Surface **a**lbedo and emissivity for **Be**lgian cities (SuaBe)

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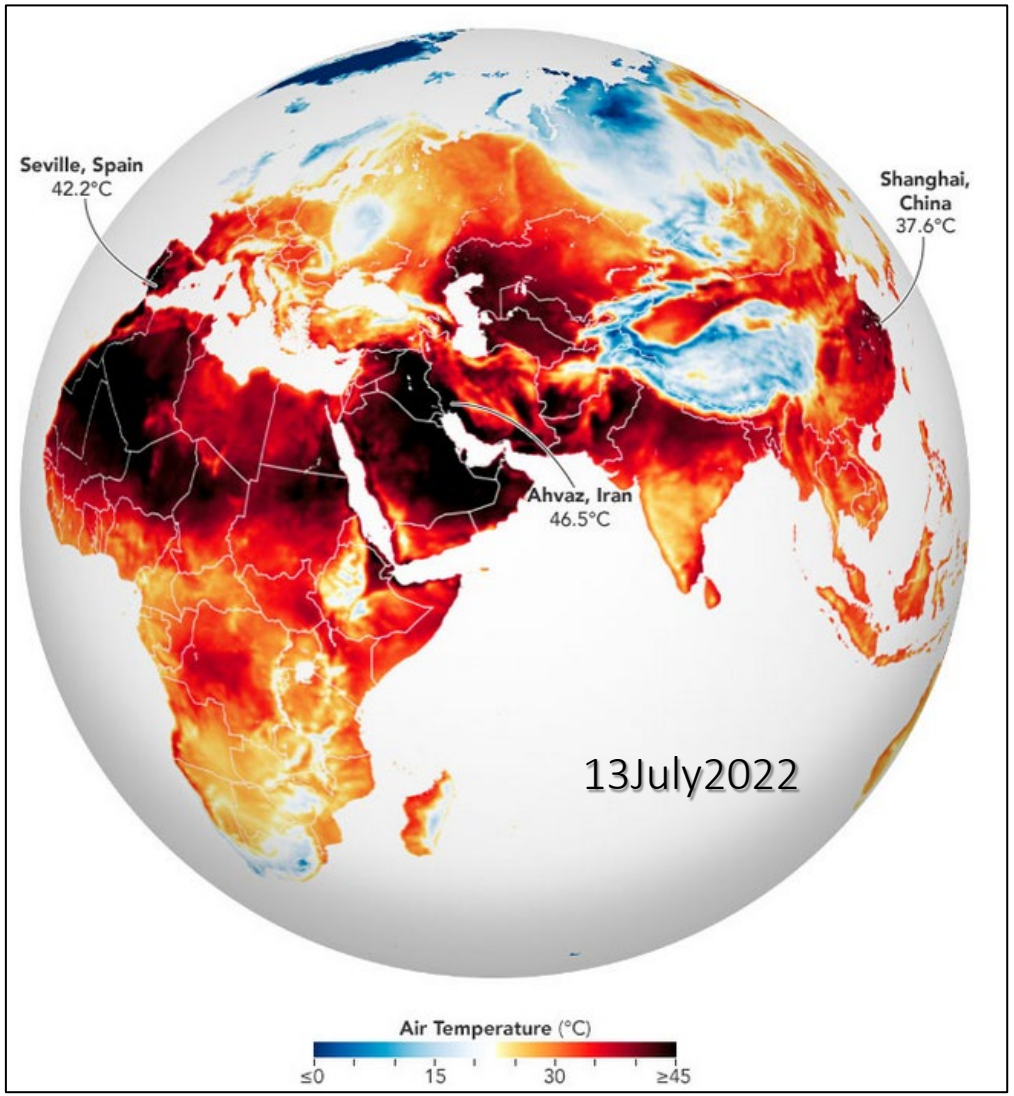
A rapidly urbanising world threatened by climate change

- More frequent and extreme heat waves.

