



Air Quality Bulletin

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Contents

1	Preamble	2
1.1	The CAMS air quality service	2
1.2	The CAQI air quality index	3
2	Air Quality Bulletin	5
3	CAQI Index for 02.07.2019	5
4	Forecast for O₃	6
5	Forecast for PM₁₀	10
6	Forecast for PM_{2.5}	14
7	Forecast for NO₂	18
8	Forecast for CO	22

1 Preamble

The objective of this document is to provide indications on the evolution of atmospheric pollution in the sites involved in the sports activities of the 30th Summer Universiade and to highlight the possible improvement and/or worsening of ground concentration over the time period of the following three days.

The air quality is represented by showing the time series of ground concentration of atmospheric pollutants, processed by the CAMS modeling system (Copernicus Atmosphere Monitoring Service, <https://www.regional.atmosphere.copernicus.eu>)).

The choice of pollutants, the units of measurement and the indicators adopted to quantify the levels of air quality (average hourly concentration, average daily concentration, etc.) is entirely congruent with the current legislation (Italian Legislative Decree 155/2010) and with the possibility of calculating the CAQI (Common Air Quality Index), developed within the European project CITEAIRII, described at this [link](#).

Among the pollutants regulated for their possible effects on human health, PM₁₀ (atmospheric particulate with an aerodynamic diameter of less than 10 microns), PM_{2.5} (atmospheric particulate with an aerodynamic diameter of less than 2.5 microns), CO (carbon monoxide), NO₂ (nitrogen dioxide) and O₃ (ozone) were chosen, for which the legislation imposes limit values and thresholds and for which the onset of criticality is more frequent. In the document it is possible to consult these analyses, presented daily for today and the following three days.

1.1 The CAMS air quality service

CAMS currently provides analysis and daily forecasts of long-range transport on the global scale of air pollutants and the quality of the background air for the European region.

The CAMS regional service is provided using a multi-model ensemble approach. The number of individual advanced systems used in the operating ensemble is currently 7. Using an ensemble approach, it is possible to derive more robust products of overall better quality than the individual systems. The main products are daily analyses and 4-day forecasts, as well as reanalysis of observations on the surface air quality of past years. The multi-model ensemble is managed daily to provide analyzes and forecasts on an European scale. Every night the systems are managed to provide daily forecasts up to D+4 (96 hours) and analyzes for the previous day based on observations on air quality across Europe.

These data are appropriately processed to estimate the general air quality conditions for the provinces of the Campania region and to predict the time series of the main atmospheric pollutants in the sites where the sporting activities take place.

Having ensemble data available, the time series are reported as ‘box-plot’ graphs in which the central (median) value represents the most reliable estimate, together with the range of

variability estimated by the ensemble.

1.2 The CAQI air quality index

The CAQI index is used on the website www.airqualitynow.eu since 2006. The CAQI index is calculated on a scale from ‘0’ (very low) to ‘> 100’ (very high), and is divided into 5 classes, as indicated in the following table, which shows the minimum and maximum values of the index for each class. The calculation is based on hourly data for each province of the Campania region of the three most significant pollutants: NO₂, PM₁₀ and O₃. The hourly concentration of each pollutant is mapped onto the corresponding index value by means of linear interpolation, and the final value of the index is the highest among those from each pollutant. The numerical values of each pollutant reported in the following table refer to the respective concentrations expressed in $\mu\text{g}/\text{m}^3$.

CAQI index		NO ₂	PM ₁₀	O ₃
very low (best quality)	0	0	0	0
	25	50	25	60
low (good quality)	26	51	26	61
	50	100	50	120
average (discrete quality)	51	101	51	121
	75	200	90	180
high (poor quality)	76	201	91	181
	100	400	180	240
very high (very poor quality)	> 100	> 400	> 180	> 240

From a scientific point of view it is a gross generalization and a huge loss of information, but for communication purposes this information reduction is considered essential. The index refers to the short-term consequences on human health. If the index is very low the quality of the air is very good and does not produce health risks. When the index is low the air quality is considered satisfactory and the pollution does not produce significant health risks. In the case where it is average, the quality of the air is acceptable, but for some pollutants there could have a moderate impact on health for a certain number of people; for example, people who are particularly sensitive to ozone may have symptoms of respiratory problems. If the index is high, the quality of the air is poor; although the general public is not affected by symptoms, specific groups of people (with heart and respiratory diseases such as asthma, chronic bronchitis, emphysema, elderly and children) are at greater risk. If the index is very high, the quality of the air is very poor, and everyone can begin to experience negative health effects, which are more serious in the case of specific groups.

A color is associated with each index class:

-  best quality
-  good quality
-  average quality
-  poor quality
-  very poor quality

In this report the index is the maximum value among those calculated from the hourly averages for the reference day.

