

Paweł Cwiakała, Paweł Wiącek: **Assessment of the Possibility to Measure Deformations of Rock Walls Using Terrestrial Laser Scanning** • Geomatics and Environmental Engineering 2016, Vol. 10, No. 2

Unexpected rockfalls and rock displacements belong to most significant dangers related to slope engineering. It may cause not only serious changes in the environment but also, and most of all, danger for infrastructure and can even lead to fatal accidents. Therefore, ensuring security in both open-pit mining and on the rocky slopes in the area of road cuts requires instant monitoring of the stability and displacements of slopes and determining the dynamics of emerging changes. Dynamic development of surveying technologies including Terrestrial Laser Scanning (TLS) allows fast retrieval of measurement data. The additional advantage of TLS is its ability to quickly obtain data of very high resolution and accuracy without direct contact with the examined object. Thus, it allows to carry out measurements for the whole object without the need for generalization. It offers new possibilities for analysis and interpretation of obtained results.

This paper presents the possibilities of using TLS method for marking displacements and volume of rock cavities formed as a result of natural and anthropogenic weathering. Discussed works are supported by exemplary measurements conducted in the area of abandoned limestone quarry "Zakrzówek" in Cracow.

**Keywords:** surveying technology, terrestrial laser scanning, volume of rock cavities, rock geometry measurements

Katarzyna Grzesik, Magdalena Usarz: **A Life Cycle Assessment of the Municipal Waste Management System in Tarnów** • Geomatics and Environmental Engineering 2016, Vol. 10, No. 2

Life Cycle Assessment, which is considered to be one of the most effective methods of environmental management, is a useful tool to evaluate the environmental aspects of waste management systems. The LCA procedure is a complex task and

requires a precise definition of the scope of a research, acquisition of a variety of accurate data, as well as a skillful selection of a method for assessing environmental aspects. This article aims to analyze the life cycle of the municipal waste management system in Tarnów in 2012, using the IWM-PL model, the application in the Polish language version, launched in 2011.

The functional unit is the total amount of municipal waste in the waste management system, i.e. the amount of mixed solid and selectively collected municipal waste, collected in Tarnów in 2012, and transported to materials recovery facility or to disposal. The boundaries of the system include recovery and disposal processes carried out in these facilities, as well as transportation of waste there.

The IWM-PL model calculates emissions to air and water for the functional unit, and then converts them into six impact categories: carcinogens, respiratory system – inorganic compounds, respiratory system – organic compounds, climate change, acidification/eutrophication, ecotoxicity. Impact categories are assigned to two damage categories: human health and ecosystem quality.

The performed assessment of the life cycle of the municipal waste management system in Tarnów in 2012 revealed a negative impact on the environment. The final result, expressed in eco-points (Pt), is significantly higher in the category of human health than in ecosystem quality. Emissions of methane and carbon dioxide from landfilling process greatly contribute to the value of the obtained result. The waste management system should be altered and the landfill of mixed municipal solid waste (including bio-waste) should be abandoned in order to reduce the negative environmental impact of municipal waste management in Tarnów.

**Keywords:** Life Cycle Assessment, municipal waste, waste management system, environmental impact

Mykhaylo Kulyk, Oleh Mandryk, Yosyf Mysak: **An Analysis of the Possibility of Using Coal Technologies to Improve Maneuverability, Mobility and Ecological Compatibility of Thermal Power Plant Units** • Geomatics and Environmental Engineering 2016, Vol. 10, No. 2

It was considered the impact on mobility and maneuverability coal thermal units of two-phasic combustion of coal in an additional furnace. Application of membrane separators for

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enrichment of oxygen supplied to the furnace of the boiler, it is expected to reduce the formation of harmful substances, even when burning low quality coal.

