



Deltares
Enabling Delta Life

Coping with urban heat island effects in Rotterdam

Watercities in transition, August 23rd

Govert verhoeven

Deltares' involvement in Heatsstress topic

Kennis voor Klimaat
Knowledge for Climate

Hittestress in Rotterdam

Partners:

- Municipality of Rotterdam
- Wageningen University
- TNO
- SBR
- Deltares (& Delft University of Technology)




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Heatstress project in Rotterdam

What is the project about?

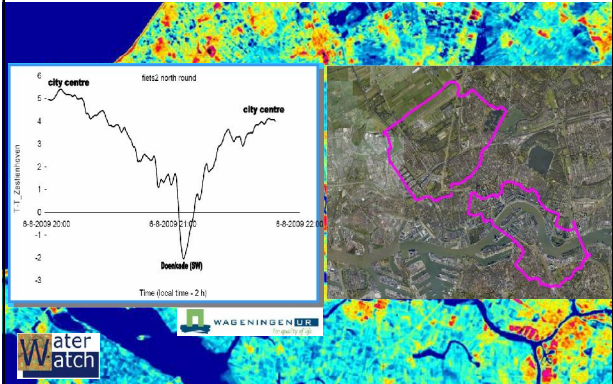
- Is Rotterdam coping with an urban heat island (UHI) effect?



If so,

- Does the UHI effect contribute to heat stress?
- What measures can be taken to prevent UHI related heatstress?

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The UHI effect in Rotterdam



Time (local time - 2 h)


Water watch **WAGENINGEN UR**

Heatstress in Rotterdam

Direct relation between:

Sleep quality and daily average outside temperature in Rotterdam.

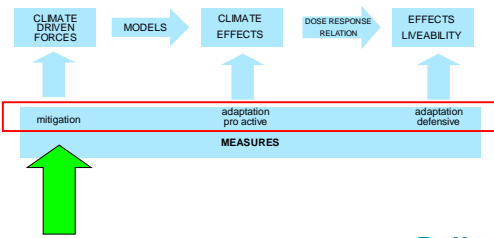
Decline of sleep quality (restlessness) with higher outside temperatures.



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Measures to reduce heatstress

Measures on three different levels



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Measures to reduce heatstress

Making a inventory of possible measures

Categorize measures based on:

- Indoor climate
- Energy conversion
- Building related
- Urban & spatial planning

Resulting in an extensive list of potential measures

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Comparing potential measures

Comparising of measures based on different aspects:

- potential effect (in W/m2 or °C)
- possible negative effect during winter time
- other positive or negative effects
- easy or difficult to implement (flexibility)
- day and/or night effectiveness
- possible scale
- ...

..... helps to define **NO REGRET MEASURES**

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Using water to cool the city

- Add more surface water
- Use of fountains
- Sprinkling streets, pavements and roofs
- Blue (and green) roofs
- 'Climate square'
- 'Washing street'

Examine potential effect of measures

Plan:

- Taking temperature measurements around open surface water

Goal:

- Quantify the effect of open water in urban areas on air temperature

Location measurements:

- Westersingel, Rotterdam

Measurement equipment:

- Distributed Temperature Sensing (DTS) technique, using optic fibre cable, in combination with regular temperature loggers.

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Distributed Temperature Sensing

