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eSciences approach in Solid Earth Science

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Recent progresses in observation equipments, analytical techniques and high performance computing technologies have produced huge amounts of geoscience data in various disciplines. However, the data acquisition tools and the data management applications are inherently different among research fields, which eventually produce different data formats even though the observed data might have similar attributes such as longitude, latitude and elevation. Those might be a large barrier to promote cross-disciplinary studies which could give us new insights into the Earth's dynamics. In this presentation, we introduce examples of eSciences approach in geosciences to handle this problem.

For multidisciplinary data visualization, it is needed to analyze each data format and to acquire a skill to use unfamiliar presentation tools which are not free in general. Here we propose Google Earth as the visualization platform. We have developed tools to help displaying various geoscience data on Google Earth. We have developed software to convert the original data files to a KML file, called "KML generator". These generators allow us to visualize various data together on Google Earth without any complicated procedures. We show KML generator for seismic tomography model as an example of our approach. Seismic tomography represents 3-D seismic velocity distribution in the Earth. Lateral heterogeneities of seismic velocity in the mantle are generally assumed to be correlated to temperature anomalies, which can be interpreted as a pattern of mantle convection. Our KML generator visualizes any vertical and horizontal cross sections of the mantle tomographic models, which is useful to understand mantle dynamics.

Our KML generator for seismic tomography model accepts users to submit their own tomography model at our website to generate KML file for their model. To submit tomographic model, we adapt JSON format, which is proposed as the common data format as tomography model by Federation of Digital Seismograph Network (FDSN). The FDSN is an IASPEI sanctioned organization that brings together the primary operators of broadband seismograph networks throughout the world. The FDSN has successfully acted as an effective organization to coordinate activities in data exchange by introducing Standard for Exchange of Earthquake Data (SEED). The FDSN has proposed data request method based on the email, which enables virtual network data center concept, and considered as a good example of eSciences application in solid earth science.

Keywords: Google Earth, eSciences, KMZ, seismic tomography