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Change of Meteorological Values in Autumn of Samarkand Region

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Abstract--- *This work shows a map of the location of meteorological stations and posts in Samarkand region. In autumn, the average air and soil temperature change at the regional stations over the months, the dates of different air temperature transitions, and the average air and soil temperature values over five days were calculated. Average temperature values for the baseline and current climatic periods are analyzed.*

Keywords--- *Station, Autumn, Average, Temperature, Soil, Regime, Resource, Vegetation, Climate, Five Days.*

I. INTRODUCTION

For any independent state providing population with stable food production and food security remains important. It is known that the main climatic factors affecting the development and productivity of agricultural crops in the conditions of irrigated areas - heat, because the moisture is carried out in a timely manner in accordance with the requirements of the plant for irrigation. Therefore, L.N. Babushkin [4] proposed a method for estimating the demand of plants for thermal resources.

In addition, more than 40 years have passed since the publication of the directory of agro-climatic resources of the region [3]. The influence of meteorological quantities plays an important role in the growth, development and formation of elements of agricultural crops. Several researchers have conducted research in these areas [1, 5, 7, 11, 16,].

Nowadays, the study of the thermal regime of regions due to climate change is of practical importance in the selection of crop varieties.

One of the most important steps in denotation the time of the sowing of cereals determines the fate of next year's harvest. Sowing of winter wheat seeds carried out in each region at optimal times, depending on soil and climatic conditions provides with steady seed intergrowth, normal preparation for winter dormancy period and wintering, and high level of harvest. The growth and development of winter wheat range from 2-3°C to 36-40°C. The temperature should be 1-2°C for biochemical and physiological processes in the seed for beginning [7]. According to the results of many years of observations, sowing the grain crop was recommended for Samarkand region on September 5 [9].

One of the most important agro-technical measures for autumn cereals is the sowing- the end of vegetation period. It is also important to know the weather conditions and future changes in the area before planting. At present, it is important to know the changes in air temperature and precipitation at meteorological stations in these regions in the process of redevelopment of agro-climatic resources of the regions, assessment of crop yields, crop forecasting.

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In the regions of the republic, when the air temperature drops from 5°C to a steady decrease, the active vegetation of the plant decreases and the dormant state of the plant begins [7, 9, 12-15]. The end of the growing season (autumn dormancy) is when the average temperature drops below 2-3°C.

In this regard, in this work the study of changes in meteorological quantities in the autumn in the irrigated areas of Samarkand region is considered.

The main aim and task of this work. The aim of the study was to study the average air and soil surface temperature fluctuations, perennial quantities and climate change at Samarkand, Dahbet, Payshanba and Koshrabad stations for autumn cereals, and to analyze their values and future changes which is one of the tasks.

Materials and methods. The Uzhydromet archive is used data on meteorological stations in Samarkand region (Samarkand, Dahbet, Payshanba and Koshrabad). Computational work [2, 17, 18] was performed on the basis of the methods given in sources

The main part. Based on the aim and task, first of all, Figure 1 shows a map of the location of meteorological stations located in Samarkand region. In work, the data of meteorological observations made at these agro and hydrometeorological stations and posts changes in average annual air and soil temperatures is considered. This map-scheme can be used in the climatic zoning of the districts then.

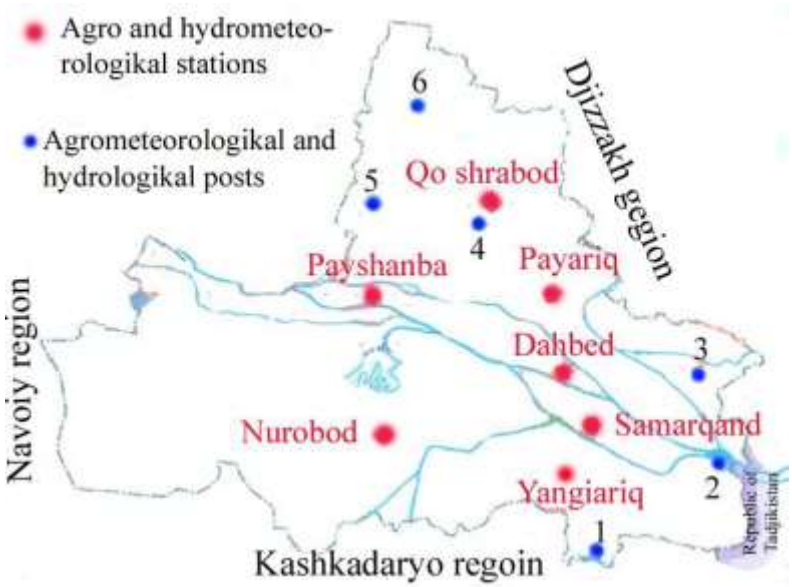

Figure 1: Map-scheme of Agro and Hydro Meteorological Stations and Posts Located in Samarkand Region

