МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ

НАЦІОНАЛЬНА АКАДЕМІЯ НАУК УКРАЇНИ

МАЛА АКАДЕМІЯ НАУК УКРАЇНИ

НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ
"ПОЛТАВСЬКА ПОЛІТЕХНІКА
ІМЕНІ ЮРІЯ КОНДРАТЮКА"

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ

United Nations Educational, Scientific and Cultural Organization

Мала академія наук України під егідою ЮНЕСКО

ЗБІРНИК НАУКОВИХ ПРАЦЬ

XVI МІЖНАРОДНОЇ НАУКОВО-ПРАКТИЧНОЇ КОНФЕРЕНЦІЇ "АКАДЕМІЧНА Й УНІВЕРСИТЕТСЬКА НАУКА: РЕЗУЛЬТАТИ ТА ПЕРСПЕКТИВИ"

205 років освітніх традицій

12-13 ГРУДНЯ 2023 РОКУ

Concentration of NaOH solution, g/dm^3	Zircon decomposition degree, %	Phase composition of products decomposition containing zirconium (according to the XRD)
880	99.2	Na_2ZrSiO_5; $Na_5Zr_2F_{13}$
740	98.2	
520	96.6	Na_2ZrSiO_5; $Na_7Zr_6F_{31}$ or $Na_5Zr_2F_{13}$
470	94.0	Na_2ZrSiO_5; $Ca_{0.15}Zr_{0.85}O_{1.85}$ (little)
425	92.0	

In summary, it can be noted that almost completely (92-99%) zircon concentrate decomposes at 320 ºC for 6 hours per concentration of the original NaOH solution from 450 to 880 g/dm^3. At the same time, changing of the concentration of the alkali solution does not significantly affect the degree of decomposition, which remains sufficiently high in a wide range of NaOH concentrations.

References:

[1] Coleman C.E. The Metallurgy of Zirconium. Vol. 1. International Atomic Energy Agency: Vienna, 2022. – 450 p.

[2] Pat. 40810 UA, IPC C22B 3/00, C01G 25/00, The method for zirconium concentrate decomposing /Pavlenko, T.V., Rudkovska, L.M., Omel’chuk, A. O. et al/ Publ. 27.04.2009, Bul. No. 8/2009 (in Ukrainian).

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EPISODIC VERTICAL LAND MOTIONS AT THE GEODYNAMIC TRAINING GROUND IN POLTAVA

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Introduction and purpose of the research

The vertical land motions (VLM) are very sensitive to environmental changes. Variations of hydrometeorological factors cause fluctuations of the topsoil, which creates difficulties in interpreting tectonic or anthropogenic movements of the ground. The magnitude of these oscillations depends mainly on hydrometeorological disturbances and physical properties of the soil [2, 3]. External factors can cause periodic (seasonal, daily) and non-periodic (slow, episodic) vertical movements. Episodic VLM we consider irregular movements of the ground, which violate their usual seasonal periodicity. At the geodynamic training ground (GTG) in Poltava, there are two factors that cause episodic VLM: the phenomenon of freezing-thawing of moist soil and significant rainfall. The purpose of this work is to assess the influence of each of these factors on the VLM.

Research methodology

We investigated the reaction of a group of benchmarks, which are located at the GTG on the territory of the Poltava gravimetric observatory [1]. These are surface benchmarks (8 with a depth of 0÷0.3 m from the ground surface, 5 and 7 with a depth of 0÷1.0 m) and well benchmarks (A15 with a depth of 1.0÷1.5 m, A16 with a depth of 1.5÷2.0 m and A17 with a depth of 2.5÷3.0 m).

Results of observations

Freezing of the soil, which includes clay components, causes an increase in its volume and the rise of the earth's surface. The amount of uplift depends on the grain size composition of the soil and its moisture content. Reducing the size of soil fractions and increasing its moisture contributes to the growth of deformations. Soil thawing causes the earth's surface to sink. Figure 1 shows some of the characteristic movements of the ground due to this processes.

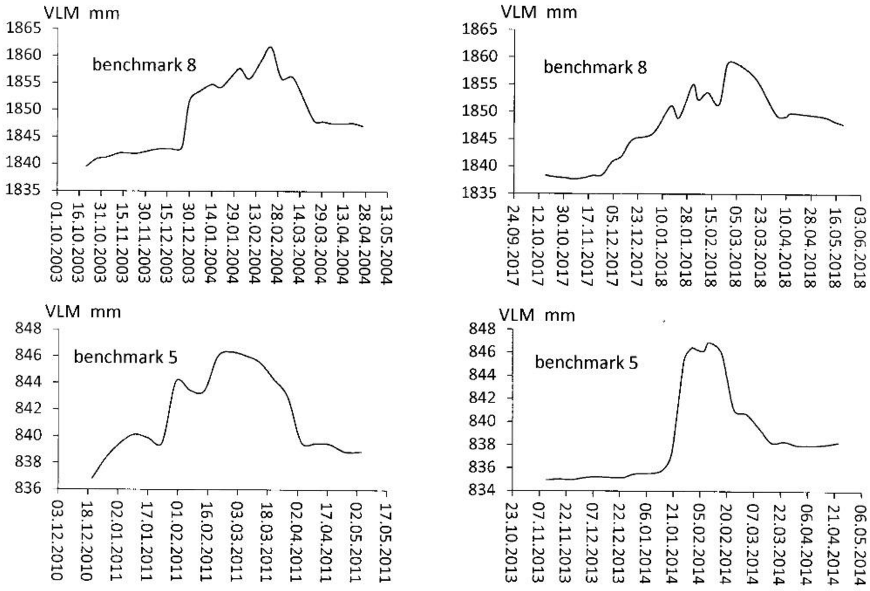

Figure 1 *– VLM are caused by freezing-thawing of moist soil*

This type of deformation depends on the magnitude and duration of the minus temperature of the soil, the depth of its penetration and the amount of soil moisture.

