GOLDENEYE

Earth observation and Earth GNSS data acquisition and processing platform for safe, sustainable and cost-efficient mining operations

Web: www.goldeneye-project.eu
LinkedIn: linkedin.com/company/goldeneye-project
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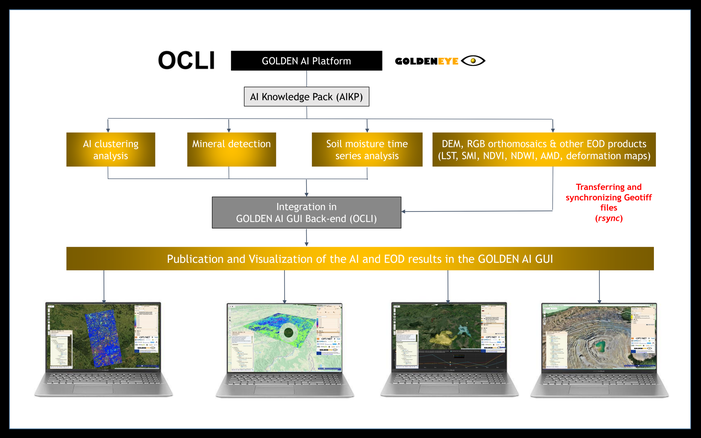
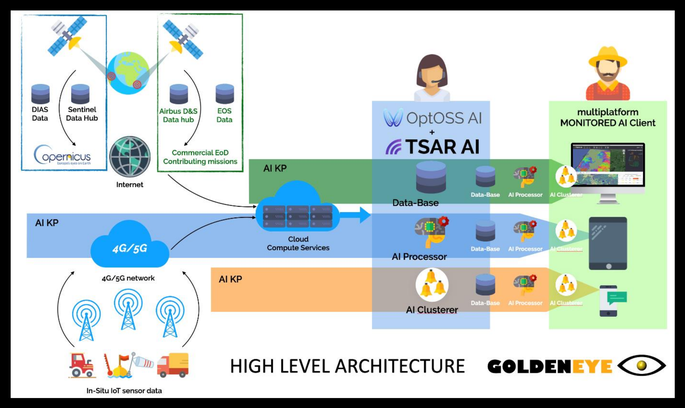
DESCRIPTION OF THE GOLDEN AI PLATFORM

The Goldeneye project implements a unique combination of remote sensing and positioning technologies, exploiting Earth observation and Earth GNSS data, together with data fusion and processing powered by data analytics and machine-learning algorithms. The platform will allow satellites, drones and in-situ sensors to collect high resolution data of the entire mine, which can be processed and converted into actionable intelligence for safety, environmental monitoring and overall productivity, allowing more efficient exploration, extraction and closure. It involves automated modules for data acquisition, data preprocessing, image processing (e.g., denoising, edge detection, etc.), and AI processing. In addition, the users communicate with the platform using natural human language, enabling to interpreting any time-series even if they do not have the necessary data science skills. These tools will be demonstrated in 5 field trials in Germany, Bulgaria, Romania, Kosovo and Finland, creating a compelling value proposition for implementation across the mining industry value chain. The project has a duration of 3.5 years and an EC funding of €8.36M. The consortium includes a large industrial partner, 8 SMEs, 4 academic/research centres and 4 end-users. The project is in the field testing phase and actively seeking partners for the commercial mineral exploration and exploitation activities.



GOLDEN AI Graphical user interface



SATELLITE SENSING

Data sources

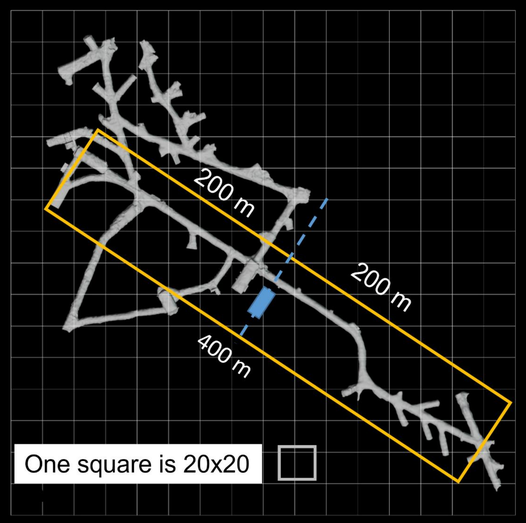
- Sentinel 1 Synthethic Aperture Radar Imagery
- Sentinel 2 Multispectral Imagery
- Sentinel 3, Sentinel 5P, Landsat 8, MODIS
- Airbus / Plejades Satellite Imagery & DEM
- TerraSAR X Radar Imagery