1 - Omonkuton, 2 - Lower basin of Rovotkhoja hydro network,

3 - Bulungur, 4 - Achabulak, 5 - Mavlon, 6 - Yangiaqchab

Meteorological stations have been monitoring air, soil surface and soil temperatures at various depths for many years. The processing of this data allows to establish the laws of several day and annual changes in air and soil surface temperature.

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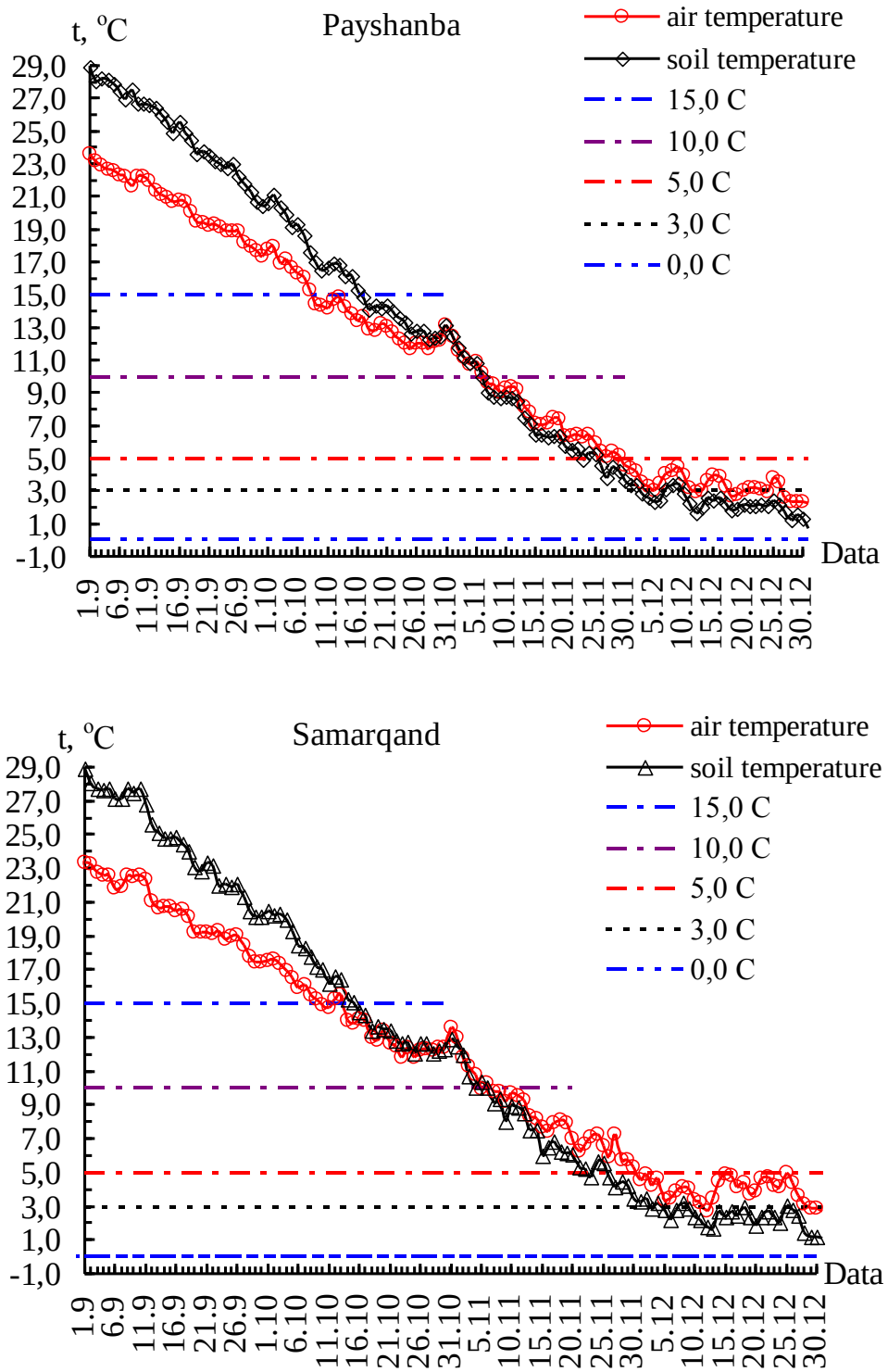
Therefore, in work, first of all, using the data observed at meteorological stations in 1991-2017, the change in the average air and soil surface temperature in the autumn for the irrigated area by date and the date of transition to different levels of temperature in the fall examined (Figure 1).



