Evaluation of stream water level and runoff discharge using long-term daily monitoring data of a rain-fed river in Russian Far East

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Thursday, 12 Apr 2018, 08:56-10:00

Objectives of study

Water discharge data are important for estimating chemical compounds runoff from the watershed.

It could be hard to obtain such data at selected remote locations. However, some indirect ways might be used to relatively precise information now.

We tried to use one approach that allows filling temporal data gaps on water runoff by using the observed dependence of it and stream water level.

Object of research

Komarovka river

Situated near the city Ussuriisk at Far East Russia.

Originates in spurs of the Sikhote-Alin Ridge at an altitude of 380 m above sea level.

Left tributary of the Razdolnaya River . Belongs to the Japanese Sea basin.

Length is about 66 km.

Daily data for several reference years (2001, 2005, 2010 and 2015) were available from for the study

Object of research – Komarovka river

Small river in the basin of the Razdolnaya River, the Japanese Sea basin

Having originane in western spurs of the Sikhote-Alin Ridge, 380 m above sea level.
Length at upstream area of research is about 66 km

Hydrological measurements (at ad hoc station) was established in 1950s and had stopped at late 1980s

EANET observations has started from 2003 – atmospheric deposition and ecological (inland aquatic) site

Komarovka river – natural pristine small river and catchment

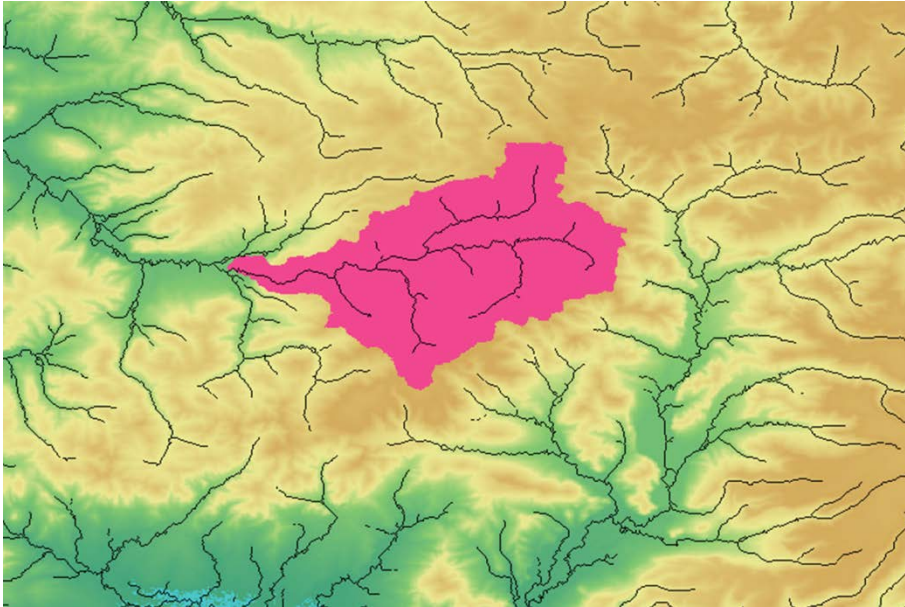**Watershed covered by   temperate deciduous forest**

