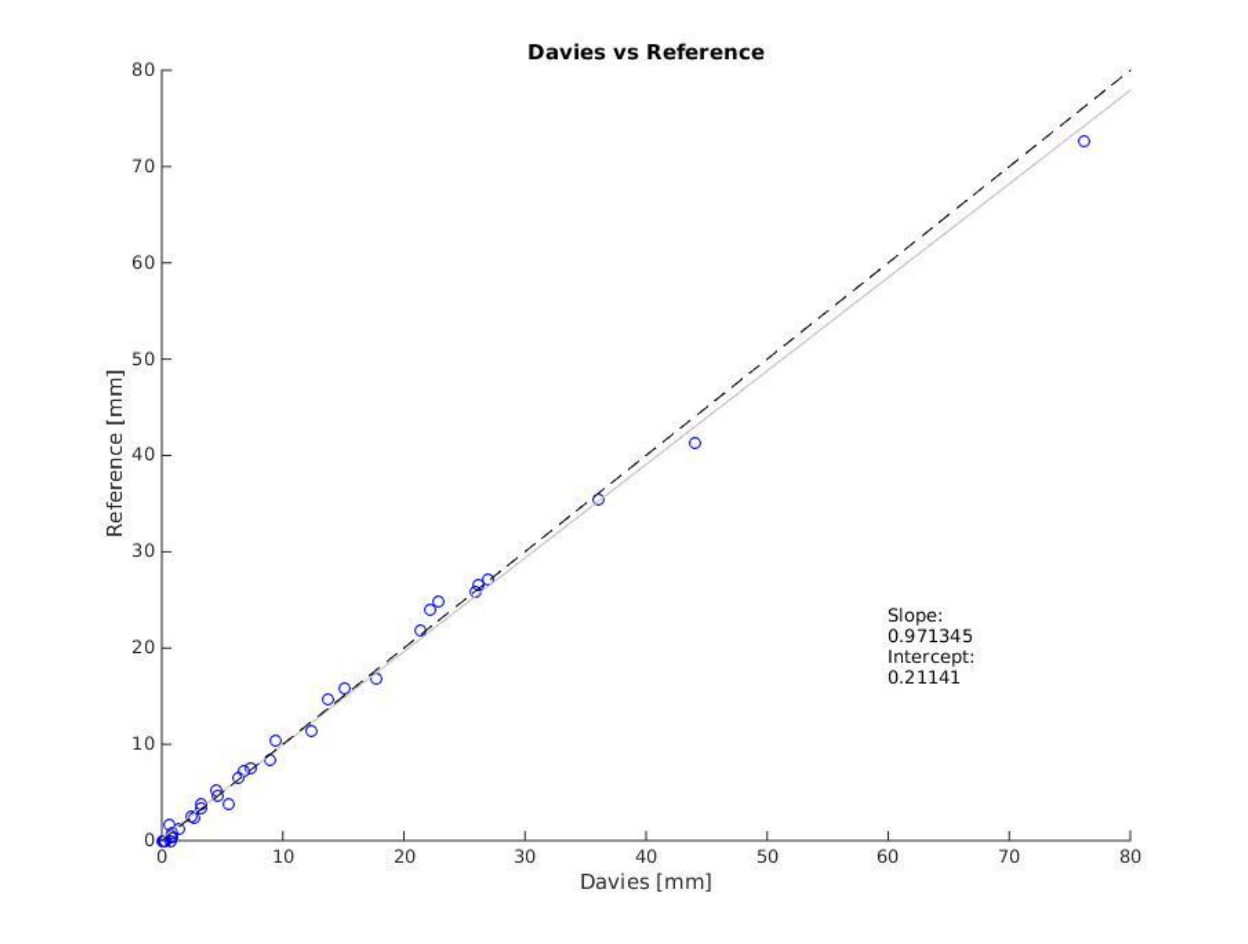
Correlation: 0.998

Root mean square error: 0.94 mm

Results

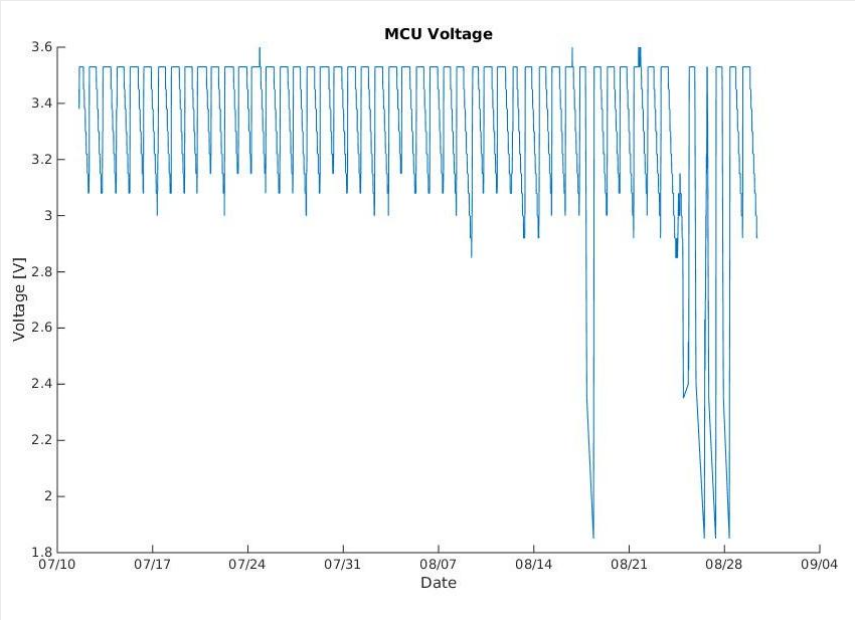

Windspeed
Daily Max
Daily Average
Windspeed [m/s]
0
2
4
6
8
10
12
14
13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Day (13 Jul to 25 Aug)

