



LIFE 15 IPE IT 013

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prepAIR
Po Regions Engaged to Policies of Air

Confronto tra un'analisi PMF di bacino e di singolo sito nel Progetto Prepair

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Introduzione

Analisi PMF svolta nell'ambito del progetto Prepair.

<https://www.lifeprepare.eu/>

«Il progetto PREPAIR mira ad implementare le misure previste dai piani regionali e dall'Accordo di Bacino su scala maggiore e a rafforzarne la sostenibilità e la durabilità dei risultati».



Scelta di effettuare un run unico di bacino

- Info di letteratura
- Le soluzioni di singolo sito avevano effettivamente portato a individuare gli stessi fattori

Implementazione del run multisito

Model Data | Base Model | Help

Data Files | Concentration/Uncertainty | Concentration Scatter Plot | Concentration Time Series | Data Exceptions

Input Files

Model input data in tab-delimited (.txt), comma-separated value (.csv), or Excel workbook (.xls) format.
Species names in first row, units in second row (optional), and date/times in first column (optional).

Date Format: Automatic

Concentration Data File: N:\Aria\CTR Area Urbane\PREPAIR\PMF\Output PMF\Intero bacino\InteroBacino05.xlsx Browse Load
Concentration data table with parameter names in the first row.
Optionally, the second row may contain units and the first column may contain date/time.
Concentration Worksheet: conc

Uncertainty Data File: N:\Aria\CTR Area Urbane\PREPAIR\PMF\Output PMF\Intero bacino\InteroBacino05.xlsx Browse Load
Observation-based or equation-based uncertainty values for each sample.
Must match concentration data format.
Uncertainty Worksheet: err

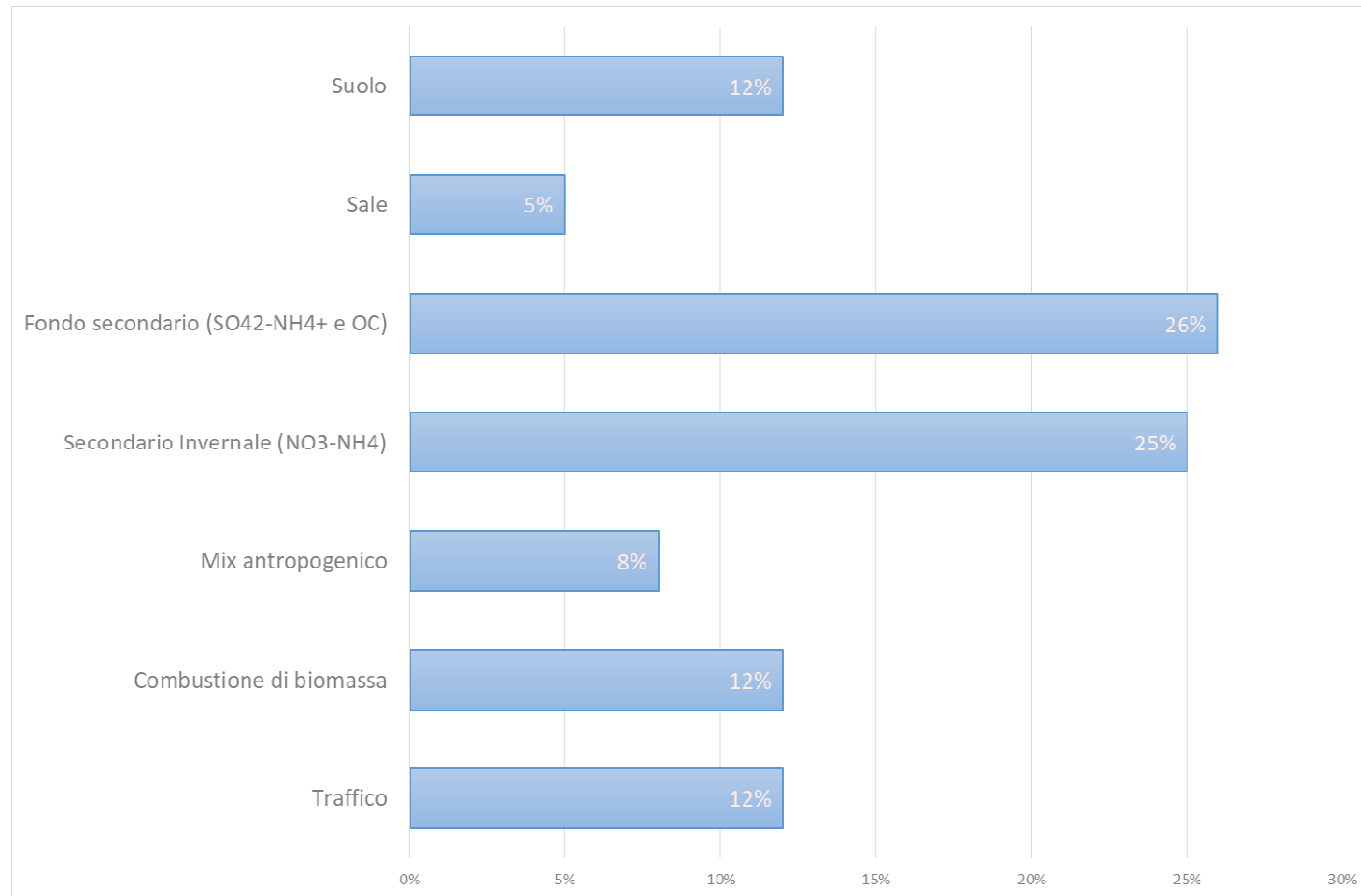
Date/Time Column: Data ID/Site Column: Sito

Unselect/Select All Display Site ID Lines

- Milano
- Schivenoglia
- Bologna
- Vicenza

Missing Value Indicator: -999 Exclude Entire Sample Replace Missing Values with Species Median

I fattori individuati



Statistiche di fitting del modello

Statistiche di fitting del modello

- Parametri della retta di regressione della massa del PM10

	Bacino	Bologna	Milano	Torino	Vicenza	Schivenoglia
Intercetta	0.47	0.80	0.97	0.71	-1.29	1.1
Pendenza	0.97	0.96	0.95	0.96	1.03	0.95
R^2	0.87	0.9	0.91	0.92	0.92	0.8

Statistiche di fitting del modello

- Rapporti diagnostici

	Bacino	Bologna	Milano	Torino	Vicenza	Schivenoglia	Rif.
NO3/NH4	3.39	3.91	3.32	3.44	3.42	3.67	3.40
SO4/NH4	3.12	3.08	3.05	2.92	2.43	3.44	2.70
EC/OC Traffico	0.29	0.24	0.27	0.30	0.44	0.13	
EC/OC BB	0.11	0.11	0.11	0.15	0.10	0.09	
Na/Cl Sale	0.73	0.80	0.30	0.77	0.56	0.75	0.56

Statistiche di fitting del modello

- Chiusure di massa dei fattori

	Mix	SSO	Nitrati	BB	Suolo	Traffico	Sale
Bacino	44%	53%	90%	55%	51%	73%	75%
Bologna	-	51%	103%	62%	52%	62%	87%
Milano	56%	63%	91%	61%	56%	62%	71%
Torino	64%	54%	81%	75%	55%	57%	128%
Vicenza	27%	55%	85%	57%	39%	62%	61%
Schivenoglia	-	49%	103%	57%	80%	40%	51%

Cfr degli output

Correlazione tra i profili dei fattori tra le soluzioni di bacino e di singolo sito

Coefficiente di correlazione di Pearson	TORINO	BOLOGNA	MILANO	VICENZA	SCHIVENOGLIA	Media
Fondo Secondario	1	1	1	1	1	1.00
Suolo	0.99	1	1	1	0.98	0.99
Traffico	1	0.99	1	0.99	0.99	0.99
Sale	0.93	1	0.99	0.98	1	0.98
Secondario Invernale	1	0.99	1	1	0.99	1.00
Mix Antropogenico	0.98	-0.02	0.99	0.98		0.73
Combustione di Biomassa	0.99	1	0.98	1	0.99	0.99
Media	0.98	0.85	0.99	0.99	0.99	

