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## Has Rennes a heat island? From sensors and climate models to remote sensing and ecology issues.

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### ► To cite this version:

Xavier Foissard, Alban Thomas, Jean Nabucet, Hervé Quénol, Vincent Dubreuil, et al.. Has Rennes a heat island? From sensors and climate models to remote sensing and ecology issues.. International Long Term Ecological Research Network & LTER-France (Zones Ateliers Network & Critical Zone Observatories) joint conference , Oct 2017, Nantes, France. hal-01662257

**HAL Id: hal-01662257**

**<https://hal.science/hal-01662257v1>**

Submitted on 12 Dec 2017

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# Has Rennes a heat island? From sensors and climate models to remote sensing and ecology issues.

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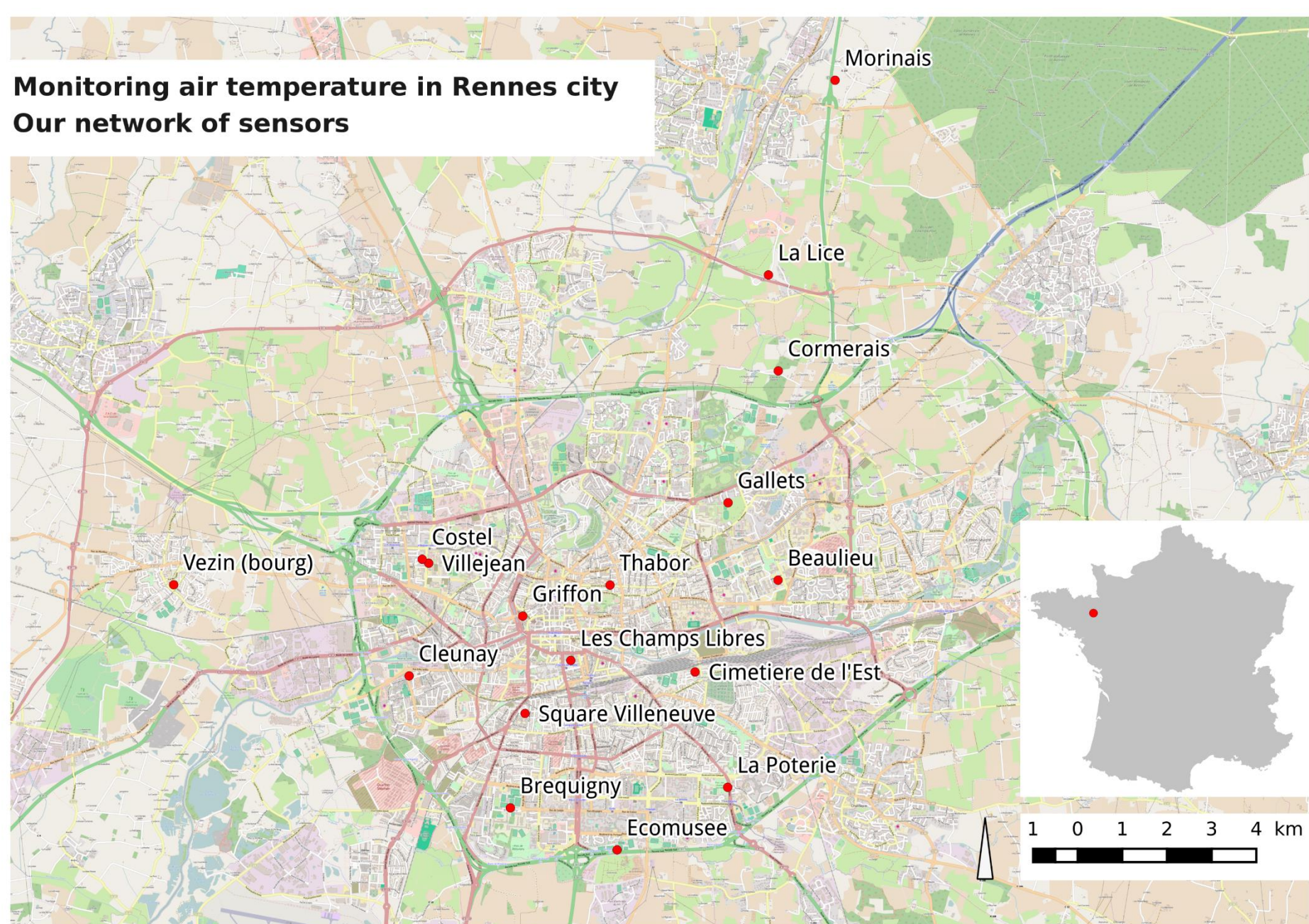
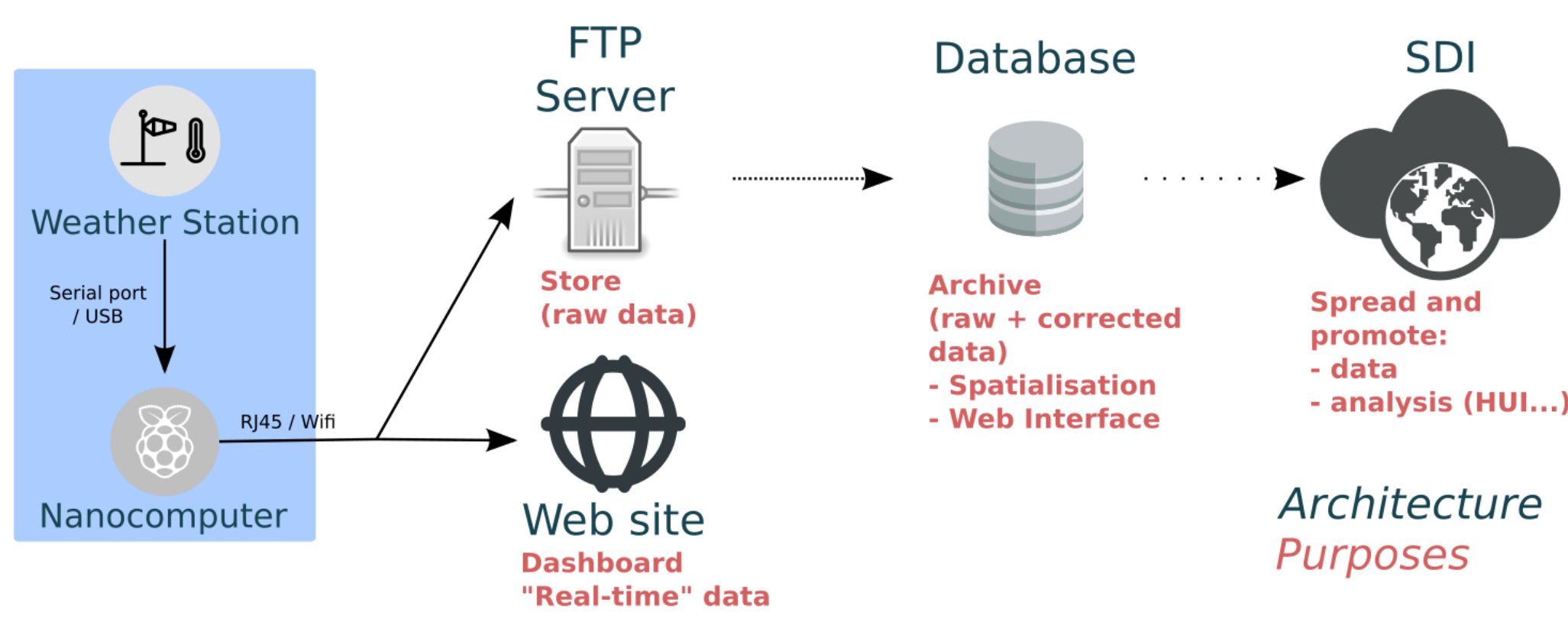
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## Network of sensors