- Heat waves are felt more acutely in cities.
- More than half of the world lives in cities.
  → Geo-information for sustainable and green cities included in STEREO IV thematic priorities

- Increased release of CO2 emissions from cooling.
- Deteriorating public health.

https://www.vrt.be/vrtnws/nl/2022/07/29/neerslagtekort-in-vlaanderen-ligt-opnieuw-historisch-hoog-veel/



https://earthobservatory.nasa.gov/images/150083/heatwaves-and-fires-scorch-europe-africa-and-asia

Strategies to mitigate heat pollution already exist

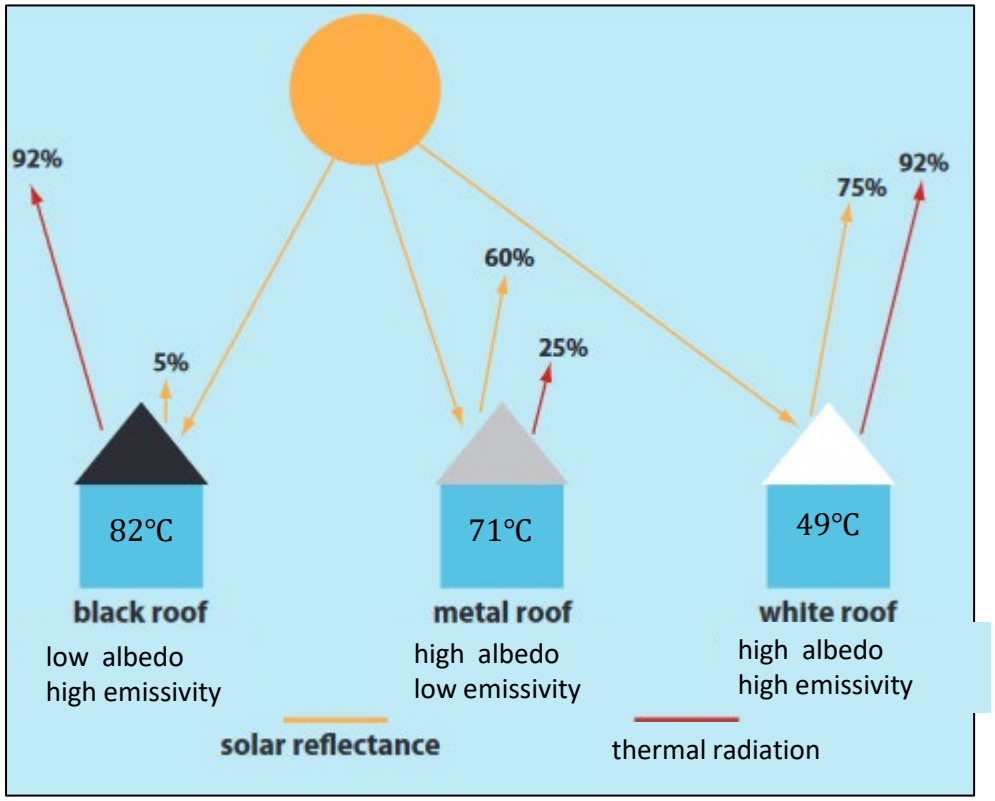
Green

Blue

Grey

Surface emissivity

Surface albedo

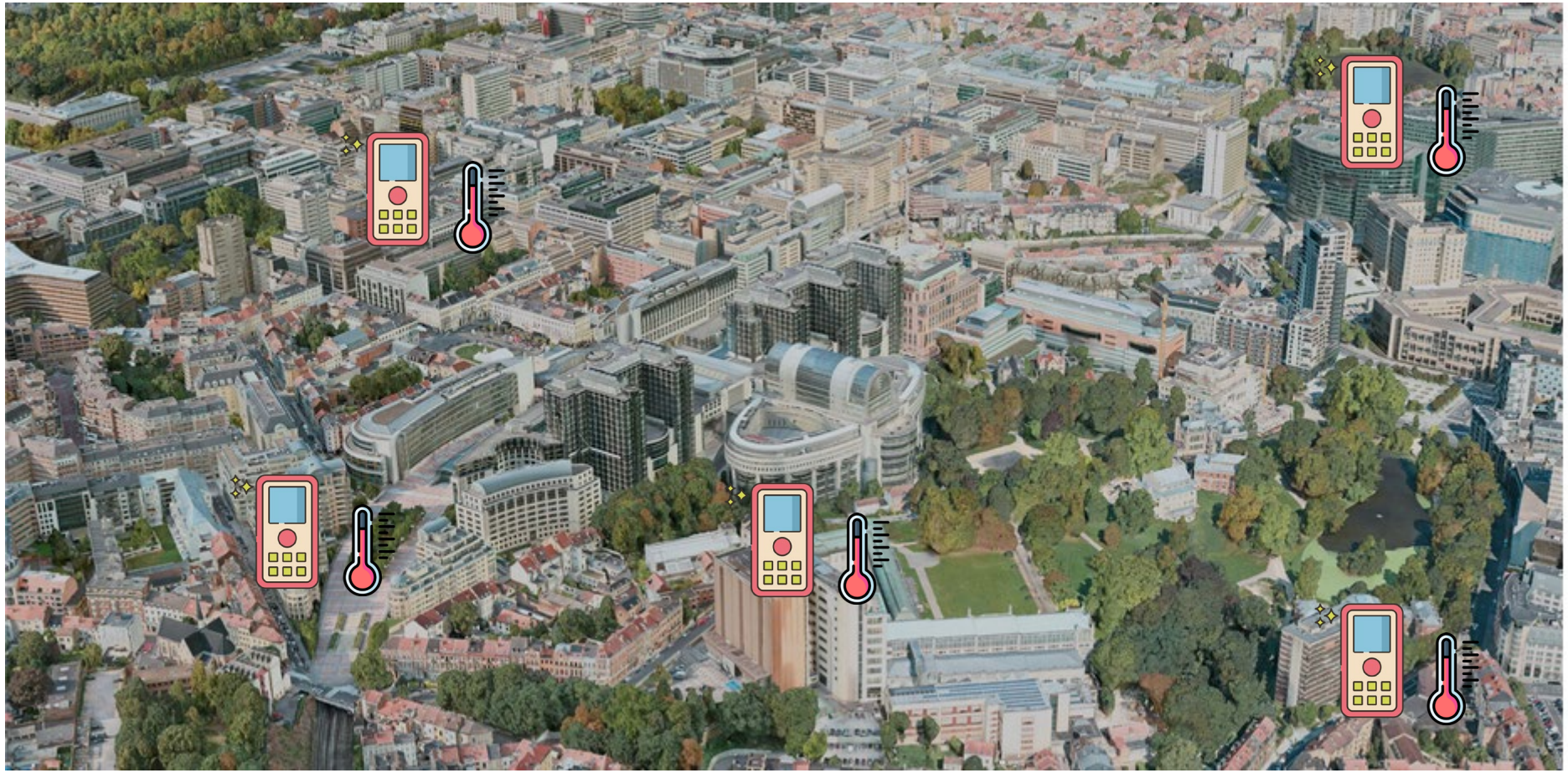


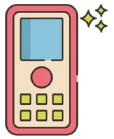
Modified from https://www.epa.gov

Grey strategies for **cool**ing **cit**ies **alre**ady **exi**st, **b**ut… **h**ow **to** **sta**rt?

https://www.3dcadbrowser.com/3d-model/brussels-city-belgium-2020