Abnormal rainfall for a short period can disrupt the usual seasonal course of VLM. Figures 2 and 3 show the reaction of different soil layers to this hydrological factor (rainfall are shown in mm per day).

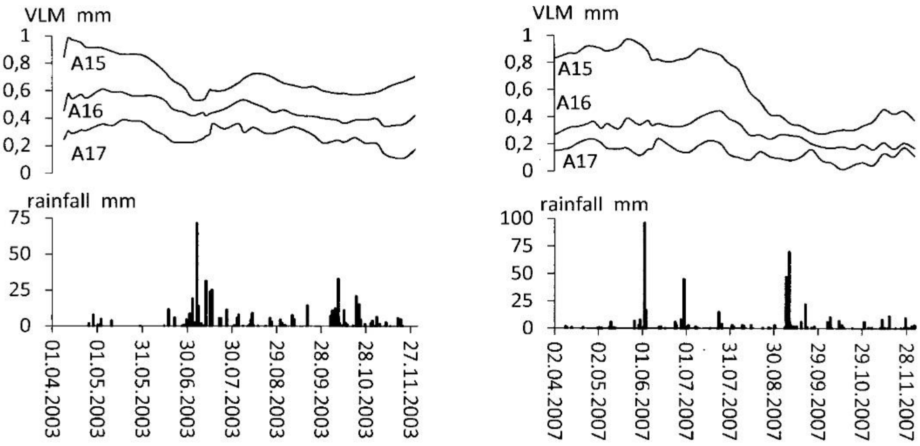

Figure 2 *– Reaction of surface benchmarks to abnormal rainfall at the GTG in Poltava*

The highest rainfall during the observation period 2001-2022 fell from July 3 to July 16, 2003. Then 190 mm of precipitation fell, which is 230% of the monthly norm or 31% of the annual norm, which caused the largest deformation for all time geodetic monitoring.

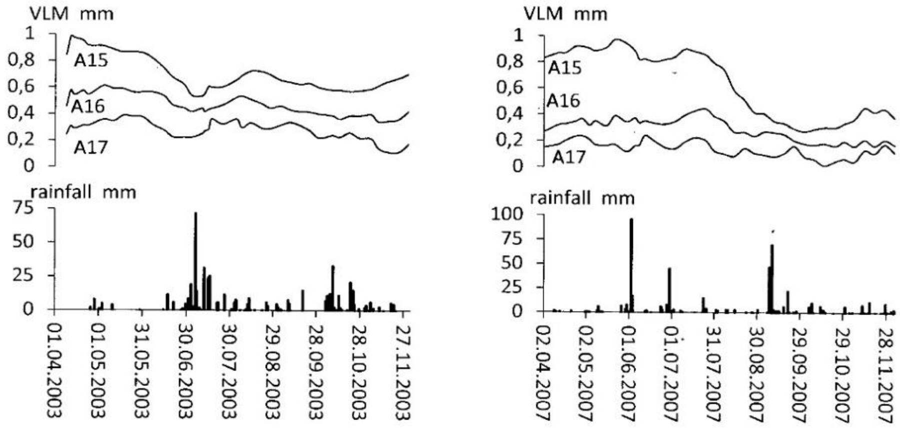

Figure 3 *– Reaction of well benchmarks to abnormal rainfall at the GTG in Poltava*

The influence of precipitation on the behavior of surface benchmarks is clearly monitored in the following years: 2003, 2004, 2007, 2011, 2014, 2015. It is these years that are characterized by abnormally significant rains.

Conclusions

Episodic vertical movements of the ground surface, which are caused by the processes of freezing-thawing of moist soil, can reach a value of 14 mm per day. For the observation period 2001-2022 this factor simultaneously influenced the dynamics of all three surface benchmarks 7 times, at least one benchmark – 9 times, did not act on any of the benchmarks – 6 times. Abnormal heavy rains in the spring-summer period can change the sign of seasonal VLM and cause the surface of the ground to rise by more than 5 mm, and at a depth of 3 m – 0.3 mm.

References:

1. Павлик В.Г. (2010) Сезонні гідротермічні вертикальні рухи земної поверхні в умовах різних за гранулометричним складом ґрунтів. Геодинаміка, 1(9), 22-27. https://doi.org/10.23939/jgd2010.01.022

2. Pavlyk V., Kutnyi A., & Kalnyk O. (2019). Features of the influence of seasonal variation of soil moisture on vertical movements of the earth's surface. Geodynamics, 2(27), 16-23. https://doi.org/10.23939//jgd2019.02.016

3. Vittuari, L., Gottardi, G., & Tini, M. A. (2015). Monumentations of control points for the measurement of soil vertical movements and their interactions with ground water contents. Geomatics, Natural Hazards and Risk, 6(5-7), 439-453. https://doi.org/10.1080/19475705.2013.873084