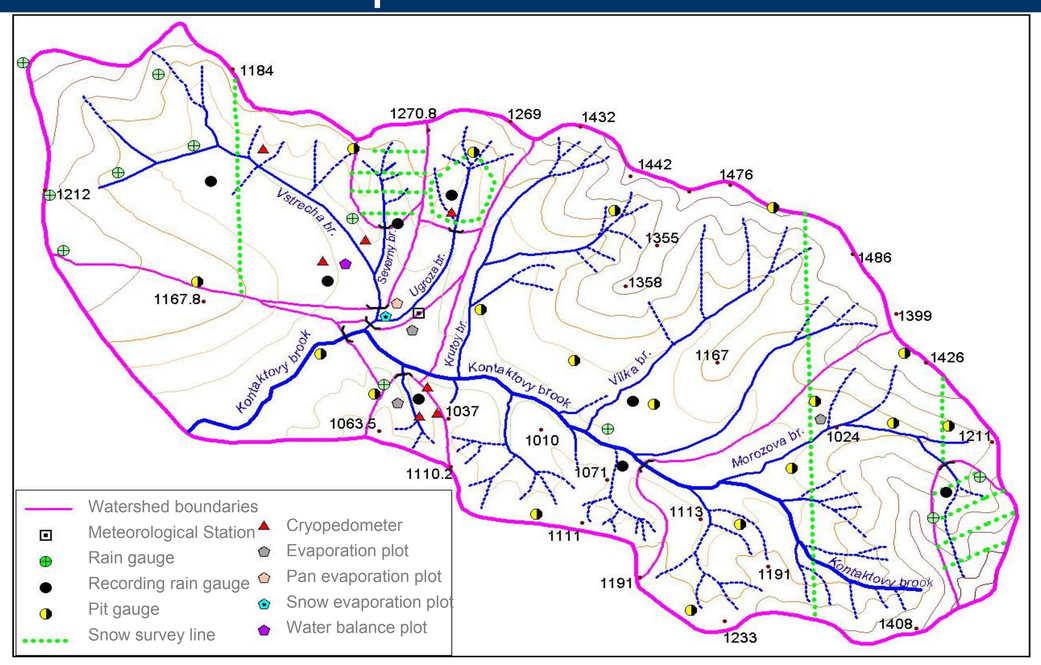
Kolyma Water Balance Station (KWBS)

