

# International Innovation Workshop on Tsunami, Snow Avalanche and Flash Flood Energy Dissipation

Date

October 20 & 21, 2014

Venue

The Majestic Congress Center, Chamonix, France



## Topics

- **Risks and Society** Philosophical Point of View
- **Detection & Alert**
  - Real-time Monitoring
  - Exchange Observed Data
  - Warning and Alert System
- **Hydrodynamics and Mitigation Devices**
  - Fluid Dynamics of Tsunami and Energy Analysis at Off Shore
  - Structures and Materials for Tsunami Energy Dissipation
  - Mega Float and Materials
  - Multi-Purpose Structures
  - Snow Avalanche Dynamics and Interaction with Structures for Energy Dissipation
  - Flash Flood Dynamics and Interaction with Structures for Energy Dissipation
- **Crisis Management** Distribution Networks, etc.
- **Reconstruction of Damaged Areas**



Jointly organized by

Tohoku University, University of Lyon, IRIDeS (International Research Institute of Disaster Science), INSA de Lyon, ELyT Laboratory, Rhone-Alpes Region, Chamonix City Hall, Science Council of Japan, UNESCO, Lyonnaise des Eaux Company, Intelligences des Mondes Urbains and Japan Society of Maintenance Tohoku/Hokkaido branch

# Background

Tsunami is one of the most serious natural disasters, as can be seen in Fig. 1. Tens of thousands of people lose their lives periodically.

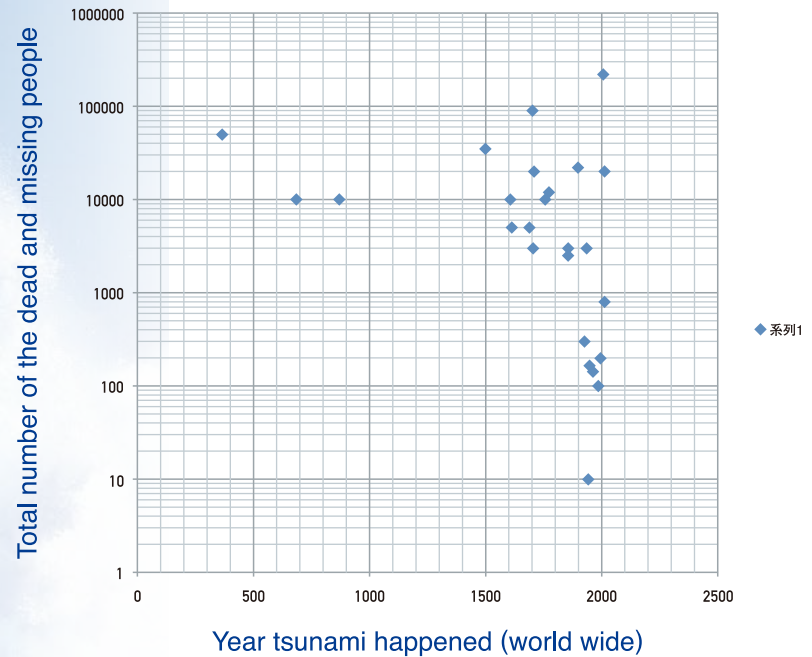


Figure 1 Total number of the Dead and Missing People in the last several centuries  
This figure was made based on data in Wikipedia by TS

## Objectives

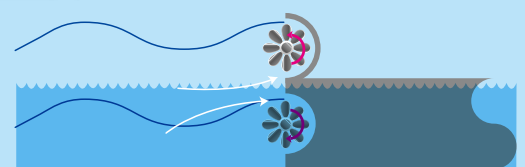
After the previous Tsunami Energy Dissipation Workshop, held in 2012 at Tohoku University, in Sendai, Japan, we have decided to hold a 2nd workshop, and have spread to other topics such as the risks related to snow avalanches and flash floods. Other topics such as the philosophical approach to the relationships between natural disaster related risks and society, and some aspects of crisis management and reconstruction after a disaster have also been added.