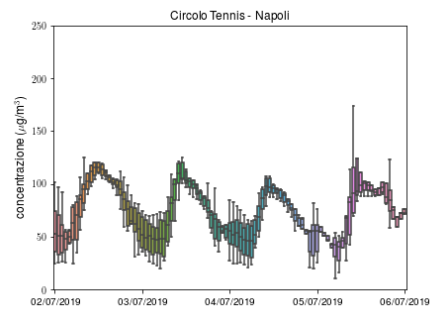
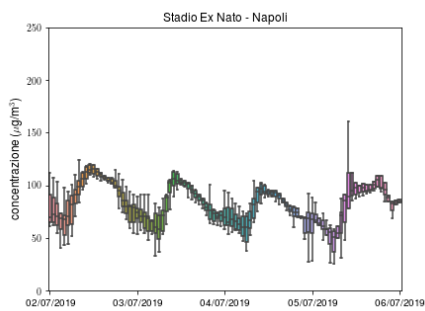
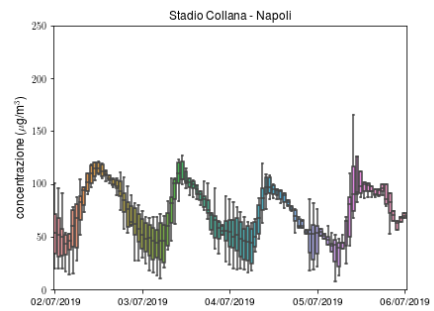
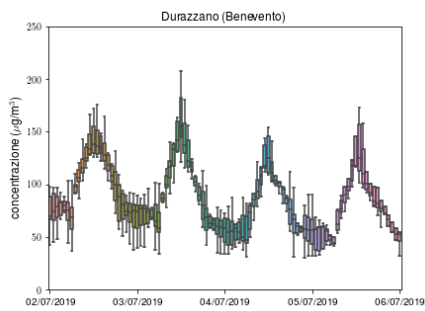
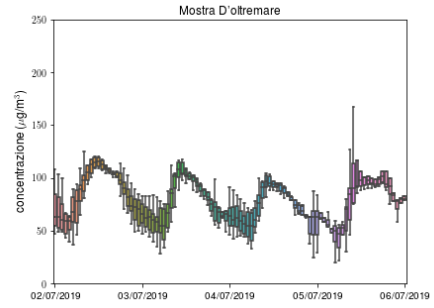
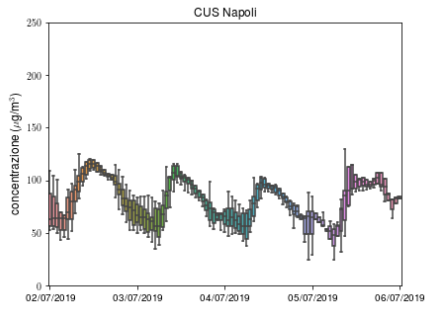
2 Air Quality Bulletin

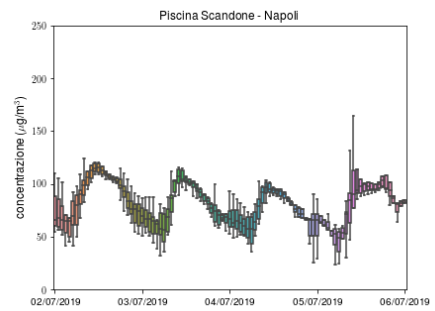
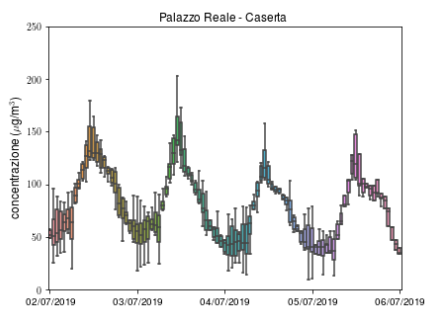
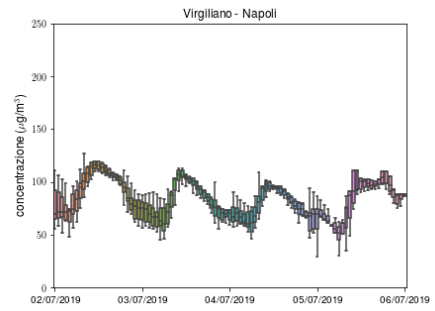
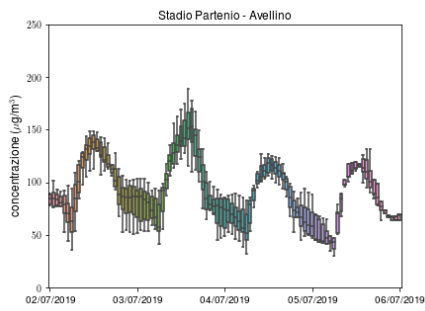
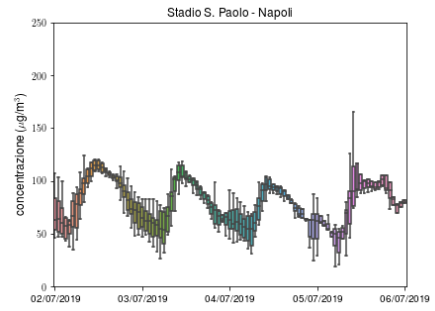
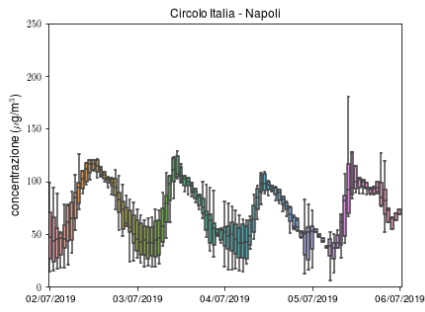
Stable and warm weather with conditions favorable to photochemical pollution. High ozone concentrations, but generally below the information threshold ($180 \mu\text{g}/\text{m}^3$). Concentrations of PM stationary, below the alarm threshold ($50 \mu\text{g}/\text{m}^3$). The CAQI index is generally good, at the limit of discrete conditions.

