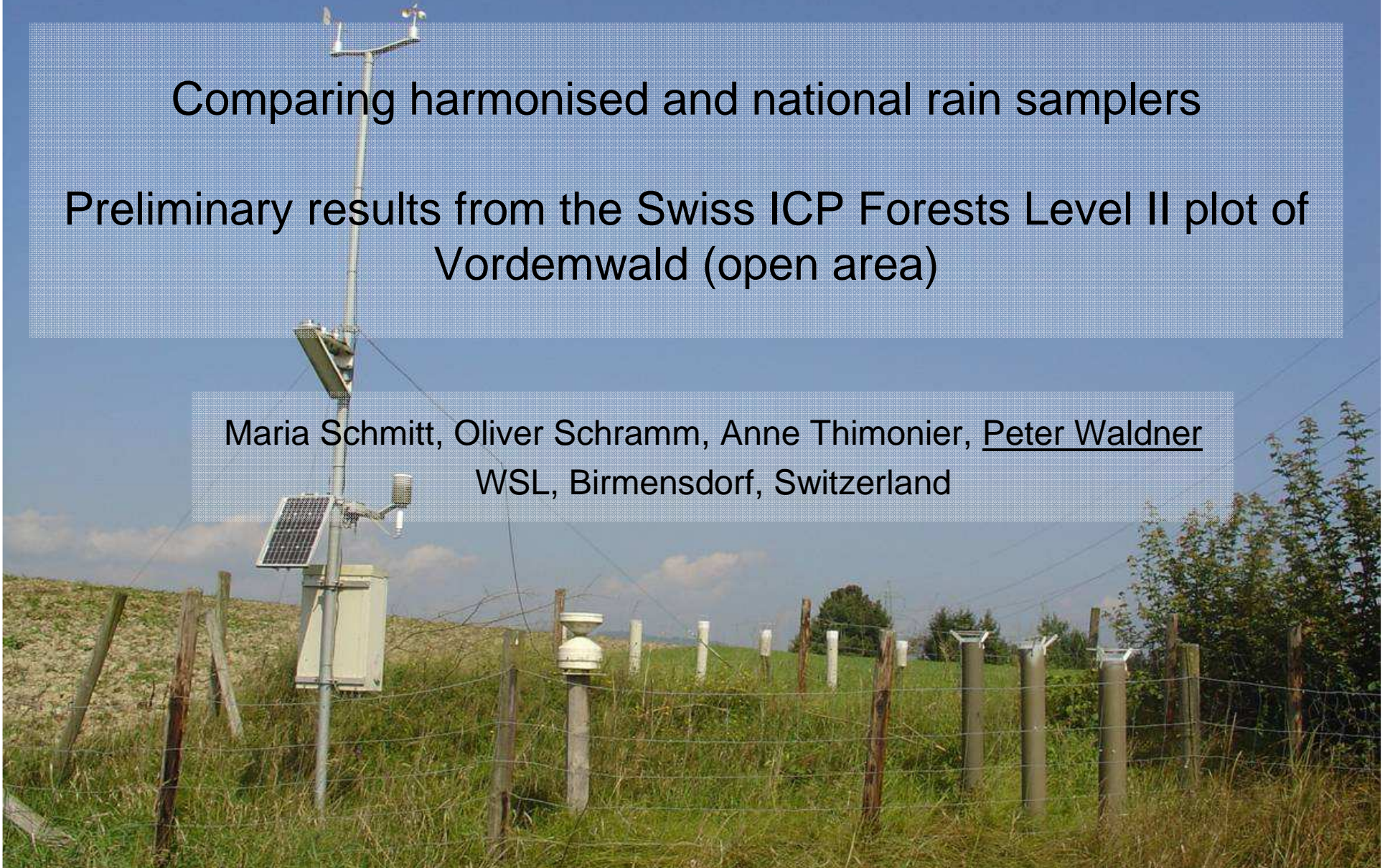


## Comparing harmonised and national rain samplers

Preliminary results from the Swiss ICP Forests Level II plot of  
Vordemwald (open area)

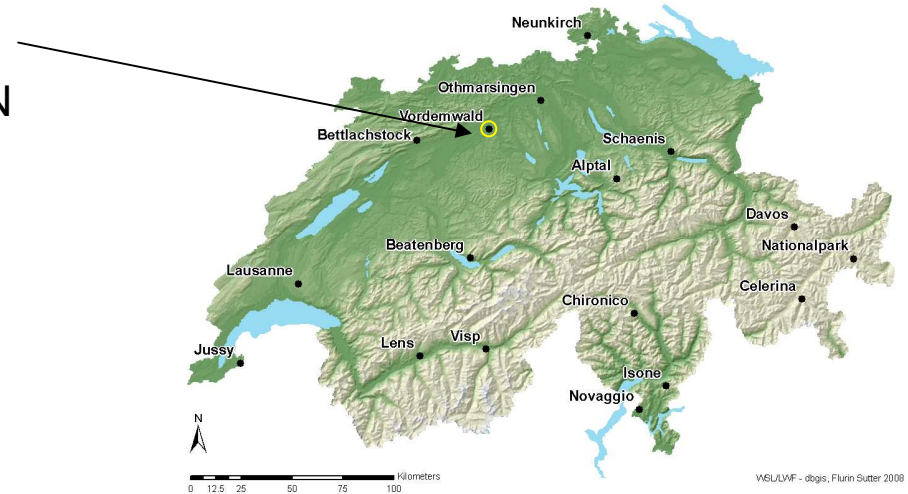
Maria Schmitt, Oliver Schramm, Anne Thimonier, Peter Waldner  
WSL, Birmensdorf, Switzerland