Air temperature is monitored in Rennes city (Brittany, France, CNRS Zone Atelier Armorique) with 1st measures in 2003.

Our network: ~20 permanent weather stations (+ temporary mobile sensors)

Data collected using cheap nanocomputers



An open-source application to [https://bitbucket.org/thomas\\_a/rpi\\_meteo/](https://bitbucket.org/thomas_a/rpi_meteo/)

- check weather station's state
- re-configure station
- gather & store data
- Send data to FTP & website

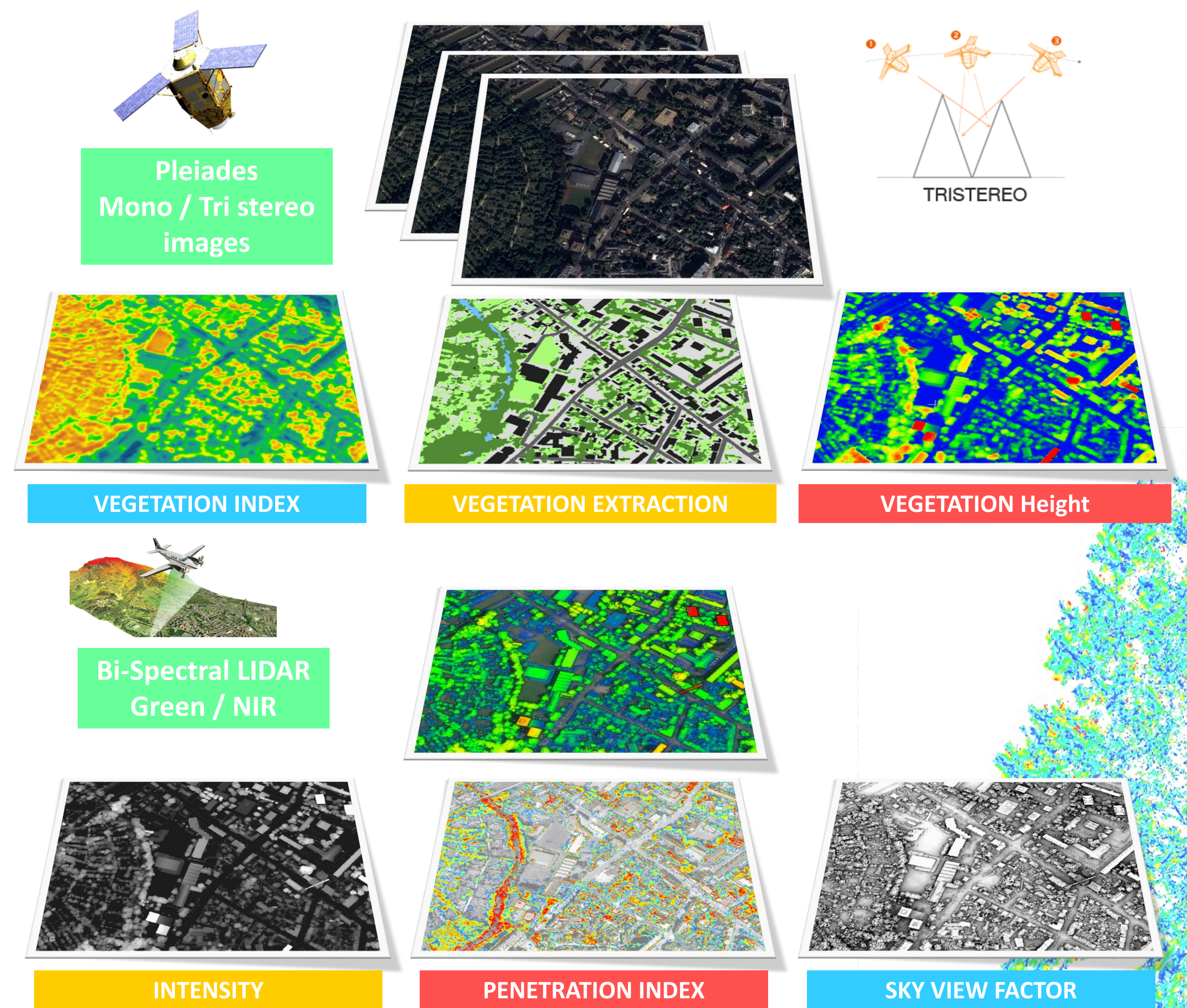
-> improve data quality

Stations throughout the city to illustrate different neighborhood: center, residences, suburban, parks...

Watch out: [https://osur.univ-rennes1.fr/meteo\\_rennes/](https://osur.univ-rennes1.fr/meteo_rennes/)

