# DETERMINATION OF THE ANCIENT CLIMATES OF CENTRAL ASIA IN THE QUATERNARY PERIOD USING DENDROCHRONOLOGY OF VARIOUS TREES

**Is'hakov Gulomjon Farkhodovich**
O'simliklar karantini va himoyasi ilmiy-tadqiqot instituti
E-mail: iskhakov.88@list.ru

***ANNOTATSIYA***

*O'rta Osiyoda davriy va umumiy iqlim o'zgarishlarini o'rganish uchun ob'ektiv va ishonchli ko'rsatkichlar kerak. O'rta Osiyoda meteorologik tarmoq bor-yo'g'i 50-80 yildan beri mavjud bo'lib, uning ma'lumotlari bizni qiziqtirgan iqlim o'zgarishlari va o'tgan yillar iqlimi haqidagi savollarni hal qilish uchun etarli emas. Xroniklar va boshqa tarixiy hujjatlar ma'lumotlarida faqat me'yordan tashqarida bo'lgan alohida tabiat hodisalari, o'ta qattiq qish va katta toshqinlar qayd etilgan. Bu ma'lumotlar uzuq-yuluq. O'tgan yillardagi iqlimning muhim ob'ektiv ko'rsatkichlaridan biri eski daraxtlarning yillik qatlamlaridir.*

***Kalit so'zlar:*** *daraxt, o'rmon, archa, O'rta Osiyo, Shung'on archa, iqlim, bog', tog', yog'in, davrlar, dendroxronologiya.*

***ABSTRACT***

*Objective and reliable indicators are needed to study periodic and general climate changes in Central Asia. In Central Asia, the meteorological network has existed for only 50-80 years, and its data is not enough to solve questions about the climatic changes that interest us and the climate of past years. In the data of Chronicles and other historical documents, only isolated natural phenomena outside the norm, extremely harsh winters and large floods were recorded. This information is long-winded. One of the important objective indicators of the climate of past years is the annual layers of old trees.*

***Keywords:*** *Tree, Forest, spruce, Central Asia, pine spruce, climate, garden, mountain, rain, periods, dendrochronology.*

**Introduction:** Party and Soviet organizations of the mountainous Badakhshan Autonomous Region strongly support the establishment of a botanical garden in Khorugh City, providing constant support in its work. The garden is separated by a very beautiful plot of land with an area of 93 hectares, located on the ancient fifth

terrace, at the confluence of two mountain streams – Gunt and Shahdara. The garden is located at an altitude of 2320 m above sea level. Garden area has excellent conditions, where permanent glaciers are also found. This area is considered to have the most optimal conditions in Central Asia. Garden area is considered to have deltas of Willow, Poplar, apple, pear, Greek Walnut, Acacia, Juniper, oak, pine and various other trees and shrubs. There are more than 70 species of trees. The average monthly temperature in the garden during the summer months is 240 C, in winter the average monthly temperature drops to -100 C. The rest of the months will be around 10-160 C. Above the height of 1700 m in the Pamirs, the temperature drops to -210S. The average monthly fat content, on the other hand, is observed up to 40 mm, during the winter months. In the summer months, the amount decreases. Garden Wood is considered one of the most favorable conditions for the growth of trees and shrubs. [A.V.Gurskiy,I.V.Kanevskaya,L.F.Ostapovich].

**Types of tall trees on the territory of the Pamir Botanical Garden**

**Table 1.**

| № | Tree name | Age | Height and width, m | Position |
|---|---|---|---|---|
| 1. | Apricot | 11 | 4,57/0,19 | Usually bears fruit |
| 2. | Circle | 10 | 8,0/0,5 | Fruit |
| 3. | White Acacia | 10 | 3,27/0,42 | Fruit |
| 4. | Kanad Bumduki | 10 | 2,0/0,5 | Fruitless |
| 5. | Pennsylvania Cherry | 7 | 2,15/0,18 | Fruit |
| 6. | Turkestan (Roshan) Ryabin | 9 | 3,36/0,24 | Fruit |
| 7. | Sofora | 11 | 7,0/0,4 | Flowered |
| 8. | Pyramid Poplar | 14 | 17,0/0,5 | Fruitless |
| 9. | Bolle Poplar | 4 | 6,0/1,5 | Without fruit |
| 10. | Bird cherry | 10 | 4,5/0,43 | Usually bears fruit |

This table details the species of tree that grow in the area we are studying. To solve many agrotechnics, Forestry and environmental and climotological problems, it is necessary to have a clear and sensitive way of recording the growth of trees in thickness. The thickening of the tree, along with the growth of its height, determines the growth of the tree.