Non-artificial measurement cross-section for water discharge

Automatic device for water level measurements with high temporal resolution at the place of rare water discharge measurements
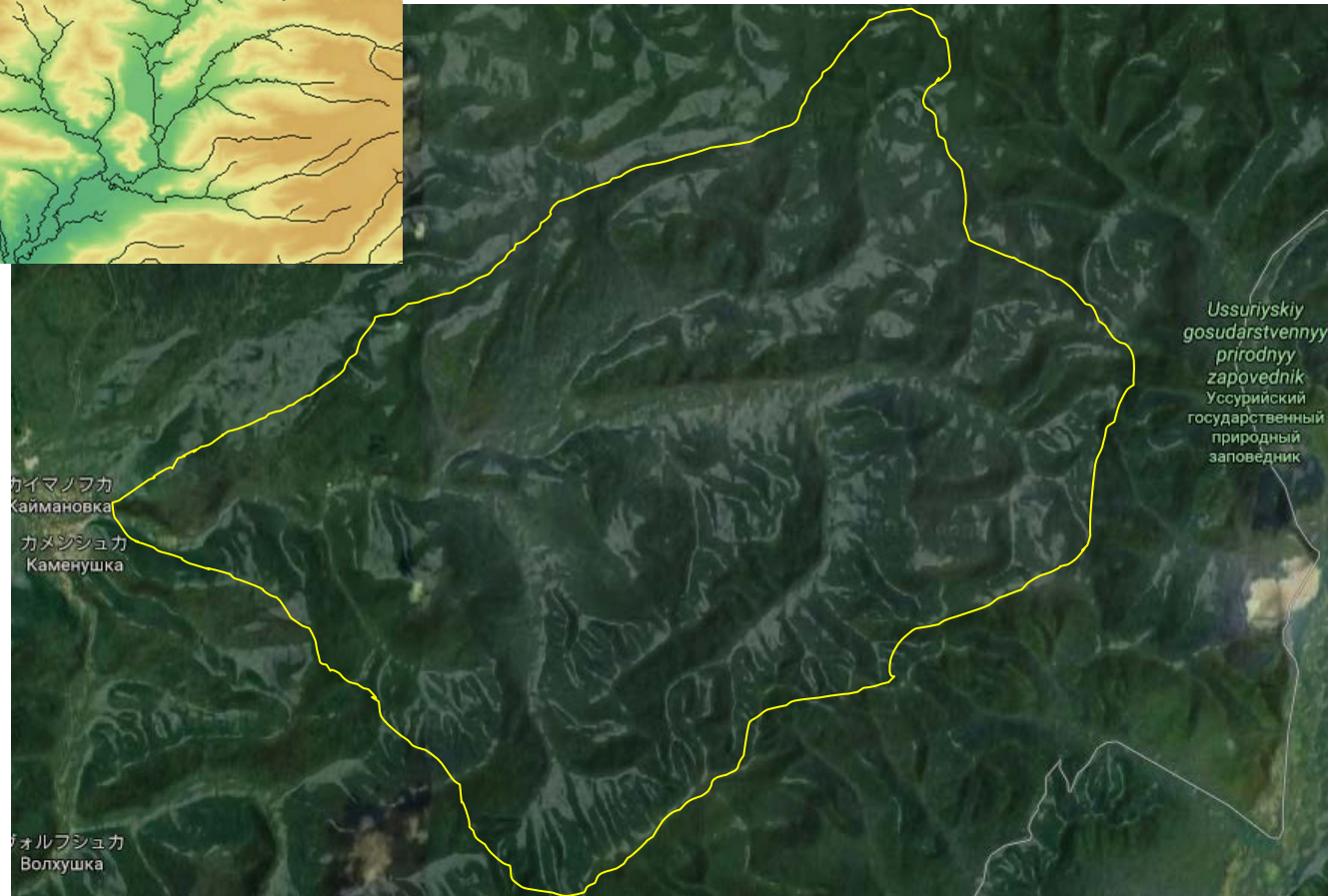
Catchment area of the river

