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A Statistical Comparison of Observed and Modelled Daily PM10 Levels in Marmara Region

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Marmara Region, with over 2500 person/km2, has the highest population density in Turkey and its making about 40 percent of Turkey's GDP. This region has many environmental problems air pollution being one of the most critical ones. Particulate matter levels are almost always higher than European Union limit of 50 ug/m3. Winter period of 2009 was particularly problematic with averages of 64.89 ug/m3. In this study, we aim to quantify spatial distribution of PM levels in the Marmara region. For this purpose, observations of 12 stations which are located in the northwest of Turkey (Marmara Region) were obtained from Ministry of Environment and Urban Planning. Statistical methods such as Hierarchical Tree Based Regression as well as statistical test such as Kolmogorov-Smirnov were utilized to understand the underlying distributions. Later we have used WRF/CMAQ modeling system at 10 km resolution to simulate the selected episode. For this run we have used TNO emissions inventory. The results of the air quality model system were compared against the measurements. Spatial analysis of the comparison results have also been conducted. It should be noted that during part of the episode Saharan dust intrusion was experienced. This was quantified using Barcelona Supercomputing Center DREAM8b model outputs. This paper summarrizes the statistical analysis of the observations and its comparison to the model results, hence quantify the spatial distribution of PM10 pollution over Marmara region.

Keywords: PM10, Istanbul, Marmara region, statistical method.