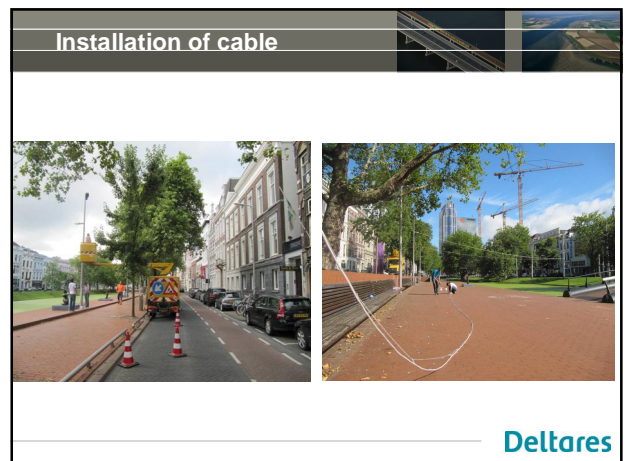
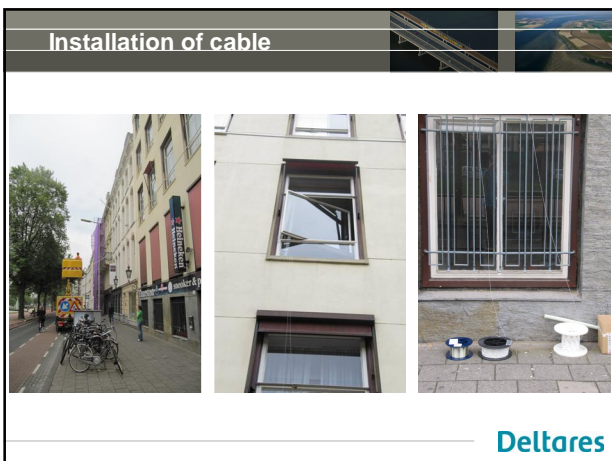
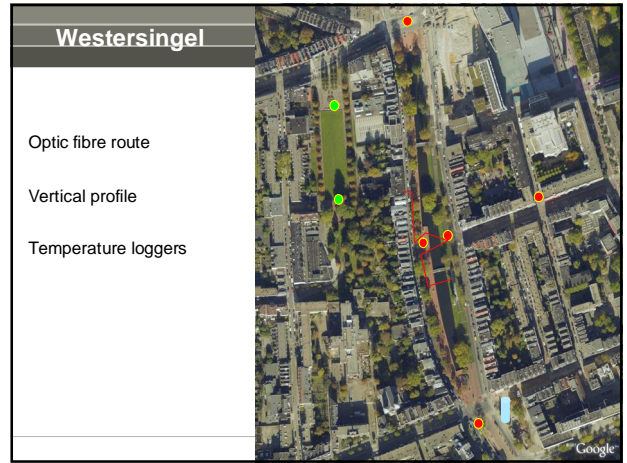
Using an optic fibre (glasvezel) cable to measure temperature

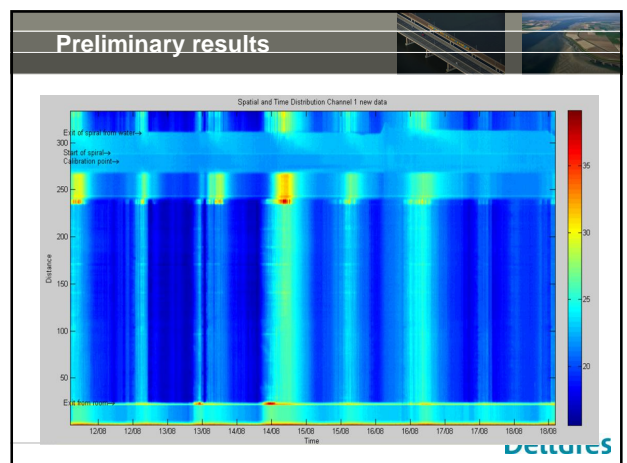
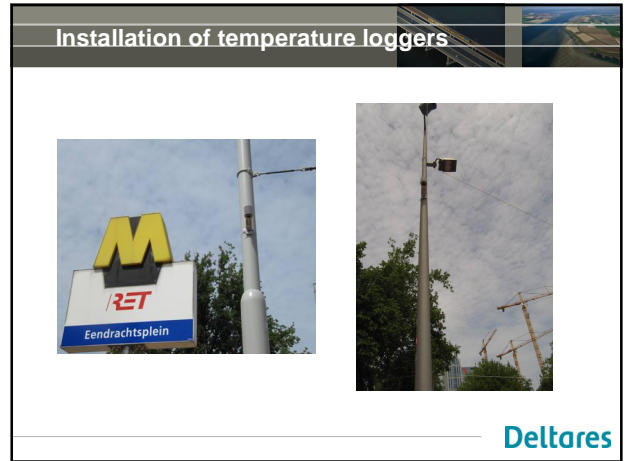
- spatial resolution: 1 meter
- temporal resolution: variable
- accuracy resolution: up to 0.01 °Celsius