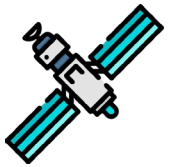
Measuring **surf**ace **alb**edo **a**nd **emiss**ivity **f**or **a**ll **elem**ent **i**n **t**he **urb**an **can**opy.





Not feasible

Estimating **surf**ace **alb**edo **a**nd **emiss**ivity **fr**om **Ear**th **observ**ation **da**ta.



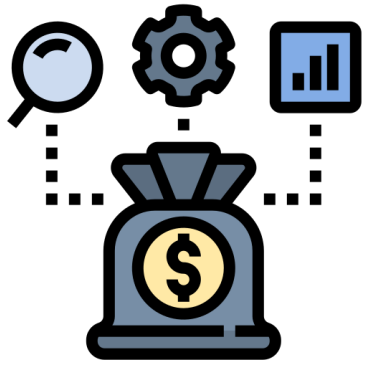
Challenges: Not feasible

Spatial scale, $\Omega_{Sun}, \Omega_{satellite}$

Designing **strat**egies **to** **miti**gate **he**at **pollu**tion **assi**sted **by** **phys**ical **mod**els.

ARTICLE NATURE COMMUNICATIONS | https://doi.org/10.1038/s41467-021-23634-7

Fig. 2 2 m air temperature departure from the Conventional case for westerly wind and building aspect ratio *H/W* = 1.0. a Full reflective case. **b** Upstream reflective case. **c** Parallel reflective case. **d** Downstream reflective case.



Oversimplified

What option to choose?

