## PM-AI: particulate matter prediction based on artificial intelligence methods

Supervisor: Dr. M. Vountas, Cloud, Aerosol and Surface Property Group, IUP, University of Bremen.

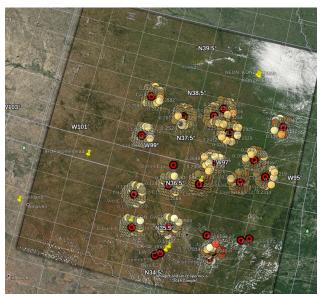
Department: Physics and Chemistry of the Atmosphere, Prof. Dr. J. P. Burrows.

Exposure to particulate matter with an aerodynamic diameter less than 2.5  $\mu$ m (PM2.5) is an important environmental risk factor. It is associated with respiratory and cardiovascular morbidity and mortality. Urbanization increases the risk of being exposed to high concentrations of PM2.5, because growing economic productivity is happening in urban focal points. Currently half of the world population lives in urban areas. Consequently PM measurements are performed using ground level aerosol monitors which are expensive to maintain or simply too expensive to install in sparsely populated areas. A further complexity in investigating PM concentrations is that PM2.5 concentrations change on spatiotemporal scales much smaller than current typical monitoring network density.

The availability of satellite-derived Aerosol Optical Depth (AOD) measurements has helped to overcome problems associated with sparse monitoring networks by providing observations where previously there were none. Several methods have been used to investigate relationship between satellite-derived AOD and ground-level PM2.5

measurements. The results are partially promising but most of them deliver moderate agreement between satellite-based PM2.5 retrievals and ground-based PM2.5. measurements of Α comparatively new approach to satellite-based derive PM2.5 concentrations is utilizing Artificial Intelligence (AI) based methods. In this M.Sc. study we aim to improve the estimate of PM2.5 concentration by using satellite-sensed AOD in conjunction with comprehensive meteorological and geographical data based on AI methods.

Skills/Interest: Interest in aerosol science and AI methods. Good mathematical background and **very good programming skills** are important prerequisites.



Aerosol Optical Depth retrieved from Satellitebased measurements.

For further information or questions please contact:

Dr. M. Vountas (<u>vountas@iup.physik.uni-bremen.de</u>). Related links/Web: <u>http://www.iup.uni-bremen.de/aerosol</u>

Preliminary workplan:

- 1) Literature survey. What is already there? Which quality?
- 2) Which AI methods? Setting up testbed
- 3) Preparing input data (meteo-geo data)
- 4) Reproducing data from literature. Extending to new stations and areas.