ANALYSIS OF PRECIPITATION AND THEIR EXTREMENESS ACCORDING TO OBSERVATION DATA AT ODESSA METEOROLOGICAL STATION FOR THE PERIOD 1976-2019

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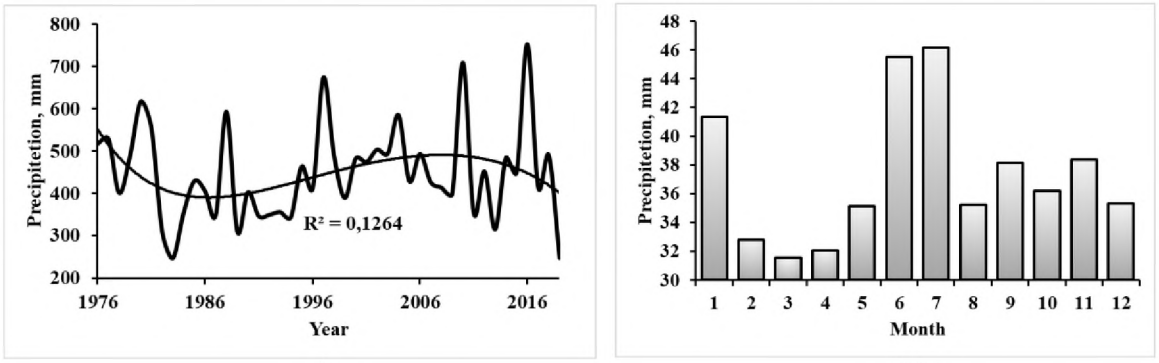
It is known that precipitation is the main source of moisture for the underlying surface; therefore, they largely determine its water balance. Both the lack of precipitation and their excessive amount are critical for human life. Precipitation is associated with such dangerous or disaster weather phenomena as droughts, floods, landslides, etc. Today, the results of scientific researches associate global climate changes, primarily with the redistribution of precipitation over the earth's surface, as a result of which territories with humid climate will become even more humid, and arid ones will suffer even more from moisture deficit in the future [2].

There are many works of scientists devoted to the analysis and forecast of atmospheric precipitation, however, it should be noted that global climate change requires scientists to conduct constant in-depth research at the regional level. The humidification regime is extremely relevant for the southern territories of Ukraine, because against the context of increased thermal background, they significantly depend from the amount of moisture, including that coming from the atmosphere. The issues of desertification of territories, soil degradation, etc. are important and relevant also.

It should be noted that the analysis of total annual precipitation at the Odessa meteorological station for the period from 1976 to 2019 shows the absence of a significant trend component. On the other hand, we can see a quasiperiodic variable (which is well demonstrated by the polynomial trend) against the background of an obvious increase in precipitation extremes in recent decades. The well-known 11-year and its overtone is a 5.5-year cycle, often found in the mode of meteorological values (the formation of an overtone can occur both under terrestrial conditions and be determined by the processes on the Sun themselves). This also includes the George Hale 22-year cycle (double 11-year) of magnetic phenomena, which in some places correspond to large amplitudes of temperature and precipitation fluctuations [1].

The above mentioned we can see on Fig. 1a, where the distribution of total amount of the atmospheric precipitation for the observation period 1976-2019 is shown. Seasonally, the maximum of precipitation is observed in summer (June-July) and in winter – in January, when 40-50 mm/month falls. The autumn months, as well as August, May and December, stand out in a separate group with

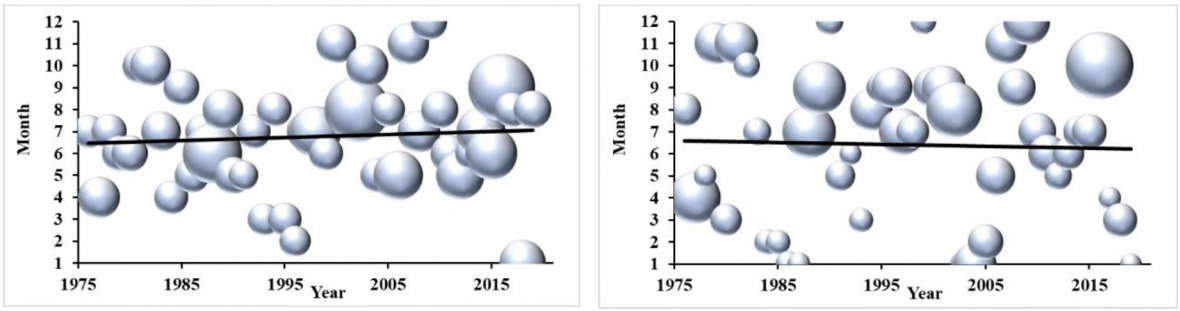
a monthly precipitation amount from 30 to 40 mm. The smallest amount of precipitation is observed from February to April – up to 30 mm/month (Fig. 1b).



a) b)

Fig. 1. Distribution of total amount of the atmospheric precipitation (a) and the annual course of precipitation (b) according to observation data at the Odessa meteorological station during 1976-2019.

The extremity of atmospheric precipitation can be estimated based by the analysis of modal component – Fig. 2. There is an increase of absolute value of the daily precipitation maximum over the past decades, as well as its shift to late summer and early autumn – Fig. 2a. By the monthly section, the following features should be noted: the precipitation monthly maximums are observed in the second half of year, although there is a tendency to shift them to late spring-early summer – Fig. 2b.



a) b)

Fig. 2. Modal component of distribution of the daily precipitation (a) and monthly precipitation (b) according to observations at the Odessa meteorological station for the period 1976-2019.

REFERENCES

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