## Climate & Remote sensing

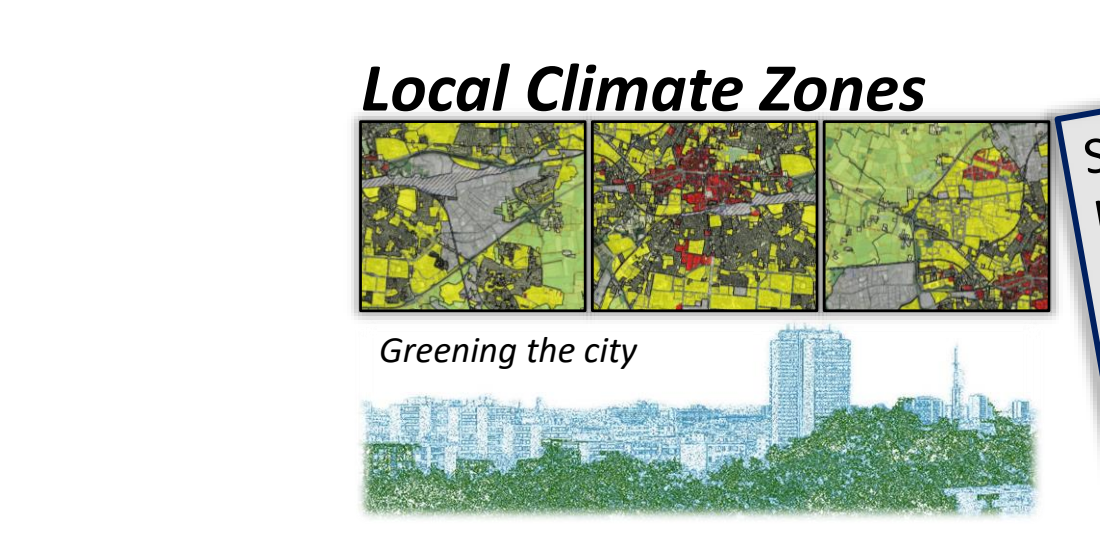
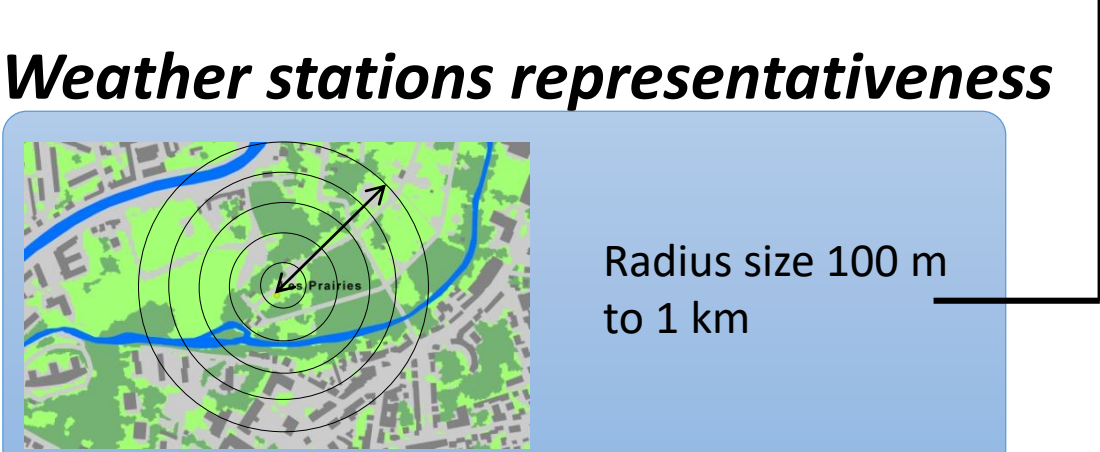
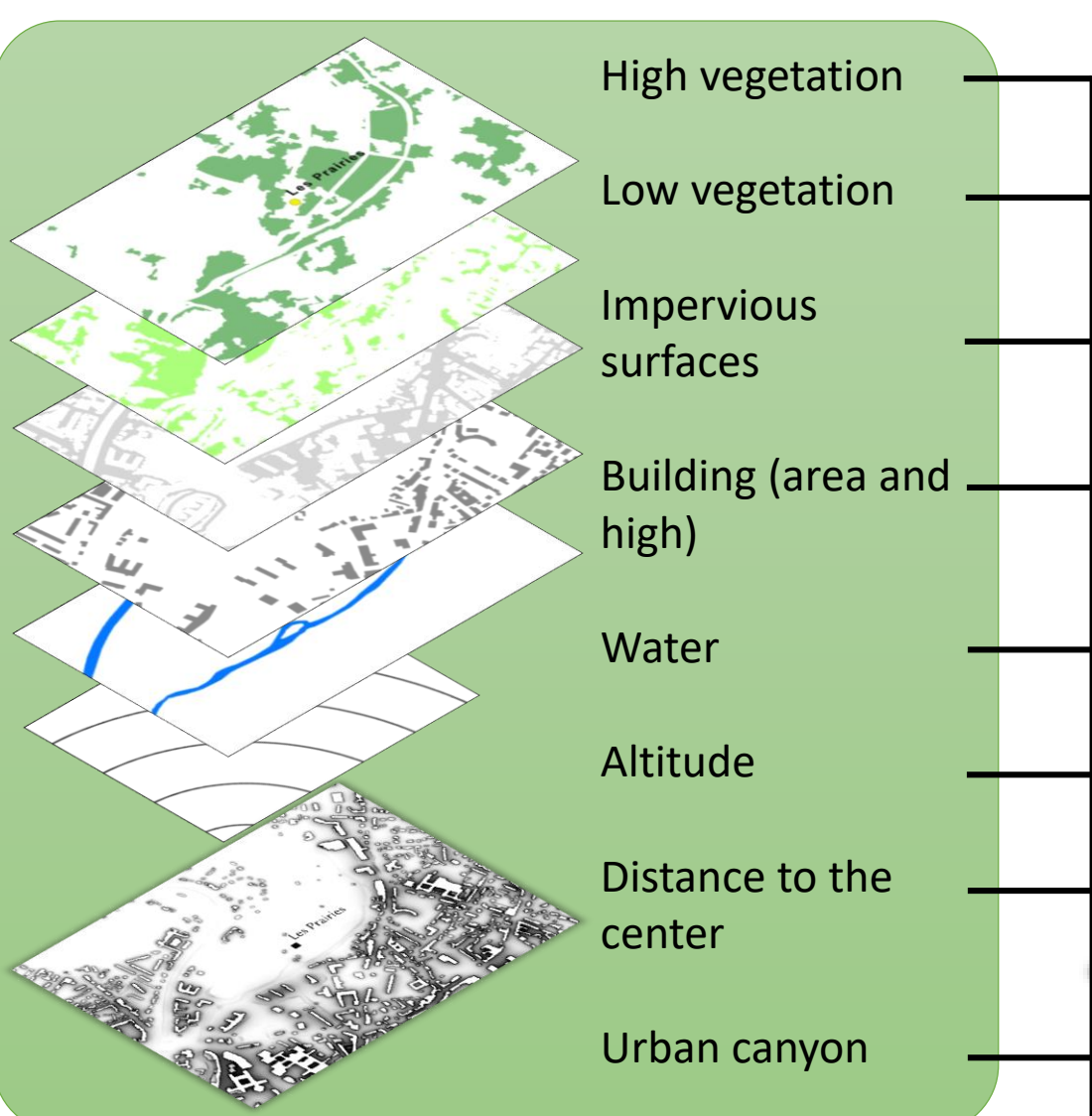
This sensors network was also used to model the local climate at fine scale based on remote sensing data analysis in 2D and 3D.