**Method.** In his paper on tree growth, Mac Dugal defined dendrographs as complex and expensive devices that record the smallest changes in the circumference of a tree trunk, recording indicators on moving paper lines. Due to the cost and complexity of their high, these devices were hardly used for mass measurements. [Mac Dougal].

So, the researchers set ourselves two tasks: 1) to study the growth and durability of tree species growing in different balladry conditions; 2) to study the climate change of past years based on an analysis of the width of the annual layers of spruce trees.

In the plains of Central Asia, peach trees rarely live for more than 6-8 years, while Schungan has been found to have peach trees that are 20-30 years old; Rushon has large peach trees that are over 50 years old. Mulberry trees in the old bases of the mountainous Badakhshan Autonomous Region often reach the age of 150-200 years. In flat forests, it was necessary to study the incisions of large tree layers of a Pine Terrace with a volume of 130-150 pieces. Tree species have been observed to have a significant increase in endurance as they rise to altitude in mountainous areas. [L.S.Berg].

**Results and Discussion.** In 1948, 54-year-old sorrel conifers with a trunk thickness of 2 cm at a height of 3700 m were found in the Shungan Ridge. On the territory of Korolkov you can find trees aged 130-140 years. These observations led us to consider separately the problem of the durability of tree species in mountainous conditions.

Our attention was attracted by Juniper, represented by a species in GBAO. This is where such a spruce, which is very close to Zarafshan, prevails. In the Vanch region, hemispherical spruce, and in the Vanch and Bartang Alpine belt, Siberian spruce thickets were found. The shrub spruce reaches a height of 3700 m in some places. Unlike most other tree species of the Gono-Badakhshan Autonomous Region, The Spruce grows in clear rainy conditions, using only the moisture of precipitation. An analysis of the age of spruce trees conducted in 1940 suggests that it may be quite large. This leads us to the idea of using old spruce trees as Chronicles of past climatic conditions. [L.F.Ostapovich]

**The growth of some trees in Khorog summer 1948**

**Table 2.**

| № | Plant name | Growth duration |
|---|---|---|
| | | Horog |
| 2. | Siren | 25-30 |
| 3. | Cherry | 36 |
| 4. | White Acacia | 52 |
| 5. | Amur barkhat | 54 |
| 6. | Ash tree | 42 |
| 7. | Tatar Maple | 42 |
| 8. | Garden cherry | 41 |

This table lists some species of trees growing in Khorog City, and ancient trees can also be found in the area. The climatic conditions here are such that the trees grew according to humidity and air temperature. The life expectancy of the trees here is considered to be longer.

The results of the work associated with the first problem consist of a short bottom. Under Optimal conditions, spruce growth is very fast. Maximum growth is observed at the age of 80-100 years, then a sharp decrease in growth indicates rapid aging of trees. At the indicated upper limit, spruce trees grow very slowly, their maximum growth is observed in 600-650 years, and a very slow decrease in growth indicates a very long life vision of spruce trees. Old spruce trees, several hundred years old, can undoubtedly give valuable materials on the history of the climate. Such information is of not only scientific, but also practical importance, since periodic climate change strongly affects the economic activity of a person. From time to time, winter in winter is known to cause great damage to crops in subtropical regions. Severe winters in the temperate zone also cause significant damage to fruit and ornamental plantations. In such winters, not only cultural plantations consisting of introduced plant species and varieties die, but also old trees of local species growing in natural forests.[A.V.Gurskiy].

