DKT-11-25-1, 2018
11. Deutsche Klimatagung


# Regional patterns of air quality derived from satellite Aerosol Optical Depth data

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With continuing urbanization, attaining and maintaining adequate air quality in cities is a major challenge for urban governance. Numerous measures have been taken to address this issue and to reduce the negative effects of air pollution on the human cardiovascular and respiratory system. Air pollution is a spatial phenomenon: airborne transport of substances yields a multi-source mixture of pollutants in any given location, inside and outside cities. Satellite data provides information on the distribution of pollutants relative to geophysical parameters pertaining to surface and atmospheric states.
We develop a method that can be used to represent spatial patterns of street-level air pollution based on satellite retrieved aerosol optical depth (AOD). AOD and ground-based particulate matter (PM) measurements are correlated with respect to further geophysical parameters such as atmospheric stability, humidity, wind, temperature and land surface cover. Consideration of these surrounding conditions is necessary, as links between vertically integrated AOD and PM at street level suffer from variability in the geophysical conditions that modulate their relationship. Hence, a special focus lies on the detection of sets of conditions that allow a reliable analysis of street level air pollution based on satellite derived AOD. AOD data is obtained from the recently developed Multi-Angle Implementation of Atmospheric Correction (MAIAC) algorithm, based on data from the Moderate Resolution Imaging Spectroradiometer (MODIS) instrument. We aim for a better understanding of pollution event patterns regarding their development in time and space, relative to urban topography and surface cover. First results we found for the cities Stuttgart, Hamburg and Berlin indicate that the prediction of PM is most reliable when high-pressure weather systems prevail, the air is dry and wind speeds are low. This pattern is similar for all three investigated cities.