# Site description and sampling methods

- ICP-Forests Level II Vordemwald

- Coordinates 07°53' E, 47°17' N
- Altitude (m) 480 m
- Annual temperature 8.4 °C
- Annual precipitation 1106 mm



- Installation of EU harmonised rain collectors in the open area only
- Start date: 13 July 2009
- Collection frequency: every two weeks
- All the samplers are replaced with clean ones upon collection
- Chemical analyses: conductivity, pH, dissolved organic carbon (DOC), total nitrogen (TN)

# Sampler types

- RA Harmonised rain sampler, in PVC tube n=3
- RB Harmonised rain sampler, storage container in the ground, connected to the funnel with a silicone tube (diameter 10/16 mm) protected with Armaflex insulating foam n=3
- R4 National rain sampler, with EU bird ring and national filters, large ventilation holes ( $\varnothing = 38$  mm) in the PVC tube n=1
- R National sampler, with national bird rings and filters, small ventilation holes ( $\varnothing = 8$  mm) in the PVC tube n=3

RA  
EU harmonised rain sampler



RB  
EU harmonised rain sampler



R

National rain samplers, with national bird ring and small ventilation holes



R4

National rain samplers, with harmonised bird ring and large ventilation holes

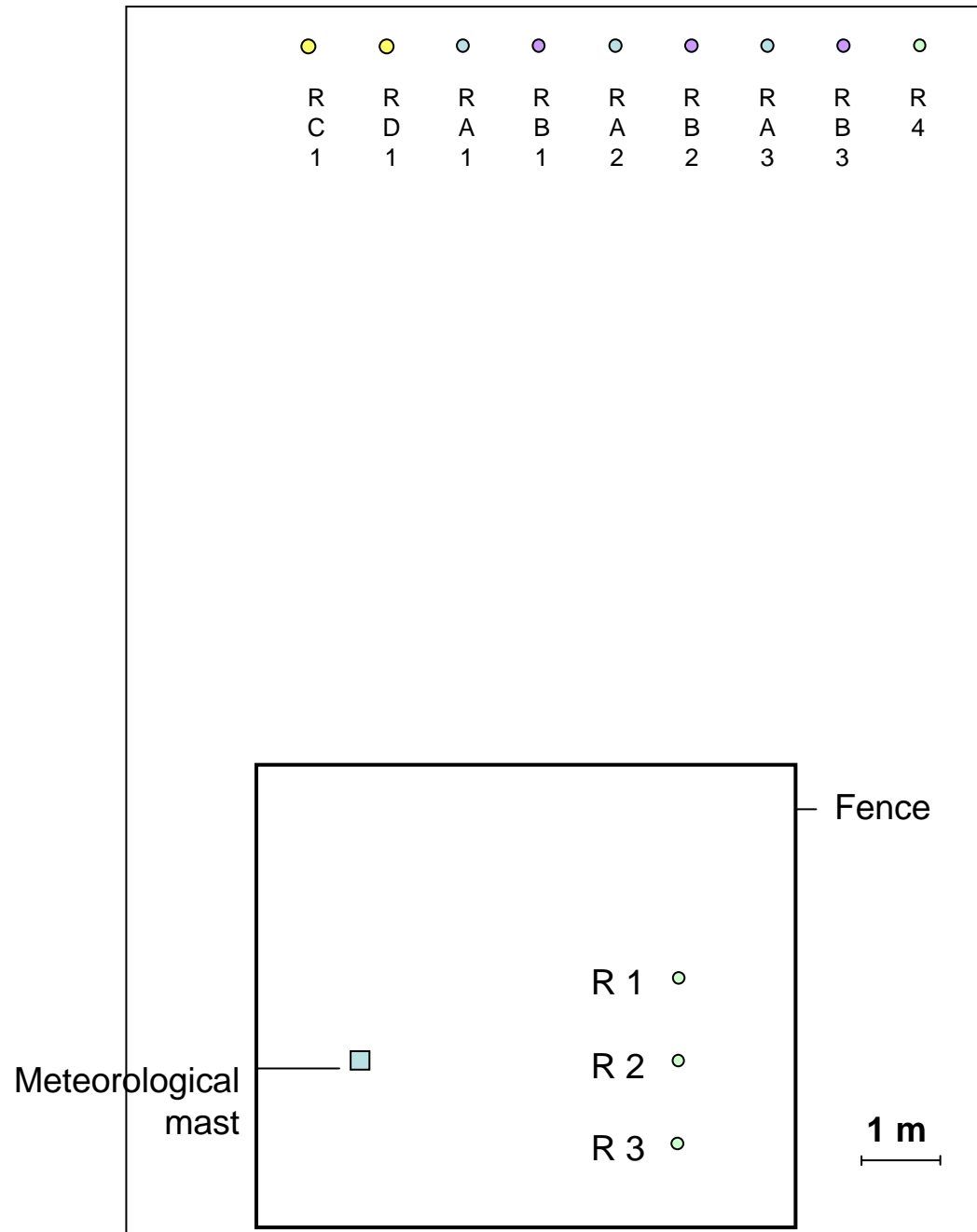


# Set-up in the field

**Legend**

- RC, RD – National prototype (n=1+1) \*
- RA – EU harmonised rain sampler in PVC tube (n=3)
- RB – EU harmonised rain sampler, with tube. Storage container in soil pit (n=3)
- R – National rain collector (n=3+1)  
R4 with EU bird ring

