Integration of a mesoscale meteorological model in a GIS-based local climate and air quality assessment study in SW-Germany

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A local climate and air quality assessment study was carried out in SW-Germany to provide local and regional planners with spatially distributed information on environmental problems related to climate or air quality arising from current land-use, as well as on strategies how to mitigate or avoid such problems in the future. The spatial extend of the study region stretching over 112 km from W to E, and 72 km from N to S, respectively, and the demand to deliver local-scale information, resulted in a GIS-based methodology which allows deriving homogeneous raster data sets of 50 m horizontal resolution from a large variety of data sources. In particular, remote sensing data from satellite systems have been utilized for retrieving topographic data as well as land-surface parameters. One of the major problems in such studies is to deal with instationary atmospheric processes like drainage flows, mountain-valley winds, dispersion of air pollutants or hazardous winds, to mention just a few examples. Two main questions had to be answered: 1. How can instationary atmospheric processes be considered in a local-scale study of such a large region? 2. How can short-term processes be integrated in an assessment study operating on long-term time-scales relevant for regional planning? A mesoscale meteorological model (MetPhoMod) was employed in the study to include atmospheric instationarity in the GIS-based, fully automated climate and air quality assessment procedures. The presentation will explain the modelling strategy, and the model output data processing and information retrieval techniques. Final results of the assessment study will be shown demonstrating the possibilities of this methodology, as well as open questions not yet answered.