Abstract of Presentation

Presentation Title:

Flood and Sediment Disasters in Japan

Abstract :

In my presentation, I firstly introduce several research topics I have been studying with my colleagues concerning to the flood and sediment disasters and finally I would like to propose research themes that may be useful in e-ASIS.

First topic is an inundation by river water and rainwater in urban cities considering drainage systems. In Japan, many inundation disasters that occurred by local torrential rainfall during a short period of time reinforced the need for accurate models to simulate flooding. We have developed integrated model, which consists of four sub-models; urban area, sewerage system, river system, and mountainous area. These sub-models are connected by interaction models. The model validity was checked by the real inundation phenomena occurred in 2006 in Matsue City, Shimane Prefecture, Japan. The model has an advantage to evaluate the effectiveness of countermeasures such as implementation of new sewer pipes against inundation.

Second topic is a hazard mapping for debris flow. In Japan, many people have been killed by the debris flow. A deep-seated landslide occurred at the Harihara River basin, Kagoshima Prefecture, Japan in 1997. The mass slid was partially transformed into debris flows. Due to this debris flow, 21 persons were killed and many houses were destroyed. The reproduction of the phenomenon was done by using 2D debris flow inundation and deposition numerical model. The method is very useful to delineate debris-flow hazardous area and farther more it is available to make a hazard map for debris flow hazard prone area. Moreover, the finite volume method using 2D unstructured mesh for debris flow flooding and deposition is applied to the 1999 Venezuela debris flow disaster in Kamuri Grande Basin to evaluate the effects of countermeasures of Sabo dams and channel works proposed.

The third topic is a natural dam failure and estimation of resultant flood/debris flow hydrograph. When deep-seated landslide happens, the natural dam (landslide dam) is usually formed in a ravine. Once dam will be failed due to overtopping of river water or sliding of the dam body, or piping, huge floods or debris flow sometimes happen. We developed an integrated 3D numerical model which can predict slip surface of the dam body and occurrence timing of sliding and can predict flood/debris flow hydrograph due to overtopping and erosion of the dam body by overtopping water. The model is available to make a delineation of hazardous area by the collapse of the natural dam.

The forth topic is a river embankment breach due to overtopping of river water and countermeasures. The river embankments are usually made of sediment, so that the breach sometimes happens due to overtopping of river water. We developed a numerical model which can reproduce river embankment breach process due to overtopping considering the seepage of water into embankment body and effects of suction against erosion. The model may be useful to evaluate the hydrograph of the outflow discharge from the breach point and evaluate the effects of countermeasures against bank breach.

The fifth topic is a evaluation of evacuation systems. With the aid of GIS software such as Arcinfo, evacuation networks of evacuation routes, refuge place, etc. can be constructed and the evacuees action can be simulated on the network by using the model of walking speed of evacuees. This method can be available to evaluate the evacuation systems for flooding, debris flows, volcanic eruption and etc.

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