DESCRIPTION OF A HYDROLOGIC DATASET FOR THE BRISY SUBCATCHMENT

R. T. Oosterhoff* and C. Paniconi†

**Department of Environmental Sciences, Wageningen University and Research Center*
Wageningen, The Netherlands

†*Center for Advanced Studies, Research and Development in Sardinia (CRS4)*
Cagliari, Italy

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Figure 1: Location of Brisy.

1 Introduction

This report describes the dataset for the Brisy subcatchment in southeastern Belgium, which is a subcatchment of the Ourthe catchment, itself a subcatchment of the Meuse river basin. The data preparation, organization, and processing steps undertaken for both the Meuse basin and the Brisy subcatchment will be detailed.

2 Brisy subcatchment

Near the northwestern border of Luxembourg runs the Ourthe Orientale from east to west. From south to north runs the Ourthe Occidentale, a watershed of the Meuse basin (Figure 1). Where they meet, near the town of Engreux, they form the Ourthe which flows northwards and eventually drains into the river Meuse. Approximately 10–15 kilometers east of the point where the Ourthe Orientale meets the Ourthe Occidentale, near the town of Brisy, flows the river Brisy from north to south into the Ourthe Orientale.

The Brisy subcatchment (Figures 2 and 3) encompasses an area of 4.64 square kilometers (maximum length: 2.85 km from east to west and 3.27 km from north to south). The subcatchment contains shallow slopes in the north and steeper slopes in the south, towards the outlet of the catchment (see Figure 4).

Figure 5 is a map of the land cover of the Brisy subcatchment. The part indicated as

Figure 2: The Brisy subcatchment.

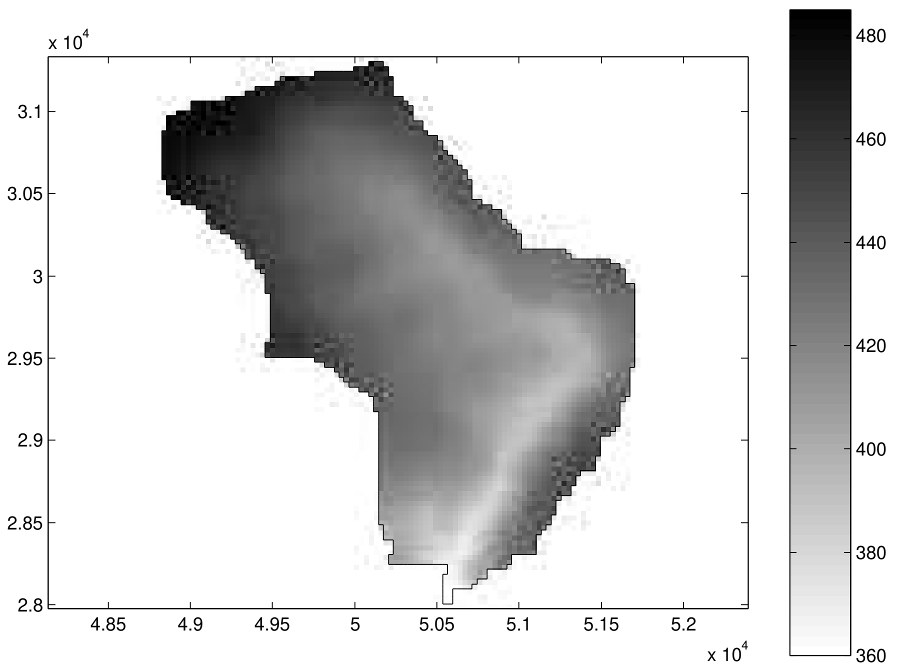

Figure 3: 30 x 30 m^2 resolution DEM of the Brisy subcatchment, top view.

