

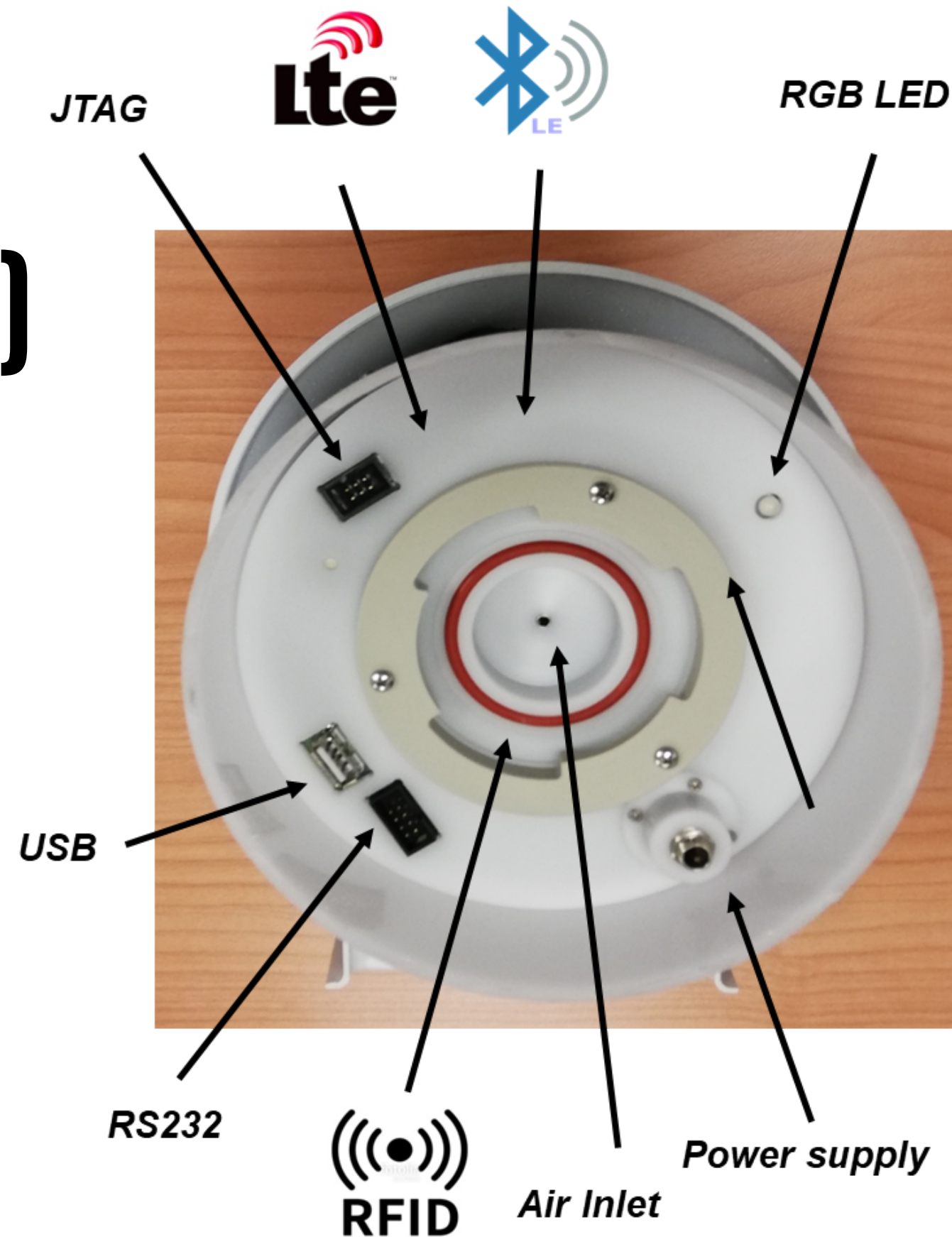
# HIGH SPATIAL RESOLUTION SAMPLER (HSRS)

The HSRS is a low-flow sampler (2 l / min) designed for sampling on a filter for medium-long periods (1-4 weeks).

The tool allows the implementation of a low-cost monitoring system for the evaluation of the spatial distribution of atmospheric particulate pollution and its chemical components.