### Linking the UHI observations and the land-use context.

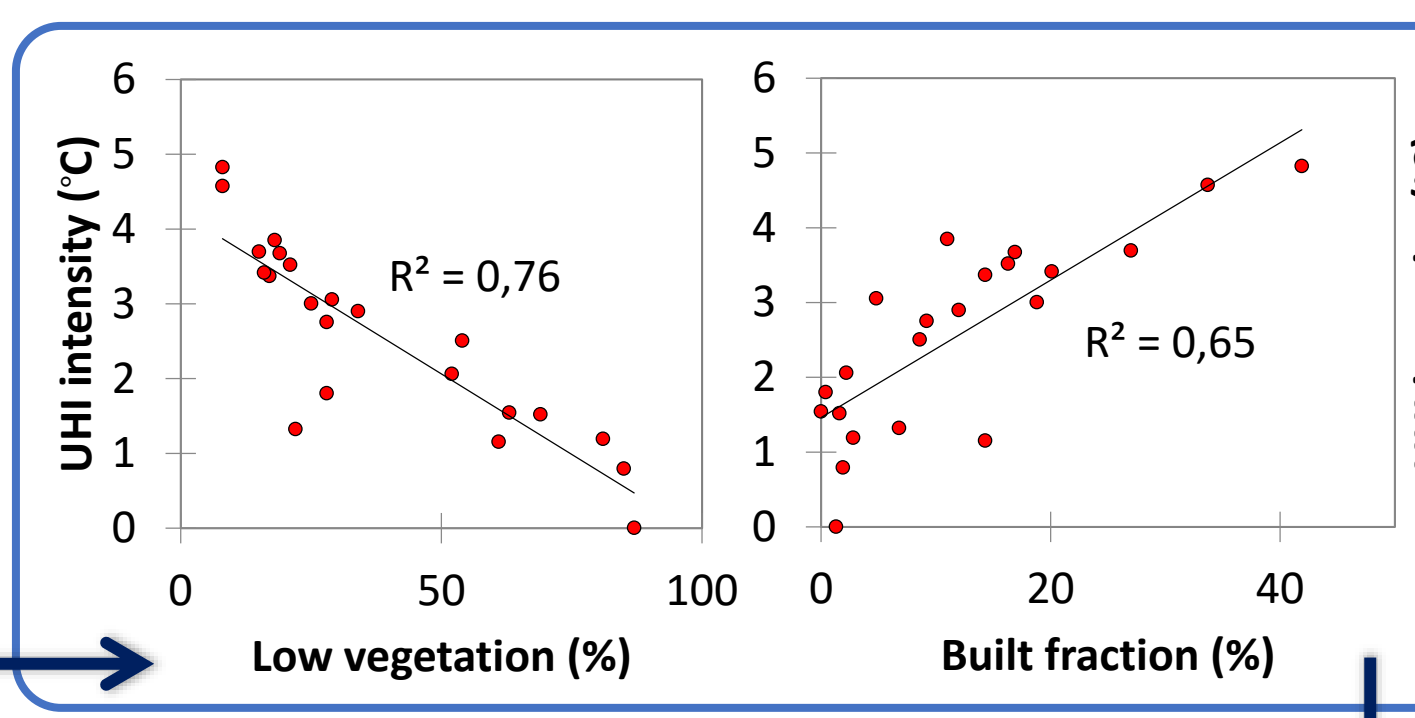
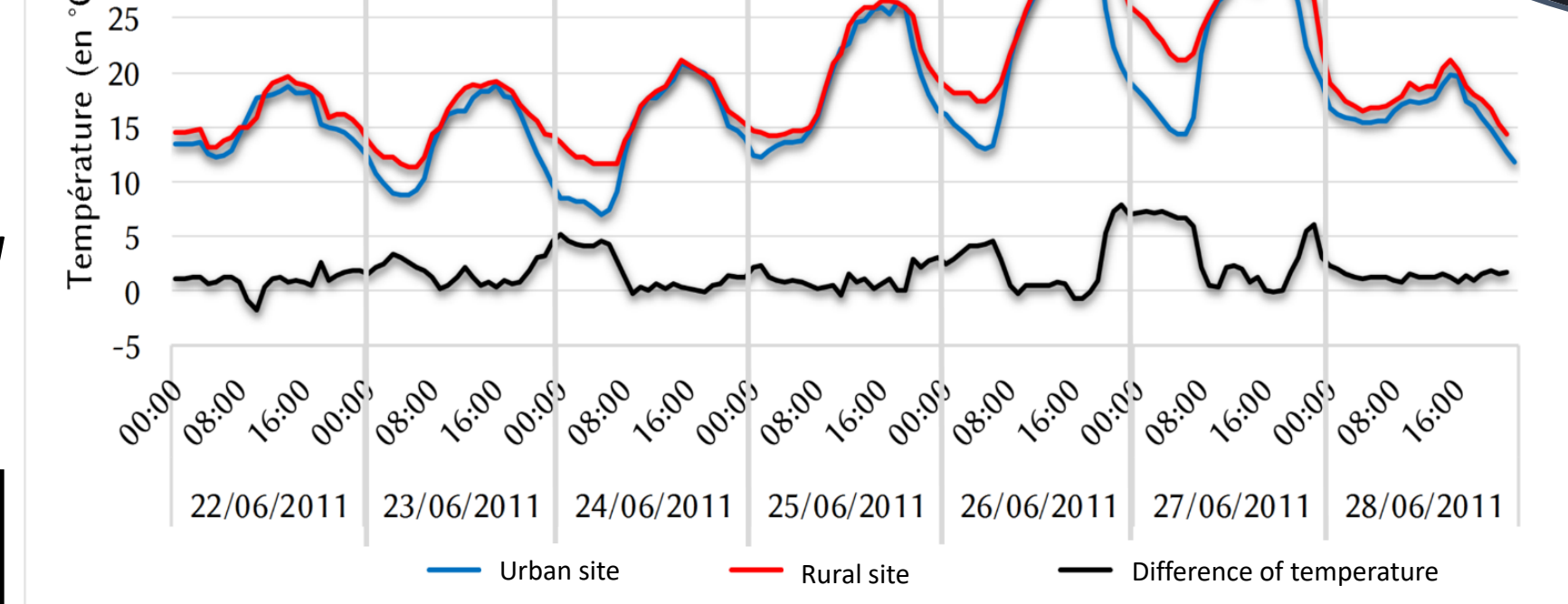
### Spatial variability

