



## SR analysis for Tuscany Region (Italy)

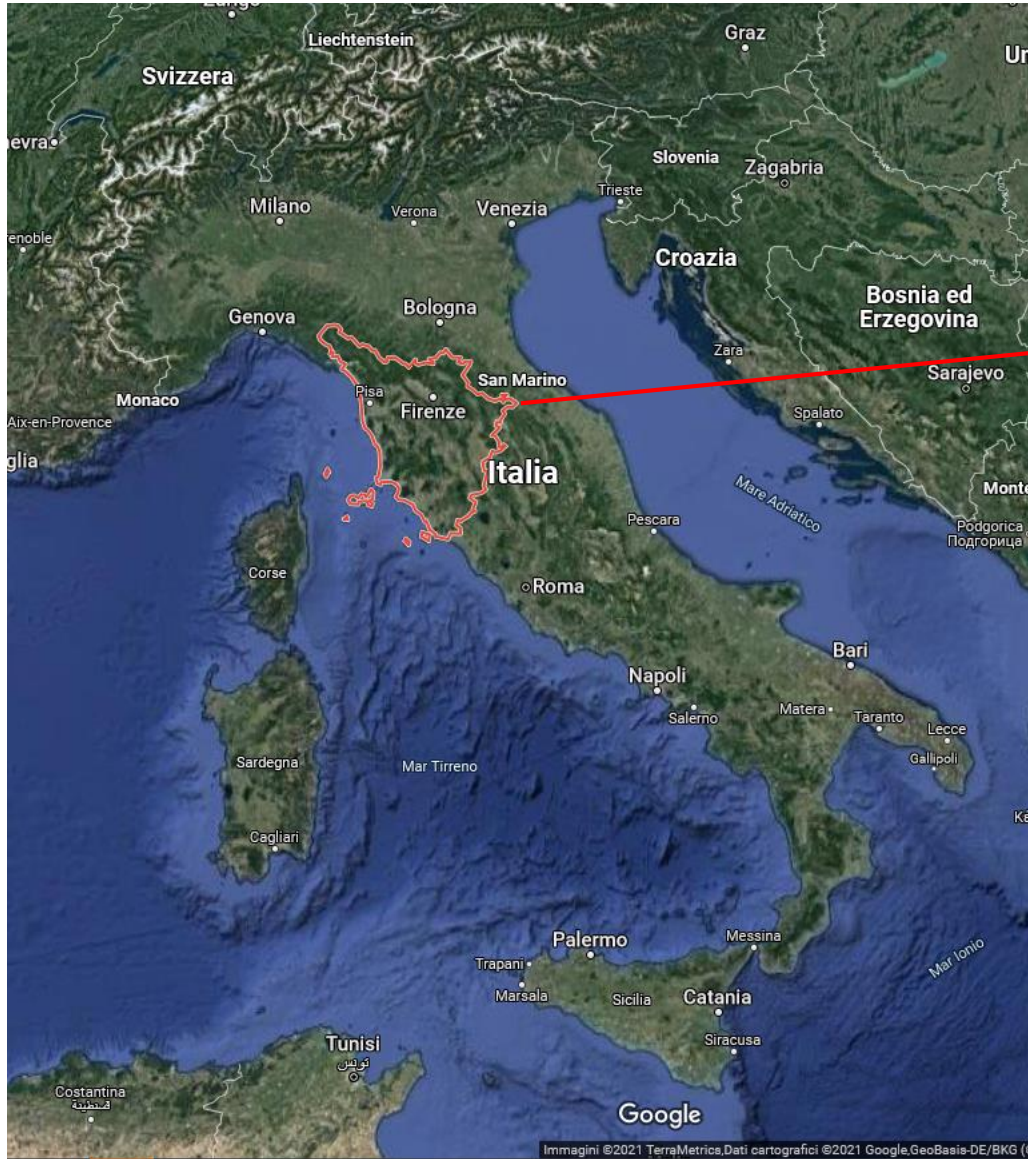


F. Guarnieri – C. Busillo – F. Calastrini (Consorzio Lamma)

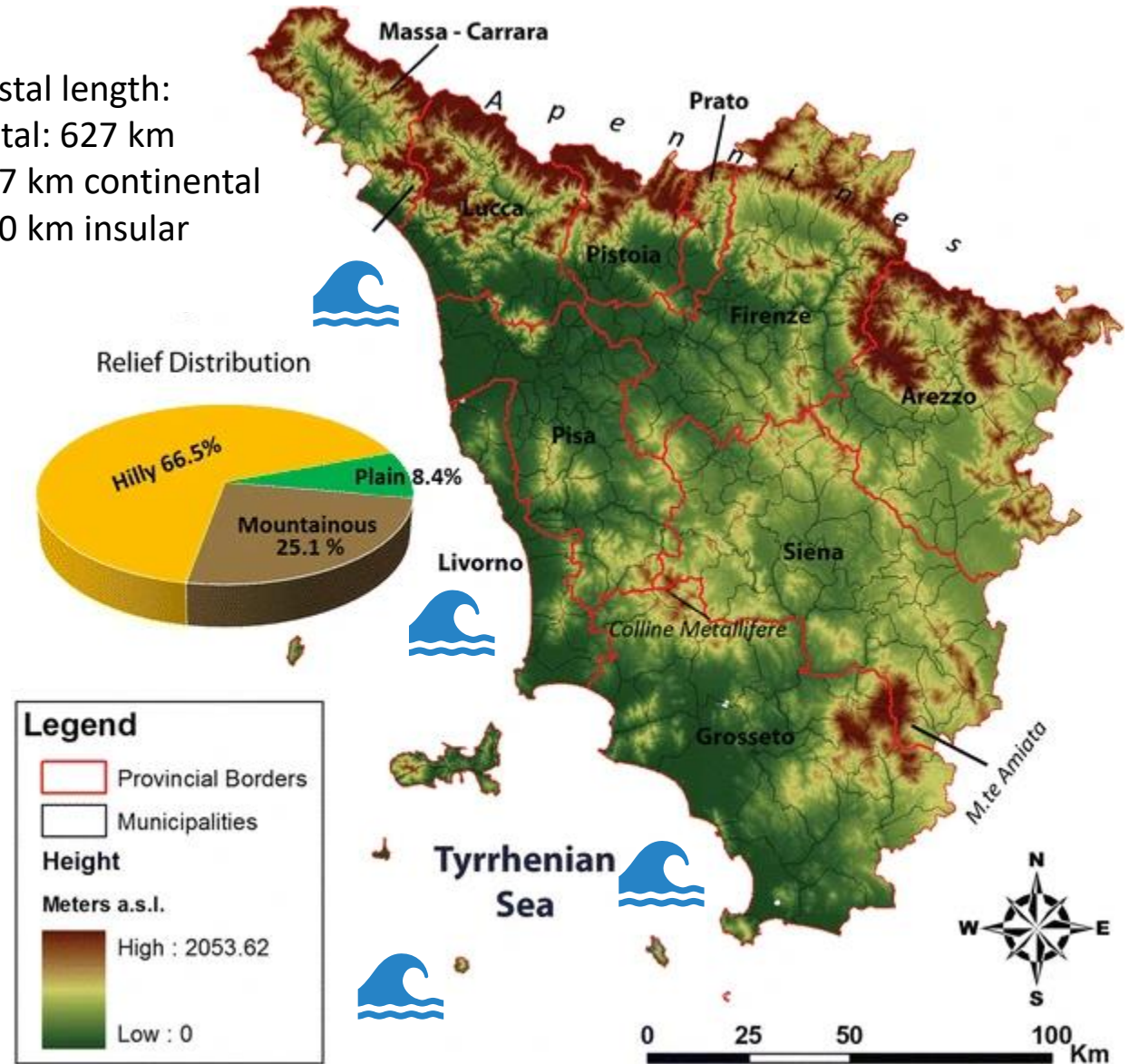


B.P. Andreini – C. Collaveri (ARPAT)

