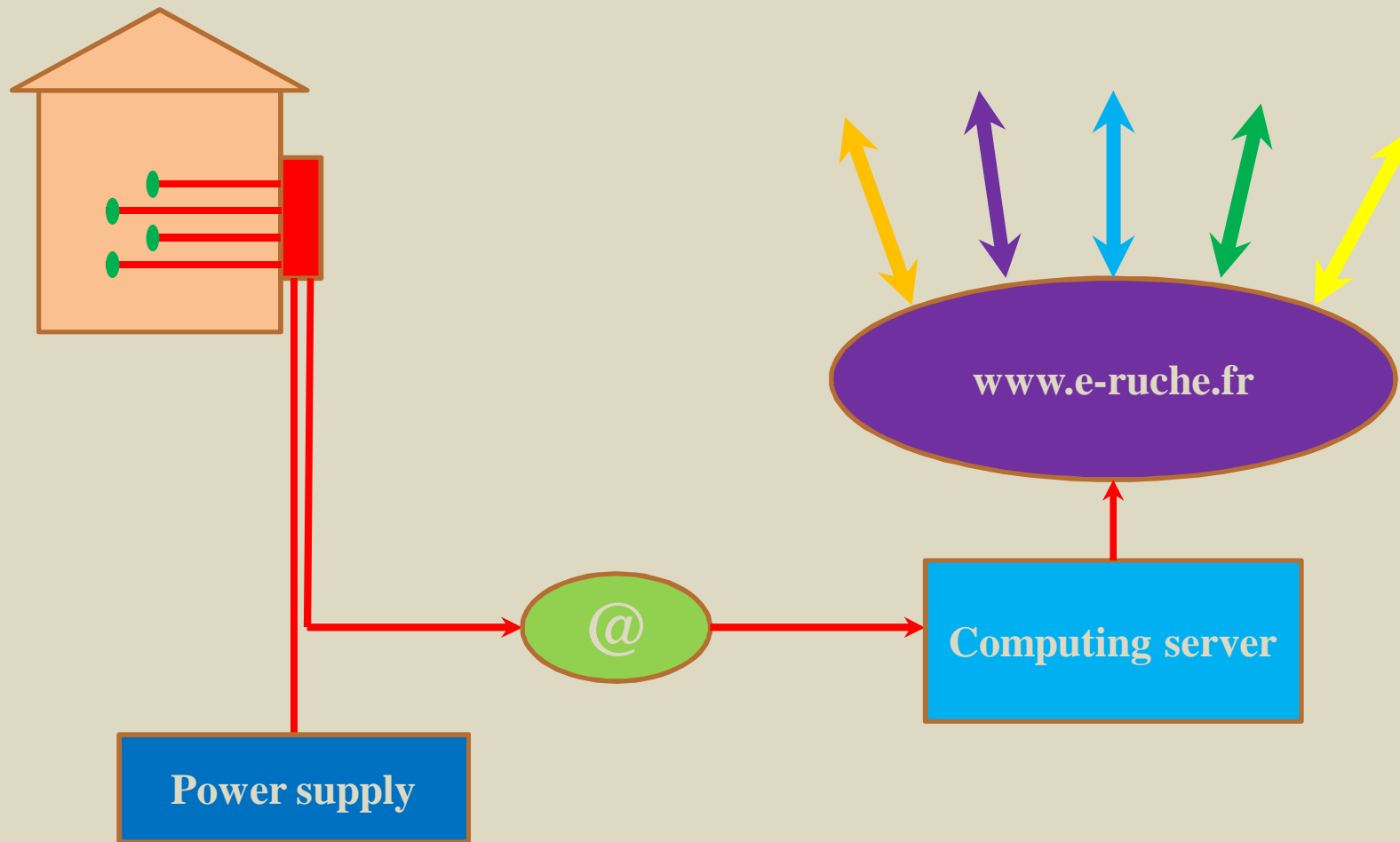


# A tool to study bees: [www.e-ruche.fr](http://www.e-ruche.fr)





# How does it work ?



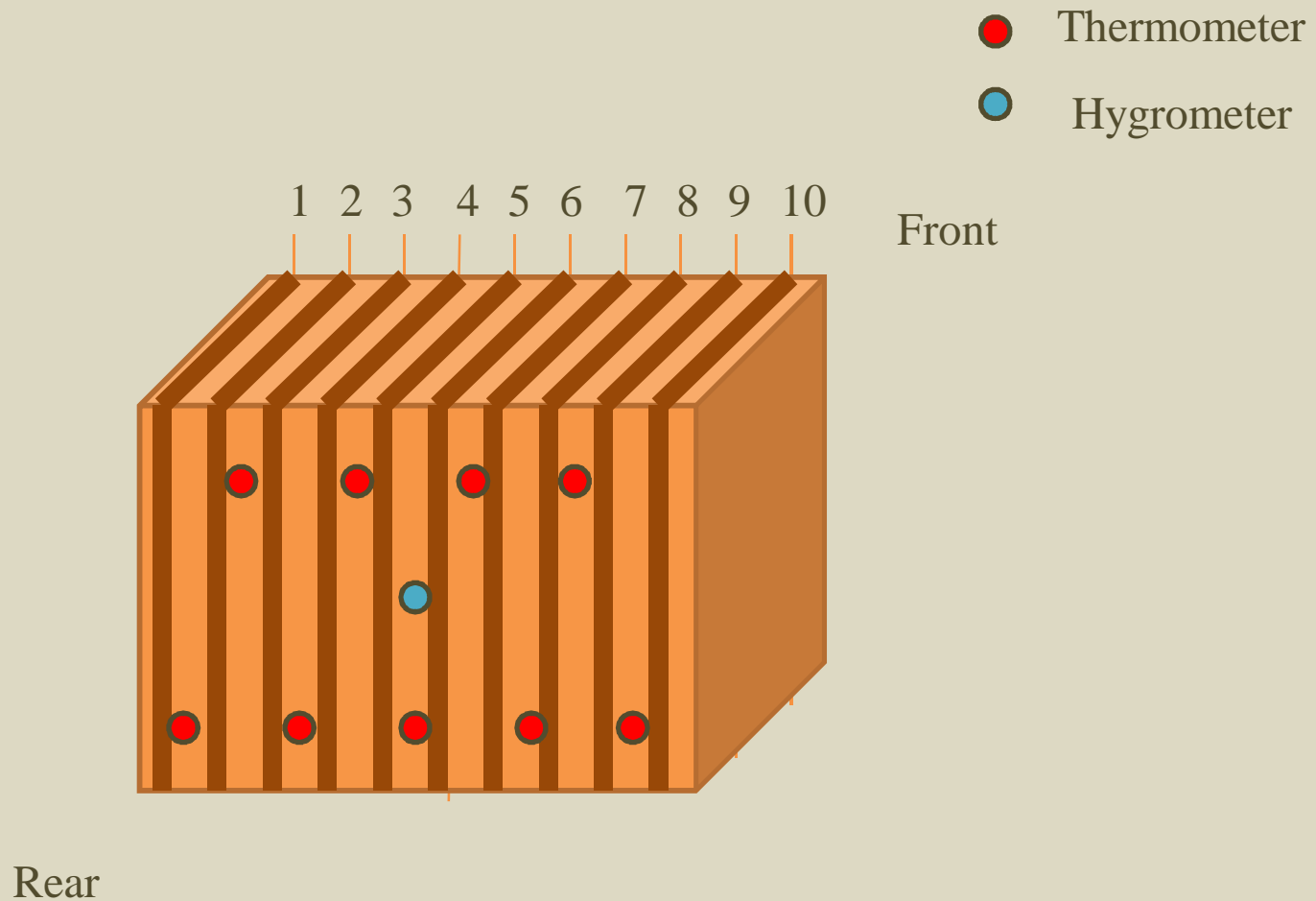
# Where?