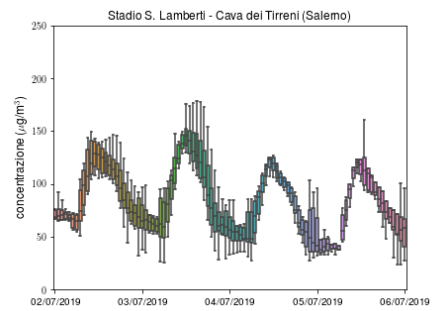
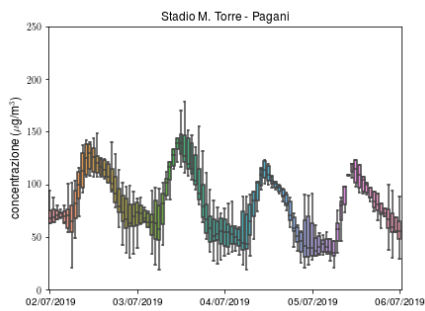
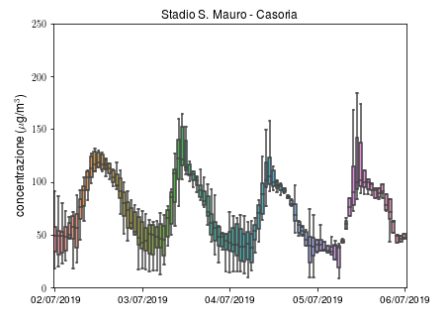
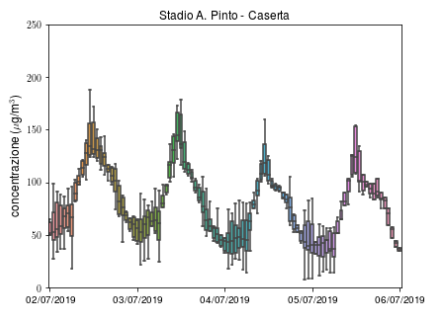
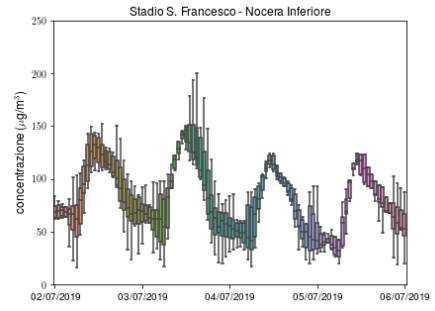
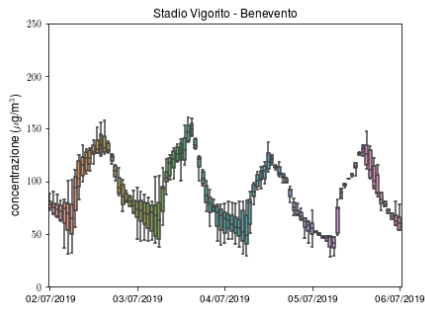
3 CAQI Index for 02.07.2019

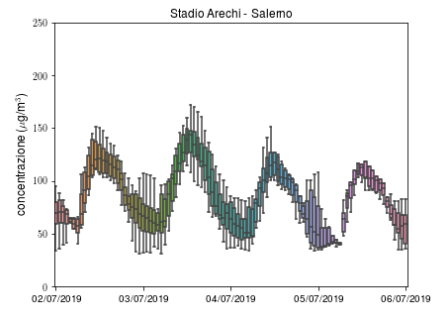
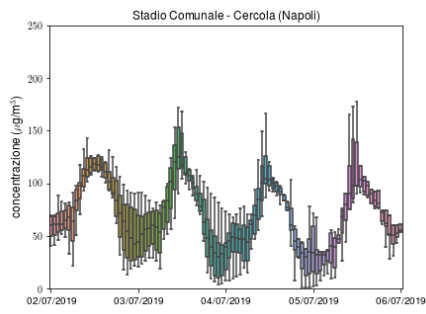
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- Mostra D'oltremare, 48
- Durazzano (Benevento), 58
- Stadio Collana - Napoli, 48
- Stadio Ex Nato - Napoli, 48
- Circolo Tennis - Napoli, 48
- Circolo Italia - Napoli, 49
- Stadio S. Paolo - Napoli, 48
- Stadio Partenio - Avellino, 58
- Virgiliano - Napoli, 49
- Palazzo Reale - Caserta, 55
- Piscina Scandone - Napoli, 48
- Stadio Vigorito - Benevento, 56
- Stadio S. Francesco - Nocera Inferiore, 55
- Stadio A. Pinto - Caserta, 56
- Stadio S. Mauro - Casoria, 50
- Stadio M. Torre - Pagani, 54
- Stadio S. Lamberti - Cava dei Tirreni (Salerno), 54
- Stadio Comunale - Cercola (Napoli), 50
- Stadio Arechi - Salerno, 51