Multi-criteria method for a spatial modelling of the UHI

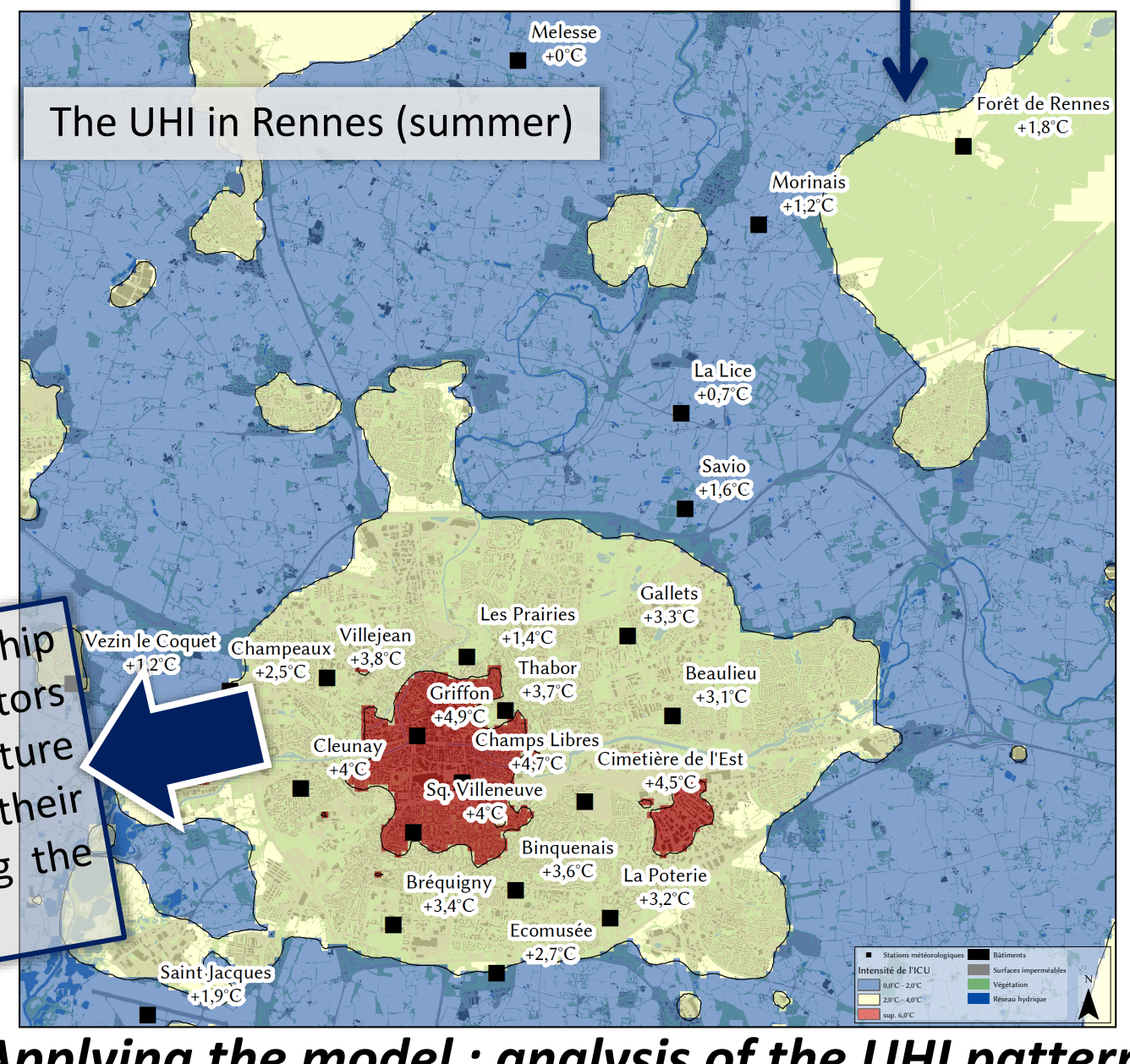


### Temporal variability

Analysis of the UHI intensity according to weather conditions



Fitting the model



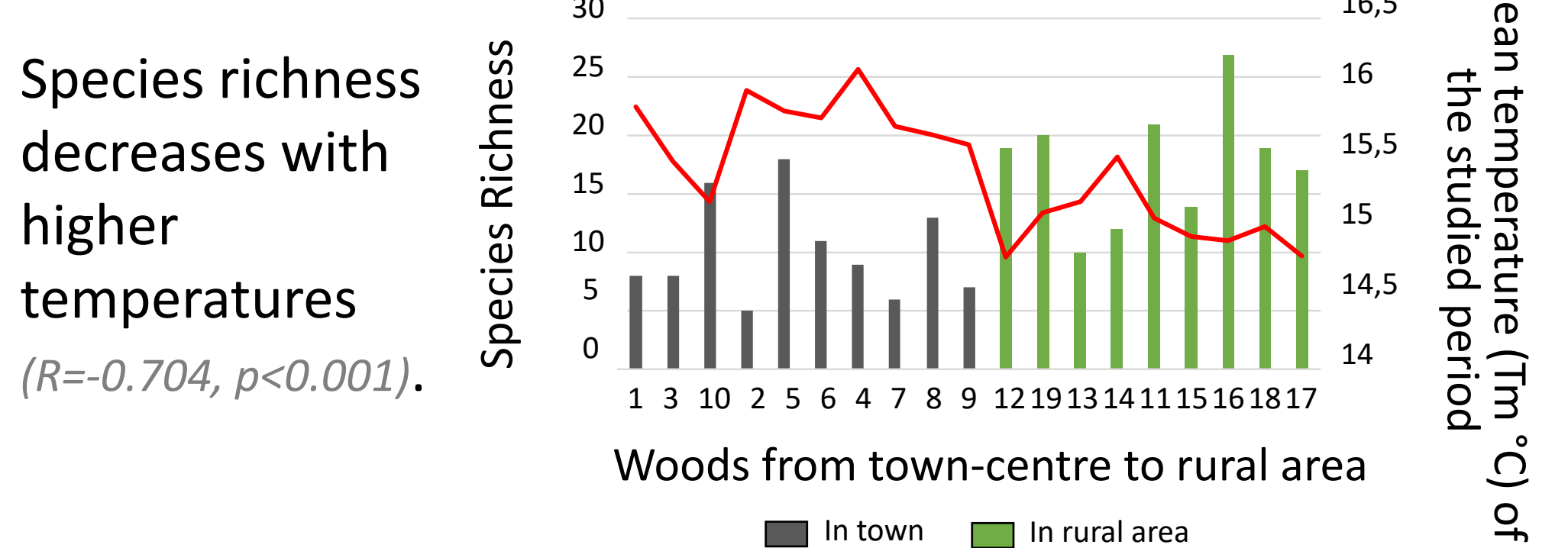
Studying the relationship between the land cover factors and the urban temperature allowed to evaluate their potential role in mitigating the UHI phenomenon.