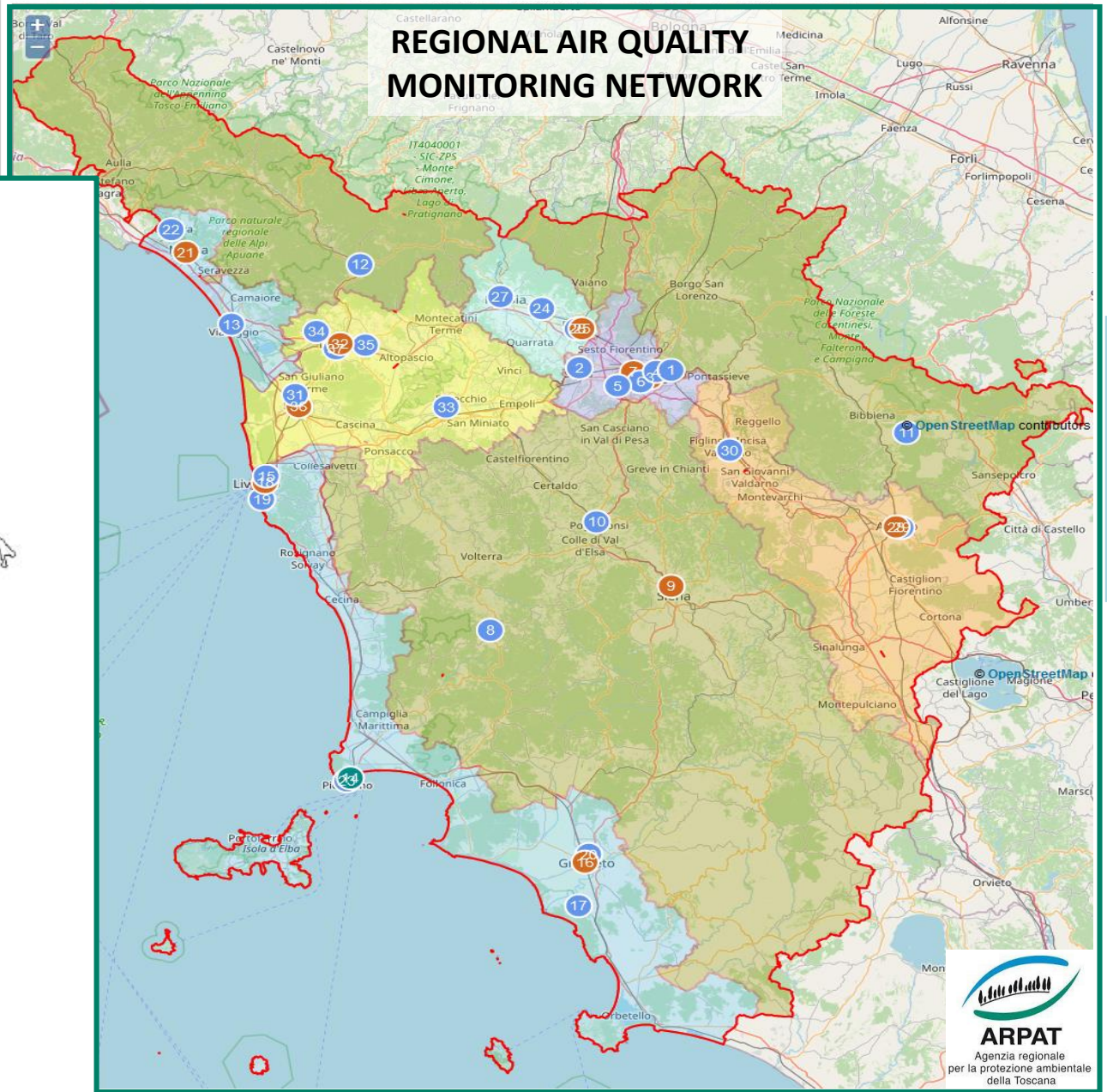
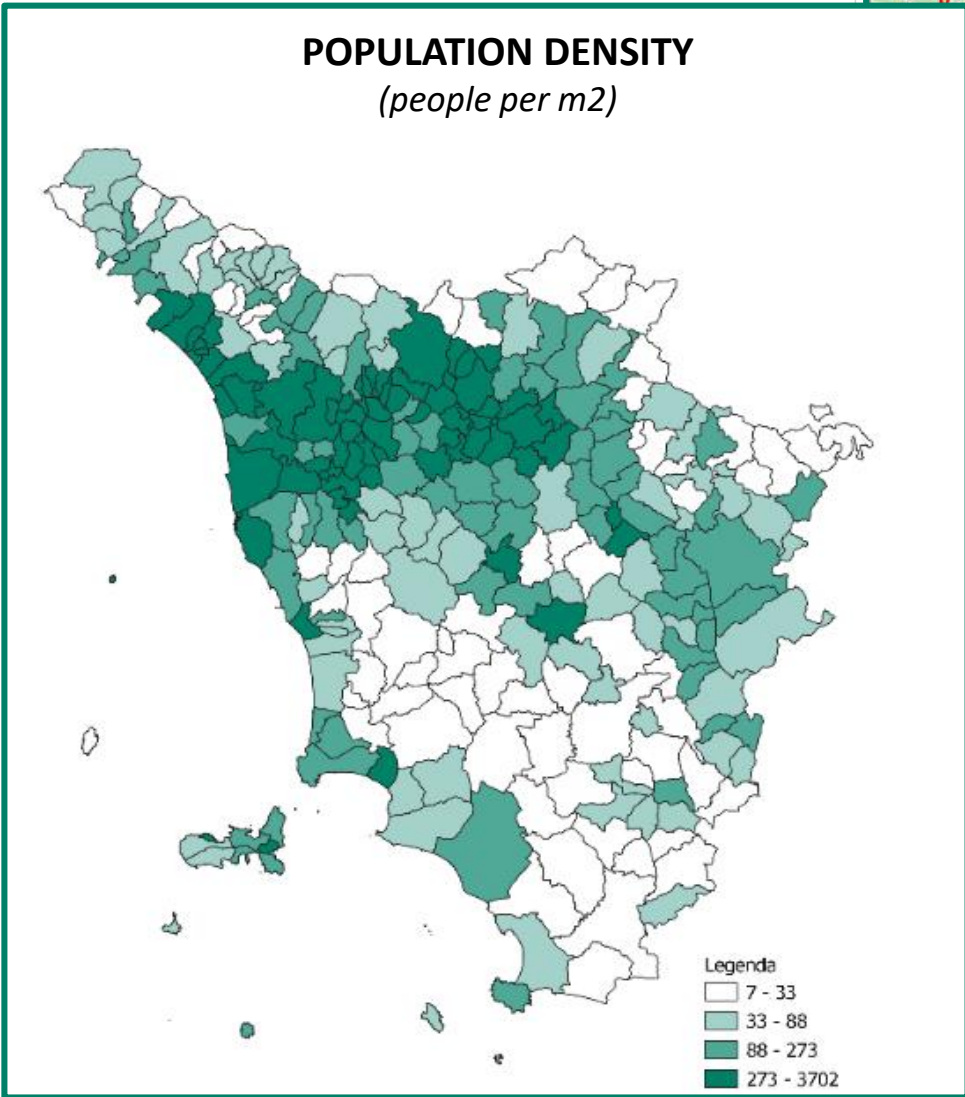
# Tuscany Region



Coastal length:  
 - total: 627 km  
 - 397 km continental  
 - 230 km insular



Source: <https://link.springer.com/article/10.1007/s10346-017-0861-4#Fig1>



### LEGEND

- Blue Circle: Background
- Orange Circle: Traffic
- Green Circle: Industrial

# Data & method

- Model: WRF-CAMx annual mean concentrations  
<http://www.lamma.rete.toscana.it/camx-info-sul-modello-previsionale> --> *some detailed info*
- Model data available 2015: use modelled concentrations at station location
- Considered location points: background stations (urban & rural types)
- Different cutoff values are evaluated (2 – 3 – 5  $\mu\text{g}/\text{m}^3$ )
- Compare the findings obtained with these evaluations with the current SR used in the Tuscany Region (based on daily mean values)

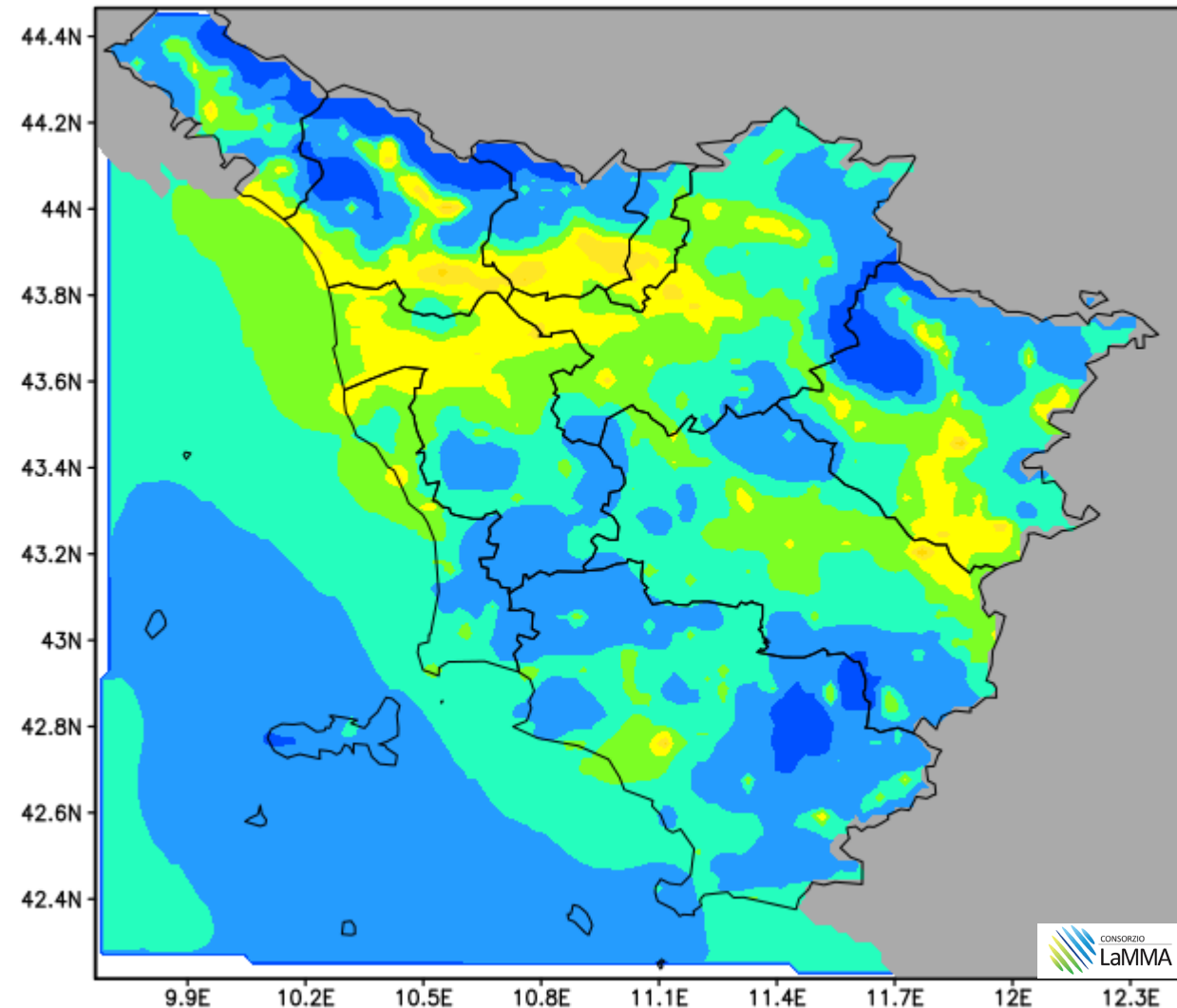
<https://www.regione.toscana.it/-/elenco-pubblicazioni-inerenti-la-rappresentativita-spaziale-delle-stazioni-di-rilevamento-della-qualita-dell-aria-in-toscana>

[Vitali L., Ciancarella L., Cionni G., Cremona G., Piersanti A., Righini G. \(2013\): Rappresentatività spaziale di misure di qualità dell'aria. Valutazione di un metodo di stima basato sull'analisi dei campi di concentrazione simulati dal modello nazionale MINNI, Rapporto Tecnico RT/2013/3/ENEA, ENEA.](#)