4 Forecast for O₃

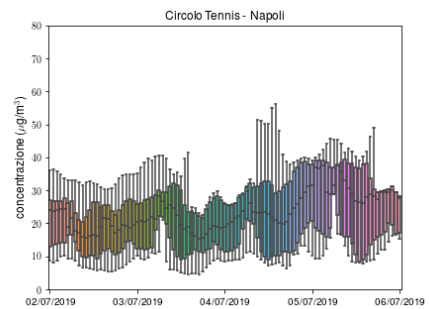
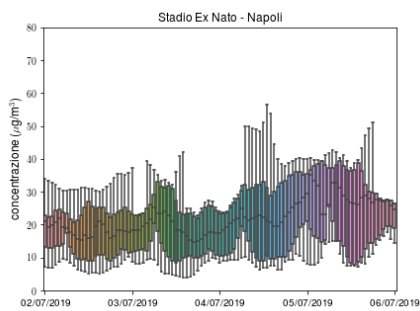
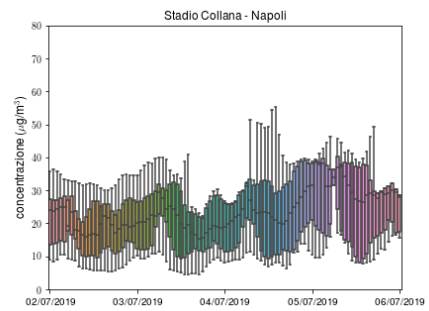
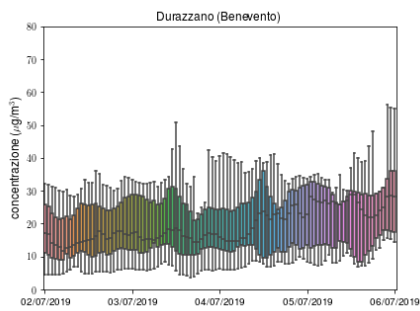
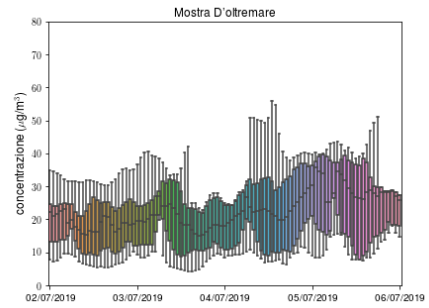
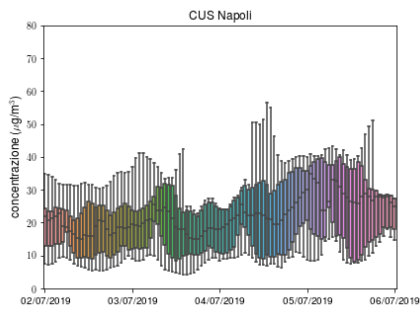


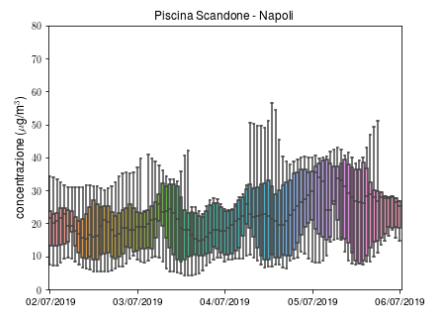
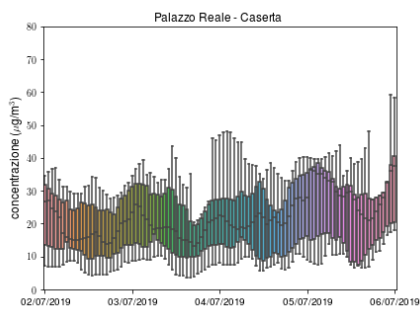
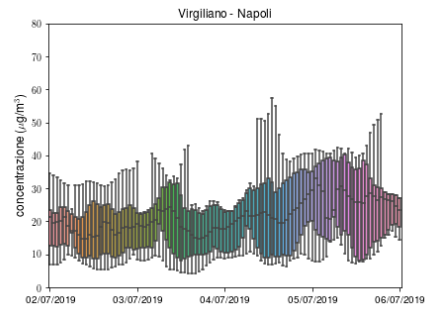
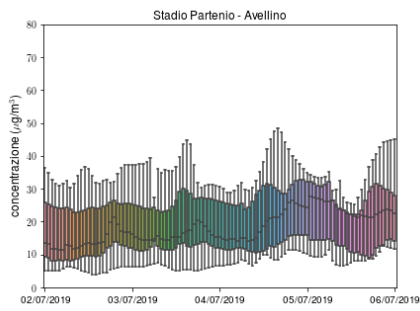
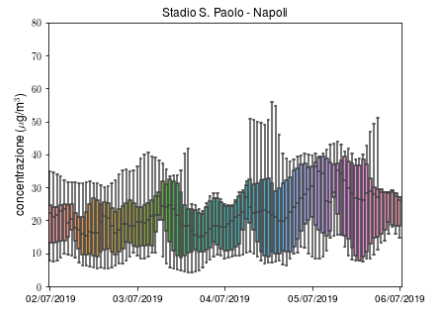
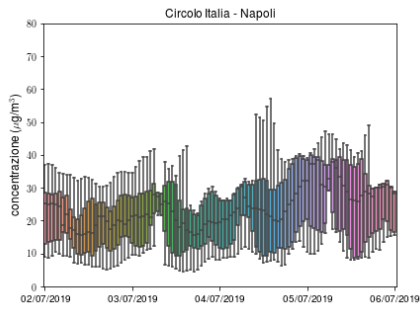


