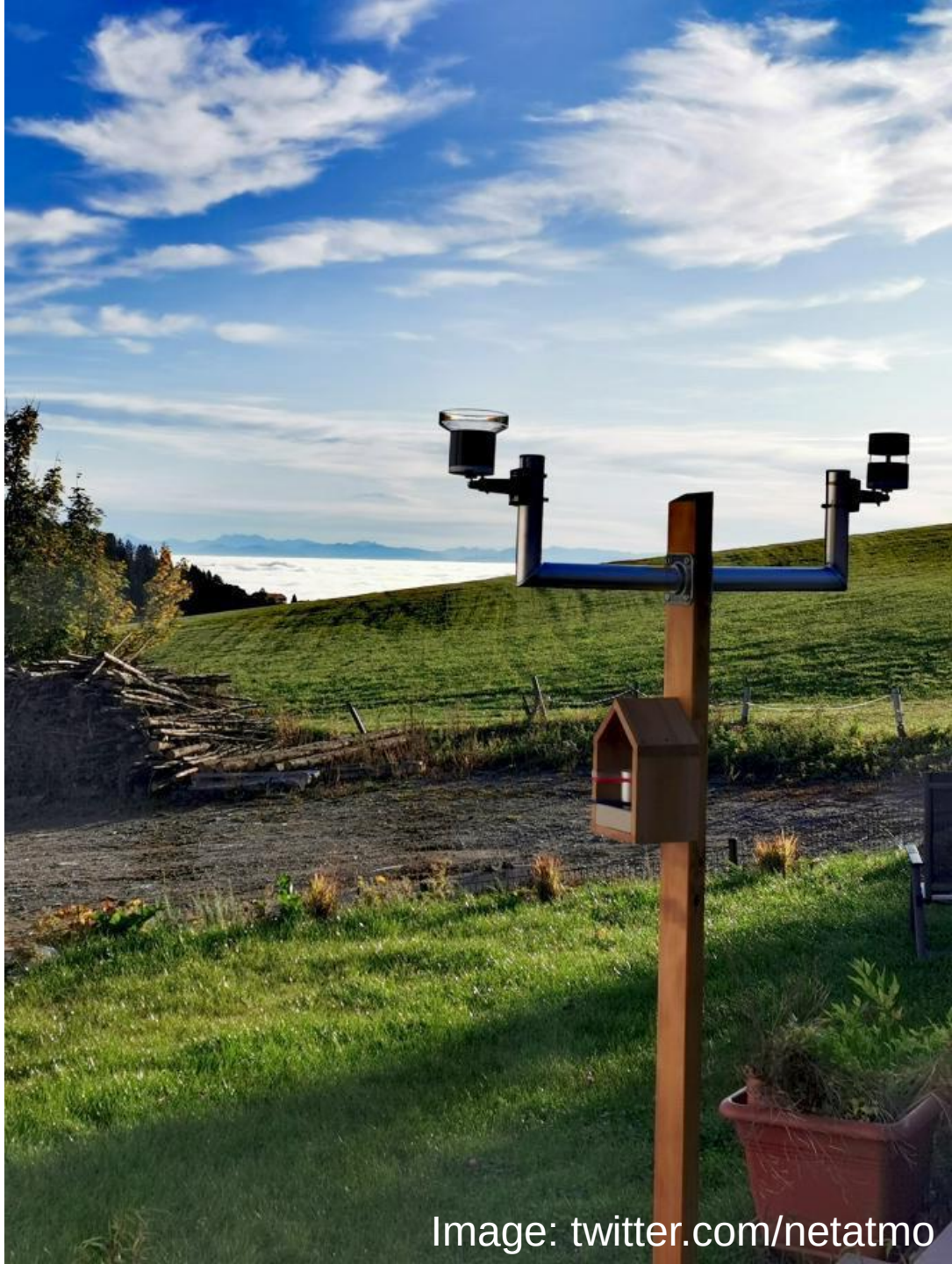
Crowdsourcing meteorological data

Jonathan Coney

Ben Pickering,

Dr. David Dufton,

Dr. Maryna Lukach

