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SPRINGS, SOME SPRINGS OF UZBEKISTAN AND THEIR GEOGRAPHICAL FEATURES

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Annotation:
If we look at the hydrosphere on Earth, we see that it is always moving and changing. The ability of water to change its state of aggregation allows it to enter other shells (lithosphere, atmosphere, biosphere). Water is one of the most important sources of life on Earth. We study the waters of our planet in two parts: ocean and land. They are always interacting, even if they are studied separately. This is because water vapor rising from the ocean is an important factor in the formation of terrestrial water. Inland waters, in turn, are divided into two major groups. These are surface and groundwater. Groundwater includes rivers, lakes, glaciers, reservoirs, and canals, while groundwater includes groundwater and artesian basins. The natural flow of groundwater to the earth's surface creates springs.

Keywords:geological structure,groundwater, Nurata mountains, hot springs, calm springs

Introduction

Springs are mainly streams of artesian and groundwater that flow from the strata to the surface.

The process by which springs are formed. Groundwater moves in different directions depending on the nature of the rocks. At the heart of this movement, of course, lies the process of gravity. Somewhere, the water finds its way out, mainly in the lowlands or ravines, and in some cases it leaks. Some small springs can appear even after heavy rains and dry up later. Springs are usually formed by the formation of contact zones between tectonic faults, sedimentary and sedimentary rocks due to the crossing of aquifers by river valleys, ravines, lake sediments. In this process, aqueous rocks are

filtered. The duration of this process affects the quality of spring water. The formation of some springs is also influenced by the narrowing of the aquifer, which causes water to flow to the surface due to compression. If the springs are flowing through the aquifer, it will slowly seep to the surface. The formation of springs is also intertwined with the tectonic movements of the area, where springs can form over time, especially in wet areas on mountain slopes. This is because over time, tectonic processes change, causing rockslides, fractures, and bends to occur, which in turn affect groundwater movement. The period between the formation of springs also affects the process of their formation. For example, water from the Cretaceous and Jurassic deposits mainly forms muddy hills and then erupts. Because the upper part of the basalt layer is not resistant to pressure, it leads to the formation of various reliefs under pressure in areas where alluvial deposits are distributed on the earth's surface. This process is usually very slow and can happen quickly in some areas. this process is related to the seismic characteristics of the area.

There are two types of springs. Hot springs and quiet springs. Hot springs are gases and vapors that come out of the ground under hydrostatic pressure. For example, the springs of Uzbekistan in the Fergana Valley, such as Shursuv and Jalal-Abad, or in Tajikistan, such as Obigarm and Issyk-Kul. Hot springs are divided into erosion and gas pressure springs, depending on the conditions of their formation. These springs are formed as a result of erosion and tectonic eruption of artesian aquifers or crossing aquifers of ravines, streams and river valleys. These springs are mainly found in the Bukhara and Karakum oil and gas regions. Because the Zarafshan and Amudarya rivers change their course, which leads to the intersection of aquifers.

Calm springs are formed when karst springs rise to the surface due to the blockage of impermeable rocks by groundwater aquifers. Underground sand, clay, granite, limestone and other similar impermeable layers block the groundwater, forcing the water to move in the other direction. As a result, because these layers are close to the surface, water seeps into the surface. Permeable and water-soluble rocks accelerate the karst process and lead to the formation of karst springs. The largest karst springs have a lot of water, some of which produce 200-250 liters of water per second. Such springs are common in the south of the Fergana Valley, in the Zarafshan and Kashkadarya valleys, and are widely used by the population. In addition, there are large springs that provide 1000-1100 liters of water per second, including the Karabulak spring in Kashkadarya, Nurata and Dehibaland in Navoi. The process of spring formation can take thousands or even hundreds of thousands of years, and in time they can dry up. Three types of springs are affected by endogenous, exogenous and anthropogenic processes. If the amount of precipitation decreases, it can also be

caused by the lack of water from springs during drought years, or by the fact that underground rocks break the waterway. Anthropogenic factors also contribute to the drying up of springs, and large-scale pumping of groundwater can accelerate this process.