The growth of the tree depends not only on the climate, but also on many other cases, the influence of surrounding plants, soil conditions, the age of plants, etc. In addition, the water supply of the tree, for example, in the River Plain, often does not depend on the amount of precipitation, but consists of a regime of snow melting in the mountains and a regime of river water flow. Therefore, F. As Shvedov noted, the writer noted that trees growing in mountainous conditions and away from other plants that undermine the influence of the climate on the growth of the tree were very suitable as a yearbook of the climate of previous years.[A.Shvedov].

**Juniper tree species and characteristic**

**Table 3.**

| № | Species | Growth Place | Age | Height m | Diameter sm | Cut in |
|---|---|---|---|---|---|---|
| 1. | The schooner arch | Medinved Shordara tract 3,600 m high | 420 | 9,0 | 35-26 | Cut in 1951 |
| 2. | Schooner rope | Schooner Ridge 3700 m height | 468 | 6,0 | 52-25 | Cut 1948 |
| 3. | Schooner arch | Schooner Ridge largest tree at 3700 m height | 930 | 7,5 | 45-36 | Cut 1948 |
| 4. | Zarafshan arch | Mount Oloy at 2600 m in the northern part to | 186 | 9,0 | 40 | Cut 1948 |
| 5. | Zarafshan arch | Mount Oloy in the northern part at an altitude of 2600 m to | 200 | 8,7 | 40 | Cut 1948 |
| 6. | Schungan arch | Medinved Shordara tract 3600 m high | 186 | 6,0 | 34-19 | Cut in 1950 |
| 7. | Siberian arch | Vanch, 3400 m altitude | 118 | | 5,5-5,3 | Cut in 1951 |
| 8. | Siberian arch | Vanch, 3400 m altitude | 131 | 8,7 | 7,7-4,7 | Cut in 1951 |
| 9. | Schooner arch | Schooner mountain 3,700 m high | 400 | 4,8 | 30-21 | Cut in 1948 |
| 10. | Schooner arch | Vanch, at 3500 m high | 358 | 6,3 | 38-19 | Cut in 1948 |

This table above gives a complete overview of the trees we are selecting and considering. Layers of width are measured with a stencil with an accuracy of 0.1 mm. In the arch, as in other species, there are sometimes secondary annual layers, which are easily distinguished from the main ones by very thin and pronounced transplants of autumn tree wood. When calculating, the secondary annual layers are combined with the main ones. The width of the very narrow annual layers is measured using object micrometers. They are placed on a part of the tree and examined through 10-20 carat flakes. In order not to lose the score and not to measure one layer twice, all measured annual layers are recorded immediately. The annual layers measured on the graphs are dropped. Graphs of annual layers of spruce trees look a little like cardiograms. Figure 1 shows the absolute values of their annual layers for three spruce trees, clearly showing sharp ups and downs in the thickness of the annual layers of trees, which may be primarily due to changes in external conditions. Internal processes of the vital

phaoliation of trees, such as plants that require fruiting, consume a lot of energy and nutrients and always lead to a slowdown in growth in the year after fruiting. [A.V.Gurskiy,I.V.Kanevskaya,L.F.Ostapovich].

