Where are the diamonds? - using the northern lights

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Short (400 char):
Conductivity of the subsurface can be imaged using man-made or natural EM fields to provide valuable insight to the geology and aid with identifying commercial targets. Using a common geological model representing a diamond-bearing structure, we demonstrate the abilities of our electromagnetic (EM) modelling implementations within the SimPEG framework to forward model and invert geophysical data.

Long (300 Words):

The northern lights are generated by charged particles that interact with the Earth's magnetic field. These interactions, along with lightning strikes around the world, generate electromagnetic energy that induces electrical currents in the ground. These currents are affected by electrical conductivity contrasts. After measuring electromagnetic fields at the surface, our work as geophysicists is to image subsurface structures using numerical simulation and optimization.

The SimPEG package (http://simpeg.xyz) fosters collaboration between researchers using different geophysical applications by providing an extensible framework for geophysical inversions. In this presentation, we introduce electromagnetic methods within the SimPEG framework. We demonstrate the advantages of having a shared language between the governing physics of these problems, the written code, visualization routines, and the ease of communication and implementation enabled by the framework. Coupled with the object-oriented nature of Python, sharing components between applications is easy, even though those applications solve problem-specific challenges.

We highlight how we leverage different parts of SimPEG to complete inversions and recover an interpretable physical property distribution of the subsurface. This poster is a part of a community effort, using a diamond exploration example as motivation, to explore the integration of a large spectrum of geophysical methods using SimPEG.