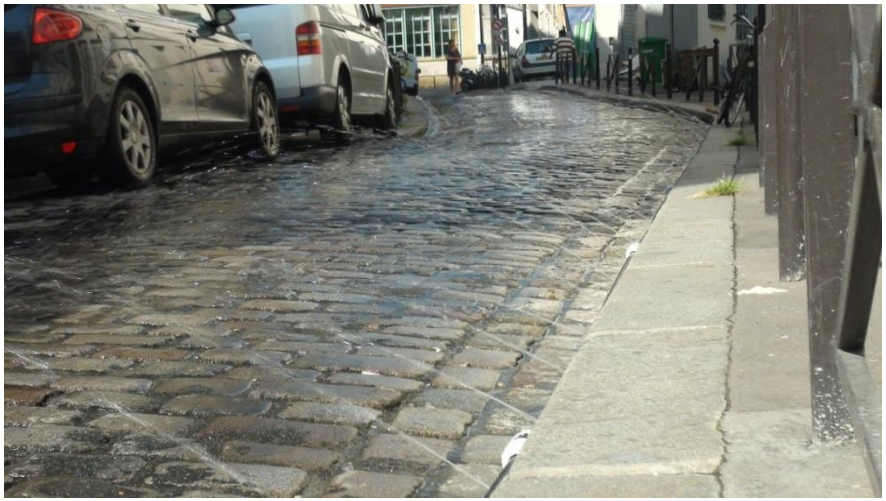
Measuring the Real-World Effects of UHI Countermeasures

A Case Study of Pavement-Watering



ICUC9 – July 24th, 2015

Martin Hendel, Pierre Gutierrez, Morgane Colombert, Youssef Diab, Laurent Royon

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ÉCOLE SUPÉRIEURE DU GÉNIE URBAIN

CONTEXT

Typical UHI Countermeasures

Santorini, Greece

New York

Eco Boulevard, Madrid

→ Few experimental field studies at the street scale or higher (Bowler et al. 2010; Santamouris 2013)

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Exception of Pavement-Watering

Kinouchi and Kanda 1997

Takahashi et al. 2010

Maillard et al. 2014

Yamagata et al. 2008

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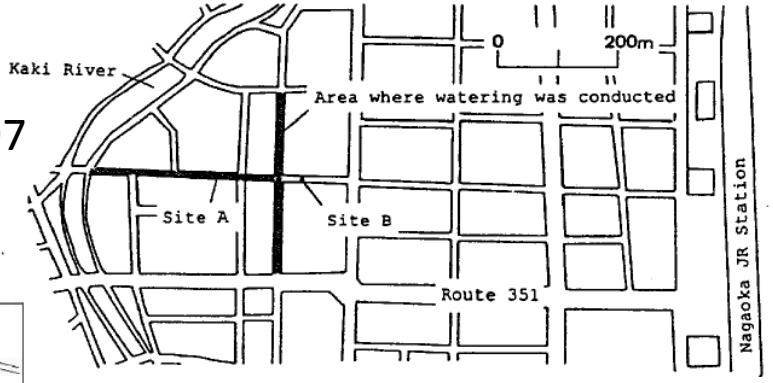
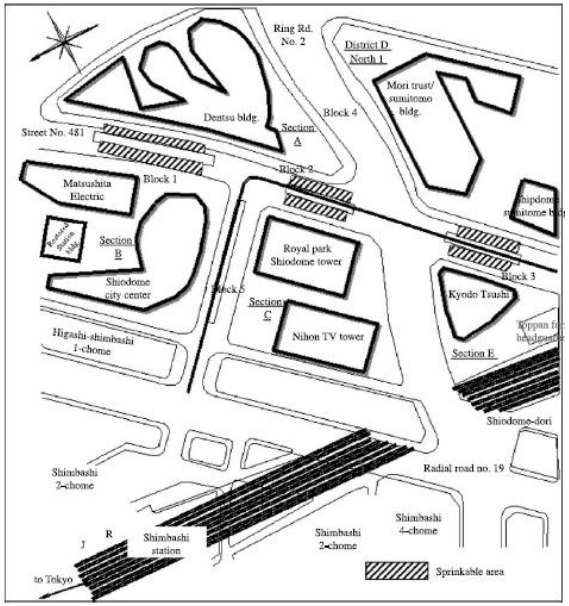
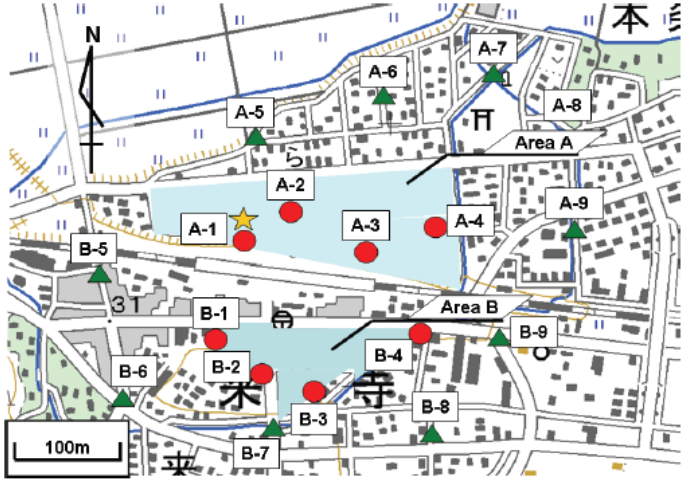
Field Methods