- France
  - Bourges
  - Micropolis
  - Canteleu
- Cyprus
  - Nicosie (2)
- Spain
  - Cordoba

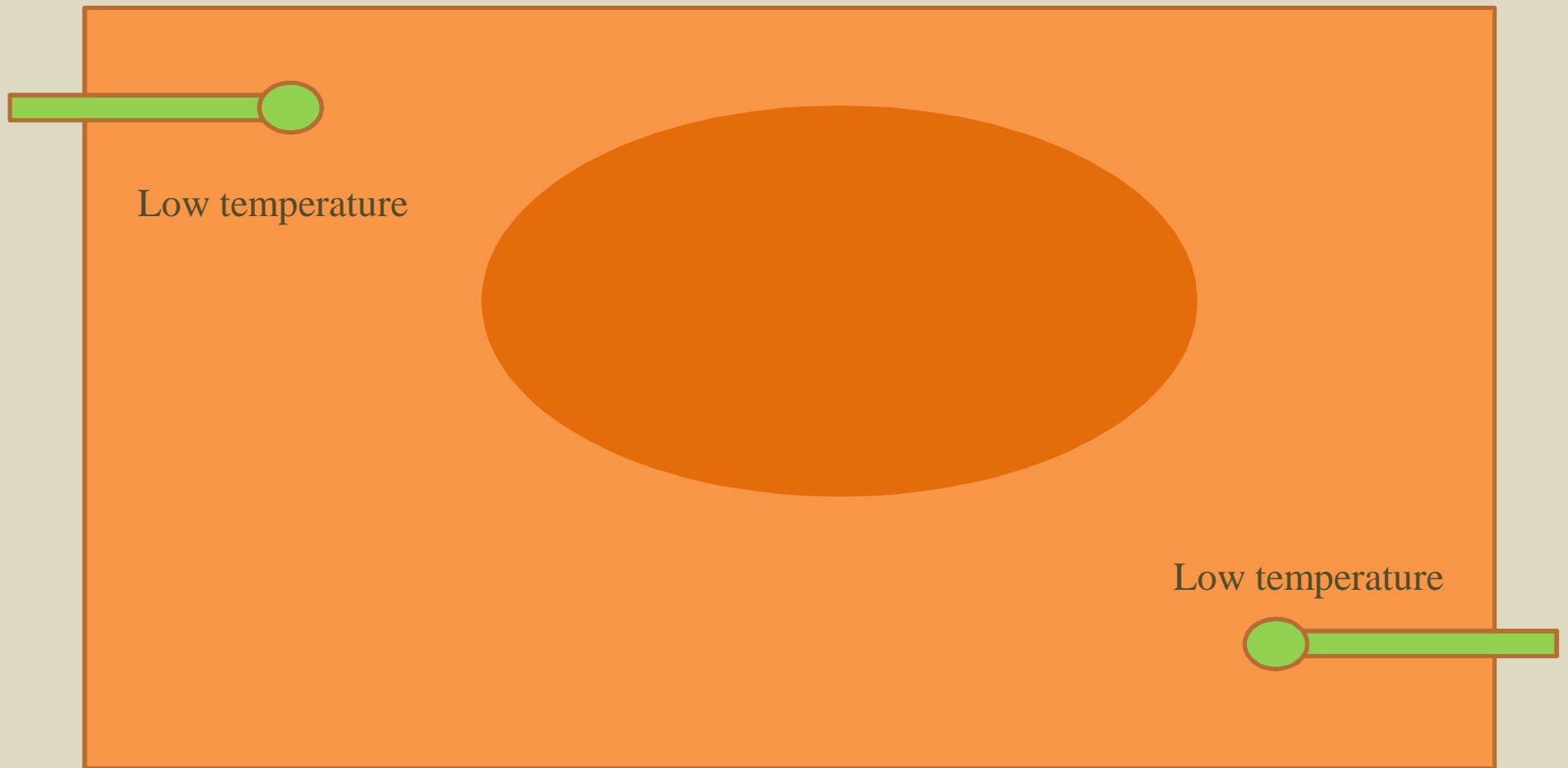
# Which parameters?

- Temperature
  - 18 thermometers inside
  - 1 outside
- Hygrometry
  - 2 hygrometers inside
  - 1 outside
- Mass
- CO<sub>2</sub> in study