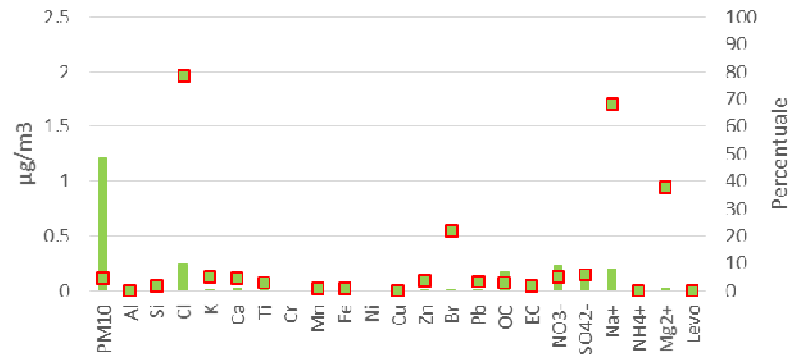
Coefficiente di correlazione di Spearman	TORINO	BOLOGNA	MILANO	VICENZA	SCHIVENOGLIA	Media
Fondo Secondario	0.76	0.8	0.75	0.83	0.83	0.79
Suolo	0.85	0.94	0.87	0.88	0.98	0.90
Traffico	0.63	0.71	0.74	0.56	0.65	0.66
Sale	0.76	0.94	0.92	0.7	0.86	0.84
Secondario Invernale	0.67	0.6	0.74	0.79	0.79	0.72
Mix Antropogenico	0.13	-0.08	0.21	0.34		0.15
Combustione di Biomassa	0.62	0.67	0.48	0.63	0.75	0.63
Media	0.63	0.65	0.67	0.68	0.81	

Correlazione tra le serie storiche

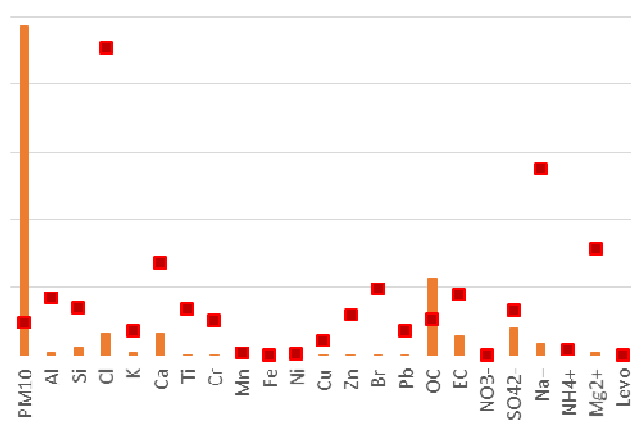
r Correlazione di Pearson	Mix	SSO	Nitrati	BB	Suolo	Traffico	Sale	Media
Bacino/Bologna	-	0.98	0.99	1.00	0.99	0.89	0.97	0.97
Bacino/Milano	0.51	0.98	0.99	0.99	1.00	0.93	0.99	0.91
Bacino/Vicenza	0.82	0.93	0.99	1.00	0.98	0.83	0.88	0.92
Bacino/Schivenoglia	-	0.94	0.99	0.99	0.99	0.94	0.99	0.97
Bacino/Torino	-0.15	0.54	0.64	0.78	0.42	0.52	0.72	0.50
Media	0.39	0.85	0.90	0.94	0.85	0.81	0.90	

Fattore Sale

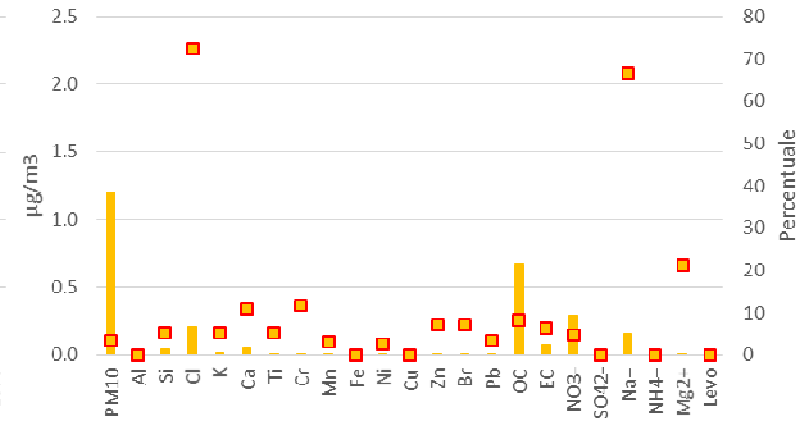
Bologna



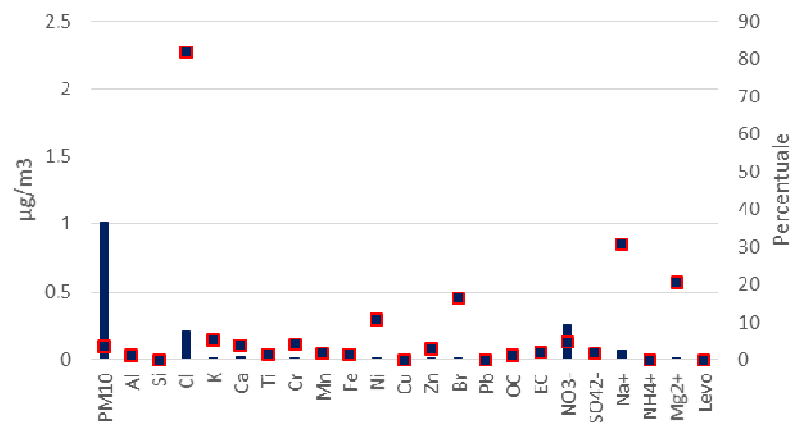
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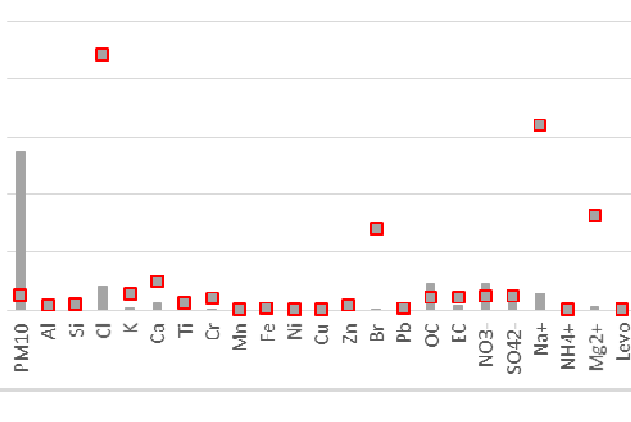
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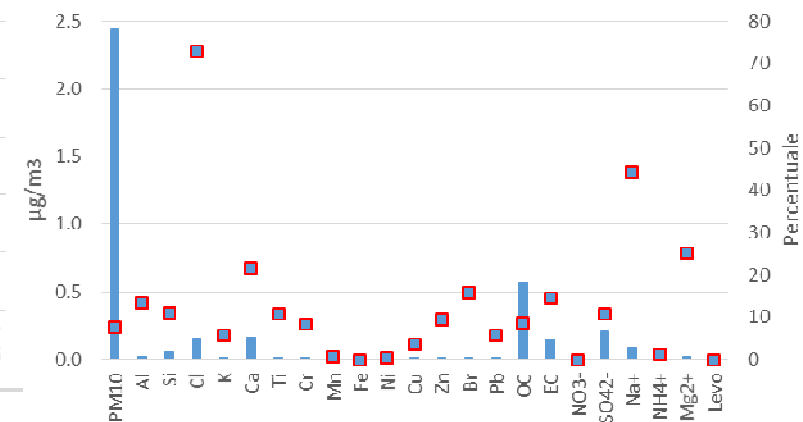
Milano