Springs come in a variety of sizes, from small springs that temporarily flow after rain to huge basins that flow hundreds of millions of gallons of water every day. Scientists have determined that the springs come not only on land but also from cracks in the ocean floor. Recently, scientists have also found hot springs at depths of up to 2.5 kilometers in the oceans. The hot water from these springs is over 300 degrees and is saturated with minerals and sulfur, creating an unusual and exotic marine landscape of a unique ecosystem under the ocean. There are many small springs in the world. Many species of them can be found, especially in karst caves. These are springs formed by the leakage of groundwater due to the melting of rocks such as limestone, marl, gypsum and dolomite. The amount of water flowing from springs depends on many factors, including the size of the pores in the rock, the water pressure in the aquifer, the size of the spring basin, and the amount of precipitation. Decreased precipitation and drought lead to changes in the water regime in the aquifer system, resulting in a decrease or drying up of spring water.

Khojamushkent spring in Yangiabad district of Jizzakh region

The study of the process of water formation in springs is called "Fault Zone Hydrogeology", which studies how fragile deformed rocks change the fluid flow of rocks in different lithological conditions, such as small, igneous and carbonate rocks. Fluid velocity is taken into account in the assessment of permeable rocks. If there is a zone of degradation in the rocks, the water can block the surface. This is because

different mechanisms and deformed rocks can reduce porosity or completely close it. Groundwater may be fresh or saturated with hydrocarbons, depending on depth.

French scientist Henry Darcy conducted various experiments on porous rocks and groundwater and was successful. He conducted experiments to study the motion of liquids through sand columns, which led to the creation of Darcy's law. In this experiment, he fully describes the flow of fluid through rocks with high porosity. These experiments of the course are the beginning of quantitative hydrogeology.

The American scientist Oscar Edward Meinzer did a lot of research on the movement of groundwater in the twentieth century. Therefore, the concept of "father of modern groundwater hydrology" is applied to it. He standardized key terms in the field, as well as defined the principles of emergence, movement, and flow. The scientist proved that the flow of water obeys Darcy's law. Meinzer also points out that the geochemical properties of water are also important to study the effects of high salinity levels in aquifers today.

Properties of spring water. The properties of spring water depend on many factors, the depth of which depends on the nature of the minerals and the process of underground filtration. It is a mistake to think that spring water is always clean and pure. This is because the quantitative composition of groundwater minerals can change the properties of water. From time immemorial, people have known this feature of springs and called them by appropriate names. If the springs contain a large amount of a substance, it is used to treat a disease. For example, among the mountain springs in the Surkhandarya and Kashkadarya oases of Uzbekistan, you can find such toponyms as Istmabulak, Yarabulak, Dambulak. In addition, human activities can affect the composition of spring water. Some springs may be reddish due to their high iron content. If surface water, including rivers, flows near springs, this process can also change the composition of spring water. If the spring is not very deep, the water quality of the spring will be assessed based on the quality of the local groundwater. However, the flow rate and the length of the flow path through the water layer also affect water quality. This is because the flow rate affects the amount of water-soluble minerals. If the flow rate of the spring is high, it will not be filtered underground enough because the ground is muddy and it is not possible to make sure that there are no bacteria or viruses. Therefore, it is recommended to take a sample of water first and check its composition to determine whether it is suitable for drinking or not.

There are constant, periodic and variable types depending on the amount of water coming out of the springs. The amount of water in permanent springs does not change throughout the year. Usually such springs come out of deep cracks. Periodic springs maintain the amount of water for a certain period of time. This can change under the

influence of underground tectonic forces. The variable springs are seasonal and the water level rises during the rainy season. Examples of such springs are groundwater springs between rocks.

Depending on the water temperature, springs are cold (00C-200C), hot (200C-420C), and hot (above 1000C). The spring water flows out of the deep underground magmatic deposits to form hot springs. Such springs are often saturated with underground minerals, which enhances its healing properties. Groundwater retains its heat between layers for a long time. It feels cool on hot summer days but doesn't freeze in winter. Warm springs are often called hot springs. Hot springs are usually studied as a geothermal source. In addition, spring waters that have a temperature above the average annual temperature of a particular area are also recognized as hot springs. Many hot springs heat up due to magmatic intrusions in areas of active volcanism, forming thermal springs. However, not all hot springs are formed in this way. Because the convective circulation of water under the ground can also lead to water heating. Given that the temperature rises by 33 degrees every 1,000 meters as it descends from the earth (for the first 10 km), we can estimate how many kilometers of spring water is coming out. There are three types of hot springs depending on the temperature. Issq (20 ° -37 ° C) medium hot (37 ° -53 ° C) and very hot (50 ° -100 ° C) springs. In mountainous areas such as the Alps, Caucasus, Pamirs, Tianshan, the temperature of thermal springs reaches + 500 + 900 C, because these mountains are located in active geosynclinal zones. In artesian basins, if the spring emerges from a depth of 200-300 m, the temperature can reach + 70 ° + 100 ° C. In areas with active volcanic processes, a mixture of water and steam is released, the temperature reaches + 150 + 200 °. An example of this is geysers in Iceland. Hot springs are found only in the mountains. Because it is associated with geosynclinal processes on Earth, we do not encounter them on the platforms. Many chemicals in hot spring water are dissolved in hydrocarbons, bicarbonate-sulfate, calcium, sodium, nitrogen, carbon dioxide, hydrogen sulfide, chloride, calcium-sodium, nitrogen-methane and other substances. People have been using hot springs to treat diseases since ancient times. (Ancient Roman or Tibilissi baths in the Caucasus,) today are mainly used for recreation and relaxation, as well as for heating homes and generating electricity. For example, in Russia, nitrogenous sprays rich in silicic acid, such as Belokurikha Kuldur, Caucasian mineral waters are carbonated waters, and the Onsen in geothermal springs in Japan are clear examples of this.

