Volcanic Disaster Mitigation Measures of the Asia-Pacific Region Earthquake and Volcanic Hazards Information Mapping Project

*Shinji Takarada[1], Ryuta FURUKAWA[1], Yuzo Ishikawa[1], Masayuki Yoshimi[1], Tadashi Maruyama[1], DAN MATSUMOTO[1], Joel Bandibas[1], Yoji Teraoka[1], Takashi AZUMA[1], Yasuto Kuwahara[1], Akira Takada[1], Kimio Okumura[1], Naoji Koizumi[1], Eikichi Tsukuda[1]

1.Geological Survey of Japan, AIST

The G-EVER Consortium promotes earthquake and volcanic hazards reduction activities through the collaboration of different research institutes worldwide. The G-EVER Promotion Team in Geological Survey of Japan has been worked on publishing a new “Eastern Asia Earthquake and Volcanic Hazards Information Map” as a part of Asia-Pacific region earthquake and volcanic hazards information mapping project since 2012. The Eastern Asia Earthquake and Volcanic Hazards Information Map shows distribution of volcanoes, calderas, pyroclastic falls and ignimbrites, fatalities of major volcanic events, active faults, earthquakes hypocenters and source areas, fatalities of major earthquakes, tsunami hazards, geology, and tectonics.
Distribution of Holocene volcanoes (<10ka) is shown on this hazard information map. East and Southeast Asia experienced 3,446 eruptions during Holocene time. Sorting by VEI allows us to list up 4 eruptions of VEI7, 19 eruptions of VEI6 and the rest of them are VEI5 or lesser. Extent of pyroclastic fall deposit is shown mostly based on literature describing the area of pyroclastic fall deposits that currently exist. On this map we adopted 4 eruptions of VEI7 (Tambora 1815AD, Rinjani 1257AD, Chambaishan 938AD, Kikai 7.3ka) and 7 eruptions of VEI6 (Pinatubo 1991AD, Krakatau 1883AD, Rabaul 6C, Witori 3.4ka, Mashu 7.6ka, Ulreung 10.7ka, and Moekeshi 9.5ka). We added 3 Pleistocene large-scale eruptions (Aira 30ka, Toba 74ka, and Aso 90ka), which are well-documented and can be used for comparative examples for hazard assessment. Distributions of calderas and large-scale ignimbrites (VEI6-8) are shown on the hazard information map. Twelve large-scale ignimbrites are selected on the map. We adapted one ignimbrite of VEI8: Toba, seven ignimbrite of VEI 7: Aso 4, Ito, Shikotsu, Toya, Kussharo 4, Changbaishan, and Tambora, four ignimbrite of VEI 6: Hachinohe, Krakatau, Pinatubo, and Rabaul.
Fatalities of major volcanic events are compiled to facilitate visual understanding of volcanic disasters in Eastern Asia. The number of fatalities and the main causes of deaths due to volcanic events are displayed. Five to thirty worst top volcanic events are chosen in each country: Japan (24), Philippines (15), Indonesia (30) and Papua New Guinea (5). The number of fatalities is categorized by seven causes; pyroclastic flow, debris avalanche, tephra fall and ballistic, lahar, tsunami, volcanic gas and other related death. The worst top 24 fatalities caused by volcanic events in Japan after 1400AD are listed. The most hazardous volcanic event in Japan was the 1792 Unzen Mayuyama debris avalanche, which caused 15,000 fatalities. The 2nd hazardous volcanic event was the 1783 Asama eruption, which caused 1,491 fatalities due to pyroclastic flow, debris avalanche, and lahar. The 3rd event was the Oshima-Oshima 1741 debris avalanche, which caused 1,467 fatalities at the coastal area due to tsunami. The worst top 30 fatalities caused by volcanic events in Indonesia after 1400AD are listed. The worst event is the Tambora 1815 caldera-forming eruption (VEI7) which caused 60,000 fatalities. About 11,000 people were killed by pyroclastic flows and about 49,000 people died due to famine and disease. The 2nd worst event is the Krakatau 1883 caldera-forming eruption (VEI6), which caused 36,417 fatalities. About 2,000 people were killed by pyroclastic flows and 34,417 people were killed by the associated tsunami. The 3rd worst event is the Kelut 1586 eruption, which caused about 10,000 fatalities due to pyroclastic flows. The contents of Eastern Asia Earthquake and Volcanic Hazards Information Map are planning to be

implemented on the online hazard information system (http://ccop-geoinfo.org/G-EVER). We believe that this hazards information map will provide useful information for earthquake, tsunami, and volcanic disaster mitigation efforts.

Keywords: Eastern Asia, Volcano, Earthquake, Disasters, Hazards