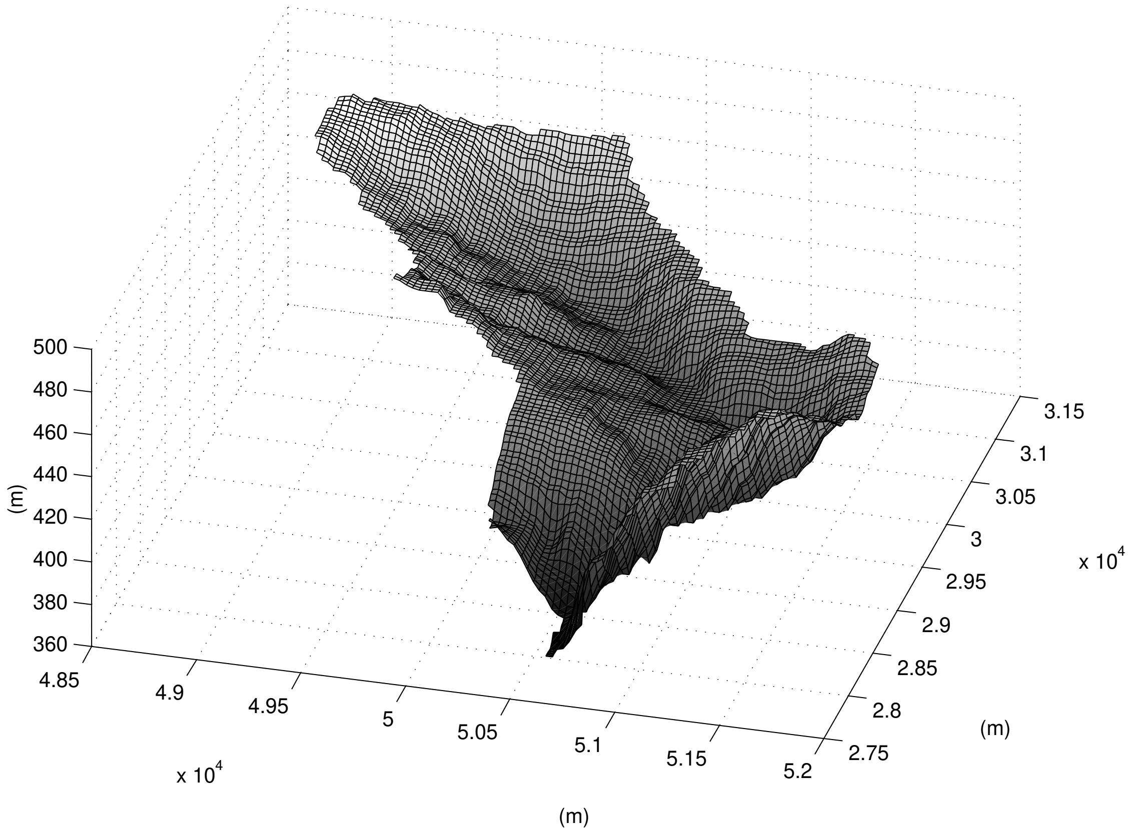

Figure 4: 30 x 30 m^2 resolution DEM of the Brisy subcatchment.