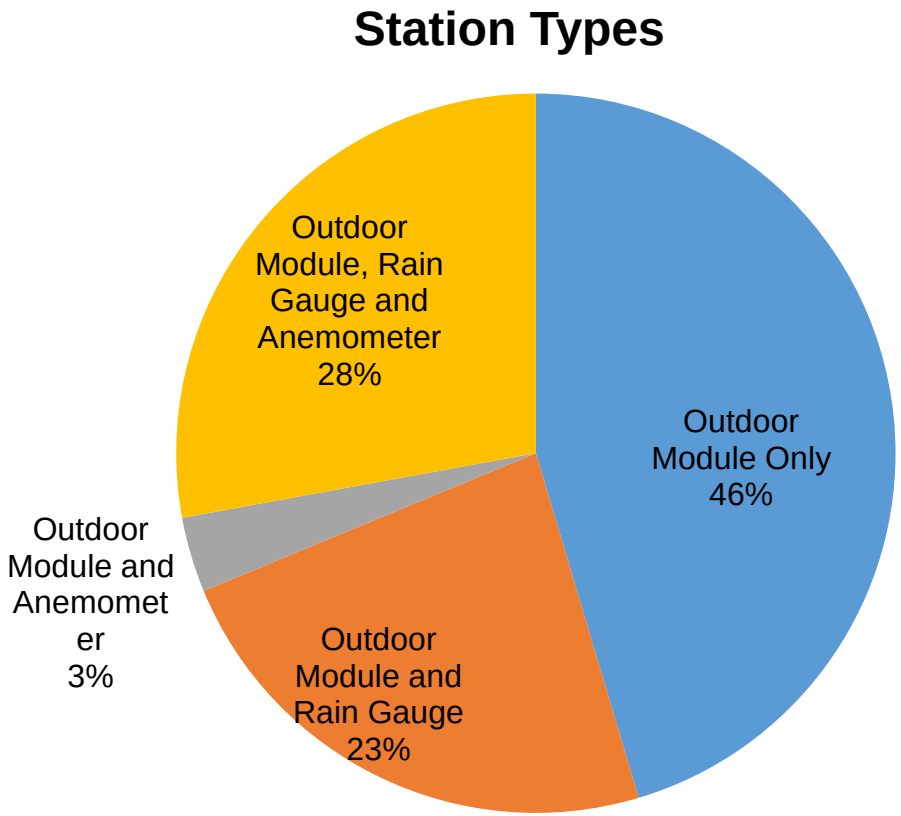


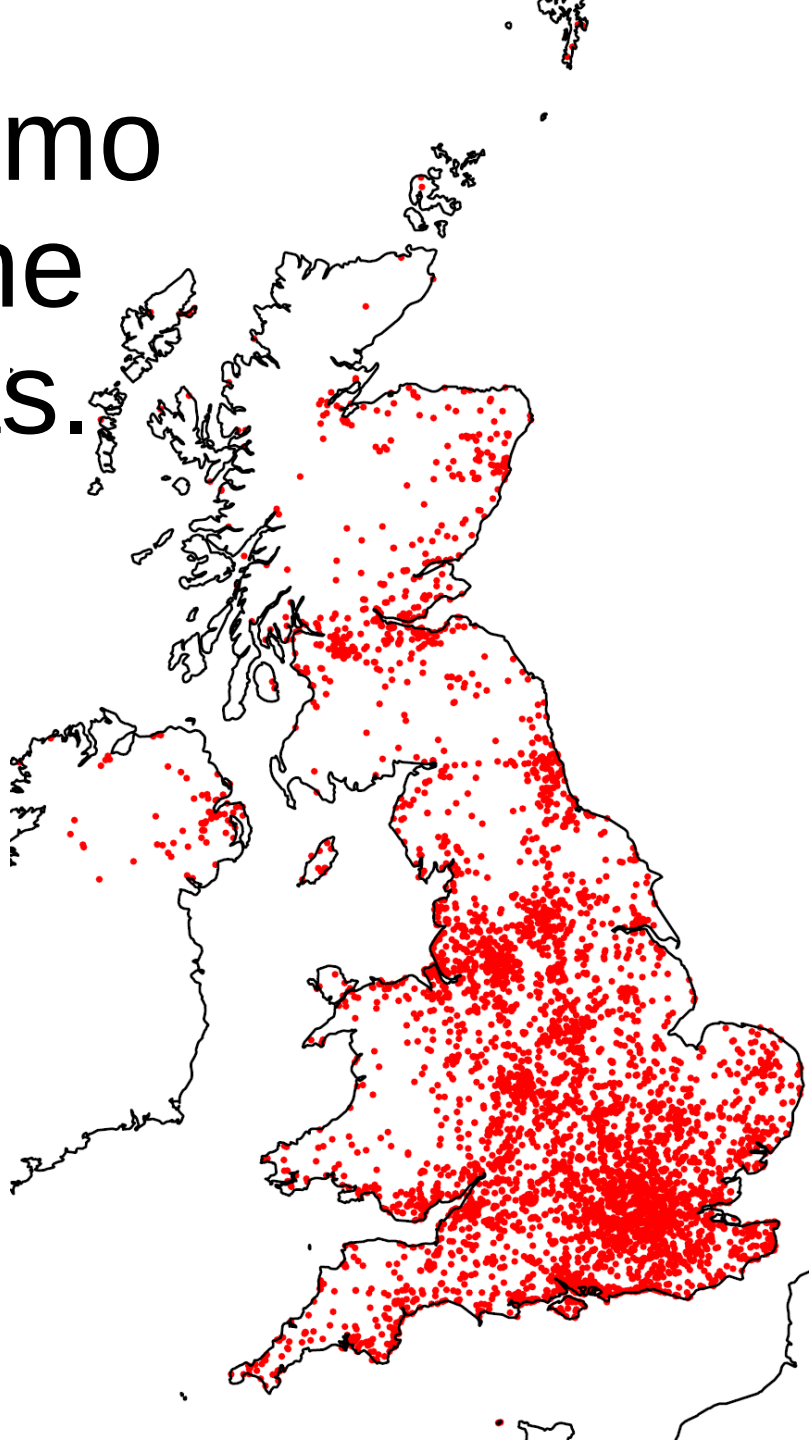
Crowdsourced data is not being used to its potential.