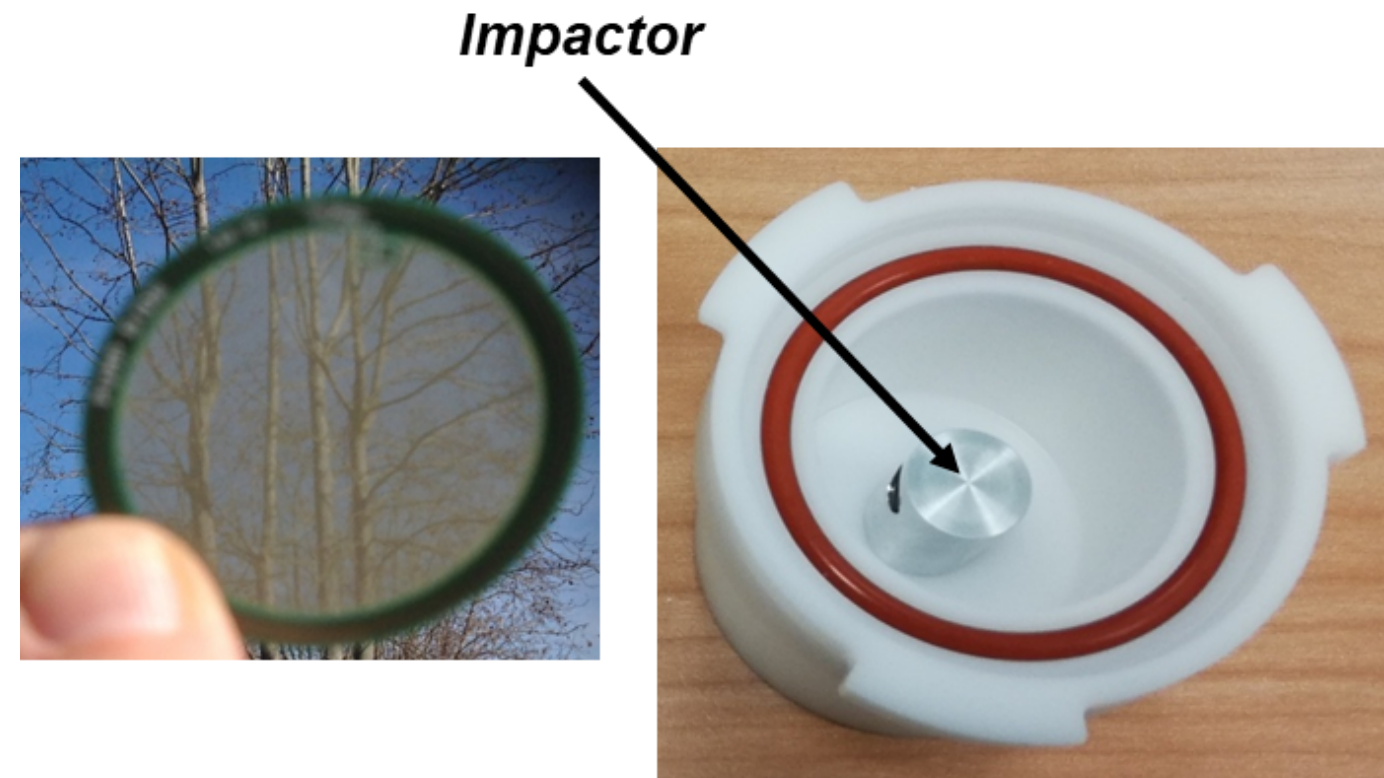


# HIGH SPATIAL RESOLUTION SAMPLER (HSRS)

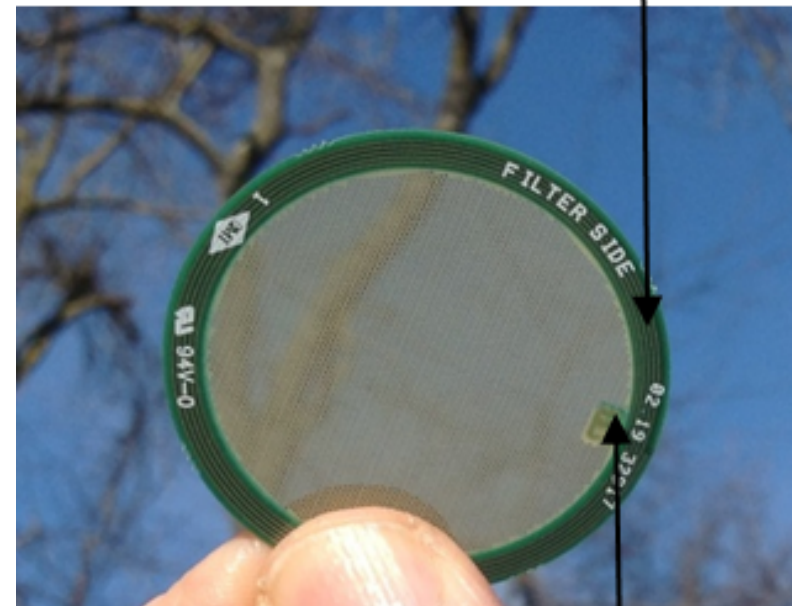


# HIGH SPATIAL RESOLUTION SAMPLER (HSRS)

RFID TAG



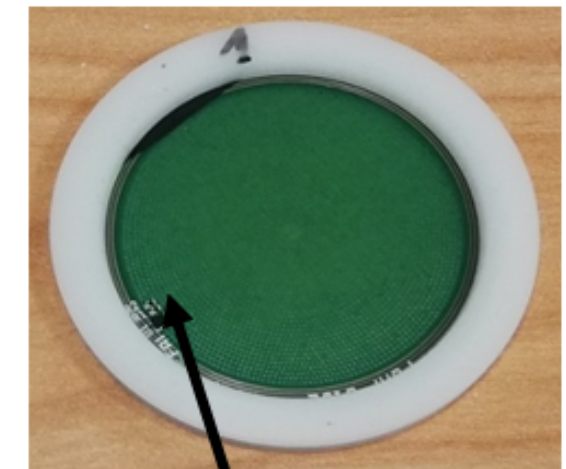
Antenna for memory power supply and data transfer



