



Changes of Hydroclimatic Characteristics in the Upper Lena Watershed

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The Upper Lena is typical mountain river, mainly flows in a narrow valley without a floodplain often limited by high or bluff shores. The stony channel abounds in a lot of rifts and cascades.

The considered territory belongs to the Baikal mountain-folded area. The watershed of the Upper Lena is an area of strong karst display. The frozen ground is one of the major natural factors of runoff formation on the watershed territory of the Lena river. The layer of summer thawing of ground characterizes the occurrence depth of surfaces permafrost soils. As a whole the capacity of a seasonally-thawed layer changes from 0,5 to 5,0 m, and these extreme values can be occasionally marked on the next sites.

For the analysis of hydroclimatic changes in the Lena river basin the average values of air temperature, the sum of atmospheric precipitation, characteristics of runoff for separate months within the period 1976-2006 were used.

As a whole, a growth of average annual air temperatures is observed, at a value of trends 0,5-0,6 ° per 10 years.

Depending on the research period the trend size of meteorological characteristics and distribution of trends within a year can change. In the previous works climate changes till 2000 were investigated. It is necessary to notice that earlier only the winter months participated in formation of positive tendencies of average annual temperatures, now the certain contribution is brought by warm period, and the maximum tendencies were displaced since December-January for February.

Statistically significant positive trends are marked in February, March, May, July, August, and October. Thus the maximum increase (1,5-1,8 ° per 10 years) is marked in February. In January, April, June, and September the rise in temperature is not significant. In November and December negative factors of regress are fixed (-0,4 -1,1 ° per 10 years), however they are statistically insignificant as well.

Tendencies of atmospheric precipitations for separate months within the considered period are insignificant in most cases and make $\pm 1\text{-}7$ mm per 10 years.

Significant changes of annual runoff for the considered period has not occurred, however an intraannual redistribution of the runoff at the expense of the runoff reduction during the spring-and-summer period and the runoff increases in the low autumn-winter period is observed.

The minimum runoff are mostly formed by ground waters. The ground water runoff is the stablest component of a river runoff; therefore the analysis of tendencies of its change is represented indicative enough at an estimation of climatically caused changes of a river runoff, despite the complexity of its allocation. The analysis of change tendencies of the groundwater component of a river runoff is made on an example of the Lena river in Kachug. Increase tendency of the groundwater component of the runoff is observed within the last three decades (from the middle of 70-s' years). And the most significant contribution to this increase brings the winter period.

In the report the estimation results of interrelations between the runoff characteristics and climatic characteristics are presented using an author's software package "Relations" intended for search and estimation of probably existing statistical dependences between variables provided that the estimations of their joint realisations can be approached and partially doubtful.