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Aerial photograph-based delineation of artificially drained areas and their relevance for water balance and nutrient modeling in large river basins

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Artificial drainage installations influence runoff regimes in agricultural areas significantly and represent an important pathway for diffuse nutrient and pesticide inputs to surface waters. Therefore they have to be explicitly considered in modelling approaches, but for large investigation areas spatially-differentiated data about artifically drained areas are in most cases not available. The few already published delineation methods either do not give area-differentiated results or are not applicable to large-scale investigation areas. Therefore, a new method had to be developed, which is based on aerial photographs and data sets about land use, soil parameters and river networks.

In a first step several thousand black and white aerial photographs at a scale of 1:12,000 were evaluated and 231 were then selected due to quality reasons. The area covered by aerial photographs sums up to more than 122,000 hectares. These orthophotos show spatial patterns typical for systematic pipe drainage installations because of differences in soil moisture, soil density and height of vegetation. The drained agricultural areas were identified and digitized to derive a data set which can be combined with land use information, soil parameters and highly-resolved river networks. On this basis typical combinations of site conditions indicating artificial drainage were derived. Afterwards area-differentiated drainage maps were created for meso- and macroscale investigation areas by GIS operations using the combinations of site conditions. The application results for the German state Lower Saxony (45,000 km^2) were validated successfully against an independent data set of artificially drained

areas derived from management plans.

After focussing on the delineation method the contribution will also present results for a river basin in northern Germany and will outline the effects for water balance and nutrient modelling results of using differentiated data about artificially drained areas.