



Air quality assessment and sensitivity studies by numerical simulations over a regional domain

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Air quality assessment over areas characterized by complex orography and land use, with spot like distributed urbanization and industrial activities, is an hard task because the use of in situ measurements is limited by the short spatial range representativeness of the recorded data. In such a situation the use of numerical model simulations is the essential tool for the assessment of pollutants concentration, both on average and on peak episodes, according the EU and national directives. Furthermore simulations are the main tool for the projection of the effects expected by the implementation of actions aimed to improve air quality.

In this work we present the results of the operational application of an eulerian model, namely FARM (<http://www.aria-net.it/>), for the air quality assessment over the Northeastern most Italian region. The updated inventory of all the relevant anthropogenic and the biogenic sources has been used to generate the emissions of pollutants which are dispersed according to meteorological fields, that have been computed on the base of weather stations and radiosoundings measurements. Boundary conditions of concentrations have been taken from the national database. The dispersive model is working off line with a spatial resolution of 4 km generating hourly concentration and deposition fields.

Air quality measurements are used to evaluate the representativeness of the simulated fields. Results of statistical tests, which are applied to grid points and to areal sets of measurements and corresponding simulation data, are described in detail. A general approach to the air quality simulations reliability evaluation is summarized.

The sensitivity of the model to changes in emission inventory inputs is presented too. Eleven different inventory scenarios are considered according to hypothetical administrative actions aimed to improve the air quality across the next ten years. The sensitivity is presented as a mathematical measure of the distance of the scenarios with respect the reference simulation.

Description of the mathematical tools developed for the sensitivity evaluation is presented together with the results.