

# Reference rainfall measurements in urban areas: do they exist?

Xi'an, China

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Knowledge  
Transfer  
Partnerships



# My background

- Trained as a Civil Engineer (BEng, Newcastle University)
- Specialised in Hydrology and Climate Change (MSc, Newcastle University)
- Commercial experience - Knowledge Transfer Partnership with Environmental Measurements Ltd
- Research degree in improving rainfall measurements (PhD, Newcastle University)
- Now employed by EML in research and development, and business development
- Interested in water in urban areas!



# Rainfall – what are we trying to measure?

Gauge Shape?

1.5m?

1.5m?

0.5m?

0.5m?

0.0m?

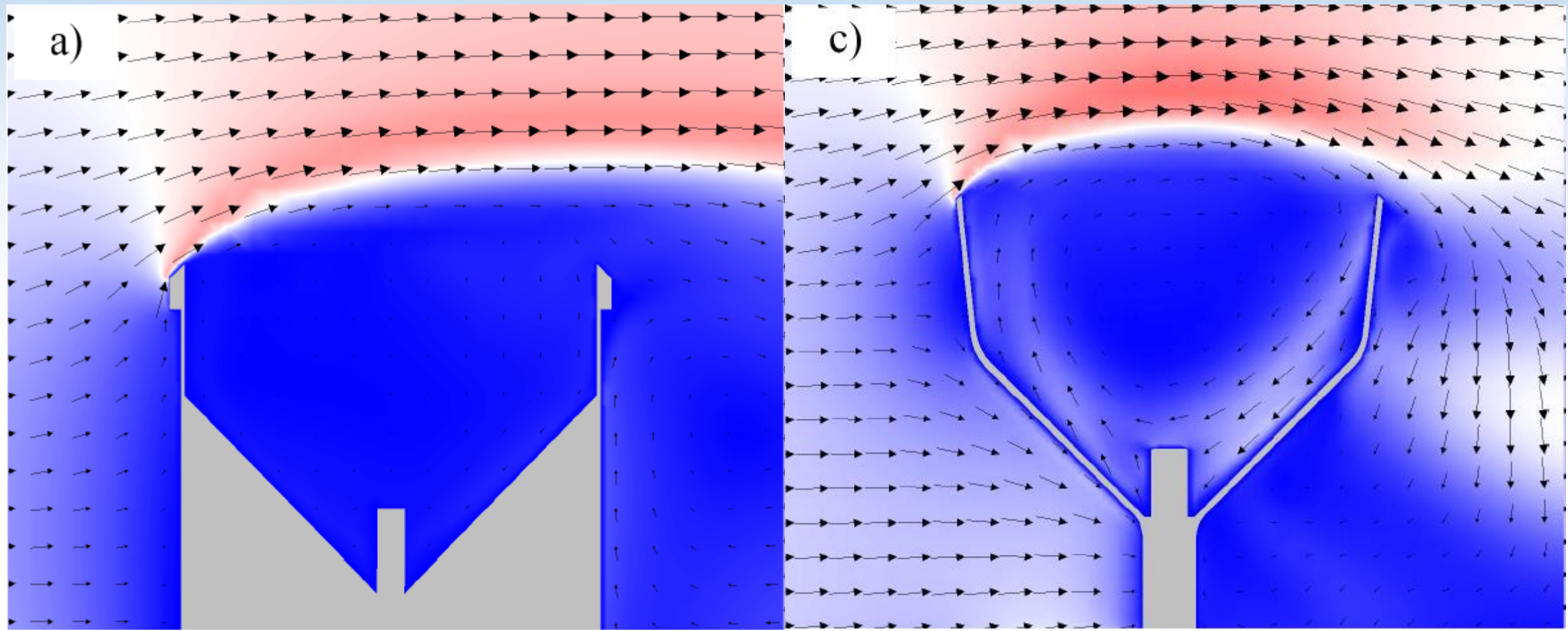


“Methods for measuring precipitation are intended to be representative of the true amount intended to represent.” World Meteorological Organization (WMO), 2008

to obtain a sample which is representative of the area which the measurement is intended to represent.” World Meteorological Organization (WMO), 2008