**Keywords:** agility, mobility, additional furnace, membrane separator air, harmful substances, modes of peak load

Przemysław Leń, Monika Mika: **The Impact of Socio-Economic Factors on the Size of the External Plot Patchwork – a Case Study of Brzustowiec Village, in the Łódzkie Voivodship** • Geomatics and Environmental Engineering 2016, Vol. 10, No. 2

The patchwork of plots is one of the major factors that have a negative impact on both the organization and the level of agricultural production. Excessive fragmentation reduces the intensity of the work and increases the cost of agricultural production, thereby generating lower and lower income. Due to the unfavorable geometry of the borders of plots, resulting from the significant fragmentation of land, patchwork of plots is also an impediment in the way of building a cadastral system in Poland.

The article presents the size of the external patchwork of plots in Brzustowiec village, in the municipality of Drzewica in the Opoczno district. The analysis was conducted also in terms of economic and social factors with relevance in assessing the prospects of further development of the region, and thereby changes in the external patchwork of plots.

**Keywords:** plot patchwork, land of non-resident owners, land consolidation, exchange of land

Aneta Mączyńska: **An Analysis of the Correctness of the Data Disclosed in the Land Register and Buildings in the Area of Water Flowing on the Example of Smyków** • Geomatics and Environmental Engineering 2016, Vol. 10, No. 2

General division of waters in Poland is regulated in the Water Law. Waters division is very essential, as it has direct impact on ownership. Boundary of watercourse disclosed in the register of land and buildings is border of the property, determines of the rights of ownership, that is why it is important to determine this properly.

During work on this article author analysed compliance of the course of the boundaries presented in documents with their

actual existence in Smyków community. Many of the usable lands were incorrectly marked. There have been found many examples of changing the coast line. The compliance of cadastre data in extent of ground water was estimated at the level of 25% and in case of the ditches/drainage ditches 40%.

In this article the author wishes to draw attention to the need of correct demonstration of watercourse boundary shown in the register of land and buildings, pointing directly examples of its erroneous determination on the example of Smyków.

**Keywords:** the shoreline, the register of land and buildings, the Water Law

Zbigniew Siejka: **This Use of Virtual Reference Station of the Multifunctional Positioning System ASG-EUPOS to Optimize the Reference Layout of the Basic Realization Network** • Geomatics and Environmental Engineering 2016, Vol. 10, No. 2

This paper presents the results of research on the use of virtual reference stations VRS (Virtual Reference Station) generated in the Polish multifunction system of satellite, active geodetic network ASG-EUPOS. The use of virtual reference stations allows us to strengthen the reference elements, shortening the length of the reference vectors, may also lead to an overall improvement the geometrical construction of the network to be determined. In this work basic research was focused on the determination of the optimal length of reference vectors, at a certain predetermined length of the observation session, executed using a static method. The performed research experiments have shown, that this approach can improve the quality parameters in created in such a way setting-out network. However, the measurable effect of quality becomes noticeable after shortening of the length of reference vectors to about 35 km. This corresponds to approximately half of the distance in which the physical reference stations (CORS) were placed in the ASG-EUPOS system. The proposed solution leads to an increase of the external reliability related to the reference conditions and improves the accuracy especially in the absolute sense (determination of the GPS vectors and position errors of points).

**Keywords:** static mode of GNSS surveying, GPS, GLONASS, Virtual Reference Station, ASG-EUPOS

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Joanna Świdwa-Urbańska: **The Content of Selected Heavy Metals of the Sediment and Soil Overburden Overlying Alkaline Sodium Waste on the Basis of the Settling Tanks of the Former “Solvay” Krakow Soda Works** • Geomatics and Environmental Engineering 2016, Vol. 10, No. 2

This paper presents the results of a study on the content of selected heavy metals (Pb, Cd, Sr, Zn, Cu, Ni, Mn, Cr) in sodium waste deposited on the settling tanks of the former “Solvay” Krakow Soda Works and in the soil overburden covering the settling tanks. The aim of the study was to determine the content of heavy metals, their correlations and relation between heavy metals and some parameters of the sediment.

**Keywords:** heavy metals, sodium wastes