## Energy Dissipation Mechanisms

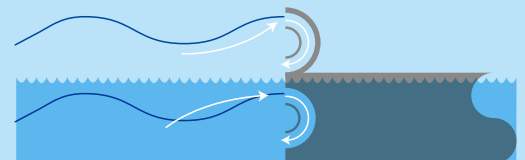
*Dropping pressure through friction loss in pores or small channels.*

*Change of flow direction and wave interaction (overhang shape, rotary vane, etc).*

*Designed materials such as shape memory alloys, metal forms, super-elastics, etc.*



Floating wave reflection



Wave flattening float<sup>※2</sup>



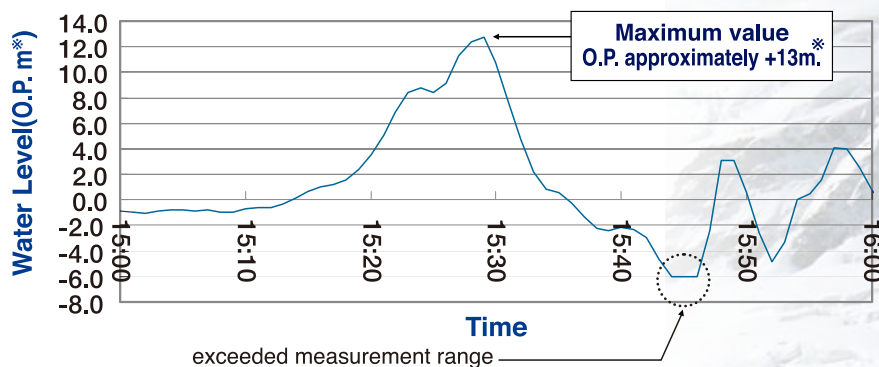
Wave control course rope for swimming pool

※2: Photo from "National Research Institute of Fisheries Engineering, Fisheries Research Agency" HP

Current counter-measures such as the Global Tsunami Warning System will play a more important role in the future. We may also consider a more active approach to mitigating Tsunami damage to minimize such tragedies with science, technology and innovation.

### Records of Observed Tsunami

Record of tide level at Onagawa on March 11th, 2011



**The height of the tsunami, measured with a tide-gauge, was O.P. approximately +13m.<sup>\*</sup>**

<sup>\*</sup> O.P.(reference plane of Onagawa: Tokyo bay average sea-surface -0.74m.)

Diastrophism (approximately -1m: prompt report value) around Onagawa Nuclear Power Station which was announced by the Geographical Survey Institute after the Earthquake was considered.

Press Release by Tohoku Electric Power Co., on April 7th, 2011

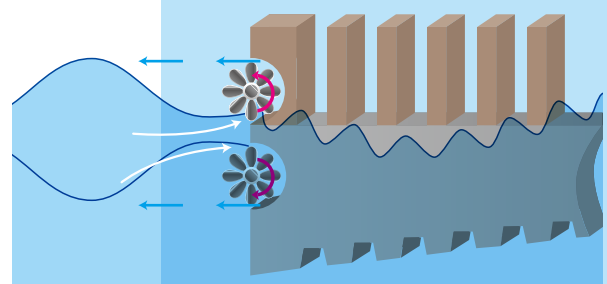
"Tohoku Pacific Earthquake observation records and research results on Tsunami at Onagawa nuclear power station"

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*Structural designs such as fluid flow energy dissipation with turbulence, flow direction change*

### Possible shapes, as examples

- (a) Change flow direction with rotatable turbines or the shape of the structure
- (b) Dissipate flow energy with obstacles designed for maximum energy dissipation
- (c) Large floating structures to prevent wave motion
- (d) Combinations of the above



**Possible mechanism of energy dissipation and wave reflection**





## Workshop Chairman

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Prof. Tetsuo SHOJI	Frontier Research Initiative, New Industry Creation Hatchery Center, Tohoku University

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URL | <http://www.fri.niche.tohoku.ac.jp/workshop2014/> (updating soon)

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