Soluzione di bacino

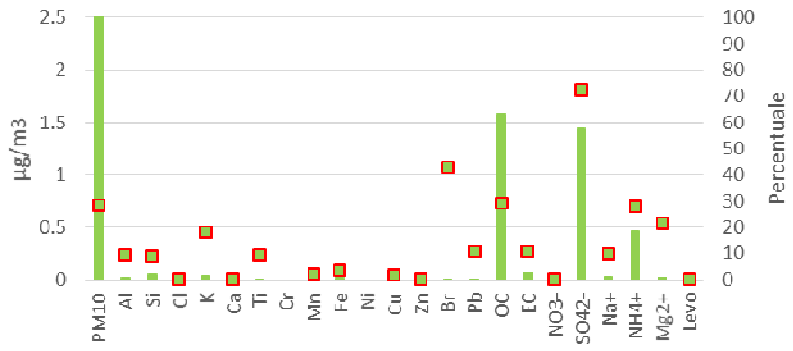


Vicenza

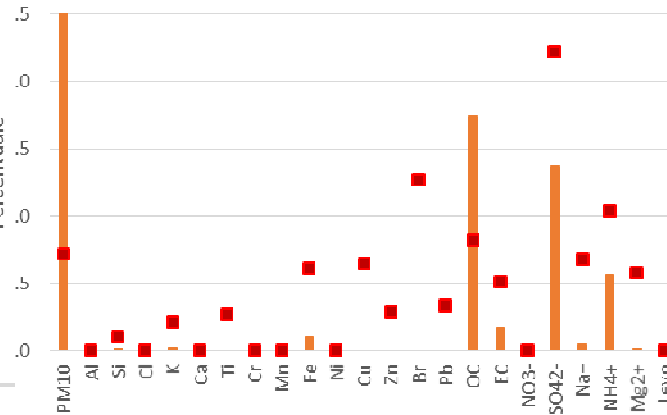


Fattore Secondario regionale (SSO)

