Climate Characteristics of the Neogene Period

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ABSTRACT

In our previous articles, we have considered the climatic conditions of Central Asia, their characteristics before the Neogene. Today's article describes the climatic conditions, nature, flora, fauna, tectonic movements of the Neogene period, the main factors that led to climate change, and ways to prevent them. Most importantly, you will gain an understanding of the impact of the ancient Tethys Sea on the climate.

Keywords: Neogene, Miocene, Pliocene, Alpine, Central Asian, climate, marine, vegetation, northern, southern, delta, Pacific, walnut, oak, pine, coniferous forests and others.

Introduction. We have witnessed cases where we were convinced that there is no such interesting activity as studying the secrets of Mother Nature as humanity is developing. As each period has its own charm, the study of climate changes in the Neogene period is of particular importance in studying the climate of ancient times and in identifying and studying the climate changes that have occurred. The Neogene period is divided into two parts: Miocene and Pliocene periods. Both of these are divided into three tiers. The animal and plant world of the Neogene period is slightly different from the present organic world. The reason is the presence of a warm sea in some places at the beginning of the Neogene period (Miocene) and the refolding of the mountains between the continents from the Alpine folding process.

Purpose and tasks of work. One of the main goals is to study the ancient climatic conditions of Central Asia and analyze the climatic conditions of the Neogene period, and compare the obtained results with those of the current period.

The main part. During this period, palm, sequoia, cypress, fern (myottsenda) and oak, larch, poplar, white pine, acacia, and willow trees grew in the swamp. These plants are adapted to hot, warm climatic conditions. Conifers and other trees are common in the northern region. In the Pliocene (upper Neogene), plants growing in a warm-warm climate are reduced, they were preserved only in the south of Europe.

Elsewhere, plants growing in warm climates are common. If we compare the Neogene period with the present period, we can see that there were no conditions for the growth of plants suitable for the tundra zone.

During this period, reptiles, water-dwelling animals, and flying birds increased from animals that lived on land. What I find fascinating is that during the Neogene, mammal species increased and evolved. For example, the hipparion species of the first horses, camels, rhinoceroses, marsupial wolves, kangaroos, bison, wild goats, deer, mammoths and other breeds began to appear. The fact that apes appeared at the end of the Neogene, and even apes, elephants, and real horses at the end of the

Pliocene show that this period was of great importance in the future of Mother Earth.

Since the Neogene deposits were formed more on land, the remains of animal bones are not well preserved in them. Animals that lived in swamps, seashores, river deltas, lake shores, or those that drowned were well preserved. They can be found on the banks of the Volga River, on the ancient terraces of the Chu and Ili Rivers in Kazakhstan, and among the frozen ground (mammoth bone) in Siberia. Hipparion (ancient horse) bone, ash, and mulberry tree turned into coal were found in the Pliocene deposits of the Chirchik Valley in the Piskom tributary of Uzbekistan. The discovery of a deer skull (Upper Pliocene) among siltstone sediments in Madigen, South Fergana, indicates the widespread distribution of mammals in Uzbekistan.

Soft-bodied animals lived in the sea - gastropods, brachiopods, cephalopods, and sea urchins. Most of these animals live in the current seas and freshwater bodies. For example, Sardium, Mastra, Enus, Tapes, Congeria, Speriales, etc.

At the end of the Paleogene period (Eocene, Oligocene), the Alpine folding phase changes the geosynclines of the Earth. Mountains appear, water recedes from the land, that is, with the change of relief, the natural-geographical conditions also change. Nevertheless, the accumulation of sediment in the young geosynclines, the movement of folding continued again. There were also partially flooded areas on land, and seas and lakes remained between the continents. The Atlantic Ocean is formed between the North and South American continents and the European and African continents. During the Neogene period, there was a land route with Europe through North America, Greenland, Great Britain. Most of the landmasses we know today were not flooded during the Neogene period. In the geosyncline of the Mediterranean Sea, islands and peninsulas formed from the folding of the Alps. Young geosynclinal zones in the west and east of the Pacific Ocean stretch from north to south, and the process of volcanism continues in these areas.

