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Assimilation of multispectral remotely sensed data in nitrate modelling

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In context of water resources management, areas with high nitrate concentrations in the leachate and their annual variability are detected based on a coupled agro-economic/hydrologic model system using remotely sensed data. LANDSAT, ASTER and SPOT scenes of the years 2000 - 2004 have been pre-processed by a wavelet based panchromatic sharpening method, classified by an artificial neural net and post-processed by a probabilistic filtering approach. Exemplified by the mesoscale catchment basin of the Rur River in the west of Germany, a detailed 15 - 20m spatial resolution land cover thematic map has been produced.

The agricultural sector model RAUMIS provides nitrogen surpluses on the basis of administrative districts. Classified satellite images have been used in order to spatially disaggregate these data from districts to a crop-specific level. In parallel, the hydrological model GROWA calculates the main water balance components. With the aid of remotely sensed data and concurrent crop identification this model can be extended to simulate the real evapotranspiration for different crops instead of an average consideration of agricultural land. Additionally, the remotely sensed information and the model enhancement are made use of in the submodule DENUZ, which assesses the denitrification in the unsaturated soil zone.

In the presentation it is shown that the application of remotely sensed data, as compared to the CORINE land cover used so far, helps to improve the model results. Spatiotemporal variability of diffuse nitrogen concentrations in the leachate originat-

ing from the agricultural application of fertilisers can be determined in a spatially and thematically more detailed way. Additionally, the bilateral relationship between agriculture and environment is examined by a coupled model approach for two political nitrogen reduction measures.