



Evaluation of WRF-CHEM Model: A case study of Air Pollution Episode in Istanbul Metropolitan

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Istanbul is the largest city in Europe with a population of about 14 million and nearly 3.2 million registered vehicles. Considering that the city is at the junction of major transportation routes on both land and sea, emissions from all motor vehicles operating in the city and those that are in transit is the major source of pollution. The natural gas is used as the major heat source and the impact of other heating sources on the pollution episodes is not clearly known. During 19-29 December 2013 Istanbul metropolitan area experienced a severe PM10 episode with average episode concentration of $127\mu\text{gm}^{-3}$. The episode was associated with a high pressure system with center pressure of 1030 mb residing over Balkans and north of Black Sea and thereby influencing Istanbul. We carried out simulations using the Weather Research and Forecasting model with Chemistry (WRF-CHEM) v3.5 to examine the meteorological conditions and to produce estimates of PM10 over Istanbul for 17-31 December 2013. The three nested domains was setup using 18, 6 and 2 km horizontal grid spacing with (90x90), (115x115) and (130x130) grid points in 1st, 2nd and 3rd domains, respectively. The each domain was run using one way nesting option after preparing the results from the mother domain as an input to subsequent inner domain. 34 vertical levels were used with the lowest layer depth of 15 m above the surface and extending to 15 km at the model top. The model was configured using the model options after many tests to find optimal model parameters and was initialized using global emissions data available publicly. The local emissions database is still in works and is not available to use in the model instead of global data. The estimated PM10 concentrations were compared against the observed conditions. This work shows the first attempt of using WRF-CHEM in Turkey to estimate the pollutant concentrations instead of using other air pollution models such as WRF/CMAQ combination. At the time of constructing this abstract, the model runs were still being conducted and the results will be discussed at the conference.

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