Research project and supervisor team

Supervisory Team	Dr Nicholas HAMM Dr Elsaid ZAHRAN
Short introduction & description of research project	Air quality is a hot topic of widespread concern in China. Maps of air pollutant concentration are important for monitoring the situation, for identifying the relationship with emissions and for supporting studies in epidemiology and public health. The opportunities for air pollution mapping have expanded greatly during the past decade due to increased access to large volumes of environmental data (big data, satellite data, in situ observations) as well as developments in statistical machine learning. The core of this project is the development and application of ideas and methods from geographic information science and geostatistics. Modern predictive models allow increased flexibility but have other problems, including the lack of an explicit spatial model, specification of an unbiased sampling scheme for training and testing, and quantification of the prediction error variance. Combined with concerns about data quality, these issues are significant because they present problems for model evaluation in terms of uncertainty assessment, variable selection and model choice. These issues are of wider significance in environmental and geospatial data science and geographic information science because similar challenges are faced in other applications (e.g., soil science, environmental pollution, land use and land cover change, species distribution modelling). This project aims to produce high-quality air pollution maps with a fine resolution and to develop a quantitative assessment tool to evaluate the uncertainty in the temporal and spatial distribution of air pollution. The specific goals are: (1) Develop a spatio-temporal modelling method that can be used for air pollution mapping. (2) Develop a spatial sampling protocol and associated uncertainty assessment tool for air pollution supported by R scripts and workflows. (3) Development of a protocol for spatial uncertainty assessment in current and historic air quality maps.
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