

IPL Project (IPL - 215) Annual Report Form 2017

1 January 2017 to 31 December 2017

1. Project Number (approved year) and Title: **IPL-215**

The influence of paleo-landslide activity on the modern slope stability

2. Main Project Fields

(2) Targeted Landslides: Mechanisms and Impacts

B. Landslides Threatening Heritage Sites

(3) Capacity Building

A. Enhancing Human and Institutional Capacities

B. Collating and Disseminating Information/ Knowledge

3. Name of Project leader: Oleg Zerkal

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Core members of the Project

Names/Affiliations:

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4. Objectives:

1. Analysis of the paleo-landslides influence on formation of modern engineering-geological conditions.

2. Scientific support and examination of site investigations for development of the Moscow City

territories where paleo-landslides are distributed.

5. Study Area: The territory of the Moscow City

6. Project Duration:
2017-2019

7. Report

1. **Progress in the project:** In 2017, the Laboratory of Engineering Geodynamics of Moscow Lomonosov State University took part in the researches within the framework of the project of slope strengthening of site "Vorobyovy Gory". Investigations included re-interpretation of geotechnical data considering the geological history of the area, field works, collection of soil samples and examination of their physical properties. For special study more than 200 cores (from boreholes) were described. The study area is located in the central part of the Vorobyovy Gory, covering area from the viewpoint to the Moscow Metro Bridge. The study of section was conducted on several parallel tracks in accordance with axial part of landslide - from the watershed "plateau" (Kosygina str.) perpendicular to the Moskva river. On the basis of new data, it is possible to clarify the mechanism of landslide processes which is based on the motion of individual elements of the landslide. In our case, the simultaneous action of several mechanisms of deformation of soils in different parts of the slope may be revealed. It should be noted that the identified slip zones are at absolute elevations substantially below the current level of the river, indicating that the basis of landslide displacements was a lower erosion level, indicating the duration (in geological time) of the development of landslide deformations.

2. Planned future activities or Statement of completion of the Project:

Laboratory tests of the physical and geotechnical characteristics and analysis of data;

Analysis of identified paleo-landslides;

Description of the conditions of paleo-landslide activity (according to assessment of present and pre-historic slope stability).

3. Beneficiaries of Project for Science, Education and/or Society

The materials were used for the development of ideas about the formation and activity of landslides in the Moscow region.

The materials were used for preparation of term student papers (2 papers), bachelor's (1) and master's (1) theses. During the scientific-practical training of master course students of the engineering and ecological department, field excursion was held.

The discussion with experts of the nature reserve "Vorobyovy Gory" was made.

4. **Results:** The area involved in landslide processes on the Vorobyovy Gory, is characterized by significantly larger values than it had previously assumed, both in area and in depth.

We can talk about the complex mechanism of development of landslide processes of this slope, which can be distinguished on primary and secondary deformations.

In the head part, where the displacement zone is located at the depths of 80 – 100 m, the deformation, confined to the lower part of the Jurassic deposits has a block character.

A similar block mechanism has a secondary landslide massifs, located in the middle part of the slope with the zone of deformation in the Cretaceous sandy-clay sediments.

The toe is represented by clays and has experienced plastic deformation, is the landslide extruding.