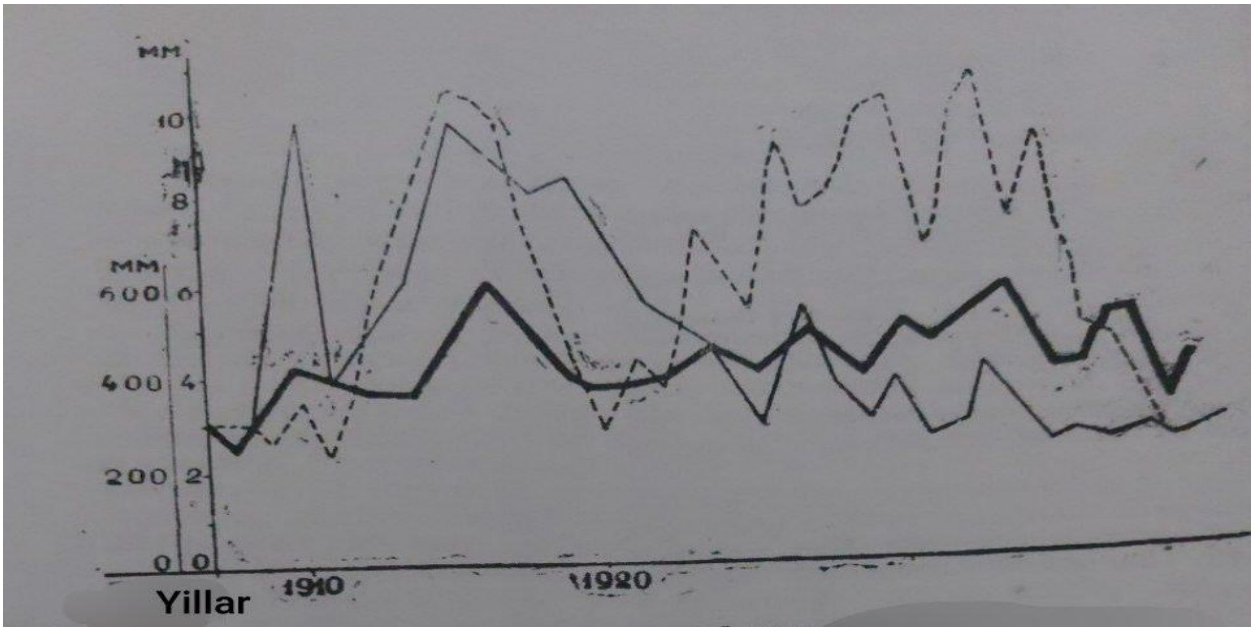


**Figure 1. Tree width and atmospheric precipitation in Otra and Kubansk is a dependency graph.**

From the graph it can be seen that in the years when atmospheric precipitation increased, the width of the tree also increased. This means that in low-fat years, the tree width has also decreased. From this it can be determined that the transverse sections of trees allow us to know the climatic annals of the distant past.

The best recorders of the climate in Central Asia are undoubtedly old spruce trees. They, as shown above, reach adulthood, their annual layers are very clearly expressed.

Table 2 details the fir trees used in this work. The data given suggest that dwarf fir trees, which grow mainly in Garden Wood, have been studied. Before calculating and measuring the annual layers, we drew two lines from the center of the cut trunk. One of them runs along the length, and the other along the short diameter of the trunk. The transverse parts of the trunk of the spruce are always built asymmetrically, and, as can be seen from the data in the table, the long and short diameters of the trunks often differ sharply in length. The trunk of the tree acquires more irregular, asymmetrical shapes due to the deterioration of the environmental conditions in which the plant exists.[A.V.Gurskiy,I.V.Kanevskaya].

A study of the growth graph of arch number 3 shows that this tree began to grow in 1010 and grew very well in the first 190 years, during which time it showed about 16 clearly visible projections on the curve, so that when they were averaged, the interval was 11.18 years old. From 1200 to 1500, over a period of 300 years, the tree

grew very slowly. It is difficult to imagine that the growth of the tree was the same during this period, but the annual layers formed during this period were so thin that they were very difficult to measure. [A.V.Gurskiy].

This depression in the growth of Spruce number 3 can occur due to individual reasons in the life of this tree. The root system of the tree could withstand the difficult-to-pass horizons of the substrate process. It is not clear that the cause of this depression in the growth of Juniper number 3 is not due to the absence of another tree of the same age. From 1500 to 1948, tree diagram No. 3 shows 34 ascents of the curve separated by a 13-year interval.[L.F.Ostapovich].

