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Urban Heat Island or Urban Heat Bubble?

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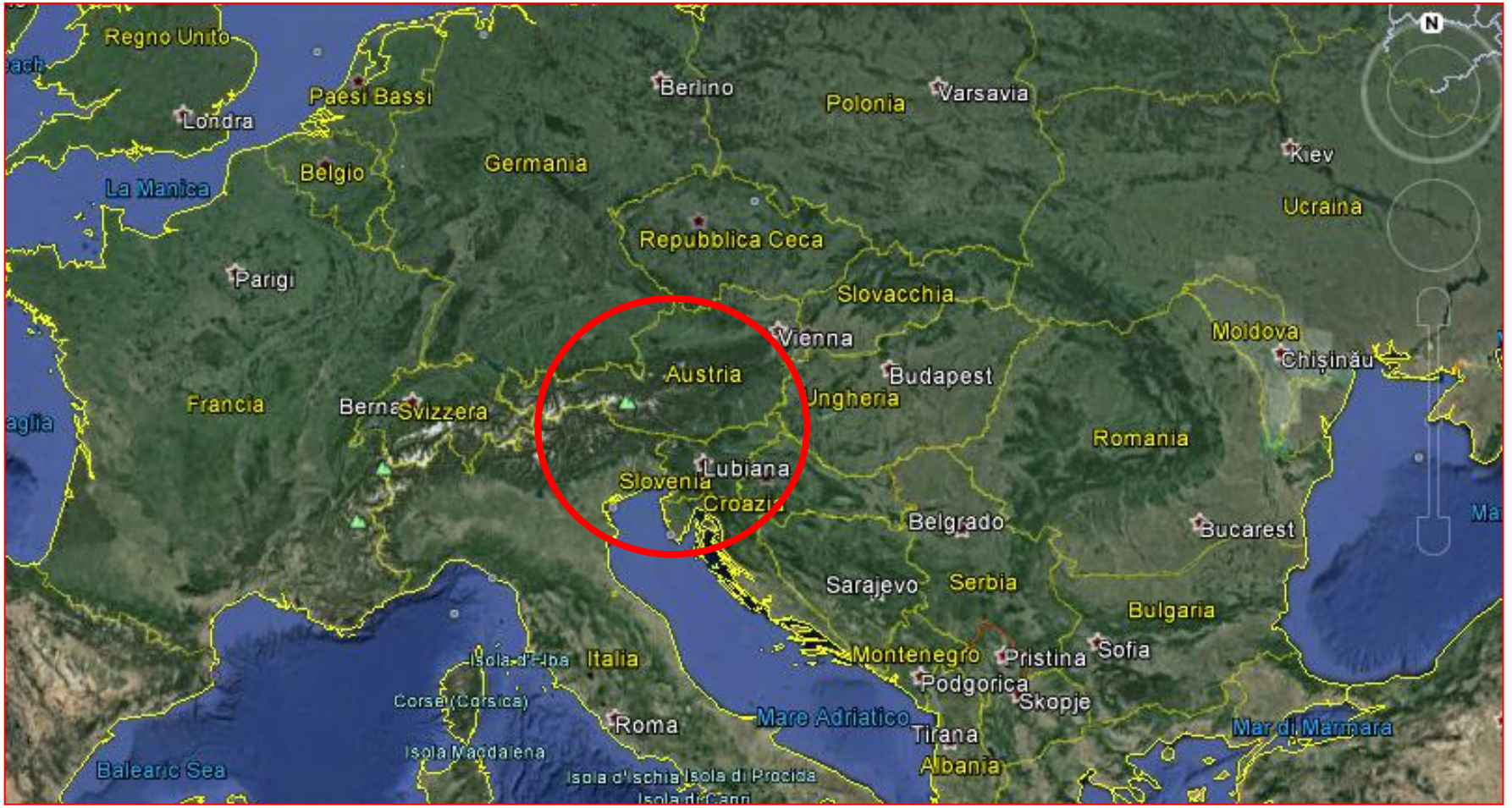
Conclusions

- Even relatively small towns (roughly 100 000 inhabitants) can experience a «heat island» effect
- «Heat island» effect is essentially observed in minimum temperatures (less in average temperatures)
- Maxima temperatures experience for small towns are more subject to a «Heat bubble» effect
- This is a «citizen science» experience carried out by volunteers with a reduced cost (roughly 3 kE)
- Some surprises sprung out as well…