In Uzbekistan, springs are used for irrigation, industrial water supply and treatment (springs in Kashkadarya and Surkhandarya, Khojapok spring). There are many springs for drinking and irrigation, mainly in the foothills of Fergana, Zarafshan,

Kashkadarya, Nurata and Tashkent oases. In these places, the water provided by some springs reaches 10-15 liters per second. The most popular healing springs in Central Asia are Garmchashma in Tajikistan, Jalal-Abad, Issyk-Kul, Jetiogus and Aksu in Kyrgyzstan. Shohimardon and other springs of Uzbekistan are distinguished by their unique features. There are also industrial salt springs in Uzbekistan, which contain iodine, barium, bromine, and other elements. Such springs are mainly found in mountainous, submerged, artesian basins between the mountains, including the Fergana and Karshi oases in the Karakum Desert. Decisions have been made in Uzbekistan to preserve the sights, including springs. There are many such gifts of nature, especially in the mountains of Nurata.

Springs in the Nurata Mountains

The Nurata Mountains are the north-western branch of the Turkestan Range, passing through Navoi, Samarkand and Jizzakh regions. In the southeast, the Sangzor River is separated from the Morguzar Range by a serpentine mountain range. It is bordered by the Zarafshan Basin in the south and the Kyzylkum Desert in the north. The Nurata Mountains consist of two parallel ridges, the North Nurata and the South Nurata. The southeastern part of the Nurata Mountains is called the Koytash Mountains. The Koytash Mountains are located in the northwest from the Sovurbel Pass in the southeast to the Sangzor River, with a length of 70 km and an average altitude of 1260 meters. The northwestern part of the Nurata Mountains is not very high, with an average altitude of 900–1100 m. Southern Nurata consists of the Gubdintog, Qaraqchitag, Aktag and Karatag ridges, which are separated from each other by the Koshrabat, Koytash and Nurata basins. The Nurata Mountains are composed of Paleozoic limestone, sandstone, shale, and metamorphic rocks. Neogene and Quaternary deposits are also common in the lower parts of the southern ridges and in the basins. Tectonically, the ridges have a meganticlinal structure, formed by Hercynian deformation, and regenerated by new tectonic movements. During the Hercynian eruption, strong volcanic eruptions took place in the district. Therefore, sedimentary deposits include sedimentary (diorite, granite) and effusive rocks, and alpine tectonics played a particularly important role in the formation of the current relief of the district. The mountains rose again during this period (reaching 4,000 meters).

There are no glaciers here as the western part of the Turkestan ridge is much lower in the district. But in the depths of the mountains, the snow does not melt until summer. Nurata district, located in the foothills of the Aktau Mountains in the Navoi region of Uzbekistan at an altitude of 524 meters above sea level, is famous for its famous

springs. There are hundreds of large and small springs between the Nurata Mountains. The underwater path of these springs is common, with spring fish found in one and found in others. The largest of these springs is the Nurata Spring, which provides drinking water to the entire population of Nurata.

Nurbulak "Nurata spring" in Nurata district of Navoi region.