It was found that Paleogene and Neogene deposits are currently under the Indian and Atlantic oceans. It can be seen that the formation of the oceans corresponds to the time of the Mesozoic and Cenozoic eras. For the proof of this process, only deposits of the Jurassic, Cretaceous, Paleogene and Neogene periods can be found when drilling under the oceans in 1969-80.

Alpine folding is very strong at the end of the Miocene, in the Pliocene, causing the formation of major mountains in the geosynclines, depressions in front of and between the mountains. Alpine folding occurred not only in young geosynclines, but also in mountains folded during the Hercynian period. In such places, there have been cases of earth cracking, rising of one area, and subsidence of another. The Hersin Folded Mountains rose and sank as a whole along the rift as a result of the Alpine fold. Bujoys are filled with sediments brought by rivers from the mountains. In this case, the mountains that were uplifted a second time include the mountains of Scandinavia, Central Asia (Tianshan, Altai, Sayan), Australia, which were formed during the Caledonian fold, the Verkhoyan mountains, which were folded during the Cimmerian uplift in the east of our Union, and the mountains of North America. During this period, the Great Africa rift occurred, and several lakes (Tanganyika, Victoria, and the Red Sea) were formed.

As a result of the Mediterranean geosyncline, the Alpine mountain folds formed a series of mountain ranges extending from west to east. The first third phase of the Alpine folding at the end of the Neogene period created the Alps, the Carpathians, the Caucasus, the mountains of the Balkan Peninsula, the Apennine Peninsula and other islands and peninsulas. To the east are the mountains of Iran, to the south of Turkmenistan. Kopetdog and Pamir-Hindikush mountains were formed. Among them and in front of them, a number of depressions, Carpathian, Kopetdog, Alpine, Caucasian pre-mountainous depressions were formed. In Central Asia, depressions of large and small intermountain ranges, such as Fergana, Norin, Burchmulla, Tajikistan depression (depressions), in Kyrgyzstan - Issyk-kol, Lake

Baikal and Talas-Olatov, Karatov mountain depressions develop in Central Asia. is filled with thick sediments. The deposits of the Neogene period in such hollows consist mainly of gravel, sandstone, siltstone, and gravelite sedimentary rhythm facies, the thickness of which ranges from several 100 m to 4-5 km.

Young geosynclines in the Pacific Rim continue to the present as a result of Alpine folding. For example, the Kamchatka Peninsula, Sakhalin, the Japanese islands, and the Kuril Islands to the east of it began to rise before the Neogene period, but are still active today. The Andes Mountains in western North America were formed by the Alpine fold. Upsurge and volcanic activity are still going on in this place. It can be seen that the Alpine folding took a sharp turn in the Neogene period by the appearance of steep rocky high mountains on land, and deep depressions (1000-11100 m) in the ocean. Sour, medium, alkaline lavas and intrusives were formed in geosynclines due to volcanic activity. Copper, lead, zinc and other non-ferrous polymetallic deposits were formed with intrusive and effusive rocks.

During the Neogene period, the inundation of land was greatly reduced. Mainly there was a water return. The south of the Russian platform and the southeast of Europe were covered by a shallow sea in the Miocene. For example, in the west, from Hungary to Moldavia, Southern Ukraine, the Black Sea, the Sea of Azov, the north of the Caucasus Mountains, through the Caspian Sea to the Aral Sea was an open sea. In these places, the sea lasts until the Pliocene. Since the Pliocene period, the Mediterranean, Black Sea, and Caspian seas have separated from each other, the water recedes, and the mountains rise. At the end of the Pliocene, the Caspian Sea (Akchagil Sea) encroaches to the lower part of the current Volga and Kama rivers. During the Neogene period, many rivers (Dnieper, Dniester, Volga, Kama) flowed into these seas, so the water was fresh. Therefore, the remains of freshwater molluscs are found in many Neogene deposits.