The study area



The study area

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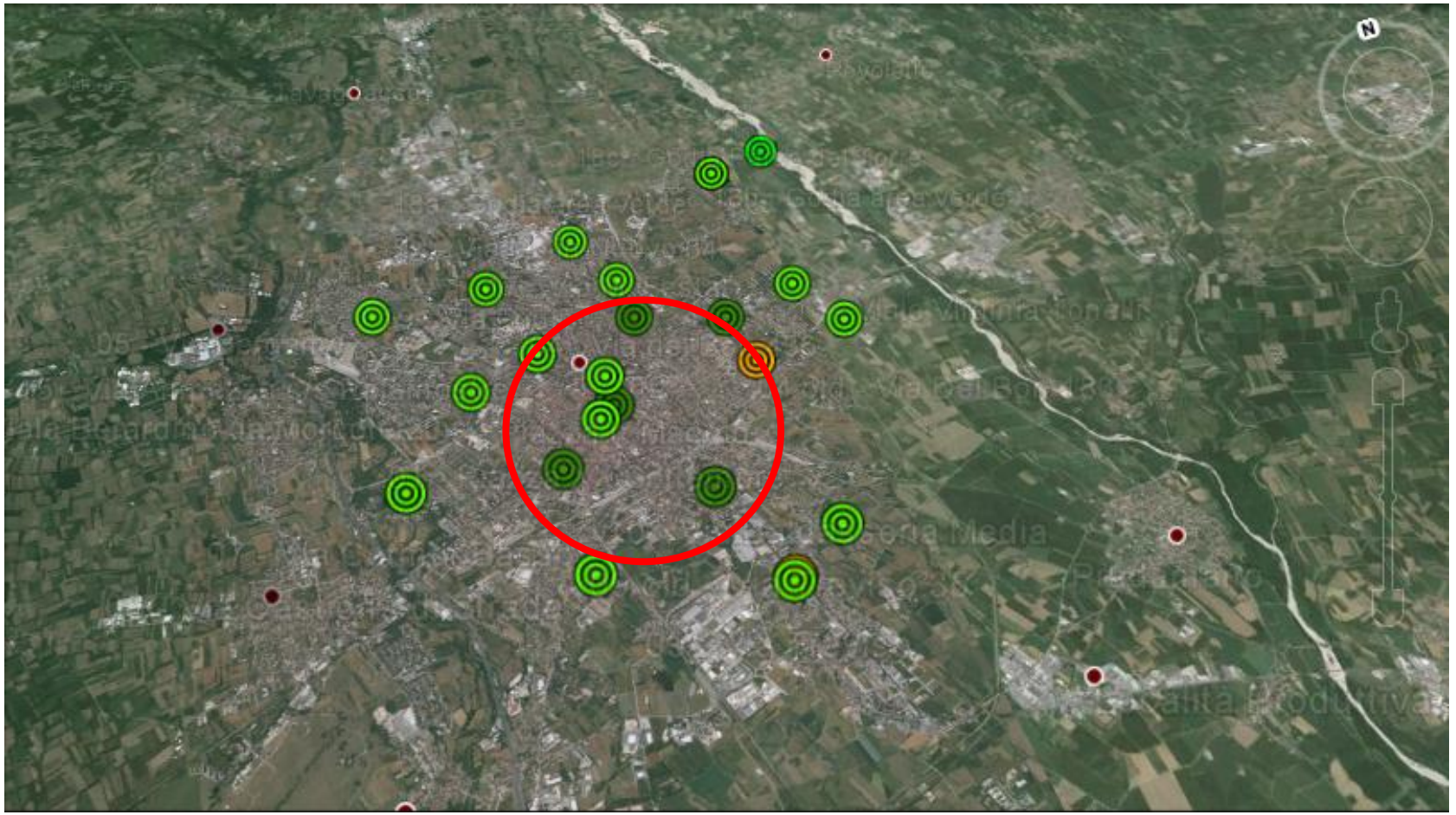
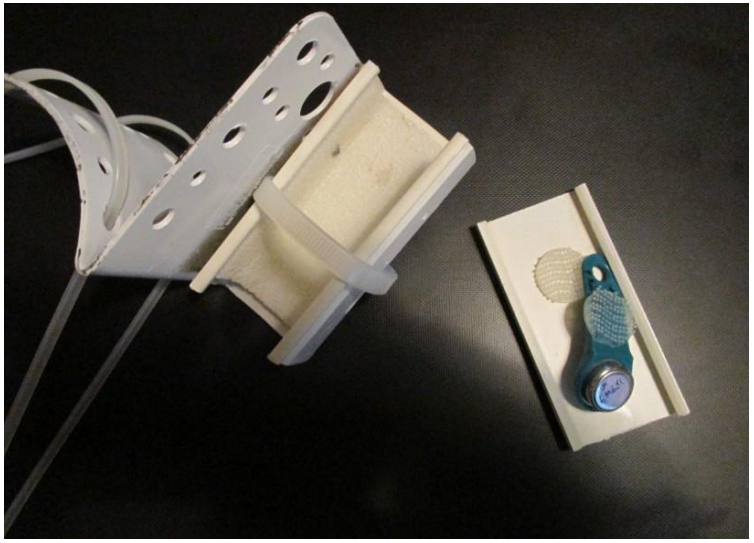