Almost no direct effect of human activities

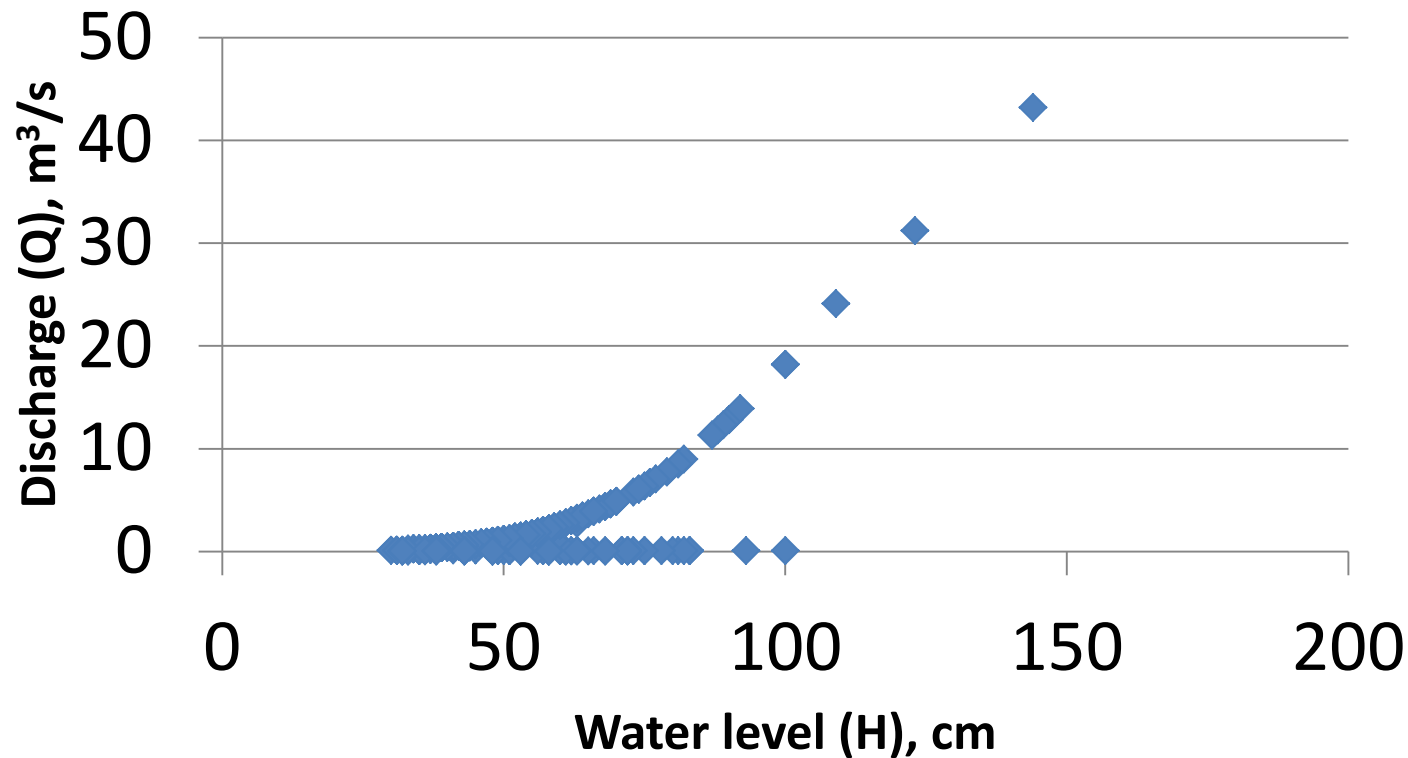Evaluation of catchment area with help of remote methods of topography analysis

Reasons of Komarovka River research

- The river is located in forest area, which seems to be a quasi-natural condition with limited human activities.

- Available daily data for several reference years (2001, 2005, 2010 and 2015)

- Long term data of some hydrological parameters are obtained on the regular basis up to now

- Much experience on hydrological studies has been accumulated there.

