



12th International Conference on Hydroinformatics, HIC 2016

## SIMULATION OF THE PRECIPITATION SCENARIOS ON THE RIVER CATCHMENT WITH CONSIDERATION OF THE CLIMATIC CHANGES

Belchikhina V.V.<sup>a,\*</sup>, Ilinich V.V.<sup>a</sup>, Asulyak I.F.<sup>a</sup>, Belolubtsev A.I.<sup>a</sup>

*a: Russian state agrarian university - Moscow agricultural academy named after K.A. Timiryazev, Pryanishnikov St., 19, Moscow, 127550, Russian.*

---

### Abstract

Usually parameters of water reservoirs are determined on the base of water balance equation with discreteness 10 days (decade). The values of such equation are calculated on the data base for the long time series. Last half of century is observed a change of different climatic characteristics, in particularity precipitations, which are an element of water balance and has very significant influence on runoff to water reservoir. Consequently there is need to simulate precipitation according to last time of series which has more short duration but more reality. However we must take to consideration a big amount of different scenarios of precipitation both for annual values and for the internal year intervals.

Accordingly main purpose of the scientific work is the checking of the method for simulation artificial rows of precipitation according to climatic changes. The next problems were decided: determination of statistical parameters and trends according to data observation for the precipitation; assessment of stationary of the time series of observations; simulation of artificial rows of precipitation according to climatic changes; check of the method for simulation artificial rows of precipitation.

Object of research was chosen a catchment of water reservoir of Moscow region.

The method Monte Carlo (variant of fragments) was used for simulation of precipitation on territory of the river catchment. The results have showed that the used method can be applied for simulation of precipitation for the studied object. It is obviously that the method must be verified for each object, and if it is necessary-the method may be changed.

© 2016 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Peer-review under responsibility of the organizing committee of HIC 2016

---

\* Corresponding author.

E-mail address: [vbelchikhina@gmail.com](mailto:vbelchikhina@gmail.com)

*Key words:* precipitation, climatic changes, runoff, water reservoir;

## 1. Introduction

The precipitations on the catchment participates in forming of runoff and they are element of water balance of water reservoir. Last time we can notice, that amount of precipitation is changed according to climatic changes on some territories. The object of research in the scientific work was change of data observation for precipitation on meteorological station of Mozhaysk city which define runoff value to the Mozhaysk water reservoir. There is necessary to considerate different scenarios of precipitation distribution relative time for successful flow regulation by water reservoir with assessment of climatic change.

## 2. Materials and methods

The statistical rank of the precipitation on the Mozhaysk meteorological station has long time observations 78 years (1936-2013). The graph of the annual precipitation values is represented on fig. 1.

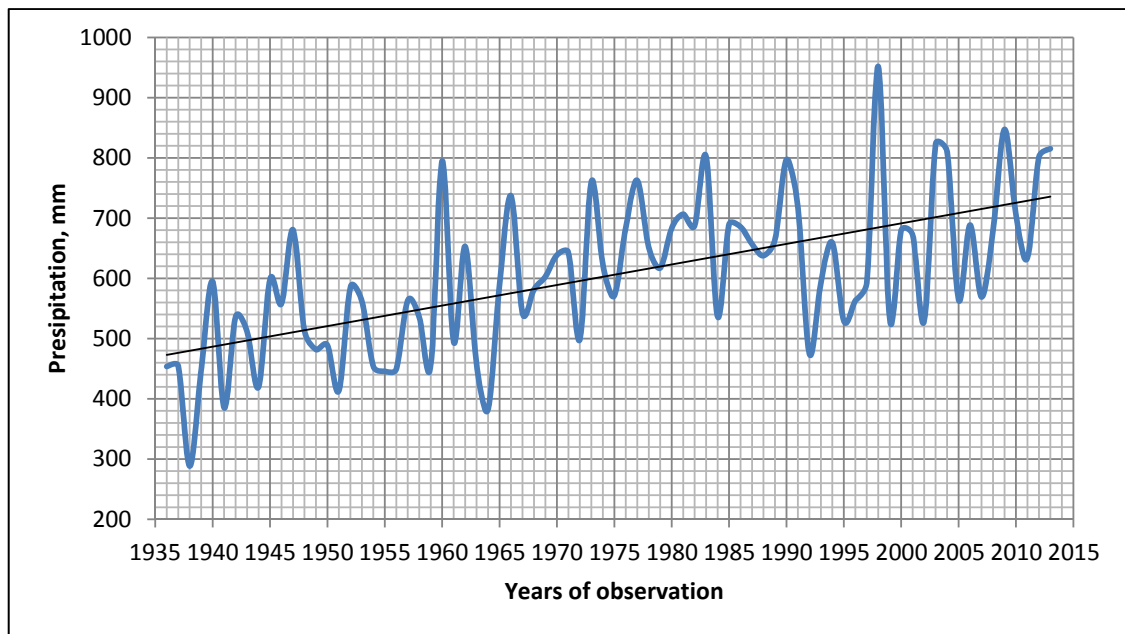


Fig. 1. Changes of the annual precipitation.

We can see on fig. 1 that there is clean trend of increasing of annual precipitation during time.

Statistical homogeneity of values was checked with help of known criterions of Fisher and Student's t-test on the base of two statistical ranks: 1936-1974 and 1975- 2013. In result a hypothesis of homogeneity has not been confirmed since Student's t-test ( $t=5,78$ ) exceeded acceptable limits of homogeneity significantly. Accordingly we can say that the second half of observed data is more real for successful flow regulation by water reservoir. However, we must have a significant amount of scenarios of precipitation relative to annual values and within annual values. But the short statistical rank (1975- 2013) does not contain various combinations of periods of small or large precipitation in the annual and the internal value of the year. It is Therefore it is necessary artificial simulation of long time series (about 300 years) to obtain them. So, next problem of the study – the checking of method for simulation artificial time

Download English Version:

<https://daneshyari.com/en/article/5030515>

Download Persian Version:

<https://daneshyari.com/article/5030515>

[Daneshyari.com](https://daneshyari.com)