Map: Met Office WOW Observations

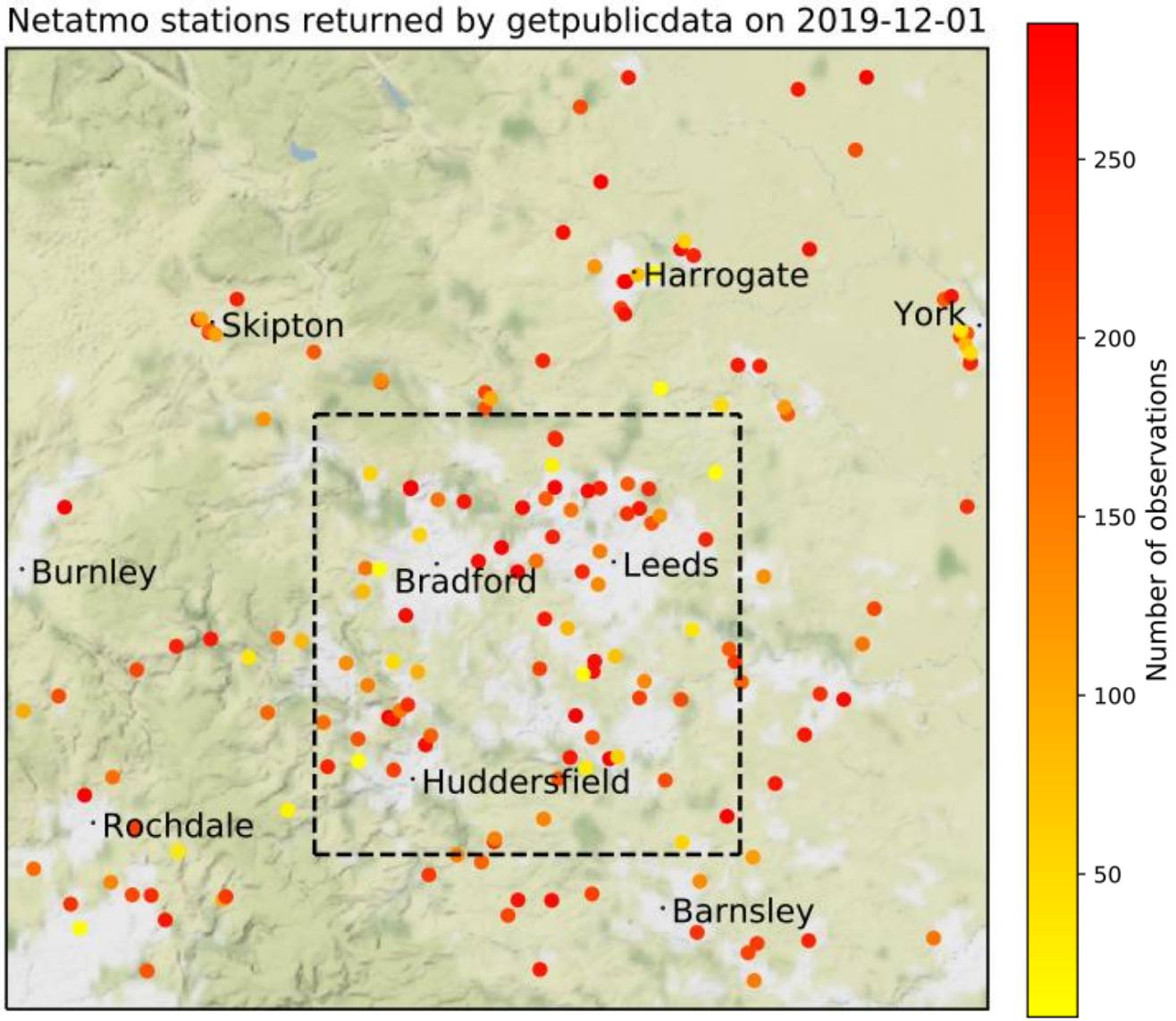
Netatmo Smart Home Weather Stations

The majority of Netatmo weather stations in the UK are in urban areas.