- Some more qualitative and quantitative discussion on hydrological regimes can be done with the purpose to evaluate budgets of pollutants at the catchment scale.
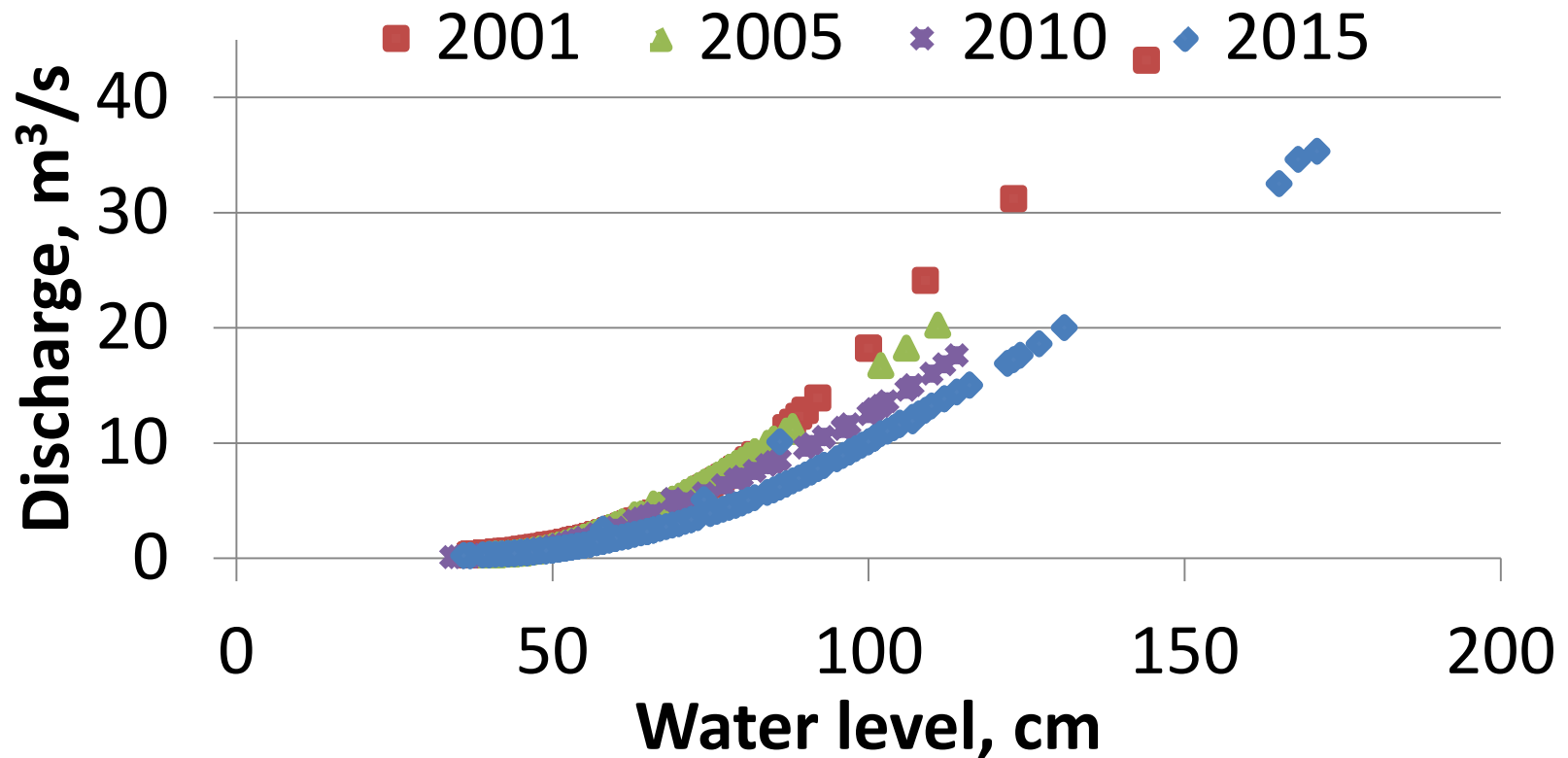
Dependence of water discharge and its level for year 2001

- Calculated from the time series of whole year measurement of Q and H
- Different graphs for cold season with low discharge (horizontal direction) and warmer seasons (with semi-parabolic shape) are clearly distinguished

The same patterns can be found for other years

Dependence of discharge on water level during warm seasons

The displacement of the dependency curves can be seen
Water discharge volumes corresponding to the same water level
have decreased throughout 2001–2015

Hypothesis for future experimental studies

Most likely the changes of dependence were connected to the modification of the river range transverse profile which demand further investigation before using that method

Other reasons, however, are not excluded and could be identified through acquisition of additional information

For cold season with low discharge dependency can not be detected