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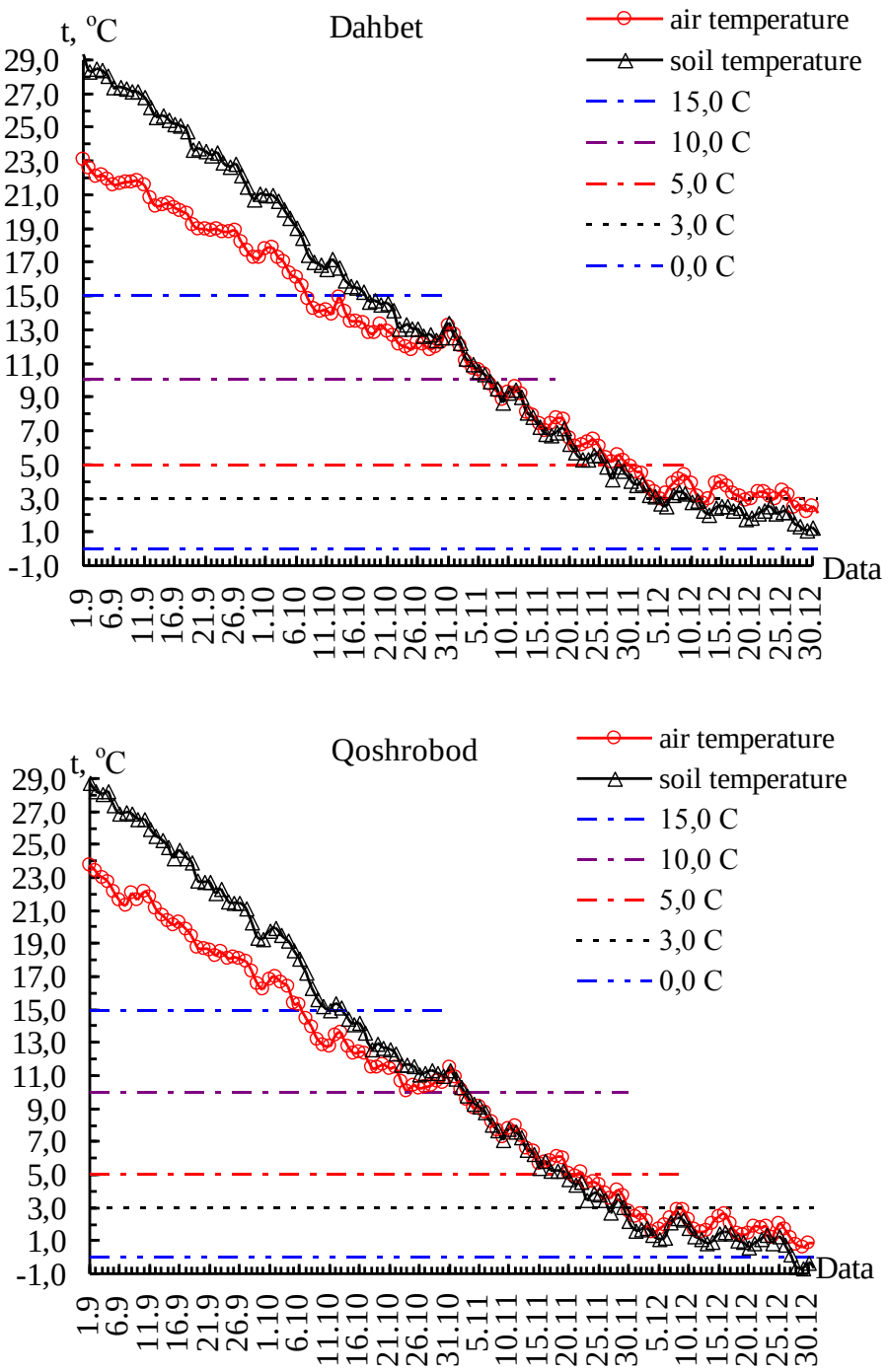