Kinouchi and Kanda 1997

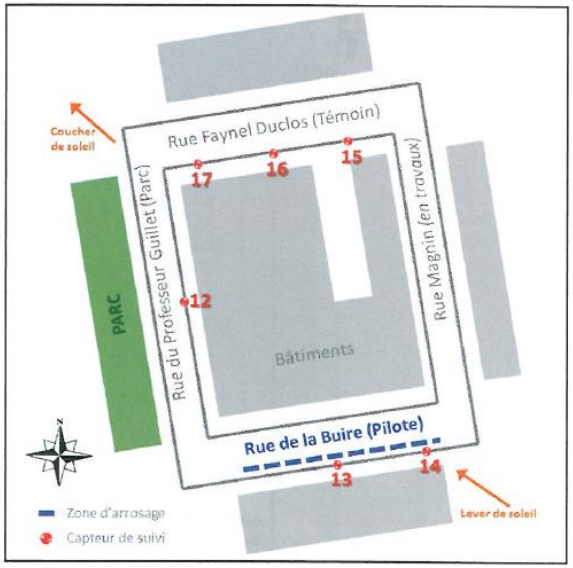




Yamagata et al. 2008



Takahashi et al. 2010



Maillard et al. 2014

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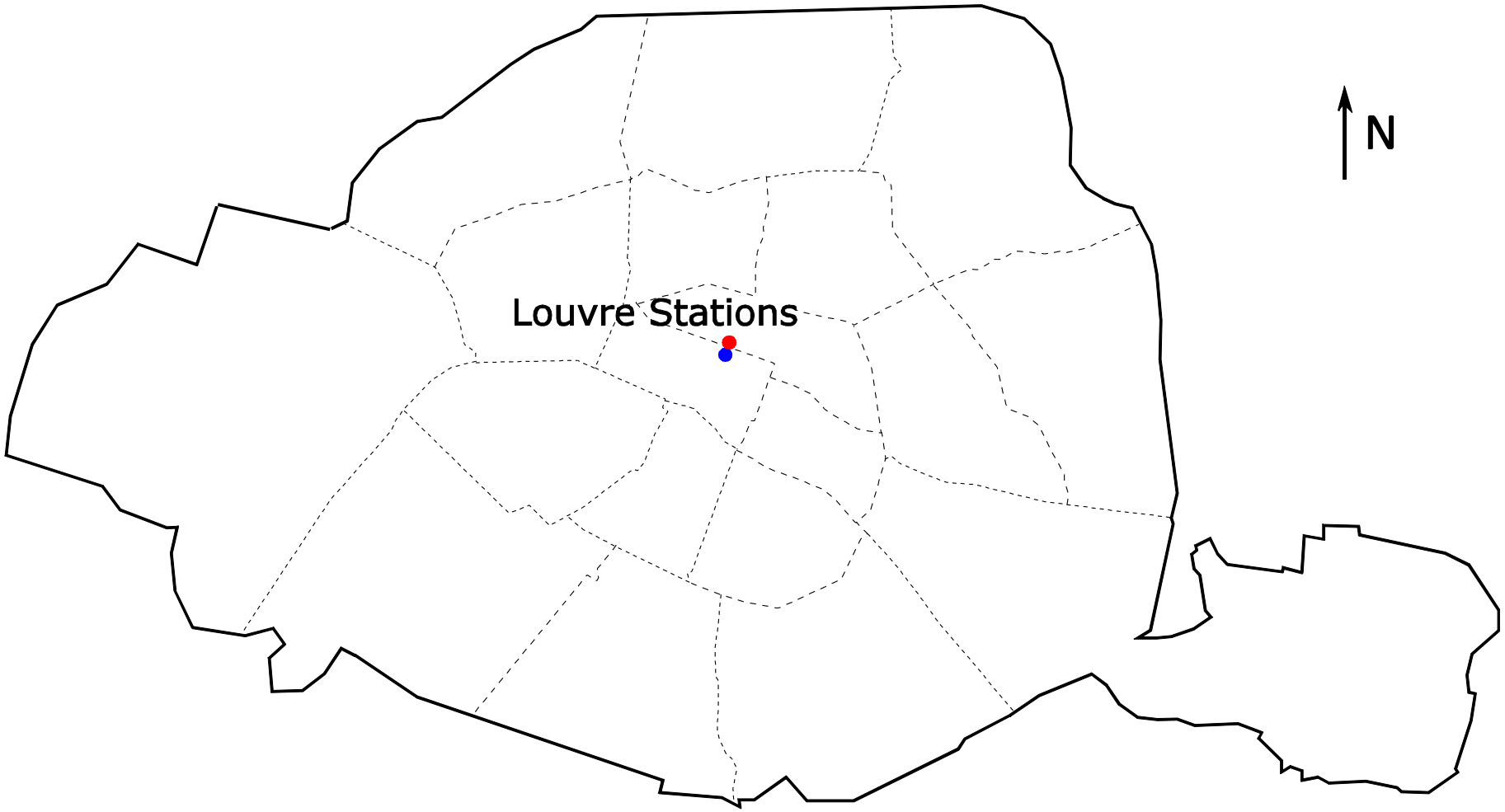
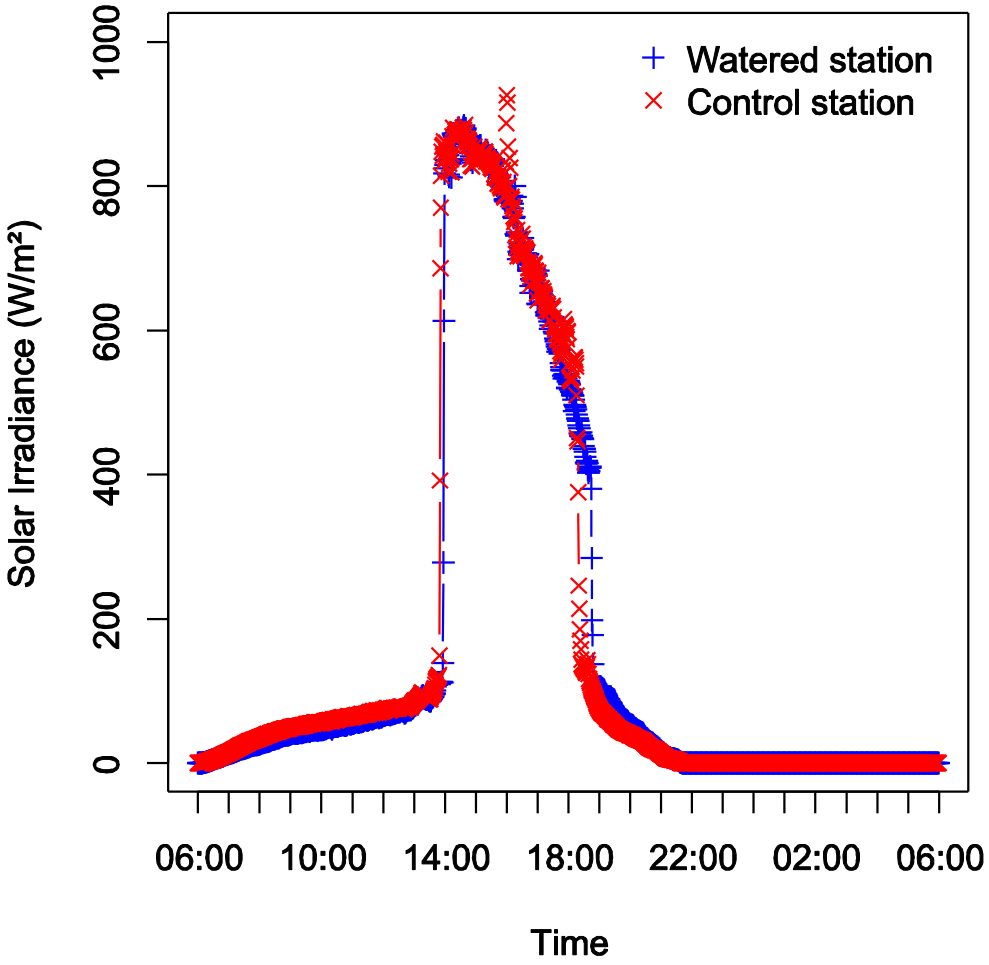
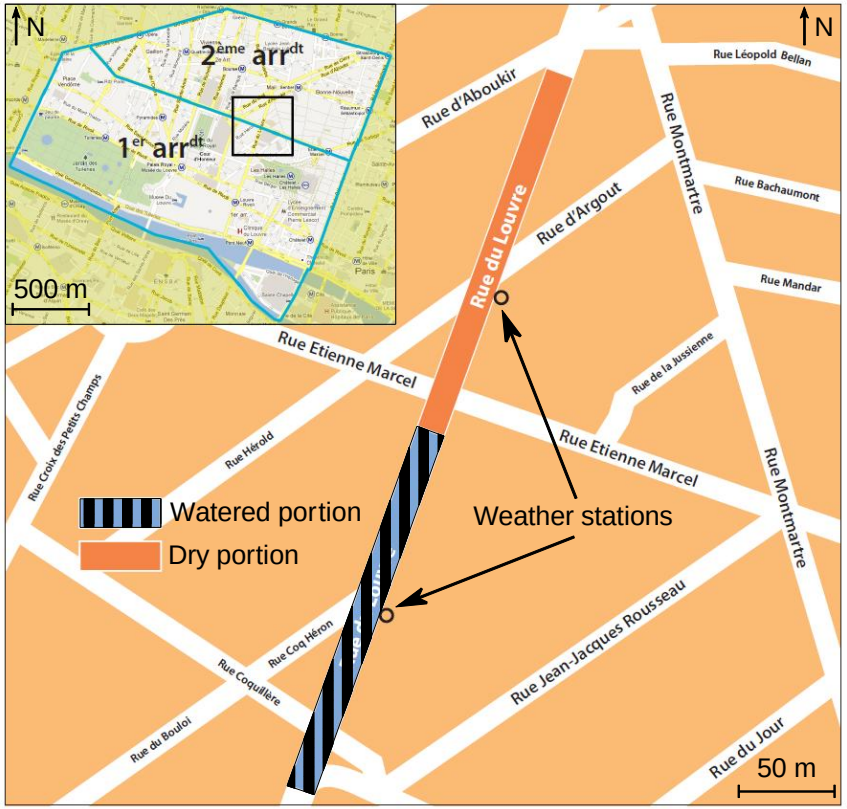
MATERIALS AND METHODS