# Where are the sensors ?

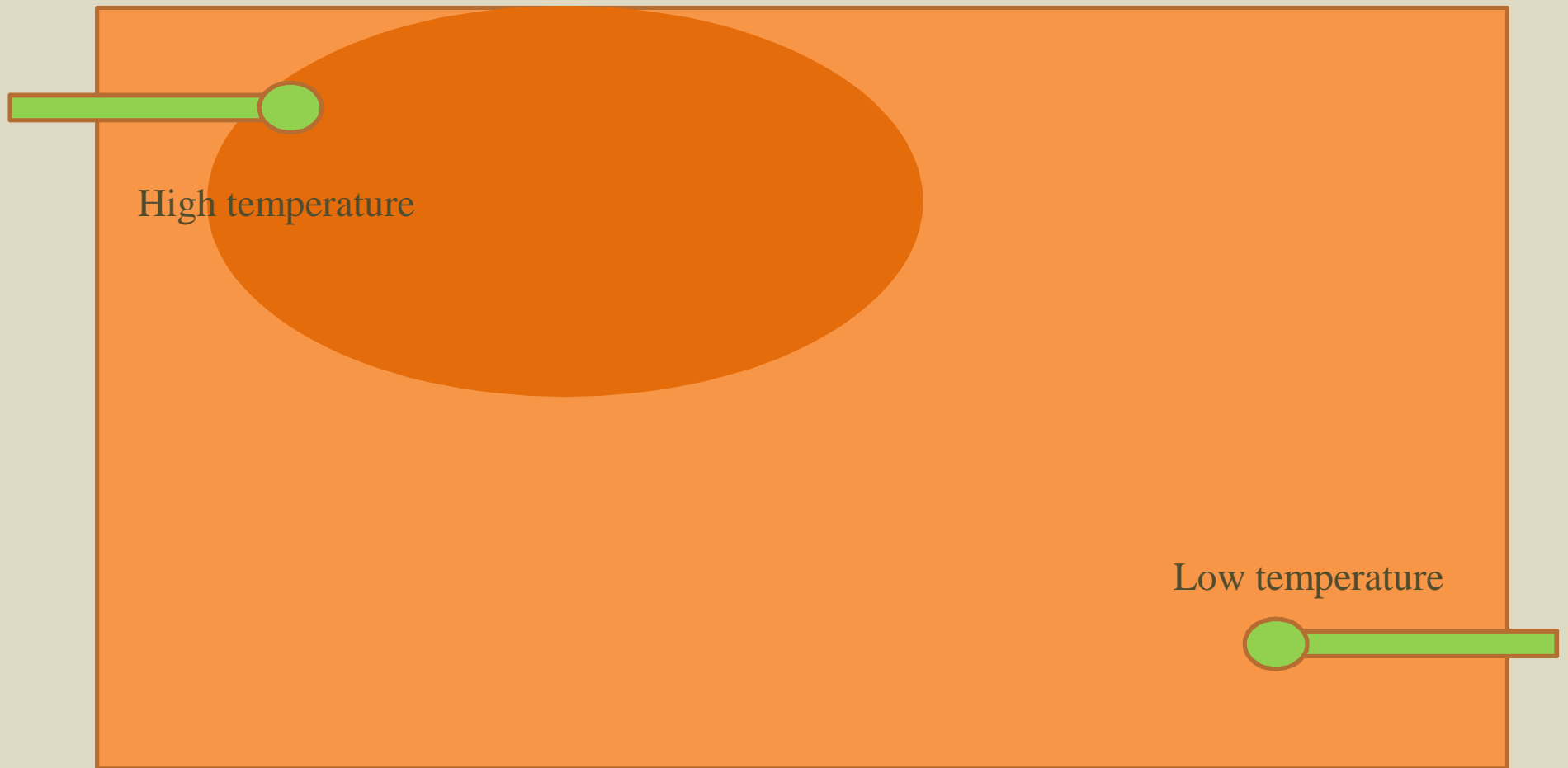


# What do these measurements mean ?





# What do these measurements mean ?



# What do these measurements mean ?



# Results

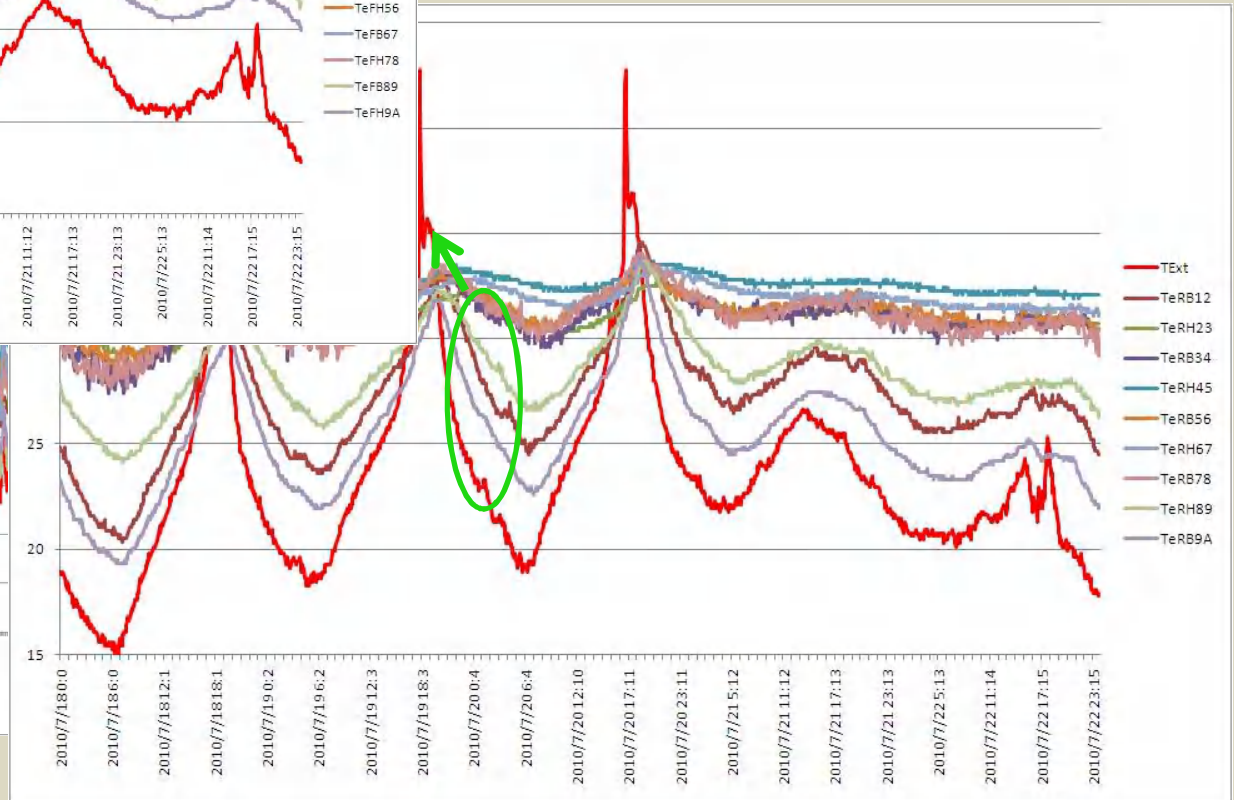
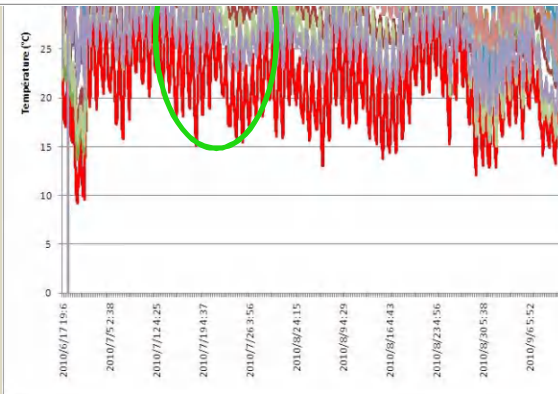
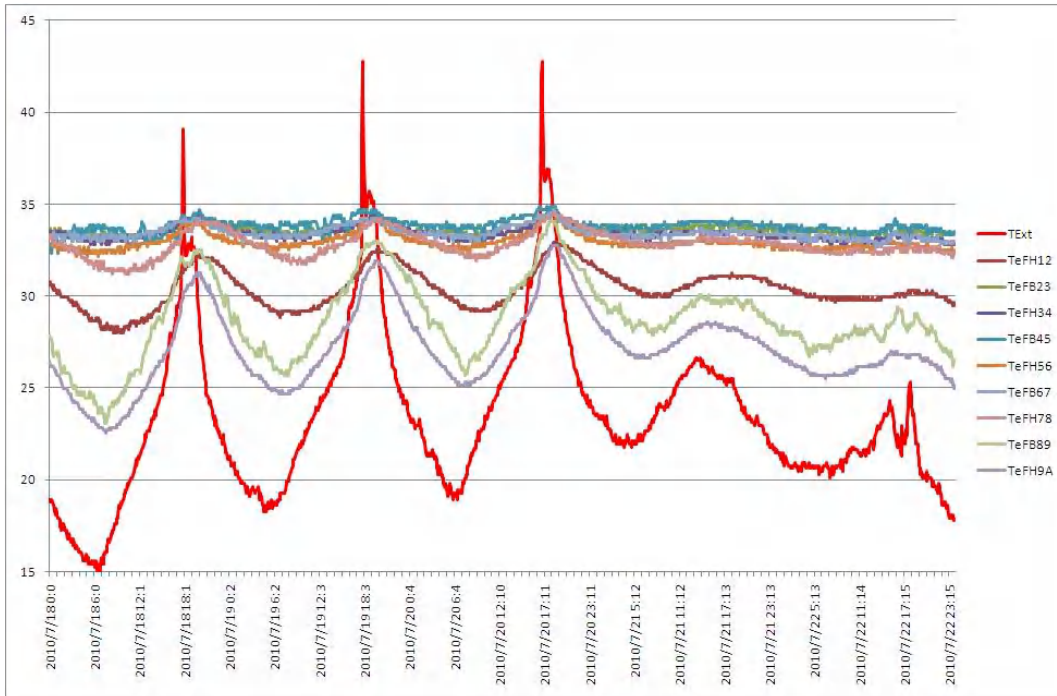
- Micropolis



