NATIONAL AEROSPACE AGENCY

RESEARCH INSTITUTE FOR AEROSPACE INFORMATICS

USE OF GIS/RS FOR ENVIRONMENTAL MONITORING AND MAPPING

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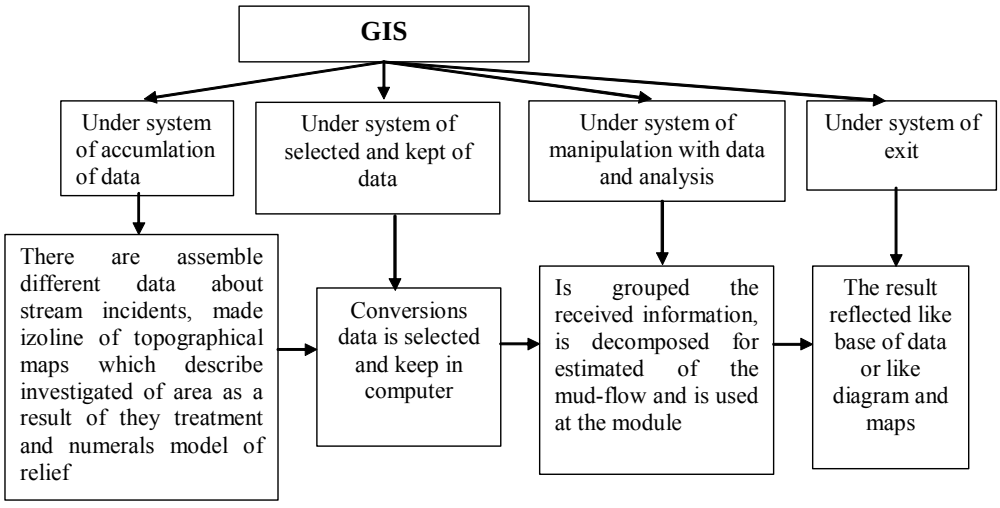
The territory of the Azerbaijan Republic has various climatic conditions connected to complex physical-geographical zones. There are often happened different destructive processes. Most typical acts of nature for various geographical areas of our country - earthquake, mud-flood, streams and landslips, snow avalanches, hurricanes, fires.

The decision of these problems by traditional contact methods is complicated by inaccessibility of objects of supervision. Therefore attempts of the reference to space means in modern conditions get the special urgency. In other words, for management danger of damages the extreme situation is necessary to use data of remote sensing (RS) and geoinformation systems (GIS). GIS will allow to simplify and to speed up any complex spatial operations. The purpose of this system consists to collect the surface and space data and drawing up of the appropriate information. These data and information will help to realize and to estimate many questions, connected to features of a relief, space and geographical factors.



With using data of RS the experts of National Aerospace Agency spent the following projects: creation of digital model of a relief and researching the mud-flow processes on the data of remote sensing with use GIS-technologies; research of floods; creation of electronic thematic maps of various scale; creation of a map ground of cadastre for characteristic place of Azerbaijan; research of the sites, polluted with petroleum, of the Azerbaijan sector of the Caspian sea; development of a technique of an estimation of soil erosion and landslips with use of the space data.

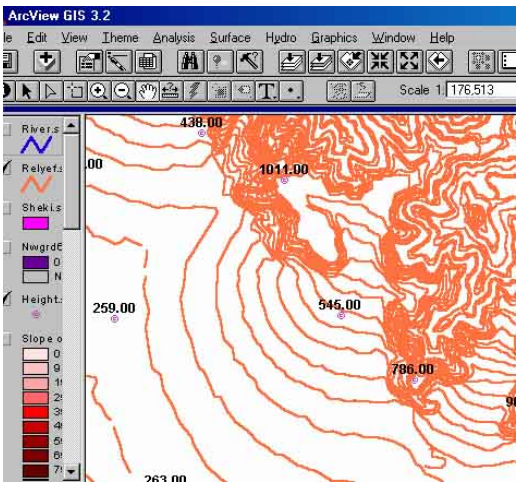
The system of forecasting of extreme situations (ES) is directed on integration in environment of geo-information systems (GIS) and data of remote sensing (RS). The purpose of the system of monitoring by a method RS consists in the collect of the surface and space data and thematic treatment of the appropriate information.

