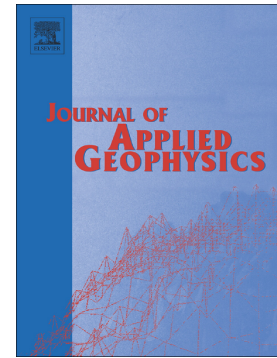


Accepted Manuscript

The importance of seismic methods application for geological reconstruction of rockslide threatened open pit

J. Kondela, M. Prekopová, V. Budinský, B. Pandula, I. Ďuriška



PII: S0926-9851(18)30287-8
DOI: doi:[10.1016/j.jappgeo.2018.09.005](https://doi.org/10.1016/j.jappgeo.2018.09.005)
Reference: APPGEO 3592
To appear in: *Journal of Applied Geophysics*
Received date: 29 March 2018
Revised date: 3 September 2018
Accepted date: 5 September 2018

Please cite this article as: J. Kondela, M. Prekopová, V. Budinský, B. Pandula, I. Ďuriška , The importance of seismic methods application for geological reconstruction of rockslide threatened open pit. *Appgeo* (2018), doi:[10.1016/j.jappgeo.2018.09.005](https://doi.org/10.1016/j.jappgeo.2018.09.005)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

The importance of seismic methods application for geological reconstruction of rockslide threatened open pit

Kondela, J., Prekopová, M., Budinský, V., Pandula, B. and Ďuriška, I.

Institute of Geosciences, Faculty of Mining, Ecology, Process Control and Geotechnologies, Technical University of Košice, Letná 9, Košice, 040 01, Slovakia

Abstract

The significance of otherwise not frequently applied seismic methods in area of open pits increases by occurrence of unpredictable phenomena threatening the deposit during mining operation. Recognizing natural hazards as rockslide, its arrangement and examination of its formation may prevent the otherwise negative impact on economy of the mining and the mining safety. In this paper synthetic methodological approach including application of seismic refraction, seismic tomography, ground vibration monitoring and geological documentation in dolomite open pit Kral'ovany-Rieka (Western Carpathians, Slovakia), where large rockslide covering area of 96 952 m² (Šimeková et al., 2013) evolved, is presented. Four 138 m long profiles were measured using Terraloc Mk8 24 channel seismograph with 10 Hz vertical geophones and geophone offset 6 m and processed by ReflexW Sandmeier scientific software. Seismic velocities and frequencies were during two blasts measured by three-channelled seismographs - UVS 1504, Vibraloc and VMS 2000 MP seismograph at four fixed standpoints to derive the ground transmission coefficient K, referring about the changes of the physical characteristics of the rock environment (Bongiovanni et al., 1991). Geological documentation included mapping and description of the basic lithological units. Results of the methods were integrated into the final model constructed by the Petrel modeling software. The case study revealed complicated geological-structural composition of the area with basement from granodiorites passing upward into thick-bedded carbonates, which are locally covered by Quaternary deposits. Primary factor influencing the rockslide triggering by steep inclination of the basement and faults formation is tectonics. Dense spatial distribution of two fault systems caused a segmentation of the carbonates into several, independently moving blocks. Further agents weakening the rock mass stability were climatic conditions and additional mining activity contributing to gravity driven independent movement of blocks. Seismic refraction and seismic tomography proved as valuable method for geological and structural reconstructions of the open pit and rockslide that are necessary preconditions for the rockslide movement prediction and suggestions of the effective landslide control.

Keywords seismic refraction, rockslide, tectonics, open pit, Western Carpathians

1. Introduction

One of the key elements determining further economic investments into exploitation of existing surface deposits is the safety of the mining process (Elevli and Arpaz, 2010). Safety mining is influenced mainly by the prevailing natural and technical characteristics at the localities of concern. Inadequate geological examination of quarries together with their insensitive exploitation may result in activation of various types of mass movement such as landslides. Successive disturbed stability of the quarry walls and the entire slope can lead to unexpected consequences influencing the whole mining process. Landslide activities can threaten buildings/communications in the slope toe surrounding and thus lead to serious damage inside the quarry, however, their impact in form of destroyed infrastructure outside the quarry is also often. Besides, landslides are long time considered as a natural hazard leading to significant economic losses, injuries and sometimes even to death (Abidin et al.,

Download English Version:

<https://daneshyari.com/en/article/11033036>

Download Persian Version:

<https://daneshyari.com/article/11033036>

[Daneshyari.com](https://daneshyari.com)