Airborne Geophysics

Airborne Geophysics in Mineral Exploration

Countries covered: European Union
United Kingdom

Summary:

Airborne geophysics was mentioned by experts as a key innovation in the D 3.2 process (see report).

Description:

Airborne Geophysics has been identified as one of the emerging technologies capable of finding potential mineral deposits under cover and at depth. Examples include recent research into Airborne IP (induced polarization) and SQUID (High temperature superconducting quantum interference device) electromagnetic applications as well as the use of drones in geophysical surveying.

No real stand-alone innovations have been made in the last 10-15 years, however developing IT technologies and algorithms have refined certain aspects of Airborne Geophysics and continuously improved the use and applicability in mineral exploration.
Good practice areas:

Resource security

Advanced airborne geophysical methods allow the detection of mineralising systems and deposits and therefore the future discovery and security of supply. Refer to key papers, such as Lee et al. (2002) and the use of SQUID in the discovery of the Sakatti Ni-Cu-PGE deposits in Finland.

Organisations involved:

CSIRO
University of Jena
Various large mining companies
Geotech

Innovation category:

Organisational
Product

Impact on the mining value chain

- EXPLORATION (incl. permitting)

Exploration

- safe and fast remote exploration
- greater depth exploration
- reduced environmental impact

Linked policies

National Research Policies
Allowing detailed research into exploration specific issues

Grants National Tax Policies
Allowing tax incentives for explorers and therefore an increased drive to use regional exploration technologies
Transferability:

It was found that, in terms of airborne geophysics, the mining industry can both learn from other industries (e.g. oil and gas) and enable other geoscience sectors to implement workflows and research (e.g. urban geoscience and geophysics - hydrogeology/ contaminated land).

Innovation drivers and barriers

Drivers:
- Policy
  - EU research strategies and grants: H2020, Finland’s Green Mining Programme, etc.
- Economic
  - Reduced cost and time of exploration in remote and covered greenfields areas
- Other
  - General technology development and availability (hardware, software, processing power, algorithms, drones etc.).
  - Business needs and demands (exploration at depth and under cover).

Impact Area

Area:
- Environment, Ecosystem services and quality of natural resources

Impact on listed area:
+ : Lower land use and thus lower biodiversity impact compared to ground based methods

Area:
- Environment, Quantity of natural resources

Impact on listed area:
+ : Exploration of so far inaccessible, unexplored areas could lead to the discovery of additional mineral resources

Area:
- Economic, Competitiveness
Impact on listed area:

+: Reduced time and costs for exploration