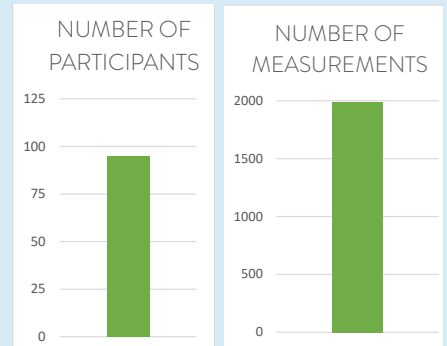


DELFT MEASURES RAIN RESULTS

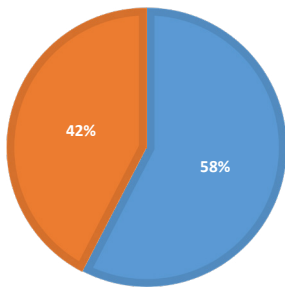
NOVEMBER 2020

Last summer we received 225 applications for citizen science project Delft Measures Rain (DMR). From those 225 applications, 95 participants across Delft have gotten into action. Together they submitted 1991 measurements between July 17 and September 14. This infographic shows the most important results, which decisions were made with regards to the data analyses, and how the data compares to official precipitation measurements. It appears that there is a difference between the amount of rainfall between different parts of the city and that the submitted data has comparable quality in comparison to data from sensors from the Royal Dutch Meteorological Institute (KNMI). Because DMR measures with a higher resolution than the KNMI, the measurements are a good addition for measuring rainfall disparities within cities.



SUBMISSION TIME OF MEASUREMENTS

■ Indicated submission time ■ Other submission times

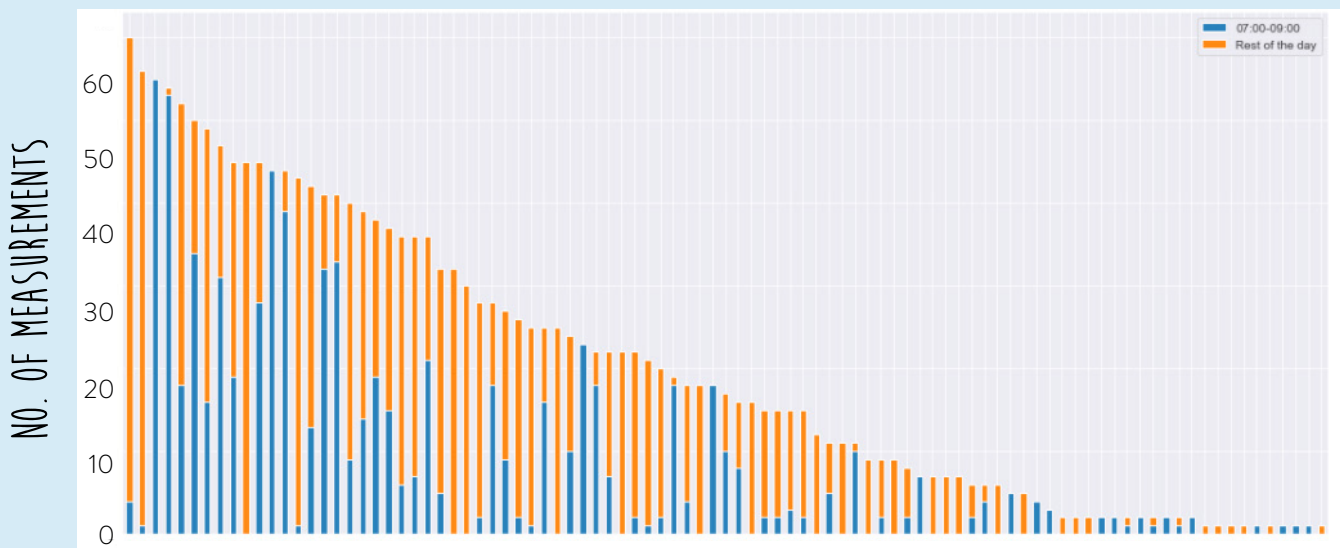


USABILITY OF THE DATA

To make accurate day-to-day comparisons of the rainfall, it is important that all data is submitted during the same timeframe. There were instructions for this in the manual, but unfortunately not everyone has been able to submit the data within the indicated timeframe.

