



MARMARA UNIVERSITY
FACULTY OF ENGINEERING
ENVIRONMENTAL ENGINEERING DEPARTMENT
ENVE 497/498 ENGINEERING PROJECT
PROPOSAL FORM
FALL 2018

Instructor : Prof. Dr. Mete Tayanç

Project Title : STUDY OF PARTICULATE MATTER AND BULK DEPOSITION IN KIRKLARELI: THE ASSESSMENT OF PARTICULATE MATTER POLLUTION WITH STATISTICAL AND PHYSICAL MODELS

Proposal No. : *MeteTayanç-1*

Number of Students : 1

Requirements (from students) : Student should be able to spend a minimum of **10 hours** each week. Student should have lab experience for PM2.5, PM10 and bulk deposition analysis and mobility to go Yıldız Technical University for bringing PM2.5 samples.

This is an ongoing 1001 TUBİTAK project in the leadership of Doç. Dr. Bülent O. Akkoyunlu

Scope of the Project :

In this study it is aimed to investigate particulate matter in highly polluted Kırklareli region via two selected stations. This investigation is planned to be carried out by PM2.5, PM10 and bulk (wet+dry) sampling, PM2.5 content analysis in terms of various heavy metals and modeling. In this respect, PM2.5, PM10 and bulk deposition samples will be collected in Kırklareli urban and rural stations, simultaneously. Laboratory analysis will be carried to determine chemical composition of bulk samples and heavy metal content of PM2.5 samples, source determination studies will be conducted and model runs including two measurement stations will be done to establish the transportation/dispersion of pollutants. Rural station of Kırklareli is expected to serve background concentrations and it can be used to evaluate long-range transport effects besides the effects of local sources to urban stations. It is aimed to analyze PM 2.5 samples for Ag, Al, As, B, Ba, Bi, Ca, Cd, Ce, Co, Cr, Cu, Dy, Er, Fe, Ga, Gd, Hg, K, La, Li, Mg, Mn, Mo, Na, Nd, Ni, P, Pb, Pr, Rb, Sb, Se, Sm, Sn, Sr, Th, Tl, U, V, Y, Yb and Zn trace elements SO_4^{2-} , NO_3^- and NH_4^+ ions and bulk samples for Ca^{2+} , K^+ , Na^+ , Mg^{2+} , NO_3^- , SO_4^{2-} , NH_4^+ ve Cl^- .

In order to study the sources of particulate matter and show the distribution of pollution in a detailed context, modeling and source determination works will be done. Air quality models that are candidate to be used in the project should be able to simulate meteorology, chemical reactions, emission and deposition processes in an integrated way. Thus, US EPA Models-3 modeling system is decided to be used, and as sub modules, WRF (Weather Research and Forecasting) will be run to simulate meteorology and CMAQ (Community Multiscale Air Quality Modeling System) will be run to simulate chemistry. Models-3 is a three-dimension Eulerian air quality modeling system and it can estimate chemical transformations, transportation and deposition of the pollutants via fast and efficient algorithms. Positive Matrix Factorization, Hysplit backtrajectory modeling and Enrichment Factor estimations will be used to determine the local potential pollution sources, the effects of medium and long-range transport, and the results will be evaluated in a comparative way.

Hardware/Software/Lab/Equipment Requirements :

Be able to use the devices in the instrumental analysis lab and basic software knowledge.

Development Plan :

To perform measurement, analysis and modeling on PM2.5, PM10 and bulk deposition at Kırklareli, Marmara Region.