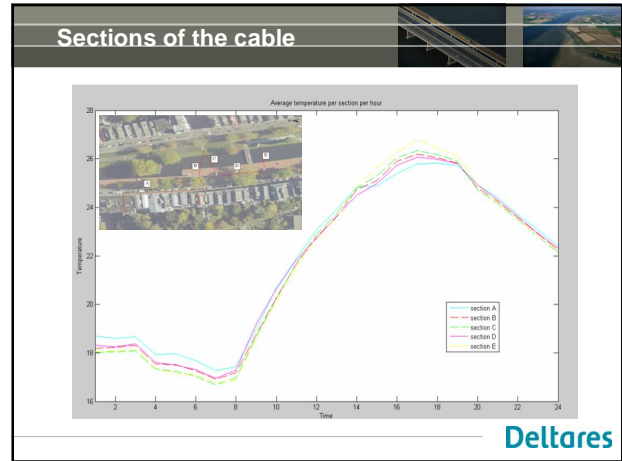
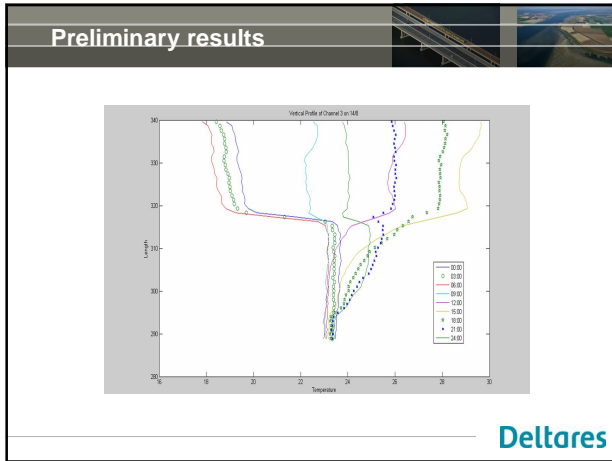
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Westersingel, Rotterdam

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- ### What we still hope to see
- (small) temperature differences during hot days between cable sections during day and night time
 - influence of fountain on temperature
 - larger temperature differences registered by temperature loggers further away from Westersingel
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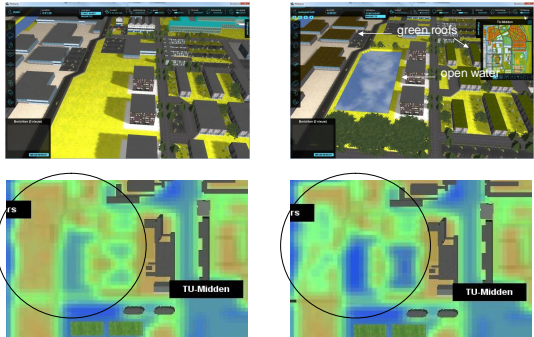

- ### Future possibilities
- if succesful, more measurement campaigns will follow with the optic fibre cable next year
 - Including also other possible measurements, both water and green.
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Workshop

How to reduce Urban Heat stress?



How to reduce urban heat stress?


How to reduce urban heat stress?




How to reduce urban heat stress?

Stakeholders:

- Municipality
- Waterboard
- Entrepreneurs
- Real estate developers
- Public utility housing enterprise
- Citizens
-



Ways to reduce the urban heat stress effect


How to reduce the urban heat stress effect?

1. It should be enforced by standards!

Example: watertoets

“An instrument to secure the interest of a well functioning watersystem in urban development plans”

WATERBELEID EN RUIMTELIJKE ORDENING KUNNEN
TEGENGESTELD O BELANGEN AANROEVEN.




FIGUUR 1012

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Ways to reduce the urban heat stress effect

How to reduce the urban heat stress effect?

2. It should be a product of participation!



Challenges:

- Who should take the lead?
- How to create awareness so all stakeholders will participate?

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Ways to reduce urban heat stress

How to reduce the urban heat stress effect?

Resuming:

1. It should be enforced by standards!
 1. Which objectives should be included in the standards?
 2. What criteria should be used to define a 'heat robust city'?
 3. How do we still secure a drive for innovation?
2. It should be a product of participation!
 1. Who should participate?
 2. Who should take the lead?
 3. How to create awareness for urban heat stress ?
 4. How to involve critical stakeholders?

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