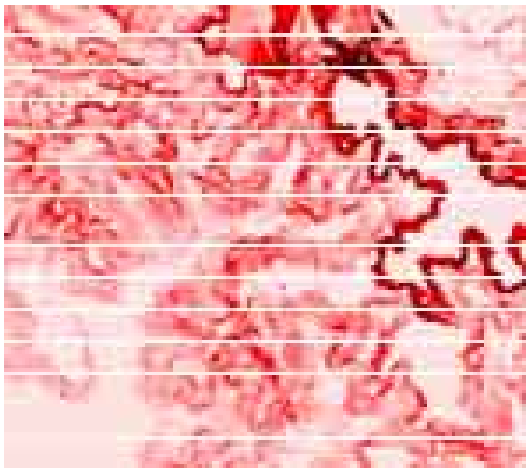
Mud-flows put huge damage not only population and national economy, but also nature too, first of all to wood files of regions and all flora as a whole. By the reason of occurrence have sat are the intensive and long downpours, rough thawing of snow and ice in mountains, characteristic for the given region. Sheki-Zaqatala the zone is considered as one of most dangerous from the point of view of the spontaneous natural phenomena, which mention both ecological factors, and socio economic.

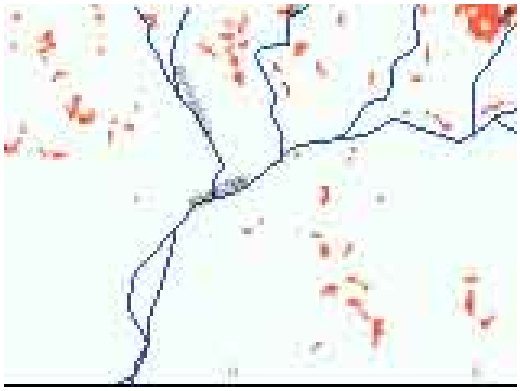
For realization of regular supervision and research mud-flow of processes, centers of origin and ways of movement mud-flow the GIS-technologies allowing to lead the complex analysis of formation mud-flow and an estimation of consequences them is used. On the basis of electronic thematic maps and space images Landsat-TM are developed GIS a mud-flow - landslip of dangerous areas of Azerbaijan.

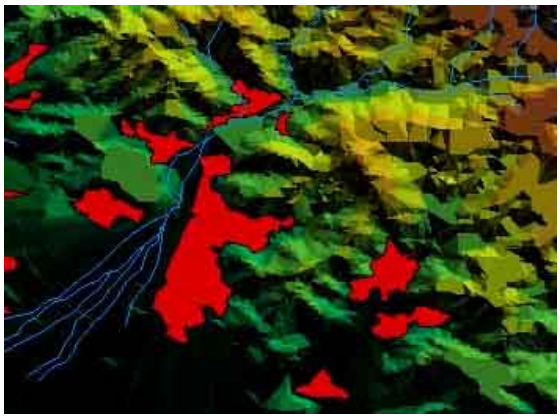
Object of research was the river Kish, located on a Southern slope of the Large Caucasus. In southern slopes of the Large Caucasus frequently arise mud-flow processes, after of long duration of a dry climate the glaciers from heights of mountains thaw, and also occurs of a downpour. For filling GIS the cartographical materials given RS, various descriptions and other information resources are used. Quality and value of final results in many respects are defined to types of the used software and means of processing of the information.

As a cartographical basis the maps of a part of pool the river Kish was taken scanned raster maps. The numerous data received from various sources (digital maps, given with the companions) are united in GIS and are processed for reception of a map of the valid condition of an environment. With use of a relief, which is reflected on an initial map and by the module 3D Analyst is automatically constructed irregular triangulate a network (TIN) and izoline maps on files of figures.