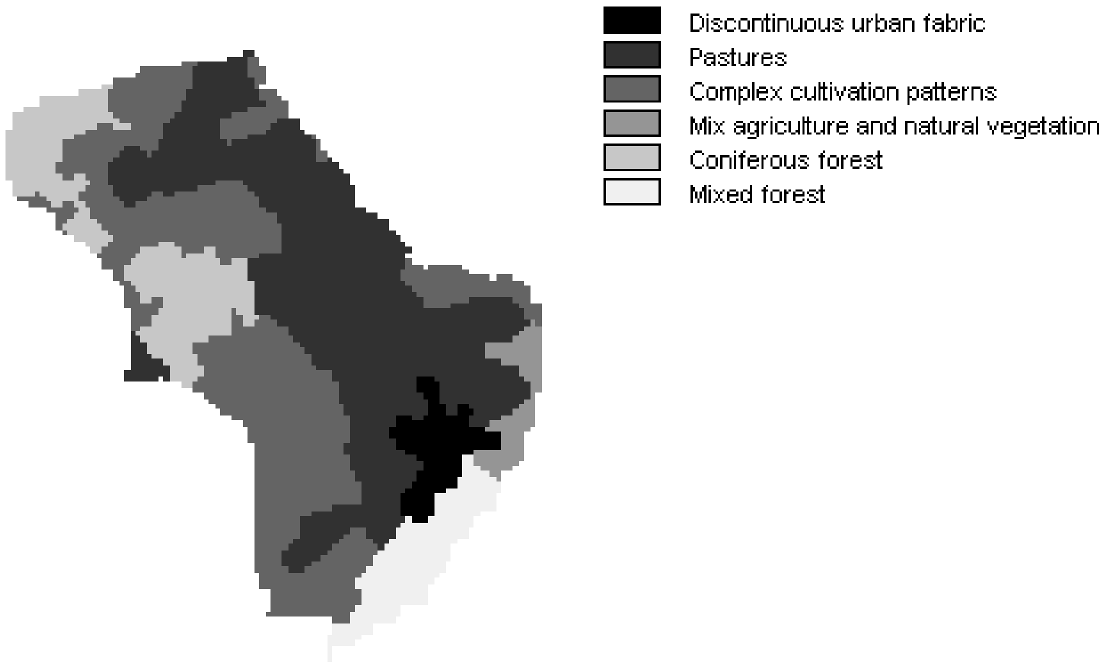

Figure 5: Land cover of the Brisy subcatchment.

Table 1: Soil texture of the Brisy subcatchment in percentages of sand, silt and clay.

	Topsoil	Subsoil
Sand	33.9	6.6
Silt	47.0	46.4
Clay	19.1	47.0

"discontinuous urban fabric" is the town of Brisy. Besides the town of Brisy and a few parts covered with forest, most of the catchment is covered with pastures and fields.

The soil of the catchment is approximately 3.0 m thick. The texture of the topsoil differs somewhat from the texture of the subsoil. Table 1 gives the percentages of sand, silt and clay in the topsoil and the subsoil.

3 Data preparation

3.1 JRC dataset

The data for the Brisy subcatchment was extracted from 2 datasets of the Meuse basin (Ourthe and Geer watersheds) prepared by the Joint Research Center (JRC) in Ispra, Italy and by the Royal Meteorological Institute (KMI) in Brussels, Belgium.

DEM data

The original data for the DEM is provided by the Belgian National Geographic Institute in geographic projection (datum wgs84) with a resolution (lat. $\times$ lon.) of 1" $\times$ 1" below 50° N (2 maps, 15" $\times$ 15" block) and of 2" $\times$ 2" above 50° N (18 maps, 15" $\times$ 15" block). Blocks have been resampled to 30 $\times$ 30 meter grid and merged to a single map.

Land cover data

Original data from CORINE database provided by European Topic Centre at Satellus AB, Kiruna - Sweden, in Lambert Azimuthal projection with a resolution of 250 m.

Soil depth

Original data is provided by European Soil Bureau, Joint Research Centre, Ispra - Italy, in Lambert Azimuthal projection at a scale of 1:1,000,000.

Soil texture for top- and subsoil

Original data is provided by European Soil Bureau, Joint Research Center, ISP - Italy, in Lambert Azimuth projection at the scale of 1:1,000,000.

3.1.1 GIS processing

All data is provided in ArcView / ArcInfo ASCII raster files. Using the function SSTIDRIS the data is imported into the IDRISI geographic information system (GIS). This function uses the row and column structure of the ASCII file as a direct analogue of the row and column structure of an image. SSTIDRIS reads the ASCII file and converts it into an IDRISI image. Further GIS processing is done in IDRISI.

To avoid problems due to local depressions in the DEM (pits) the function PIT REMOVAL is applied to the DEM. The purpose of this module is to create an adjusted "depressionless" DEM (Figure 6) in which the cells contained in depressions are raised to the lowest elevation value on the rim of the depression. Each cell in the depressionless DEM will then be part of a monotonically decreasing path of cells leading to an edge of the image. A path is composed of cells that are adjacent horizontally, vertically, or diagonally in the raster grid and that steadily decrease in value.

