

Volcanic hazard estimation using tephra GIS and geo-spatial information

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There are many data of tephra in Japan such as 'The tephra atlas (Machida and Arai, 2003),' however, less database of tephra in Japan, compared with Quaternary volcanoes, active faults and land slides and so on. As the database of tephra is produced with location information in GIS, it is possible to identify each tephra easily in field works, for the researchers of Quaternary field such as geomorphology, geology, volcanology and archeology. In addition, it is expected the governmental utilization for disaster prevention such as the production of hazard maps and the estimation of environmental impact, because it is easy to analysis the distribution data of tephra combined with other spatial data such as DEM, NSDI and land condition map of volcano.

In this research, the authors have developed the tephra GIS data about the tephtras originated from Tohoku District, North East Japan, and middle and upper Pleistocene wide area tephtras. In this presentation, the authors introduce the results of case study for hazard map use in Kitakami Plain, Tohoku District, Japan.

The authors digitized the tephra distribution data about Iwate Volcano and Akita-Komagatake Volcano on the Tephra Atlas and so on, and overlay the tephra distribution and transportation network data of Spatial Data Infrastructure 25000 on GIS. As the results of overlay analysis, highway and national road were located on the east foot of Iwate Volcano was covered by volcanic ashes of Iwate Volcano several times in ten thousands years, and volcanic ashes of Akita-Komagatake Volcano when the caldera of Akita-Komagatake Volcano was formed gave large influence on the wide area near Morioka City.

Next, the authors introduce the way to open the tephra GIS database using Web-GIS. Outcrop information and tephra distribution information on the 1/25,000 topographical maps are distributed by Cyber Japan Web System. The authors developed the trial Web GIS system about Bandai Volcano and Akita-Komagatake Volcano. At first, the location information of outcrops is described on topographical maps. When the users click the location of outcrops, various data about outcrops is described such as photo of outcrop, column section, sketch of the outcrop, mineral composition, petrologic characteristics, index of each minerals, chemical composition and so on. Input information about Bandai volcano is based on Suzuki et al. (1995), Koarai et al. (1995), Koarai and Soda (1995) and so on such as the tephtras originated Bandai Volcano and wide spread tephtras. Input information about Akita-Komagatake Volcano is the isopack maps of each tephtras and outcrop information based on Wachi et al. (1997) and chemical composition of each tephtras based on Fujinawa et al. (2004). In additionally, the assumption of volcanic hazard areas on hazard map, polygon data of landform classification, the results of automated landform classification using 50m DEM and 10m DEM are input in this database.