Challenges:

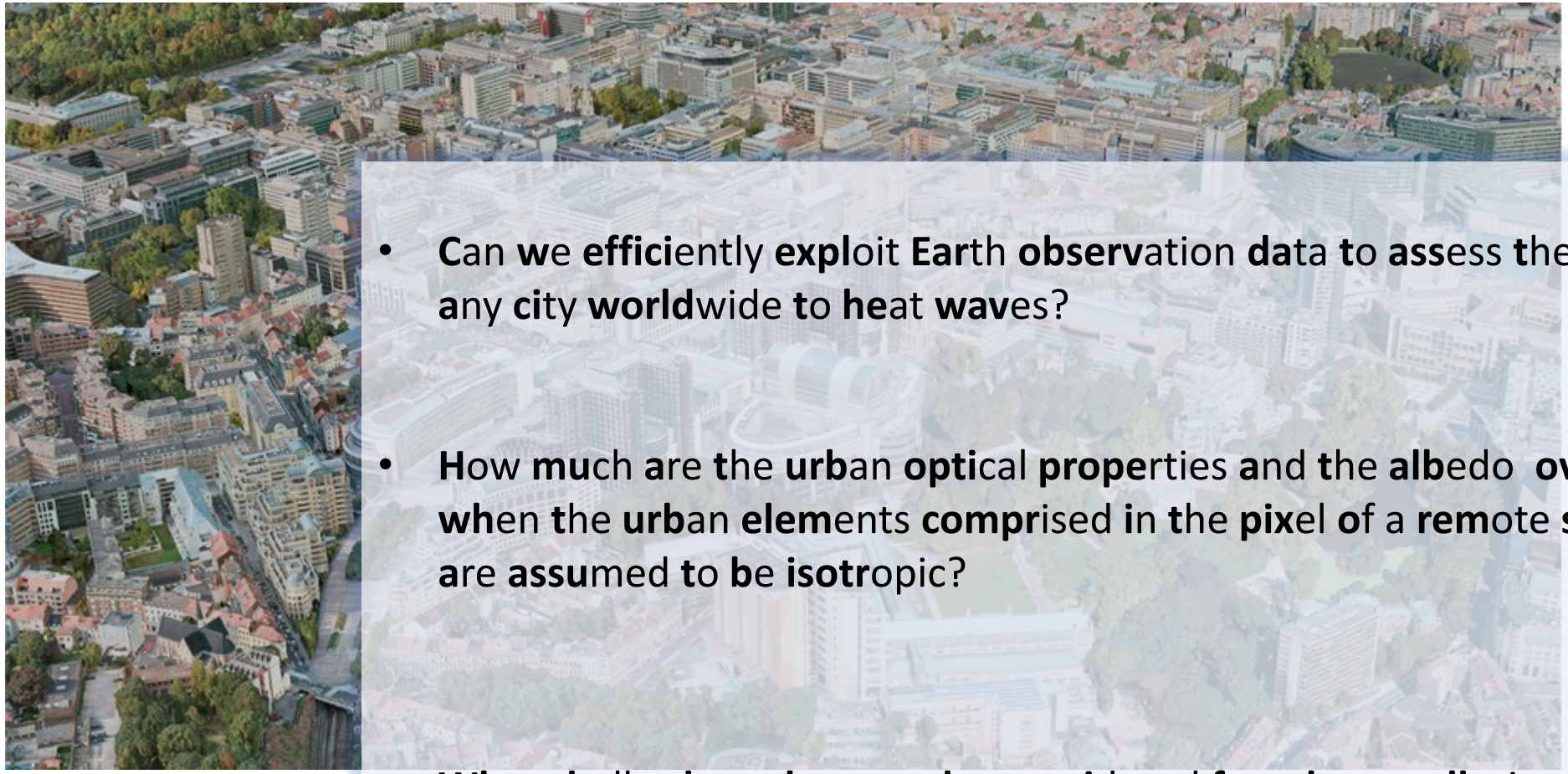
Not feasible

Spatial scale, $\Omega_{Sun}, \Omega_{satellite}$

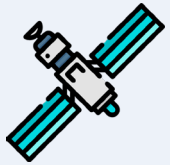
Oversimplified

SuaBe

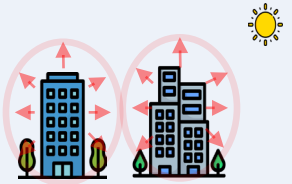
SuaBe's scientific questions:



- Can we efficiently exploit Earth observation data to assess the vulnerability of any city worldwide to heat waves?



- How much are the urban optical properties and the albedo over estimated when the urban elements comprised in the pixel of a remote sensing image are assumed to be isotropic?



- What shall urban elements be considered for a heat pollution mitigation intervention?

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vito remote sensing

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