During the Lower Neogene, the climate changes. On the Russian platform, due to the warm sea, coal was formed, while on the eastern side (in Central Asia), gypsum, table salt, red molasses land deposits were formed. However, at the end of the Pliocene period, the climate cooled due to the retreat of the sea from the land. In place of the Mediterranean geosyncline, a series of mountain ranges stretching from west to east appears. As a result, the warm sea passage and air flow from the south is blocked, and finally the air in the northern hemisphere begins to cool. An example of this is the remains of animals found among the genus of this period.

Neogene deposits mainly consist of terrestrial and marine deposits. Marine deposits are distributed in Kamchatka, Sakhalin, Crimea, Kuril Islands. In other places, the continental deposits consist of molluscs and are 2-6 km thick.

By the Neogene period, the climate had become absolutely continental, as a result of which the Arctic and surrounding areas were reduced to the Mediterranean and nearby areas.

Studies show that the Neogene climate changed in three stages:

1. Progressive cooling spreading in high latitudes and formation of ice sheets in polar regions;

2. Significant increase in temperature concentration between high and low latitudes;

3. Isolation and a sharp superiority of the continental climate.

The climatic conditions of the Miocene period are characterized by the fact that the rise and fall of temperature in the regions have sufficient changes only due to the correlation of nature and differ from each other at the beginning, end and middle of the Miocene period. In the Miocene, the tropical belt formed latrites, high magnesian limestones, and tropical vegetation complexes.

In the Neogene period, several coal seams can be found in large areas. And they were found to be tropical forest trees. They are mainly found near the sea, palm trees and tropical ferns are the main ones.

The climate of the northern and southern tropical polar regions changed during the Miocene. Miocene flora and fauna show that the tropical regions later became subtropical. And there, evergreen forests were formed and became broad-leaved forests.

Palms and tropical ferns were abundant in the second half of the Miocene. In the second half of the Miocene, as a result of the cooling, the vegetation was subtropical instead of tropical. The main changes occurred in the subtropical climate region. At the beginning of the Miocene, broad-leaved forests and palm forests were formed in large areas. At the end of the Miocene, the remains of trees such as oak, chestnut, hornbeam, ficus, and pine were found in mixed forests in northern China and Japan. Based on the remains and types of trees, it can be said that the temperature in Central Asia at the beginning of the Miocene began to cool down after the second half of the Miocene.

The remains of pine, oak, walnut, berry trees were found in Central Asia. These trees determined the climate and amount of rainfall there. And mixed forests are formed. Chestnut-double forests were formed in Central Asia in Kazakhstan, and they were formed in the middle of the Miocene period.

Central Asia is also covered by coniferous forests in large quantities. By the end of the Miocene, the temperature in Central Asia decreased. As a result, there was a change in the fauna and flora of Central Asia. Two main phases of climate can be shown during the Miocene; 1. Warming phase at the beginning of the Miocene; 2. It is divided into cooling phases at the end of the Miocene. The findings show that the duration of the warm period was 4-5 months in Central Asia during the Miocene.

By the beginning of the Pliocene, mixed broad-leaved forests appeared, the main part of which was made up of oak and hornbeam trees. From the second half of the Pliocene period, broad-leaved forests were replaced by coniferous forests.

A temperate cold climate prevailed in the northern regions of the globe.

By the Paliogen period, snow-glaciers were formed on the top of folded mountains and high hills. About 50% of the glaciers of present-day Antarctica were formed during the Pliocene. As a result, polar cold climate regions were formed.

Paleobotany and paleozology and the remains of oak, walnut, and chestnut trees belonging to the Pliocene period show that the climate cooled during this short period. During the Neogene period, the relief of the earth was formed. Based on the above, it can be said that the influence and importance of the Neogene period on the formation of the changes, twists and climates of the Neogene period on the climate of the present time is great. And the analysis and study of changes in this period is the foundation for assessing future climate changes.

