APPLICATION OF A PHOTOCHEMICAL MODEL TO THE ASSESSMENT OF REGIONAL AIR QUALITY
LEVELS IN SOUTHERN ITALY: PROCEDURES AND RESULTS

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INTRODUCTION
The application of numerical models for air quality assessment is allowed by the
legislation of European Community (EU) that establish the possibility of using
modelling techniques in combination with air quality observations. This work
showed the air quality modelling assessment results over the Apulia region with 4
km grid spacing for the year 2013 (fig.1(a)); for this purpose, the three-
dimensional Eulerian model FARM (Mircea et al., 2015) was applied (fig.2) and
evaluated.

RESULTS
For NO₂ (fig. 4(a)), relevantly lower than the
prescribed thresholds, higher levels were
estimated in correspondence of larger urban areas
and major traffic roads. As for PM₁₀, PM₂.₅ and BaP
(fig. 4(b-d)), the highest predicted concentrations
were estimated in the Taranto industrial area and in
the central southern part of the peninsula,
where the biomass burning emissions due to
agricultural activities and (especially) to residential
heating by fireplaces are relevant. Results showed
some exceeding of the limit values as regard the
PM₁₀ and BaP species.

EMISSIONS
Emission data were derived from the regional INEMAR inventory
(http://www.inemar.arpa.puglia.it), updated to the 2013, while the
emissions from the neighboring regions were taken from the Italian
national emission inventory. According to the INEMAR inventory, the most
relevant pollutant sources in the region are a steel plant, the largest in
Europe (placed in Taranto area, fig. 1(b)), a coal-fired power plant, the
second most powerful in Italy (in Brindisi area, fig. 1(b)) and biomass
burning for residential heating. To reconstruct accurately the emissions
from the biomass residential heating, it was carried out a specific survey on
the biomass consumption for the residential heating in Apulia (fig. 3).

Table 1: Statistical indicators

The model performance was established using the DELTA
software package (fig. 5), showing a good behaviour of the
model, with a tendency to underestimate the PM₁₀ levels
(Tab. 1).

These promising results suggest the use of this modelling
system for source apportionment studies to better analyze
the influence of different sources on air quality. Future
improvements will consider the application of data
assimilation/fusion techniques.