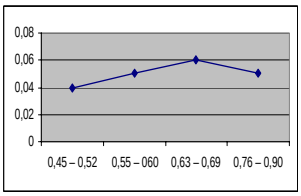


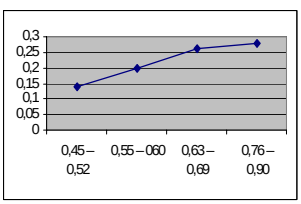


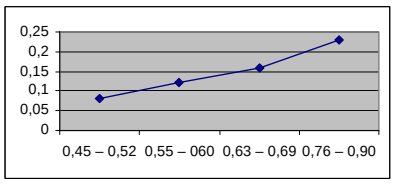
The basic source of the information in these systems intended for mud-flow of the phenomena in high mountainous area, are the materials taking aero-foto pictures, satellite data. After binding the images to maps, was processed with files of heights of points and their coordinates. The numerous data received from various sources (digital maps, given with the companions), is decoding and is classified material united in GIS and is processed for reception of a map of the valid condition of environments.

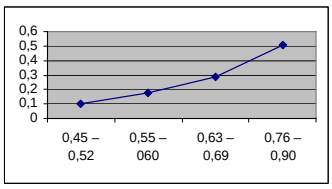
From the received data have created various maps - fragments - geological, geomorphological, soil, vegetative maps. To the offered methods, which the dangers mud-flow estimated on 5 mark to a scale, defined mud-flow of the centers.

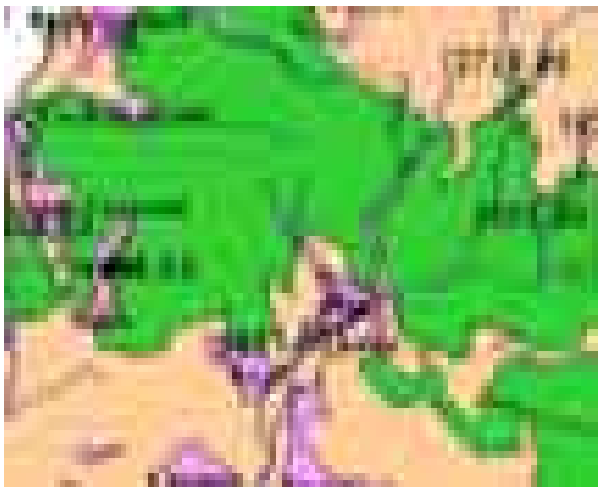
№	Number of object	Length of waves λ, мкм			
		0,45-0,52	0,52- 0,60	0,63 - 0,69	0,76-0,90
1	Objects of the I class- Black ground	10 / 0,04	13 / 0,05	15 / 0,06	13 / 0,05
2	Objects of the II class- clayey- sandy soil	20 / 0,08	31 / 0,12	41 / 0,16	59 / 0,23
3	Objects of the III class- naked area	36 / 0,14	51 /0,2	67 / 0,26	72 / 0,28
4	Objects of the IV class- limewater soil	77 / 0,63	154 / 0,6	184 / 0,72	189 / 0,74
5	Objects of the V class- vegetable cover	26 / 0,10	46 / 0,18	74 / 0,29	131 / 0,51

