

## **ABSTRACT**

of dissertation for the degree of Doctor of Philosophy (PhD)  
in the specialty: 6D075500 - «Hydrogeology and engineering geology»

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**Theme: «Application of remote sensing to assess the hydrogeological conditions of Western Kazakhstan»**

The most acute problem in Kazakhstan is providing the population with qualitative drinking water. A number of regions, including Western Kazakhstan is experiencing an acute need in it.

**The relevance of the research.** Large prospects for the groundwater search is the western part of the Caspian depression, poorly studied in hydrogeology, located in the interfluvium of Zhayk (Ural) and Volga in the system of eolian sand massifs with the general name «Naryn». Sites of sand massifs are the natural groundwater reservoirs, where large enough deposits of fresh groundwater are formed in specific natural and geological conditions. The great perspectives for the discovery here of new large sources of fresh groundwater are associated with ancient buried valleys and erosion cuts. They are of great practical interest for the search of large deposits of fresh groundwater. Therefore, the study of hydrogeological conditions and the search for weakly mineralized groundwater using remote sensing methods in the thick sedimentary deposits of the Northern Caspian region is very relevant.

**Research aims and objectives** is the study of the hydrogeological conditions of the Naryn sands with the identification of perspective areas for the search of groundwater deposits on the basis of the integrated use of modern remote sensing methods, surface research and methods of groundwater reserves and resources estimation.

**Results of the research.** An analysis of the vegetative index, lineaments, the digital relief model and the heat field of the Naryn sands was carried out based on RS data. The boundaries of known aquifers have been specified, additional aquifers have been predicted, and possible structures associated with the buried valleys have been identified during the course of complex studies of hydrogeological conditions, the thermal fields distribution and linear-hydrodynamic analysis, taking into account the water content and water saturation of rocks.

A geoinformation model of the Naryn sands was constructed to process extensive geological-hydrogeological, geophysical, geomorphological information and ERS analysis results, which made it possible to identify perspective areas based on a comparison of the results obtained and GIS classification methods for carrying out more detailed hydrogeological investigations to identify new groundwater deposits.

The regional hydrogeological zoning was carried out based on the geological and hydrogeological studies and the thematic processing of remote sensing data, followed by an assessment of the forecast reserves and groundwater resources of the study area.

The topic of the thesis published in 7 articles. It includes: 3 articles in the republican specialized publications recommended by the Committee for Control in Education and Science of the Ministry of Education and Science of the Republic of Kazakhstan and 1 article in the international magazine, included in the Scopus database (NEWS of the National Academy of Sciences of the Republic of Kazakhstan, Series of Geology and Technical Sciences); 3 articles were published in the materials of international conferences, including 1 in the materials of a abroad conference (SGEM 2017, Vienna, Austria).

**Application area** - hydrogeology and engineering geology.

**Scientific novelty and practical significance of the obtained research results** is the use of a comprehensive method of hydrogeological research, including the processing, analysis and interpretation of ERS materials and the capabilities of GIS technologies that have made it possible to scientifically substantiate the prospective areas based on the created geoinformation model for more detailed hydrogeological prospecting work in the sandy massifs of the Northern Caspian, as well as the use of research results in the search for groundwater deposits under regional hydrogeological studies of desert areas.