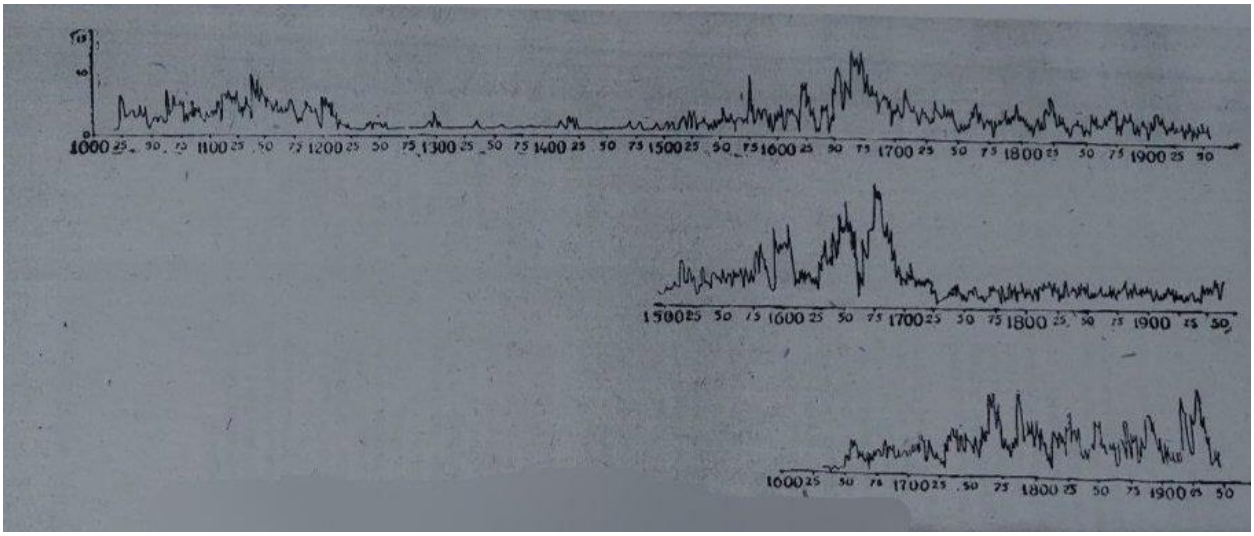

**Figure 2. Graph of rhythmic variations of the widths of juniper trees №1, №3 and № 9 in mountainous Badakhshan.**

From this chart, we can see from the graph that the deeper and more depressions were, the better the precipitation in those years and the better conditions for the growth of the tree and the expansion of its trunk.

For arch No. 1 from 1475 to 1950, 45 ascents of the curve are identified, separated at intervals of 106 years. Arch No. 9 from 1615 to 1940 shows the 26th rise of the curve at an average interval of 1212. It is known that Douglas, based on a study of the annual layers of coniferous tree species in California, identified 11-year periods of oscillation of sunspots. L.S. While discussing small periodic climate changes, Berg expressed doubts about the strict periodic regularity of climate change, noting that these fluctuations often do not correspond to the correct rhythms. [Mac Douglas].

Most often, climate changes of 9-14 years can be observed. F. Shvedov, as mentioned above, based on a study of the annual layers of white Acacia in Odessa, found periodic fluctuations in the width of the annual layers of the observed spruce tree, and not always with the right periods. Willick makes it clear that there are changes

in the width of the layers depending on the age of the tree. The maximum width of suitable layers for tree No. 3 dates from 1625-1950. For a simultaneous number 1 tree, number 9 dates from the 1750s to the 1770s. [F.Shvedov].

In Figure 2, trees show graphs of absolute and relative sizes of annual layers. The lower curve is markedly flattened, showing less dependence on tree age. Flattened curves speak very clearly about the periodic fluctuations in the growth of spruce trees, depending on the changes in external, environmental conditions during the growing season of different years. [A.V.Gurskiy].

**Conclusion.** From the graph and results considered above, it can be said that in the range from 1000 to 1600 years in Central Asia, the depression curves of the tree are not so deep, that is, during this period there was not much precipitation, and the diameter of the tree did not expand much. In the interval between 1600-1920, it can be seen from the graphs that depressions deepen and the amount of precipitation is greater, during which the air temperature is also lower, and a state similar to that of the Little Ice Age is observed. Thus in Central Asia, the drying of the climate during these periods shows that it was not observed in ancient times.

In summary Figure 2 shows the flattened curves of the relative width of the annual layers for the three spruce trees No. 9 and 1,3, which grow on the Pine and Vanch at a distance of 200 km from each other.

