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DEVELOPMENT OF THE GEOMORPHODYNAMIC PROCESSES IN BASIN OF NURA RIVER

In the basin of the Nura River in different years researches were carried out, caused by the need to provide water resources in sufficient quantity of the coal industry, metallurgical production. In addition, researches were also conducted in order to identify underground reserves of fresh water, because the region belongs to the poor of drinking water. In recent years, due to deterioration of the ecological situation in the whole country, in particular, Central Kazakhstan, these researches have become an environmental dimension. Currently, in our opinion, it is necessary to conduct comprehensive geographical researches. To this end at the laboratory "Ecological-geographical research in Central Kazakhstan", of the geography department Nura expedition was established. The study of geodynamic, geomorphic, modern exogenous natural and anthropogenic processes is one of the main directions of expedition.

The geological structure of the considered area was most fully and thoroughly investigated in connection with the location here of the Karaganda coal basin. Outcrops of effusive and sedimentary rocks of Ordovician, Silurian, lower and middle Devonian are everywhere. Among the effusive rocks of Devonian marked intrusive rocks - granodiorites, quartz diorites and granites. Intrusive rocks are most common in the Western part of the basin. They are composed the granite massif Koytas. Small outcrops of intrusive rocks occur in the Eastern part of the basin in the area of the small moundy relief of Tasshoky massif.

Anthropogenic deposits are represented by eluvial, diluvial, proluvial and alluvial sand-clay and sand-pebble deposits. Eluvial deposits are developed on ridges and hills, are composed of sands and clays. In the structure of the river valleys in areas with hilly-moundy relief sandy, sandy-pebbly and sandy-gravelly sediments are dominated. On the flat part of the basin alluvial deposits have a different composition - sandy loams, loams, clays with small and medium pebbles and gravel. Floodplain terraces of Sherubainura are formed mainly of sand-pebble and sandy-gravelly formations. In the valley of the Nura River alluvium capacity reaches 35 m in the valleys of Solonka and Big Bukpa - no more than 5 m /1/. To the north in the area of Saransk and Industrial sector of coal basin alluvial deposits are widespread in the river valleys of Kokpekty, Solonka, Ashlyarik and Karagandinka.

In the basin of Nura anticline Tekturmas refers to the Caledonian region, to Varissorian - anticline Erementau and Karaganda Synclinorium. Tekturmas anticline is located in the south, composed of effusive-jasper rocks and extends from the southwest to the northeast. Karaganda Synclinorium is located in the middle and made deposits of Ordovician, Silurian, lower-middle Devonian and carboniferous sediments of the Carboniferous. In relatively stable tectonic conditions of the late Triassic and early Jurassic Central Kazakhstan has experienced a total peneplanation that led to the development of denudation plains with well-developed weathering crust. In the Karaganda region epoch of alignment was interrupted by the formation of a narrow trough in the central part of the Karaganda Synclinorium. Thick layers of clastic material throughout the Lower Jurassic filled the narrow valley-shaped depression latitudinal strike. The composition of the deposits is alluvial and lacustrine-marsh. Occurrence in the trough, about 15 km wide, indicates that there was a river valley, the bottom of which is gradually going down. In other parts of the basin tectonic activity was negligible. Within the Karaganda region denudation was renewed at the end of the Jurassic and continued throughout the Cretaceous. The formation of Jurassic deflection could lead only to a certain partition of the adjacent areas of Upper Triassic-Lower Jurassic plain and a slight decrease in the residual mountains.

Neotectonic movements of Neogene and Quaternary in the basin of the Nura River and a large area of Central Kazakhstan was preceded by repeated raising and lowering fixed in relief and the Cretaceous-Paleogene sediments. New movements are only a stage in the general tectonic development of the area. They were preceded by at least four rhythms: 1 - in the late Cretaceous-early Paleogene; 2 - in the middle Oligocene; 3 - in the upper Oligocene; 4 - in the Miocene. The long epoch of relative tectonic quiescence, prevailed in Central Kazakhstan in the Mesozoic, Late Cretaceous was replaced by the general uplift. The amplitude of the uplift is determined by the depth of incision of river valleys. In the basin of Nura to them belong the buried ancient valleys Nura Sherubainura and Isen. Maximum incision of channels in Paleozoic rocks reached 80-100 m.

The axial part of the Karaganda Synclinorium was used by ancient hydrographical system. Formation of the river valley proceeded in the conditions of continuous-intermittent uplift that began in the late Upper Cretaceous and ended in the early Middle Oligocene. Due to them, on the slopes of the valleys in the Paleozoic rocks ledges terraces were embedded, preserved in the buried state until now. Tributaries of the second and third orders of magnitude of the main rivers of the basin contributed to the fragmentation of the Mesozoic denudation plains and the formation of pre-Miocene hills. Territories, which were lying away from the river, kept their plain. This explains the fairly widespread of Mesozoic denudation

plain along the northern slope of Tekturmas Anticlinorium. Tectonic movements of the upper Cretaceous-lower Paleogene stages in the basin of Nura were a reflection of such uplifts engulfed the whole Central Kazakhstan. This is evidenced by the development of ancient valleys, not only within the investigated area, but also in the river basin of Sarysu. Here there is a complete analogy with the Nura River basin.