Station Positions



Station Positions





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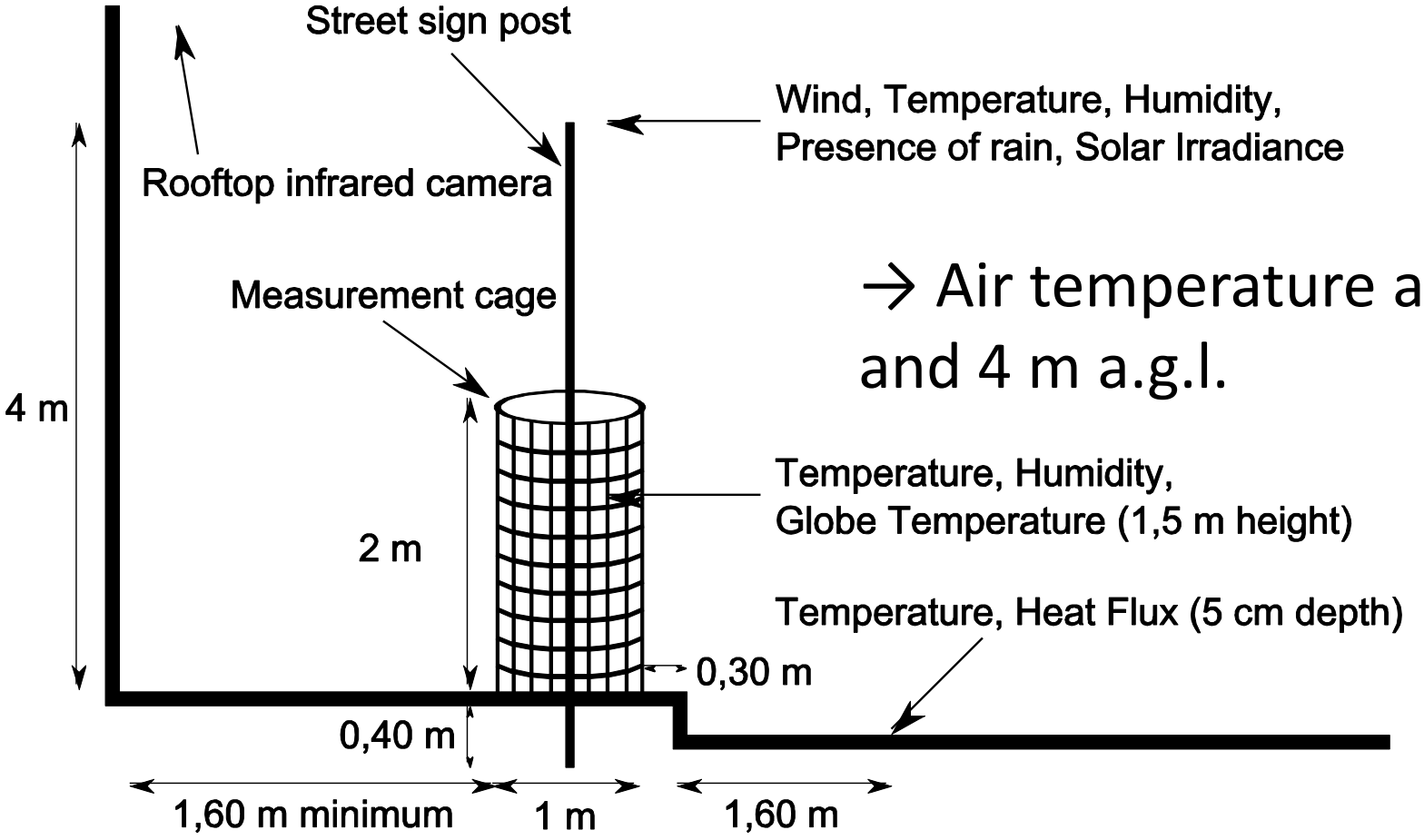
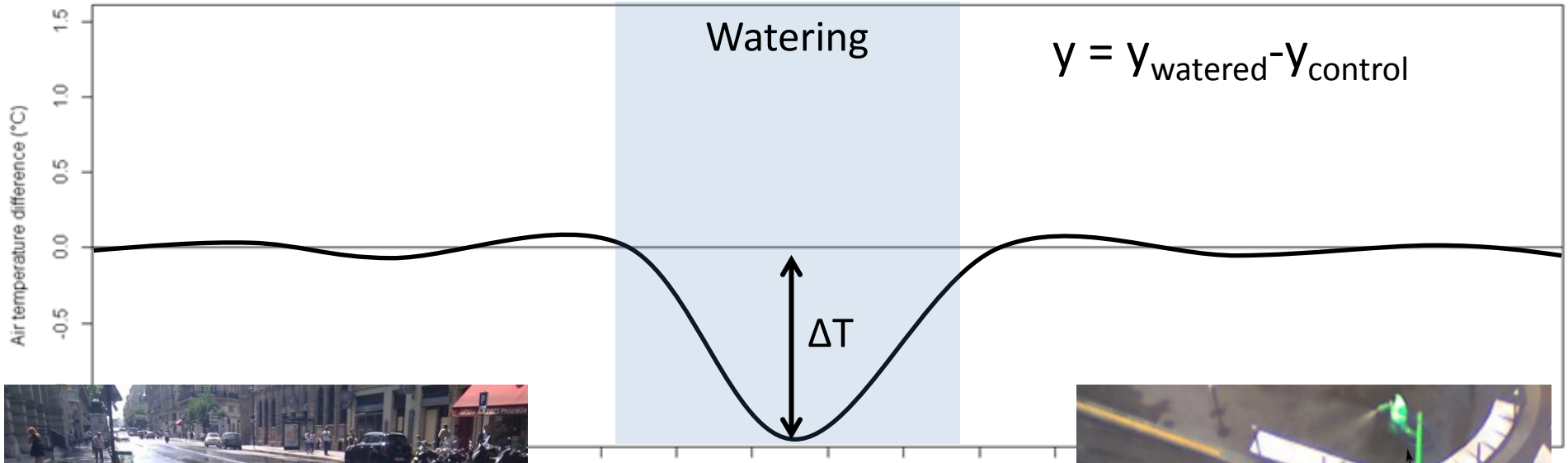
Station Instruments