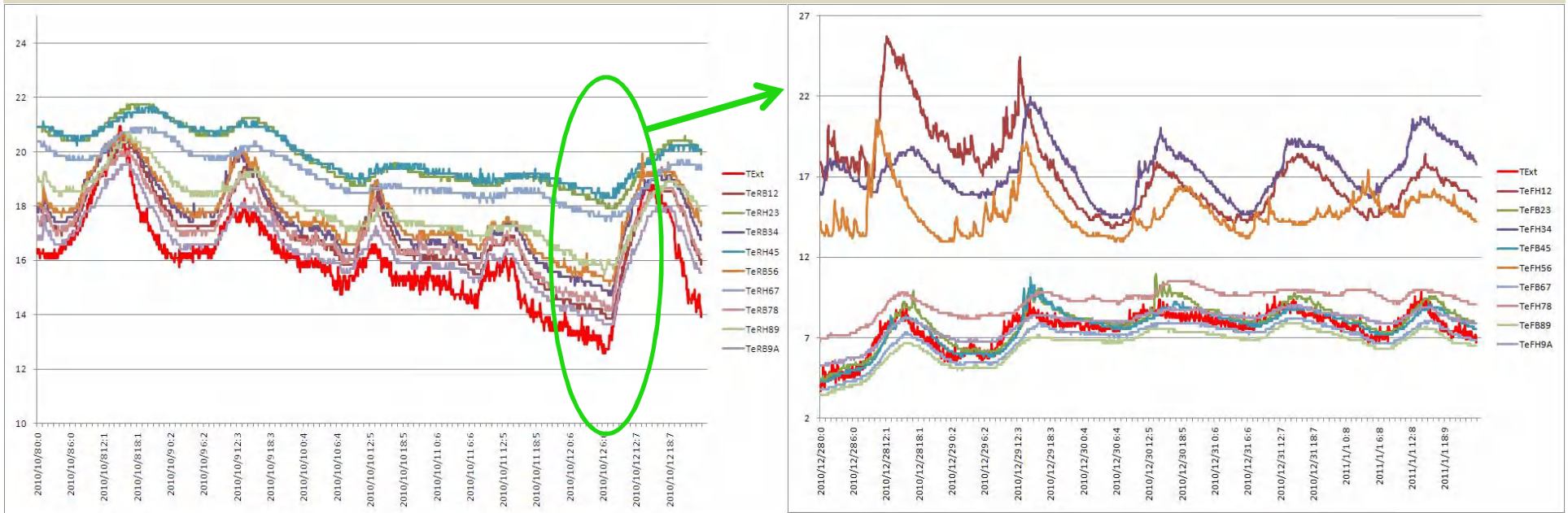
- Cyprus



Measured from June  
(2010)