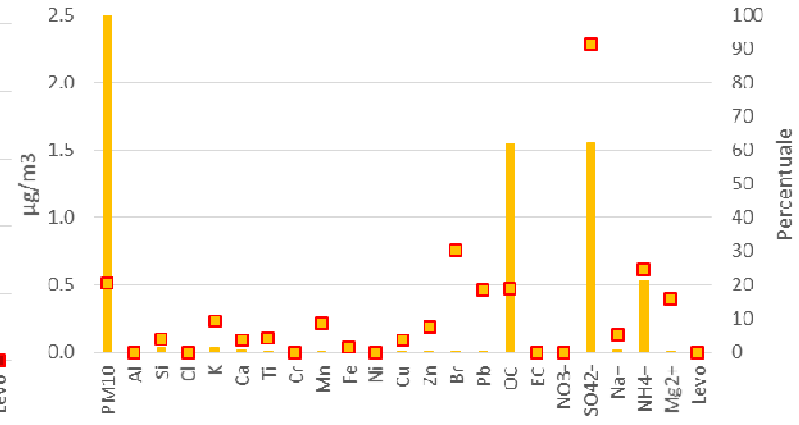
Bologna



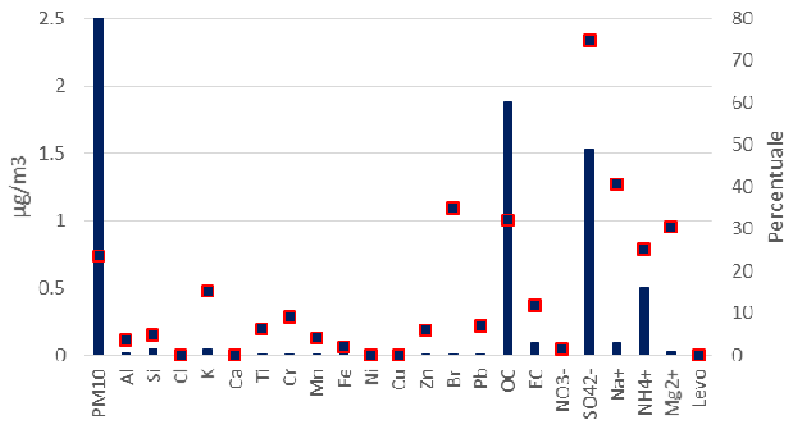
Schivenoglia



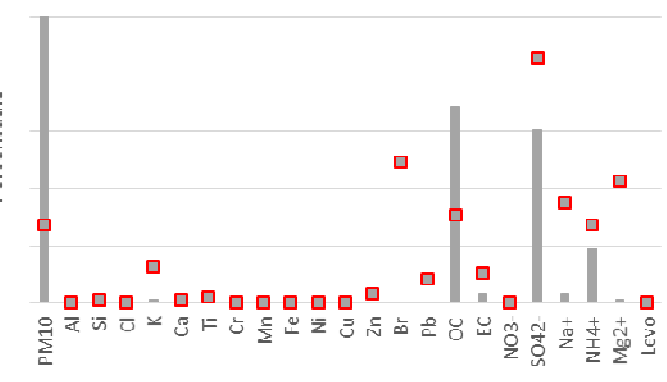
Torino



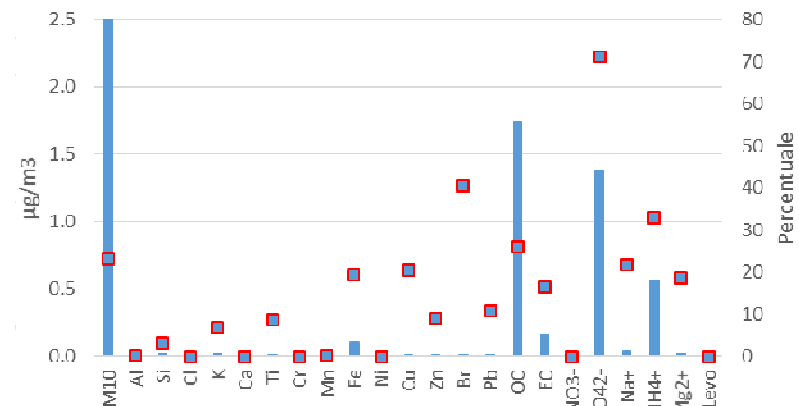
Milano



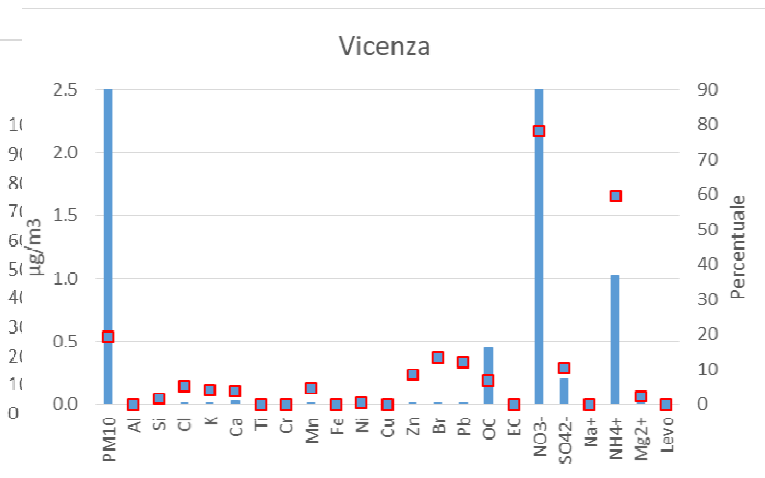
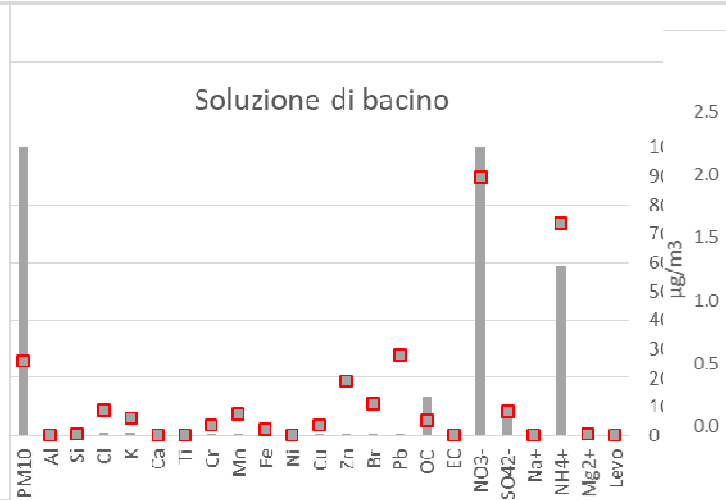
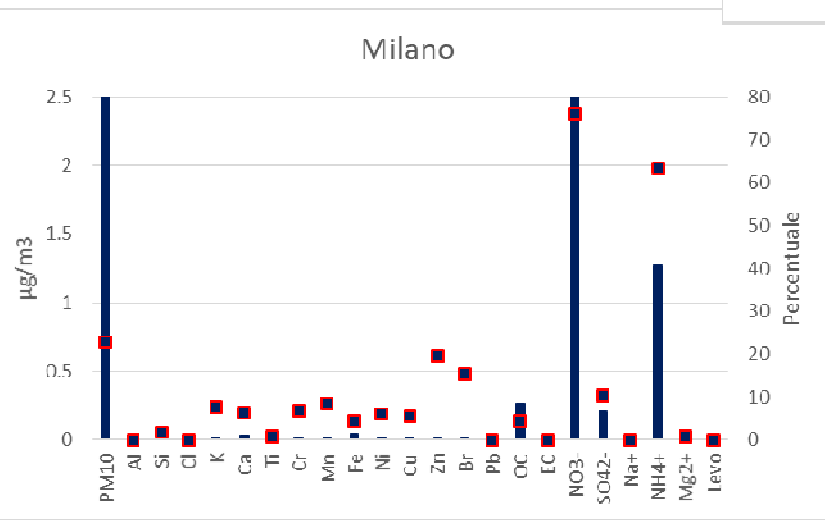
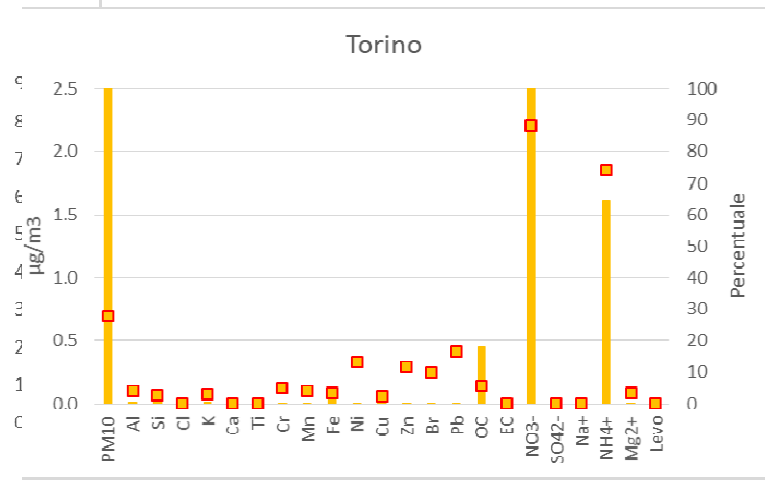
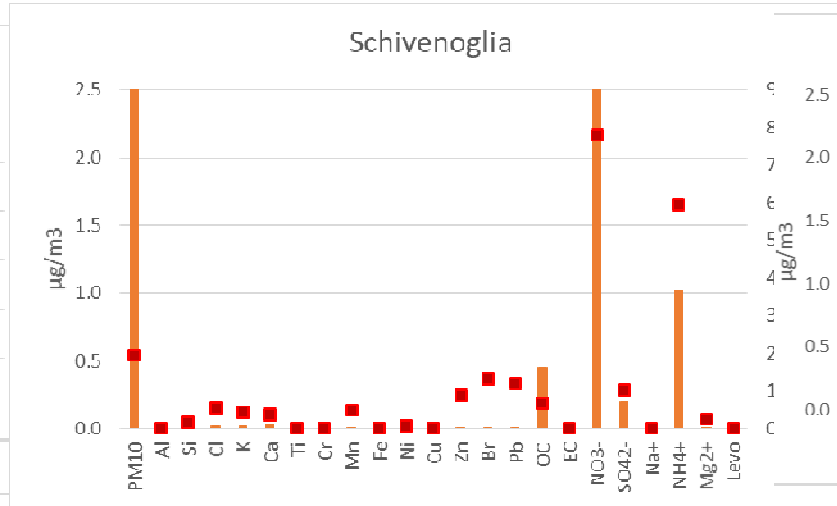
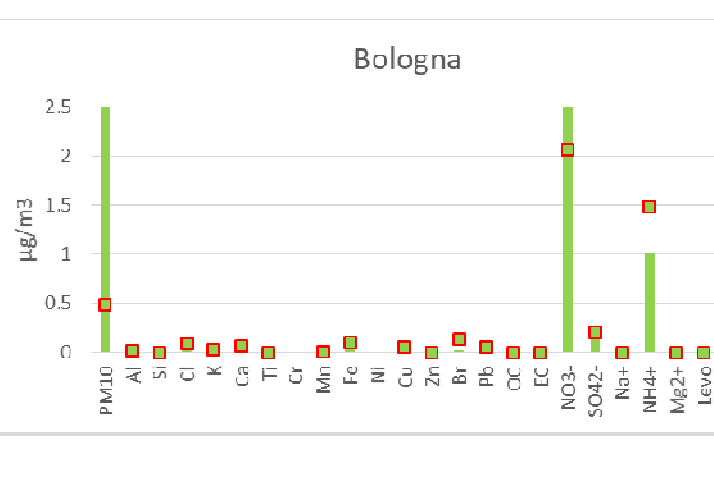
Soluzione di bacino