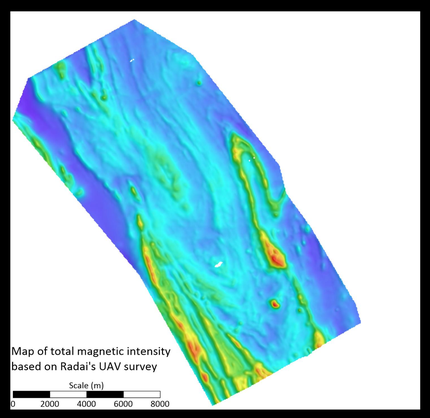
Applications

EXPLORATION:
Locating new deposits especially in remote areas
SAFETY:
Ground deformation and slope stability in open pit mines and tailing dams
ENVIRONMENTAL FOOTPRINT:
Changes of ground cover and surface waters

GNSS in-mine geolocation system

The GNSS in-mine geolocation system provided by GNS will help to develop the re-user safety within the vast network underground tunnels, to prevent personnel entering banned areas and in case of emergencies to help to locate the person(s) in distress.

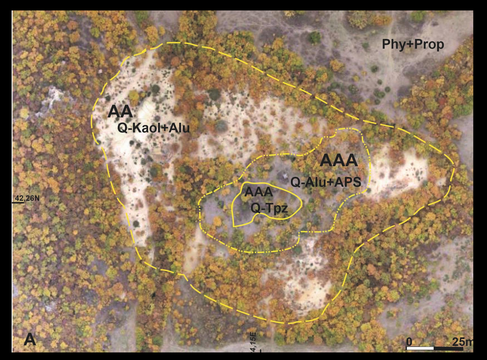




UAV BASED SENSING

3D UAV mapping

Our preliminary UAV supported remote sensing and field mapping of Pesovets volcanic cone outlined the AAA (advanced argillic) and AA (argillic) domains in addition to fault-controlled ring and radial structures in combination with spectral mineral detection methods demonstrate quick approach for mineral exploration area selection and targeting.



Alteration zoning around Pesovets silica cap outlined by UAV survey, field mapping and mineral detection study

Electromagnetic (EM) field measurements

Radai's novel electromagnetic (EM) measuring system (Louhi) for mineral exploration has been improved and the next version is planned to be put into production next year. Its new functionalities include:

Ground loop transmitter:
- 400 m long wire laid out as a loop on the ground
- Three frequencies between 1 - 20 kHz
- Total output power 500 W

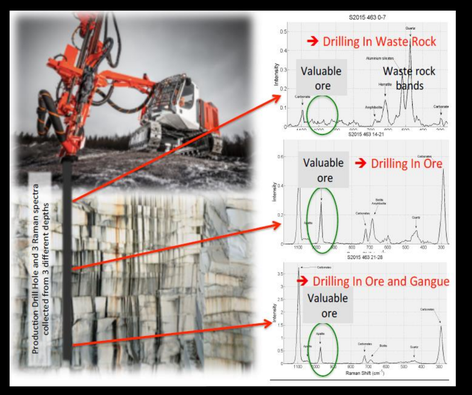
3-component EM receiver:
- Lightweight (1 kg) birdie towed by a drone
- One measurement per second
- PC software for reading the data from the receiver and creating result files
- Real-time measurement is also possible when connected to PC via USB

PROXIMAL SENSING

Active hyperspectral technology

Active hyperspectral technology enables early phase mineral mapping in surface and underground mines at any point of Run-Of-Mine. The solution delivers a new modality of ore sorting and unlocks the sustainable and responsible way to mine natural resources. It increases resource recovery and minable tons and reduces the effort of mining companies. The technology combines active supercontinuum laser-based illumination with an advanced hyperspectral data acquisition, thus, allowing for mineralogy mapping from distances up to 15 meters under any ambient light conditions. For example, the technology can perform during the 24/7 operation of surface mines or in the total darkness of underground mines.

Timegated Raman technology



Time-gated Raman spectroscopy produces mineralogical and structural information from minerals and other materials and the measurements can be carried out in a non-contact manner. The aim during the Goldeneye project is to customize a time-gated Raman analyzer and integrate it to a drilling unit. This would enable continuous and near real-time measurements from drilling cuttings, and the measurement results would be sent to the Goldeneye platform where the data could be used to augment and improve the mineral predictive maps produced by the other Goldeneye sensing techniques.

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