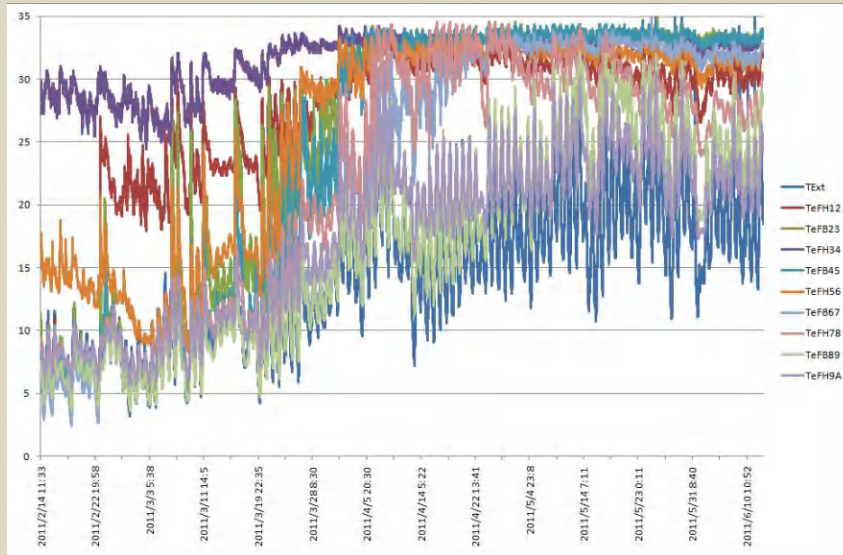


# Temperatures measured from october to january(2011)

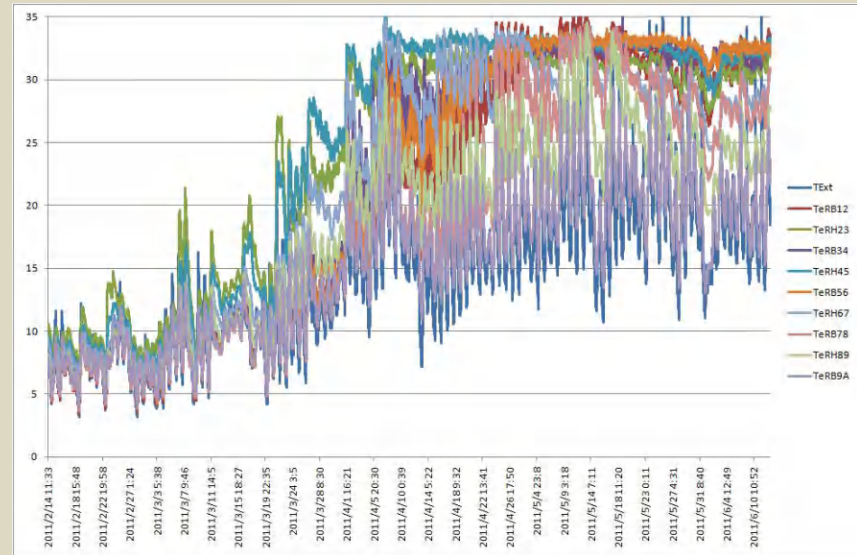


# Temperatures measured from january to june (2011)

Front sensors

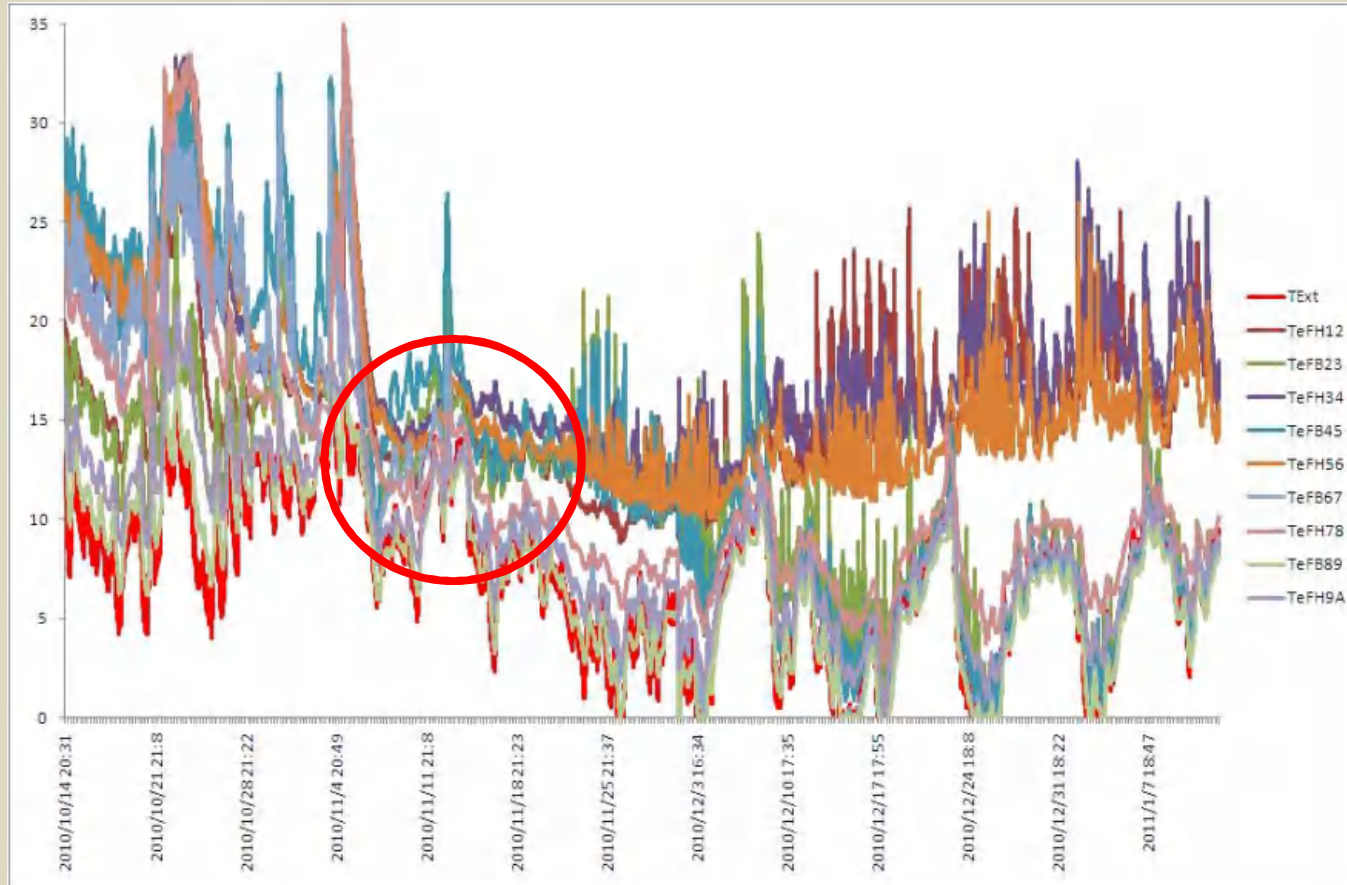


Rear sensors





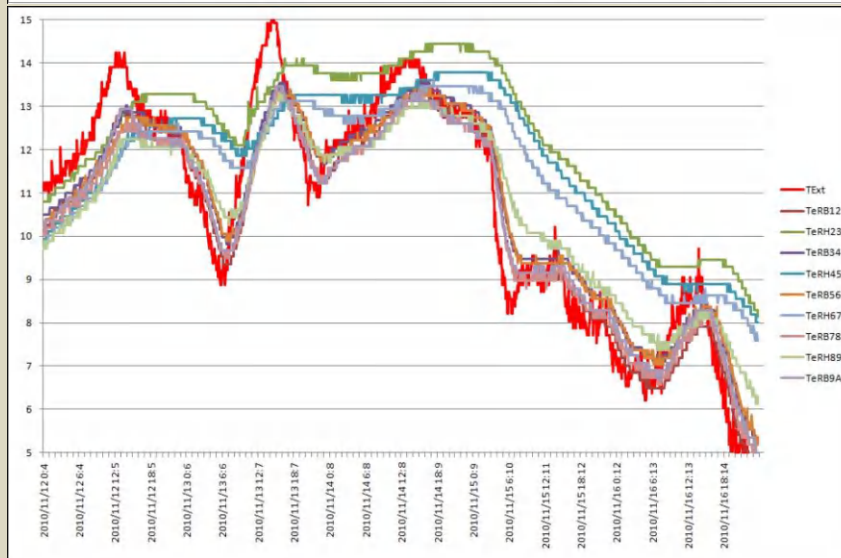
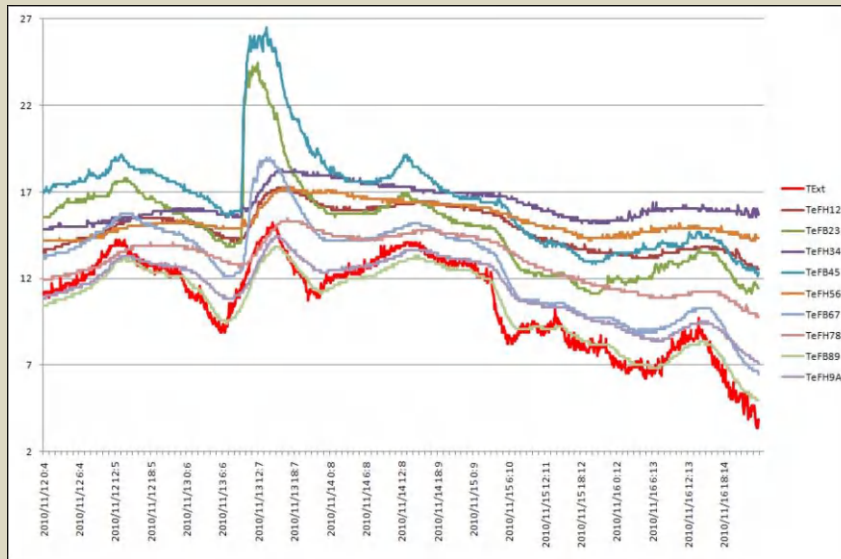
# Where are the bees ?



