A dashboard for near-real-time air pollution episodes analysis and support to decision making

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Aim

In Italy environmental monitoring is carried out by the environmental agencies of each region (ARPA) or autonomous province (APPA), with the coordinating role of ISPRA. This network-shaped organization assures an extensively branched and flexible deployment of resources, but still requires an effort in order to guarantee **effective data collection**, **sharing**, **harmonization and publication** at a national level, in particular when dealing with **up-to-date data**. In order to fill this gap, providing an up-to-date overview on Italian air quality, the web platform **calicantus** (https://sdati.arpae.it/calicantus-intro/) has been developed. The platform helps AQ experts in the interpretation of high pollution episodes and in the validation of observed data.

Products



Figure 3: Time series (left) and map (right) of exceedances of a threshold can help in analyzing duration, frequency and extension of the air pollution episodes.

Data collection

To face the heterogeneity of data formats, metadata availability, protocols used, data supply

PM10: daily average (µg/m³) period: 2017–07–08 to 2017–07–16

timing, etc., the observed data collection phase of *calicantus* (top left side of Figure 1) was developed with an adaptive approach: flexibility is required to the data gatherer, rather than to the data providers.

Furthermore, **air quality forecasts** for today and three days ahead are collected, provided by seven chemistry-transport models of the Copernicus Atmosphere Monitoring Service (CAMS).





Figure 4: The sequence of maps of PM10 concentrations gives an overview of the evolution of an episode: the large fires on the Vesuvius volcano affected air quality in Southern Italy, July 12th 2017



Figure 1: Flowchart of the calicantus platform

Interactive web interface

After the automatic data collection processes, the following phases – extraction, processing and visualization (right side in Figure 1) – are **interactively triggered and customized** by the user through the web interface. Products are shown in Figures 2 to 6. Furthermore, the cluster analysis tool (Maechler *et al*, 2017) can identify areas where air pollution was relatively homogeneous during a selected period.



Figure 2: The web platform *calicantus* provides interactive maps of forecasted (left) and observed (right) air quality

Conclusions

- to face the heterogeneity of observed data formats, transfer protocols, data models, etc. is
 - a challenging task, but not impossible
- ► an up-to-date **synoptic overview** of AQ is necessary to understand some pollution episodes

Figure 5: Timeseries of daily box-and-whiskers plots can help in identifying local hot-spots or measurement problems. NO_2 in Dubrovnik, Croatia, (left) in summer 2017, and (right) in Nocera, Italy, in winter 2016 was particularly high.



a compromise between standardization and flexibility may help reach the goal

Perspectives

- extension to other Italian regions and European and Mediterranean countries
- higher resolution forecasts over Italy

Figure 6: Hourly forecasts are provided on cities selected by the user. The spread of the 7 CAMS models can be considered as an estimation of the uncertainty of the forecast.

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Acknowledgements

The authors thank the colleagues of the environmental agencies providing data and helping in developing and managing the data flows (Anna Abita, Bianca Patrizia Andreini, Monica Angelucci, Lorenzo Angiuli, Maurizio Baldassi, Monica Beggiato, Klemen Bergant, Andrea Bolignano, Daniele Branchini, Hatem Cherif, Antonio Conti, Anna Maria Crisci, Antonio D'Ambrosio, Marco Deserti, Francesco Filippini, Guido Lanzani, Lucia Mangiamele, Mirco Moser, Giuseppe Onorati, Salvatore Patti, Dragana Pejaković, Marco Pompei, Marco Stefanelli, Fulvio Stel, Janja Tursic, Rahela Žabkar, Luca Zagolin). We also thank all the users of *calicantus* who reported bugs or suggested improvements. Finally, a special thank to Stefano Cattani for server management.