Memory



Filter holder



RFID Memory

# HIGH SPATIAL RESOLUTION SAMPLER (HSRS)

HSRS F20 Board

Pressure sensor

Flow meter  
Aluminium body



Atmospheric pressure sensor

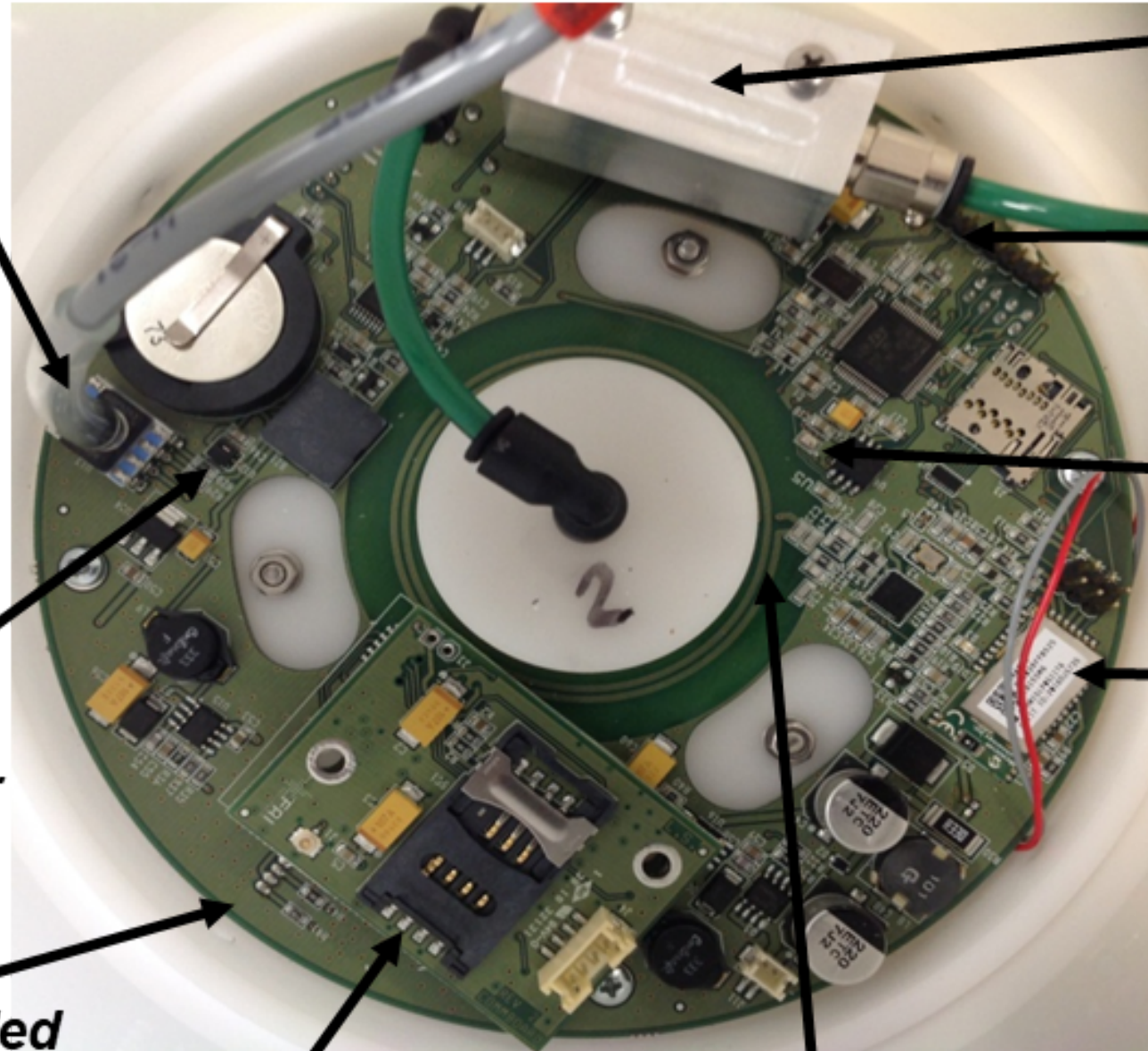


T-RH sensor

RGB led



Data transfer to cartridge




# HIGH SPATIAL RESOLUTION SAMPLER (HSRS)

Web Dashboard  
(Cloud Info Management)