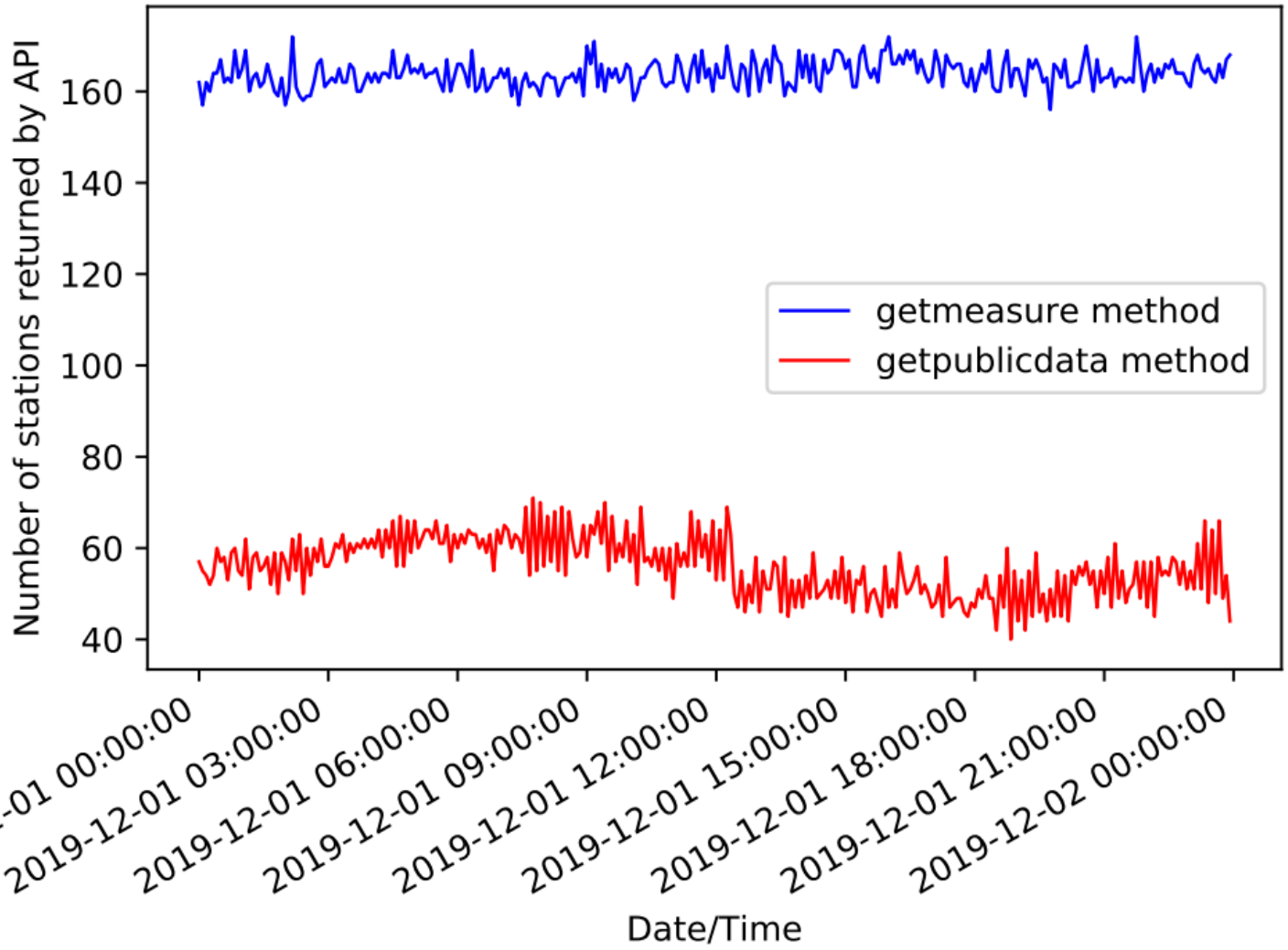




The API does not always allow for easy collection of data.



