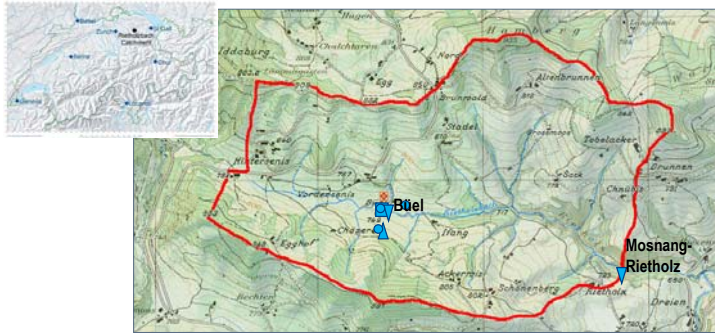


**Rietholzbach basin, Switzerland**

**Basin characteristics**

River Basin / River Basin (according EU-WFD)	Thur river basin, Rhine river basin
Operation (from... to...)	since 1976
Gauge coordinates / Gauge datum:	9°0' E; 47° 22'N / 682 m a.s.l.
Catchment area:	3.31 km <sup>2</sup>
Elevation range:	682 – 950 m a.s.l.
Basin type: ( alpine, mountainous, lowland)	pre-alpine
Climatic parameters: (mean precipitation, temperature and others)	1459 mm, 7.1 °C (1976-2007)
Land use:	73 % pasture land, 24% wood (mainly coniferous forest), 2% settlements, roads, 1% wetlands
Soils:	Cambisol, Regosol, Gley soil
Geology:	'Nagelfluh', sandstones, marl, limestone, gravel pockets
Hydrogeology: (Type of aquifers, hydraulic conductivity)	heterogeneous system of interconnected aquifer layer in the Upper Freshwater Molasse
Characteristic water discharges: ( $Q_{min}$ , $Q_{max}$ , $Q_{mean}$ )	annual means: 67.4, 145, 106 l/s (1976-2007) absolute min-max: 2 – 12044 l/s

**Map of the research basin**



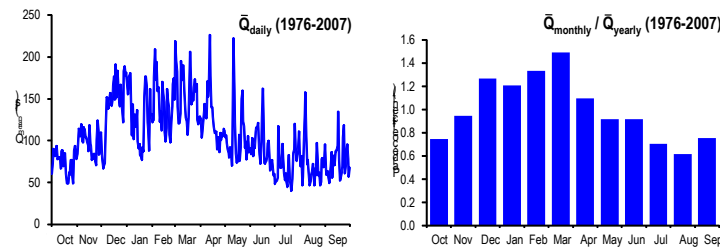
stream flow, temperature ground water level and temperature precipitation, evapotranspiration, and other meteorological variables

Map basis: Federal Office of Topography

There are two measurement sites:

- Mosnang-Rietholz – the main gauge at the outlet of the catchment which is operated by the Federal Office for the Environment, Hydrology Division, Bern, Switzerland,
- Büel – our site where most of the measurements are carried out.

**Mean hydrograph / Pardé flow regime**



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

Human impact by artificial drainage systems and wells for water supply.

Wetland next to the uppermost part of the creek, but no stagnant water.

The hydraulic conductivity of the soils ranges between  $1 \cdot 10^{-5}$  to  $5 \cdot 10^{-4}$  m s<sup>-1</sup>. To pass the lysimeter, i.e., a soil column of 2.5 m of gley-cambisol takes ~6 months.

Based on a <sup>18</sup>O analysis the mean residence times have been estimated:

- The residence time in the Upper Freshwater Molasse, which are particularly located at the slopes, is ~1 year, which is identical to the surface base flow at the catchment outlet.
- The Quaternary glacial sediment layers in the bottom of the valley have a buffering effect. E.g., at Büel the mean residence time is ~2 years.
- The residence time depends strongly on the hydraulic conductivity of the soil and the aquifer as well as on the slope.

**Instrumentation and data**

Measured parameters	Measuring period	Temporal resolution*	Remarks
Stream flow / temperature	1976 – cont. 1993 – cont. 1995 – cont.	5'	@Rietholzbach-Mosnang small tributary @Büel upper creek @Büel (w/o temperature)
Precipitation	1976 – cont.	5'	2x @1.5m, 2x @0m
Snow height	2000 – cont.	5'	
Evapotranspiration	1976 – cont. 2009 – cont.	5' 10 Hz	by a lysimeter by EC @ 2, 5.5, 9m
Discharge	1976 – cont.	5'	by a lysimeter
Ground water level/temperature	1996 – cont. 1998 – cont.	60'	@Büel 2x @Büel (north-, and south slope)
<sup>18</sup> O isotopes	1994 – cont.	~bi-weekly	7x (precipitation, soil water, ground water, stream water)
Radiation	1989 – cont. 1997 – cont. 2001 – cont. 2006 – cont. 2008 – cont.	5'	short-wave incoming radiation short-wave outgoing radiation sunshine duration long-wave radiation direct-diffuse short-wave radiation
Air temperature/ humidity	1976 – cont. 2009 – cont.	5' 10 Hz	2x @2m by EC @ 2, 5.5, 9m
Wind speed	1976 – cont. 2009 – cont.	5' 10 Hz	1976 – 2008 @2.5m 2003 – cont. @10m by EC @ 2, 5.5, 9m
Wind direction	2000 – cont. 2009 – cont.	5' 10 Hz	@10m by EC @ 2, 5.5, 9m
Pressure	2001 – cont.	5'	
Soil temperature	2000 – cont. 2009 – cont.	60' 10'	@-5, -10, -20, -40cm @-5, -15, -25, -35, -55, 80, 110cm
Soil heat flux	2000 – cont. 2009 – cont.	60' 5'	3x @-5cm 3x @-5cm
Soil moisture	1994 – cont. 2009 – cont.	60' 10'	2x @-5, -15, -25, -35, -55, 80, 110cm 4x @-5, -15, -25, -35, -55, 80, 110cm
Sensible, latent, CO <sub>2</sub> flux	2009 – cont.	10 Hz	by EC @ 2, 5.5, 9m

\* The resolution changed over time. Generally up to 1996 it was hourly.

**Applied models**

WaSiM-ETH PREVAH TRAIN BROOK90 TOPMODEL BOWAM DIFGA

**Main scientific results**

1. (Further) development/validation of models based on catchment data is successful, particularly for WaSiM-ETH and PREVAH.
2. Mean annual water balance derived from lysimeter data (1976-2007): 1459 mm precipitation, 1016 mm discharge, 560 mm evapotranspiration
3. Interflow is the dominating runoff component.
4. Runoff of summer flood events consists mainly (50-80%) of pre-event water.
5. Mean residence time in the catchment is up to 2 years.

**Key references for the basin**

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