Figure 2: Dates of Average Air and Soil Surface Temperature Changes in Autumn

If we look at the trend line in Figure 2, the average air and soil surface temperatures at the stations will decrease smoothly from September 1 to the first five days of December, and the average air temperature will slow down from the second five days of December. At the beginning of September, the soil surface temperature differs from the average air temperature by 6,0°C, and their values coincide in the third five days of November, followed by a decrease in soil surface temperature relative to the average air temperature. The average temperature at Samarkand,

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Peyshanbe and Dahbet stations is as follows: 15,0°C - the fourth five days of October, 10,0°C - the second five days of November, 5,0°C - the last five days of November, 3,0°C - the last five days of December Koshrabad station – 15,0°C - the second five days of October, 10,0°C - the first five days of November, 5,0°C is the fourth five days of November, 3,0°C is the first five days of December. The autumn dormancy for winter wheat falls on the last five days of December. Based on these graph data, the thermal resources of the region can be estimated.

It is important to know the values of average air and soil surface temperatures over five days (pentadas) in the provision of agrometeorological services to agriculture and in assessing the state of plant development phases.

Therefore, Table 1 below calculates their multi-year values for the five days based on the data collected for 1991-2017. These data can be used to calculate the effective temperatures required for cereals (winter wheat) in five days.

Table 1: Samarkand, Dahbet, Peyshanbe and Koshrabad Meteorological Stations for Five Days in September-November Multi-year Values of Average Air Temperature (1991-2017 yy.)

			Data					
	Months		1-5	6-10	11-15	16-20	21-25	26-31
Kattakurgan	IX	air	23,1	22,1	21,3	20,1	19,1	18,0
		soil	28,3	27,1	25,9	24,4	23,1	21,3
		difference	-5,3	-5,0	-4,7	-4,4	-4,0	-3,3
	X	air	17,2	15,4	14,5	13,4	12,3	12,1
		soil	20,2	17,9	16,7	14,7	13,5	12,6
		difference	-3,0	-2,5	-2,2	-1,3	-1,2	-0,5
	XI	air	11,6	9,7	8,5	7,1	6,3	5,1
		soil	11,6	9,2	7,8	6,3	5,3	4,1
		difference	0,0	0,5	0,7	0,8	1,0	1,0
Samarkand	IX	air	23,0	22,3	21,1	19,9	19,1	18,0
		soil	28,1	27,4	25,4	23,8	22,5	20,7
		difference	-5,1	-5,1	-4,3	-4,0	-3,4	-2,8
	X	air	17,1	15,7	14,8	13,7	12,1	12,5
		soil	19,9	17,9	16,0	14,1	12,7	12,4
		difference	-2,8	-2,2	-1,2	-0,4	-0,5	0,0
	XI	air	11,6	9,8	8,8	7,7	6,7	5,5
		soil	11,3	9,2	7,9	6,4	5,2	4,1
		difference	0,3	0,6	1,0	1,3	1,5	1,4
Dahbet	IX	air	22,4	21,6	20,8	19,6	18,9	18,0
		soil	28,5	27,2	26,0	24,5	23,2	21,7
		difference	-6,2	-5,6	-5,2	-4,9	-4,3	-3,8
	X	air	17,3	15,2	14,2	13,4	12,2	12,0
		soil	20,5	18,0	16,5	15,1	13,6	12,6
		difference	-3,2	-2,8	-2,3	-1,7	-1,4	-0,6
	XI	air	11,5	9,5	8,6	7,4	6,0	5,2
		soil	11,5	9,6	8,4	6,9	5,4	4,5
		difference	0,0	0,0	0,2	0,5	0,6	0,7
Koshrabad	IX	air	23,0	21,7	20,9	19,3	18,3	17,4
		soil	28,2	26,8	25,2	23,6	22,0	20,4
		difference	-5,2	-5,1	-4,3	-4,3	-3,7	-3,1
	X	air	16,5	14,2	13,0	12,1	10,7	10,4
		soil	19,5	16,7	14,9	13,4	11,9	11,0
		difference	-3,0	-2,6	-1,9	-1,2	-1,2	-0,6
	XI	air	9,8	8,0	6,9	5,9	4,6	3,6
		soil	9,9	7,9	6,6	5,4	3,9	2,9
		difference	-0,1	0,1	0,2	0,5	0,6	0,7