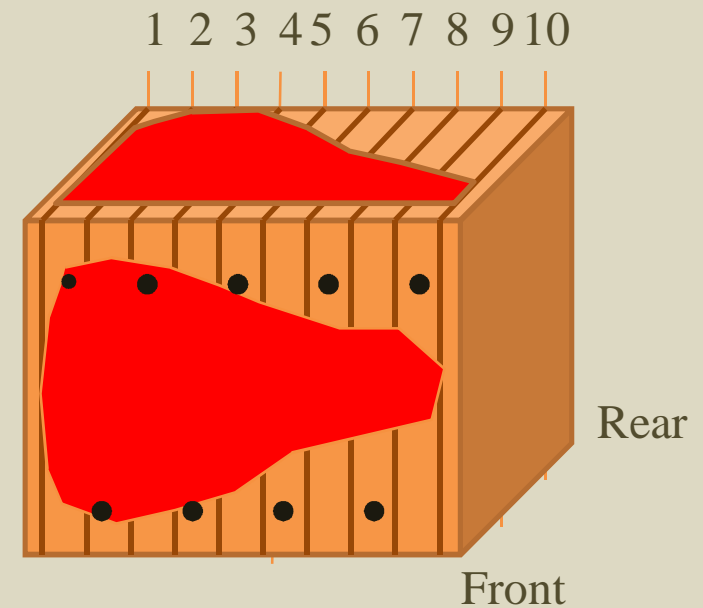
Front sensors

# November 2010: from the 12 th to the 16th

Front sensors

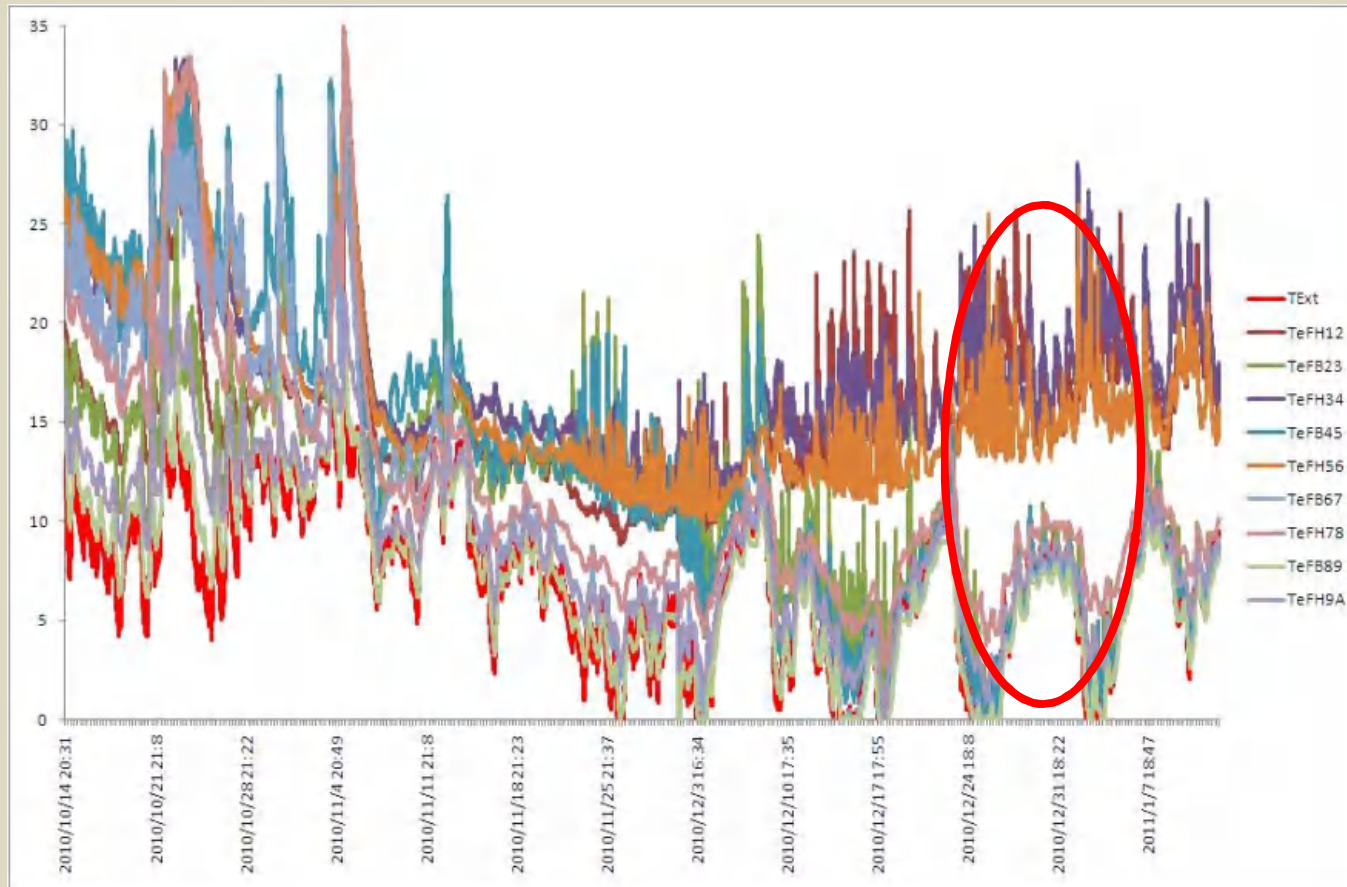


Rear sensors





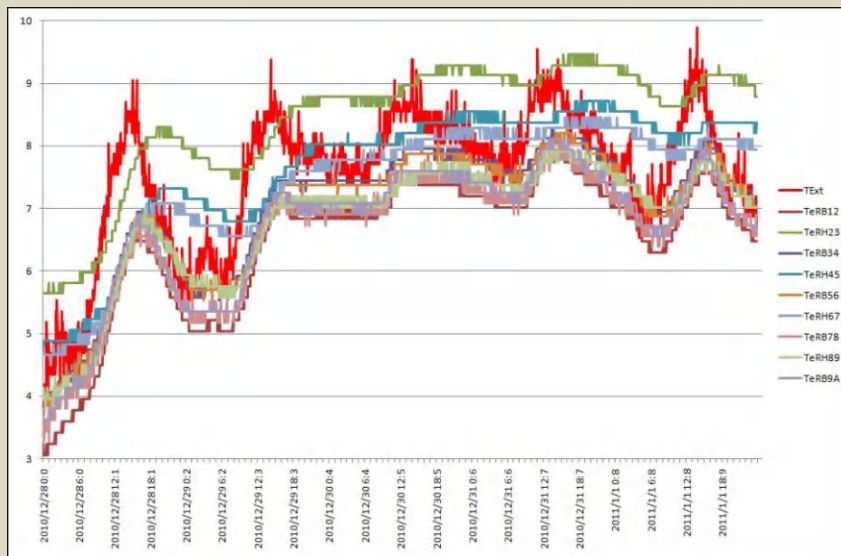
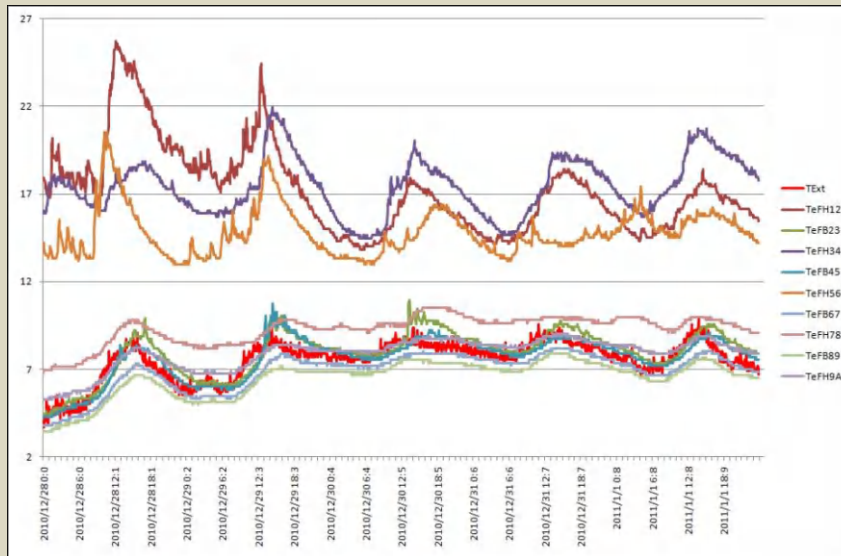
# Where are the bees ?