Monitoring strategy

- Use cheap data loggers to record temperature

- Deploy data loggers with a homogeneous micropositioning
- Record temperature every 15’ for reasons of storage (~ 1 month) and time precision (good for temperature, not stable for time drifts)
- Compare data logger measurements with “official” synoptic monitoring station to evidence offsets related to the monitoring device
- Try to survive… (e.g., UTC nightmare)

Monitoring infrastructure



"nests" projected to be:

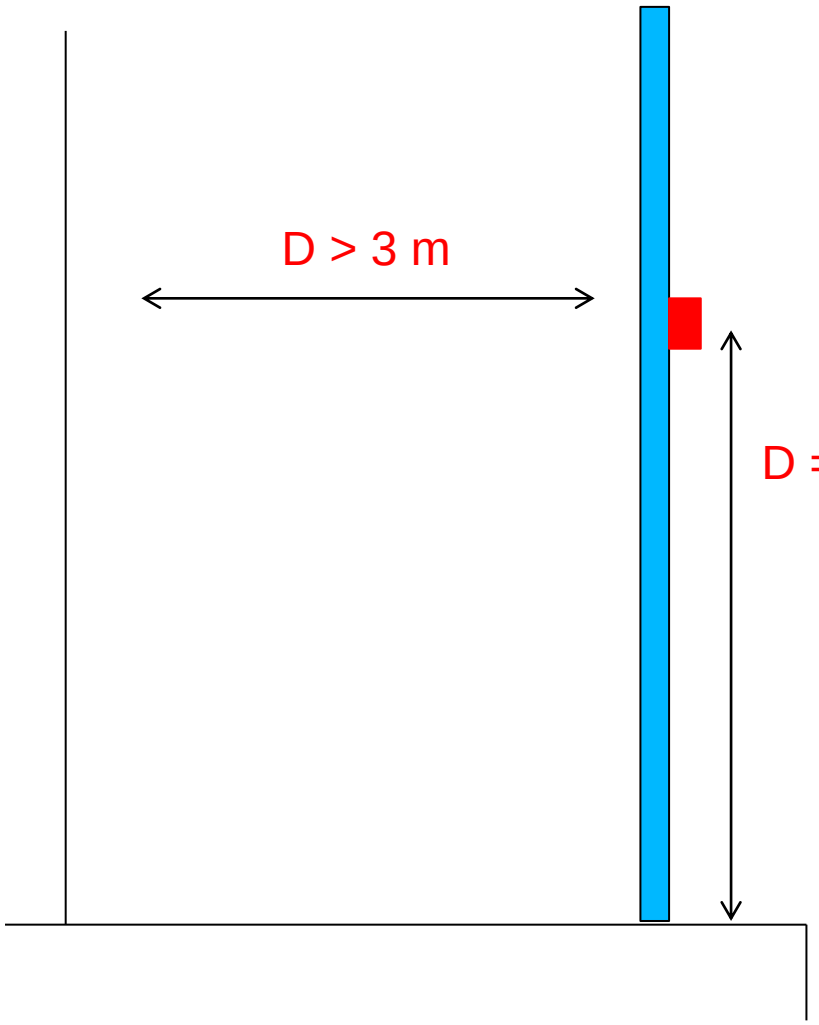
effective shield to direct solar radiation