\* Data not shown









# Temperature measurements



## Infrared thermometer

- Measurement of the temperature of the sample upon collection



## iButtons

- Continuous recording of air temperature in the PVC tube (below the storage container)
- Time step = 1 hour



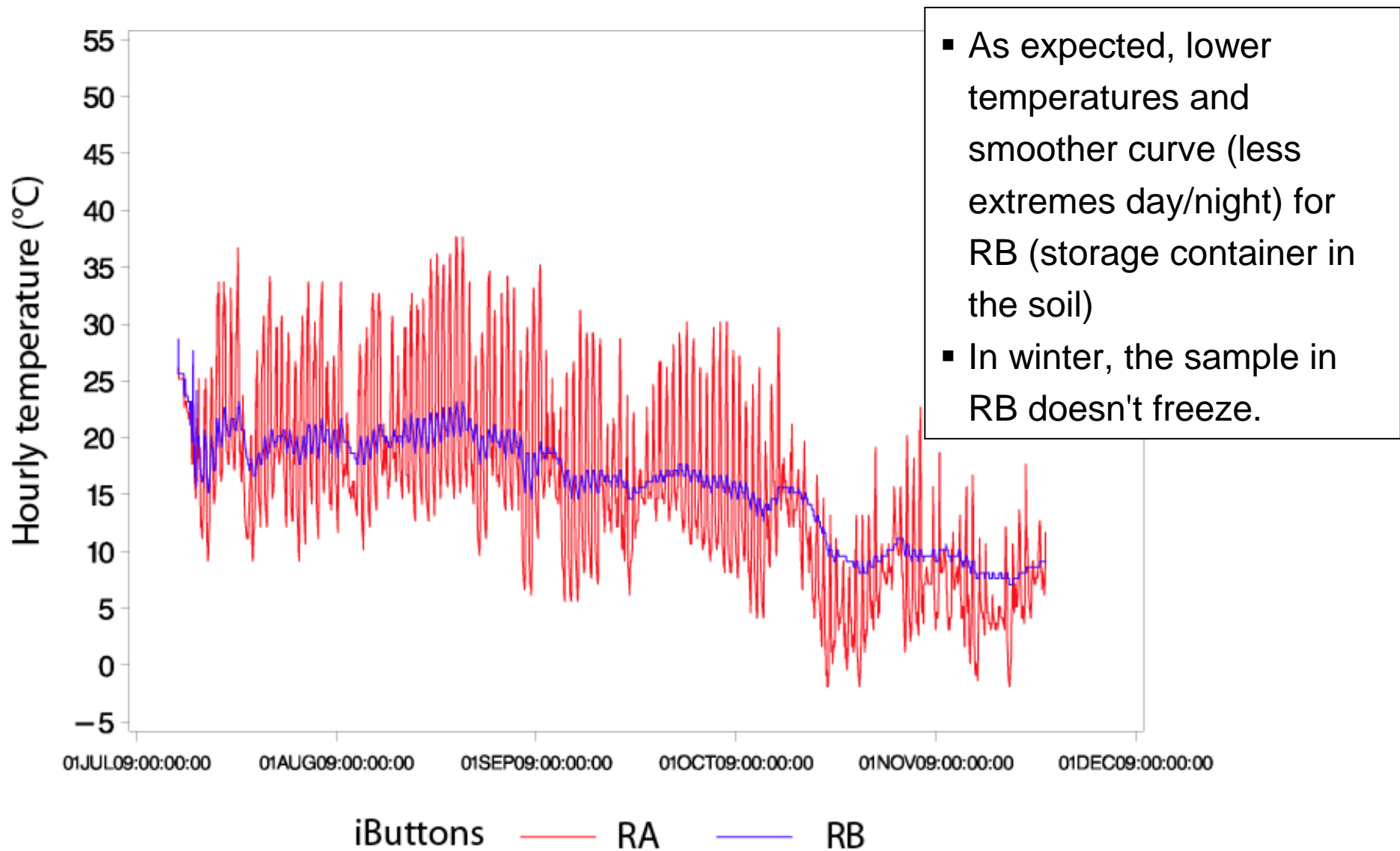
## Meteorological station

- Continuous recording of air temperature
- Time step = 10 min
- Automatic rain gauge

