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Quantification of air pollution levels and their sources for the Eastern Mediterranean: a megacity perspective

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Eastern Mediterranean has a population over 200 million with two major Megacities (i.e. Cairo and Istanbul). These megacities play dual role in air pollution in the region: being a victim and culprit at the same time. In order to understand these roles, a modeling approach is taken as part of the CityZEN project. A regional modeling system, consisting of the Weather Research and Forecasting (WRF) meteorological model and the Community Multi-scale Air Quality (CMAQ) chemistry and transport model is set up. TM4-ECPL global chemistry model is utilized to produce the necessary boundary and initial conditions. The modeling system is set up to run in two domains: a mother domain covering Europe and northern Africa and a more focused on Eastern Mediterranean domain. The regional anthropogenic emission inventory has been compiled from a number of different sources: two high resolution emission inventories developed for Istanbul and Athens at 2 km resolution; 10 km resolution emission inventory of INERIS covering Europe; and the emission inventory of CIRCE at 10 km resolution to cover the remainder of the domain including Middle East and North Africa. These inventories have been processed to prepare 30km gridded emissions using MOSESS emission model. MOSESS model was also used to process emissions data to provide CMAQ ready data (i.e., speciated and vertically and temporally distributed). Regional biogenic and dust emissions are calculated at each time step using the online MEGAN and GOCART modules of WRF-CHEM model. The presentation will summarize the methodology used for this effort as well as the results of the simulations. It focuses on the seasonal variation of air pollution levels in 2008 over the Eastern Mediterranean area, mainly on ozone and particulate matter as well as major source contributions and impacts.