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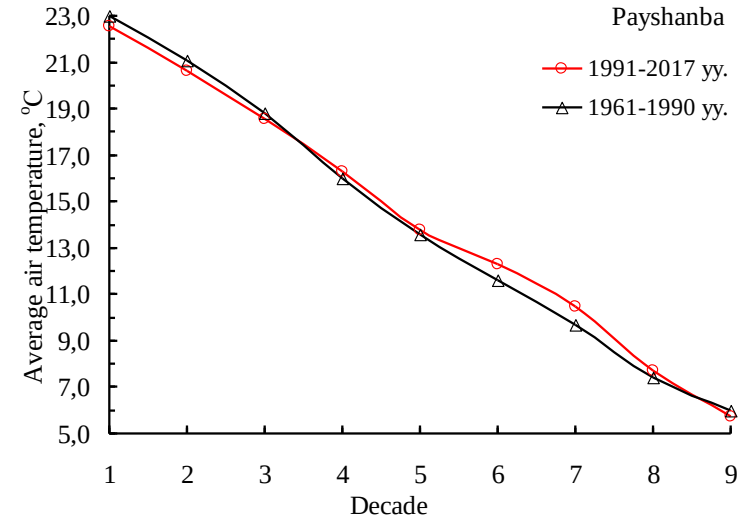
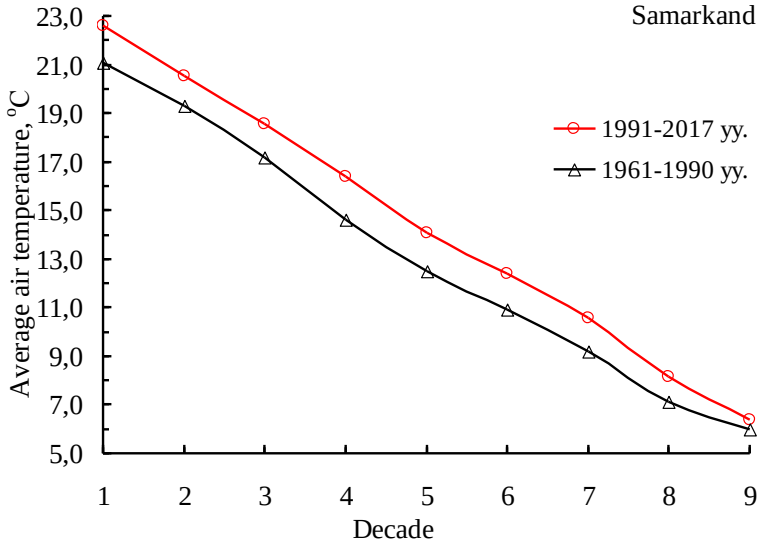
Climate, to a certain extent, determines the productivity of crops and livestock. Therefore, in order to properly use the climatic potential of the regions, it is necessary to first study the climate, determine its importance in agriculture and know how to reduce the damage from adverse weather conditions.

According to the recommendations of the UN Climate Practice Guidelines, a climatic standard or base norm should be calculated when at least 80% of the annual average is available. This means that normative or average values for months can be calculated when at least 24 years of 30-year data are available. Climatic norms have two main purposes: they serve as an indicator of conditions in a given region in accordance with the current climatic trend, and the control point can be compared to climatic conditions in a given region (or given region) for a given time [18]. These problems have also been studied by a number of researchers [6, 10, 12-15]. Figures 3 and 4 show the change in average air temperature and precipitation over decades in the base period (1961-1990) and then in the period (1991-2017) (where: 1- 3 (September), 4-6 (October), 7-9 (November) Decades).