From the DEM a map of the drainage network is created using the function RUNOFF. RUNOFF calculates the accumulation of rainfall units per pixel as if one unit of rainfall was dropped on every location. Using the RECLASS module, a threshold value of 511 is applied to the output to produce the drainage network (Figure 7).

To identify the subcatchment the function WATERSHED is applied to the DEM. WATERSHED identifies watersheds from a raster surface image. A seed image is provided with the seed located in the stream right before the Brisy enters the Ourthe Orientale.

Working from this map of the Brisy subcatchment, maps of land cover, soil depth, and soil texture are created for the catchment using the IMAGE CALCULATOR in IDRISI.

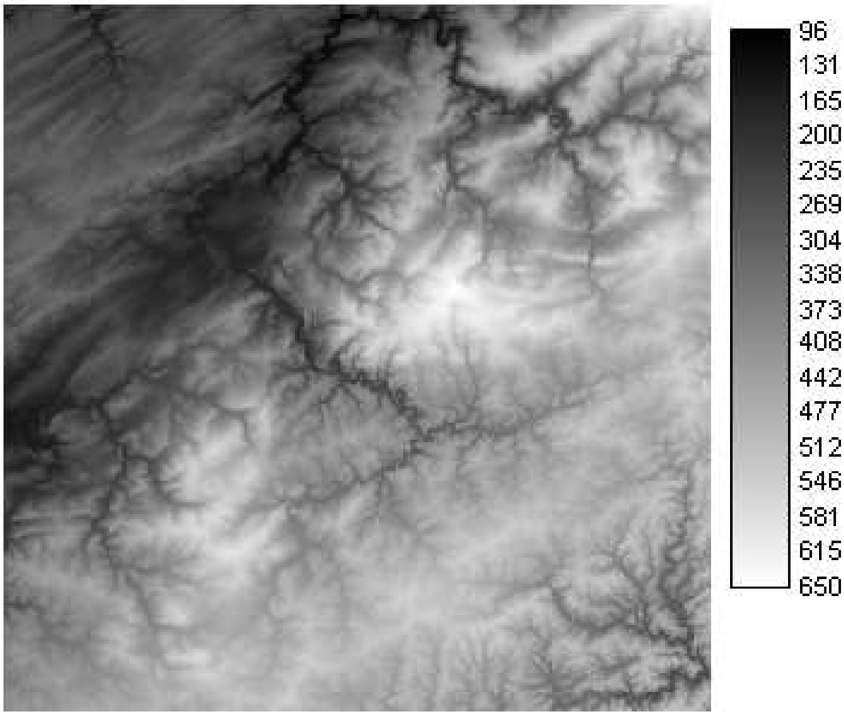

Figure 6: 30 x 30 resolution DEM of the Ourthe Catchment (depitted).