**DOES IT REALLY MATTER????**

# Why would it matter dynamics



# Experimental design



**Nafferton Farm**



# Experimental design

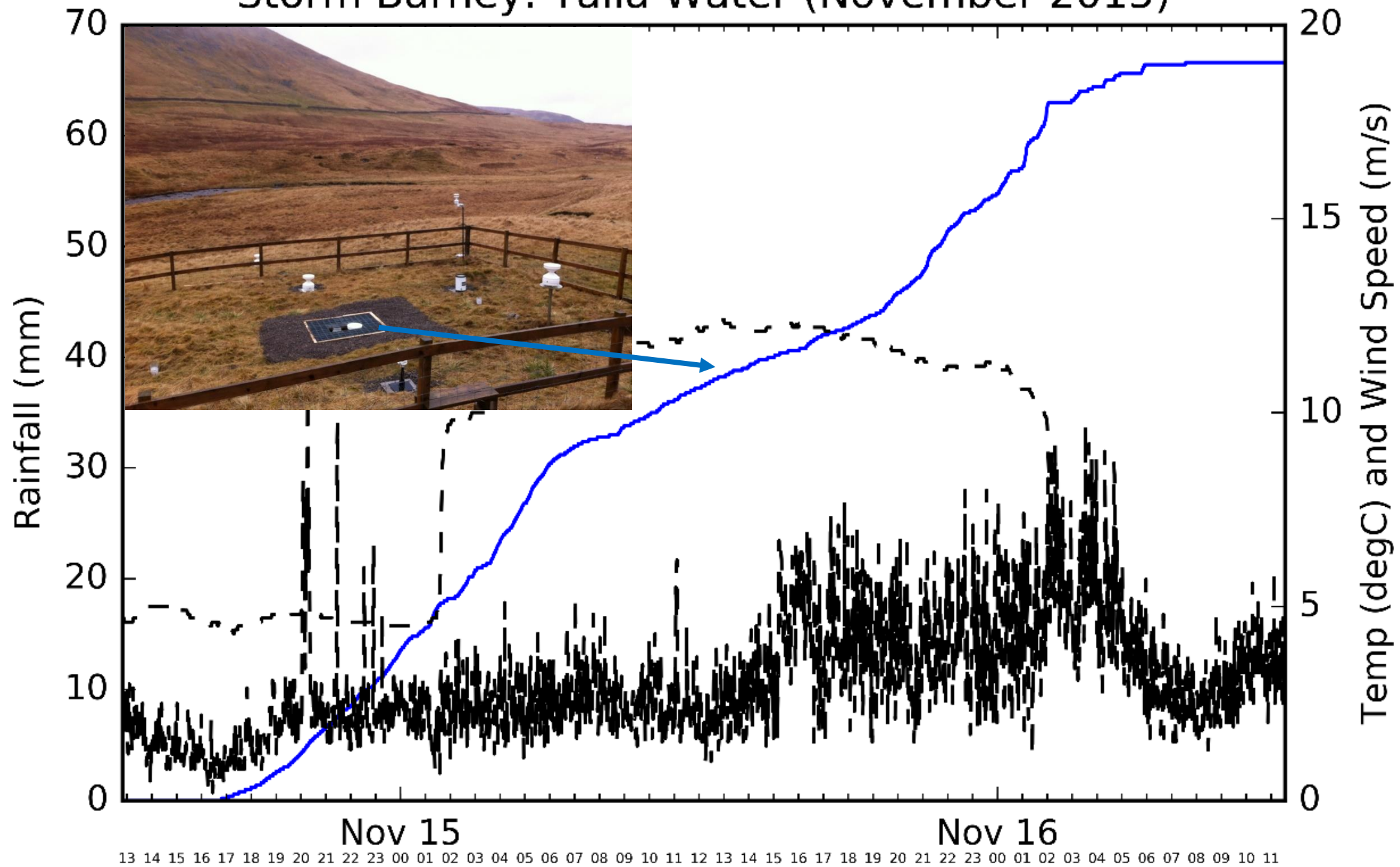


Talla Water





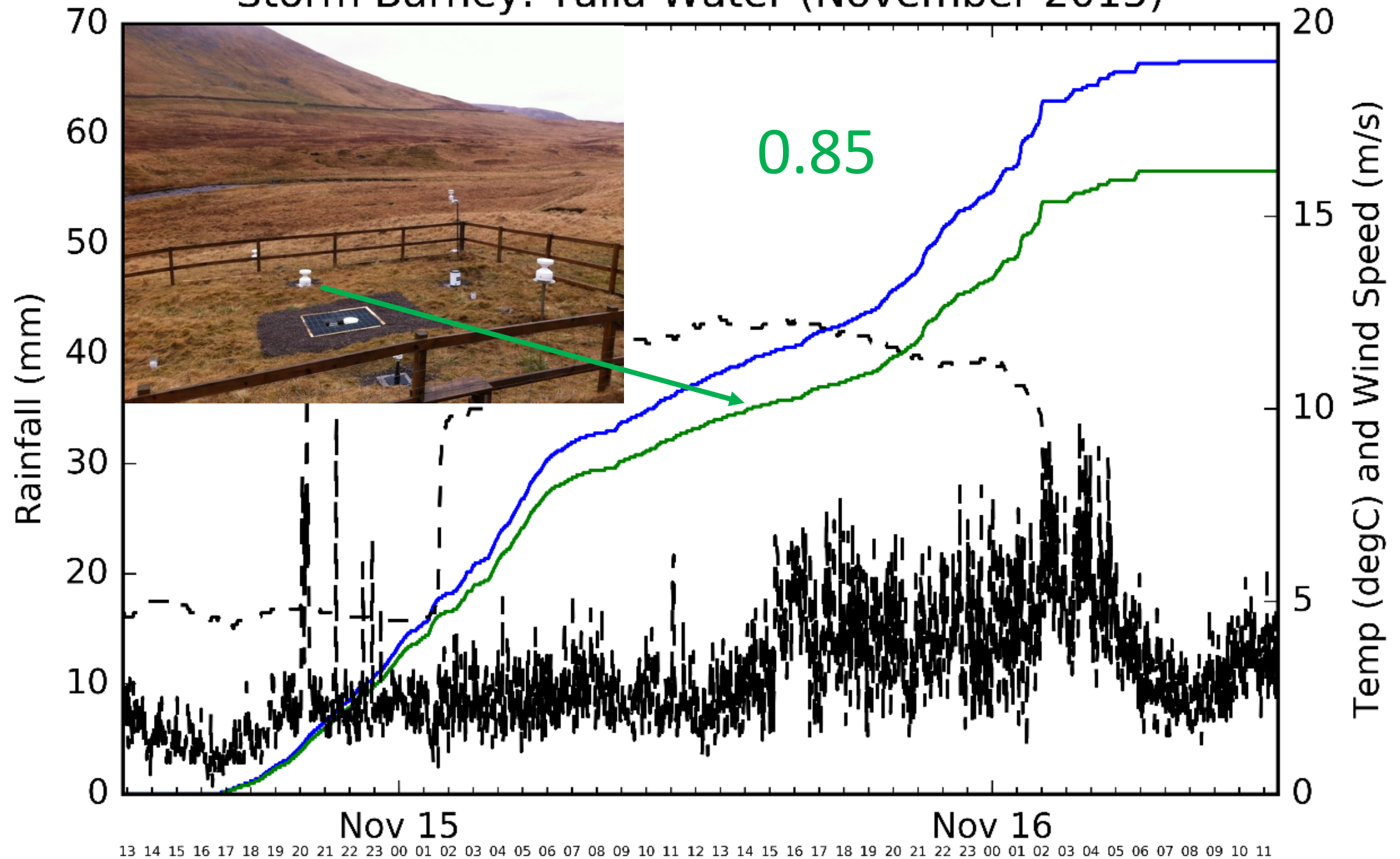
# Storm Barney: Talla Water (November 2015)