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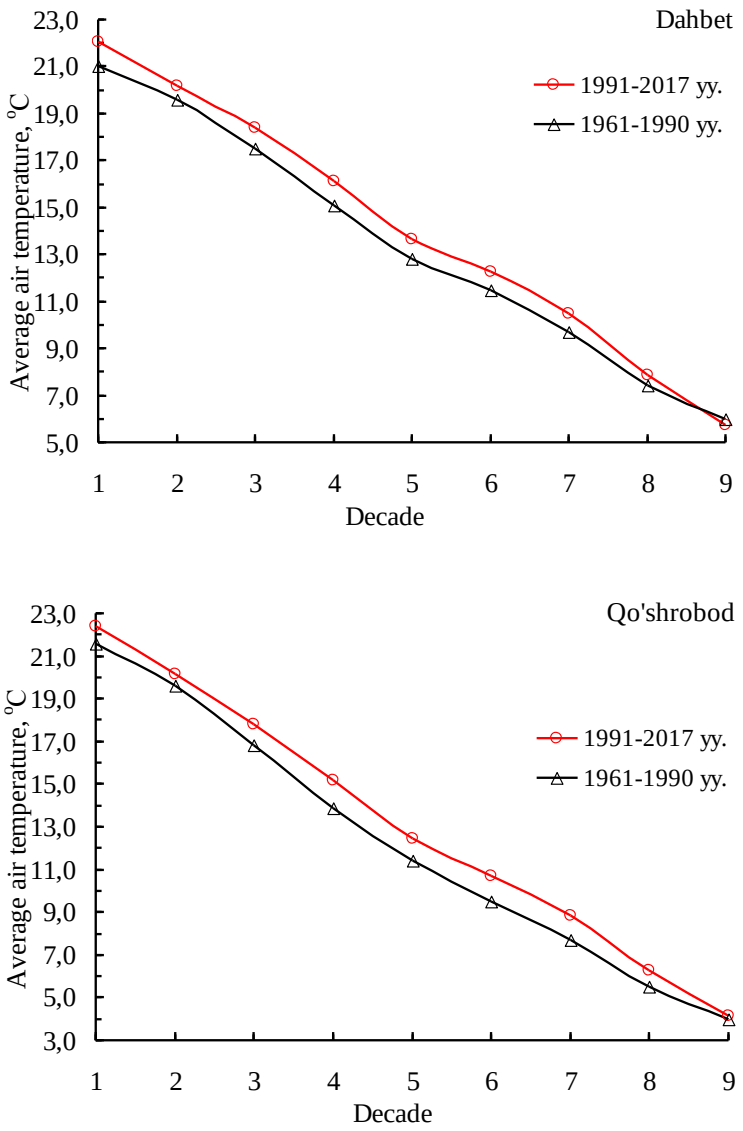

Figure 3: Decades of Average Air Temperature at Samarkand, Dahbet, Payshanbe and Koshrabad Stations in the Autumn Period in the base Period (1961-1990) and then in the Period (1991-2017)

As can be seen from Figure 3, the increase in the average air temperature increased in the region in September-November compared to the base period for stations (1961-1990) in the current climatic period (1991-2017) only in late November temperature changes weren't noted.

One of the important issues is to analyze the recurrence and duration of synoptic processes that occur in the Central Asian region, which lead to changes in air temperature and precipitation in the autumn.

II. Conclusion

In general, the average temperature in the region has risen slightly. These changes indicate the need to reconsider the sowing period of winter wheat in the region.

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Given that the winter dormancy period for wheat falls on the last five days of December, these data can be used to calculate the sum of the effective temperatures required for grain crops (winter wheat) on the five days.

This information can be used to provide agrometeorological services for cereals grown in irrigated areas.

Based on the above, Samarkand region requires research in the following main areas for grain crops in irrigated areas:

- Changes in the value of meteorological measurments in the region from sowing to ripening;
- Dangerous meteorological events observed during development;
- Find the optimal sowing date by district;
- The sum of the temperatures required to pass the phenological phases of cultivated varieties;
- The effect of water temperature and hydro ecological conditions on crop development during irrigation;
- Assessment of agrometeorological conditions in the formation of productivity elements;
- Elements of productivity and yield forecasting;
- Agroclimatic maps of irrigated lands.

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