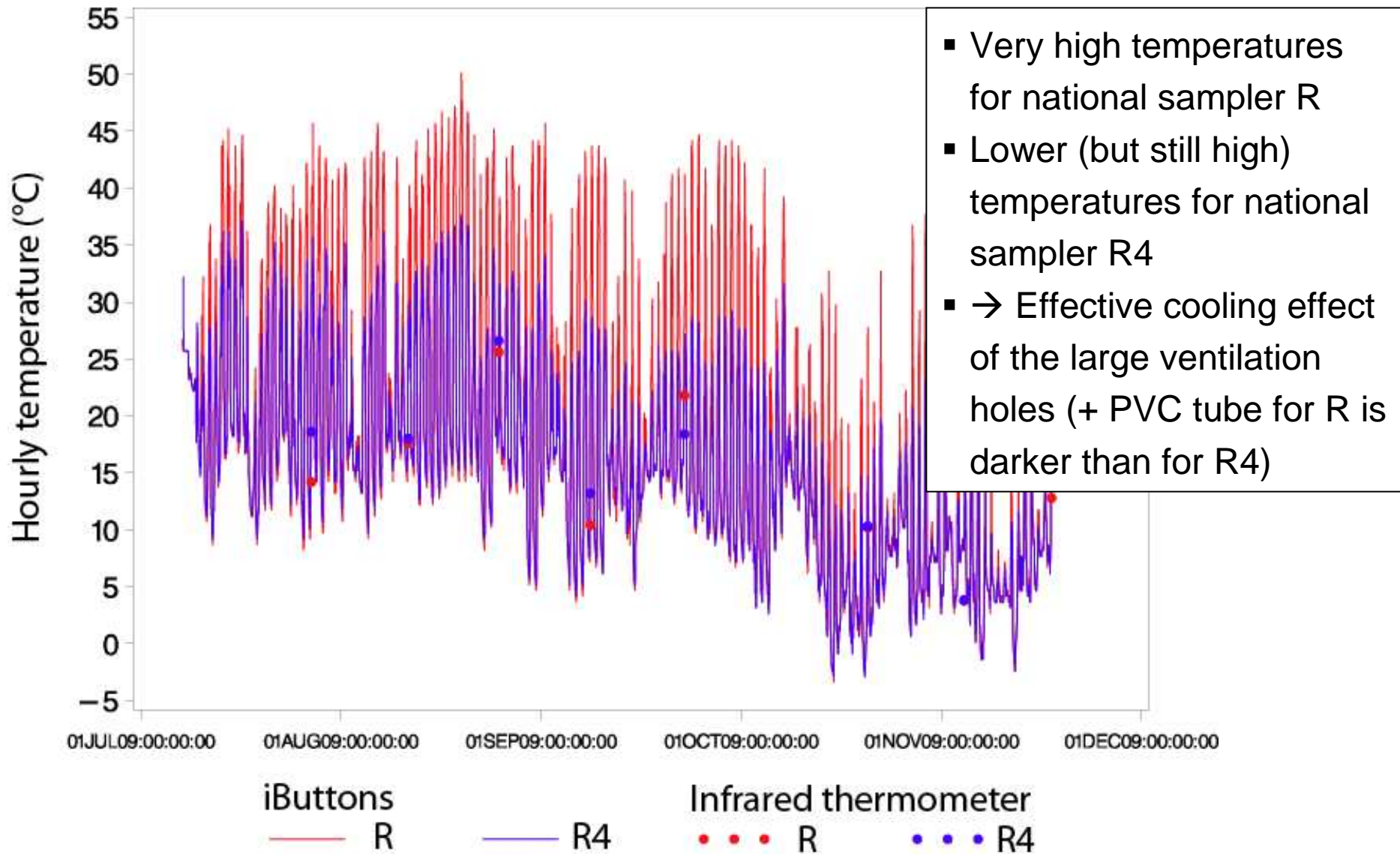
# Problems

- Agricultural activities in the vicinity of the open area (very difficult to find an appropriate open area on the Swiss Plateau)
- High rates of contamination by bird droppings during the summer (many samples had to be discarded) (+ during the first 5 series of measurement, the bird rings were not mounted exactly according to the manual)
- The mesh used as filter for the harmonised sampler is too loose; dirt and insects were frequently found in the storage container
- → We decided to measure only pH, conductivity, DOC and TN (no external costs) (but we archive the samples)

