

**A STUDY AND MAPPING OF LAND SLIDES SITUATED IN GREAT CAUCASUS-
AZERBAIJAN DOMAINS IN THE NORTHEAST SLOPE BY THE AERIAL PHOTOS**

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ABSTRACT

In this article, landslides that are the most popular subjects of exogenic forces were studied. In our investigation, the information provided from aerial photos and traditional searching methods were taken account together. The reason for us to prefer Northeast slopes of Great Caucasus in studying on landslides that there are many human funds. The results yielded gave us possibility of detecting landslides in which area is occurring densely. Also, the revaluation of these regions in terms of slides is very useful as to where human funds are proper to be made in the future.

It has been one of the most popular subjects to study exogenic forces in recent years. The extent to which the external forces have had impacts on human activities such as building and agriculture is not possible to measure. Among the external forces mass movements have a special importance. In searching of Landslides, it is of great value to consider the conventional methods for searching and the information provided by the aerial photos together. The interpretation of those aerial photos gives us ample evidence to learn the genesis of landslides and the morphometric analysis.

It is not coincidental to prefer the Northeast slopes of Great Caucasus in analysing Landslides. This is a region consisted of natural gas and the other sources, pipe lines, roads, hydrotechnical establishment, centres of settlements and so on.

In the field which we continued our researches landslides have got a special prominence in the exogenic forces and processes. Here landslides developed in a rather lower, middle lower or higher mountains area those are Velveçay, Babaçay, Cimiçay and Ataçay river basins (see Table 1 for details). Our study proved, in the result, that the analysing of landslides by deciphering of aerial photos is very useful. It has been benefited from uncoloured photos in various scales to detect landslides in detailed way. Landslides are seen quite clearly in these photos. For example, Atuç, Rucuk, Hirt (Velveçay river basin) Yukarı Findiğan, Halanc, Altuağaç, Baluşlı (Ataçay river basin) and so on. Our study has also been based on various colour spectrums from aerial photos in studying and analysing landslides. These various tones of colours are changed according to the exposition and the light conditions. All kinds of parameters were taken into consideration in depicting photos. The natural determiners took the most important part in on determination of different elements. The change in tones of colour of various degrees in the photos, the landscape, and the differentiation of its structure are conformed to the changes in vertical direction. These investigations gave us some possibilities to determine both the numerous particularity and qualities of landslides. In the results of combining data's from aerial photos and observations of the land these maps were prepared (see Figure 1 and 2 for details). In analysing and the interpretation of photos, numerous landslides of various growth were detected throughout Celveçay river basin. From the aerial photos, they are seen to be a transition of one type to another by the exogenic forces (from the flooding to the landslide, from the landslides to the streaming and so on). The analysis of aerial photos shows us that the falls of the

land and the landslides cause the soil the vegetation and hydrography to be altered in a large scale. In addition to these, the aerial photos give us some possibilities to determine the land falls and landslides of various times (by the aid of different colour tones).

In the field of our study landslides are divided into three types in terms of their morphologic aspects: superficial slides, slides occurring in type of a current, slides occurring with land falls. Superficial slides are characterised by dragging of upper layers. The fields effected by these slides involve hundreds of meter and they form small hills in relief such as cimi landslide.

Landslides in type of a current are characterised by the flow of semi-liquid state mud and stone fragments with the floor of amphitheatre. Their length can reach a few kilometres (Atuç, Ruçuk, Yerfi, Karabulak and the others). These landslides flow rapidly towards the small river basins and they cause floods in case of long rainfalls. These slides are composed of three parts in terms of morphological aspects: amphitheatre region, dragging region and the region of Alluvial cones. The amphitheatres of these kind of landslides form small river basins with perpendicular slopes like cirque.

The diameters of these holes change from 0.5 km to 1.5 km, the height of the perpendicular slopes change from 5 to 100 meters. The exit of the amphitheatre is towards the river bed in a sloped way and a large amount of slide materials are accumulated here. The moving mass of the slide passes the dragging region, issuing out of the amphitheatre and finds its way to the scattering alluvial cones. The width of the dragging mass is highly reduced through the dragging region and is altered in 10 meters. Many of the cracks are come into existence in the surface of the newly-formed slide fields perpendicularly and in the current direction. Alluvial cones constitute the lowest part of landslides and bring into existence a relief that is waved ground.

The slides formed with the newer and the less dense materials fill the lower regions transcending the mass that was formed by the old slides. The length of the Alluvial cones formed by the slides is more than 1 kilometers. Its width is more than 20 meters. The speed of the dragging mass is changeable in the various parts which constitute the slide and bears a seasonal character. The speed which is very high in the dragging field is reduced immediately towards the river bed. The litologies of slide masses found in the investigating field are various.

The dragging materials are consisted mostly of clays, sandy clays, limestone of Jura and Cretaceous and green clays with marl. Landslides came into existence by the saturation of the upper layers of masses with the rains and underground waters.