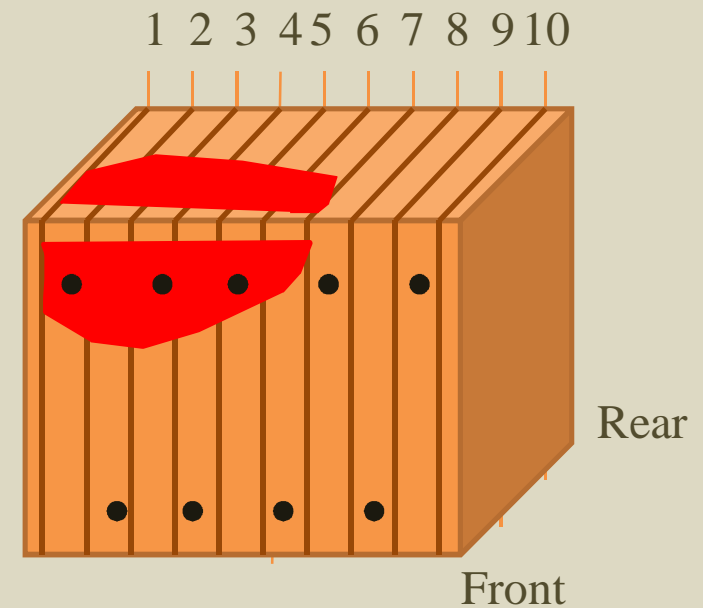
Front sensors

# December 2010: from the 28 th to the 31th

Front sensors



Rear sensors



# Short conclusion...

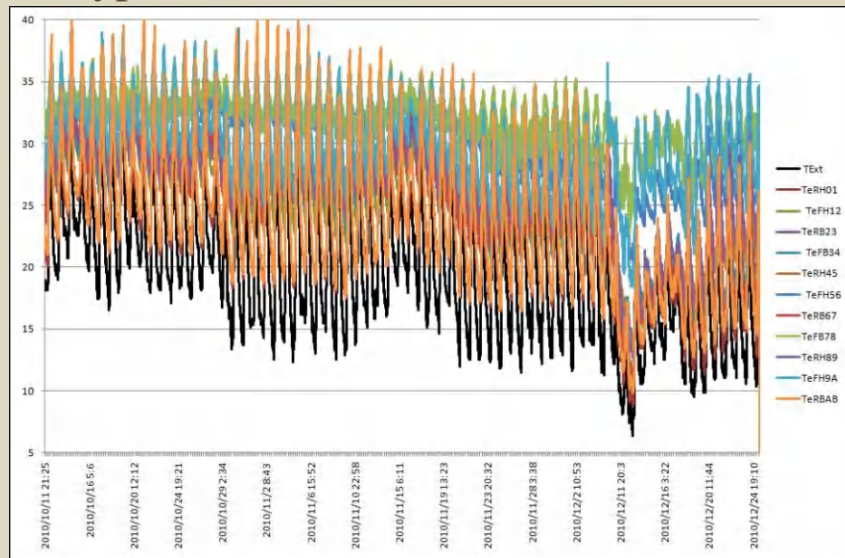
- With that system, we are able to see the moving of the bees in the beehive.

This is an interesting information specially in winter

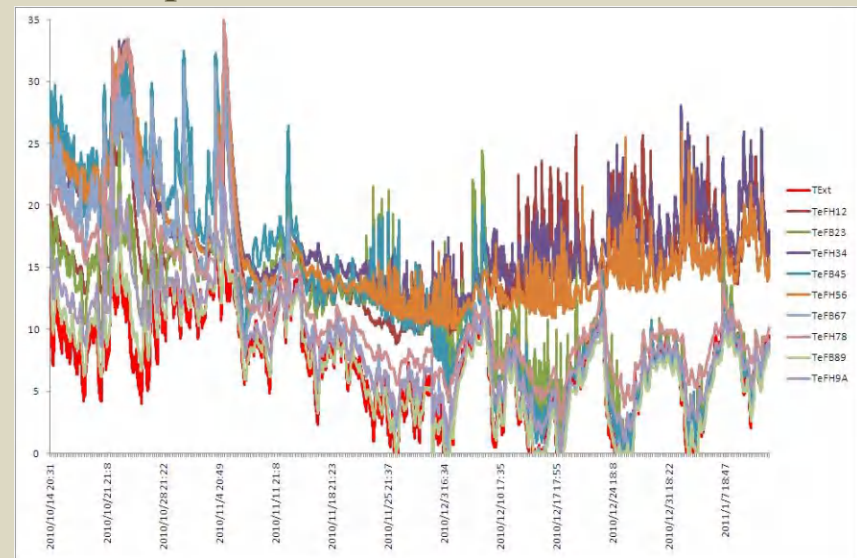
- In case of damage, we can determine the date of death of the colony