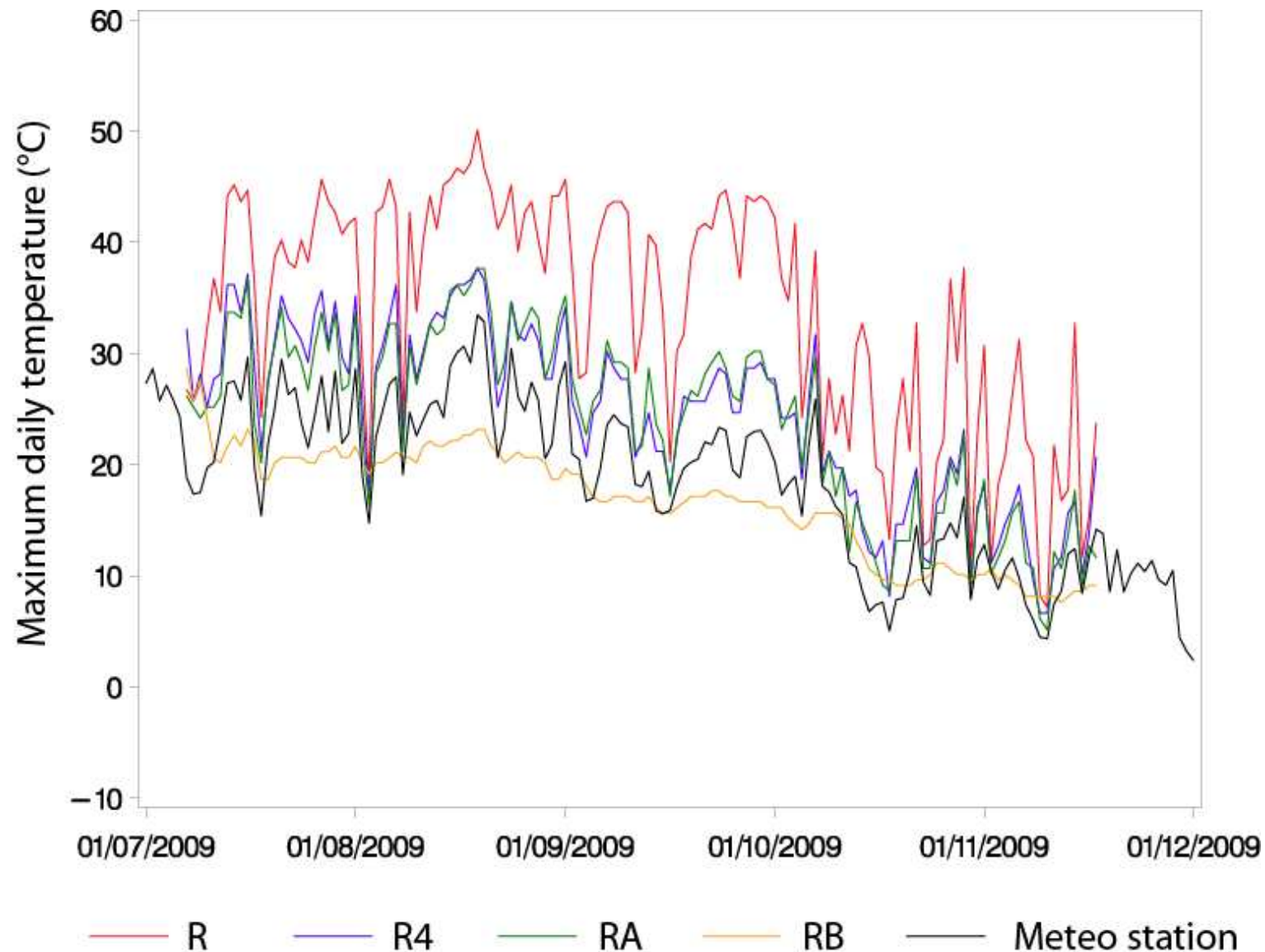
# Temperature in the PVC tube - Harmonised samplers RA & RB



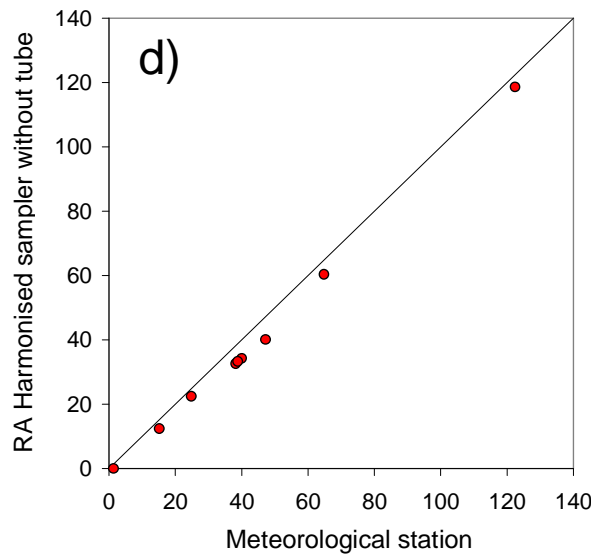
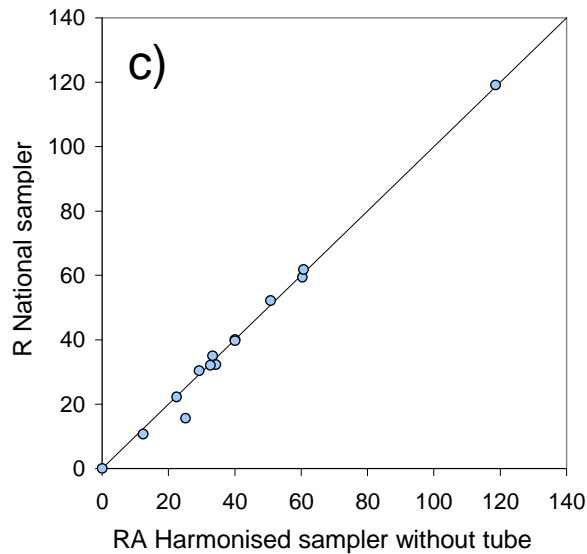
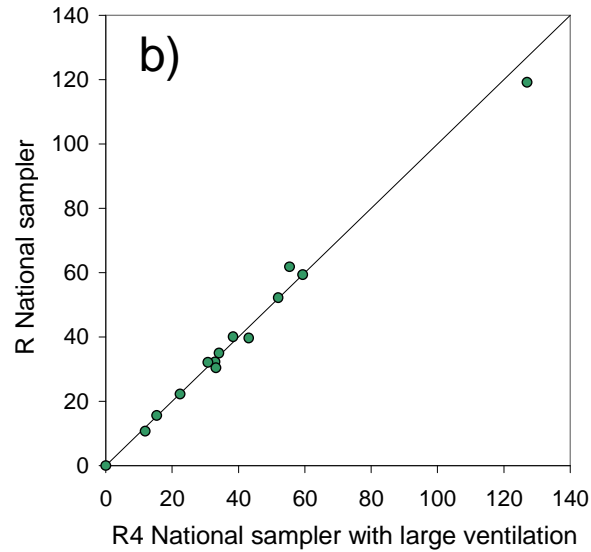
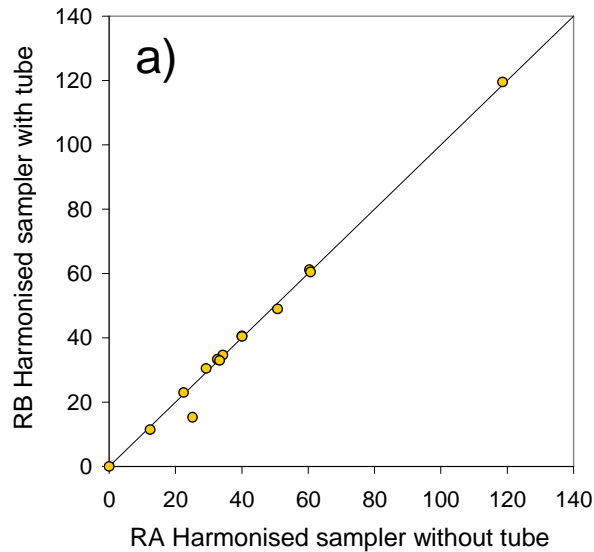
# Temperature in the PVC tube - National samplers R & R4



