Research profile

My primary research focuses on convective scale numerical modeling of air quality and meteorology in regional domains and urban areas in particular. Within that I am interested in the study of chemical and dynamical properties of urban boundary layers. Of specific interest are the development, application and evaluation of regional scale chemical transport models such as WRF-Chem, or COSMO-MESSy and the parameterization of sub-grid scale processes within the urban canopy. I use these model systems to simulate the concentration of primary and secondary pollutants in urban environments and feedback processes between urban heat island and regional air quality also taking into account the regional to city scale impact of urban heat island mitigation measures on urban climate and air quality.

A crucial part of my current work aims to focus on the cooling potential of green urban spaces and the impact of urban greening on regional and local air quality, specifically taking into account the relationship between biogenic volatile organic compounds and tropospheric ozone concentration.

Within past research at the UK Met Office, I contributed to the development and lead the evaluation and verification activities of the first high resolution regional coupled Ocean-Atmosphere-Wave numerical modeling system for the UK which combines Unified Model, NEMO and Wave Watch III model components. Key element was the investigation of the impact of sea surface temperature and ocean state on Marine Boundary Layer evolution.

Science communication is one of my key interests, because I think finding a common and understandable language is crucial within a multi-disciplinary environment. As active supporter of Scientists for Future, in the regional group Mainz-Wiesbaden, public outreach is one key feature of my scientific work.