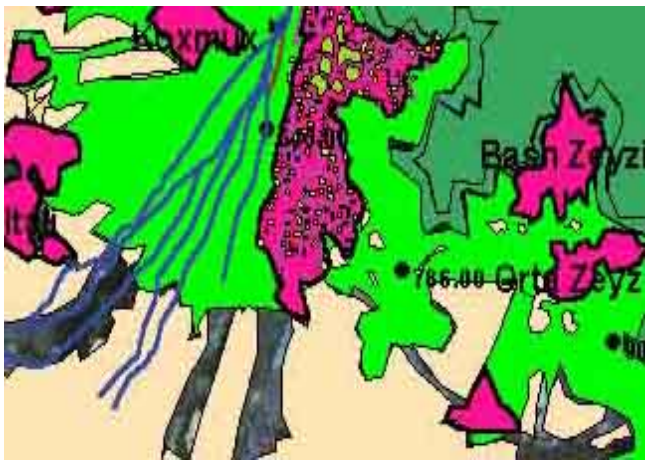








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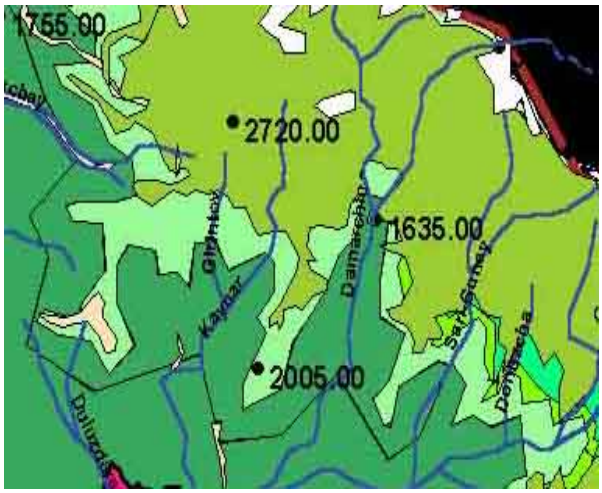
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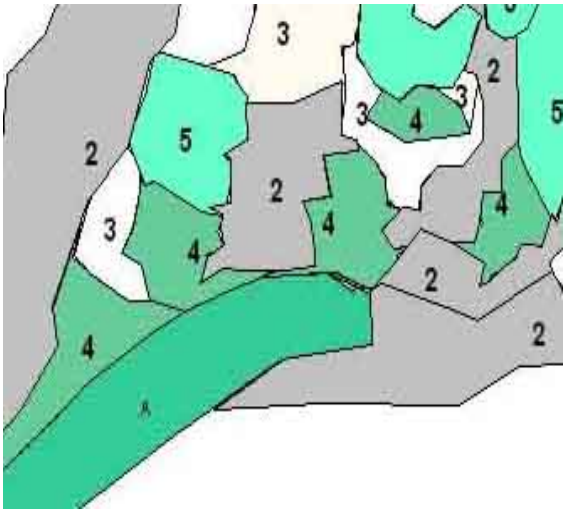

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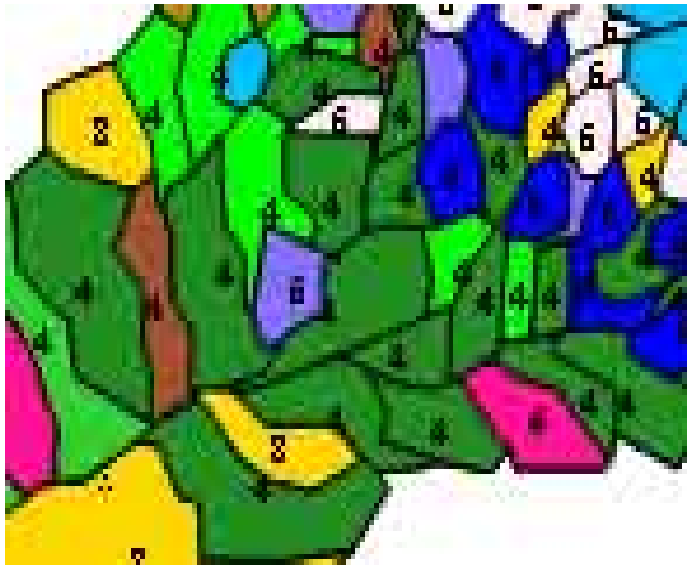
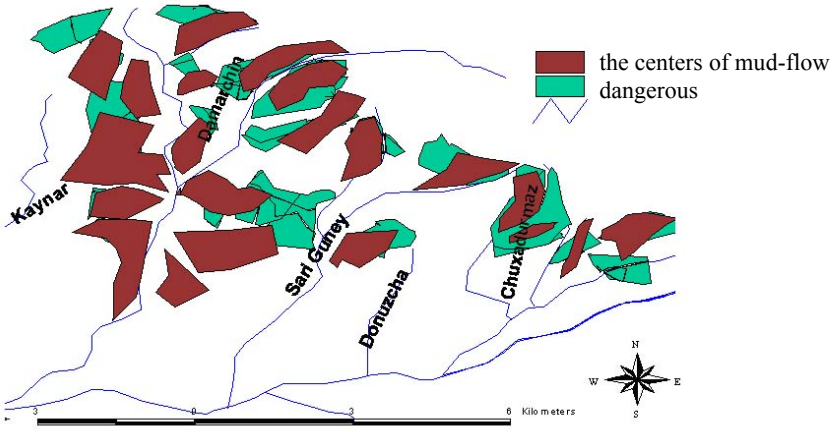