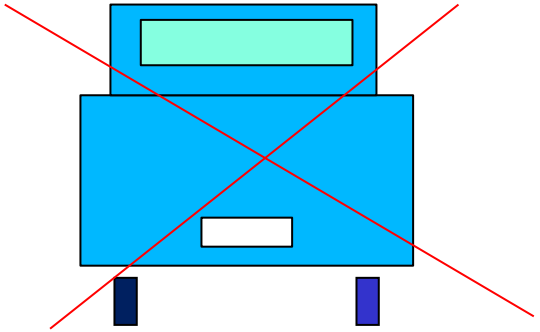
easy to insert and extract loggers

easy to orient northward

cheap and discrete

Monitoring strategy





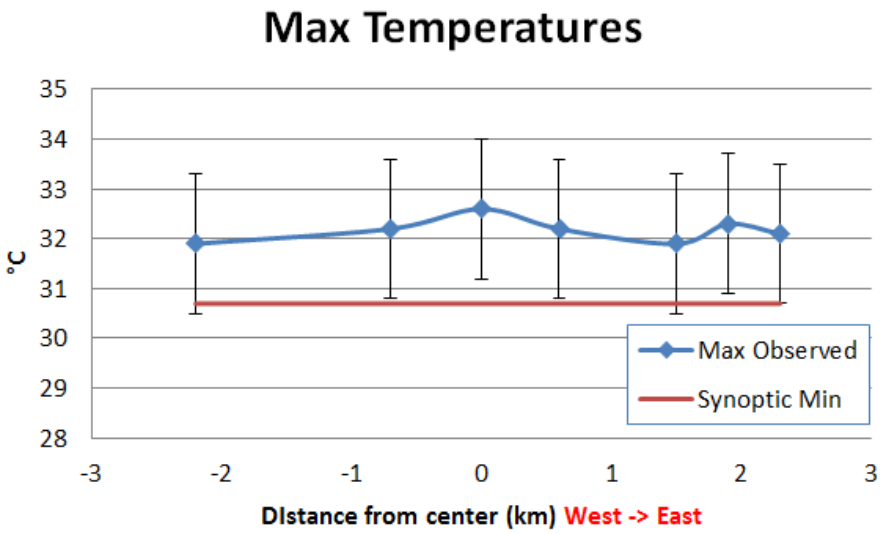
Use urban light poles