[HTTP://WWW.FAI-HSRS.COM/SITE/LOGIN](http://www.fai-hsrs.com/site/login)

User name: faiuser Password: password

 **Device HSRS\_01**  
Detail from last data revelation

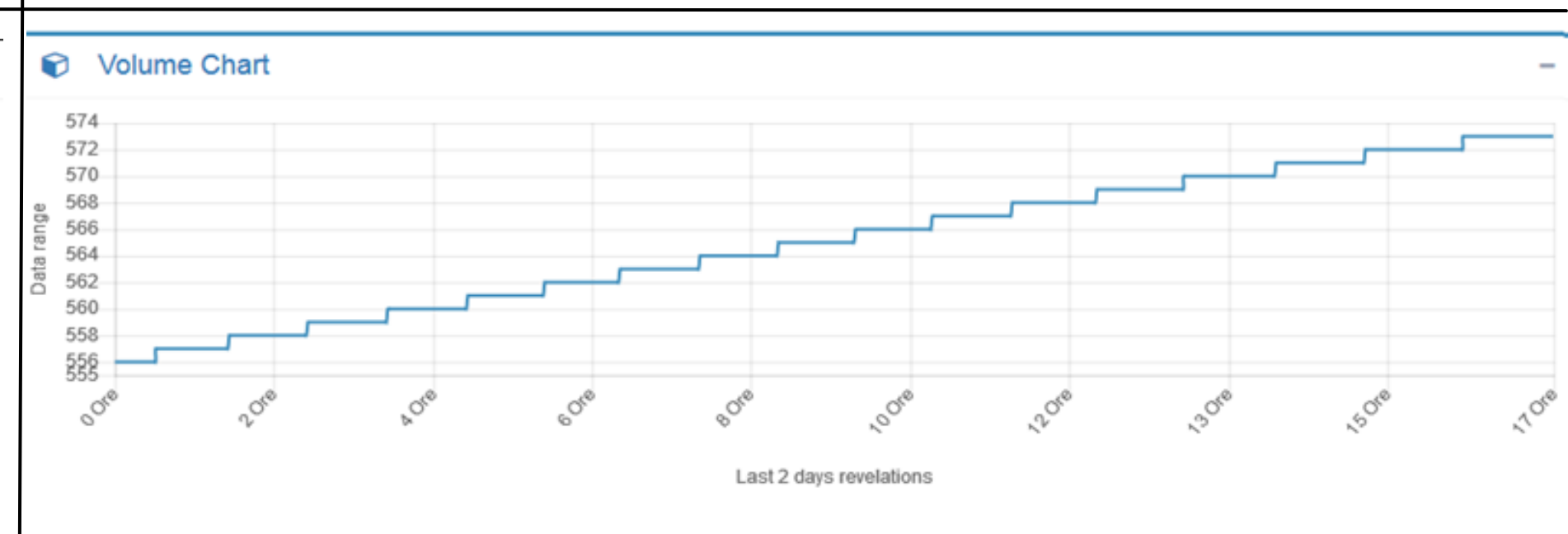
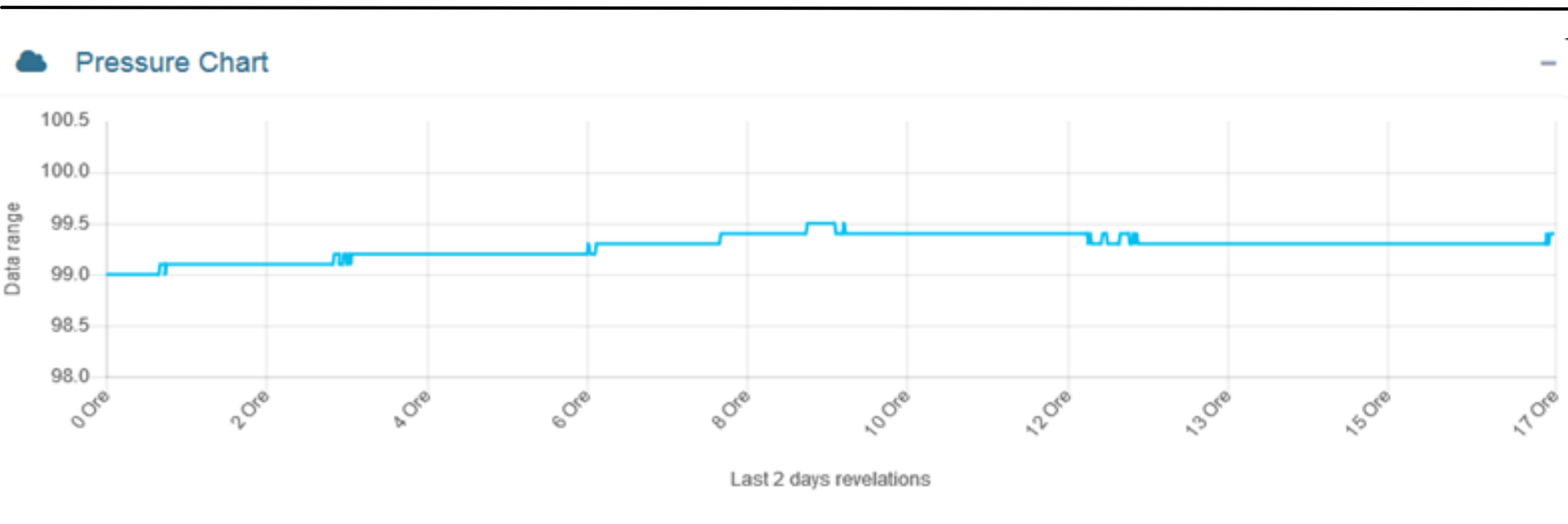
ID	1549
Device Name	HSRS_01
State	● Sampling
Cartridge ID	Cartridge_T01
Modem Record Date And Time	Feb 4, 2019 5:17:00 PM