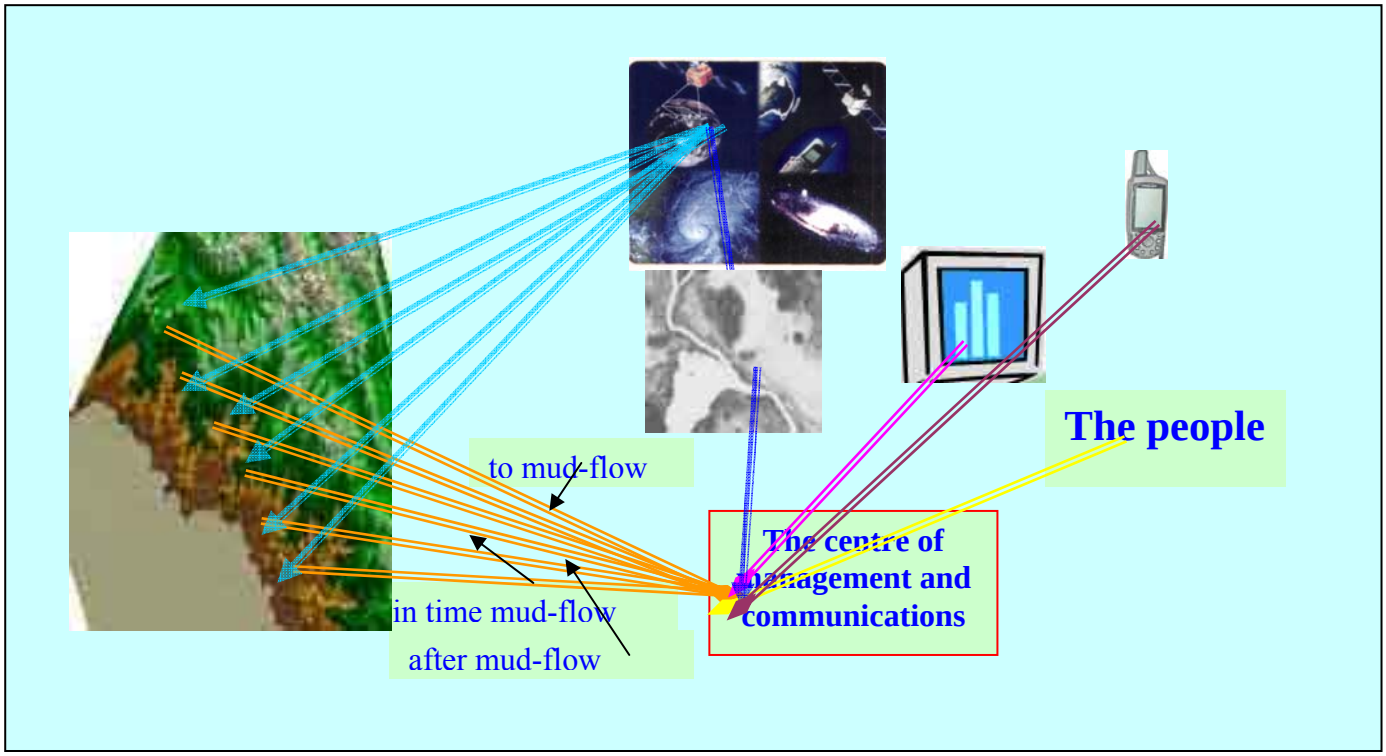


For creation it of systems the data received from geo-information technologies given of remote sensing, GPS and GLONASS were used.
The investigated objects are supervised with the help by the satellite aerial;
Are analyzed all of the going information;

The space images received up to mud-flow, in time mud-flow and after mud-flow are compared to maps, which is reflected of the investigated objects;
In result are defined border which is filling up with waters;

After decoding a space images, are defined of borders of water which is taking place in area mud of a flow;

Is collected the objects on danger mud-flow.



The offered system allows also in time to undertake measures on rescue of the population, to carry out measures on engineering protection a village and landslip of dangerous territories, and also widely to use new geoinformation technologies and global navigation satellite system at designing and operation hydraulic engineering and watereconomic of objects.