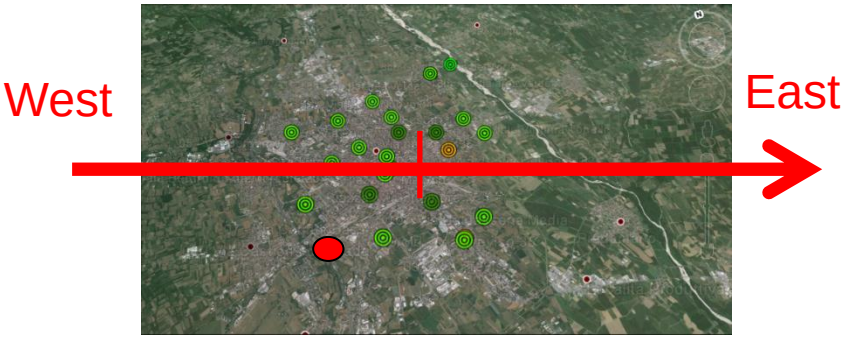
Far from walls

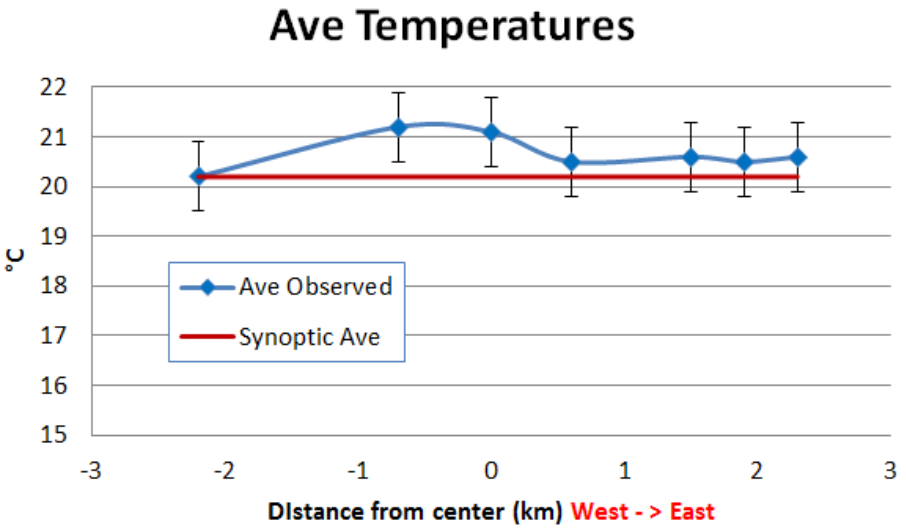
Far from car parks

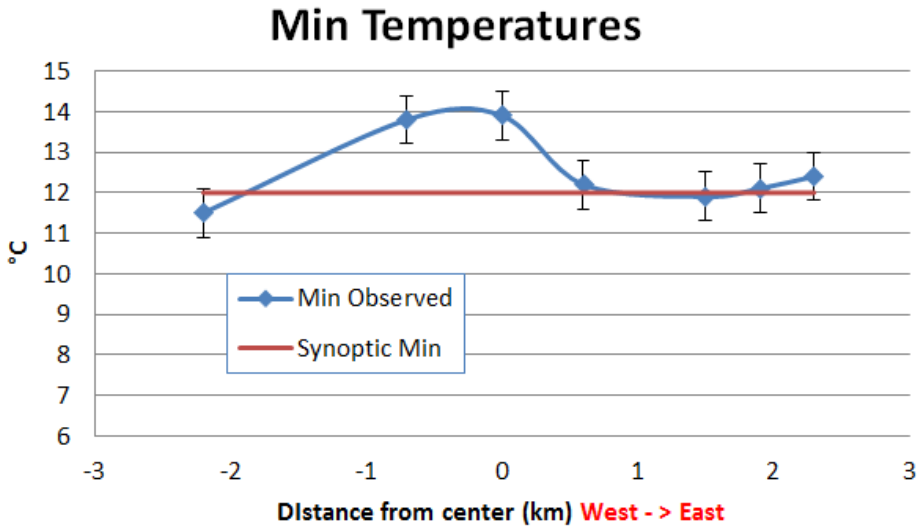
Easy to find

Results



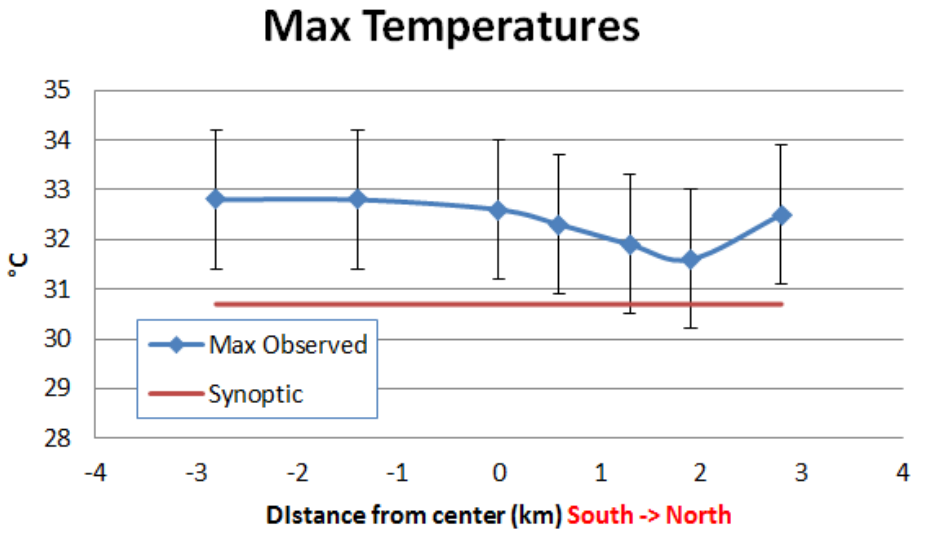


