

Airport emissions characterized by multivariate nonlinear time series models

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Aviation activities are included in the Community Scheme of Allowances of Greenhouse Gases by the 2008/101/CE Directive of European Parliament and the Council of December 19th, 2008, amending the 2003/87/EC Directive. The airport major emission sources are aircraft engines fuelled by petroleum products, activities directly related to the passengers and luggage movements, as well as the airport structure operations (heating, fuel storage, etc.).

Ca' Foscari University in collaboration with SAVE S.p.A. and Ente Zona Industriale (EZI) has been studying the "Marco Polo" airport (45°30'40"N, 12°20'38"E – Tessera, Venice - Italy) emissions since June 2009, by monitoring the main atmospheric variables, and the major pollutants concentration revealed in the study area. Specifically, the chemical species monitored every hour are: PM₁₀, SO₂, O₃, NO, NO_x, NO₂, CO, methane and non-methane hydrocarbons, while meteorological variables sampled are wind speed and direction, solar radiation intensity, precipitation rate, and temperature. The sampling site (a parking area near the airstrip – site 1 highlighted in yellow in figure 1) was chosen estimating the main fallout points of aircraft emissions below 1000 m and neglecting the other sources. This estimation was achieved by processing the air traffic data provided by SAVE SpA, using a Lagrangian model SPRAY (Tinarelli et al., 1994) that is part of the SCAIMAR modelling system, managed by EZI. The study of airport pollutants dispersion in the Venice area is extremely important because: i) Marco Polo air traffic is among the highest in Italy and ii) the airport is located near the Venice lagoon, a complex and delicate ecosystem.

Multivariate nonlinear time series models are developed in order to study the dynamic interaction of monitored pollutants as a function of weather conditions and to give useful information for the characterization of airport emission contribution.

Results show that near the study area there are several sources of monitored pollutants (some of these are highlighted in red in figure 1), and that the airport is not the dominant one.

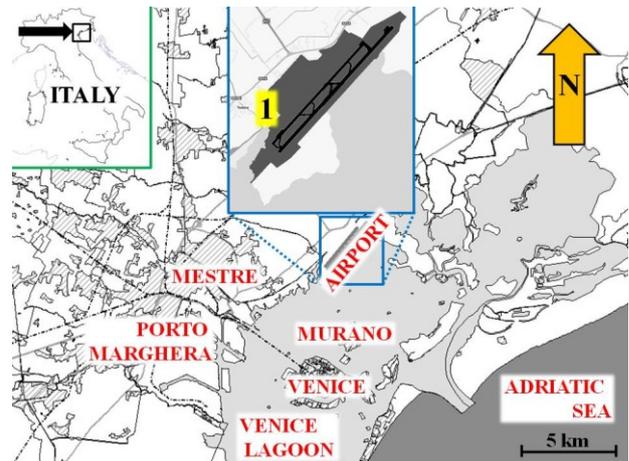


Figure 1. "Marco Polo" Airport location near Venice lagoon and sampling point

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