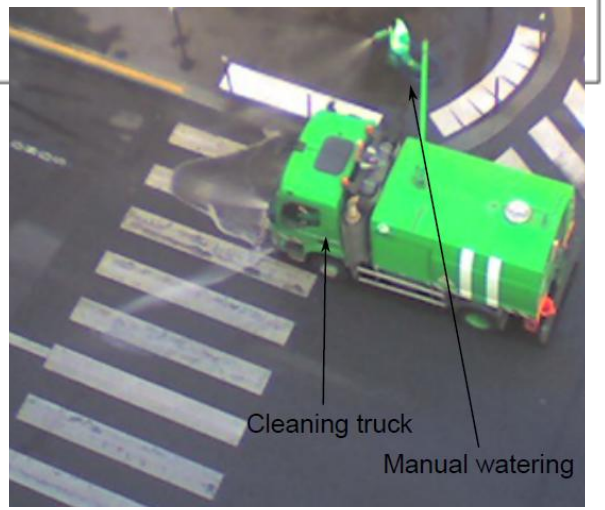


→ Air temperature at 1.5 m and 4 m a.g.l.

Analysis Method



→ Pasquill Stability Class
A or A-B



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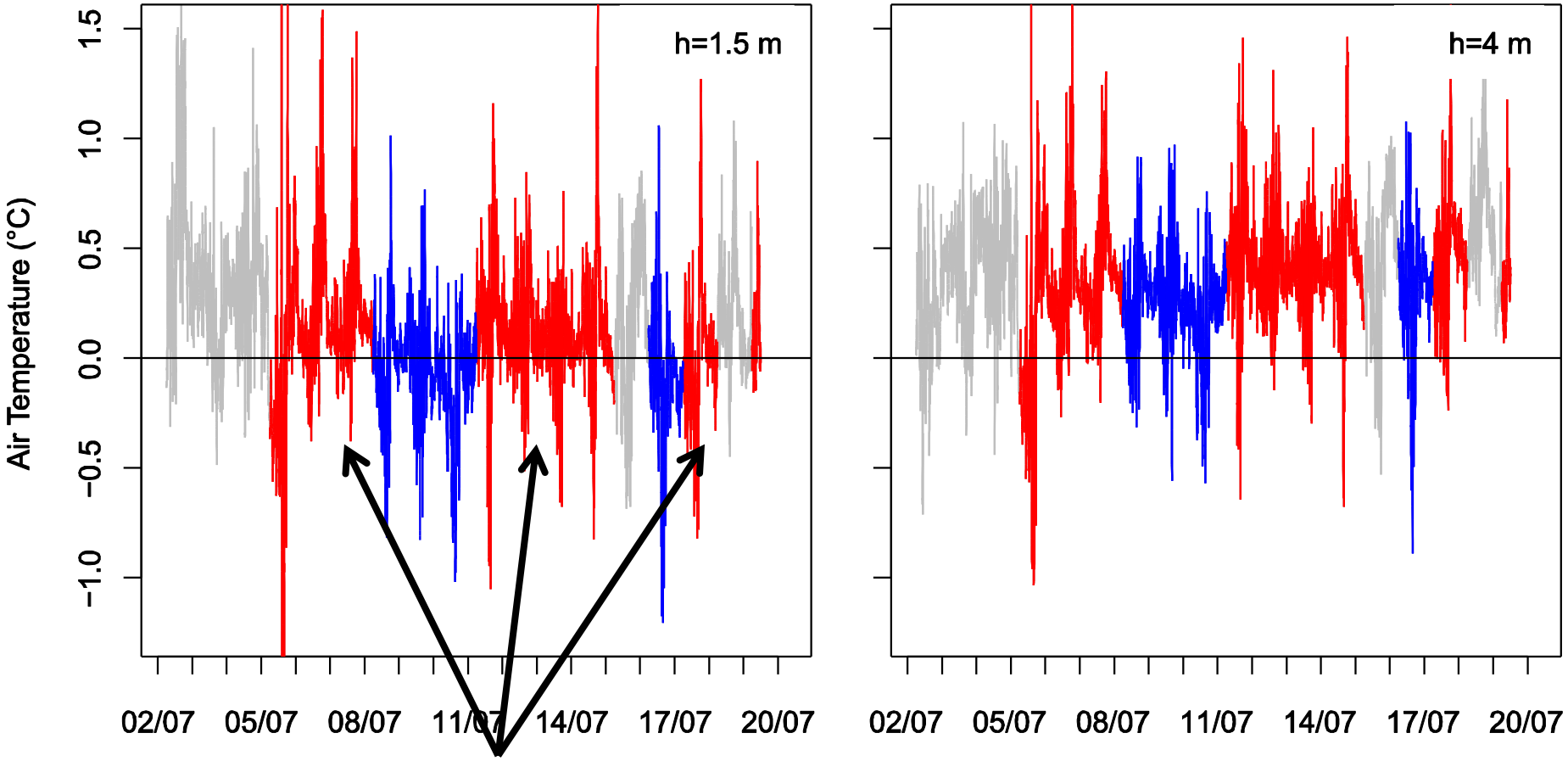
RESULTS