- Pollutants: NO<sub>2</sub> / PM<sub>10</sub>

# PM10

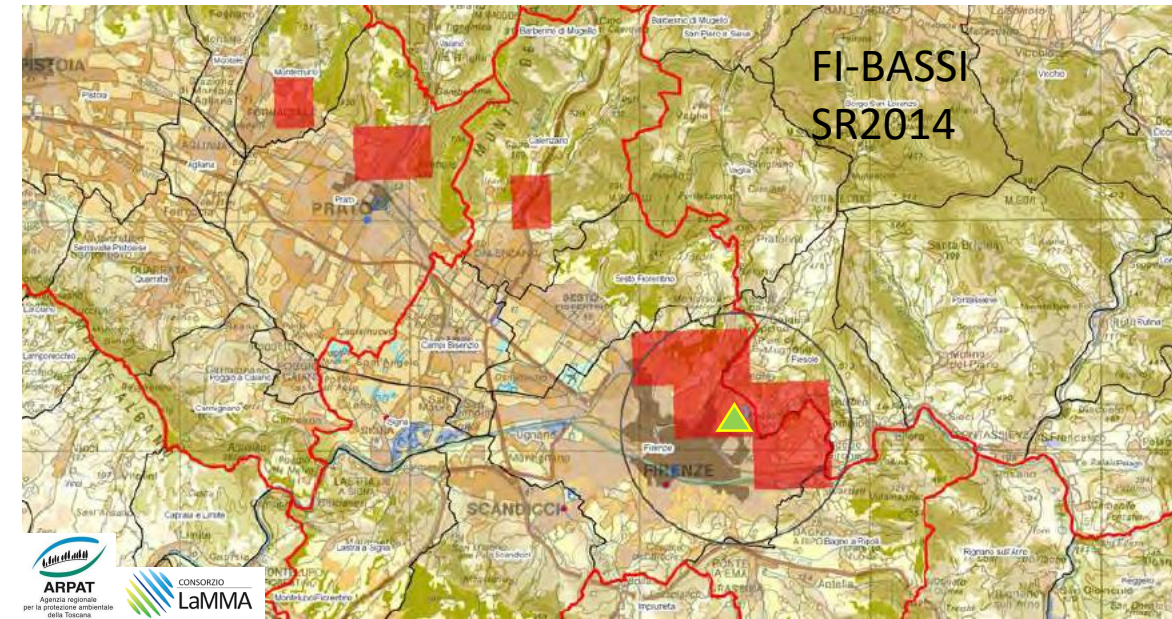
PM10 [ $\mu\text{g}/\text{m}^3$ ] MEDIA ANNO 2015



[ $\mu\text{g}/\text{m}^3$ ]

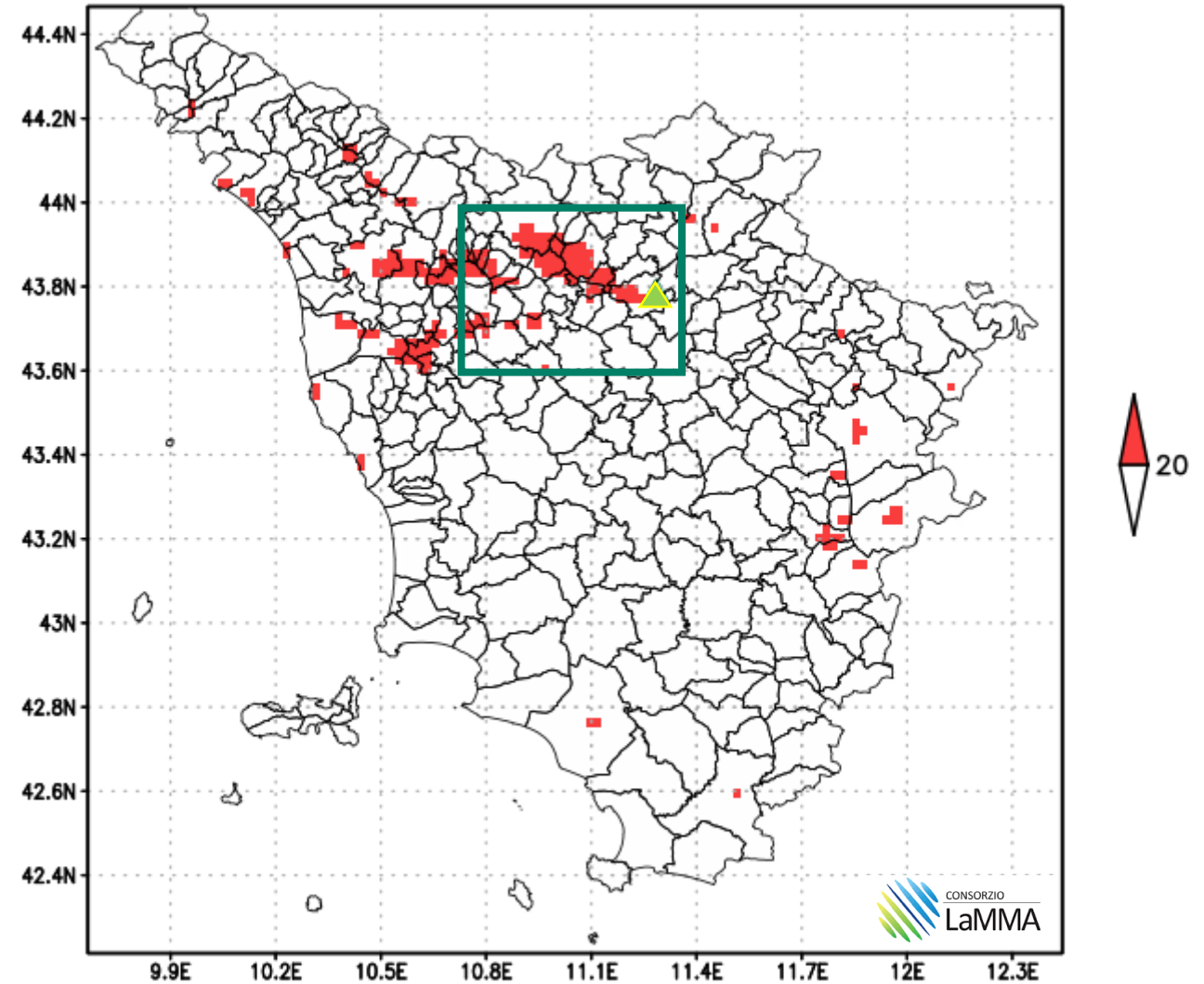
- PM10 – 2015 annual mean
- Values greater than  $5\mu\text{g}/\text{m}^3$
- Cutoff of 2 and 3  $\mu\text{g}/\text{m}^3 \rightarrow$  not considered
- Cutoff value considered:  $5\mu\text{g}/\text{m}^3$
- Threshold values: 20% and other values in its around (15%-30%)

# RESULTS-PM10



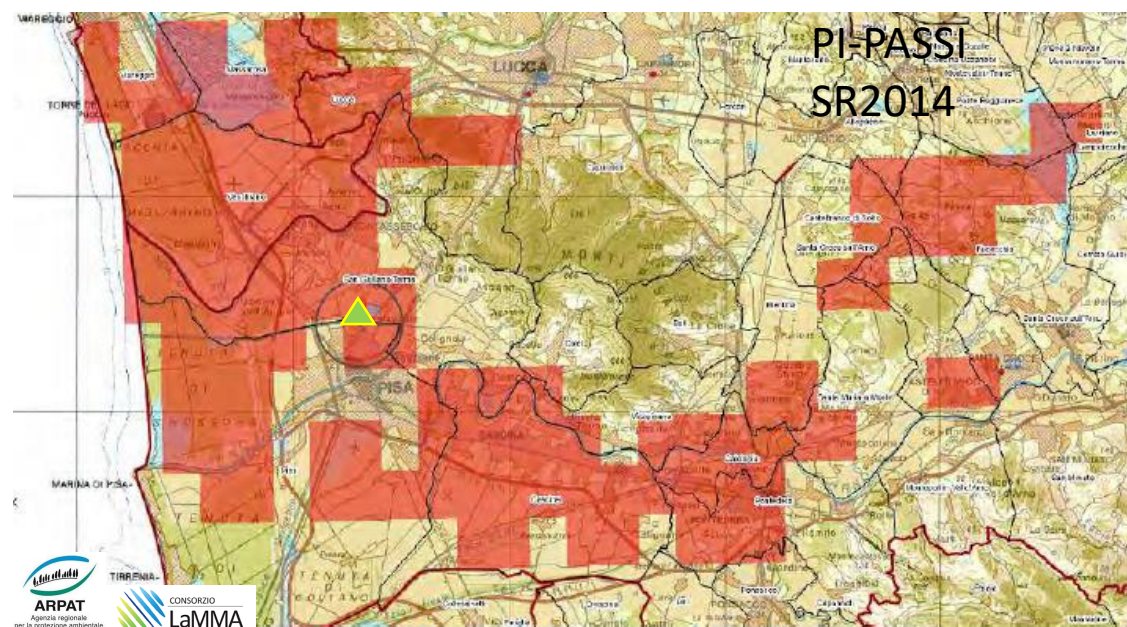
Current SR of the station point FI-BASSI (red pixels)

pm10 – FI-BASSI – 2015 (cutoff 5)



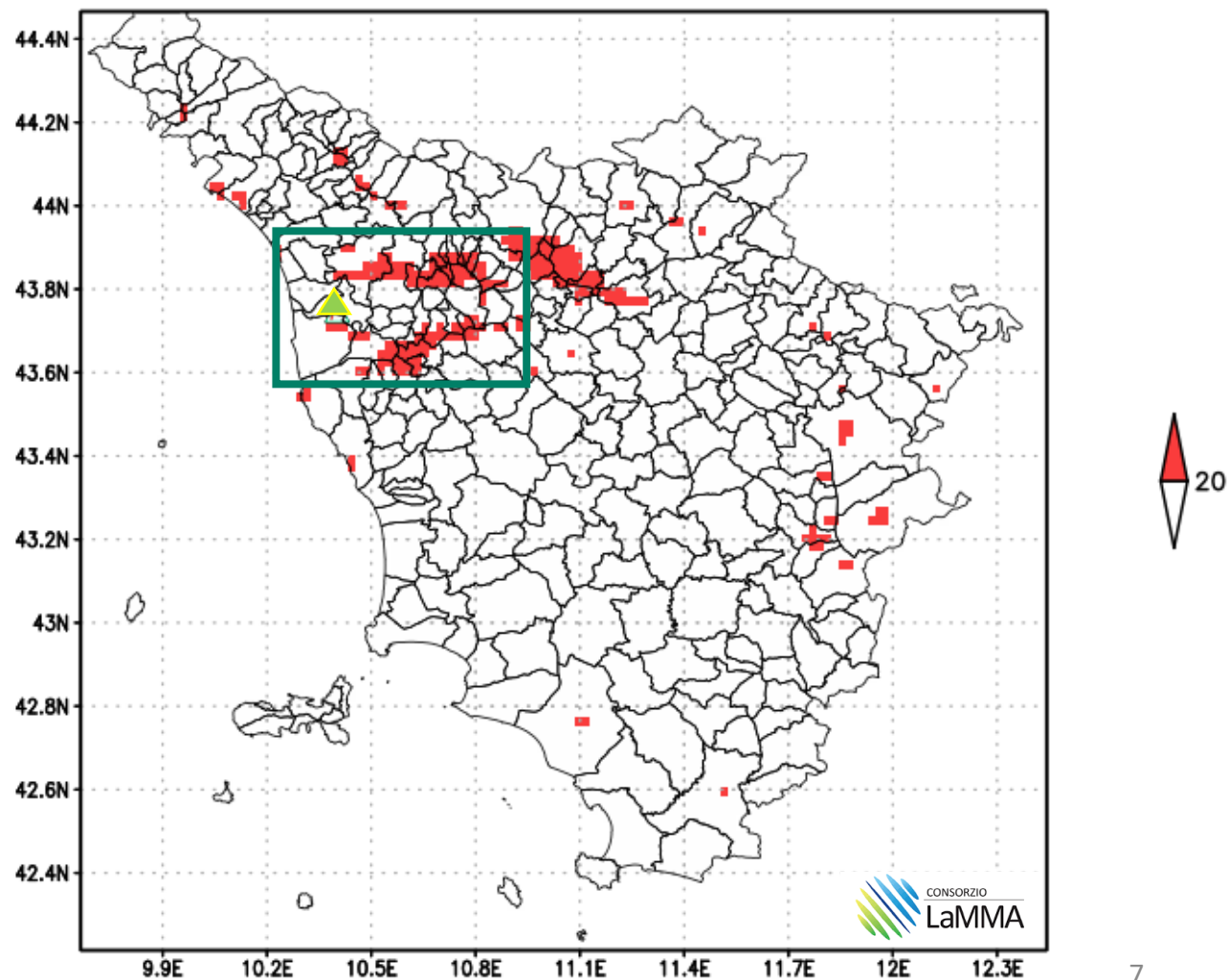
New SR of the station point FI-BASSI (red pixels) with a threshold of 20% and cutoff  $5 \mu\text{g}/\text{m}^3$

# RESULTS-PM10



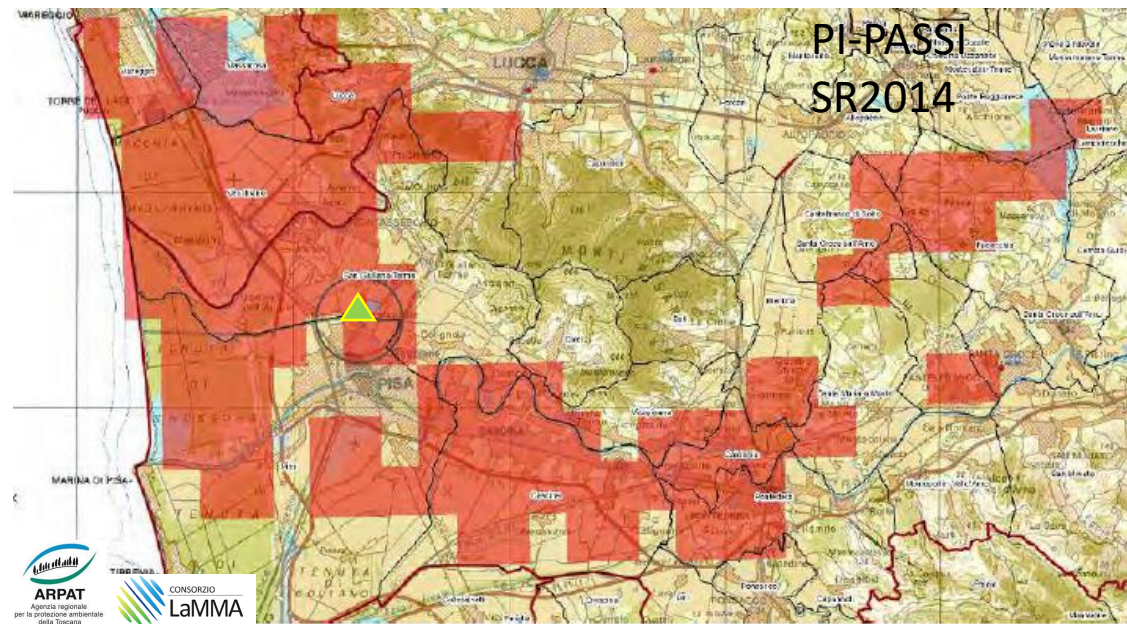
Current SR of the station point PI-PASSI (red pixels)

pm10 - PI-PASSI - 2015 (cutoff 5)



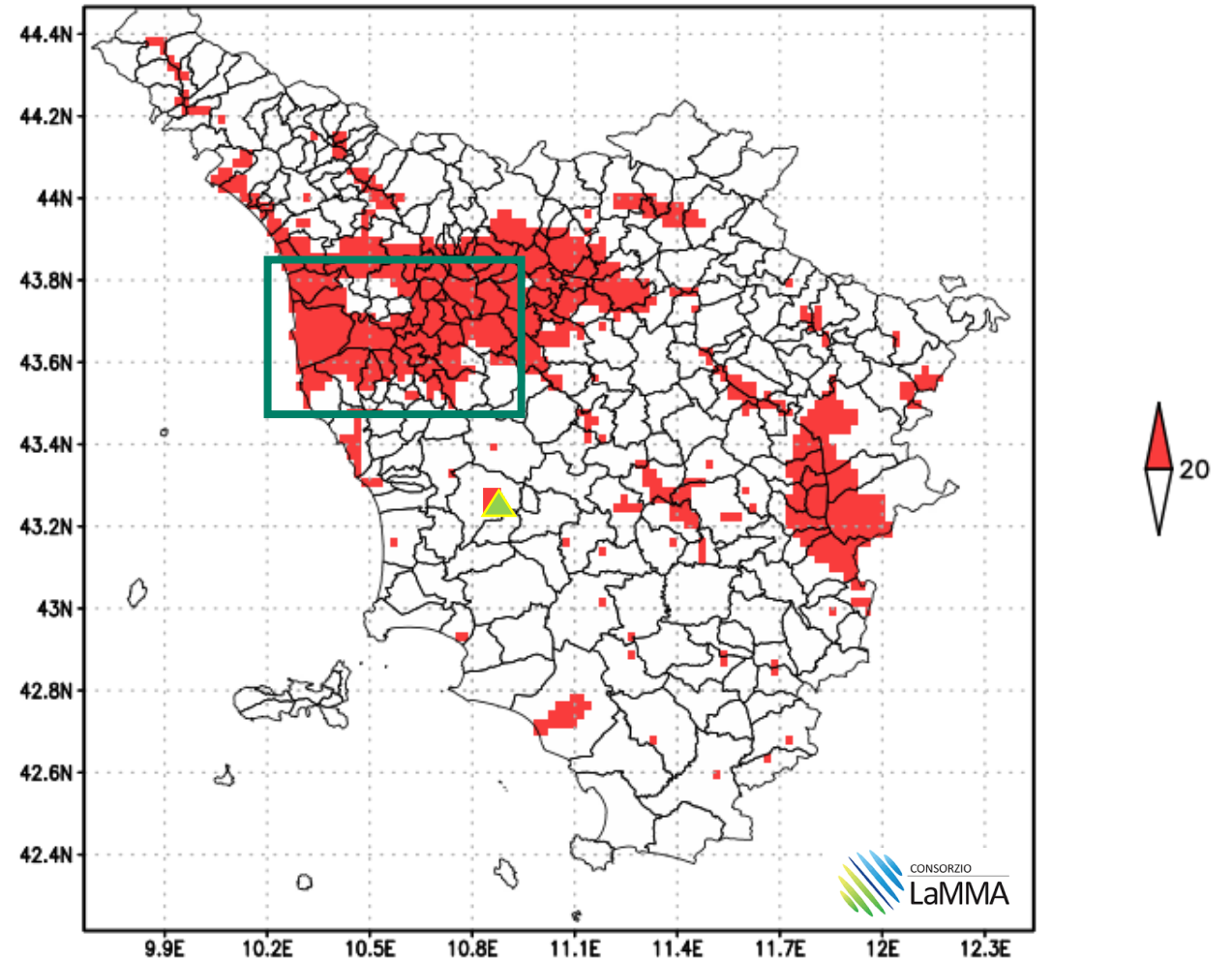
New SR of the station point PI-PASSI (red pixels) with a threshold of 20% and cutoff  $5\mu\text{g}/\text{m}^3$

# RESULTS-PM10



Current SR of the station point PI-PASSI (red pixels)  
The coastal area in the PISA surroundings, in the new SR, it seems to be represented by an inner station point (PI-MONTECERBOLI) with a very different geographical properties.

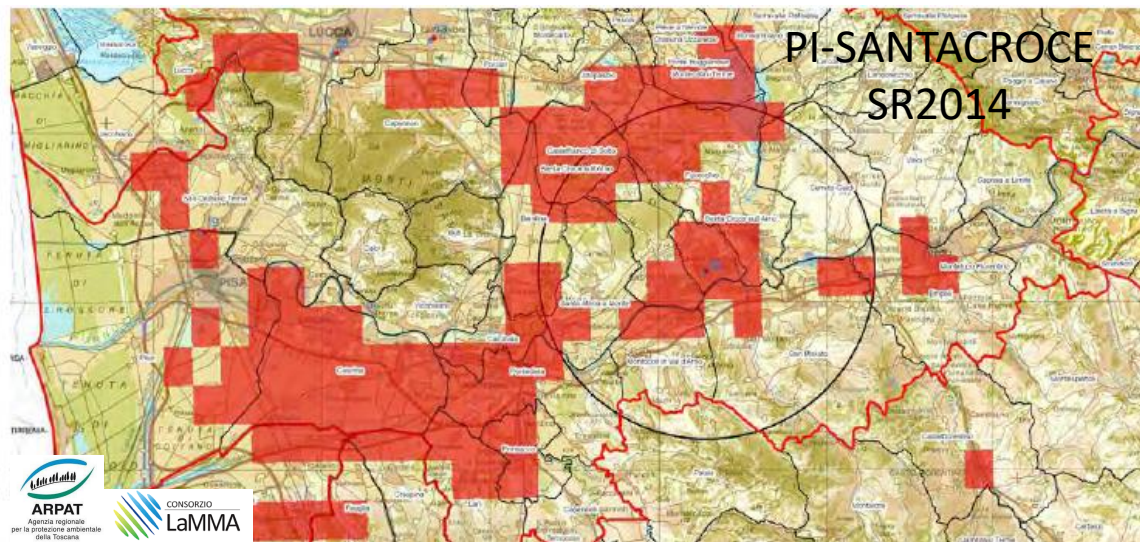
pm10 – PI-MONTECERBOLI – 2015 (cutoff 5)



New SR of the station point PI-MONTECERBOLI (red pixels)  
with a threshold of 20% and cutoff  $5\mu\text{g}/\text{m}^3$

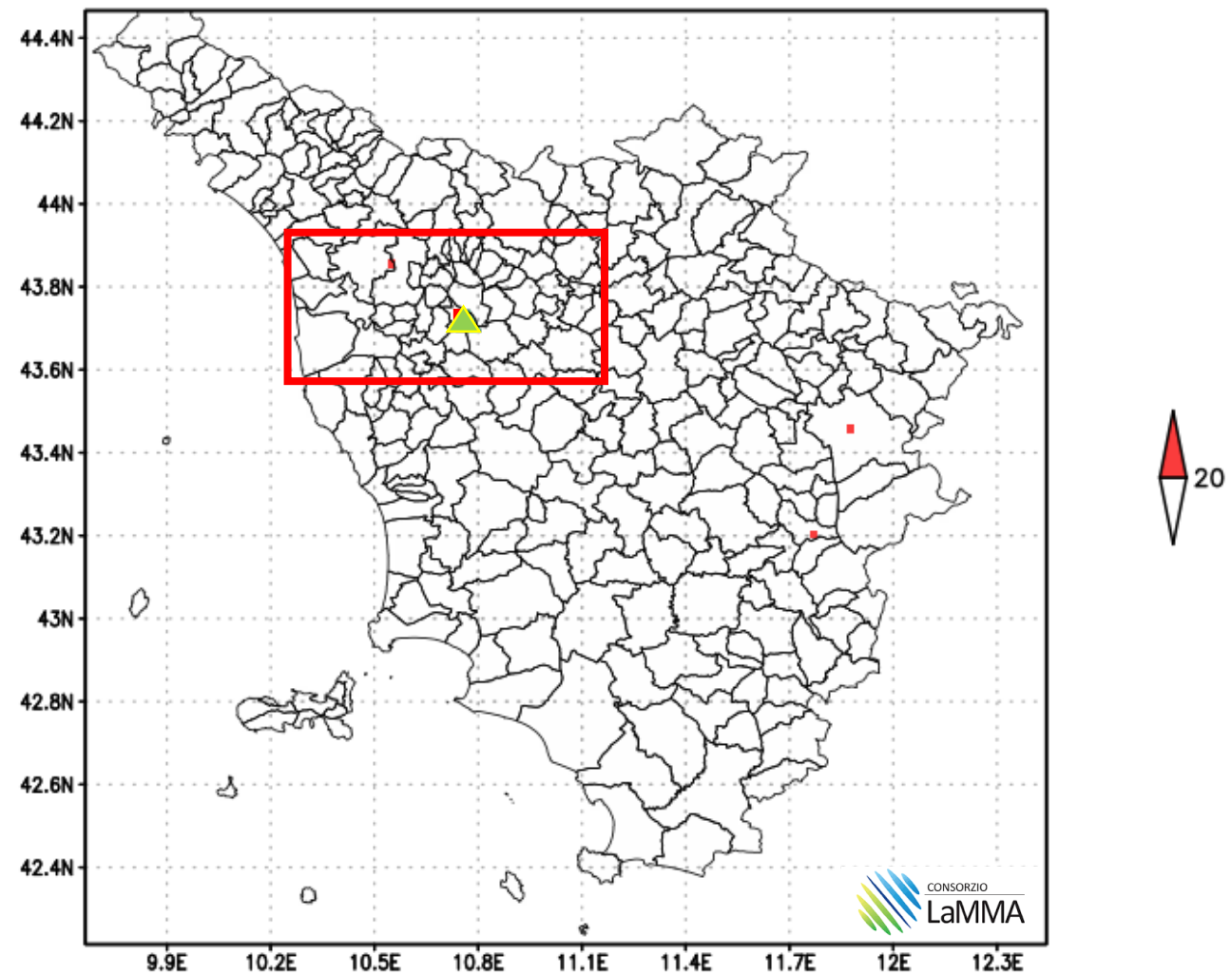


# RESULTS-PM10



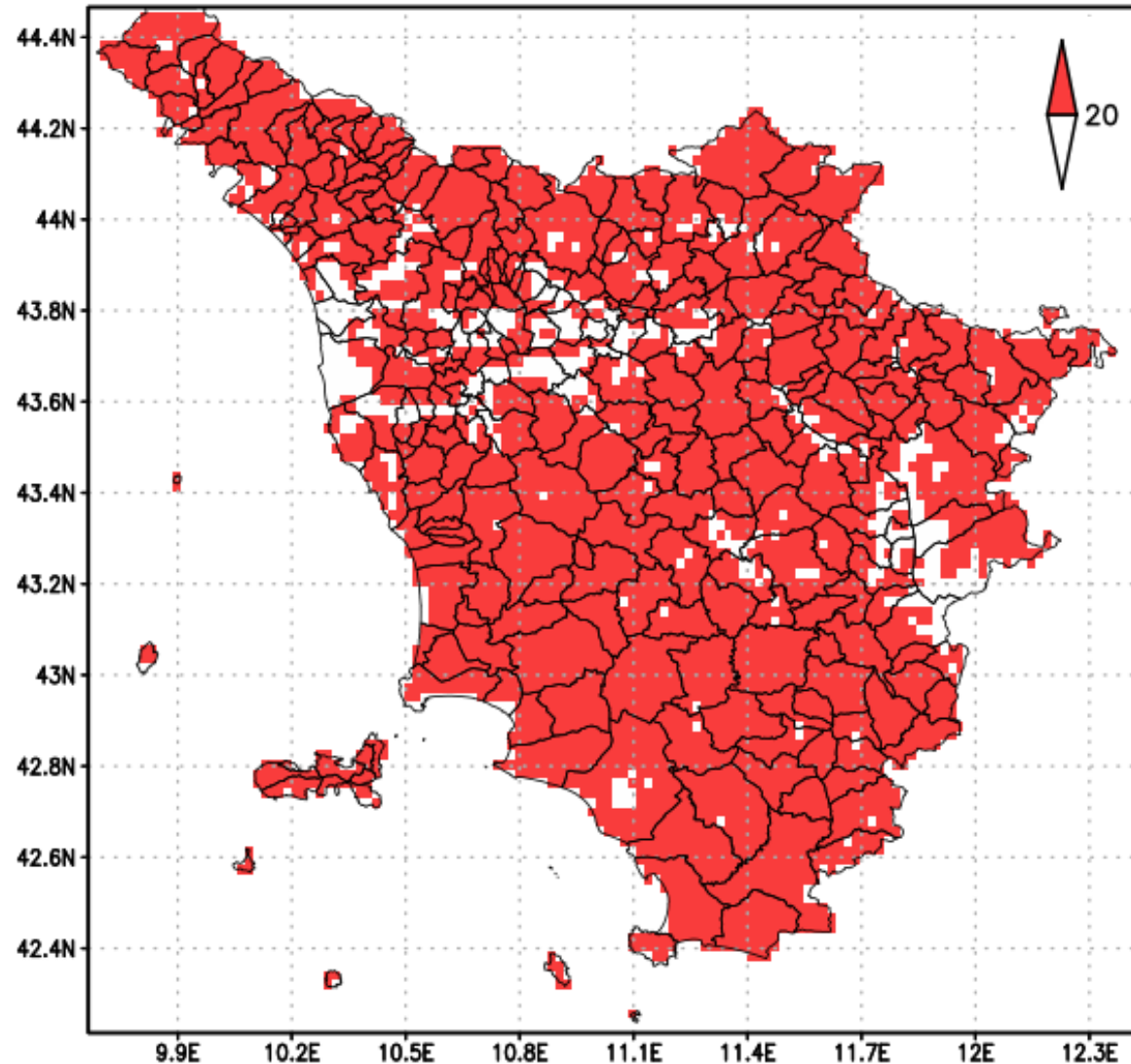
Current SR of the station point PI-SANTACROCE (red pixels)

pm10 – PI-SANTA-CROCE-COOP – 2015 (cutoff 5)



New SR of the station point PI-SANTACROCE (red pixels) with a threshold of 20% and cutoff  $5\mu\text{g}/\text{m}^3$

# SR PM10 – territorial coverage

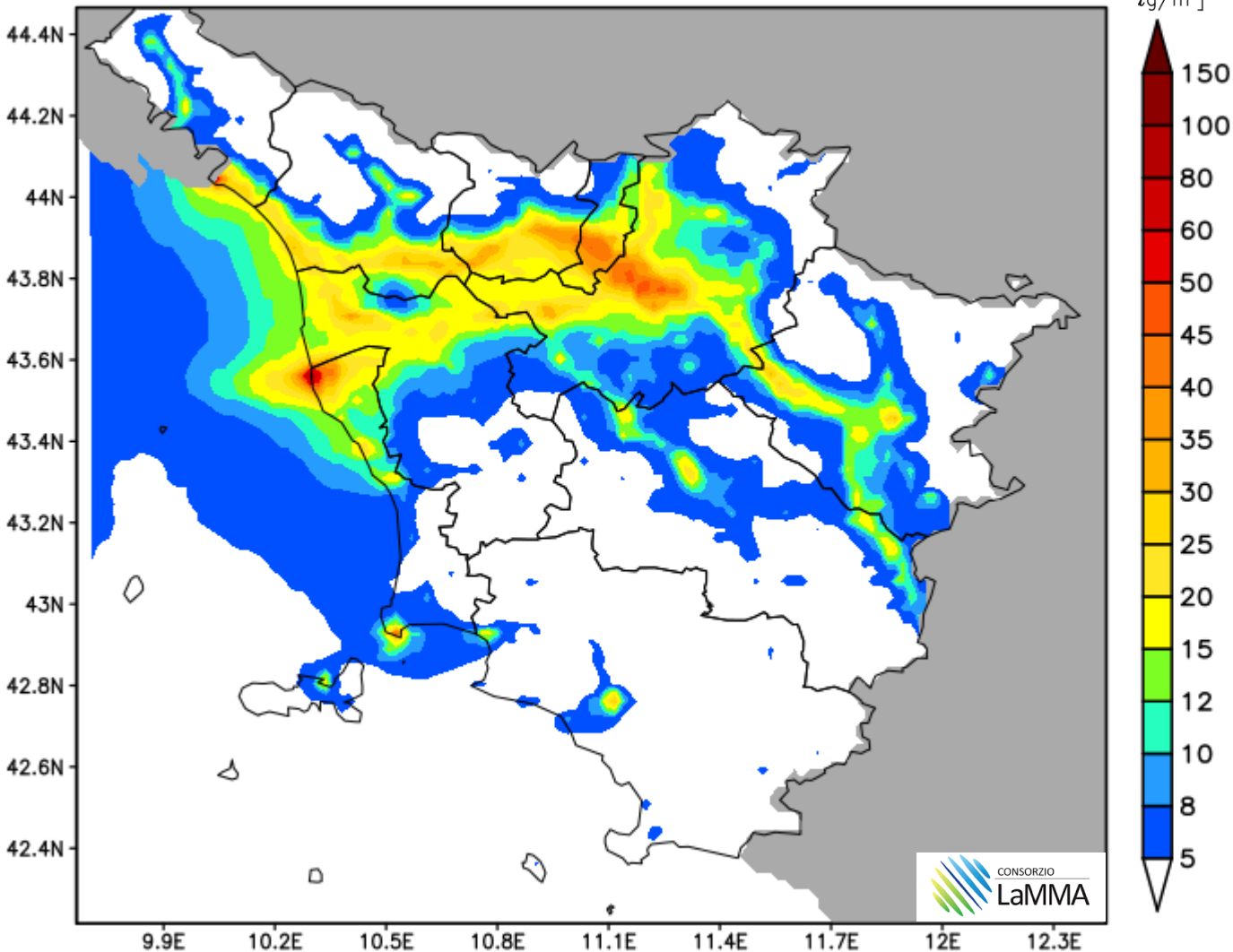


# Remarks

- PM10 : SR cover the whole region (also with the threshold of 18%)
- SR of each single station point is quite different from the current SR adopted in Tuscany region.
- The use of annual mean in Tuscany region doesn't take into account the interannual variability, not properly represented and the local dynamical conditions driven by meteorology, that are too much smoothed, in a region with a complex orography.
- Probably it could be interesting to evaluate the performance on a seasonal mean.
- Difficulties to attribute the representativeness of a station point to a municipality since each station point often represent a very large part of its surroundings.

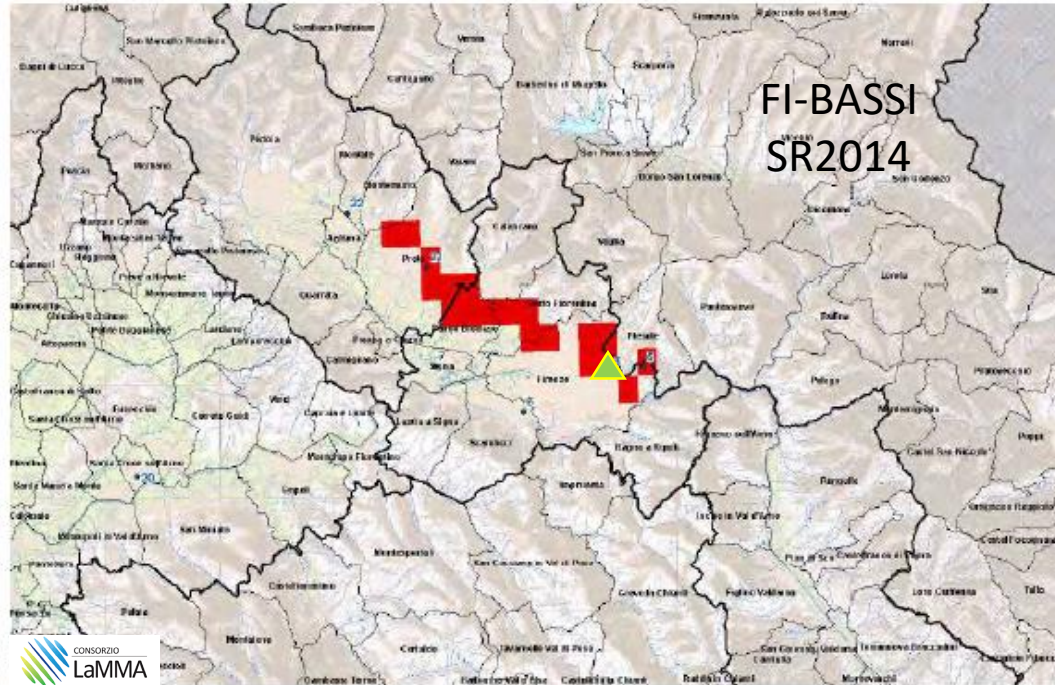
# NO2

NO2 [ $\mu\text{g}/\text{m}^3$ ] MEDIA ANNO 2015



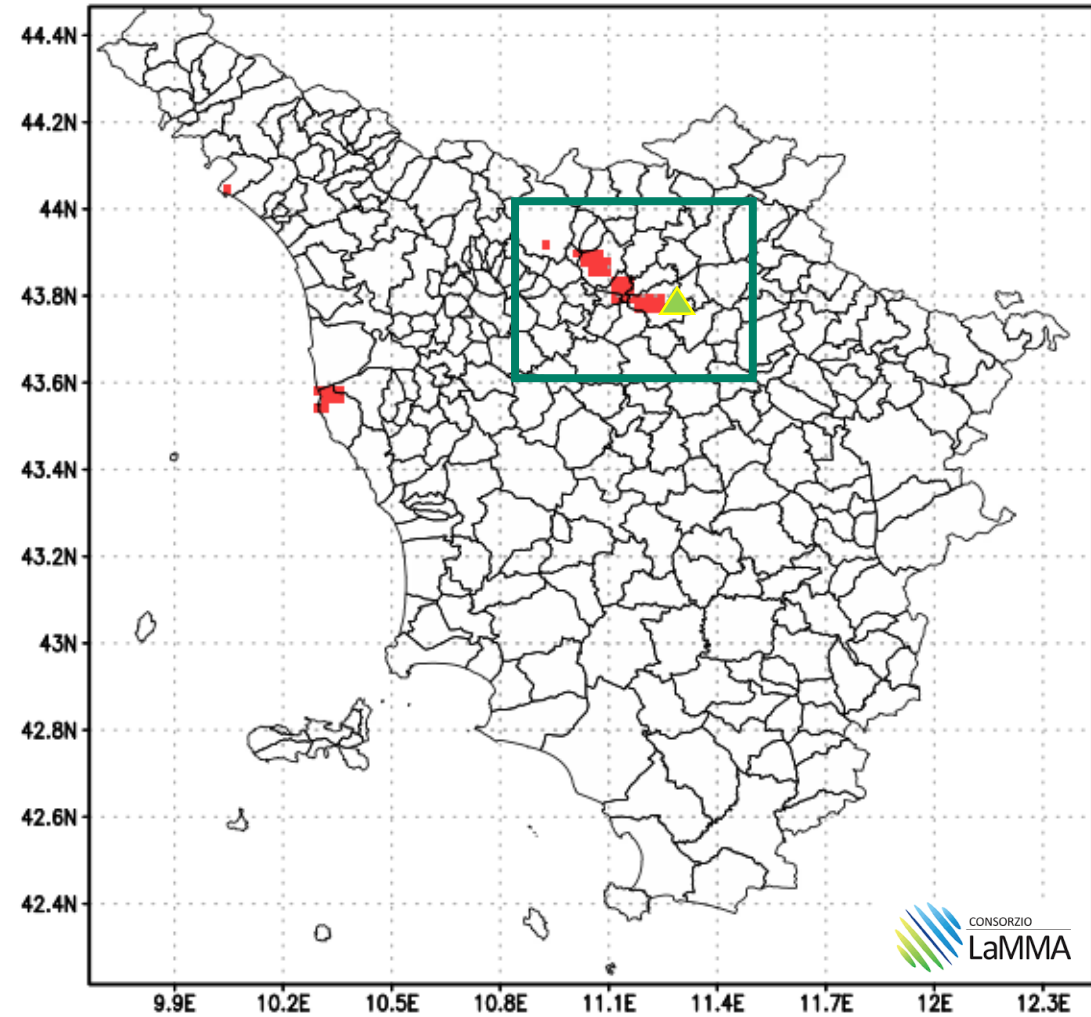
- NO2 – 2015 annual mean
- Cutoff of 2 and 3  $\mu\text{g}/\text{m}^3$
- Treshold values: 20% and values in its around (15%-30%)

# RESULTS-NO2



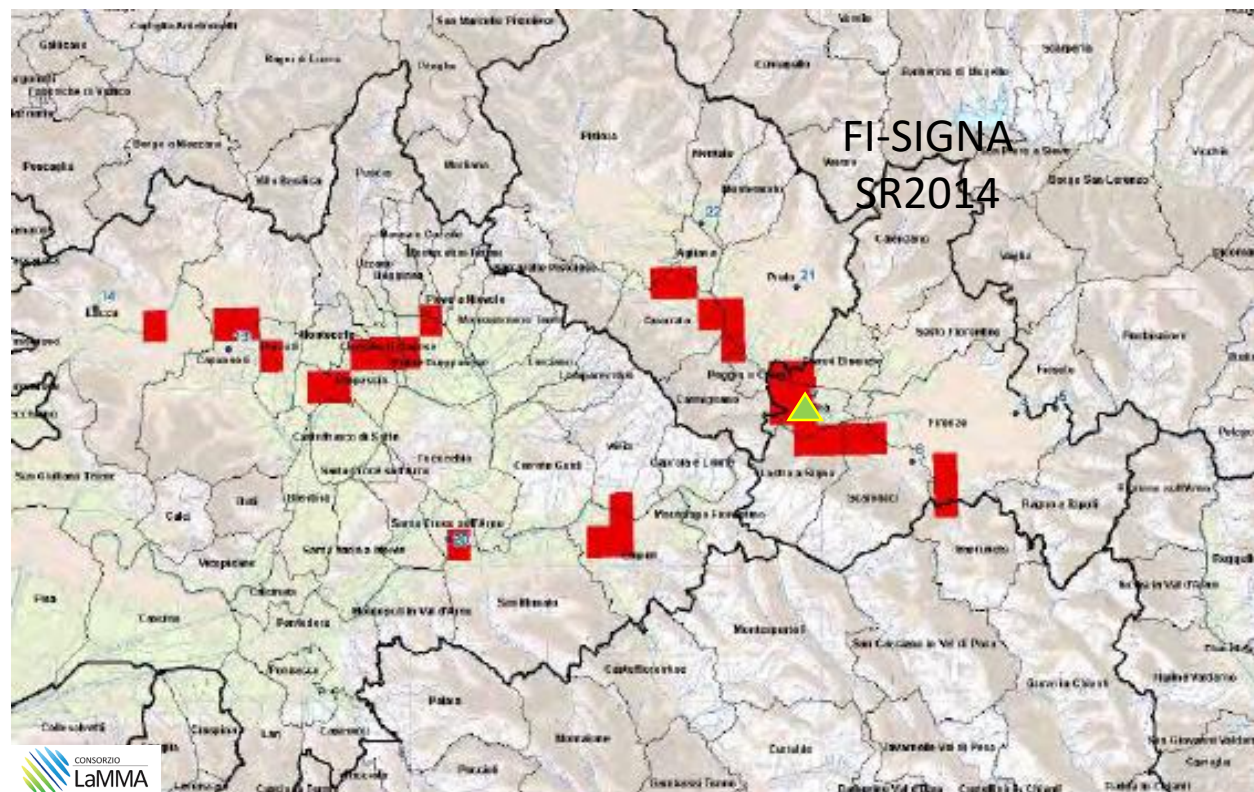
Current SR of the station point FI-BASSI (red pixels)

no2 – FI-BASSI – 2015 (cutoff 2)



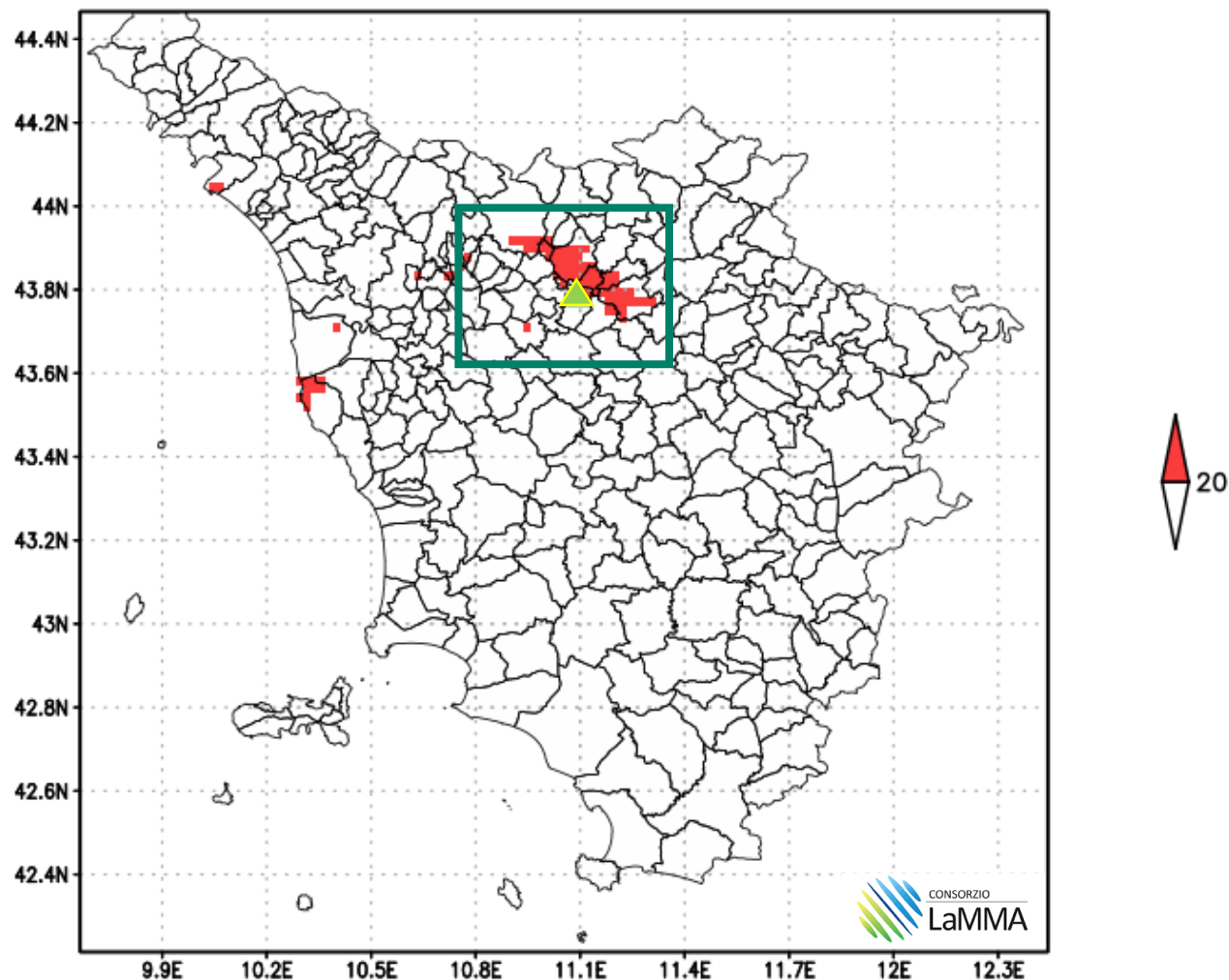
New SR of the station point FI-BASSI (red pixels) with a threshold of 20% and cutoff  $2\mu\text{g}/\text{m}^3$

# RESULTS-NO2



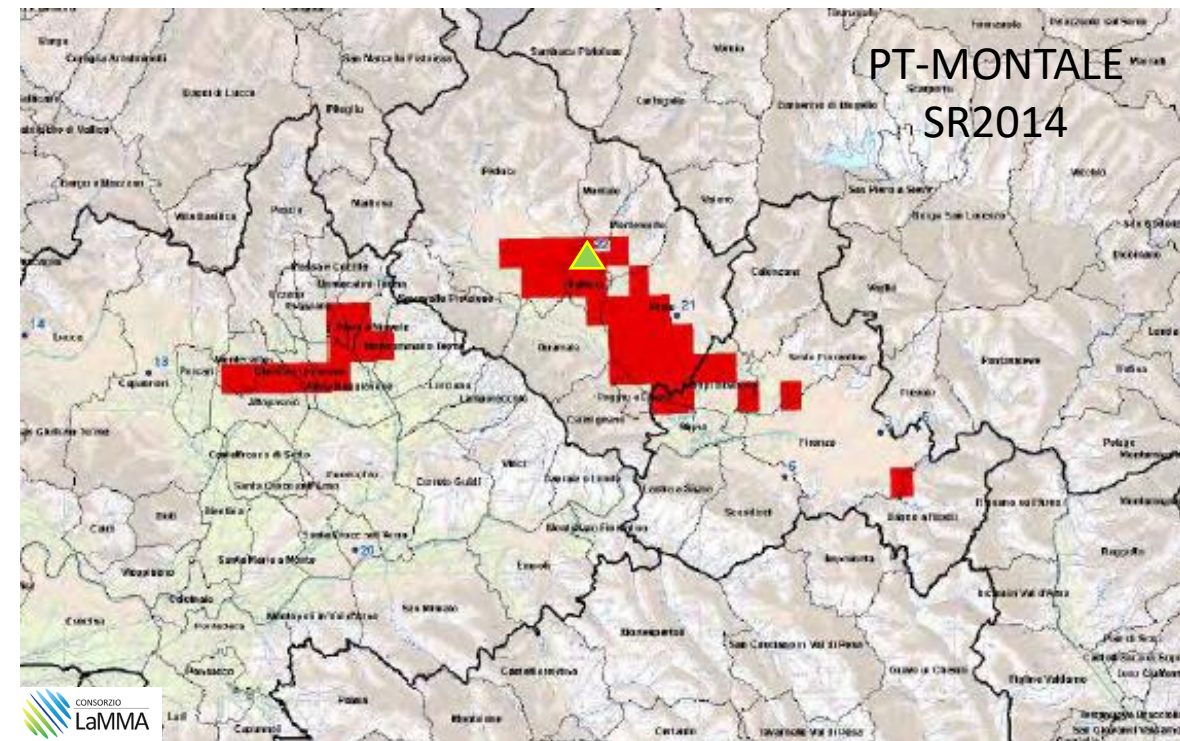
Current SR of the station point FI-SIGNA (red pixels)

no2 - FI-SIGNA - 2015 (cutoff 5)



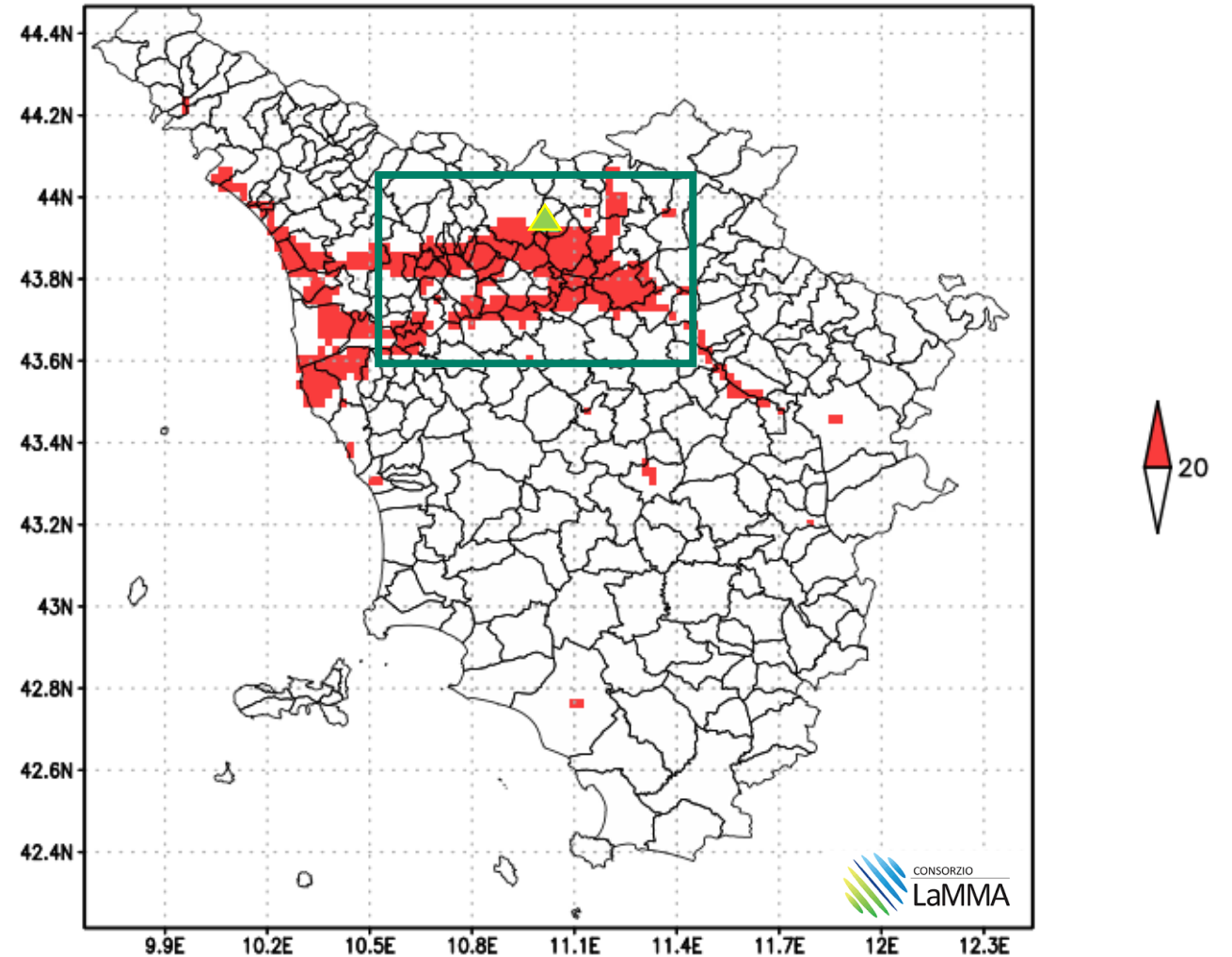
New SR of the station point FI-SIGNA (red pixels) with a threshold of 20% and cutoff  $2\mu\text{g}/\text{m}^3$

# RESULTS-NO2



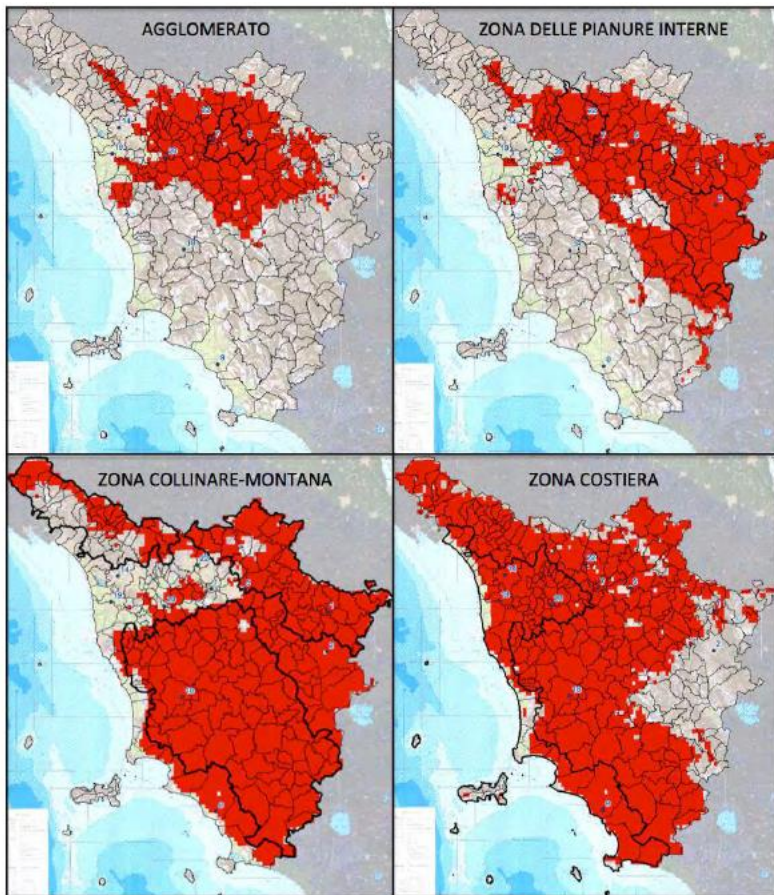
Current SR of the station point PT-MONTALE (red pixels)

no2 – PT-MONTALE – 2015 (cutoff 2)



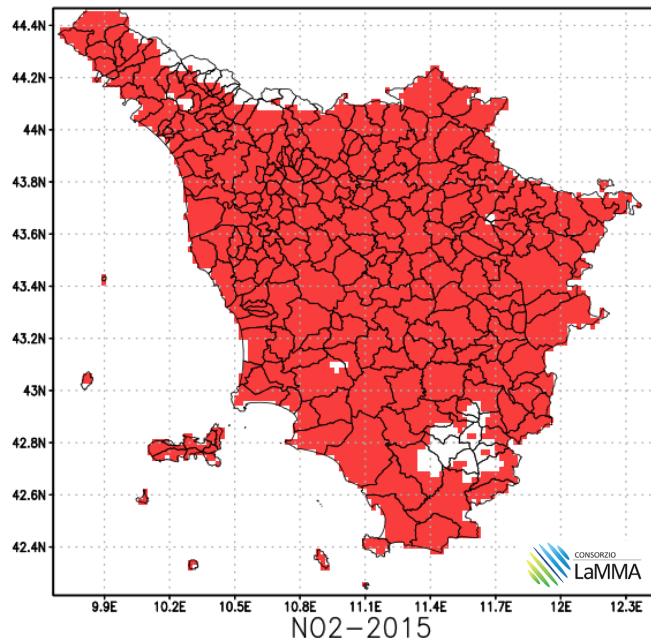
New SR of the station point PT-MONTALE (red pixels) with a threshold of 20% and cutoff  $2\mu\text{g}/\text{m}^3$

### Current SR for TR



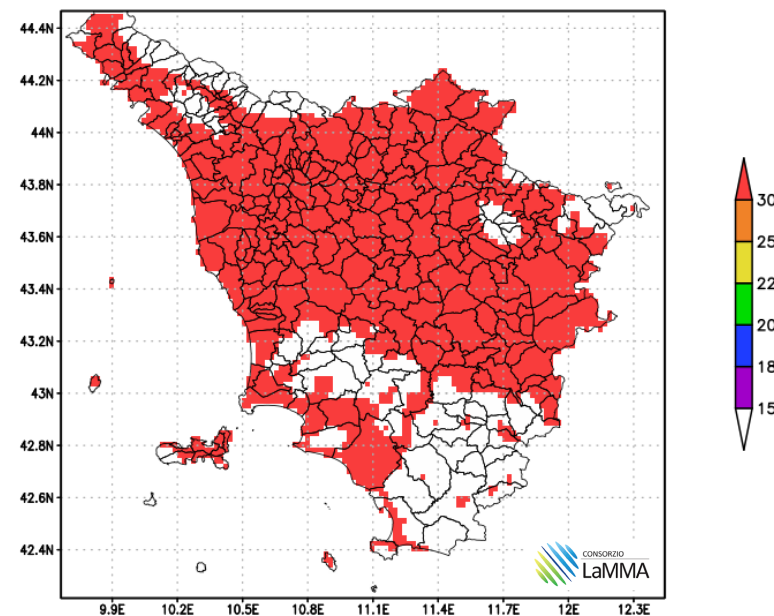
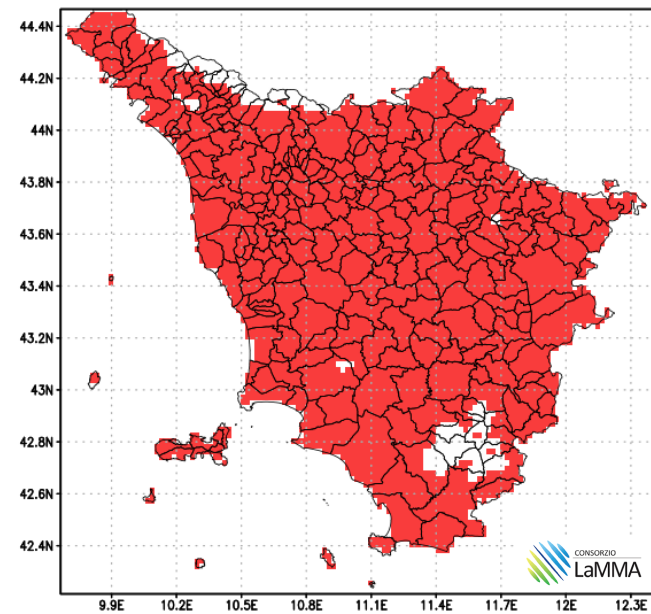
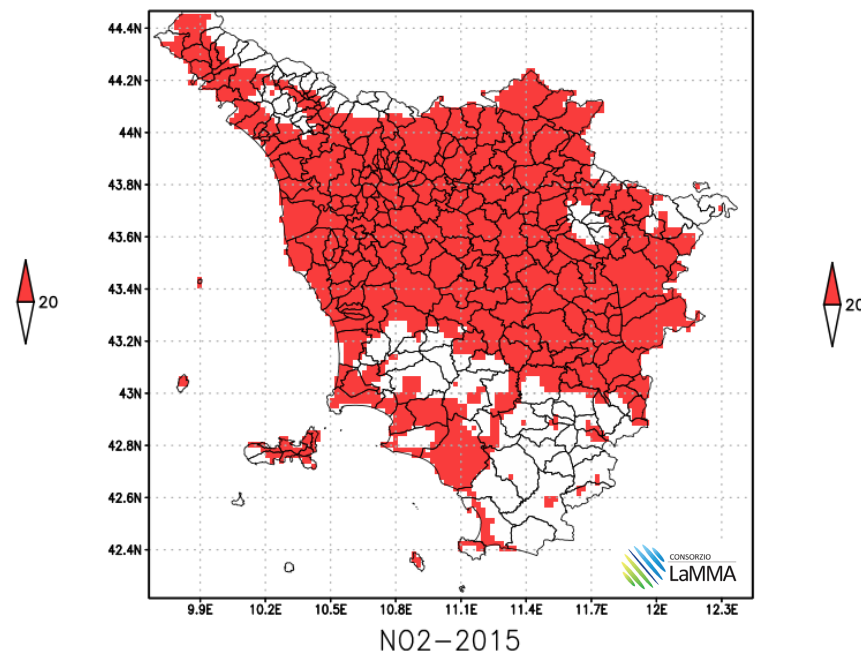
### NEW SR - NO2 cutoff 2

N02-2015



### NEW SR - NO2 cutoff 3

N02-2015





# Remarks

- NO<sub>2</sub> : SR cover the whole region (the threshold 20% seems to be enough)
- Cutoff 2 or 3 μg/m<sup>3</sup> give differences especially in the south inner part of the region and the upper part of the Apennines characterized by lower concentration estimates. (ok 2 μg/m<sup>3</sup> )
- The SR currently used in TR for the NO<sub>2</sub> shows not such differences with this new one, as PM<sub>10</sub> does.