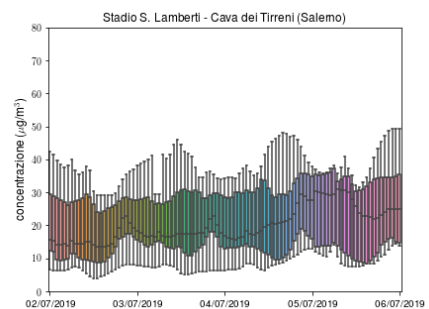
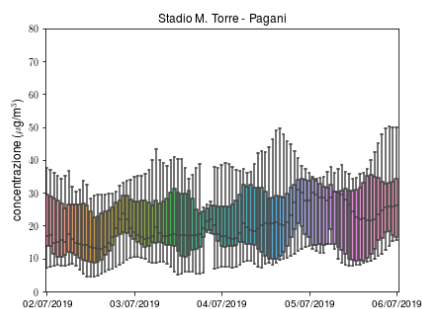
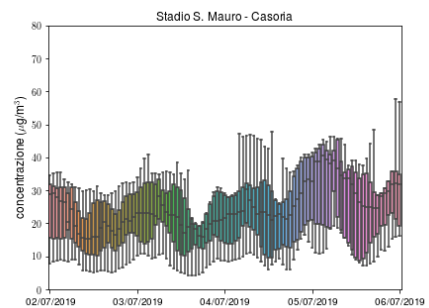
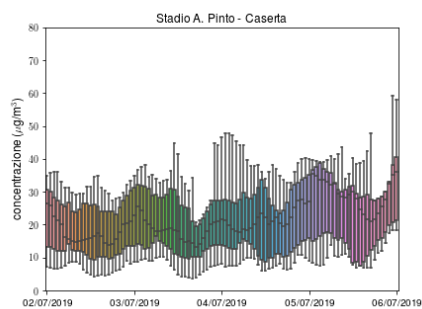
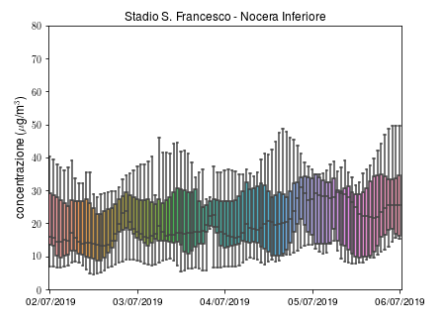
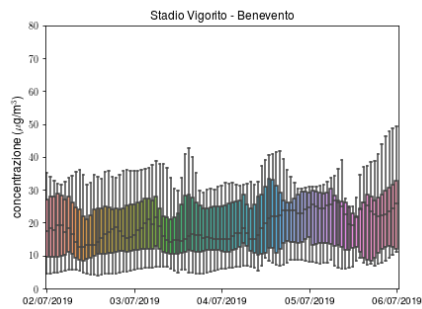


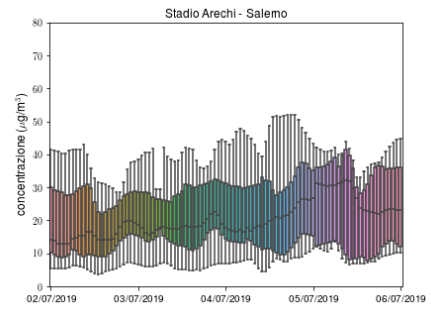
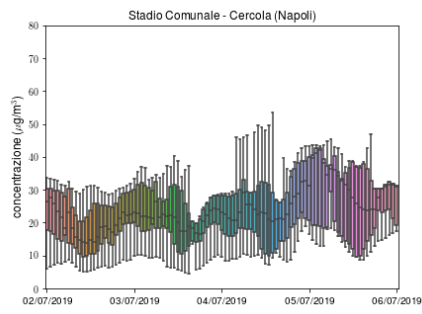


5 Forecast for PM₁₀

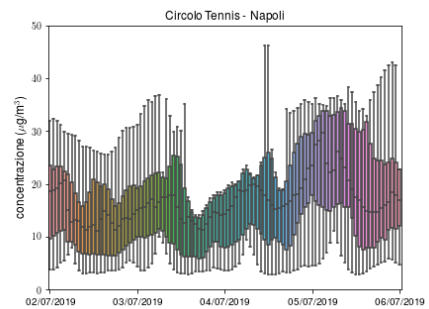
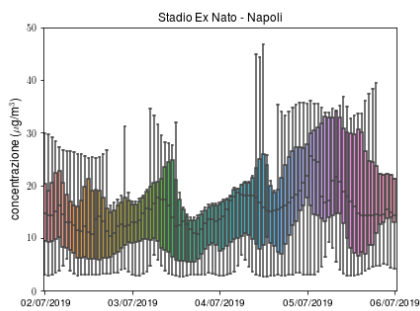
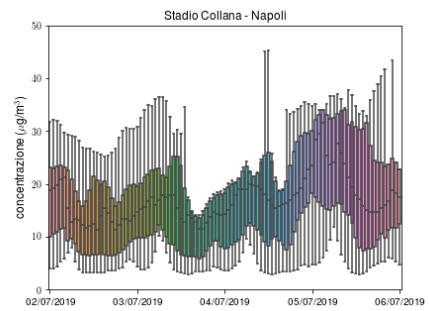
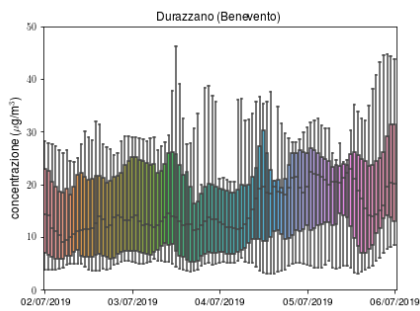
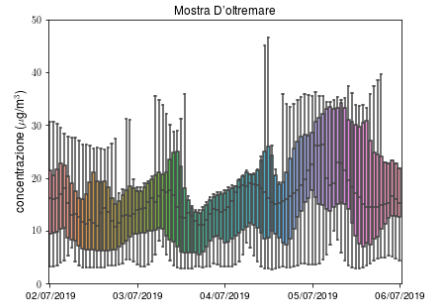
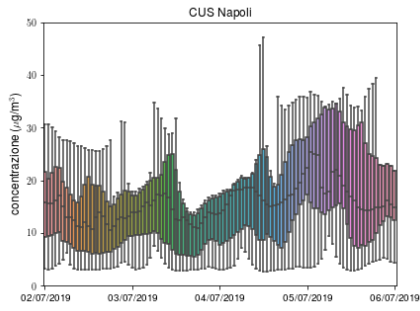


