

Monika Badurska: **Orthorectification and Geometric Verification of High Resolution TerraSAR-X Images** • Geomatics and Environmental Engineering 2011, Vol. 5, No. 3

TerraSAR-X is a German radar satellite, which was launched in June 2007. The satellite is equipped with a modern SAR system using the X band microwave radiation frequency and is capable of acquiring very high resolution SAR images independent of weather conditions and illumination. The paper presents the results of geometrical correction of high resolution TerraSAR-X images. The research was based on images acquired in HighResolution SpotLight mode in single polarisation HH with spatial resolution about 1 m. In orthorectification process the data supplied by the distributor in the SSC format was used. The results of orthorectification using various amount of ground control points was checked. The influence of the digital terrain model used in orthorectification process was also analysed. The last part of the work presents verification of geometric precision of geocoded product (EEC) generated by the distributor.

Keywords: TerraSAR-X, SAR, orthorectification

Antoni P. Barbacki: **The Problem of the Energy Efficiency and Renewability in Applying Heat Pumps, Referring to the European Union Directive** • Geomatics and Environmental Engineering 2011, Vol. 5, No. 3

The article presents the requirements contained in the European Union Directive 2009/28/WE for the systems such as heat pumps to be able to classify their effect as the management of renewable energy. The Directive also introduces a legal requirement that the installations with heat pumps are energy efficient. Only pumps fulfilling the mentioned above conditions shall be regarded as using energy from renewable resources the value of which will be considered at calculating the contribution of renewable energy in the total gross energy production.

In this context also the speculations concerning the issues of renewability, emission and economics during the exploitation of heat pumps were presented.

The general conclusion from the presented speculations is that both the level of renewability, emission and economics of the application of heat pumps are strictly connected with the high value of the coefficient of performance (COP), depending on climatic conditions and the applied low temperature source.

Keywords: heat pumps, EU directive, renewable energy

Paweł Cwiąkała, Przemysław Kuras, Olga Sukta: **Analysis of Dynamic Strains of Suspension Bridge on the Example of Pedestrian Footbridge** • Geomatics and Environmental Engineering 2011, Vol. 5, No. 3

The article discusses the basic principles of operation of modern ground-based radar interferometer, constituting a part of the IBIS-S system, as well as its abilities to be applied in the surveys of the structure. This system assures high accuracy, continuous recording, and the simultaneous observation of numerous points, and therefore it is applicable to study the dynamics of objects. The article presents and discusses the results of measurements of vertical and torsional vibrations carried out on the pedestrian suspension footbridge. The conducted research confirms the accuracy and usefulness of the ground-based radar interferometer for measuring vibrations.

Keywords: dynamic analysis, suspension bridge, pedestrian footbridge, radar interferometry

Janusz Dąbrowski: **Application of Difference Analysis Perception in Comparison of Calculation of the Effects of Floods** • Geomatics and Environmental Engineering 2011, Vol. 5, No. 3

The article presents the application of difference analysis perception in comparison of calculation of the effects of floods. The year 2010 was for Poland particularly acute in terms of flooding, which resulted in damage to the infrastructure of many communities. In the case of damage to the state property, a local government authority may apply for grants to remove these effects. The data contained in the work makes up a collection of 142 pairs of independent calculations of the effects of flooding on the Podkarpackie province. The first calculation was made by specialists in a municipality, and the second verification by the committee representing the interests of the State in the person of the Governor. The basis of calculations was the data from the Secocenbud.

The difference analysis is usually applied while comparing two independent perceptions describing the same value. Surveyors often use the difference analysis perception in measurement of angles, length and height differences. While property estimating, the difference analysis perception is hardly used due to lack of relevant data. The data compiled and presented by the author concerns calculations made in late May and June 2010, with dozens of municipalities of the Podkarpackie province. With so little time-interval we have completely ignored in the analysis the impact of the economic and environmental impact on the value of real estate valuation. An additional advantage of the analysis is the fact that all the valuation estimates mainly the effects of flooding in relation to road infrastructure. With such a selection of data it was possible to carry out a thorough analy-

sis of differences in perceptions. The article shows a certain regularity associated with the valuation of the effects of floods being so far in the field of speculations and assumptions due to lack of data. Based on the data and its interpretation, the article contains practical proposals for local and state government.

Keywords: difference analysis perception, the calculation of the effects of floods

Katarzyna Grzesik, Kinga Guca: **Screening Study of Life Cycle Assessment (LCA) of the Electric Kettle with SimaPro Software** • Geomatics and Environmental Engineering 2011, Vol. 5, No. 3

Life cycle assessment is an important tool to evaluate possible impacts associated with products. LCA is a "cradle-to-grave" approach, it addresses the environmental aspects and potential impacts throughout a product's life cycle from raw material acquisition through production, use, end of life treatment, recycling and final disposal. The goal of this paper is conducting the screening LCA of the popular electric kettle, Zelmer model 17013, manufactured, used and disposed in Poland. Data on the kettle structure and its components was obtained from service manual and from the technical data on this model published by the manufacturer. The screening LCA was conducted with SimaPro software, a professional tool to collect, analyze and monitor the environmental performance of products, in which life cycles could be modeled in a systematic way, following the ISO 14040 standards. The LCA results show that 99% of the total environmental impact during the entire life cycle of the electric kettle has the use stage of the product, that is consumption of electricity produced in Poland. All efforts to improve the environmental performance of this product should be put in optimising the use phase that is to minimize the electric energy consumption. The presented LCA is a screening study using already available data in SimaPro databases. Conducting the extensive study was not possible due to the lack of exact and detailed data. The study results have some limitations and definitely cannot be used to compare products.

Keywords: life cycle assessment, environmental impact, life cycle, LCA study, SimaPro

Anita Kwartnik-Pruc: **Exclusion of Land from Agricultural and Forestry Production. Practical Problems of the Procedure** • Geomatics and Environmental Engineering 2011, Vol. 5, No. 3

The process of excluding agricultural and forest land from production is a two-step procedure. The first step includes a change of property use in the local zoning plan. The second element of the

process leading to the actual exclusion of land from agricultural or forestry production is an administrative decision allowing for such an exclusion.

This article presents practical problems associated with determining the area of exclusion. Difficulties associated with the disclosure of changes in land use in land and building register have also been highlighted here. Shortcomings of legal regulations in the subject matter have been pointed out and complementation of the normative acts has been proposed.

Keywords: agricultural lands, forest lands, exclusion of lands from agricultural production.

Martyna Poręba: Use of Integrated GPS and INS Systems in Aerial Photogrammetry • Geomatics and Environmental Engineering 2011, Vol. 5, No. 3

A synthetic overview of the present state of knowledge regarding the use of GPS and INS systems in aerial photogrammetry is presented. Although, the inertial navigation can calculate the position of the aircraft without any help from outside world, a large number of error are introduced. Hence a GPS is used to aid the INS, using a Kalman filter which helps in estimating the errors in the INS and thus updating position to improved accuracy. The deficiencies inherent in both systems as well as the reasons for their integration are considered. Since the use of a GPS system during flight still requires the creation of a net of ground control points and the planning of blocks with sufficient overlap between images, GPS/INS system integration has become a topic of keen interest. For this purpose, the basics of GPS/INS integration and the advantages and disadvantages of this solution are explained.

The summary presents conclusions about directions for further development of integrated systems and a brief discussion of the current state of studies on direct georeferencing published in international scientific literature.

Keywords: GPS, INS, integration, Kalman filter, direct georeferencing, ground control points, aerial photogrammetry