Kontaktovy basin, Russia

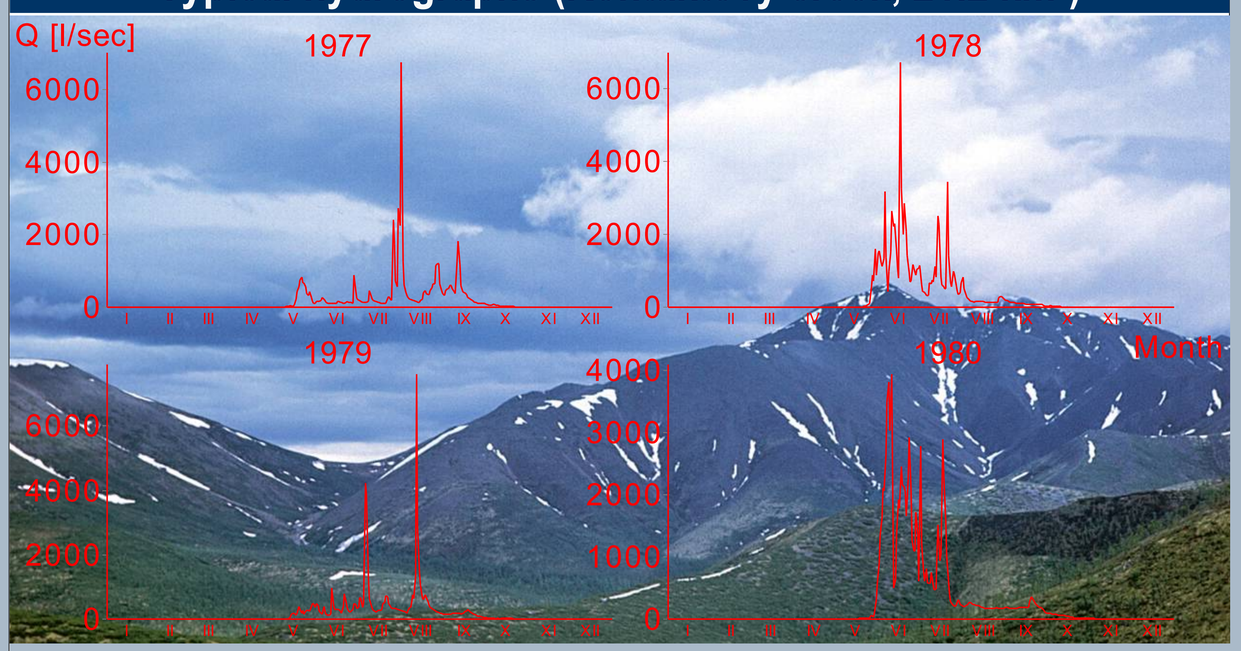
Basin characteristics

River Basin / River Basin	Kulu River / Right Kolyma River
Operation (from… to…)	Since 1948, still in operation
Gauge coordinates:	61°54’ N; 147°25’ E/ 1070 m a.m.s.l.
Catchment area:	21.2 km^2
Elevation range:	800 – 1700 m
Basin type:	Mountainous
Climatic parameters:	405 mm; -13.1°C (1948-1992)
Land use:	31% Barren Alpine tundra (Talus), 27% cedar and alder woods, 14% larch open woods, 11% open terrain and sloping woods
Soils:	Stony-rock debris, clayey podzol
Geology:	Shale, granite, diorite
Hydrogeology:	Fractured rock, ground water outflow from deep aquifer in not frozen channel area (“talik”)
Water discharges	Q_{min} = 0 l/s, Q_{max} = 7610 l/s, $Q_{average}$ = 195 l/s (1974 – 1984)

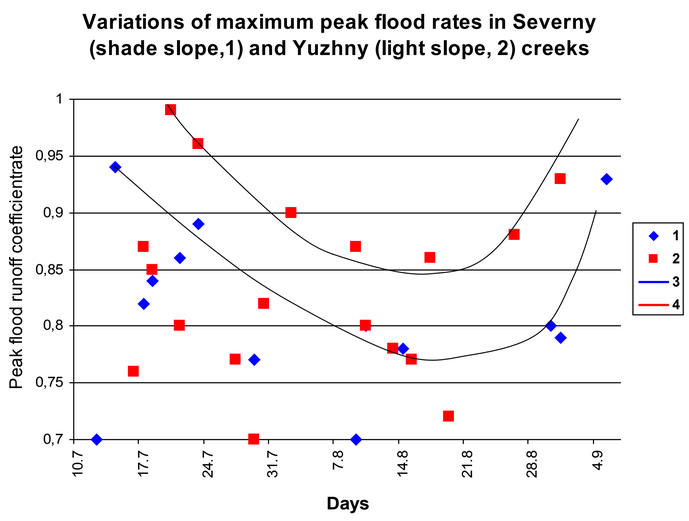
Map of the research basin



Typical hydrographs (Kontaktovy creek, 21.2 km^2)



Special basin characteristics – continuous permafrost



The permafrost thickness over Kontaktovy Creek basin area ranges from 120-210 m in the valleys to 300-400 m in the hills. Maximum depth of the seasonal soil thawing is 30-40 cm in the shaded slopes (Yuzhny Creek) and 1.5-2 m in the light slopes (Severny Creek). It influences on the landscape types formation and changes of maximum rain peak floods runoff coefficients during the warm period.

Instrumentation and data

Measured hydrological parameters	Measuring period	Temporal resolution	Number of stations
Stream flow	1948–cont.	Minute Daily	7
Meteorological observations	1948–cont.	3h	1
Precipitation	1948–cont.	Minute Pentad, decade in winter, daily in summer Decade Month	10 5 10 10
Snow surveys	1948–cont.	Monthly (October – March), decadely (April…)	5
Evapotranspiration	1958–cont.	Pentade	4
Snow evaporation	1958–cont.	September – October, March – April (12-hourly)	1
Pan evaporation	1970–cont.	Decade	1
Energy balance	1958–cont.	Decade	1
Soil freezing/thawing	1958–cont.	Once in 5 days	5
Soil temperature at depths 0.1 – 3.2 m	1974–1981	Daily	1
Flow water chemistry	1958–cont.	Event based	2

Applied model

1. The model “Hydrograph” (in process)

Main scientific results

1. Regional equation for the rain peak flood discharges computation. This equation takes into account effective rain depth and intensity, density of working drainage network.
2. Transient moisture that forms during the autumn period as subsurface storage of ice (in rock glaciers and talus slopes) provides additional runoff recharge reaching 120-130 mm from areas occupied by these landscape types.
3. Evaporation (E) from surfaces covered by reindeer moss and talus depends on water availability 5 mm, number of rain events (*N*) and moss holding capacity. It may be computed using relationship $E=5\sum N$. Evapotranspiration from sphagnum can be twice greater compared to evaporation from water surface.
4. Maximum rain peak flood coefficients depends on depth of seasonal thawing soil layer and changes within 0.86 - 0.98 range for shaded slopes and 0.77- 0.95 for illuminated slopes.

Key references for the basin

1. Boyarintsev, E.L., Serbov, N.G., Dovbysh V.N. & Popova N.I. (2006) Experimental studies of evaporation and condensation in mountainous permafrost regions. In: Proc. VI Hydrological Conference, 28 September – 1 October 2004, St.Petersburg, Russia, Section 5, part I, Meteoagentstvo Press, Moscow, p.78-82. (In Russian)
2. Zhuravin, S.A. (2004) Features of water balance for small mountainous watersheds in East Siberia: Kolyma Water Balance Station case study. In: Northern Research Basins Water Balance. IAHS publ. № 290, 2004, p 28 – 40.
3. Boyarintsev, E.L. (1988) Specific factors of the rain peak flood formation for the Kolyma Water Balance Station area. Proc. DVNIGMI, vol.135, Gidrometeoizdat, Leningrad, p.67-93 (In Russian).

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