Gravity Case Study of the Podolsky Deposit, Sudbury Basin

KEGS Symposium 2011

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Geology – Sudbury Basin

Podolsky Property

Sudbury Basin
Data coverage

- Airborne Gravity
- Airborne Magnetics
- LiDAR Elevation
- Density Voxels
- Datamine model
3D Inversion Overview - Definition

Inversion considerations
- Non-unique process
- A priori information
- Complementary geophysical data

Practical solution
- Robust
- Simple
- Efficient
Unconstrained Gravity Inversion

- Ni Ramp deposit
  - Benchmark: Unconstrained Gravity Inversion
  - $C_0$ based on Occam criterion
  - Poor correlation with geology

Density contrast 0.6 g/cm$^3$
Constrained Inversion

- Invert magnetic data
- Create Gravity model covariance from magnetic model
  \[ C_s^{-1} \leftarrow F(m^{sus}) \cdot C_0^{-1} \]
- Invert gravity data
- Good correlation with known geology

Density contrast isosurfaces
1.8 & 1.0 g/cm³
Conclusions

Better resolved interpretation due to:

- Better airborne gravity/mag instrumentation
- Denser data collection
- Large storage capacity
- Availability of high power computation

Proven Inversion techniques

- Constrained 3D inversion yields more realistic results
- Improved optimized algorithms
- Display 3D inversion technique