

Workshop



on September 16, 2013, 11:00 am to 5:00 pm, in Aachen, EUROGRESS

GMES-based Geoservices for Mining to Support Prospection and Exploration as well as the Integrated Monitoring for Environmental Protection and Operational Security

Background

Spatial information is needed in all phases of the mining life cycle. Main issues are the economical prospection and exploration of deposits as well as environmentally friendly and safe mining activities from mine planning through mine development and mineral extraction to closure and reclamation. In this workshop, a current R&D project is presented, which is supported by funds from the EU and the Federal State of North Rhine-Westphalia. Within the project, innovative multi sensorial analytical methods as well as geographic information technologies are being developed. In particular high resolution hyperspectral and multispectral data as well as radar data will be tested in combination with innovative in-situ measurements, e.g. latest geophysical exploration methods, ground-based radar and geo information technologies. All used methods will be bundled as cross-technology geo services and will be optimized towards the real requirements from industry within pilot studies in selected mining areas in Germany and abroad. Final target is strengthening the support to all processes in prospection, exploration and monitoring for environmental protection and operational safety in mining.

Talks

The integrated, cross-technology geo services, which are currently being developed, will be introduced during the workshop:

- Method development – optical sensors
- Method development – systems for monitoring of ground movements
- Development of integration technologies (GDI) and quality assurance procedures
- Implementation of methods into practice
- Results of a user survey which was conducted in 2012

Discussion

How can innovative remote sensing and in-situ measurements support and optimize mining processes? This question will be pursued within the workshop. Some examples of the application of these methods within different phases of the mining life cycle:

Prospection – search for mineral resources and deposits:

- Exploration of geological and hydrogeological structures with the aim of geological mapping
- Assessment of the deposit reserve
- Determination of the presence of individual chemical components at the ground surface using the spectral signature of rocks and vegetation (search for indicators)

Exploration – detailed examination on the workability of the deposit:

- Assessment of the spatial extent of the mining area
- Analysis and evaluation of existing infrastructure in the exploration area
- Determination of the first drilling locations
- Analysis of the prospective minerals in the rocks or the percentage distribution of minerals in the deposit
- Exploration of the topography and relief in order to determine the appropriate mining method and appropriate mining technology

Mineral extraction – development and mining of mineral resources:

- Detection of ground movements (subsidence and uplifts) within the influence range of mining
- Analysis of ecological impacts of mining (e.g. vegetation changes, water logging)
- Analysis of the changing land use during mining operations
- Monitoring of the stability of opencast mine slopes and dump slopes
- Determination of potential sites for spoil or overburden dumps
- Analysis of bulk material in opencast mining for targeted operations control in order to guarantee constant composition of main and country rock

Mine closure / Land reclamation:

- Monitoring of reclamation measures
 - Vegetation analysis by recording the spectral signature of vegetation (determination of chlorophyll content)
 - Investigation on the distribution of soil moisture (directly by image spectra or indirectly by plant indicators)
 - Site analysis for individual groups of vegetation
- Monitoring of ground movements after cessation of mining operations (settlements, slope monitoring, uplifts due to rise of groundwater)

Monitoring during the extraction and closure phase:

- Monitoring of georisks, detection of ground movements or subsidence, uplifts and landslides as well as resulting subsidence damages
- Analysis of ground movement rates, assessment of expected subsidence damages and prevention of subsidence damages
- Monitoring of shallow ground water before, during and after mining operations
- Analysis of the overburden material in relation to chemical composition
- Monitoring of the land surface in areas of abandoned mining with regard to sinkholes or other subsidence damages



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