# Maximum daily temperature in the PVC tubes (all sampler types) and air temperature measured by the meteorological station

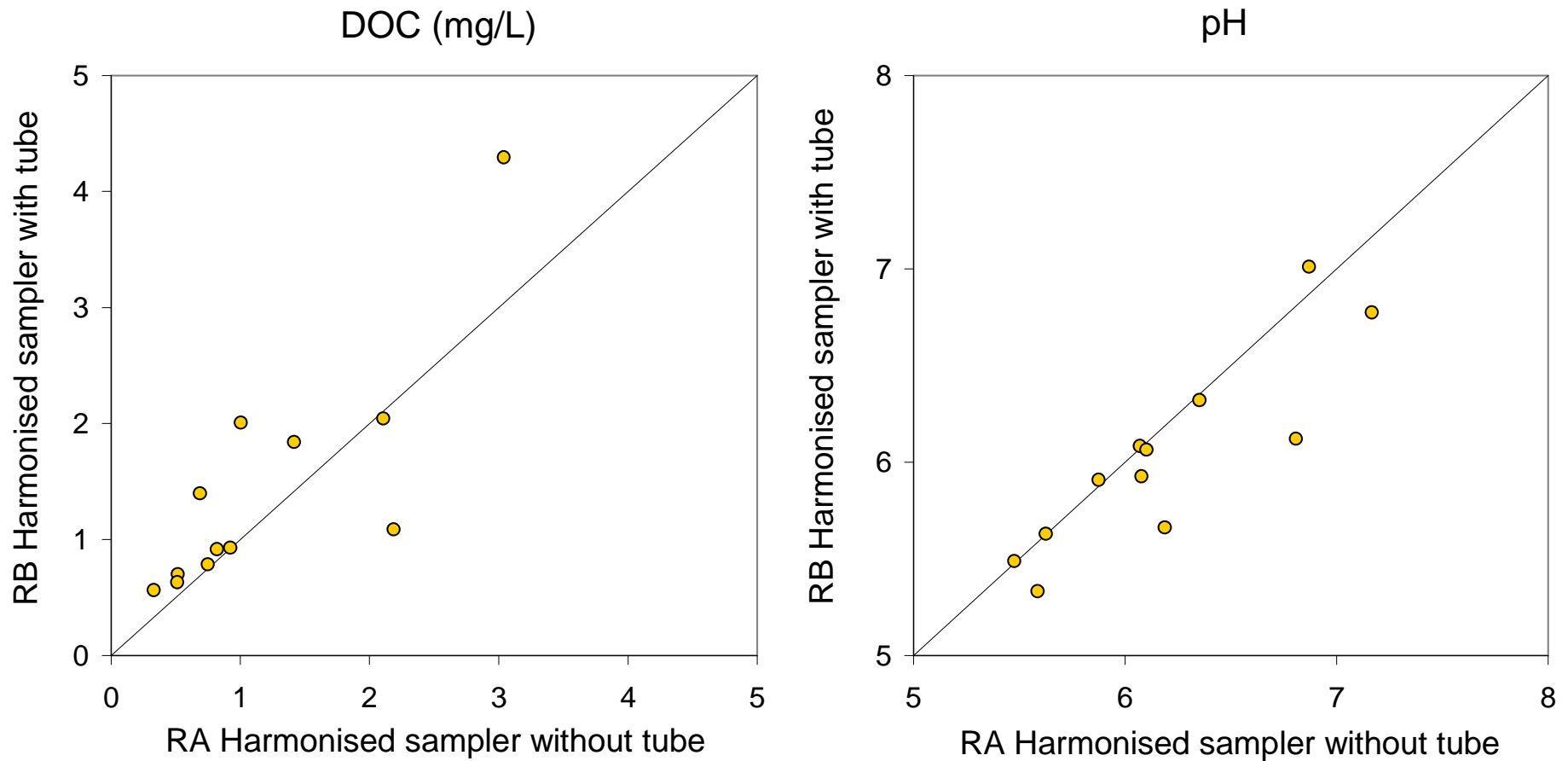


# Precipitation volume



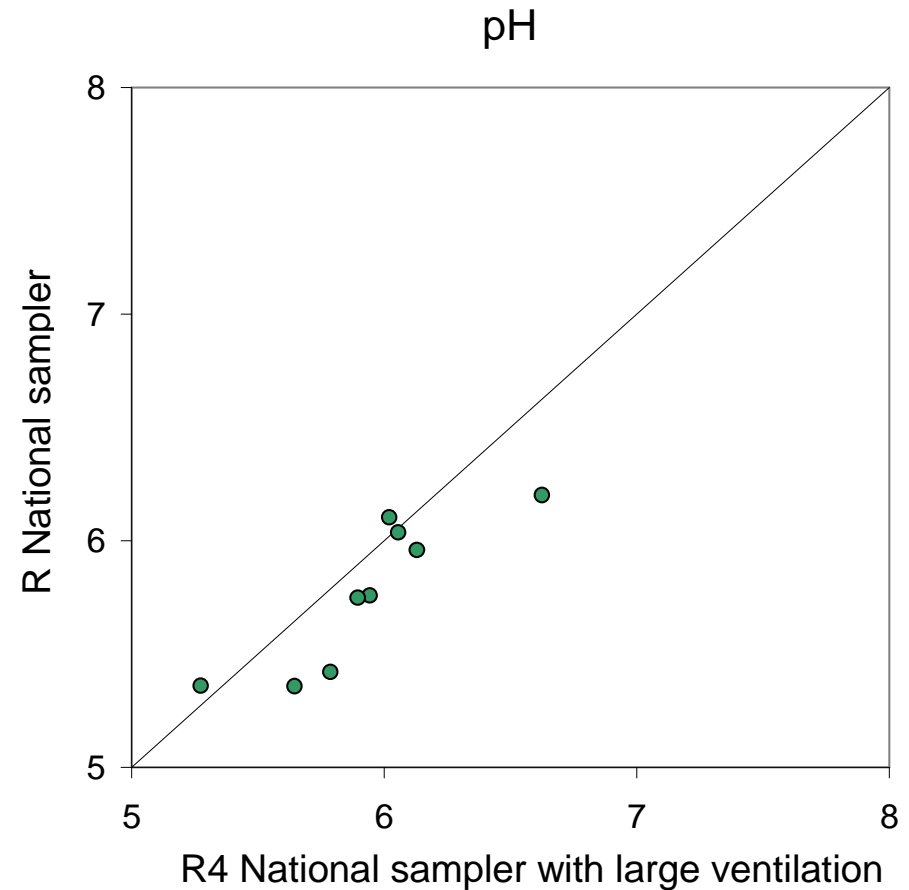
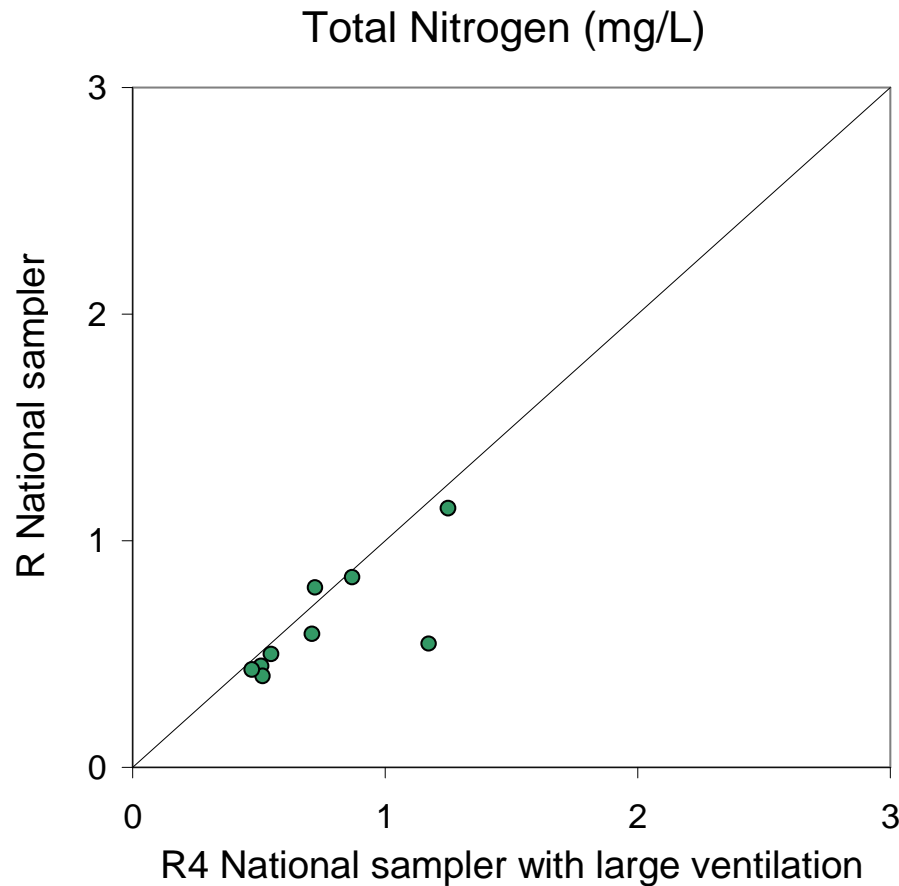
- Very good agreement between the precipitation volumes collected by all sampler types (RA, RB, R, R4) (but slightly lower agreement when precipitation is in the form of snow)
- No significant differences between any of the samplers
- But all samplers measure systematically less precipitation than the rain gauge of the meteorological station (Example: Figure d)