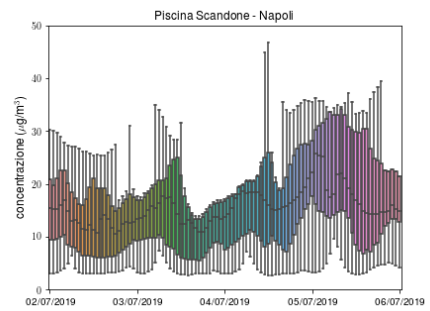
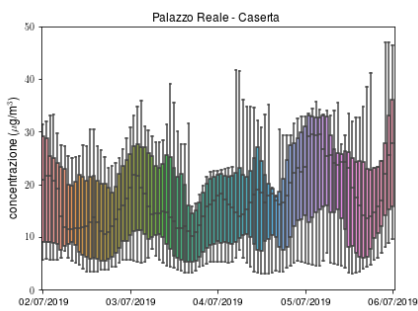
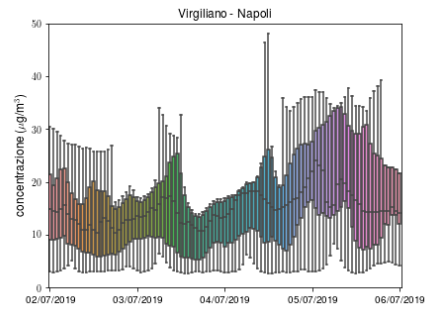
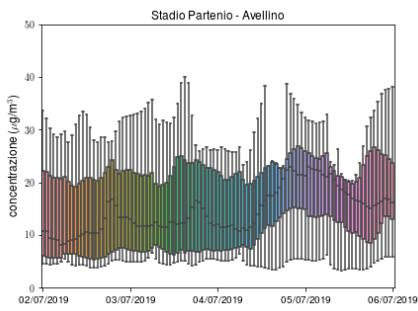
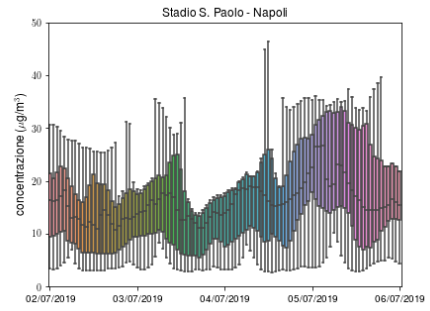
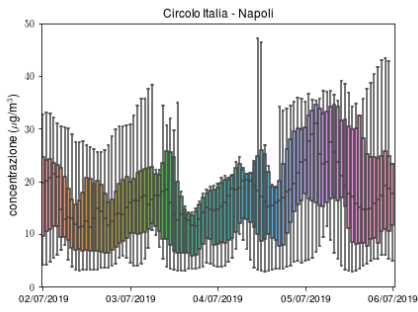


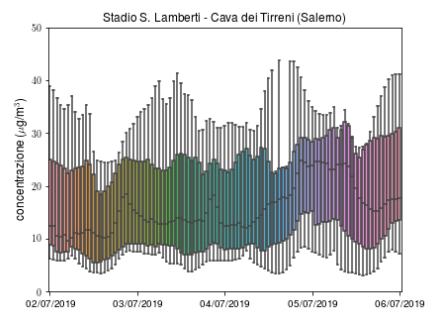
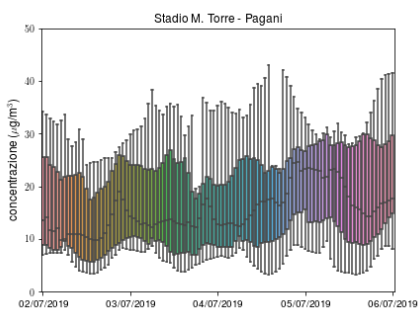
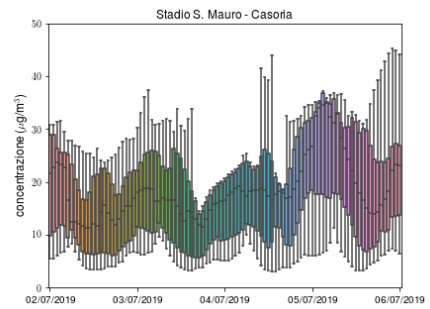
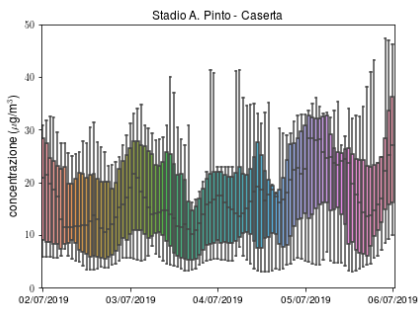
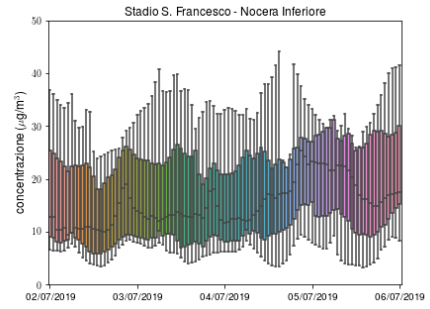
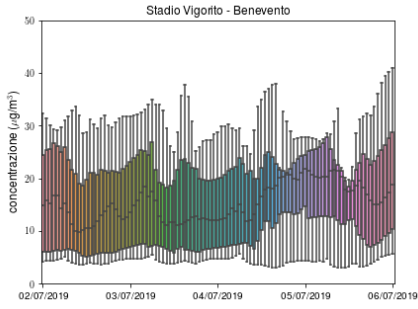