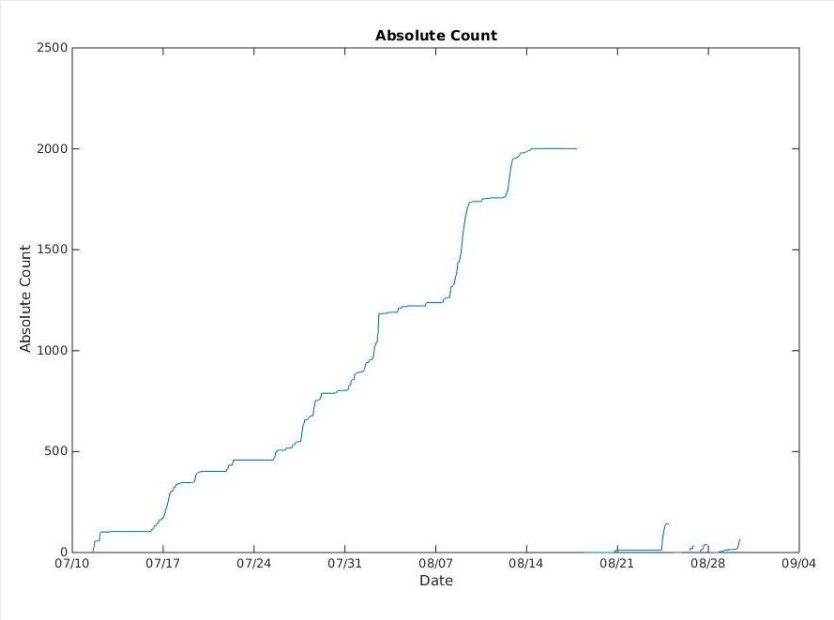
Results



Slope: 0.971345
Intercept: 0.21141

Issues





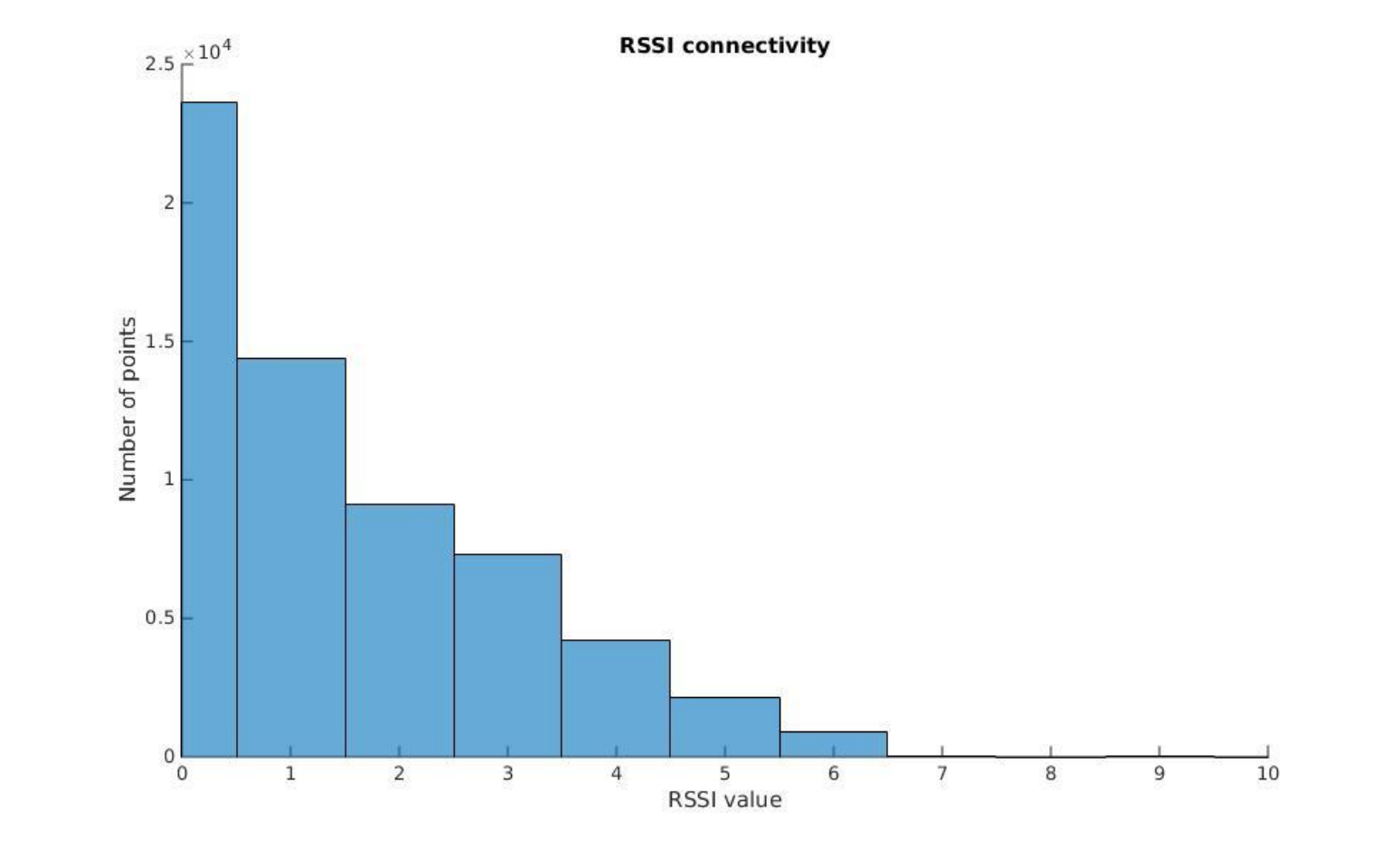
Late evening 24 Aug, MCU voltage dropped below 2.4 V threshold (left)

- As a result, the absolute tip counter reset (right)

Rainy/cloudy weather in Bergen since the 24th

- Solar panel insufficient power?

Issues



RSSI: 0 -> Limit of connectivity

Going Forward

- Davies Rain Collector has performed well, but more analysis and data will be needed to make an informed conclusion
  - Hourly data analysis next
- Second rain collector will be deployed soon, with adjustments, removing need for 95% correction
  - Will be installed next to existing collector
- Need to ensure power and wireless connectivity are adequate
  - Low power leads to absolute tip counter reset and connection loss
  - Poor connectivity leads to missed minutely reports