Functional Gridding of Geophysical data for high resolution mapping of local anomalies

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Summary

I will present a method that we researched and developed to regularize geophysical data to a lattice using an accurate and fast functional gridding mechanism. I will present examples that demonstrate how this method can accurately interpolate irregular data. This method is especially useful to identify very localized structures, such as Kimberlite pipes.

Introduction

In order to achieve high-resolution imaging, geophysical data must be processed
from highly accurate, spatially regularized lattice.

Theory and Method

Higher accuracy of gridded data improves the signal to noise ratio. We developed a gridding technique that builds a regular grid from randomly located points on 2D or 3D data sets. We used an iterative local update scheme to make the approximation of the data more accurate. As well, we utilized a mixture of global and local updates, decided by frequency of improvements on the approximation by each iteration step. The geological features present in the study area are assumed to be local and continuous through functional interpolation. We compared our results to several gridding techniques used in commercially available software, including Krigging, triangulation, radial basis, inverse distance to a power and minimum curvature.

Conclusions

Our iterative local update technique has proven to be more accurate for the same or improved efficiency level. This technique can be applied to any spatial axis and is efficient enough to apply to large 3D surveys.

Acknowledgements

References

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