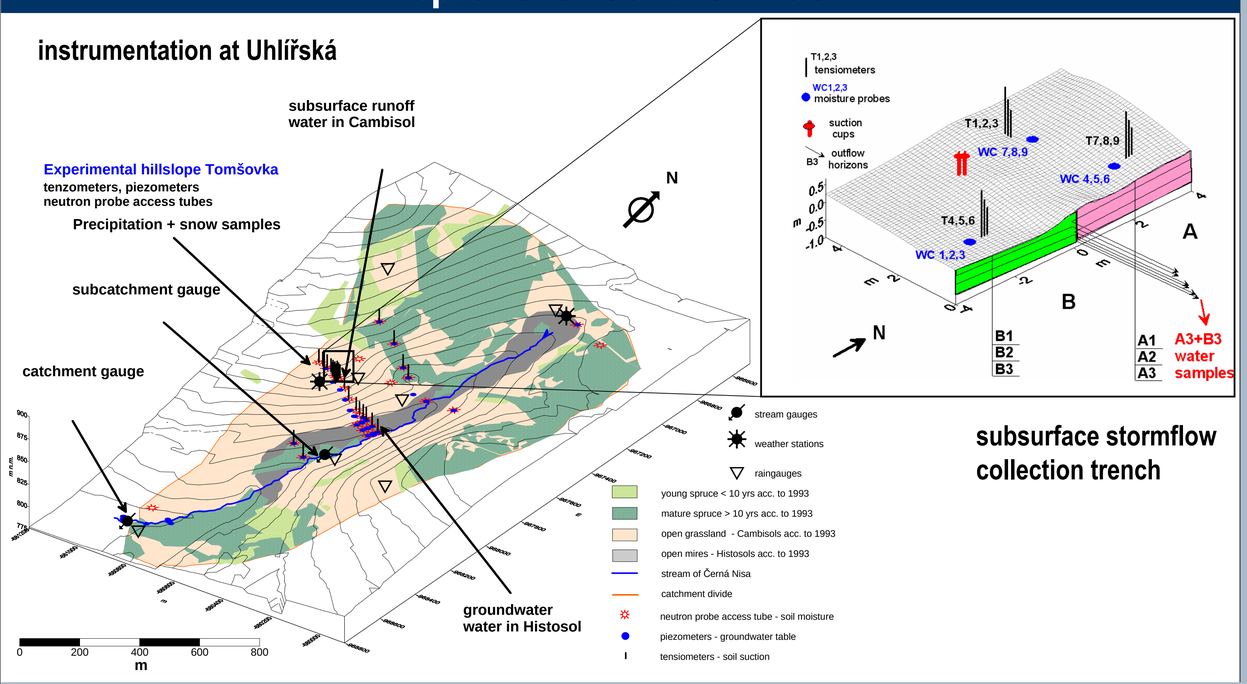
Uhlířská

Czech Republic

Basin characteristics

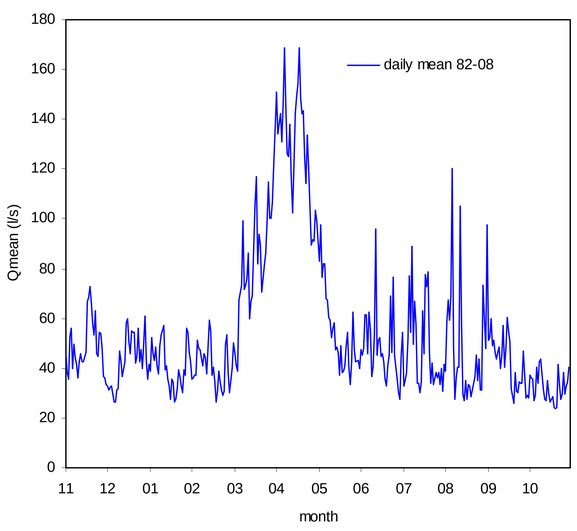
River Basin / River Basin (according EU-WFD)	Černá Nisa rive basin / Nisa river basin
Operation (from… to…)	Since 1982, still in operation
Gauge coordinates / Gauge datum:	15°09'E, 50°49'N, 776.17 m a.m.s.l.
Catchment area:	1.87 km^2
Elevation range:	776 – 886 mm a.m.s.l.
Basin type: (alpine, mountainous, lowland)	mountainous
Climatic parameters: (mean precipitation, temperature and others)	1400 mm (1931-60 derived), 4.6°C (1961-1997)
Land use:	95% Norwegian spruce, 5% grassland, single beech trees
Soils:	Dystric and Podzolic Cambisols, Histosols, Gleysols
Geology:	granite, deluviofluvial sediments, glacial tills
Hydrogeology: (Type of aquifers, hydraulic conductivity)	fractured bedrock, sedimentary shallow aquifer
Characteristic water discharges: (Q_{min}, Q_{max}, Q_{mean})	Q_{mean}=55 l/s (1982-2008), Q_{max}=3824 l/s (7.8.06 7:45), Q_{min}=7 l/s

