The use of OpenStreetMaps for building hydrological models

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Hydrological models often rely on land cover map to determine a number of model parameters, improving those maps may ultimately lead to better models. OpenStreetMaps (OSM) is a rapidly growing open-source geographical, crowdsourcing based. mapping initiative. It includes an impressive amount of information, most notably on man-made features. Although coverage varies widely between locations the detail of built up areas can exceed that of traditional land-use/cover sources such as the Corine land cover map for Europe. A stepwise procedure has been developed to extract information from OSM for hydrological and hydraulic models using existing and newly developed tools. In short the procedure first clips a region of interest from an OSM file, creates shapefiles from selected features and uses those to create gridded maps with fraction of paved area, fraction of open water and fraction of unpaved area in each cell. The tools are fully configurable and can be used to generate other maps. A hydraulic schematisation is derived by combining OSM line features with typical open-source elevation data from the Shuttle Radar Topography Mission (SRTM). Rivers are burned in the elevation by artificially lowering the SRTM DEM at river locations to derive flow directions. Elevated features such as major roads and railway tracks are imposed onto the elevation.

Two cases are demonstrated here. In the first case a Rapid Assessment Model for Urban Water Supply was built using data from OSM and SRTM for a district in the town of Arnhem. In the second case 1x1 km resolution maps were made of fraction Urban area and fraction open water in the Meuse catchment and used in a distributed hydrological model. When comparing the maps generated from OSM with the Corine maps significant differences were found. Apart from the fact that OSM landuse coverage is far from complete surprisingly good results have been obtained. Most notably the easy inclusion of roads within the paved land use fraction may be very useful in hydrological applications.