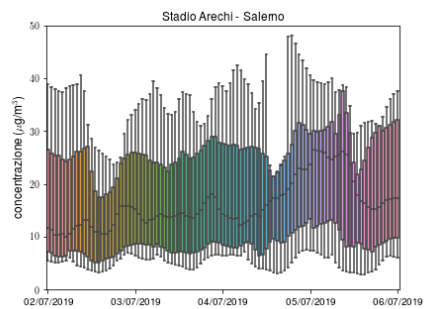
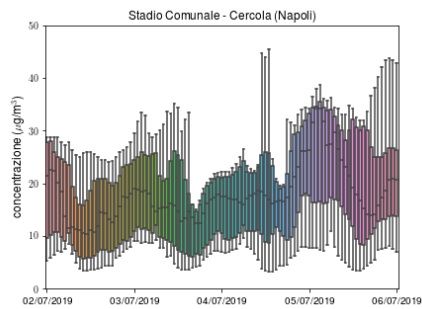


6 Forecast for PM_{2.5}

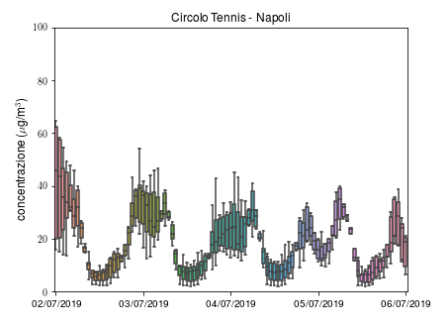
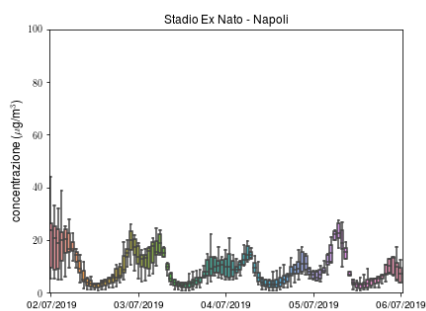
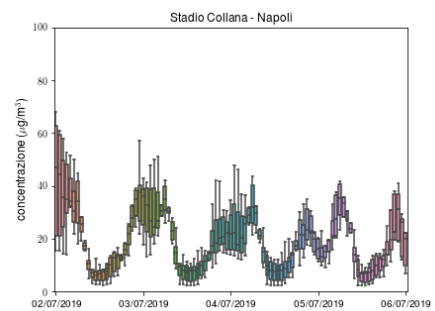
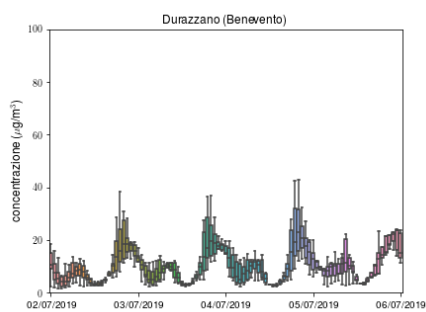
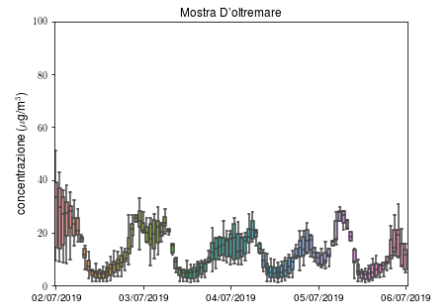
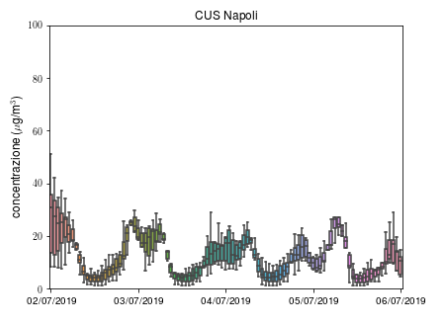