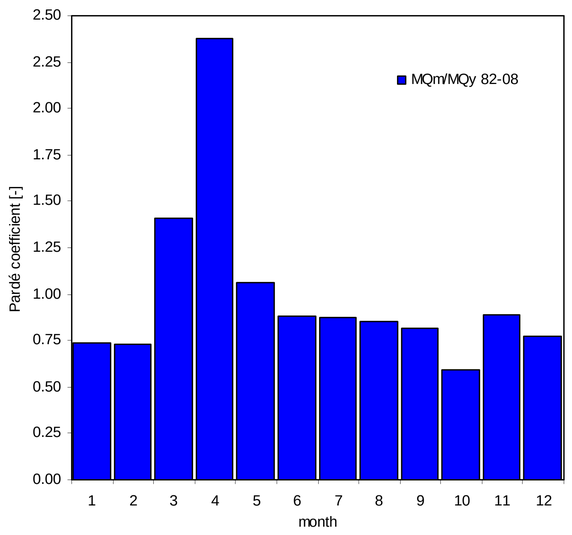
Map of the research basin



subsurface stormflow collection trench

Mean hydrograph / Pardé flow regime

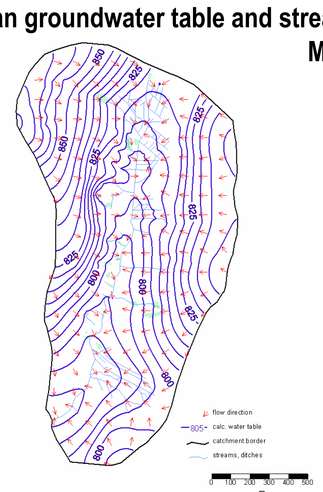




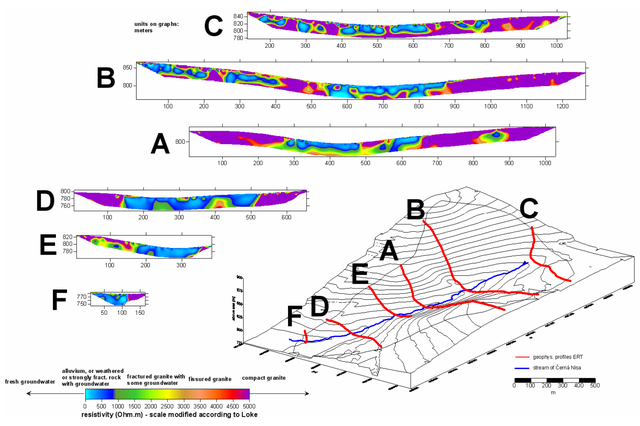
Czech Hydrometeorological Institute and River Labe authority data

Special basin characteristics (hydrogeology, lakes, reservoirs etc.)

