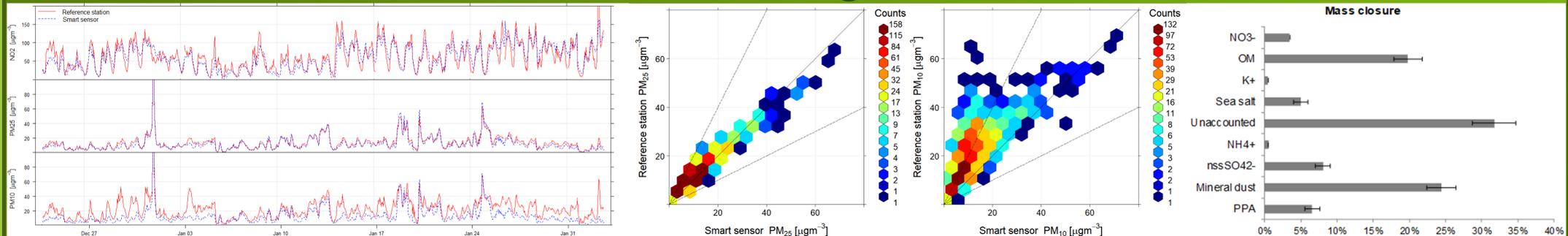


ASSESSING THE IMPACT OF PORT EMISSIONS ON AIR POLLUTION IN GENOVA

A. Bisignano¹, M. Beggiato¹, M. C. Bove¹, F. Cassola¹, R. Cresta¹, P. Oliveri¹, D. Sacchetti¹, P. Brotto², A. Mazzino³ and P. Prati⁴

¹Ligurian Regional Agency for Environmental Protection (ARPAL), Genoa, Italy; ²PM_TEN srl, Genoa, Italy; ³ Department of Civil, Chemical and Environmental Engineering, University of Genoa, Genoa, Italy; ⁴ Department of Physics and INFN, University of Genoa, Genoa, Italy.

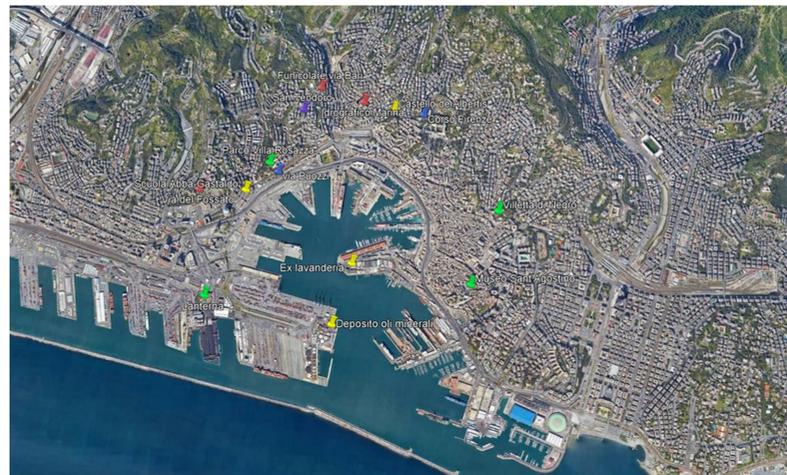
Monitoring



- Low-cost sensor network implemented to extend the operational monitoring managed by the Regional Environmental Agency.
- Two monthly campaigns designed to estimate PM concentration and sources through filter-based sampling.
- Compositional analyses performed to reconstruct most of the PM mass, thus allowing a first rough estimation of the origin.

Ports play a crucial role as hubs for Mediterranean trade. At the same time, they are sources of air pollution. Within the framework of the INTERREG Maritime Italy-France program, the AER NOSTRUM project targets a twofold objective:

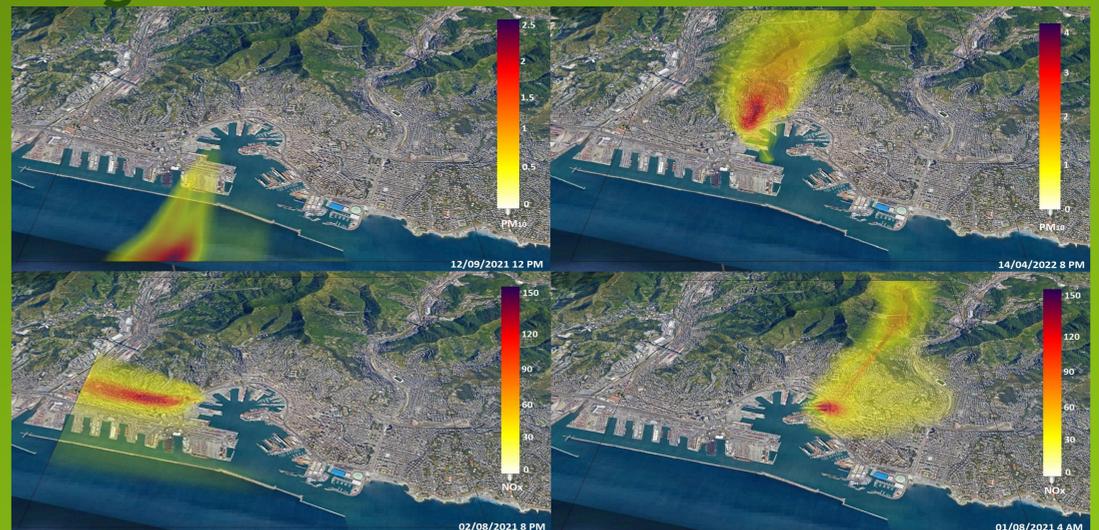
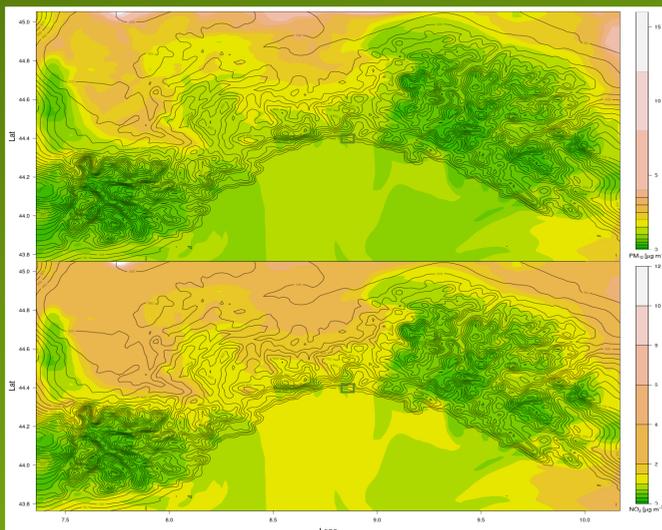
- to achieve a shared platform for monitoring and simulation data
- to assess the benefits of potential emission mitigation strategies



- Vehicle-based monitoring systems
- Official air quality stations
- PM₁-2.5-4-10 (Sensirion SPS30, optical particle counter), PM_{2.5}-10 (Acoem Ecotech Microvol 1100 (low volume gravimetric air sampler))
- NO₂ (Uniftec SENS-IT, metal oxide semiconductor), PM₁₀ (ITS-United FDS 15, infrared optical sensors)
- NO₂ (Uniftec SENS-IT, metal oxide semiconductor), PM₁-2.5-4-10 (Sensirion SPS30, optical particle counter)

The study area includes several key ports of France and Italy; here the focus is on the port of Genoa, one of the busiest European seaports in terms of movements of goods and people. The area is affected by passenger traffic, being the core of the cruise and ferry sectors. Monitoring and modelling approaches are combined to assess how the port of Genoa affects the air quality.

Modelling



- Air quality modelling system used to perform high resolution simulations over the port area.
- High resolution emission inventory compiled based on a detailed study of maritime traffic in the port.
- CALMET/CALPUFF simulations run with a resolution of 90 m over a 6.3 × 7.2 km² domain.
- Background concentrations calculated using CHIMERE chemistry-transport model, online and two-way coupled with the WRF model and ran without port emissions (three nesting domains, inner at resolution of 1.4 km resolution)

Ongoing work

- Use of the experimental campaign database to feed a receptor model through positive matrix factorisation.
- Comparison between simulated and observed concentration values at three reference stations.
- Benefits assessment of possible emission mitigation strategies, such as the cold ironing and the use of liquefied natural gas.