According to the data, 65 million years ago, the water level was warm in the middle latitudes during the Paleocene period. In the general direction, the cooling of all latitudes of the ocean occurred 48 million years ago. These data show that mountain glaciers were formed in Antarctica during the early-middle Eocene. Only their size is limited.

Another characteristic of the period is that the Archaean tropical rainforests in Europe were formed in the Paleocene. These forests were covered by Normapolles vegetation at the beginning of the Eocene, and by parotropic vegetation in the middle of the Eocene. Baisova and Pokravskaya divided this world of flora into single classification types.

Central Asia at this time evergreen subtropical broad-leaved trees poltavik plants A.N. According to Krishtovik, it consisted of walnut, beech, beech, laurel, magnolia, palm and subtropical conifers. Swamp forests of cypress, nyssa and alder have developed here and become the main area of coal accumulation.

In Central Asia, about 48 million years ago, the archaic mammal fauna replaced the dinosaur fauna by a more advanced tapir fauna, incl. The first were replaced by artiodactyls and rodents, which indicates a slightly drier climate. Data on the continental vegetation of the high latitudes of the Northern Hemisphere show that the climate is contradictory. According to the testimony of many glaciers, the northernmost finds of the remains of paratropical plants, with reduced drops, high humidity and thermophilic ferns, and all conifers, have been determined to belong to the middle Eocene.

Castanopsis, Aralia, Rhus, Magnoliaceae, Glypfoxtrobus and even remnants of Ficus and Palmae Sabalites were found in the main part of the forests.

A.M. Frandkinoy and V.S. According to Volkovoy, I.A. Kulkovoy, the highest level of heat in the Bering region corresponds to the middle and upper Eocene boundaries 45-44 million years ago. Thus, the hetenochronism of the climate trend in this region with respect to the global Eocene peak of 53-52 million years is shown. According to new data, the maximum transgression of this sea, which connects the Tethys Sea with the Arctic Basin, occurred during the Middle and Upper Eocene turning period, Barton Age, 43-40 million years ago. In the sedimentary rocks of this period, there are forminifera complexes in the Turgai Strait and in the north, Textularia carinatiformis-bolivinopsis spectabilis. Remarkably, these brics include a number of tropical species that lived in the Tethys basins. In the middle of the Priabonian age, about 37-40 million years ago, the closing of the Turgai Strait, changes in the composition of vegetation in Siberia and the Northeast can be seen over time. Therefore, the replacement of the paratropical Poltava flora by the temperate Turgai flora may be one of the climatic consequences of the closure of the Torgai Strait. But, probably, it was a response to the frost that began 47-43 million years ago. It is possible that the formation of heavy ground water in the Eocene continued in two ways: in the Tethys epicontinental basins of the Mediterranean type, and in the polar type of the western Antarctic coast and in the western part of the polar basin, along the coasts of which local mountain glaciation centers appeared, and during the polar night seasonal sea ice appears. Until 50 million years ago, cold bottom waters, if accumulated, would probably have been only in the western part of the polar basin. After spreading the floor of the Norwegian Sea, the sea entered the Atlantic Ocean. At that time, a necessary condition for the formation of polar groundwater in the Arctic basin was, of course, the entry of warm saline waters, which was carried out mainly through the Torgai Strait and the West Siberian Sea. About 45 million years ago, this penetration intensified, and a strong flow of warm waters from the Turanian and southern Russian basins moved along the eastern shores of the polar basin. A unique climate is favored here, with minimal annual temperature changes and high humidity, but with seasonal changes in light. Such a climate could only have arisen under conditions of high SO2 content in the atmosphere. Frequent changes in climate associated with changes in the flow of warm waters into the polar basin and pronounced seasonality of light should have greatly accelerated the rate of evolution in this region of the world. It is known that in the early Middle Oligocene, the Torgai subtropical flora was widespread on the Eurasian continent: here, up to the shores of the polar basin, now swampy mixed forests are thermophilic broad-leaved forests with a relatively high participation of up to 50% of species Fagaceae, Juglans, Ulmus, Ilex, Acer, Aralia, Zelcova, Nyssa and the divergent Taxodiaceae are separated. At the beginning of the Oligocene, the average annual temperature E.K. According to the method estimated by Borisova, V. Kalimanova made 18-20 0 C in the Penjin Basin at 63-64 0 latitude. Annual rainfall is 1000 mm. Brontotherien complex of early Oligocene mammals of Kazakhstan and Mongolia, with a large number of representatives of garden and forest stations, indicates the climate of subtropical savannas, the name for the present semi-desert regions. A long period of active cooling developed in the late Oligocene and early Miocene.