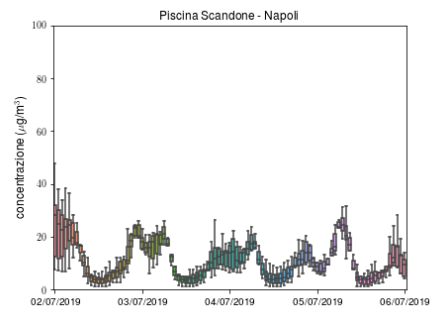
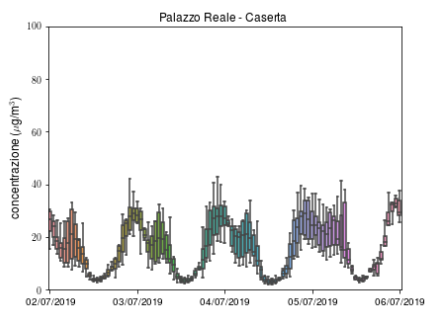
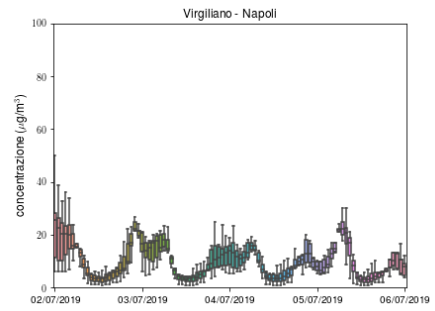
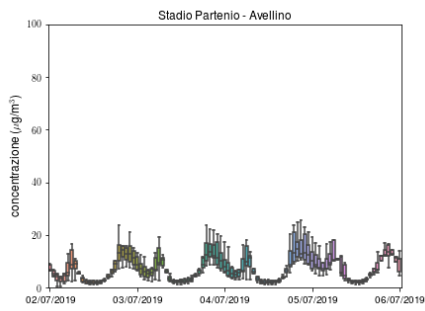
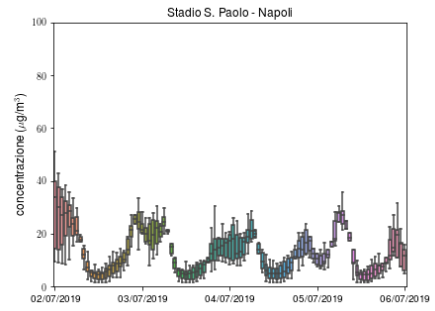
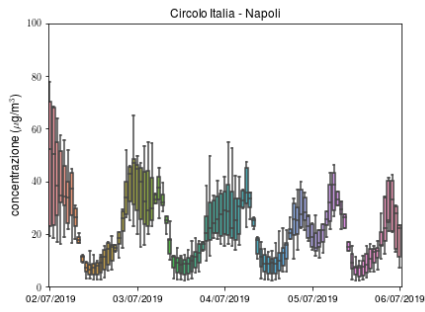


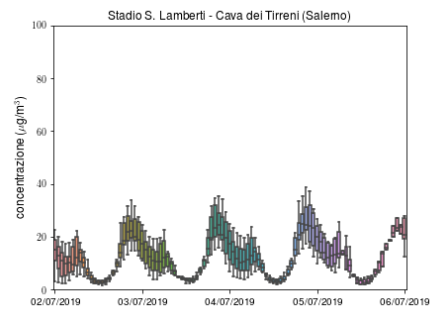
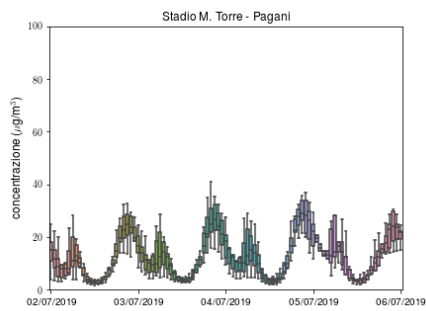
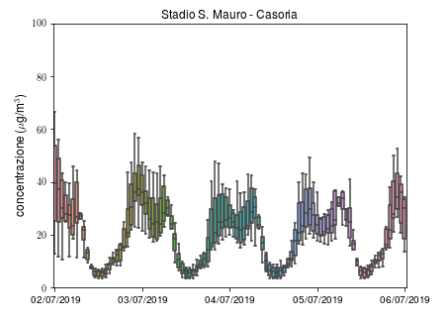
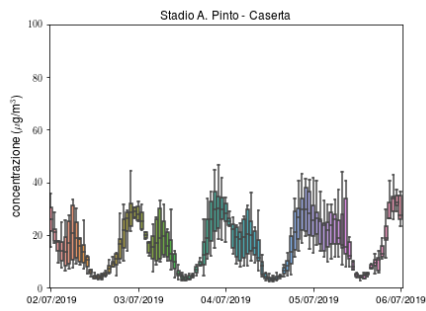
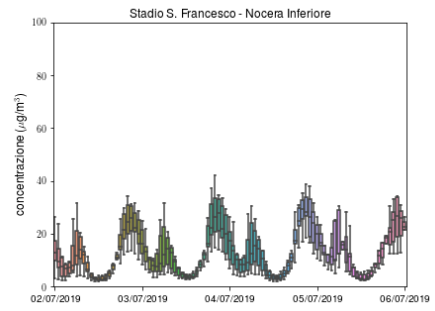
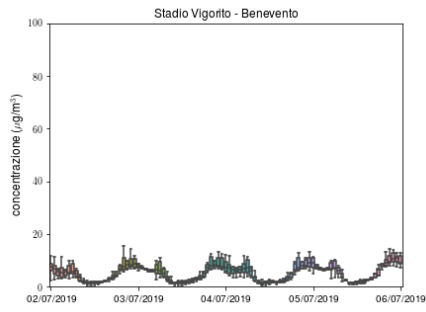


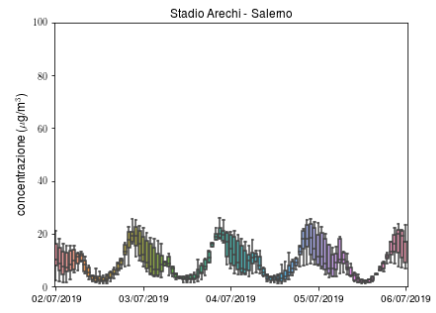
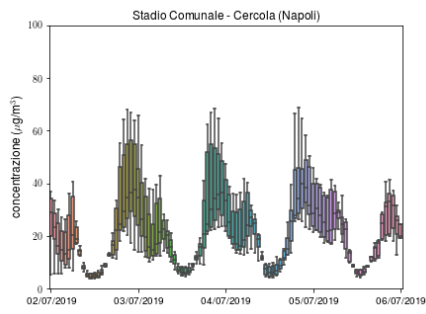


7 Forecast for NO₂









8 Forecast for CO

