Open-source Python software for the visualization of magnetotelluric data and three-dimensional resistivity models

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SUMMARY

I present an open-source Python software (MTdmv) for MT data and three-dimensional (3D) model visualization that is available for academic use. The code can be directly run from a Python console without installation. The matplot.lib is the main library to create plots and picture files. The Google Earth 'kml' files can be produced from the edi files, or the coordinates and information in the edi files can be changed from a text file. The data visualization consists of plotting the frequency normalized impedance, apparent resistivity definitions, and Schmucker and Bostick transformations. The mentioned MT quantities can also be plotted as pseudo-section and maps for the measured and model response data. The real and imaginary parts of the frequency normalized impedance can be estimated from one another using the Hilbert transform to validate the dispersion relation.

The model visualization part could read ModEM and other data formats and shrink, modify and resave in different file formats. The extraction of a resistivity section in any direction can be achieved by defining the coordinates of two points or a point and angle pair. A resistivity section can be created along a crooked line, such as a seismic line through the coordinates given in a text file. The resistivity variation with depth can be plotted for a given coordinate. The model maps can be superimposed on Google Earth images. The software could automatically create all possible maps and sections for a given attribute.

All colourmaps contained in matplot.lib library can be activated. The picture files can be saved in pdf, jpg and all other formats supported by matplotlib and in any desired resolution. Furthermore, the image files can be obtained in any language after adding someone's native language to the language text file.

Keywords: Magnetotelluric, Python, Data visualization, Model visualization, Three-dimensional visualization.