Another similar spring was found in the foothills of the village of Zulqarnayn in Nurata, and its composition was found to be very similar in comparison. In the distance from the Nurata Mountains to the Sultan Uvays Mountains of the Kyzylkum Desert, a variety of mountain springs have created beautiful oases. When we study the springs in the Nurata Mountains, we divide them into three groups: perennials (springs that flow continuously throughout the year); seasonal (temporary springs that are active after rain or during certain seasonal changes); and periodic (appearing in a short period of time and reappearing many years later). Although the temperature and composition of these springs are different, their genesis is the same. But their flow rates are different. Local springs are used by the population. They plant long, sturdy perennials around the spring. This condition helps maintain groundwater levels. Springs such as Jambulak, Sovuqbulak, Karabulak in the Nurata Mountains are formed on the slopes of the mountains and join the rivers. Floods are frequent in these areas, damaging the nature around the springs. However, the locals will be able to restore it because the way of life and economy of these peoples are closely connected with springs. Many springs are cleaned and piped to remote areas. Given the fact that these springs are repeated in the same direction at different sizes, the springs have been repeated as a result of the general movement of groundwater in the area. Because the mountains of Nurata, Sangzor, Morguzar descend from south-east to north-west. The beginnings of these mountains are the high mountains of Tajikistan, where the huge glaciers are the source of not only river water but also groundwater. Depending

on the terrain, the movement of groundwater has led to the formation of various springs in the territory of Uzbekistan, especially in the Nurata Mountains. The movement of groundwater in the mountains can be compared to that of capillaries. The tiny vessels coalesce into larger vessels, which rise to the surface under the force of gravity and pressure. Groundwater always tends to fill in pores and voids.

At the foot of the Nurata Mountains, summers are dry and hot, and winters are not so cold. The climate is cool on the slopes and in the upper parts, with more precipitation. The average annual temperature is 13.4-14.4 degrees, in January -0.6-2.3 degrees, and in July 15-25.4 degrees. The highest temperature is 46-47 degrees in the mountains, the lowest is 29-30 degrees. Many rivers and streams (Osmonsay, Kulbasay, Uchmasay, Majrumsay, Ukhumsay, Sentabsay, Tusunsay, Oqtepasay, Koksaroysay, Oqchopsay, etc.) start from the Nurata Mountains and overflow in spring and dry up in summer. Despite their low water consumption, they also cause floods in the spring. If we look at the climate of the Nurata Mountains, we can see that it has a dry continental climate and low rainfall. Typically, 200-300 mm of precipitation falls on the hills in the areas facing the humid air of the mountains, and 700-800 mm. The snow cover is also not thick, 15-30 cm. Given the large amount of evaporation in the area, it is doubtful that groundwater generated by precipitation will form large springs. We conclude that such springs are caused by the melting of snow and ice in the high mountains of Tajikistan and their movement to the northwest. The study of the composition of springs in the Nurata Mountains revealed the presence of many nitrogen, hydrogen sulfide, sulfur dioxide and carbon dioxide. This composition is directly related to the properties of the rocks. According to locals, the water level in the springs has dropped significantly over the past two decades. For example, Onabulak at the foot of Mount Zaynak was very watery twenty years ago and sometimes overflowed, but now we can see a huge basin of the spring and a small amount of water flowing out of it. We also find traces of many dried springs in the Nurata Mountains. This shows that in the past there were a lot of springs and a lot of water in them. There are also periodic springs in these mountains, the formation of which is associated with crustal tectonics, and every few years the springs open, and after some time they dry up again.

There are other wonderful types of springs in these mountains, which are called cave springs. We also find many caves in the Nurata Mountains and you can feel the cool and humid air when you enter them. Various caves have formed in areas with layers of water-soluble limestone, dolomite and gypsum. As a result, groundwater was released into the caves. The water dripping from the cave walls creates a spectacular view. Plants such as maple, willow, willow, hawthorn, chilanji, mountain mint, and

mountain onion grow around Nurata springs. These plants also affect the order of groundwater. Some of the springs have the appearance of a huge pool, the water is clear and calm and you don't even notice where the water is coming from. The locals call such springs kolbulak. Depending on the depth of the springs in the Nurata Mountains, we divide them into deep and shallow springs. Deep springs are constant and flow throughout the year. Shallow springs overflow after spring rains and become shallow in early summer. These types of springs are small in size.

Nurata springs still attract many tourists. Every year, thousands of tourists visit Nurata to visit the Fountain of Light. On the surface of this spring, light is formed in the early morning due to the glare of the rocks. The origin of the name Nurata is connected with Nurbulak, the spring of Nurata.

Springs have long met the diverse needs of humans. For example, it has been used for drinking water, domestic water supply, irrigation, mills, navigation, and electricity generation. Today, fishing, swimming, recreation, therapy; water for livestock; used in fish farming and other industries. It is necessary to preserve such wonderful gifts of nature.

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