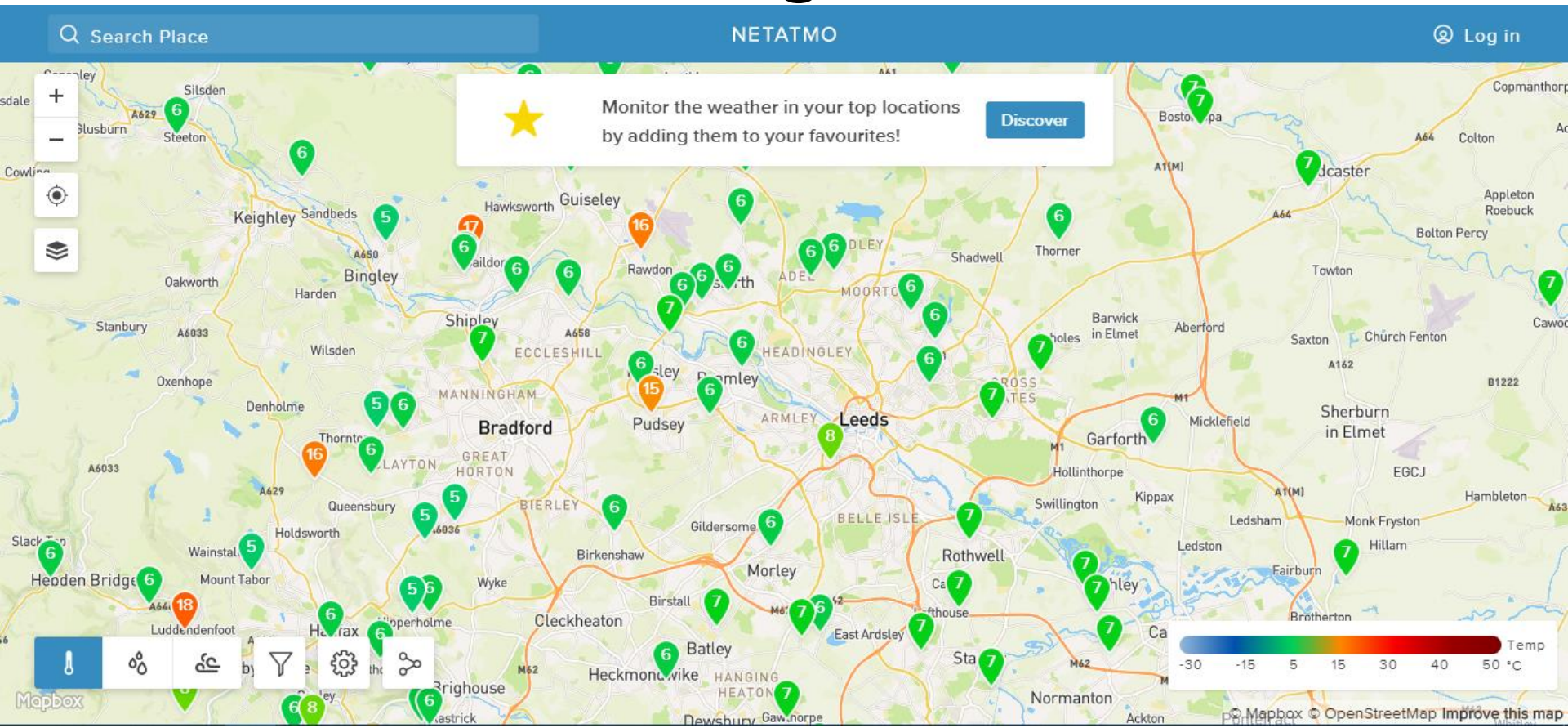
There are several ways of getting data from the API.



