The Upper Metuje River, Czech Republic

Location

The Upper Metuje catchment is located in the north east of the Czech Republic on the border with Poland. The Metuje River joins the Elbe River, which flows through Germany into the North Sea.

Catchment description

The catchment is formed by Mesozoic sediments that are underlain by poorly permeable Permian and Carboniferous formations. Large part of the catchment belongs to the Broumovsko Protected Landscape Area, which can be characterized by its unique Cretaceous sandstone relief, fluvial river network, rare and protected plant and animal species, and local traditional architecture. The land cover consists predominantly of cropland, grass fields and forest.

Key descriptors:

Catchment area	247.75 km^2
Level of station	361 m a.s.l.
Maximum altitude	819 m a.s.l.
Mean flow	2.73 m^3s^{-1}
Q10 (10-year return period)	62.0 m^3s^{-1}
Average annual rainfall	746 mm

Hydrological summary

Metuje is a slowly responding catchment due to groundwater storage in large aquifers. The hydrologic regime is influenced by groundwater abstractions (public water supply) and waste water discharges (waste water treatment plants, outflows

from mines).

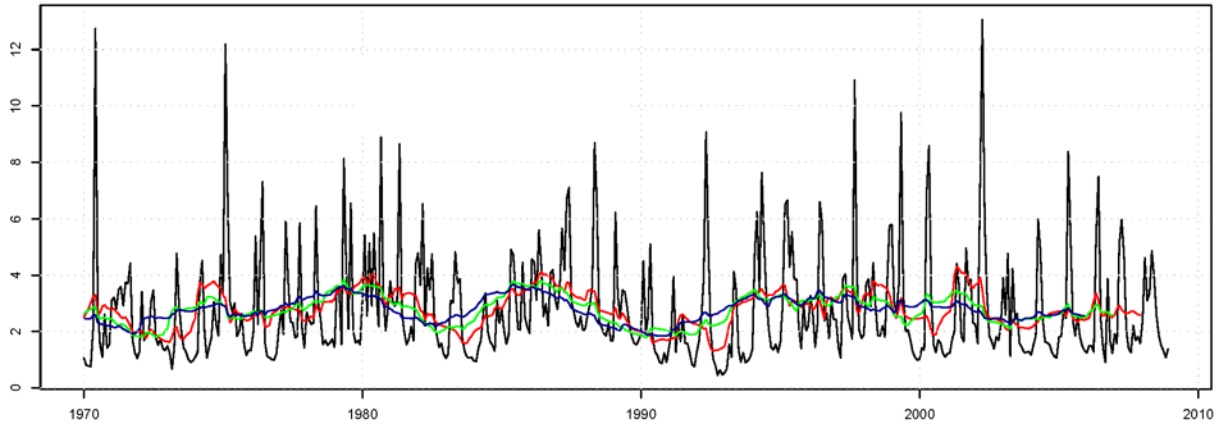

Figure. Observed runoff at Hronov (black line) smoothed by moving averages of different lengths (colour lines).

Data availability and facilities

Daily streamflow data from automatic gauges operated by T.G.Masaryk Water Research Institute (T.G.M. WRI) are available for the MVIII, MXII and ZVI sites (for their location see the map below) for the period 1967 to present. The other sites are monitored by Czech Hydrometeorological Institute (CHMI) mostly from 1970.

Figure. Location of the streamflow gauging sites (blue dots)

Precipitation is measured at Hronov, Broumov and Police nad Metuji (see the map below) by CHMI. T.G.M. WRI observed precipitation at a number of locations during the period 1965–1974. Subsequently this monitoring had to be reduced.

Figure. Location of the rain gauges (blue dots)

A number of extraction and observation wells are situated in the catchment area (see figure bellow). Four of these wells are maintained by T.G.M. WRI. The groundwater level observation sites are located in the centre of the catchment. The depth of the wells varies from 5 to 300 m.

Data on abstractions and recharges are also partly available.

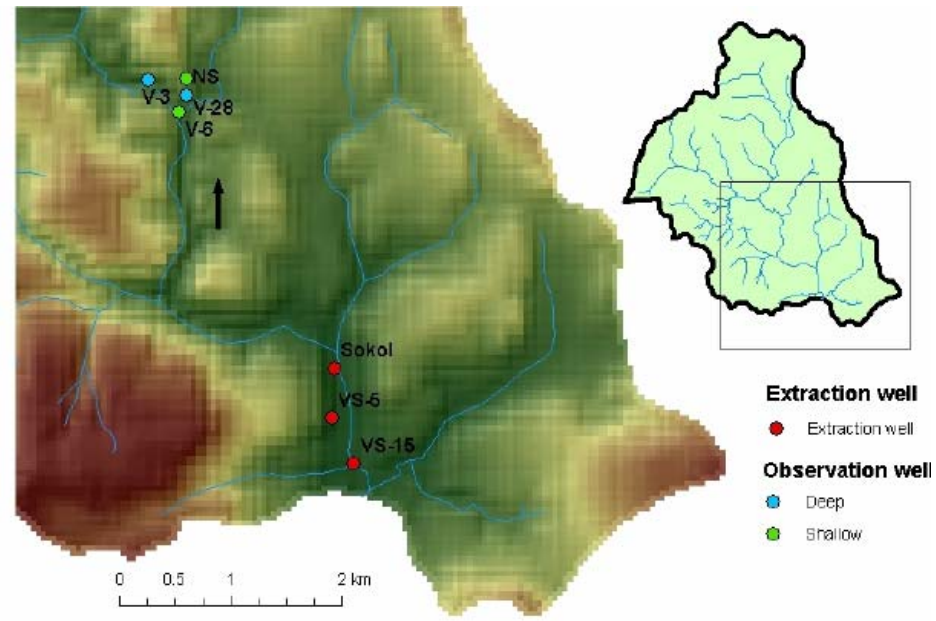

Figure. Location of the extraction and observation wells

Research Activity and Outputs

- Research on the relationships between surface water and groundwater
- Development of BILAN water balance model
- Assessment of climate change impacts on hydrologic cycle including groundwater

Institutional support

The Metuje basin is extensively studied by T.G.M. WRI from 1964 when the first experimental catchment in this area was established. The research is focused on description of hydrological processes, development of hydrological models and most recently on climate change impact simulation. Part of the observation network belongs to the national observational network maintained by CHMI.

Value to network

The Metuje River basin to Hronov station is hydrologically closed with an aquifer depth of up to 200 m, which is unique not only in the Czech Republic. The water resources are impacted by climate change and water potentially available for the water supply can be assessed, since the data on water use are available and can be incorporated into the models. The water resources can be studied by simulation with the BILAN model in combination with MODFOW model.

The Metuje Observatory provides data for hydrological conditions that are common in its region but which are quite different from those monitored by many other observatories in the network. Some distinguishing features of the Metuje catchment in the European context are: relatively high wastewater discharges and high groundwater abstractions and baseflow.

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