Which could be a good information too

## Cyprus results

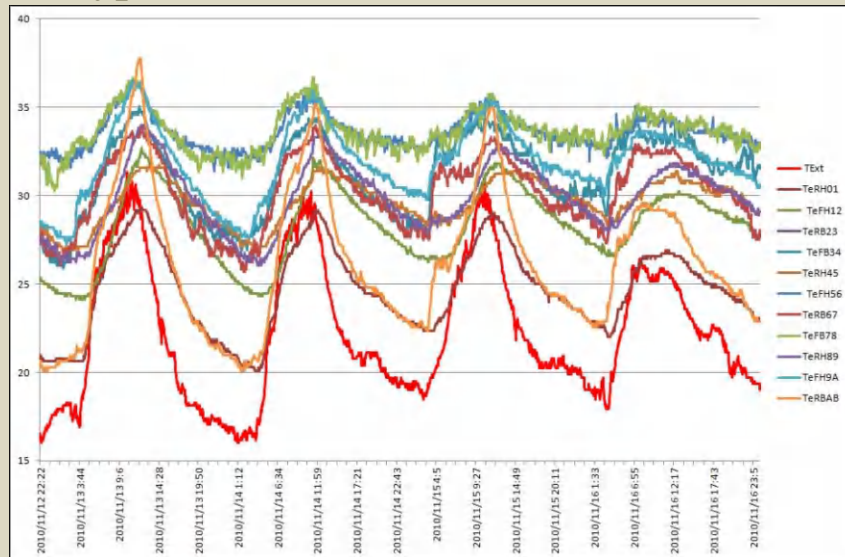


## Micropolis results (front)

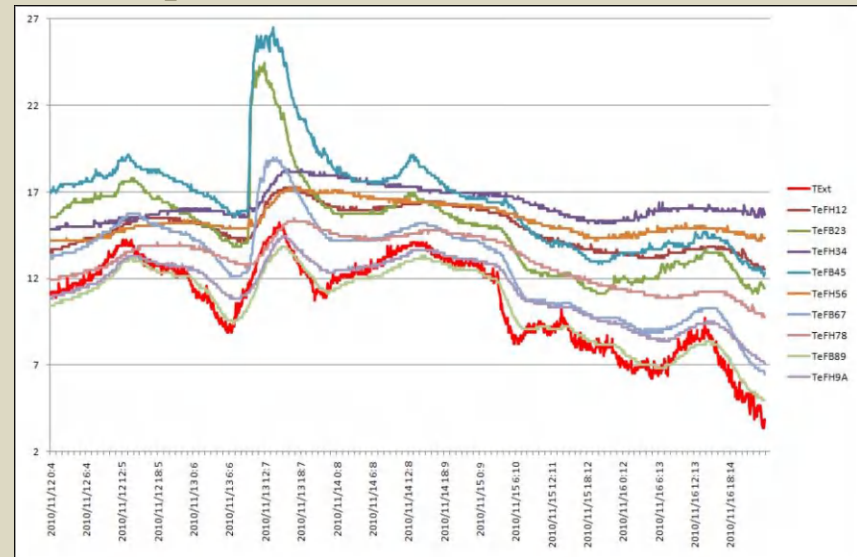


# November 2010: from the 12 th to the 16th

## Cyprus results



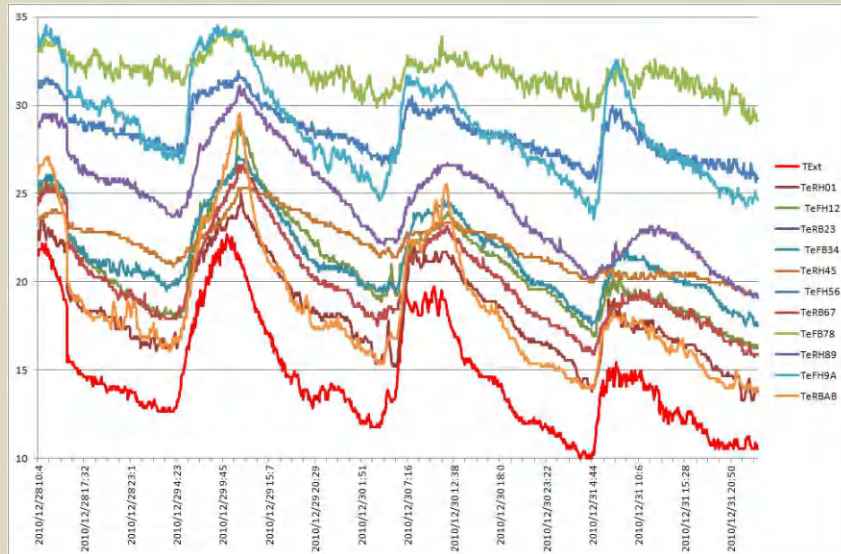
## Micropolis results (front)



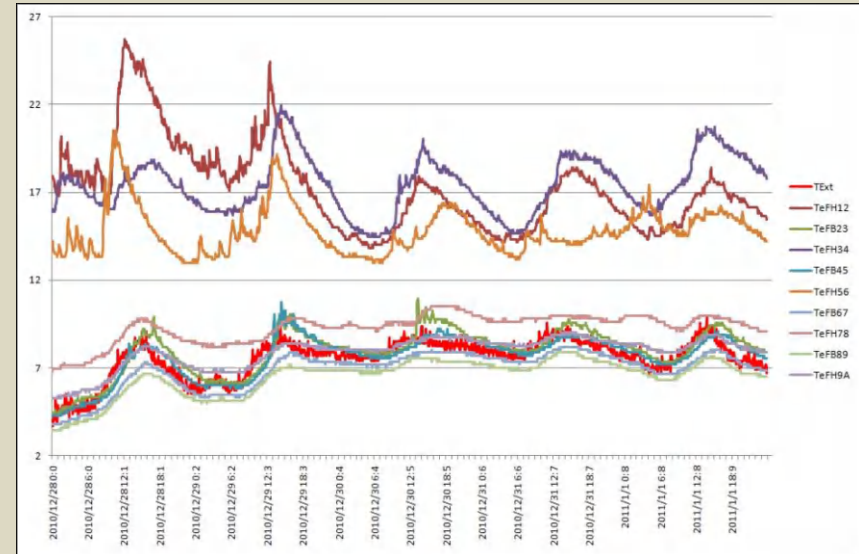


# December 2010: from the 28 th to the 31th

## Cyprus results



## Micropolis results (front)



# Short conclusion...

- The behaviour of the bees strongly depends on external temperature...

That is not a surprise but even if the data are quite different, the laws seem to be the same

- Then, even if the beehives are located in quite different places, we could be able to define some sort of normal behaviour.

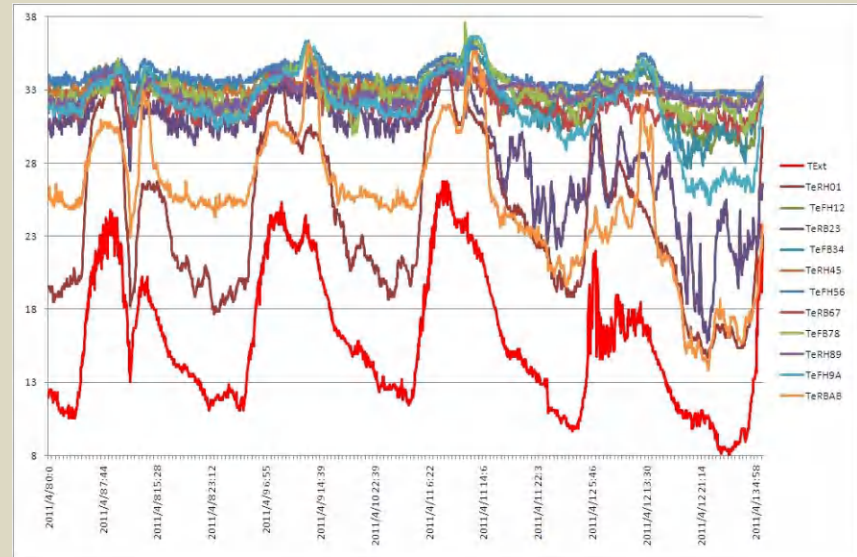
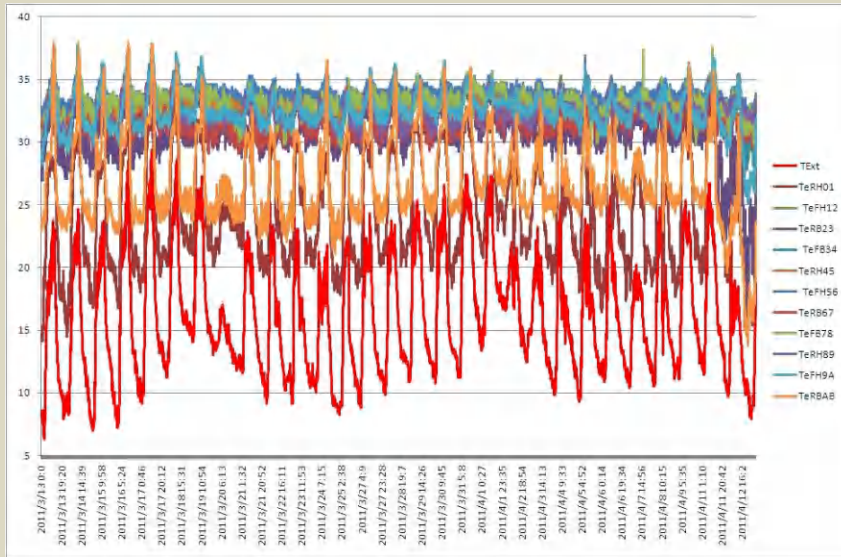
That would permit to detect distances to the average and then lead to help to understand what happens for example in winter

# A last question...

What is about swarming ?...



# Swarming ?



# Short conclusion...

- On this example, swarming has not dramatic effects on temperatures in the beehive

For me it was suprising, but finally swarming is a part of the live of the colony and then it must not lead to damage to the future colony

- This observation will have to be investigated more

# General conclusion

- e-ruche is a good tool to investigate what happens in the beehives specially in winter
- With that system we can imagine many type of investigations (winter, swarming...)

If you are interested to collaborate with e-ruche,  
please contact us:  
[www.e-ruche.fr](http://www.e-ruche.fr)

# I would like to thank for their support:

- UNAF
- Conseil Général du Cher
- Micropolis
- Département Mesures Physiques – IUT de Bourges

Thank you for your attention