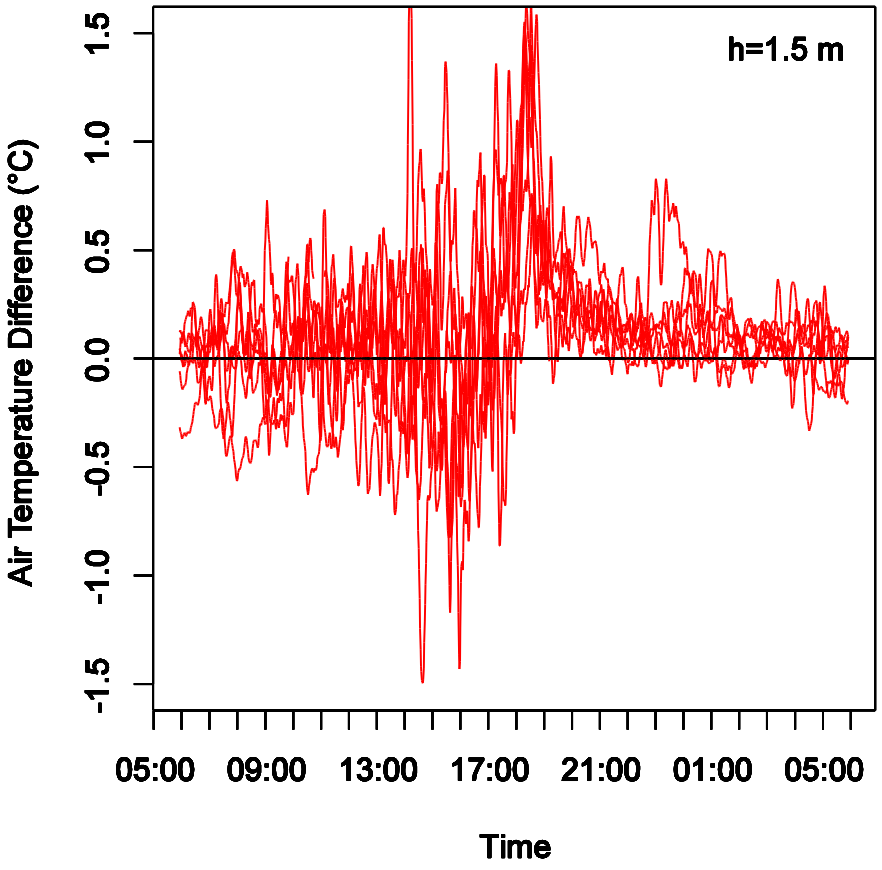
Problems Arise…



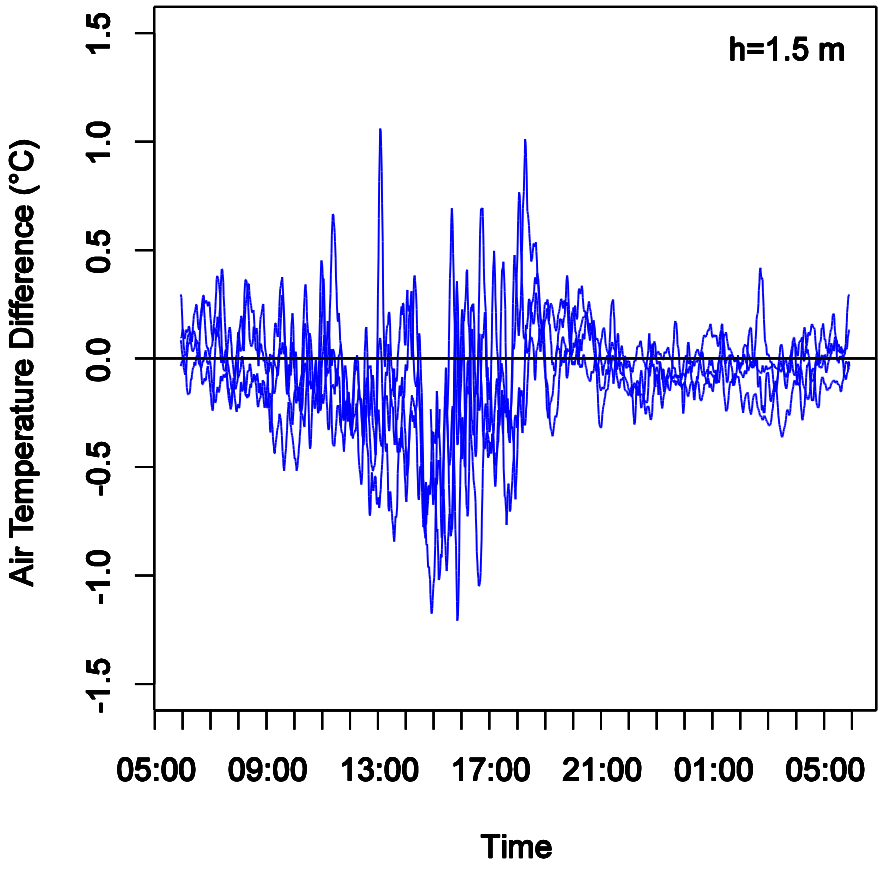
Differences between sites in the absence of watering…

What's the Difference ?