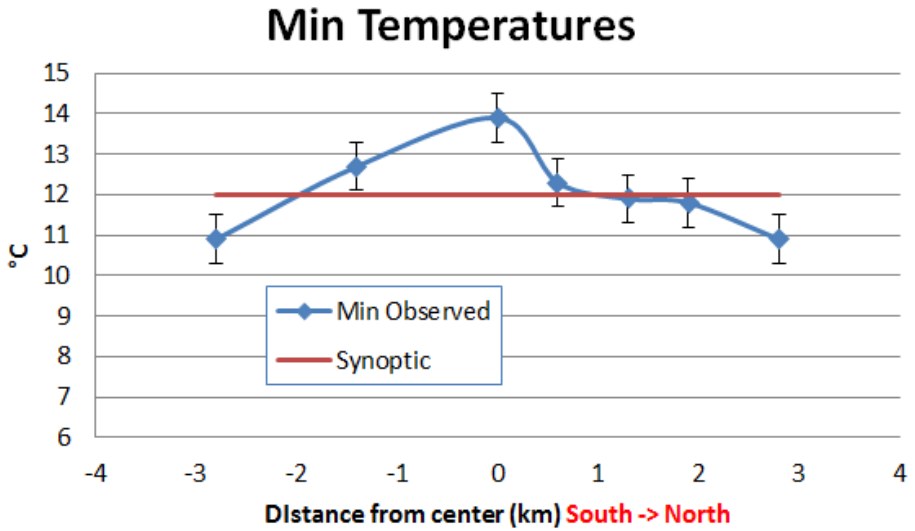


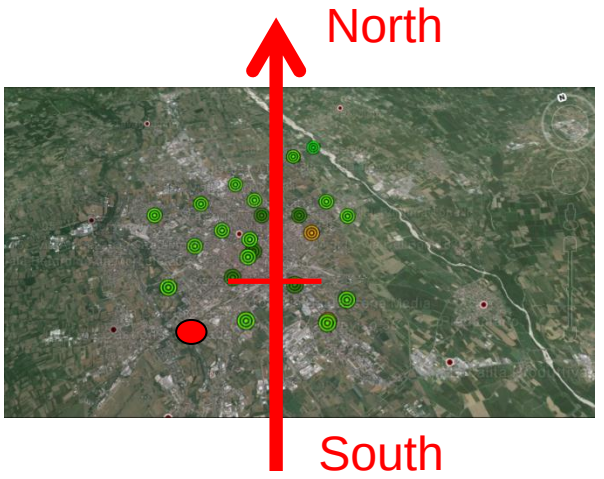


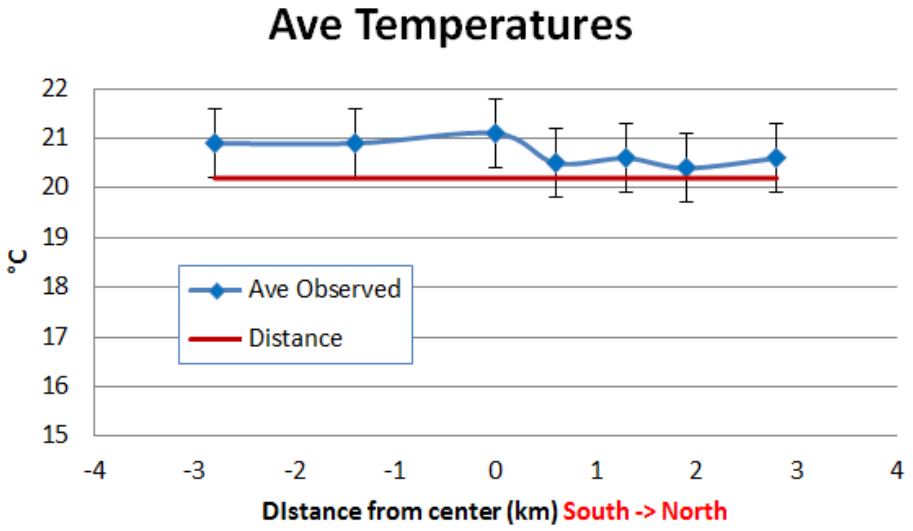
Error bars are the standard deviation between data loggers in the nest and synoptic measurements