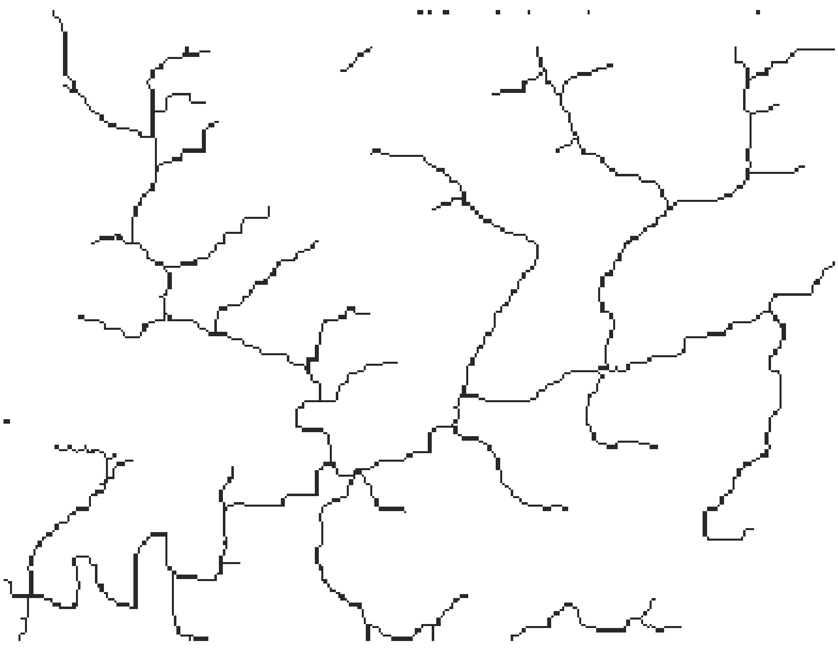

Figure 7: Drainage network (detail) of the Ourthe catchment.

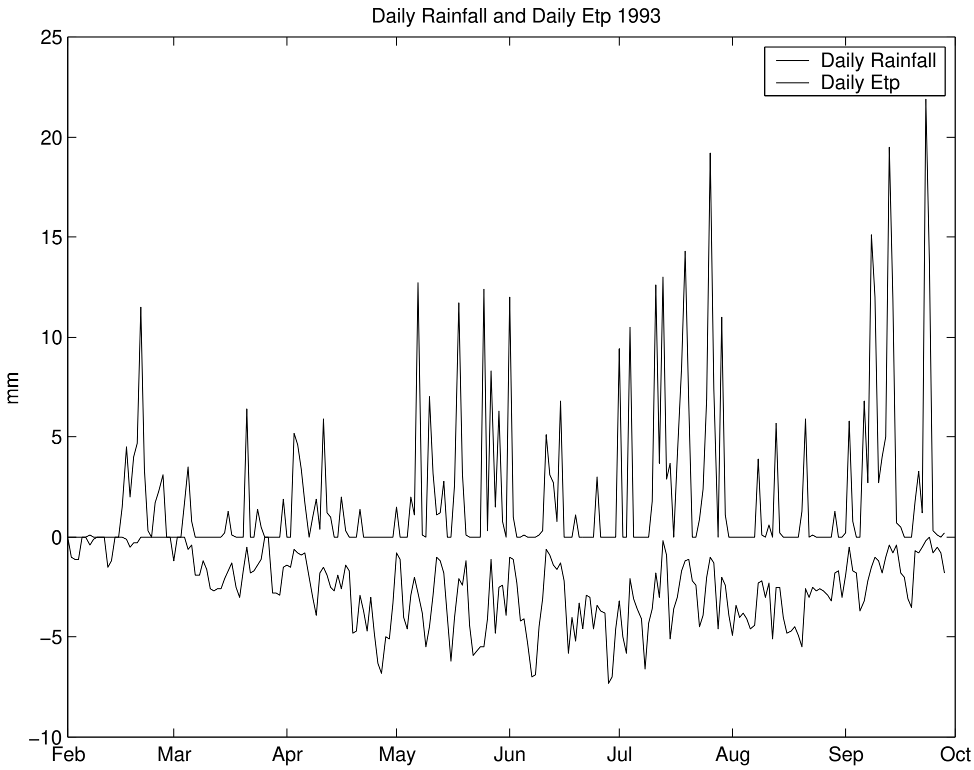

Figure 8: Daily rainfall and potential daily evapotranspiration for a selected 240-day period.

According to the JRC dataset, soil depth and soil texture is fairly homogeneous over the Brisy subcatchment.

3.2 KMI dataset

The KMI dataset contains meteorological data recorded at several stations on the Ourthe and Geer watersheds. For this study data of rainfall and evapotranspiration for the meteo station in St. Hubert is used. This station is located 15 to 20 kilometers southwest of the Brisy subcatchment. For the period 1968 to 1997 files containing daily rainfall (mm/day) and (potential) daily evapotranspiration (mm/day) are provided.

Plots of rainfall (mm/10 days) and potential evapotranspiration (mm/10 days) are created. From these plots an 8-month period from February to October 1993 (240 days) is selected (Figure 8). To get the net atmospheric flux needed for input to hydrological models the potential daily evapotranspiration is subtracted from the daily rainfall and converted to m/hour.

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