Crowdsourcing this data has some more niggles too.

- User places sensor incorrectly – i.e. in direct sunlight
- User places sensor indoors
- Possible biases within the sensor themselves:
  - Lag time
  - “warm bias” (Chapman et al., 2017)

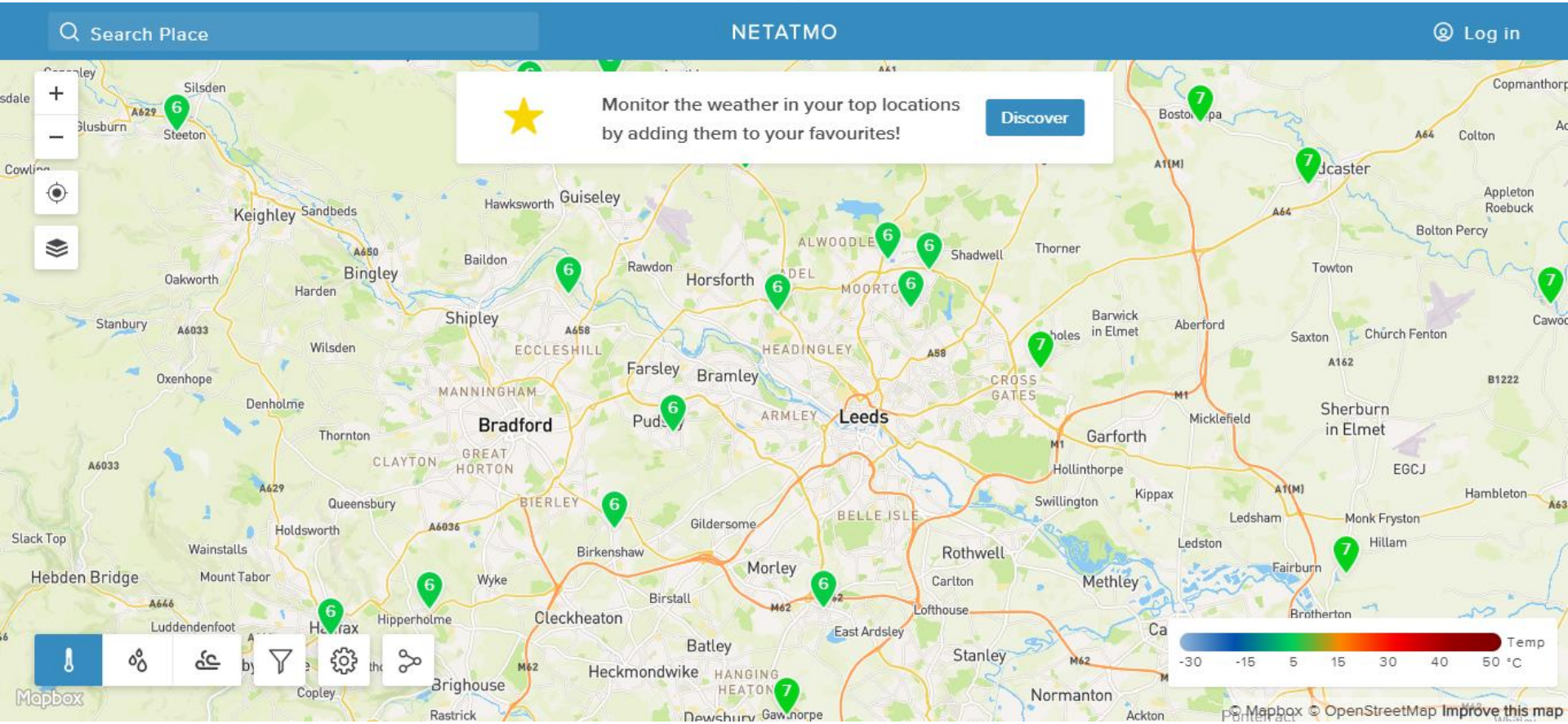
Methods of filtering the data



Without filter

Netatmo weather map:
https://weathermap.netatmo.com/

Methods of filtering the data



With filter

Netatmo weather map:
https://weathermap.netatmo.com/

Aims of the project

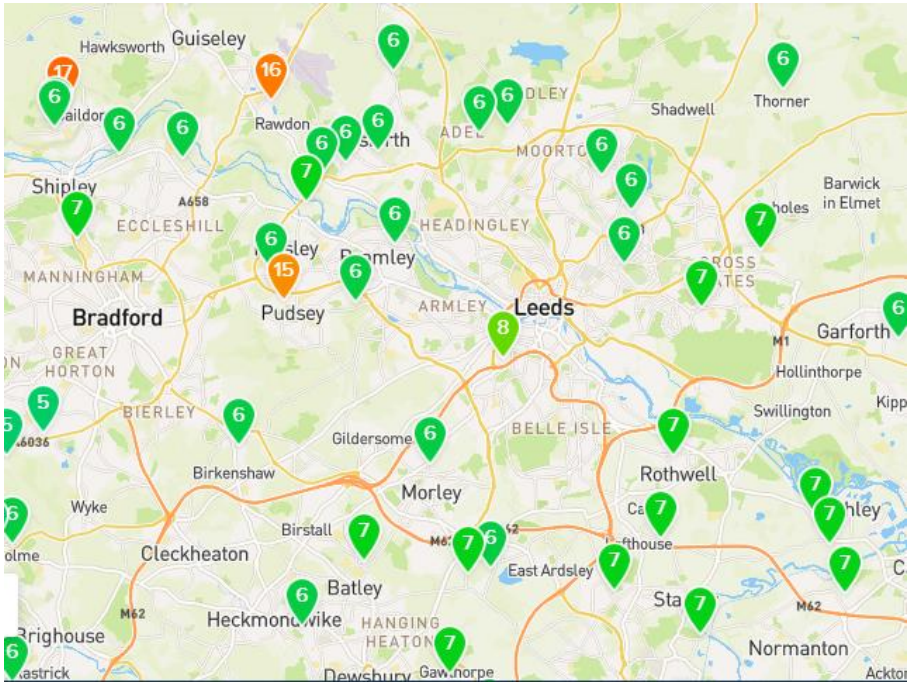
- Measure the accuracy of the Netatmo temperature and humidity sensor in a climate chamber
- Write Python code to collect data from Netatmo weather stations in the UK
- Perform spatial validation and compare quality control methods of this data
- Publish the data set for UK stations
- Produce a scientific paper based on the work.

The first part of the project involves testing the Netatmo temperature sensor in a climate chamber.

Image: androidpit.com

Previous papers have come up with varying methods of filtering the data.

- One method proposed by Nipen et al. (2019)
- One method proposed by Meier et al. (2017)
- Filter used by Netatmo on the weather map



Summary

- Crowdsourcing meteorological data has great potential.
- If we are to use data from home weather stations in weather models, we need to be able to assimilate the data properly.