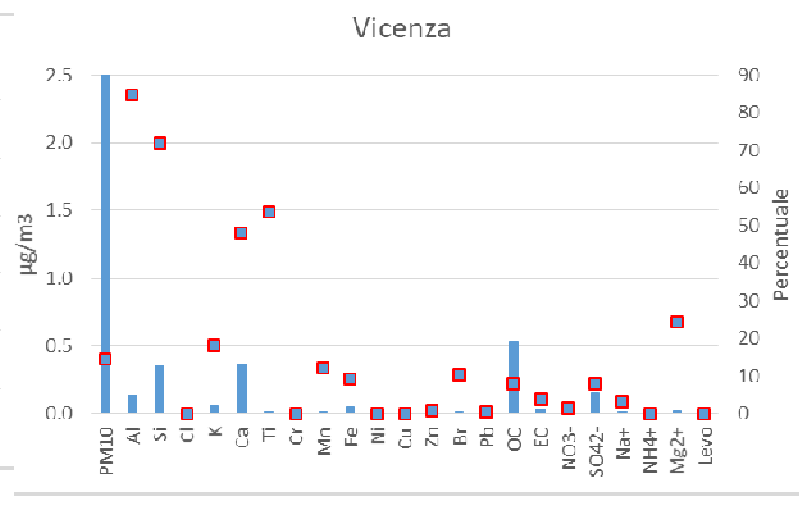
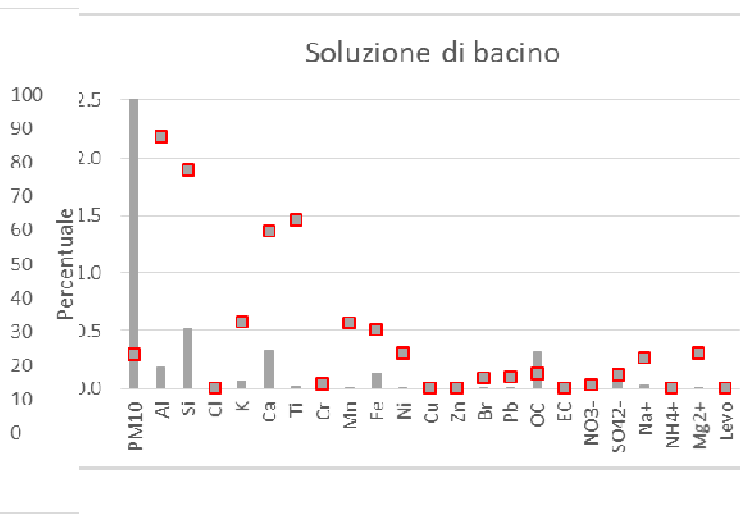
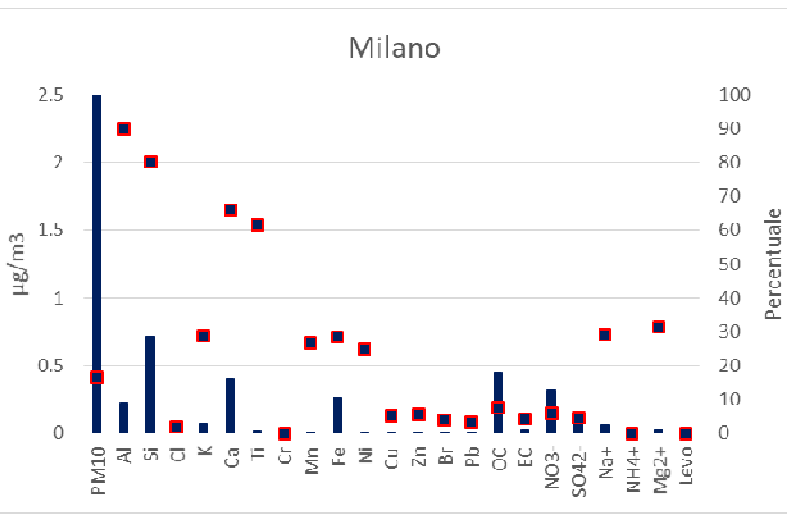
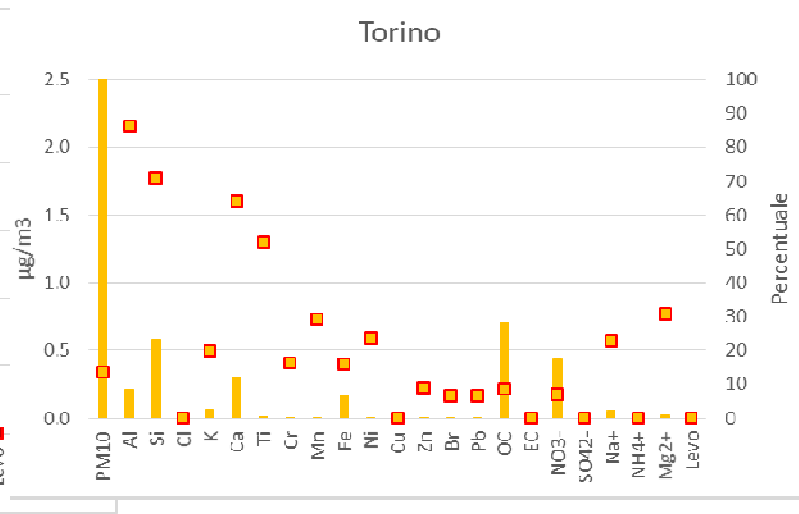
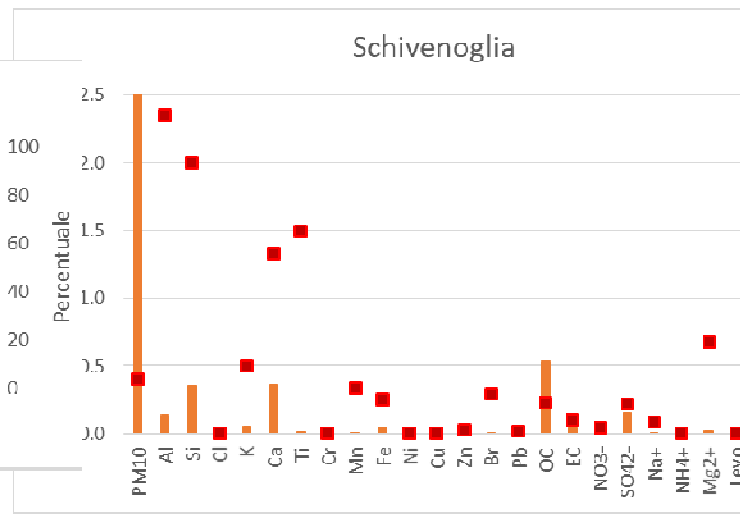
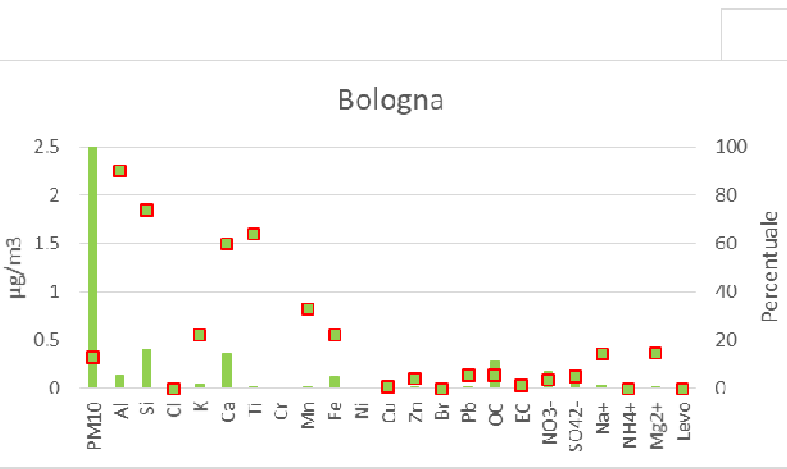
Vicenza