Applying the model : analysis of the UHI pattern

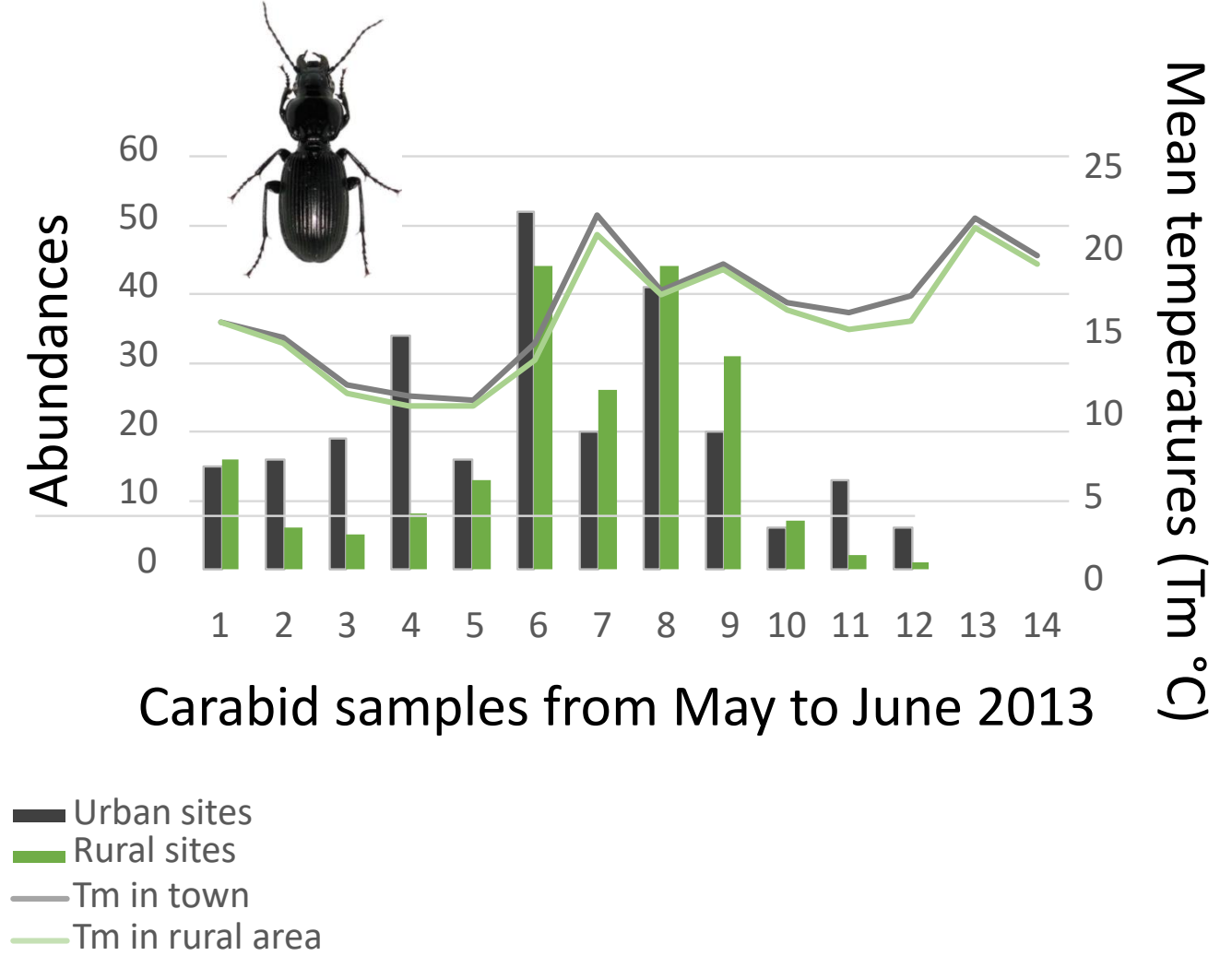
## Climate model

### Ecologists and climatologists now explore together the effects of the UHI on carabid beetles species.

#### Effect on Carabid beetles communities



#### Effects on one species: Pterostichus madidus



*P. madidus* seems to be active earlier in urban woods than in rural ones ( $\chi^2=29.9, p<0.001$ ).  
=> Link with climate is being analysed.

#### Data acquisition

In each of the 19 woods distributed from the town-centre to the rural surroundings:

- 1 Tinytag for air temperature 2m high
- 6 pitfall traps collected every 5 days from May to July 2013

## Climate & Urban biodiversity

