Education and Drill Activities against Tsunami Disasters in Chile and Japan -WG4a Activities-

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Enhancement of Technology to Develop Tsunami-Resilient Community

--- MASTER PLAN ---

PROJECT PURPOSE: Development of Technologies and Measures to Improve Communities and People to be Well-prepared and Resilient against Tsunamis

Group 1: Development of Mathematical Simulation Models
- Development of mathematical simulation models
- Model validation in 2010 tsunami damage in Talcahuano
- Construction of tsunami database for 2010 Chile & 2011 Japan earthquakes
- Development of design methods for tsunami-resistant structures

Group 2: Proposal of Estimation Method and Mitigation Measures for Tsunami Disasters
- Development of manual for tsunami disaster estimation
- Tsunami estimation in Iquique
- Estimation of Chile tsunami in Japan
- