

# The nation-wide dataset of urban PM10 chemical speciation for Italy: a focus on secondary inorganic compounds

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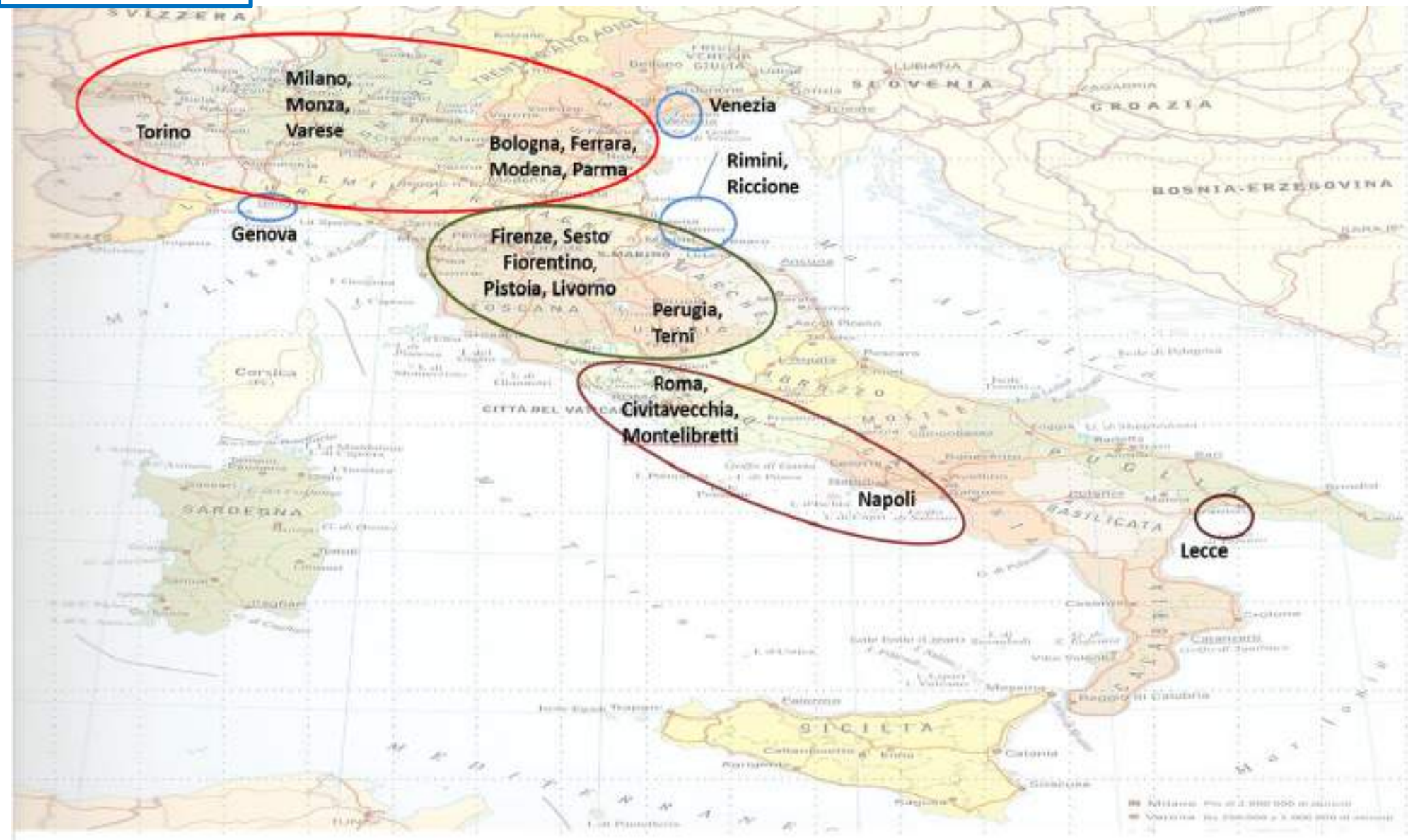
The **Working Group WG1: Aerosol generation sources and processes of the IAS**, collected a chemical speciation datasets of PM10 in Italy to explore the influence of geographical characteristics on urban pollution and the contribution of natural and anthropogenic sources.

The published article represents the first study done from a national perspective on this topic:

<https://www.sciencedirect.com/science/article/abs/pii/S004896972306518X#f0035>

Talk 29/09 Source Apportionment Adriana Pietrodangelo

## PM10

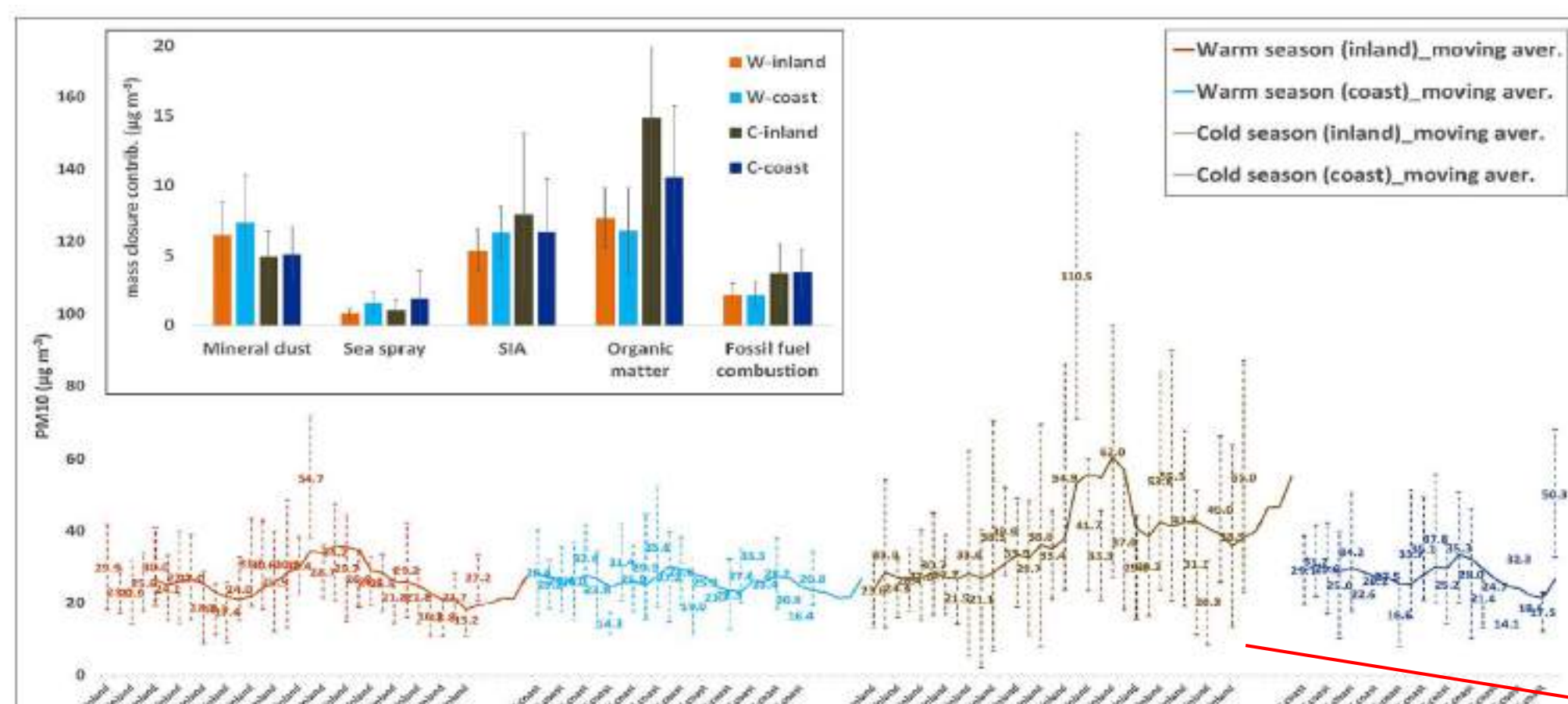


PM10 samples were submitted to different chemical-physical analyses covering the 2005–2016 period and comprising **season-averaged** chemical speciation data directly provided by the participating institutions; PM10 chemical composition data refer to urban sites of large or medium cities in the Po valley, inland areas or coastlines, across the Italian territory were composed in this way :

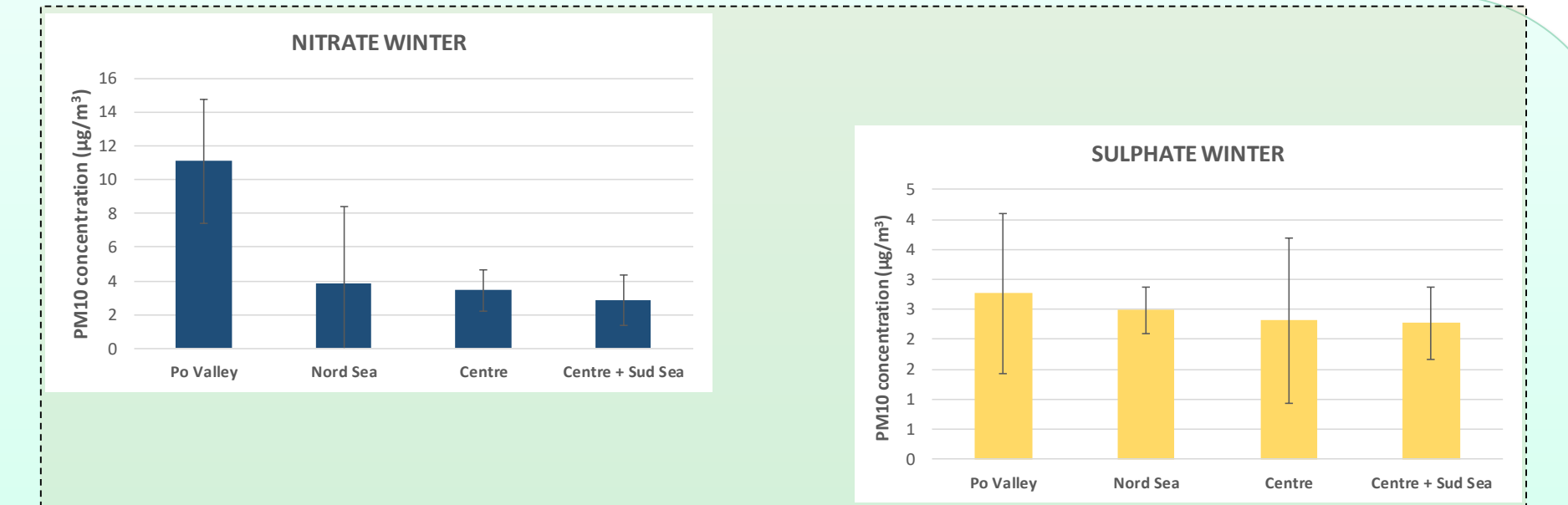
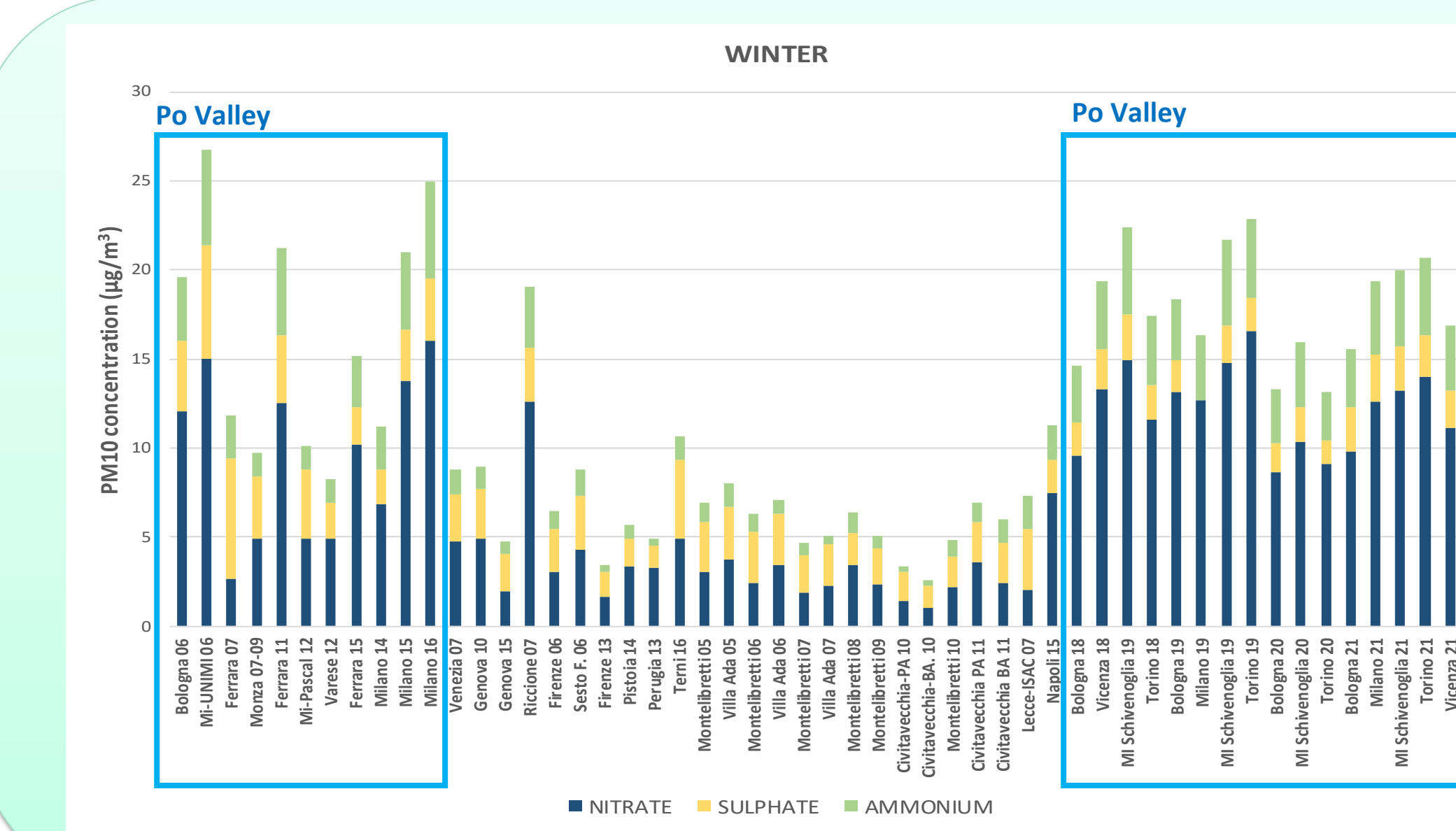
- elements with Z > 11 by XRF technique;
- organic carbon (OC) and elemental carbon (EC) by thermo-optical TOT/TOR technique;
- anions, cations and sugars (levoglucosan) by ion chromatography.

### PM10 Dataset description

- PM10: 110 cases aggregated by 24h
- 40 chemical variables
- Time period: 2005–2022 **Minimum data coverage for each: 60% of total cases**
- Sites urban background
- Case: site-season-year for each city
- Seasons: mean ± standard deviation



PM10 mean values reported by combining season (warm (W)/cold (C)) and proximity to coastline (inland/coast) site information. Error bars are standard deviation submitted with mean values. In the inner plot, PM10 contributions calculated by mass closure are also reported by combined criteria of season and proximity to coastline.



The Po Valley exhibits elevated nitrate, sulphate and ammonium values relative to the rest of the peninsula during the winter period. With respect to sulphate, marine areas appear to display slightly elevated values.

It is imperative that meteorological factors must be taken into account when conducting such comparisons.

A sounder differentiation is obtained by combining season with geographical features, i.e., by assigning cases to an 'inland' or 'coast' category based on the distance from coastline)

### PM10

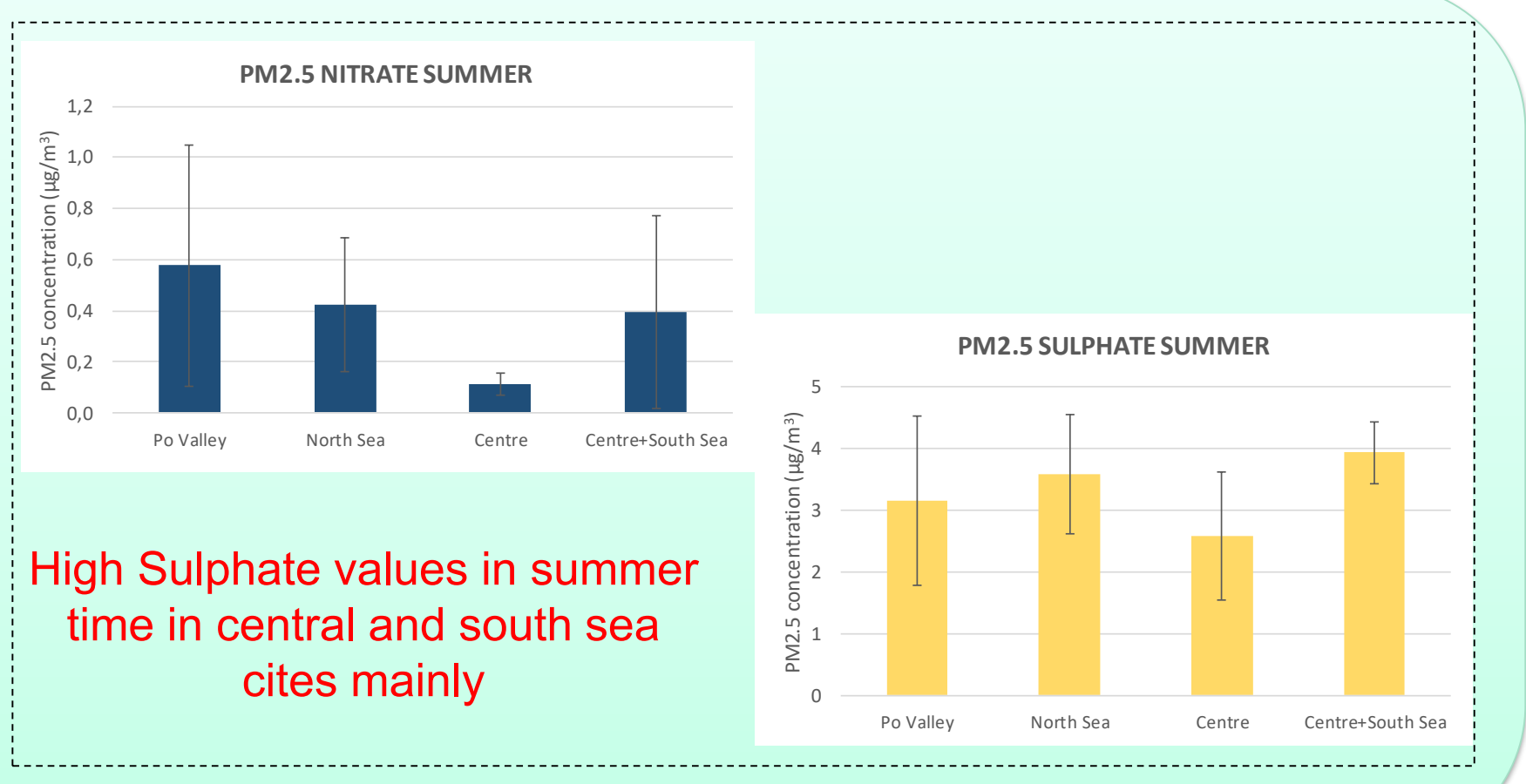
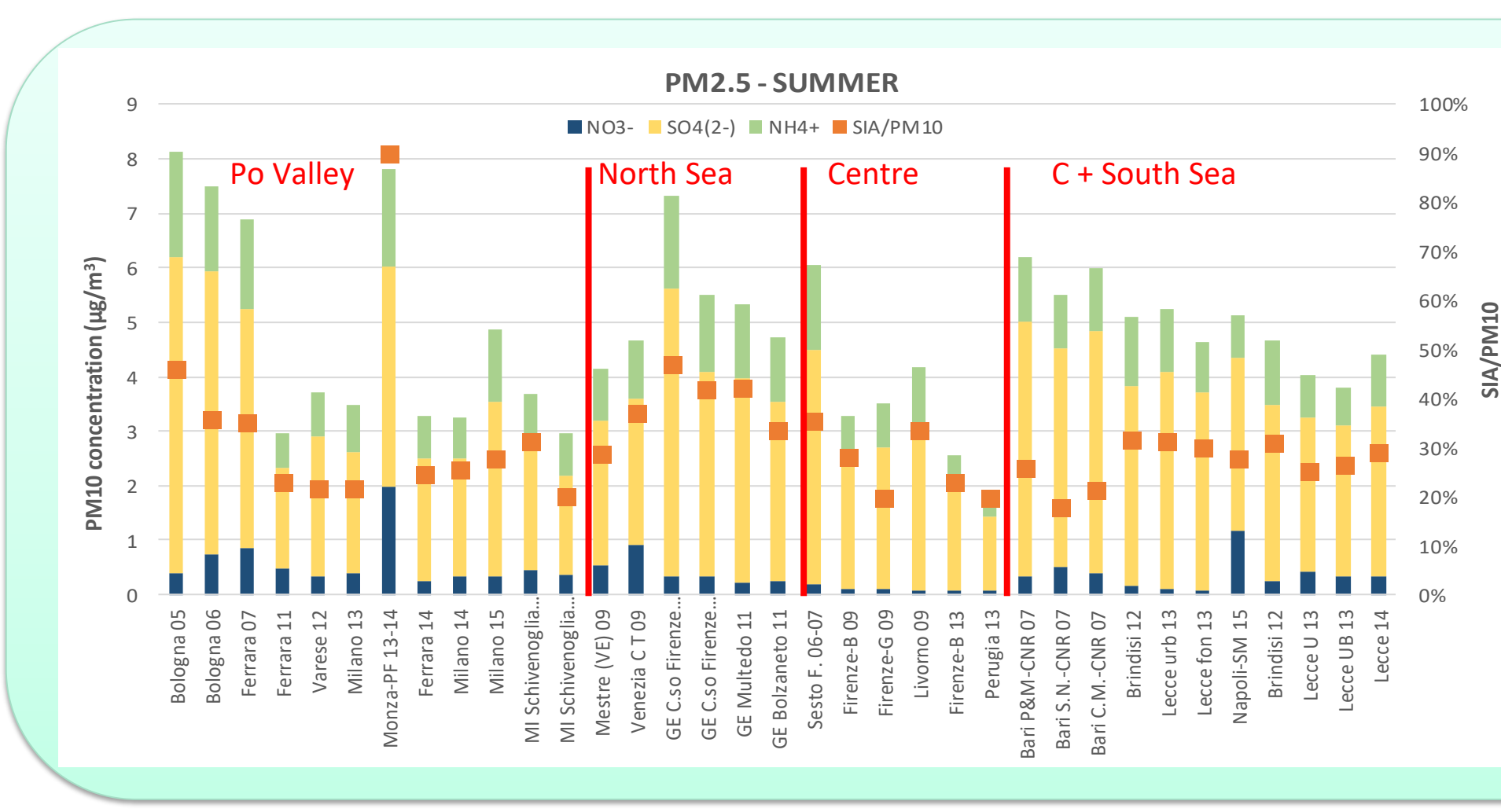
only the group of inland cities in the cold season show clearly higher PM10 mean values than the other groups.

**OC:** inland cities in the cold season show higher organic matter levels than coastal cities although both inland and coastal winter values of this contribution are higher than in the warm season, as expected.

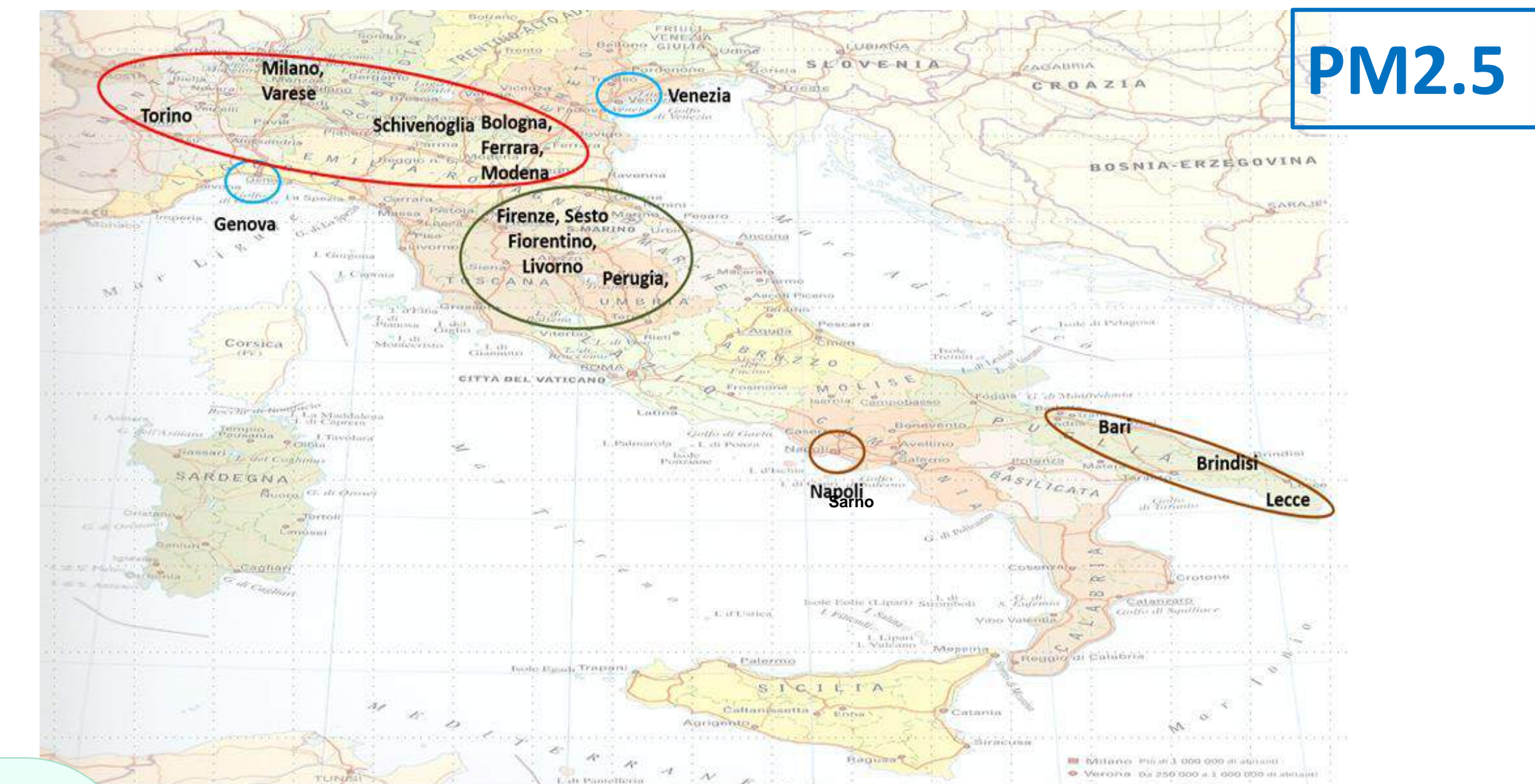
**SIA:** inland cities in the cold season show higher levels than coastal cities.

This PM10 dataset of seasonal averages of several Italian sites as input for PMF analysis using EPA PMF 5.0 -> Talk 29/09, Pietrodangelo

## SUMMER

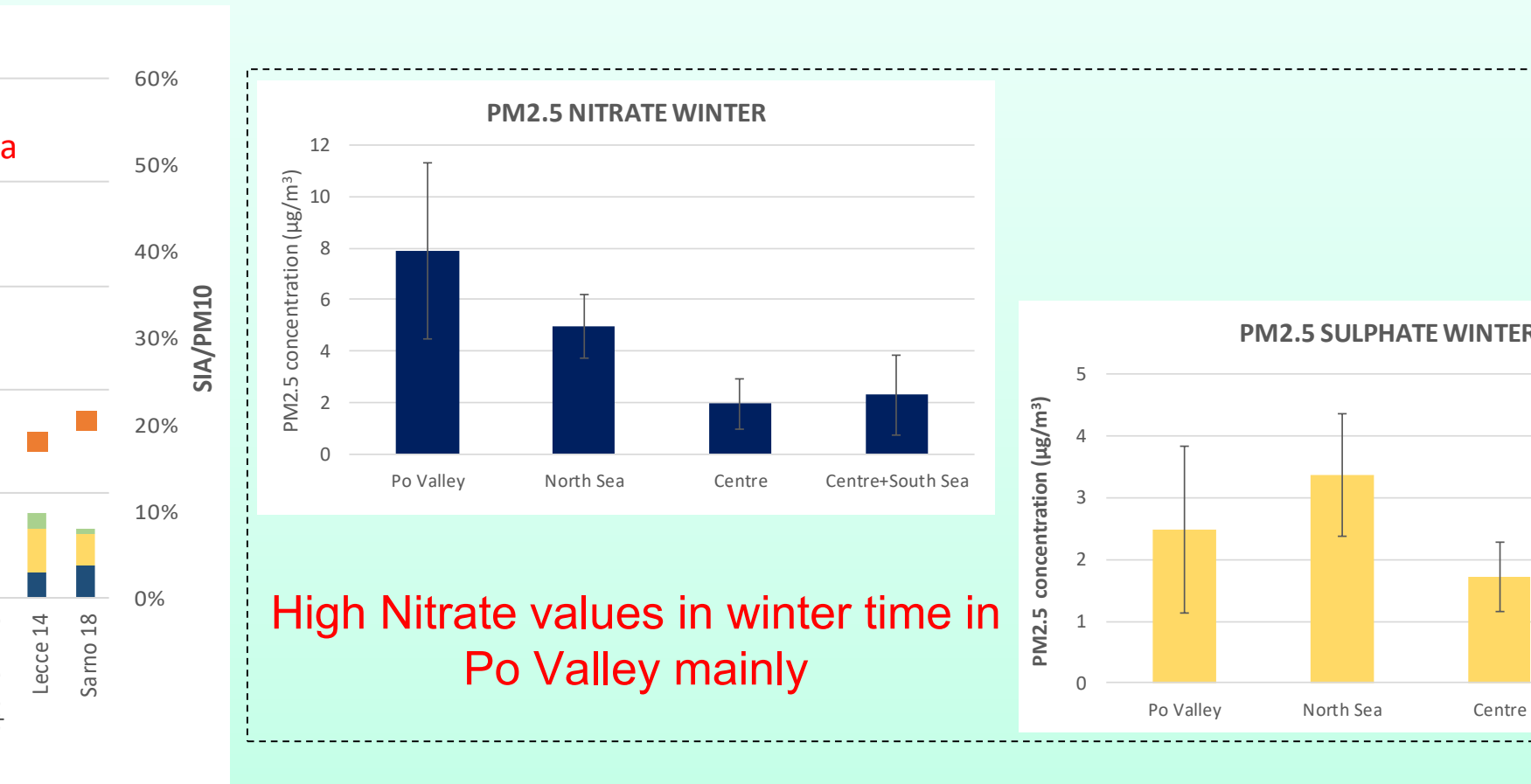
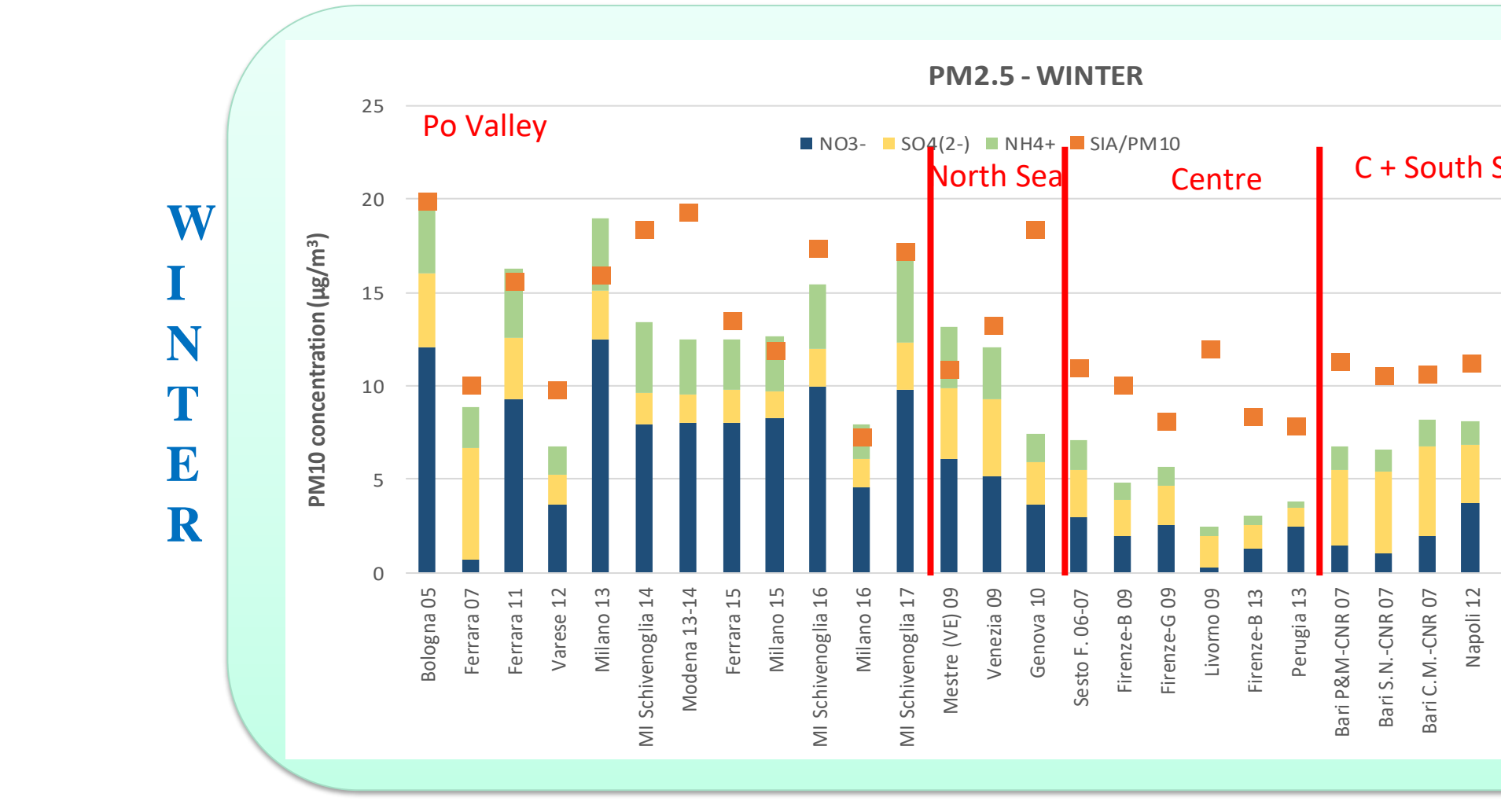


