



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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Studying river water regime is necessary for understanding nutrient and pollutant balances at the drainage catchment. In particular, continuous water discharge data are important for estimating chemical compounds runoff from the watershed. Such data, however, can be difficult to obtain at selected remote locations, especially for many small natural streams. In this study, we propose a framework that allows filling temporal data gaps using the observed dependence of water runoff discharge and stream water level.

We used the daily data for several reference years (2001, 2005, 2010 and 2015) available for natural hydrological/hydro-chemical point of a small river Komarovka in the Russian Far East. The watershed of this mostly rain-fed river spans the steeper slope of Sikhote-Alin range. We identify two characteristic runoff-stream dependence regimes within each year of observations. The first one refers to the period of winter low water levels coinciding with minimum flow rates. The second one establishes in the warm periods simultaneously with higher water levels, including rain-driven increase in runoff and rainfall flooding. From the regression analysis of the data, we conclude that the flow rate largely depends on the individual river profile.

Comparing the regression data for selected years, we find that the significant change in the inter-dependency is present in the warm periods: water discharge volumes corresponding to the same water level have decreased throughout 2001–2015. Such might be due to modification of the river range transverse profile, which should be investigated in greater detail. Other reasons, however, are not excluded and could be identified through acquisition of additional information. We present the regression results and discuss the associated uncertainties of the method, also in view of its subsequent application for calculating the runoff of chemical compounds from the catchment.