13 14 15 16 17 18 19 20 21 22 23 00 01 02 03 04 05 06 07 08 09 10 11



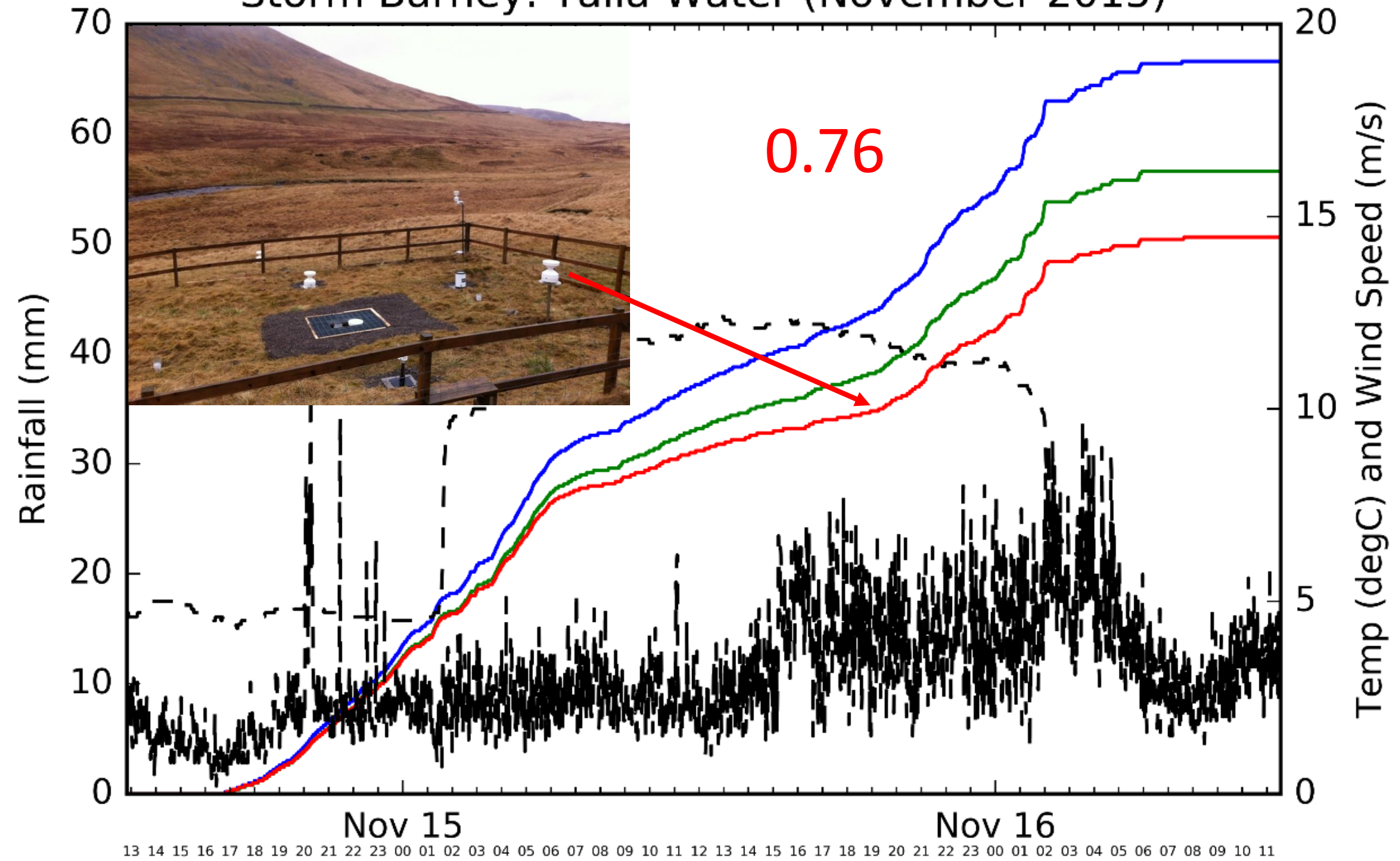
# Storm Barney: Talla Water (November 2015)