The cooling and drying that led to the expansion of the savanna belt in Central Asia at the end of the Oligocene is confirmed by the exchange of the brontoteriv indicator listed in Mongolia. It is dominated by a variety of fast-moving equids, rhinoceroses, and generations of ancient burrowing rodents. Divided into Tsanganomys, Tataromys and other species. Thus, both floristic and faunistic data indicate that a seasonal climate with warm summers and unstable snow winters emerged in mid-latitude Asia at the end of the Oligocene.

According to G.S. Rayushkina, who studied in detail the flora of the indricotheric horizon in the Kazakhstan sections, the Mugojar plateau, at 440 north latitude is now deserted, closed at the end of the Oligocene and covered with a subtropical laurel forest with a mass of evergreen plants, including Cinnamomum cinnamomi. The closest analogue of these

forests is the modern forests of Colchis. G.S. The winter temperature of Rayushkina Mugojar is 20 C, the amount of annual precipitation is about 1000-2000 mm.

A large number of foraminifers Miogypsina, Steginoporella and several tykontanales (Tripneustress plans, Scutella panlensis, etc.) passed through the northeastern part of the Tethys Sea and are now found again in mangrove forests in the Indian and Pacific Oceans. The sequence of climatic events of the early middle Miocene is currently being studied in Japan. They are characterized by marine tropical fauna, including foraminifera. According to Ikibeni, the remains of Miogisina, moeuskas Vicarya, Turritella corals, and most importantly the rich terrestrial flora of Dejima have been found. According to Tanoy, this flora is deciduous forests, enriched by up to 44% of evergreens for the entire Miocene - conifers such as Sompotonia, Cinnamomum, Machilus, Lithocarpus, etc. currently living in Toywen and in southern China Glyptostrobus, Taiwania, Cunninghamia and other species found.

The flora of the Miocene climatic optimum is well studied in the Asian part of the USSR. These are considered to be the hedgehog horizon of the coastal marshes and kizinsk flora, upper Sakhalin, northern Kamchatka.

The Middle Miocene is considered to be the time of the collision of the African and Eurasian plates and the cessation of contact between the Tethys and the Indian Ocean, the growth of mountains and the convergence of the Mediterranean and Central Asian climates.

According to the fauna of the continental region, this indicates an increase in temperature and anidization. It is shown by the ocean zone in Europe (MW 3,4,5) and is shown in Central Asia. –Represented by Neoshin-Kushuk-Arlouturme complexes and Hemingford in North America, in which the Savannah-forest Auxiterian complex with the first mastodons and many rodents takes the leading place. According to some paleolandscape and paleoclimatologists, the temperature optimum was in the Miocene, according to some international scientists, Soviet scientists V.M. Sinisinim, V.E. Haunim, N.A. Yasamanov, V.I. Jegallo and E.N. According to Ananovoy, according to the main data, the thermal optimum of the natural-climatic zones in the Northern Hemisphere coincided with the Terkhansk-Langiisk period in the Miocene.

During the Miocene, there were mangrove forests from around the Mediterranean Sea to the Pamir-Tibet Mountains, where rainfall was between 1200 mm and 2000 mm.

According to the information given above, the climate of the Neogene period was reflected in a different order across the globe compared to the climate of other periods. It is not a secret that the climate of this period revitalized the life of the future generation under its freshness. Therefore, we can consider the climate of the Neogene period as a renaissance period.

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