Geophysical Research Abstracts
Vol. 20, EGU2018-13060, 2018
EGU General Assembly 2018

Atmospheric pollution over EM region: Model results and insight from observations

Jonilda Kushta (1), George Georgiou (1), Yiannis Proestos (1), Theodore Christoudias (2), Jos Lelieveld (1,3)

(1) EEWRC, The Cyprus Institute, K.Kavafi str, 20, 2121, Nicosia, Cyprus, (2) CaSToRC, The Cyprus Institute, K.Kavafi str, 20, 2121, Nicosia, Cyprus, (3) Max Planck Institute for Chemistry, Mainz, 55128, Germany

We use WRF-Chem (Weather Research and Forecasting with Chemistry) model to study the pollution transport and transformation paths over Eastern Mediterranean. The model simulated hourly concentrations of air pollutants for a year-long period (2015) during which measurements are available for 13 stations over Cyprus (4 of which background stations, 1 industrial and 8 urban/traffic stations) and additional stations from AIRBASE and EMEP for the wider area. We focus on the island of Cyprus due to, apart from the availability of observational data, its location in the centre of the region of interest and in the pathway of transport of pollution from various sources and directions. The model was initialized with meteorological initial and boundary conditions (ICBC) using the NCAR-NCEP Global Forecast System output (GFS) at a 1o x1o spatial resolution. The ICBC for the chemical species are derived from the MOZART global model results (2.5o x 2.5o) and the emission inventory used in the study is the EDGAR-HTAP v2 dataset with a horizontal grid resolution of 0.1o $\times$ 0.1o. We also present results from a up-to-date high resolution emission inventory that incorporates hourly and day-of-week variation based on reported national emissions for 2015 for Cyprus. We investigate the natural and anthropogenic component of the particulate matter (PM) load over EM in annual and seasonal temporal scale. The inorganic components of total PMs (sulphates, nitrates, ammonium and elemental carbon) are well captured by the model at Ag. Marina EMEP station, with a slight overestimation of the ammonium nitrates. Elemental carbon is underestimated in Crete and Cyprus probably due to the emission rates. Mineral dust constitutes a significant player in total PMs especially during dust storm episodes with sources both from North Africa and Middle East. We also perform a sensitivity analysis of the impact of EC on radiation and precipitation for a summer and winter month (August and February) by changing the particles hygroscopicity to elaborate on the possible climatic effect of soot in the region. From this timely-limited scenario it is shown that hydrophylic EC aerosols enhance/suppress winter/summertime precipitation. Through the direct radiative effect (hygrophobic BC) a slight suppression in both winter and summer precipitation is noticed. The results indicate that the adequate representation of air pollution patterns in the region from models is necessary for air quality, human health, renewable energy and climate change studies.