International Session (Oral) | Symbol H (Human Geosciences) | H-DS Disaster geosciences

[H-DS06_2AM1]Natural hazards: impacts on society, economy, and technological systems

Convener:*ELENA PETROVA(Lomonosov Moscow State University, Faculty of Geography), Hajime Matsushima(Research Faculty of Agriculture, Hokkaido University), Chair:ELENA PETROVA(Lomonosov Moscow State University, Faculty of Geography), Hajime Matsushima(Research Faculty of Agriculture, Hokkaido University)

Fri. May 2, 2014 9:00 AM - 10:45 AM 422 (4F)

The last decade set a sad record in the number and scale of natural disasters and clearly demonstrated high vulnerability of human society and technosphere to their impacts. The most serious consequences have the so-called natural-technological disasters that have place when natural hazards trigger accidents at technological objects such as nuclear power plants, chemical plants, oil refineries and pipelines, etc. One of the most large-scaled natural-technological disasters occurred on March 11, 2011 in Japan as a result of a massive 9.0-magnitude earthquake off the northeast coast of Honshu Island that caused a more than 30-meter tsunami. A distinctive feature of natural-technological events, such as of the 2011 Tohoku earthquake, is their multihazard and synergistic nature with a disaster impact on the technosphere, resulting in simultaneous occurrences of numerous technological accidents. It is very difficult to deal with the consequences of such natural-technological accidents and disasters, because one has to cope not only with the primary aftermaths of the natural disaster itself, but also with the secondary effects of a number of technological accidents, which can be much more serious. These consequences are the more severe the higher are the population density and concentration of industrial facilities and infrastructure (especially hazardous and vulnerable objects) in disaster-affected areas. The main goal of this multidisciplinary session is to summarize case studies of relationships between natural hazards and technological disasters, their social and economic consequences; and to encourage a discussion about tools and methods to prevent disasters and to minimize their consequences.

10:20 AM - 10:35 AM

[HDS06-P03_PG]Developing Automatic Delineation of Alluvial Fans for Rapid Hazard Assessment in Aurora Province, Philippines

3-min talk in an oral session

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On Nov. 14, 2004, flashfloods from Subsob River struck Barangay(village) Paltic in Dingalan, Aurora Province around 4 a.m. when most residents were asleep - leaving hundreds homeless and 135 people dead. The series of floods caused by Violeta, Winnie, and Yoyong until December 2004 killed at least 300 people in Dingalan, Aurora alone. Mud buried 300 houses and residents were forced to stay on rooftops or seek higher ground. Because of these incidents, measures were devised to improve available geohazard maps to raise public awareness about landslides, debris flows and alluvial fans. This study developed a

method to rapidly identify alluvial fans, thereby, hastening geohazard mapping in the region. Alluvial fans are fan shaped geologic formations deposited from tributaries from a mountainous terrain which flows out from the sudden break of a slope. Intense rainfall increases the discharge of sediments and water on these areas which could induce disastrous events such as flooding and debris flows. In this study, manual and automated methods in delineating fans in Aurora Province were compared. Manual delineation of alluvial fan boundaries were done through the contour lines generated from the 10-meter synthetic aperture radar (SAR)-derived digital elevation model (DEM). However, manual mapping of alluvial fan boundary which makes use of topographic interpretation of geomorphic features is subjective and time consuming. Biases were addressed by the second method by including factors such as 1) fan area of slope ranging from 1 to 8 degrees, 2) contributing stream networks from fan apex to fan toe , and 3) the fan potential lateral extent within the buffer zones based on the relief of the sediment source area in the GIS-based model. The outputs were compared with the manually delineated fans. Manual delineation identified 14 alluvial apex of 14 alluvial fans in 6 municipalities affecting 36 barangays . On the other hand, automated method identified 183 apex of 126 alluvial fans in 7 municipalities affecting 105 barangays. Although greater number of fans and wider fan area were identified using the automated method, manual delineation is still needed to check the results especially in volcanic regions. In addition, inactive alluvial fans are not accounted by the automated method.