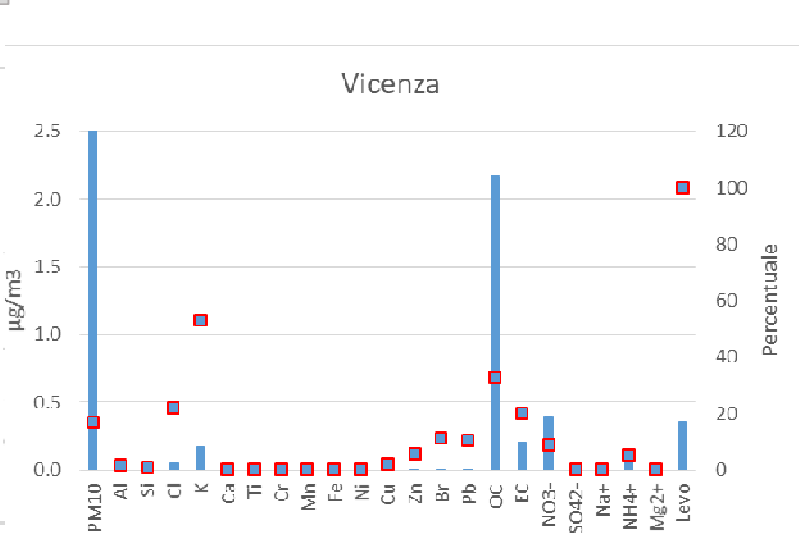
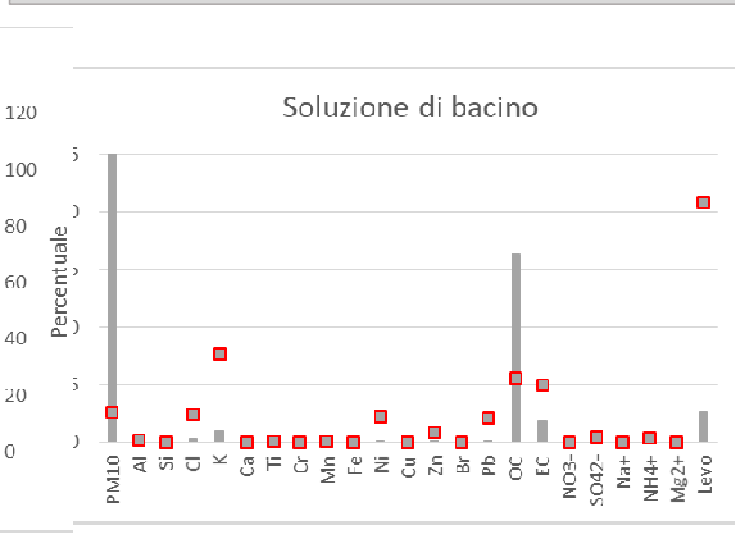
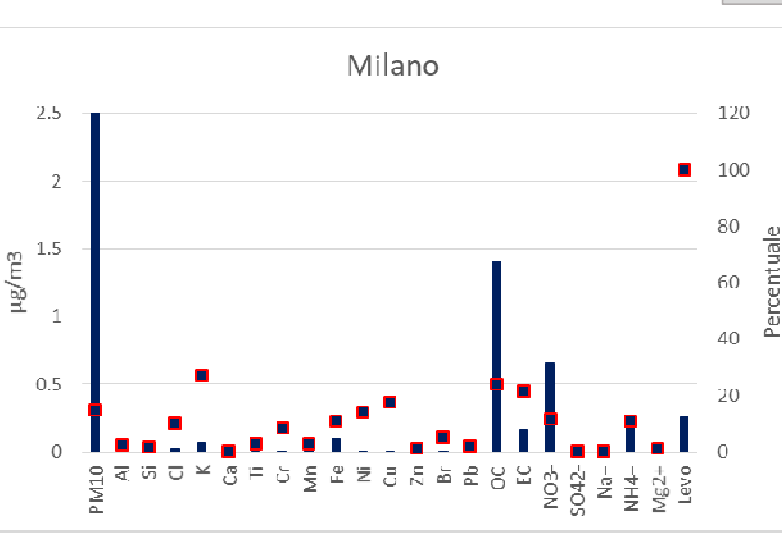
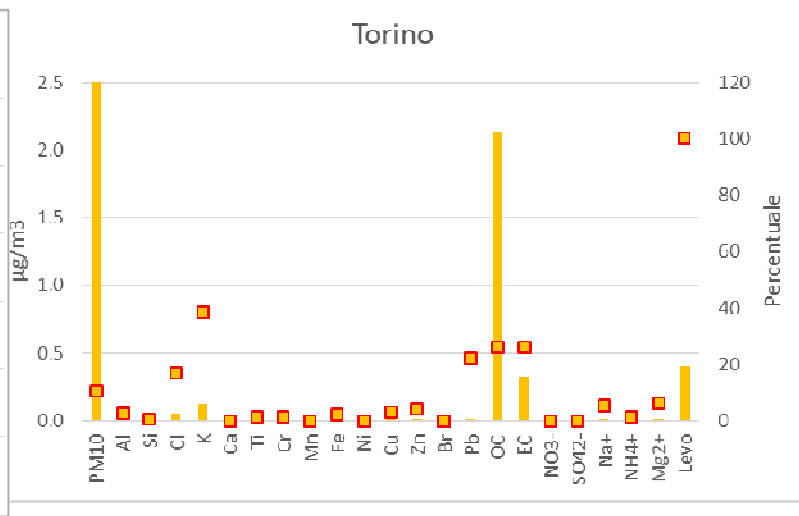
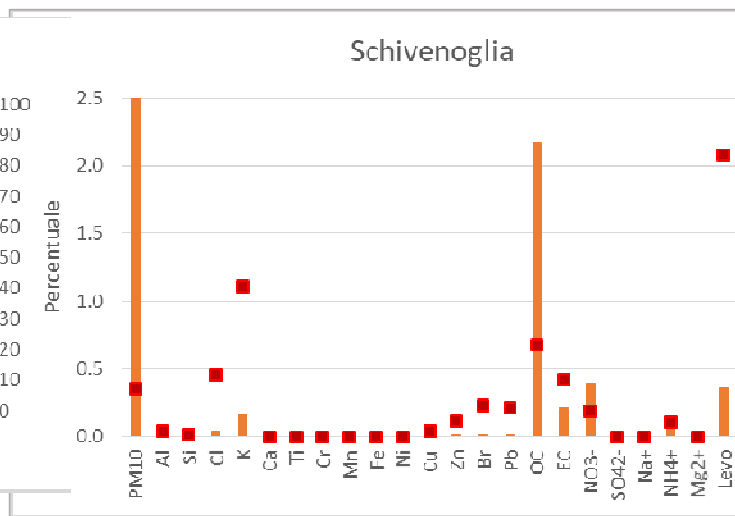
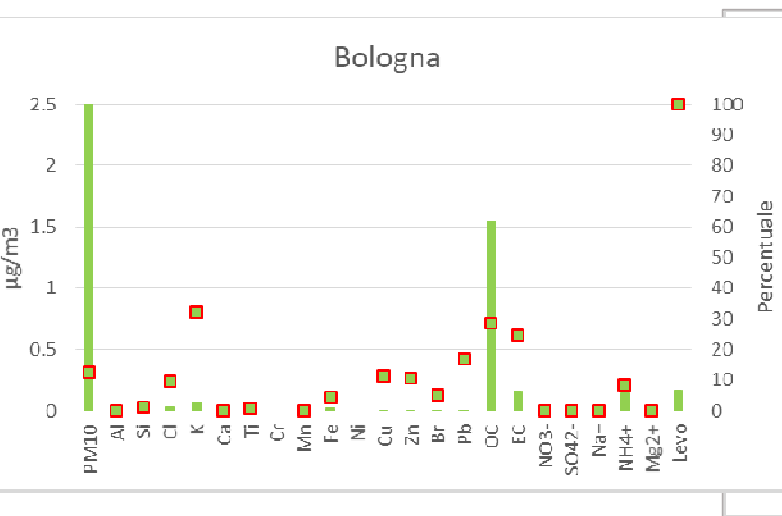
Fattore Secondario Invernale (NO3)



