Mapping and calculating of technogeneous loading on geological environment by using satellite data and GIS

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Estimation of geological environment is a base for rational utilization of natural resources and country's sustainable development. Natural processes are getting more and more interlaced with anthropogenic processes and as a result becoming man-caused. It was the very reason why the necessity to develop new methodological and technological aspects for estimation of geological environment condition appeared. Modern satellite data and GIS (Geographical Information System) can be used for solving this task.

The task of the research was an assessment of a level of disturbed natural cover and the ruts due to motor vehicles, which is geographically reflected on the damages-map of a natural surface by roads.

For the investigation of the topsoil damage on the roads of Ustyurt region, the topographic maps of 1:200 000 scale, digital satellite images of Landsat-7 and SAR images have been used. These data provide bigger swat width and temporal resolution, which is needed for the solution of the task. The data, mentioned above are the most easy to access, of good quality and reliable.

As an illustrative example, the Aktumsuk block of gas-oil field is considered in the present paper.

As a result of our study, a density of road lines has been determined and calculated in GIS using satellite data. It became a basis for developing a map of natural cover disturbed by roads. Three gradations are distinguished: strong, moderate and weakly disturbed. The disturbance level corresponds to certain density of the roads. By the density of the roads here we mean number of roads in the unit area.

The area and the place of extention of disturbed natural cover are very dynamic. Annually, the are of different cathegories of degraded soil can increase, and can decrease if rational measures are used and applied. In this connection, it is necessary to create a data base of different cathegories of degraded soil and conduct constant observation on the intensity of the process development, create a monitoring, which is aimed to forecast the development of dynamic processes.