Dry



Watered



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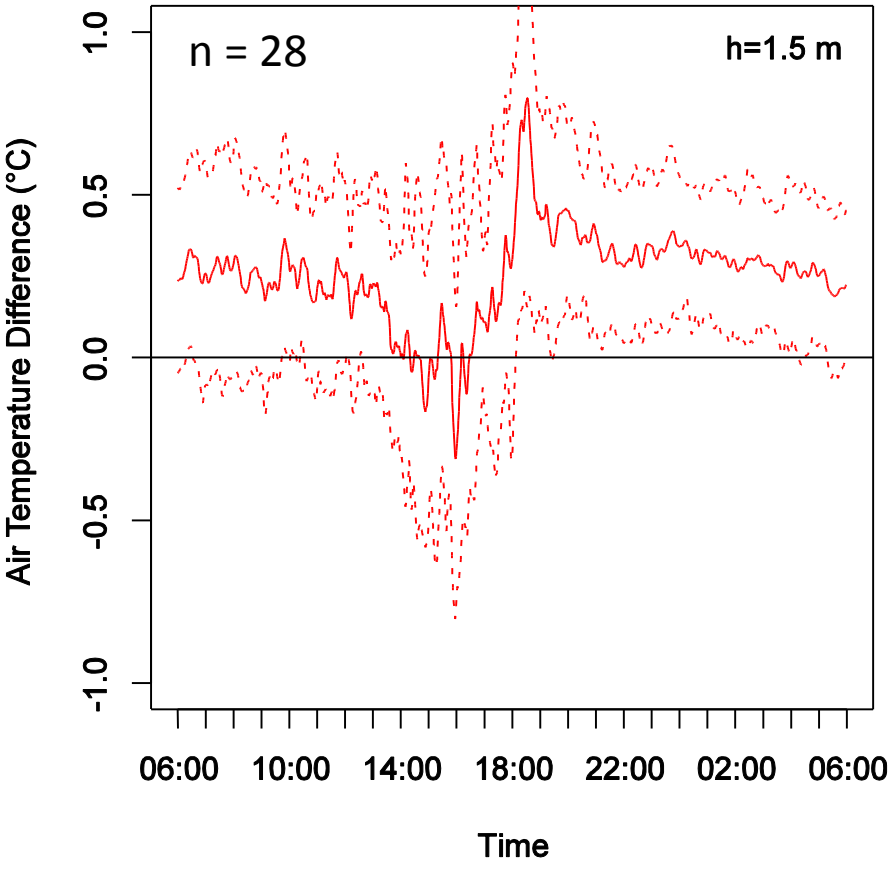
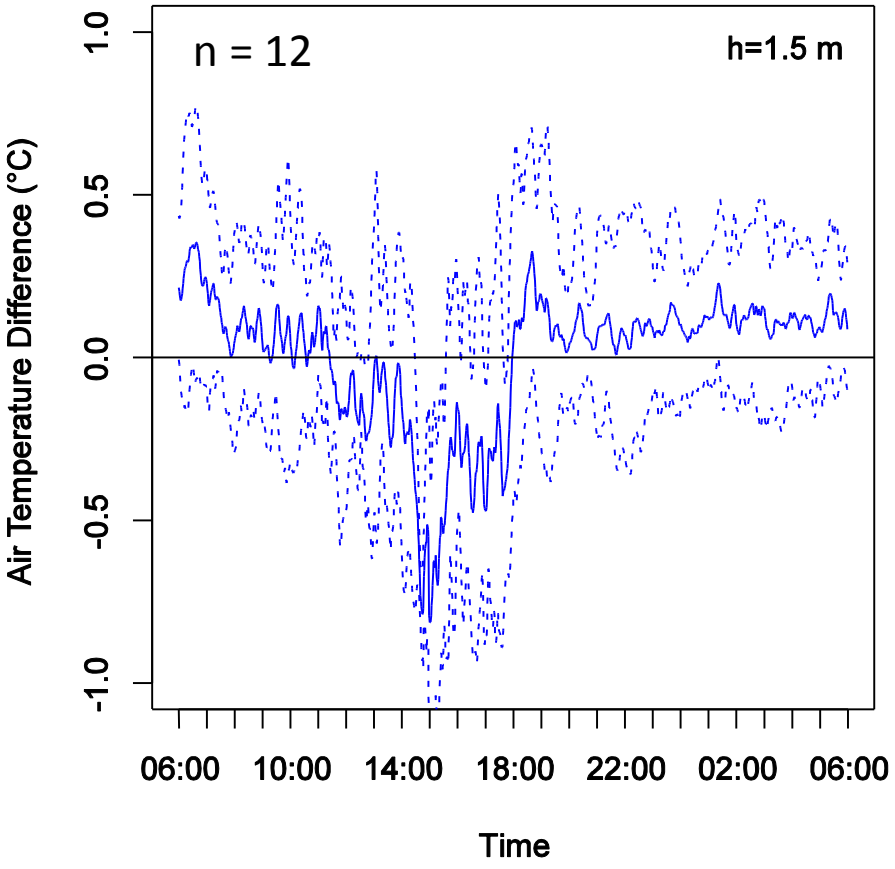
What's the Difference ?