Mean groundwater table and stream drainage Modflow



Composition of the subsurface acc. to ERT



Instrumentation and data

Measured hydrological parameters	Measuring period	Temporal resolution	Number of stations
Streamflow	1982 – cont. *subcatchment 2007 – cont	1h 10 min (since 1996, *2007)	2
Precipitation	1961 – cont (nearby Bedřichov) 1982 – cont. (seasonal) 1996 – cont. (seasonal)	Daily (since 2004 impulse) Hourly Impulse/ 0,1 mm	1 continuos – Bedřichov 7 (seasonal)
Air temp., Humidity & Radiation, Wind speed	1982 – cont. 1996 – cont	1h 10 min	1 2
Groundwater level	1997 – 2002 1999 – cont.	monthly hourly	15 2
Soil Suction Soil Moisture	1997- 2002 / 1998 – cont 1997 – cont / 2006 – cont	biweekly / 10 min quarterly / 10 min	120 / 21 20 / 11
Env. isotopes ^{18}O, ^{3}H, ^{2}H hydrochemistry + Al, Fe pH, redox, ORP, nitrates, chlorides	2006 – cont 1996 – cont, *2004 - cont 2004 - cont	event, daily, monthly monthly, *event 10 min	16 1 1

Applied models

Concept model	SWMS_2D, S1D, S2D, S1D_Dual – Richard's eq+ADE based models	
Modflow+MT3D	Topmodel	Magic

Main scientific results

1. Overland flow is limited occasionally to saturated areas. Direct runoff ranges 0-25 % of total event precipitation at the drainage ditches and temporal streams (isotopes)
2. Evapotranspiration forms approximately 20% of the annual precipitation
3. Snow covers the catchment typically November to April. Major runoff contribution from snowmelt takes place in April and March. Winter season (Nov-Apr) forms 58% of the total runoff.
4. Soil profile of Dystric Cambisol type plays crucial role in transformation of the hydrograph interacting soil water in capillary pores and gravitational water in preferential pathways (proved by environmental isotopes)
5. Soil profile of Histosol overlying sedimentary aquifer impacts the chemical composition of the outflow. There is strong correlation of hydrochemical parameters with the magnitude of streamflow (indirect for pH, el. conductivity; direct for ORP)
6. Direct pressure transition in the saturated subsurface is the most probable mechanism of the storm rainfall to flood runoff response Due to low hydraulic conductivity of sedimentary materials overlaid by peat, there is partially pressured water table observed at the transition zone in between hillslopes with Cambisol and valley with Histosol due to hillslope lateral return flow
7. Groundwater recharge is approximately 36% of the rainfall, baseflow forms 46% of the streamflow. Aquifer forms the space available for approximately 2 yr of precipitation amount as estimated based on electrical resistivity tomography and modelling approach
8. The mean residence time of water in the catchment is estimated to approx. 7 months (env. isotopes). The residence time of the groundwater is estimated in the range of 1- 10 years by modelling approach

Key references for the basin

1. BERCHA Š., BUBENÍČKOVÁ L., JIRÁK J., ŘIČICOVÁ P. (2008). Water Storage in Snow Cover and Runoff in Experimental Basins in the Jizerské hory Mountains. Soil Water Res, 3 (3), 175-182
2. BLAŽKOVÁ S., BEVEN K. (1997): Flood frequency prediction for data limited catchments in the Czech Republic using a stochastic rainfall model and TOPMODEL. Journal of Hydrology, 195, 256-278.
3. ŠANDA M., NOVÁK L., CÍSLEROVÁ M. (2007): Tracing of the water flowpaths in a mountainous watershed; in Pfister, L. and Hoffmann, P: Proceedings of 11th Conference of the Euromediterranean Network of Experimental and Representative Basins (ERB) IHP-VI, Technical Documents in Hydrology, No. 81, UNESCO Working Series SC-2007/WS/54, Paris, 2007, 125-131.
4. ŠANDA M., SOBOTKOVÁ M., CÍSLEROVÁ M. (2007b): Water Flowpaths in the Mountainous Watershed Traced by 18-oxygen Isotope. In: Advances in Isotope Hydrology and its Role in Sustainable Water Resources Management (IHS-2007). Wien: IAEA, 2007, 419-425. ISBN 978-92-0-110207-2.

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