 Device Detail



# HIGH SPATIAL RESOLUTION SAMPLER (HSRS)

Web Dashboard (Cloud Info Management)





► Terni Valley (center Italy)

► Anthropogenic sources:

- Vehicular traffic
- Domestic Heating
- Industrial activities



**Waste treatment hub Acea-Aria incinerator**



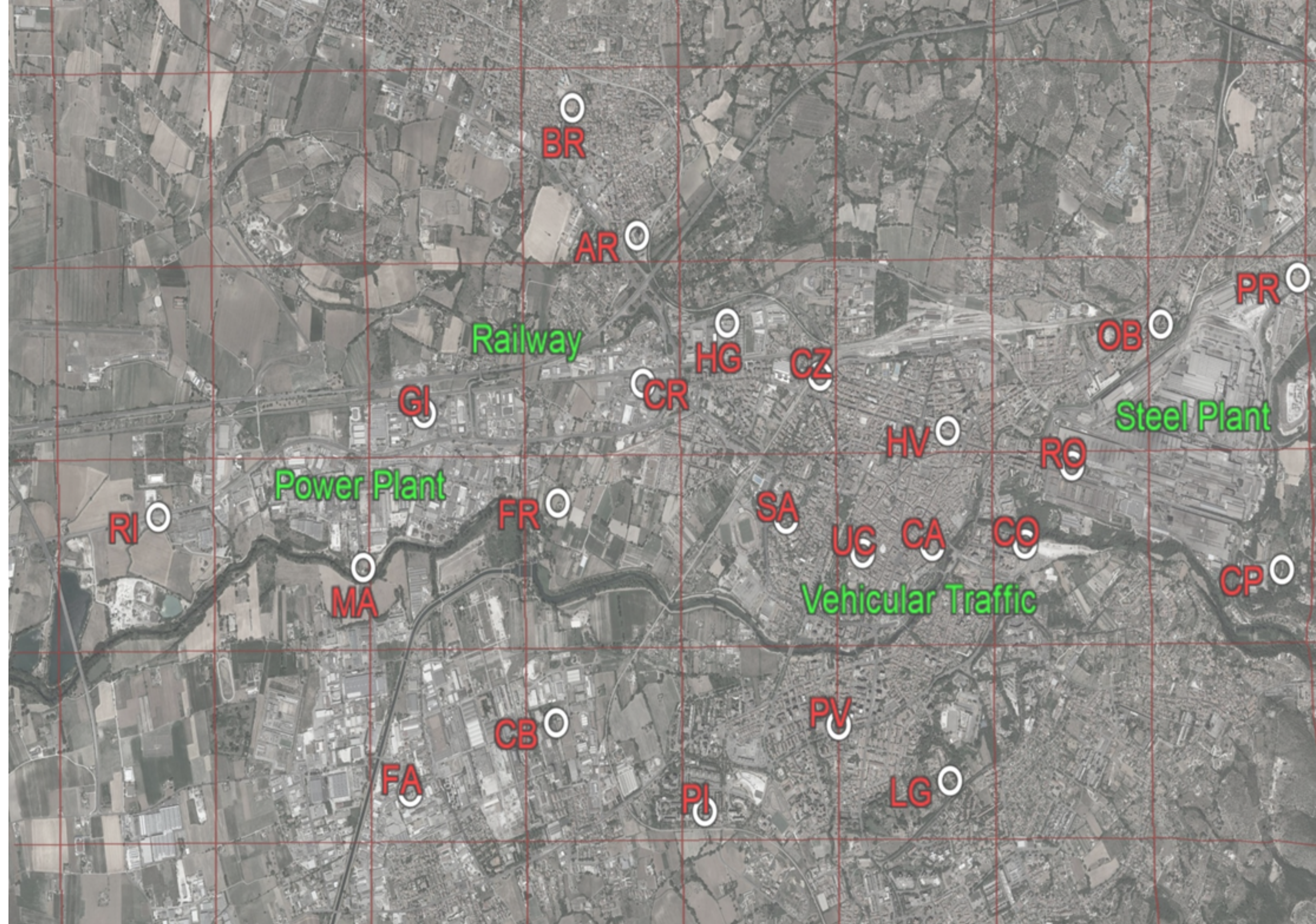
**Steel production site (TK AST)**



23 HSRS were located at different collection sites to design an extended, dense and low-cost monitoring network across Terni.