- Finding the best method of quality control is the first step to use this data well.

Images: twitter.com/netatmo

References

- Chapman, L., Bell, C., and Bell, S. 2017. Can the crowdsourcing data paradigm take atmospheric science to a new level? A case study of the urban heat island of London quantied using Netatmo weather stations. *International Journal of Climatology*. 37(9), pp. 3597-3605.
- De Vos, L., Leijnse, H., Overeem, A., and Uijlenhoet, R. 2017. The potential of urban rainfall monitoring with crowdsourced automatic weather stations in Amsterdam. *Hydrology and Earth System Sciences*. 21(2), pp. 765-777.
- Meier, F., Fenner, D., Grassmann, T., Otto, M., and Scherer, D. 2017. Crowdsourcing air temperature from citizen weather stations for urban climate research. *Urban Climate*. 19, pp. 170-191.
- Netatmo. 2012a. *Netatmo Connect APIs*. [Online]. [Accessed: 4th December 2019]. Available from: https://dev.netatmo.com/en-US/resources/technical/reference.
- 2012b. *Netatmo Smart Home Weather Station*. [Online]. [Accessed: 26th December 2019]. Available from: https://www.netatmo.com/en-us/weather/weatherstation.
- Nipen, T. N., Seierstad, I. A., Lussana, C., Kristiansen, J., and Hov, . 2019. Adopting citizen observations in operational weather prediction. *Bulletin of the American Meteorological Society*.