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Estimation of land surface parameters for Mesoscale Meteorological Modeling using GIS and Remote Sensing

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The primary forcing of the atmospheric boundary layer over the land surface is through the solar radiation absorption at the ground, which generally results in a diurnal variation surface flux of momentum and scalars; the latter determine the vertical profile of wind, temperature and humidity in the surface layer. Parameterisation of such processes demands the estimation of various physical parameters involved in meteorological modeling; for instance, surface temperature, emissivity, albedo, aerodynamic roughness length, evapotranspiration, land use / land cover. A realistic estimation of the aforementioned parameters will significantly improve the accuracy of simulation and prediction of meteorological models. The present study is carried out with main objectives to improve the quality of the input data used for mesoscale meteorological models and enhance the potential use of GIS and remote sensing in the fields of climatology and meteorology. The Greater Athens Area is used as a case study and a new land use / land cover data base is developed based on a hybrid of unsupervised / supervised classification methodology and use of satellite data from the Landsat 7 Enhanced Thematic Mapper Plus (ETM+). Vector data originated from the Corine land cover database were also used for optimization, verification and accuracy assessment of the results. Moreover, a new data set including estimations of the roughness length and the evapotranspiration was developed for the study area. The advantages of estimating land surface parameters from satellite data for the initialization and application of mesoscale meteorological models is further discussed.