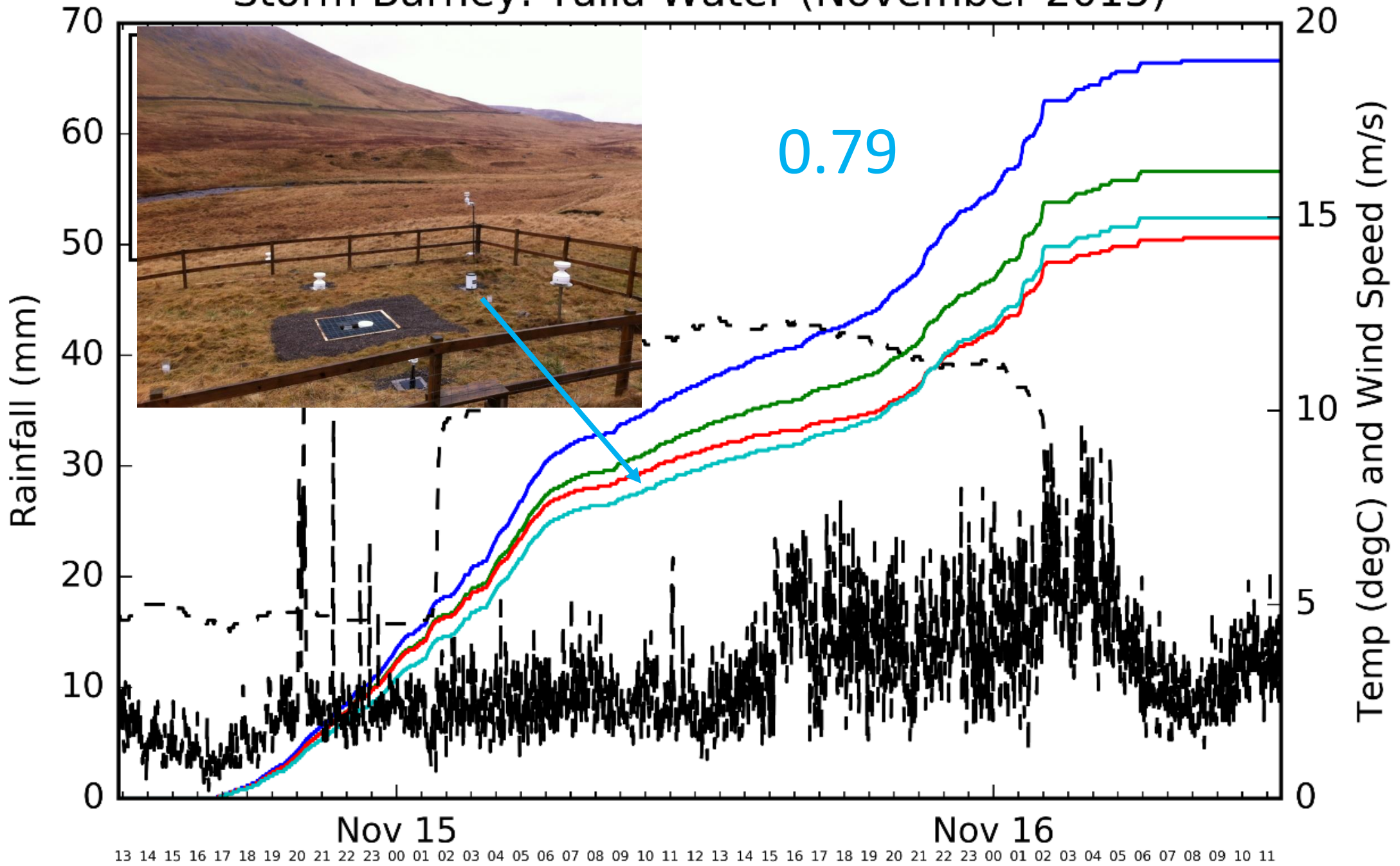
# Storm Barney: Talla Water (November 2015)



13 14 15 16 17 18 19 20 21 22 23 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 00 01 02 03 04 05 06 07 08 09 10 11