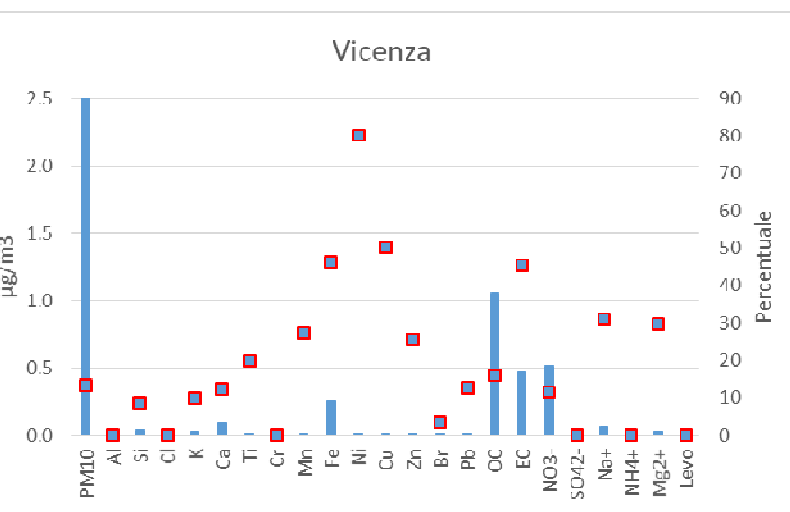
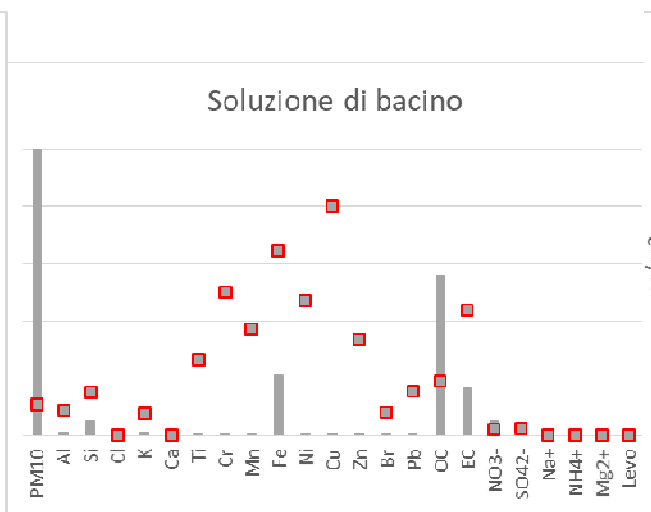
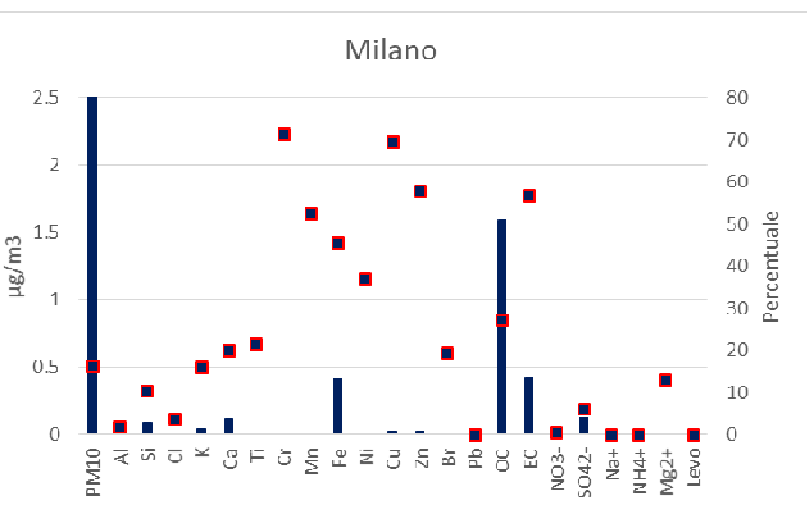
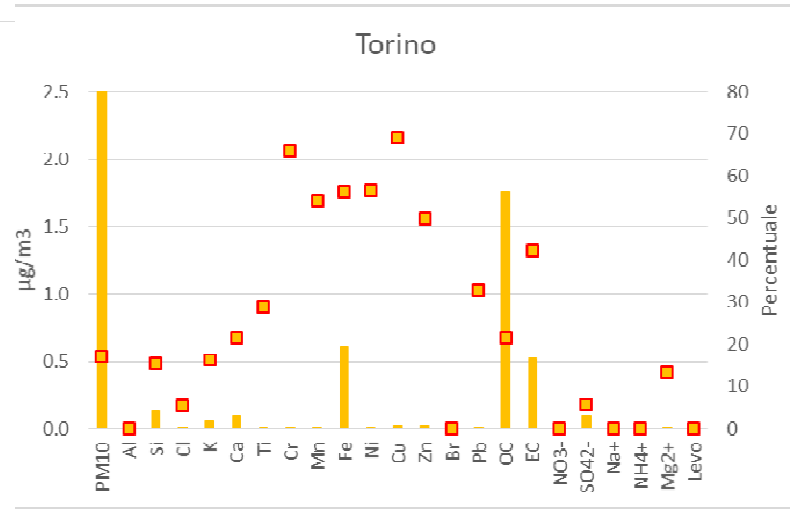
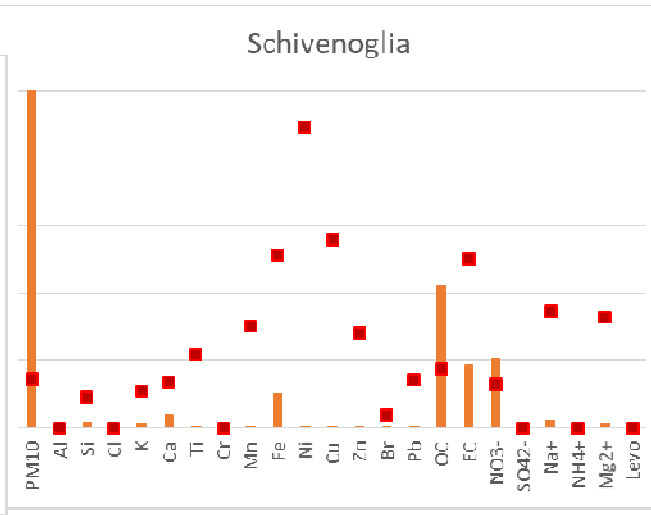
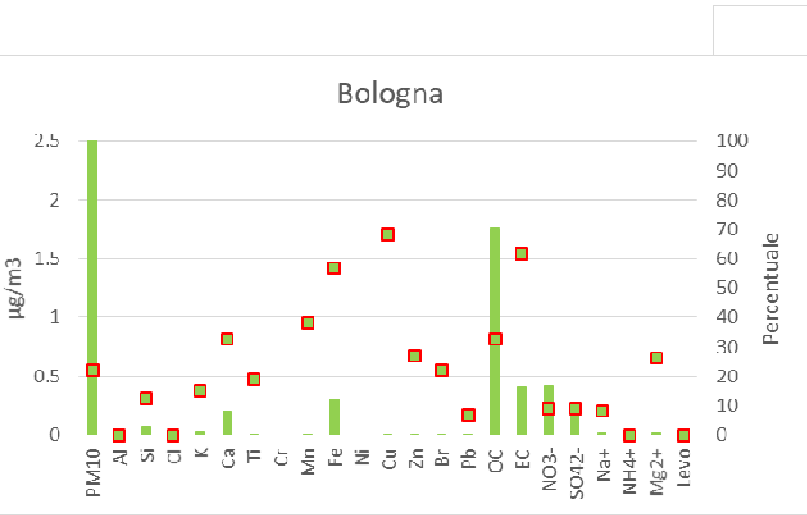
Fattore Suolo



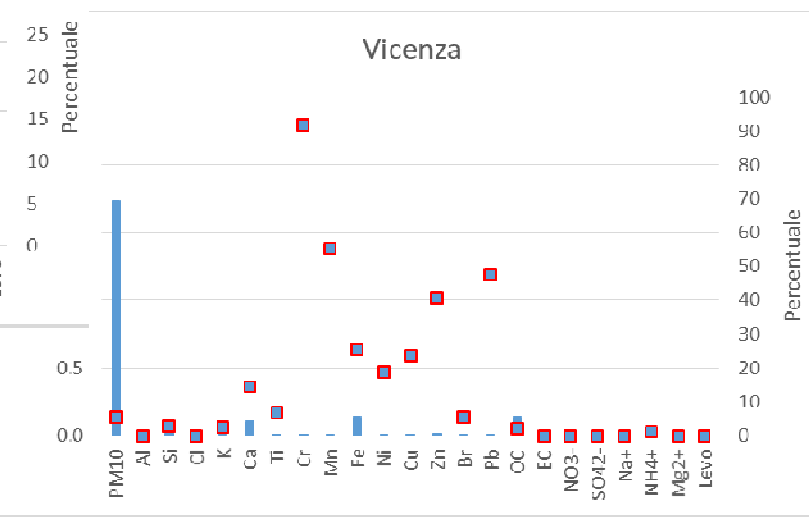
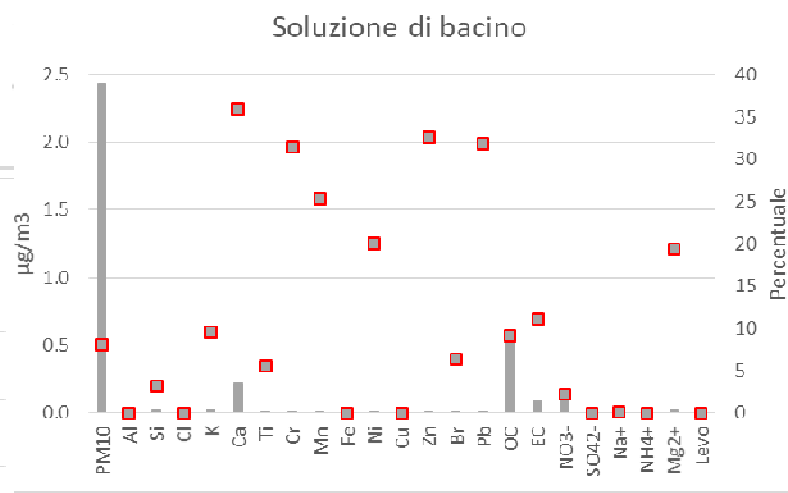
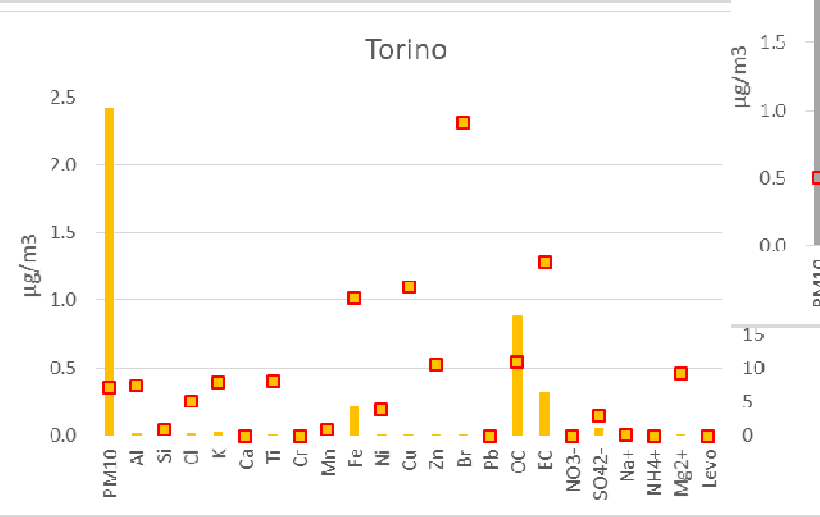
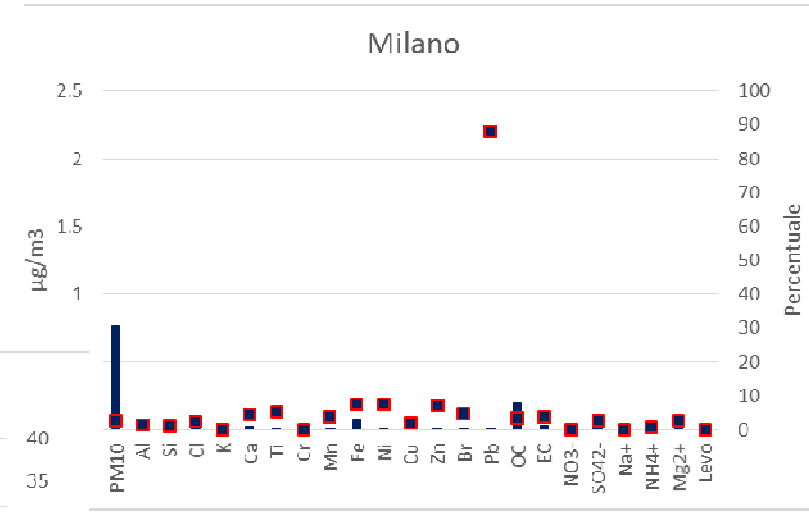
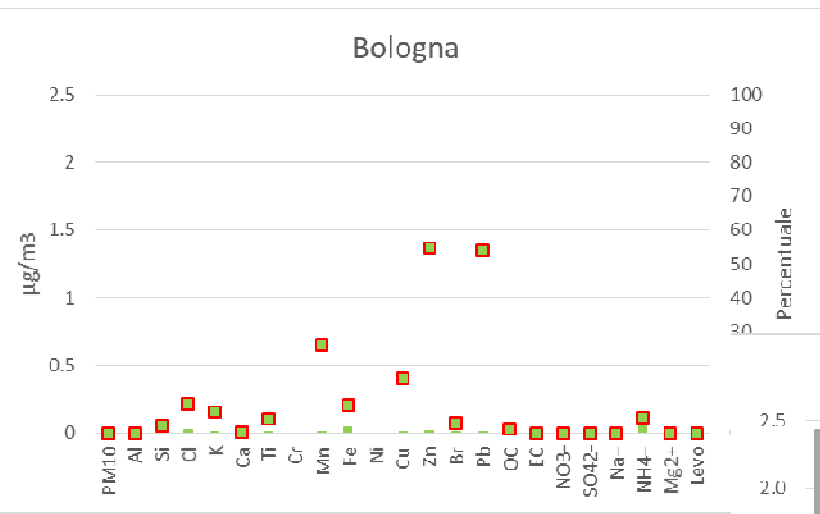
Fattore BB