Results









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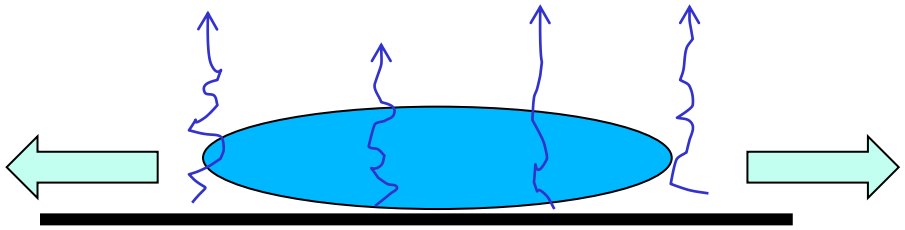
Open questions (and tentative answers)

- Why difference between minima and maxima behavior?

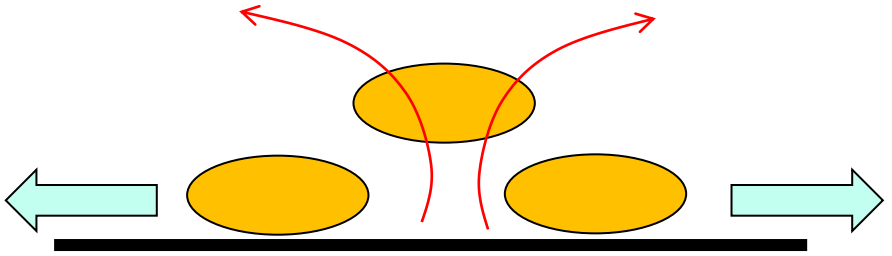
Minima are achieved through a radiative mechanism (laminar)

Maxima are achieved through a convective mechanism (turbulent)

MIN



MAX



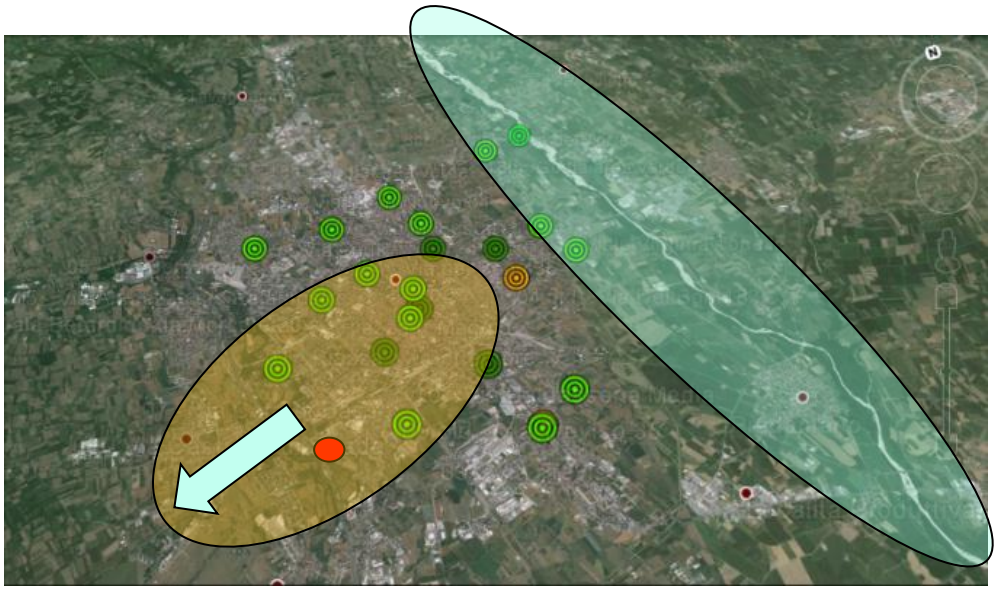
Open questions (and tentative answers)

- Why “overestimation” of temperature by synoptic station?

There is a night cold pool development on a local river basin (blue area)

Night breeze regime is from Northeast toward Southwest

Northern part less windy (?)



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- This is a «citizen science» experience carried out by volunteers with a reduced cost (roughly 3 kE)
- Thermal asymmetry in a symmetric situation and impacts on synoptic measurements

Thanks for your attention

Благодаря