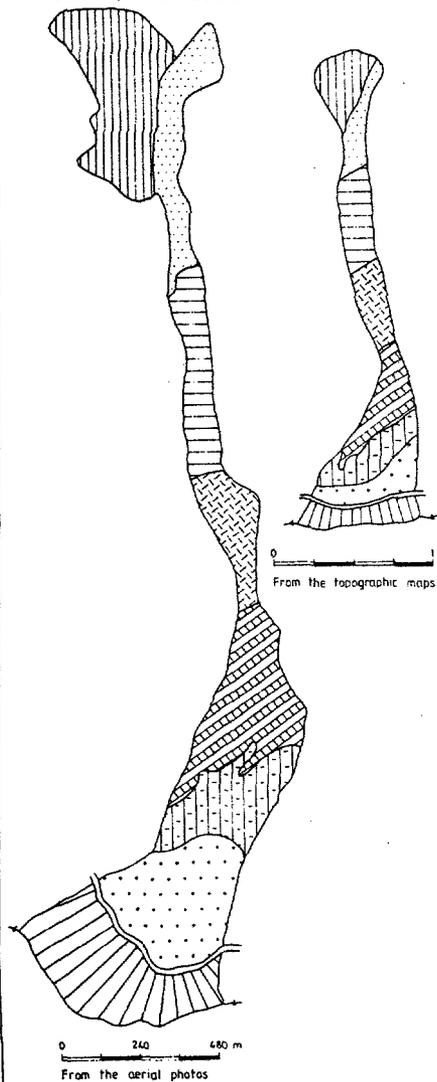
Landfalls mostly happened on Kilov mountains. The amphitheatre of Atuç Landslide here has been made with tough rocks. In the result of the sliding of lands with a plastic characteristic the limestones and sandstones accumulated in amphitheatre cause the landfalls. In the genesis of landfalls, tectonic cracks, gravitational process, earth-quake, erosion are prominent factors. Coming out of the amphitheatres landfalls are moved towards the dragging land. In the result of the landfalls, a large number of roads and some houses are reported to have been under the debris.

The deciphering of the aerial photos and the observations of the land gives us in detecting of landslide fields which are occurring more densely and mapping. The revaluation of these regions in terms of slides is very useful as to where human funds are proper to be made in the future.

Table 1: The morphometric indicators about the landslides situated in the northeast slope of great Caucasus's Azerbaijan domains

The name of the river basin	The name of landslide	Length (km.)	Maximum width (km.)		Altitude above the sea level (m.)		Exposition	Slope inclination (%)
			Anfityatr	Alluvial cone	The altitude of the Landslide's initial position	The altitude of the Landslide's end position		
Velveleçay	Yerli	6.0	1.0	2.8	1700	1200	South	20-22
	Karabulak	2.5	0.02-0.03	0.1-0.2	1680	1300	South	20-25
	Atuç	5.0	0.8-1.0	2.2	1794	1100	North	20-25
	Ruçuk	2.5	0.03-0.05	1.0	1500	1080	North	15-17
Ataçay	Altıağaç	3.0	0.2-0.4	0.6-0.7	1400	1300	North	15-16
	Baqışlı	6.0	0.8-0.9	1.2	1250	1200	North	10-15
	Halanc	5.0	0.6-0.7	0.2-0.3	1250	1100	North-south	15-18
	Yukarıfındığan	2.2	0.1	0.6	950	890	North	10-12

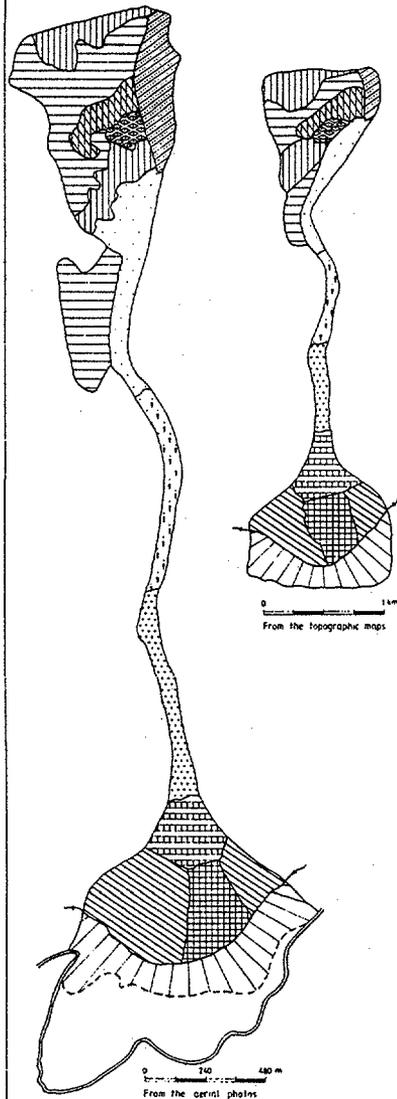
ALTIĞAÇ LANDSLIDE



LEGEND

-  The steep slopes of the amphitheatre
-  The newly materials on the steep slopes and the field of the passage
-  The smoothed relief of the field of the passage
-  The newly materials on the steep slope densely converted into pieces with the cracks in the field of the passage
-  The newly materials and lakelets on the less scattered waved relief of the alluvial cone
-  The densely scattered with deep cracks waved relief and the lakelets on it
-  The old landslide materials of the less steep slopes scattered with a middle degree
-  The old landslide materials of the less steep slopes which were poorly scattered
-  Atalay river
-  The road

ATUC LANDSLIDE



LEGEND

-  Densely scattered steep slopes
-  The scattered steep slopes with a middle degree
-  The less scattered steep slopes
-  The materials made up off the sand and limestones on staged relief of amphitheatre
-  The lakelets on the waved relief of the amphitheatre
-  The new materials made up off the stones with clay in the amph-theatre depression (Happened in 1973)
-  The new materials made up off the stones with clay on the steep slope of the passage of the field
-  The new materials made up off limestones sandstone and clays on the steep slope of the passage of the field
-  The lakelets on the less waved relief of the alluvial cone
-  The waved relief on the old materials of the alluvial cone
-  The old materials densely converted into pieces with the cracks of the alluvial cone
-  The old landslide with steep which has been densely scattered
-  Veljecey river
-  The overland road annihilated with the forming of the landslide
-  The newly made soiled road