Geophysical Research Abstracts
Vol. 14, EGU2012-7658-1, 2012
EGU General Assembly 2012

Role of local circulation in the evolution of severe PM10 episode in Krakow area in winter 2010

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Air quality in the cities in southern Poland is often below the standards defined by the CAFÉ Directive. Most of the poor air quality episodes are due to extremely high PM_{10} concentrations. Episodes of poor air quality where PM_{10} concentrations exceeded alert threshold level (200 $\mu g/m^3$ in respect to daily average) took place over 20 days during the winter of 2010/2011 in Krakow. Hourly concentrations exceeded 800 $\mu g/m^3$ and highest observed concentration was 980 $\mu g/m^3$.

High PM_{10} concentrations in Krakow are usually associated with temperature decrease, which indicates more intensive emission from the coal based domestic heating. Also, transport of polluted air masses from the industrial region of Silesia acts as an additional source of PM_{10}.

A high resolution GEM/LAM-AQ simulation was undertaken to evaluate severe PM_{10} episode over Krakow on 15-18 of December 2010. Two-step self-nesting procedure was applied. GEM-AQ simulation on a global scale with the variable grid over Europe provided boundary conditions for a regional run at 5 km resolution. Results from the regional simulation were used to drive a 1 km resolution simulation on a target grid centered over Krakow.

The 1 km resolution simulation showed interesting local recirculation pattern that might explain the observed evolution of PM_{10} episodes. Also, we will present a comparison of the GEM/LAM-AQ model results with the available meteorological and air quality measurements..