Electromagnetic survey of the Pb-Zn ore deposit of Lontzen (Belgium)
1. Context

Ore deposits are more and more complexe

- Low grades
- Small size
- Mineralogy
- Geometry
- Depth

>>> **Actual needs**: more accurate geophysical methods (tonages, geometry, grades...)
1. Goal of the project

- Target the Belgian Pb-Zn ore deposits using geophysics

- Better understand the geology and the genesis of these deposits

- Improve imaging using innovative inversion techniques

- Better detection, targeting and estimation of the grades/tonnage
1. Location

Pb-Zn districts of Belgium

(Dejonghe 1985a;b, 1990b, modified)
1. Location
1. Location

Pb-Zn districts of Belgium

(Dejonghe 1985a;b, 1990b, modified)
1. Mississippi Valley Type

Dejonghe and Jans 1983
1. MVT deposit of Belgium

Deposit of Dickenbusch (Dejonghe et al., 1993)
1. Old mining works in the Verviers synclinorium
1. Lontzen ore deposit

Dejonghe 1998
1. Study area
Massive sulphides (95%)
- Sphalerite, galena, pyrite/marcasite, chalcopyrite...

Massive oxides (5%)
- Smithsonite, limonite, cerusite...
1. Hole-drilling program

55 hole drill

750m
1. 3D modeling
1. 3D modeling
1. 3D modeling

- Lontzen
- Poppelsberg East
- Poppelsberg West

Legend:
- N Namurian
- V Visean
- T Tournaissian
- F Famenian
2. Geophysics survey on the field

- Electromagnetic survey
- Electrical survey: Electrical Resistivity Tomography and Induced Polarisation
- Magnetometry
• Electromagnetic survey

• Electrical survey: Electrical Resistivity Tomography and Induced Polarisation

• Magnetometry
2,1) Electromagnetic survey

EM-34 profiles in Lontzen area

Legend
40m Vert
Std deviation
- < -2.5 Std. Dev.
-2.5 - -1.5 Std. Dev.
-1.5 - -0.5 Std. Dev.
-0.50 - 0.50 Std. Dev.
0.50 - 1.5 Std. Dev.
1.5 - 2.5 Std. Dev.
> 2.5 Std. Dev.

Pb-Zn vein

<table>
<thead>
<tr>
<th>Spacing</th>
<th>Configuration</th>
<th>Depth of investigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>20m</td>
<td>Horizontal</td>
<td>15m</td>
</tr>
<tr>
<td></td>
<td>Vertical</td>
<td>30m</td>
</tr>
<tr>
<td>40m</td>
<td>Horizontal</td>
<td>30m</td>
</tr>
<tr>
<td></td>
<td>Vertical</td>
<td>60m</td>
</tr>
</tbody>
</table>
20m_spacing coaxial (1.6kHz => 15m)
2,1) 20m spacing coaxial
2,1) 20m spacing coaxial (secondary derivate)
2.1) EM 34-3 survey

40m coaxial
(0.4kHz => 30m)
2,1) 40m spacing coaxial
2,1) EM 34-3 survey

20m coplannar (1,6kHz => 30m)
2.1) 20m spacing coplannar
2.1) EM 34-3 survey

40m coplannar (0.4kHz => 60m)
2,1) 40m spacing coplannar
2.1) Electromagnetic anomalies

Big anomalies on the Northern part of Poppelsberg East vein
2.2) Geophysics survey on the field

- Electromagnetic survey
- Electrical survey: Electrical Resistivity Tomography and Induced Polarisation
- Magnetometry
2.2) Electrical survey on the field
2.2) Electrical resistivity survey on the field
2.2) IP results
2.3) Geophysics survey on the field

- Electromagnetic survey
- Electrical survey: Electrical Resistivity Tomography and Induced Polarisation
- Magnetometry
2.3) Magnetometric survey

GSM-19 v7.0
GEM system
2.3) Magnetometryic survey (second derivate)
3) Discussion (ERT/EM)
3. ERT_krigeage
3. Magnetometry (second derivative)
3. EM 34: 20m coaxial (second derivate)
3. EM 34: 20m coplannar (second derivate)
3. Discussion
4. Conclusion

- 3D modeling of the Pb-Zn deposit of Lontzen allowed to
  - Better understand the geology and the genesis of the deposit
  - Target the deposit to explore it using geophysics

- Geophysics on the field:
  - **Electrical survey**: The best technique in our case study
  - **EM survey**: good results on a part of the vein
  - **Magnetometry**: good results on a part of the vein
  - ...

Thank you for your attention