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International Union of Geodesy and Geophysics

TSUNAMI RESEARCH AND RELATED TOPICS IN JAPAN 2003-2006

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By
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1. INDIVIDUAL RESEARCH ACTIVITY OF THE JAPANESE COMMISSION MEMBERS

1.1 National Defense Academy

By Koji Fujima

The recent activities are listed as follows:

- (1) Field investigations of 2004 Indian Ocean Tsunami in the Maldives and Sumatra Island
- (2) Field investigations of 2002 Stromboli Tsunami, 2003 Tokachi-oki Tsunami, 2005 Java Tsunami and 2006 Solomon Tsunami
- (3) Development and application of new numerical method for solving dispersion equations
- (4) Test of finite volume method in numerical simulation of urban flood by tsunami
- (5) Force acting on mooring rope of ships by tsunami
- (6) Effect of building complex on tsunami flooding
- (7) First step of making an integrated database of 2004 Indian Ocean Tsunami

The items (1)-(2) are the investigations of recent tsunamis, the items (3)-(4) are based on numerical simulation and the items (5)-(6) are hydraulic experiments. The item (7) is the cooperative work of IGUU Tsunami Commission.

1.2 "Tsunami Disaster Mitigation Course" started in 2006

International Institute of Seismology and Earthquake Engineering (IISEE),

Building Research Institute (BRI) by Yushiro Fujii,

International Institute of Seismology and Earthquake Engineering (IISEE) of Building Research Institute (BRI) of Japan, in partnership with Japan International Cooperation Agency (JICA), has been conducting training courses of "Seismology Course" and "Earthquake Engineering Course", on the mitigation of earthquake damage for young researchers and engineers from earthquake-prone developing countries since 1962. From 1963 to 1972, these training had been given in cooperation with UNESCO. Up to now (Oct. 2006), more than 1,200 participants from 95 countries have taken several courses at IISEE, BRI.

IISEE, BRI has newly started a training course on "Tsunami Disaster Mitigation" in late September 2006. This course aims at fostering persons to have high capabilities to plan, teach and extend technologies related to tsunami disaster mitigation, through training not only in the fields of Tsunamis, but also in the field of Tsunami Disaster Mitigation Policies. Participants, after coming back to their countries, are expected to develop earthquake- and tsunami-related technologies applicable to each country by its own efforts, taking into consideration actual conditions and systems of the respective countries.

The period of this course is about one year. This course will be conducted at least for three years.

Number of the participants will be five in each year. We have accepted a total of 5 researchers or technicians for 2006-2007 course, who came from 4 countries (Bangladesh, Indonesia, Malaysia and Thailand). The curriculum of this course is approved as a master's degree program by National Graduate Institute for Policy Studies (GRIPS) and BRI. Participants will get into a master's program and they will be screened by their academic transcripts.

1.3 Tohoku University, Disaster Control Research Center

Tsunami Engineering Laboratory (TEL)

By Fumihiko Imamura

The TEL aims to develop integrated technologies for reducing tsunami disaster, including: 1) developing early warning systems to alert coastal residents, 2) implementing and maintaining an awareness/educational program on the indicators of tsunami dangers through databases, computer graphics and the results of field investigations, and 3) producing tsunami hazard maps to identify areas susceptible to flooding/inundation.

Tsunami warning systems are a combination of monitored detection sensors and advanced technology for numerical simulation along with appropriate communication methods to alert people. The system utilizes the physical fact that earthquake waves travel 25 times faster than tsunami waves. Thus, seismic waves emanating from a large earthquake will arrive before the tsunami giving the tsunami-threatened community lead time to evacuate. After receiving a tsunami warning, research on the human response and behavior is also important to reduce the human loss. Combined science of human recognition and information technology would initiate a new warning and evacuation system with the more accurate and detailed information of the tsunami for response.

Rapid development of industry and changes in land use and human lifestyle would create a new type of disaster or increase a secondary damage which should be taken into consideration in the preparedness for and mitigation of a tsunami disaster. At the same time, historical and pre-historical events have been studied using sedimentological and numerical method to estimate their frequency and magnitude.

Although undersea earthquakes generate most tsunamis, other geophysical phenomena such as landslides, volcanoes and meteor impact have also caused the disturbance of water surface and large tsunamis. The TEL also focuses research on these aseismic tsunami to improve numerical simulations and warning systems.

The fishery boat damage and its damage reduction plan are discussed in the present study focusing on the coastal region of Miyagi where the probability of an earthquake occurrence within 30 years is expected to be 99%. Although the countermeasure on the land against the tsunami attack have been started with constructing the sea wall and wave-break and making hazard map, less one on the sea is carried out at the present. The evacuation flow for fishery boat is discussed by the process of issuing warning, and making decision and action, depending on the location of occurrence of tsunami and that time. A hazard map on the sea could be made by adding the information of tsunami arrival time, maximum water level and velocity and boat damage index developed in the present study.

2. List of Publications

(J) or (in Japanese : papers in Japanese)

2003

Abe,Ku., Long wave measurements at bay-shaped coasts using a pressure gauge (II)-Mano and Ryotsu bays, vol.32, pp.15-25, 2003

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