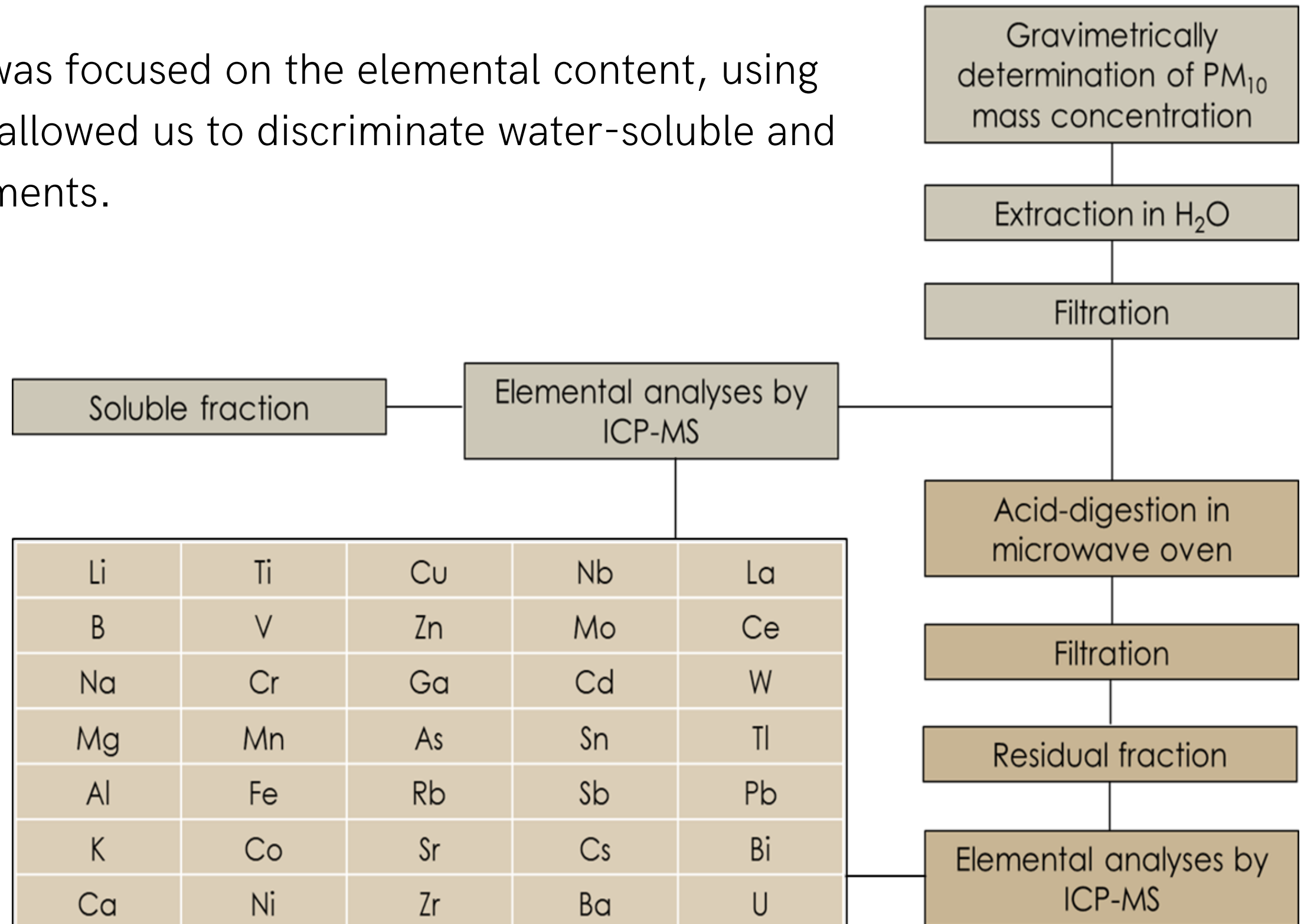


Localizations of the samplers and of the lichen biomonitors were chosen, with the support of the Terni district of ARPA Umbria, in order to evaluate the impact of different local PM10 emission sources.

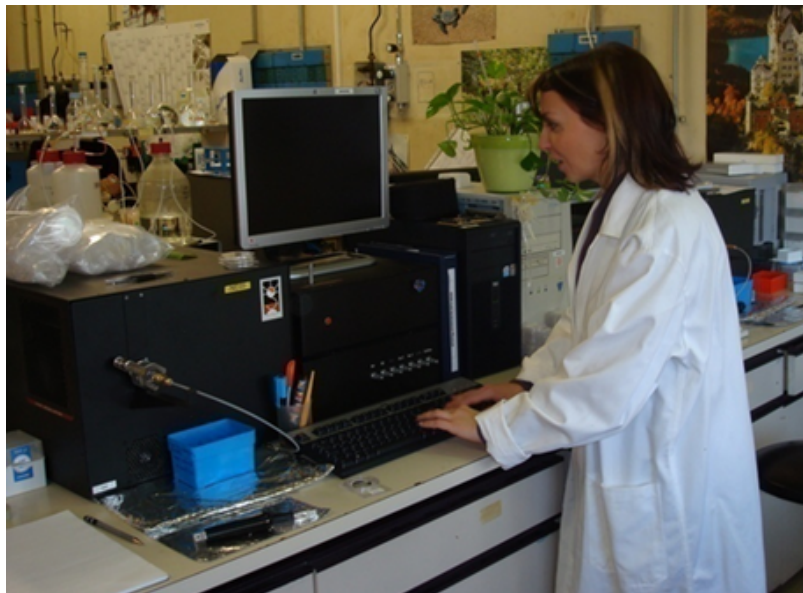


Chemical analysis of the PM samples was focused on the elemental content, using a chemical fractioning procedure that allowed us to discriminate water-soluble and insoluble fractions of the analyzed elements.

- This approach proved to be valuable for increasing selectivity of elements as source tracers



# CHEMICAL CHARACTERIZATION



## Chromatography (IC)

1. Inorganic  
( $\text{NO}_3^-$ ,  $\text{SO}_4^{2-}$ ,  $\text{Cl}^-$ ,  $\text{Na}^+$ ,  $\text{Ca}^{++}$ ,  $\text{Mg}^{++}$ ,  $\text{K}^+$ ,  $\text{NH}_4^+$ )