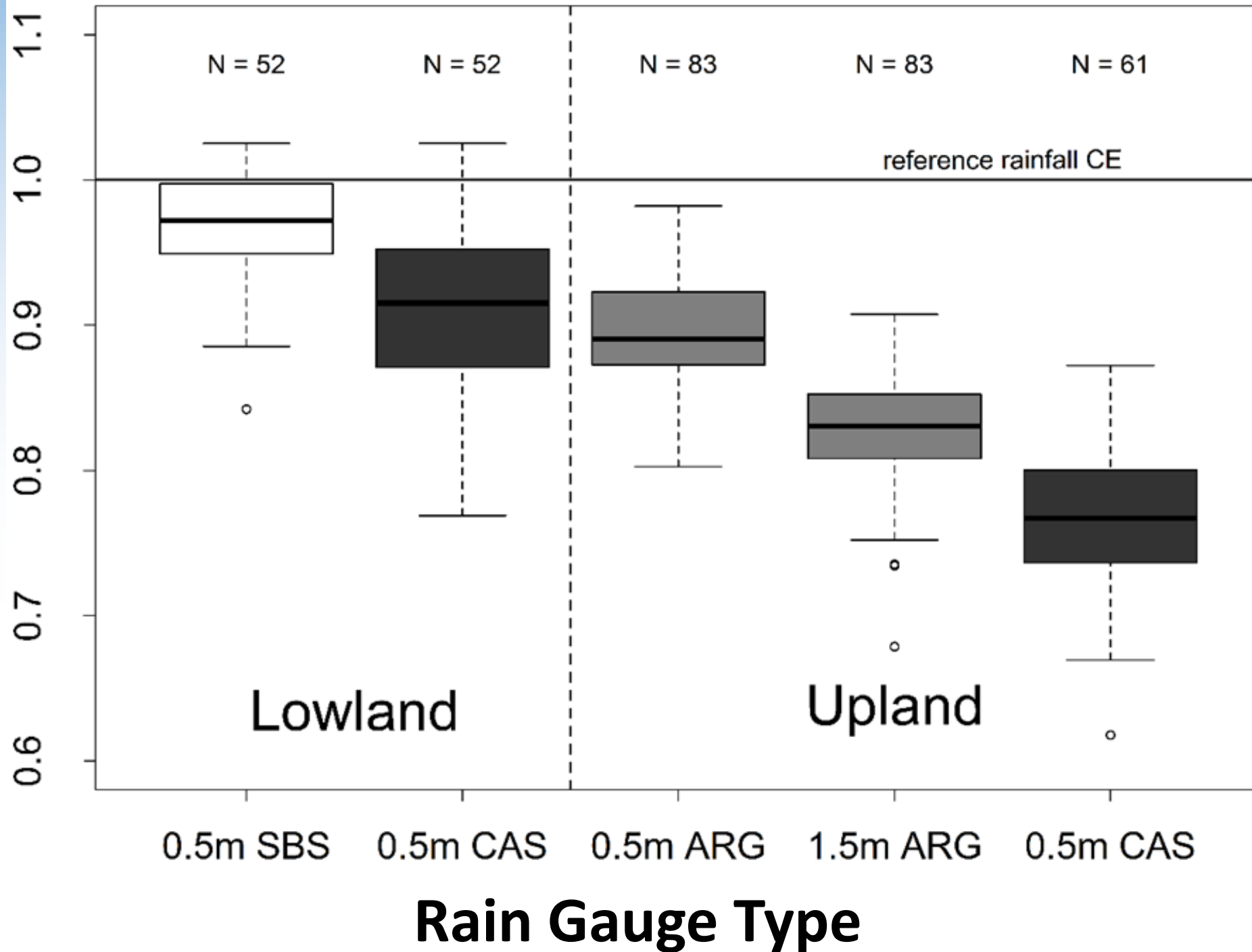


# Storm Barney: Talla Water (November 2015)



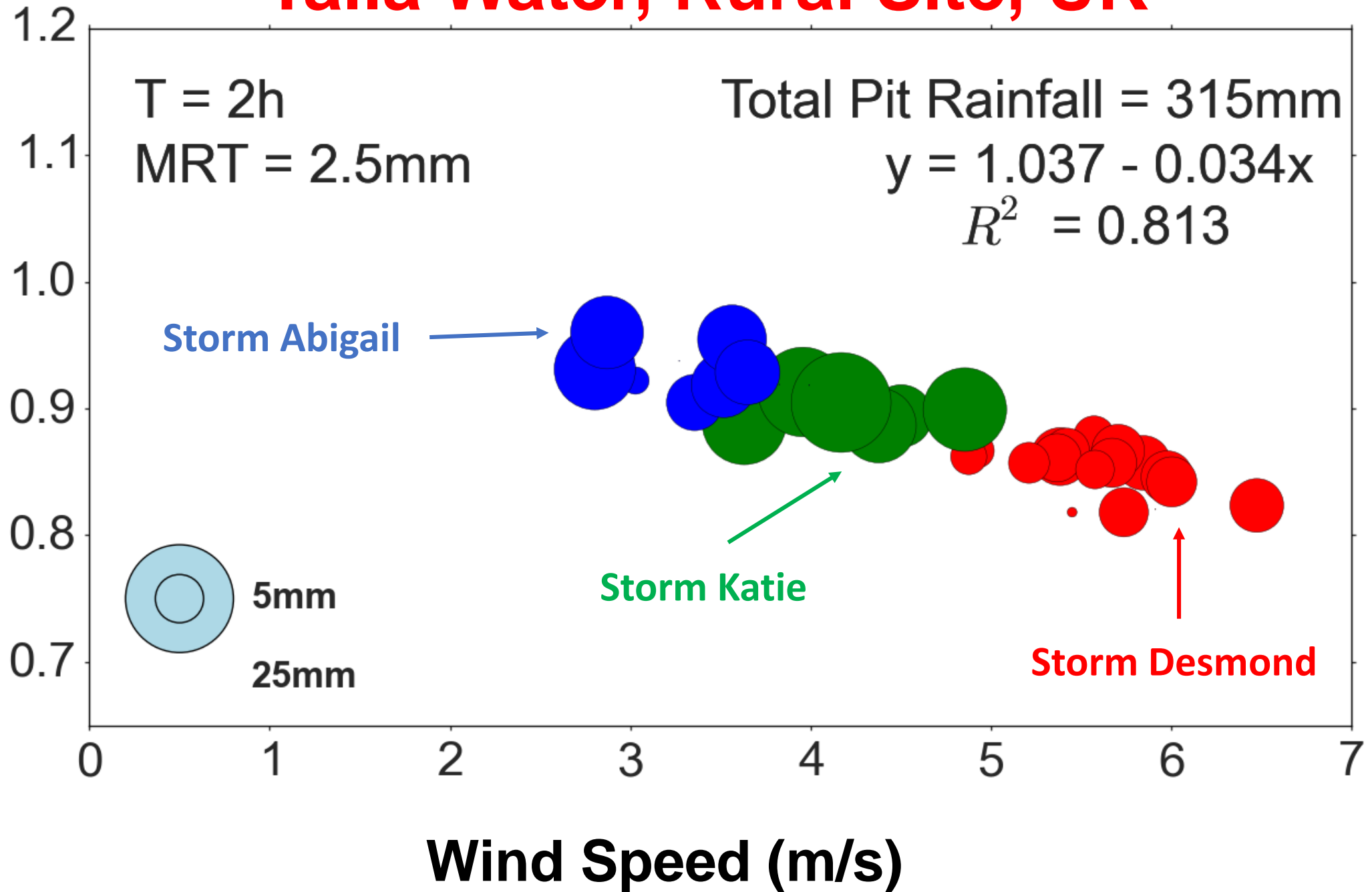
13 14 15 16 17 18 19 20 21 22 23 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 00 01 02 03 04 05 06 07 08 09 10 11

# Catch Efficiency (CE)



# Talla Water, Rural Site, UK

Catch Efficiency (CE)



# WHAT HAPPENS IN CITIES...?!



# Newcastle-upon-Tyne, North East UK.

Population = 0.3m

- Urban Observatory: Newcastle's urban laboratory has “The largest set of publicly available real time urban data in the UK”
- National Green Infrastructure Facility: “A living lab for finding solutions to global challenges in water for urban sustainability” and “An integrated testbed for smart water systems”









# The Data....?



# Thanks for your attention!

- Any questions?



Knowledge  
Transfer  
Partnerships




# References:

## Water Resources Research

AN AGU JOURNAL

Research Article

### A Computational Fluid-Dynamics Assessment of the Improved Performance of Aerodynamic Rain Gauges

Matteo Colli , Michael Pollock, Mattia Stagnaro, Luca G. Lanza, Mark Dutton, Enda O'Connell


First published: 18 January 2018 | <https://doi.org/10.1002/2017WR020549>

## Water Resources Research

AN AGU JOURNAL

Research Article |  Open Access |  

### Quantifying and Mitigating Wind-Induced Undercatch in Rainfall Measurements

M. D. Pollock , G. O'Donnell, P. Quinn, M. Dutton, A. Black, M. E. Wilkinson, M. Colli, M. Stagnaro, L. G. Lanza, E. Lewis, C. G. Kilsby, P. E. O'Connell

First published: 07 May 2018 | <https://doi.org/10.1029/2017WR022421>