Dry



Watered



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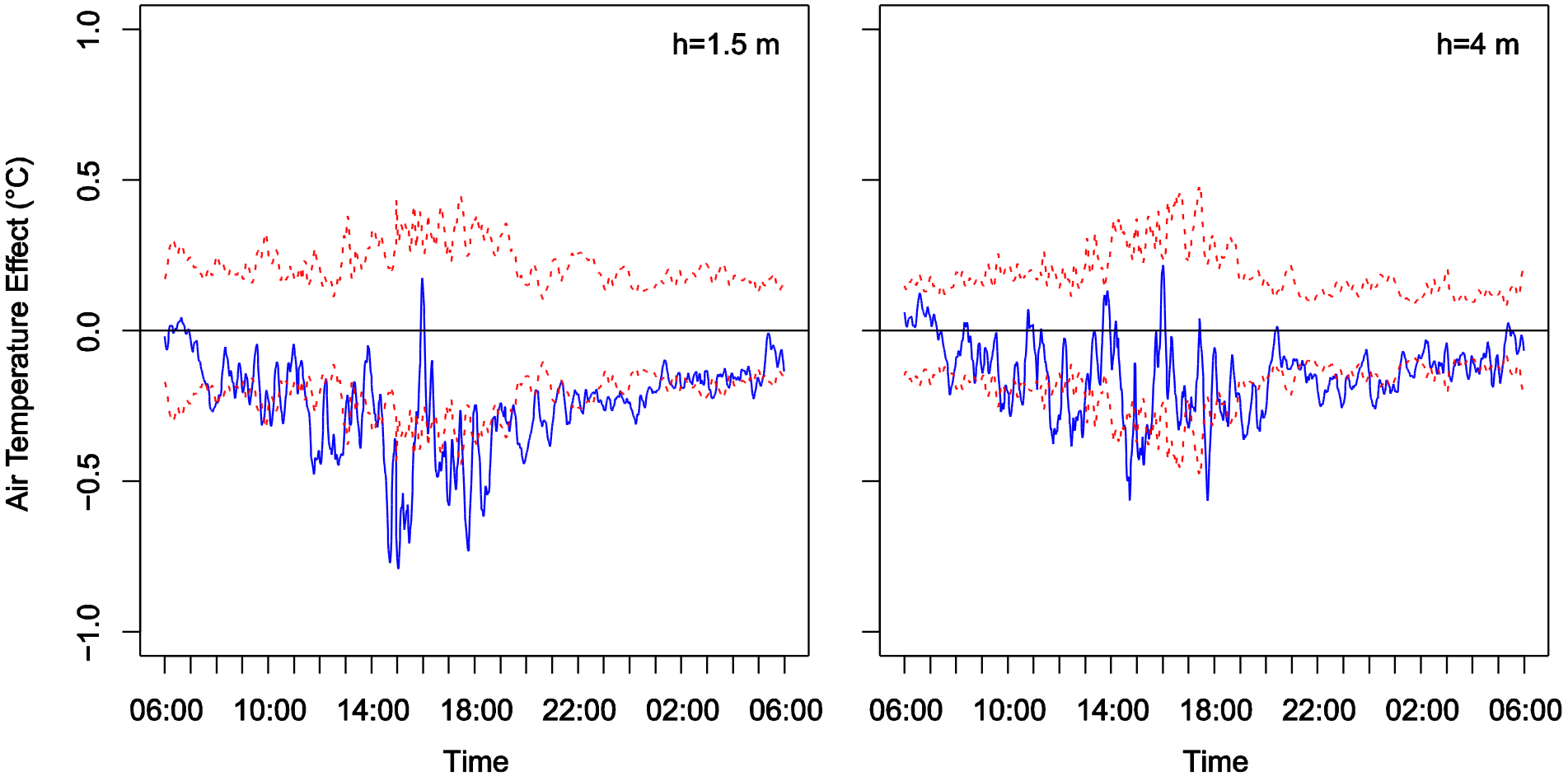
What's the Difference ?



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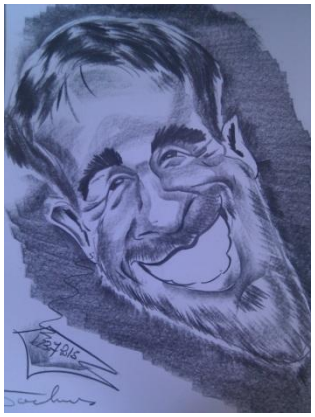
Summary

- Identical sites in urban areas don't exist!
- Approach is generalizable to other countermeasures
- Stations don't need to be so strictly paired, but signal noise may increase if distances are too great
- Sites must be characterized prior to UHI countermeasure implementation

Future Work

- Additional feedback from other field studies
  - Other sites
  - Other countermeasures

- Other analysis tools?
  - Time series analysis
  - Data mining techniques
  - …



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ResearchGate

Thank you for your time

Hendel, M., Gutierrez, P., Colombert, M., Diab, Y., & Royon, L. (2015). Measuring the Effects of UHI Mitigation in the Field: Application to the Case of Pavement-Watering in Paris. *Urban Climate*, (under review).

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