The second stage of tectonic development of the area is associated with an average Oligocene. Lowering process led to the flooding of ancient valleys and enhanced accumulation of lake-marsh deposits Chiliky formation. The third stage is characterized by intense erosion of the roof mid Oligocene deposits. Wide dissemination of sand-gravel deposits of chagray formation in the lower reaches of the Nura indicates the epoch of Upper Oligocene uplift. The formation of a number of ancient valleys or cleaning previously developed erosion forms from filling their precipitation are occurred. The fourth stage is different negative movements across the whole of Central Kazakhstan in the Miocene. Started lacustrine transgression led to the flooding of all previously created erosive forms and depressions of different genesis. Significant areas of Mesozoic denudation plains were under the water. There is an accumulation of clay Aral and Pavlodar formations, on the border of which the gap is traced, indicating rise areas. The capacity of the Miocene sediments within Karaganda synclinorium reaches 100-120 m, to the outskirts reduced to 25-30 m. Accumulation of Miocene lacustrine sediments has ended by the formation of the lake plain, which had one level. The appearance of the surface is important, because its deformation allows drawing some conclusions regarding the magnitude and character of Post-Miocene movements. These neotectonic movements for Sarysu-Teniz watershed indicate E. E. Milanovsky /2/ and A.E. Mikhailov /3/.

Tekturmas vaulting uplifts were noted by V.J. Malinowskiy /4/. Within the Karaganda region this structure has an important role. Lifting axle stretches from South-West to North-East, with a total length of 150 km. In relief it is expressed clearly in the form of a chain of ridges. Post-Miocene uplift, which led to the creation of patterns, is recorded on isohypses roof clays of the Miocene. The absolute height in the axial strip reaches 600 m. Relative excess are 300-350 m. Tekturmas lifting is asymmetrically: the northern slope is gently sloping, its length is about 40 km, is complicated by structures of the second order; southern slope, length of about 10 km, steep, is complicated by fractures. Deluvial plumes and structure of valley of Sherubainura river indicate significant intensity of the latest movements in the axial part of Tekturmas uplift. The river valley narrows when crossing the vaulting uplift.

Baydaulet uplift is located in the South-Western part from Tekturmas vaulting uplift, expressed in the relief in the form of a shaft. Uplift can be traced for more than 100 km. Shaft-imagery emphasizes by the position of the ancient Mesozoic denudation plain and structure of the crossing valleys. In the axial part of the shaft plain experienced a significant uplift (800 m), rivers have a narrow valley, embedded in the Paleozoic rocks. In the upper reaches of the river Sulu-Medina Topar deflection begins. The total length of the trough is 130 km. Topar deflection is divided into a number of structures of the third order. A significant portion of the deflection performed by the clays of Miocene age. While comparing the neotectonic structures with structures of Paleozoic age there is certain heredity: Tekturmas vaulting uplift corresponds Varissorian Tekturmas anticline, and Topar depression - synclinal structures or imposed troughs.

The formation of Dolinka depression occurred in the Paleozoic, during the formation of coal basin. Depression executed by deposits of lake-alluvial genesis, with capacity of 100 m. During the Pliocene and Quaternary time depression was behind in elevation from the surrounding areas, as an area of relative bend. This character of the latest movements is consistent with the bottom relief of the basin, which is an ideal plain. Comparison with the Paleozoic structures allows speaking about heredity of Hercynian structures by neotectonic structures. To the North-East of Dolinka depression and South-West of the river Shiderty is the area that represents the alternation of narrow depressions and elevations. In their arrangement clearly identified two areas - the north-east and north-west, corresponding to the direction Caledonian and Varissorian folding. Positive structure corresponds to a uplifting Itzhan, holding Sokyr-Nura interfluve. Uplift is dissected by valleys of small rivers, the largest of which are the Karagandinka and Solonka. The North-Eastern slopes of uplift Itjan are become to Upper-Nura depression, which made by deposits of Miocene and Quaternary age.

It should be noted, that intense negative movement that took place in Turgay or Irtysh syncline, when the whole of the ancient relief gradually turned below sea level, would not give an opportunity to identify any phasing of tectonic development, nor its connection with the relief. Very intense positive movements would lead to the domination of processes of deep erosion, to the destruction of all the ancient elements of the relief and the domination of only man-made landforms. Moderate positive and negative movements occurring in the basin of the Nura River, contributed to the preservation of ancient landforms, ancient river valleys.

Referens

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