The graphs show a significant matching of the curves, proving the suitability of the annual layer analysis method to assess the climate of previous years. These curves also suggest that there are longer climate changes than the 11-and 30-year periods of Bringner, Douglas, and other scientists. [Mac Douglas].

In the transverse latitudes of the tree annual layers, the state of depression is felt in the late 17th and first quarter of the 18th century. The late 18th century and the first quarter of the 19th century also saw a strong depression. The depressions are characterized by the rise of the curve in the 1930s and 1940s. There was a significant depression in the 60s of the last century, following these great depressions, there is a general rise in the curve that lasted until recently. Based on the general course of the previous 3-4 centuries, it should be assumed that in the coming years there will be a slight decrease in the curve. Of course, it is impossible to see a general change in climate, depending on more land than the drawn curves. Conversely, it can be concluded that the last half-century saw a general increase in the curve. [A.V.Gurskiy].

This is the case, in our opinion, of the late academician L.S. Berg supports the conclusion that no general drying (warming) of the climate of Central Asia has been observed in the historical period. To assess this, the curves of the annual rings of properly worked old trees are certainly more reliable than short-term observations and of course geobatanic nature. [L.S.Berg].

**List of literature used:**

1. Yu.M.Petrov klimat I Pogoda Samarkand Gidrometeoizdat, 1982.-99 b.
2. T.N.Dolimov, V.I.Troitsky. Evolutionary geology Tashkent: teacher, 2007.-336 b.
3.V.A.Zubakov. Globalnie klimaticheskie sotia neogena Hydrometioizdat, 1990.-197 b.
4. A.A, Abdiyev. Neftigas areas and aquateries of the world. Tashkent: East, 2009,-493 b.
5. M.L.Arushanov. Klimatichesky spectrum planet Zemlya. Tashkent. Uzgidromet, 2010.-160 b.
6. P.Baratov, M.Magnatqulov, A.Gafnikov, the natural geography of Central Asia. Tashkent: Teacher, 2002.-220 b.
7. K.S.Losev klimat: vchera, Segodnya... zavtra I, L.: Hydrometeoisdat, 1985.-174 b.
8. O.V.Nalivkin Paleogeography Sredney Azii. M.- L.: AN USSR, 1936.-205 b.
9. Srednyaya Aziya. Moscow: Изд.AN USSR, 1958.-648 b.
10. S.S.Shuls. Analiz noveyshiy tektoniki I relefa Tyan-Shanya zapiski Vsesoyuzi. Geograficheskogo obtshestva. T.Z. M.: Geografgu, 1948.-316 b.
11. N.A.Yasamanov Manziltno-klimaticheskie uslovia Yura, Mela I paleogena Yuga USSR, M.: Nauka, 1978.-223 b.
12. N.A.Yasamanov drevnia klimati Zemli. L.: Hydrometeoisdat, 1985.-296 b.
13. M.Qoriyev is the natural geography of Central Asia. Tashkent: Teacher, 1968.-334 b.
14. A.V.Gursky, I.V.Kanevskaya, L.F.Ostapovich Osnovnie itogi introduktsii rasteniy v Pamirskom botanicheskom Sadu. Stalinabad SSR, 1953.-97 b.
15. B.P.Alisov B.V.Poltaraus Climatology. Moskovskogo University, 1974.-290 b.
16. E.P.Borisenkov, L.G.Polozova Kolebania klimata za poslednee tisyacheletie Hydrometeoizdat, 1988.-406 b.
17. Rubinstein E. S., Polozova L. G. Sovremennoe izmenenie klimata. - L.: Hydrometeoiedate. -1966-p. 13-24.
18. X.Arakawa Izmeneniya klimata. Hydrometeoisdat, 1975.-112 b.
19. Series Geograficheskaya Tom 2, Izvestia Akademii Nauk USSR, Izdatelstvo "Nauka" 1972.-105-107 b.
20. Vestnik MGU Tom 1, Izvestia Akademii Nauk USSR, Izdatelstvo "Nauka" 1975.-108-110 b.