# Conductivity, pH, DOC, TN - Harmonised samplers RA & RB



- [DOC] tends to be higher in RB than in RA
- pH tends to be lower in RB than in RA (n.s.)
- No distinct pattern for conductivity, [TN]

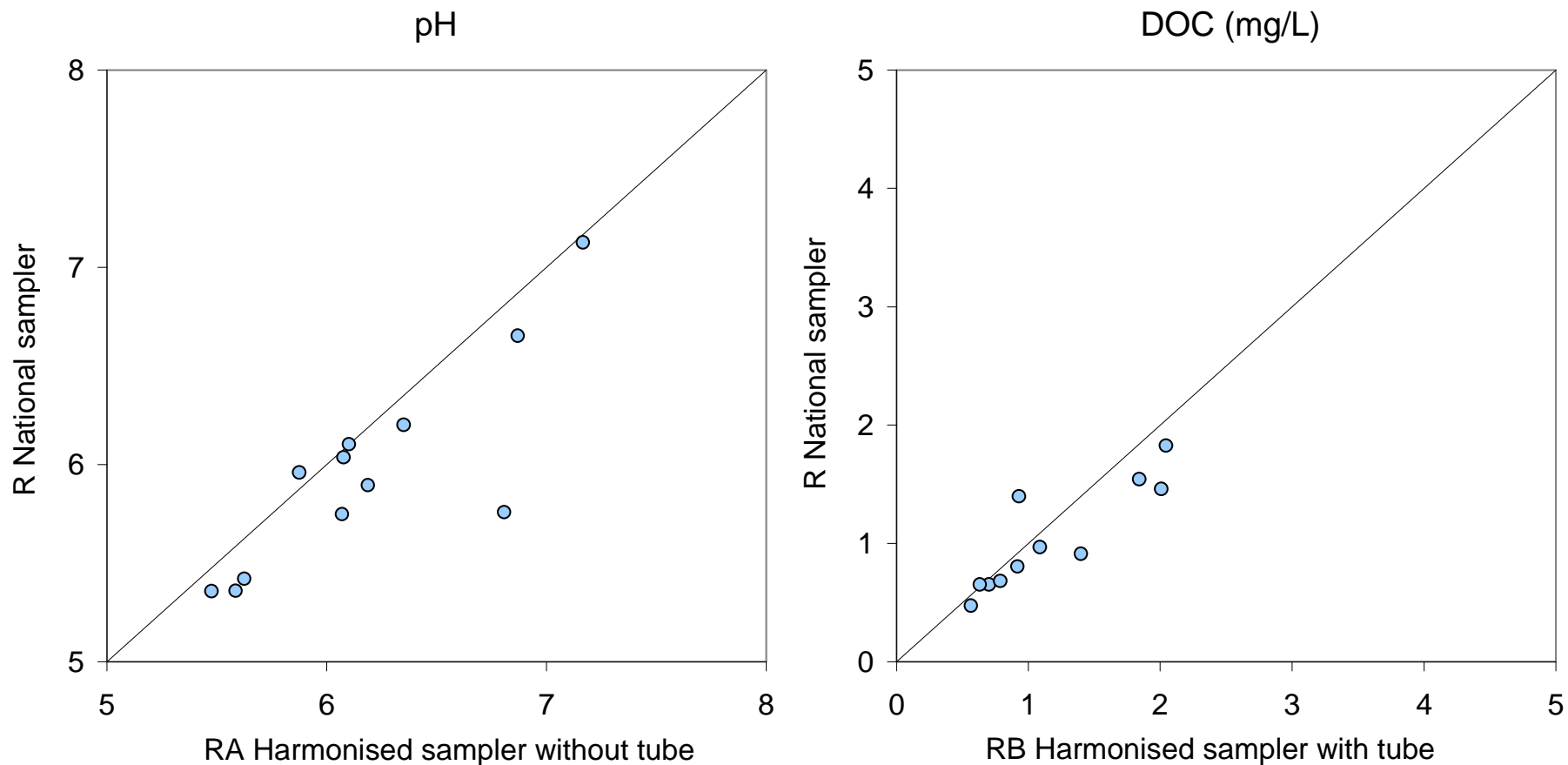
# Conductivity, pH, DOC, TN - National samplers R & R4



- [TN] tends to be higher in R4 than in R
- pH tends to be higher in R4 than in R
- No distinct pattern for conductivity and [DOC]
- Temperature effects?



# Conductivity, pH, DOC, TN - National and harmonised samplers



- [DOC] tends to be higher in RB than in R
- pH tends to be lower in R than in RA
- No distinct pattern for conductivity, [TN]

# Conclusions

- No evaporation losses, in spite of very high temperatures?
- Possible effects of high temperatures:
  - Decrease in pH? (lower for R than for R4, RA - but not compared with RB)
  - Decrease in [TN]? (but difference only between R and R4, not between RA and RB)
- Effect of the silicone tube
  - Elevated [DOC] ? (rinsing experiment: [DOC] = 1 mg/L, [TN] < 0.1 mg/L in 30 mL Millipore water used to rinse silicone tubes taken back to the laboratory after two weeks in the field)

We warmly thank

- Nouredine Hajjar for analysing the samples in the laboratory
- Yuk Ying Cheung Tang for washing the samplers
- Gusti Schneider for the maintenance of the iButtons and LWF meteorological station