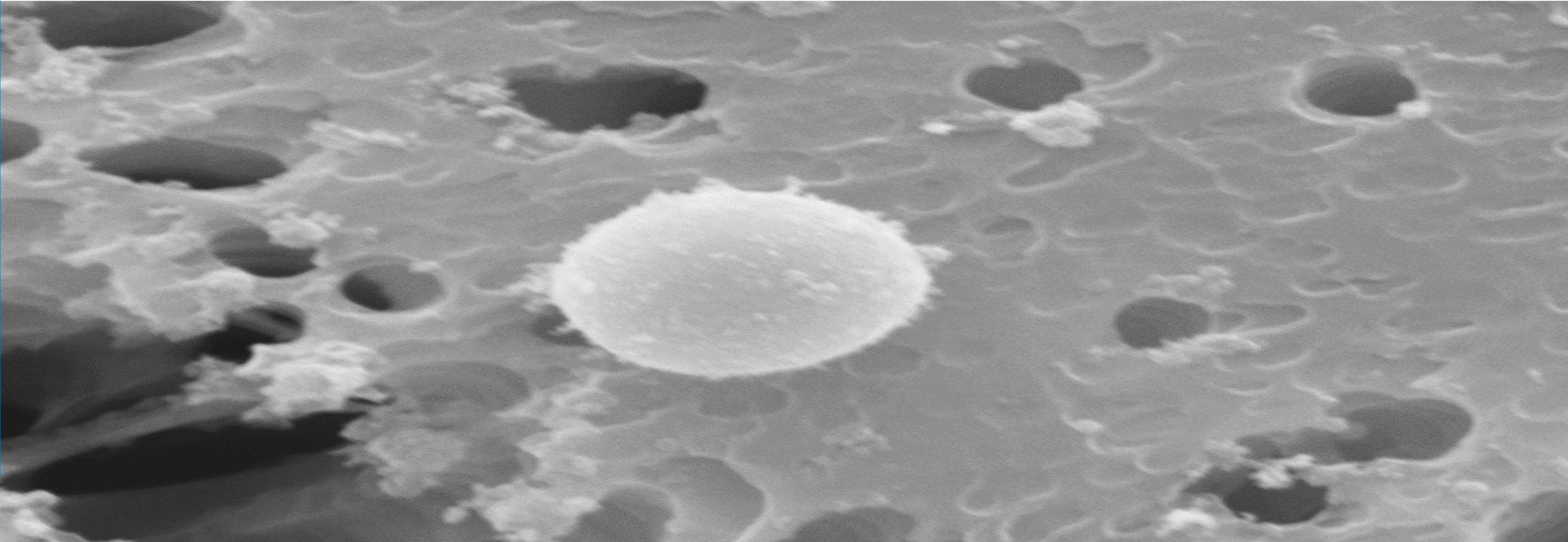
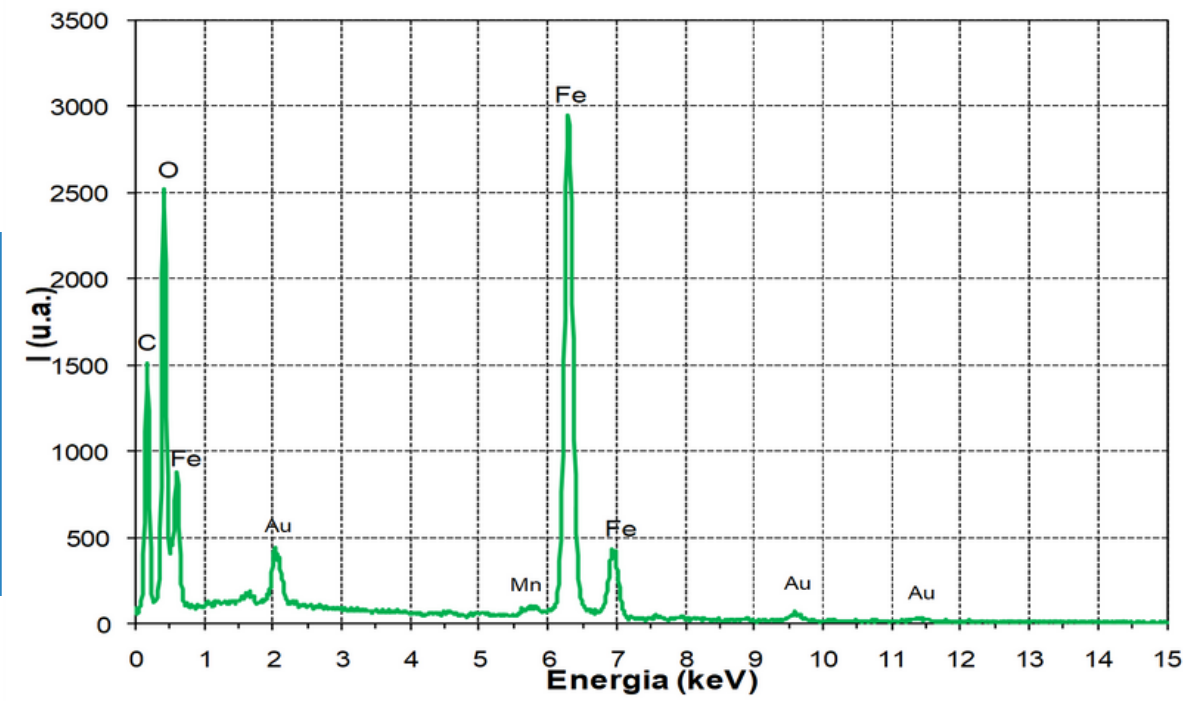


## ED-XRF

2. Natural sources  
(Si, Al, Fe, Mg, S, Ca, K, Ti)



# Spherical particle Anthropic Origin



EHT=25.00 kV  
300nm

29-May-2011  
I Probe= 137 pA

Mag= 25.00 K X  
Detector= SE1