[JJ] Evening Poster | S (Solid Earth Sciences) | S-VC Volcanology

[S-VC40]Mitigation of Volcanic disaster - Basic and applied research

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Volcanic disaster is caused by wide range of volcanic phenomena including ash fall, lava flow, pyroclastic flow, debris flow, mud flow and etc. To mitigate volcanic disaster, wide range of technologies such as simulation technology, data processing on GIS, communication technique are required. This session invites talks and broad reviews related to these topics. Talks on database technology, case example of social and school educations, and specific examples of eruption crisis are also encouraged.

[SVC40-P01]Development of a GIS tool for viewing volcanic and tectonic data in Japan

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We have difficulties in direct observations of subsurface magma-movements. Instead, we can collect indirect information about the magmatic activity by using a lot of observation data and analyses data. Various kinds of volcanic and tectonic data have been accumulated with various formats. It is not easy for us to check all the data manually at a time.

The goal of this study is to develop a GIS tool for searching and viewing volcanic and tectonic data in Japan. Earthquake and crustal deformation data are installed in the system. Crustal deformation data are provided by Interferometric SAR (InSAR) analysis and Global Navigation Satellite System (GNSS) observation. The tool we developed visualizes such information on maps and graphs on the browser. HTML, JavaScript and CSS are used for the data processing or web browser design. Cesium is used as the mapping framework. Dygraphs is used for plotting data. Both of Cesium and Dygraphs are JavaScript Open-Source-Library.

Seismic data are mapped on the base layers with round marks. The diameter of the mark shows magnitude. The color of the mark represents the depth of epicenter. By clicking the mark, the user can get the minute information about the earthquake occurred at the location appeared as the text on the screen.

InSAR analysis data (image) is overlaid on the map. The transparency of the image can be adjusted for super-positioning or comparison of plural images. The user can get pixel values from the overlaid InSAR image. The value shows crustal deformation by cm in the satellite LOS direction. In addition, if the user clicks two points in a single image, the difference between the values of the two pixels, that is relative displacement, is calculated and displayed on the screen.

Crustal deformation data by GNSS observation is plotted in graphs. The user can see the time-series of displacement at the ground stations in the three directions (east-west, north-south and up-down) where the range of axes dynamically changes in response to the mouse cursor movement by the user. The optional function of drawing error bars is also implemented.

In future, we plan to install more kinds of data for better evaluation and estimation of volcanic activity. When a lot of data are installed, building of database is inevitable for simple management of them. Migration of this system to web-GIS is our next step where anyone can use the tool anytime and anywhere through the internet.