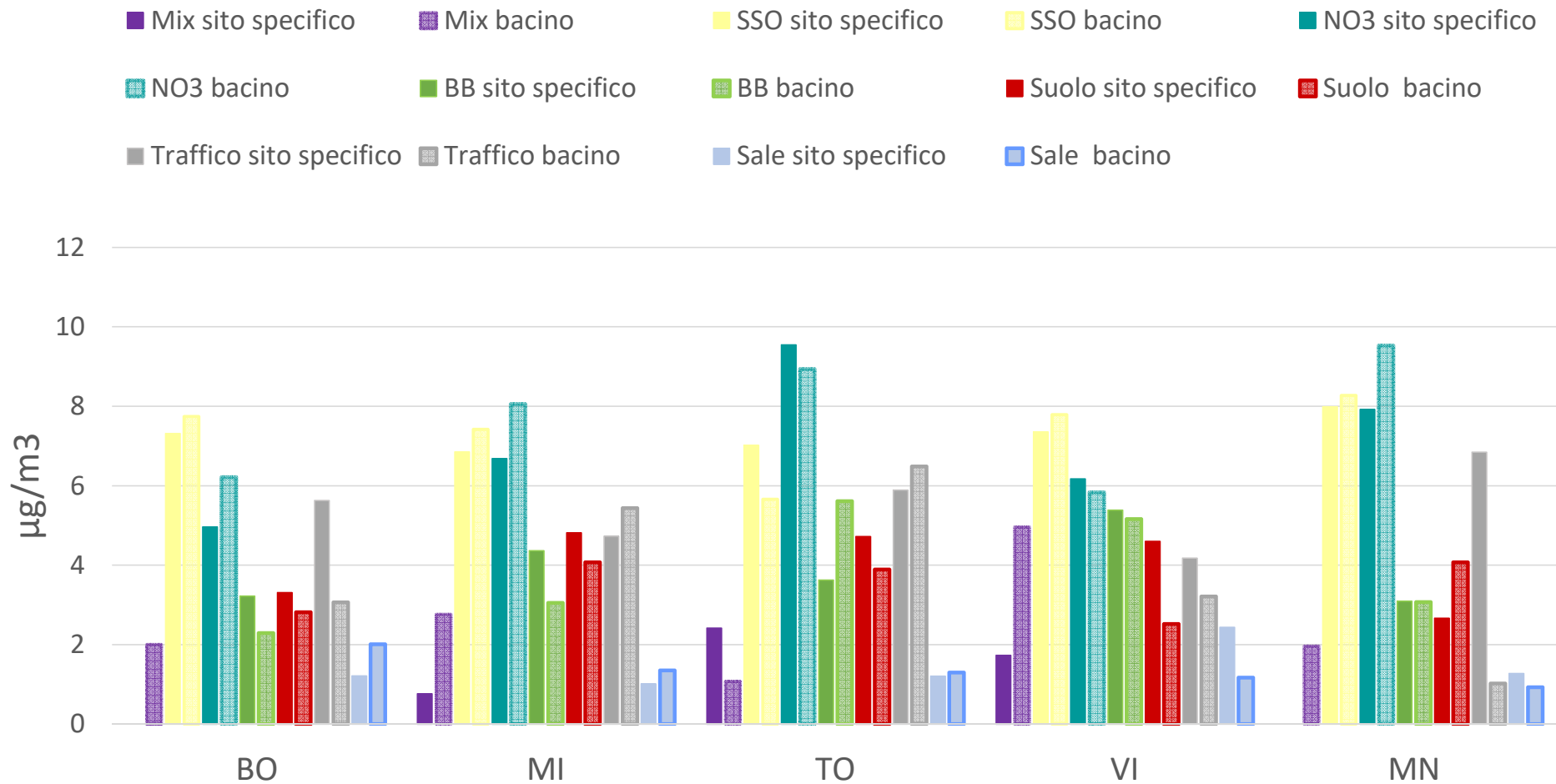
Fattore Traffico



Fattore mix antropogenico (siti urbani)



Confronto degli apporzionamenti



Conclusioni

Scopo di Prepair era valutare l'andamento delle serie storiche, per valutare l'efficacia delle misure intraprese. L'idea era quella di considerare il bacino come un «unicum», pur con le sue differenziazioni, e non di lavorare su 5 siti isolati. In quest'ottica ci è sembrato più opportuno, qualora fosse stato possibile, effettuare una PMF unica.

Conclusioni

- La soluzione di bacino, rispetto alle soluzioni di singolo sito presenta:
 - ✓ minor adattamento alla realtà locale vs maggior robustezza della soluzione (minor overfitting)
 - ✓ maggiore comparabilità degli apporzionamenti perché eliminate le differenze imputabili alla diversa definizione dei profili (ovviamente questo può essere anche uno svantaggio)
- Il cfr tra la soluzione di bacino e le soluzioni locali permette di individuare meglio quali sono i siti o i fattori che presentano una maggiore peculiarità
- Per quel che riguarda il profilo industriale, risulta comunque necessario soffermarsi sui profili locali