High Sulphate values in summer time in central and south sea cities mainly



## PM2.5

## WINTER



High Nitrate values in winter time in Po Valley mainly

### Dataset PM2.5 description

- PM2.5: 74 cases aggregated by 24h
- 40 chemical variables
- Time period: 2005–2022
- Sites urban background
- Case: site-season-year for each city
- Seasons: mean ± standard deviation

**Minimum data coverage for each case: 60% of total cases**

## DISCUSSION AND CONCLUSION

- The **Working Group WG1: Sources and Aerosol Generation Processes of the IAS** collated chemical speciation datasets of PM10 in Italy with the objective of investigating the influence of geographical characteristics on urban pollution and the contribution of natural and anthropogenic sources;
- The **secondary inorganic compounds** are of particular interest; the Po Valley exhibits elevated ammonium nitrate levels during the winter months, exceeding those observed in other regions of the peninsula. Additionally, marine areas display slightly elevated sulfate levels;
- It is important to consider the role of meteorology in this context;
- The **PM2.5 database** appears to corroborate the findings observed for PM10. It should be noted that PM2.5 database is more limited compare to PM10 database. A call for PM2.5 dataset is always open and it is recommended that more recent PM2.5 datasets, submitted using the same methodology as the previous ones, be sought;
- The scope of the study would be extended to encompass non-urban locations and explore carbon characterization in the future perspective.