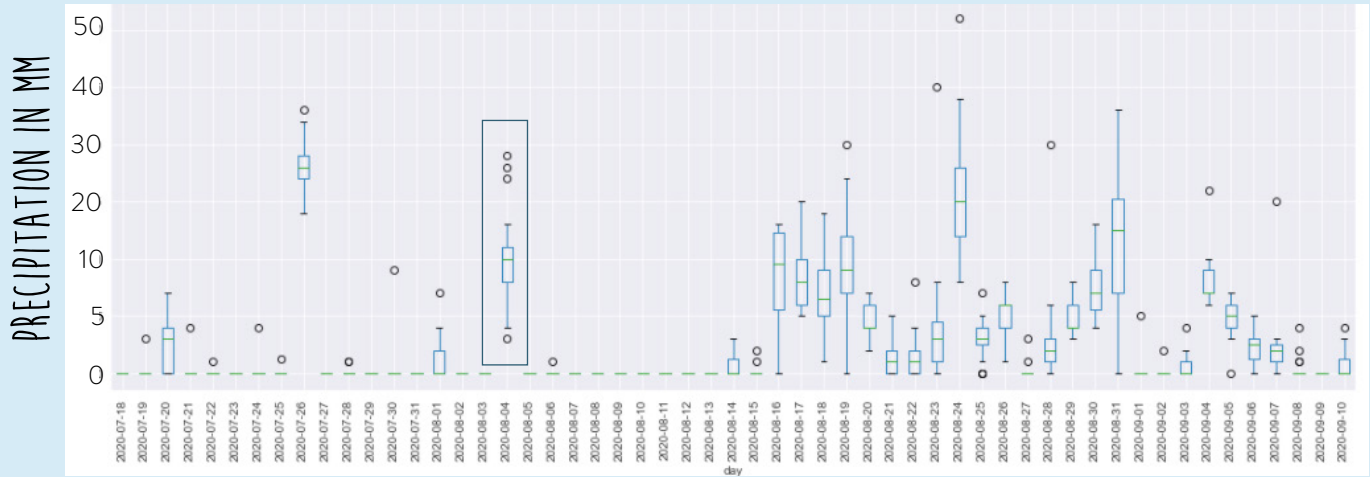
Across the 2 months of data collection, on average 57,6% of the measurements were submitted in the given timeframe. That data has been used in the day-to-day comparisons. Luckily, the data that was submitted outside of that timeframe was still usable for the week-to-week comparisons with the KNMI data and the rain gauges of the municipality of Delft. In this way, all data and all the efforts of the citizen scientists have still been valuable for the research.

SUBMITTED MEASUREMENTS



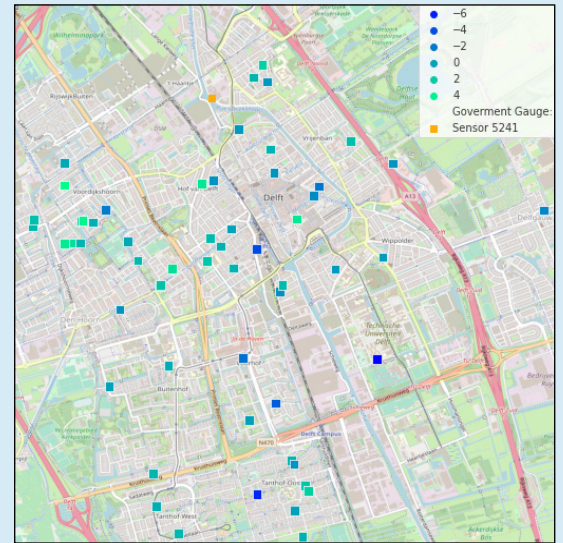
Above you can see how many measurements were submitted per participant. Each bar represents one person or measurement location. The blue part of the bars indicate measurements that were submitted within the indicated timeframe and thus the ones that have been used in the day-to-day comparisons. The orange part of the bars are measurements that were submitted during another timeframe. **You can see that some participants submitted a few datapoints, while others have measured the entire two months!** We are impressed by everyone's efforts and the submitted data and really want to thank all the participants for that!

RAINFALL IN DELFT



The graph above shows the precipitation per day on different measurements locations. On the horizontal axis, you see the different days, on the vertical axis the mm of rain that are measured. The rectangles represent the most average datapoints. Most datapoints are covered by this rectangle and thus all measure a very similar amount of rain. The circles above or beneath the rectangles represent locations that have measured much less or much more rain than the average. **It can be seen that on the same day there can be large differences in rainfall between different locations. Within the cadre you can see that on the same day one place measured 4mm, while another location measured 30mm! A lot of circles can be seen outside of the rectangles, meaning that the rainfall differs quite often between different parts of the city.**

To confirm this finding, a map was created. It shows how much each measuring location differs from the average amount of rainfall measured across the city. Dark blue points represent less rain than average, while lighter points represent more rain than the average. **This map shows that on average the north-west of Delft receives more rain than the other parts of the city. So there is a clear difference in rainfall patterns within the city!**



COMPARISON WITH THE KNMI

Besides mapping the difference in precipitation in the city, we also researched how reliable and usable the DMR data are when compared to the official KNMI data. The KNMI uses sensors, but these measure a much larger area and thus have a lower resolution than our research design.

To compare these data, the amount of rain per week for both DMR and KNMI was calculated. Then, the two averages for each week were compared. **From the graph below you can see that the DMR data (blue) barely deviates from the KNMI data (red). Eventhough DMR didn't use sensors but home-made rain gauges, this didn't have a negative influence on the general reliability and accuracy of the data.**



In addition, the precision of the DMR data was analysed. The expectation was that reading small amounts of rain (1-2 mm) in the rain gauge might be more difficult than reading higher amounts of rain. **The analysis shows that measurements of 0-4 mm rain are indeed less reliable than the measurements of the KNMI. However, boven 4mm the measurements are very similar and can be compared very well to the KNMI data.** In conclusion, the DMR measurements with this type of rain gauge can be a good addition to mapping local rain showers and the incidental flooding that accompanies them.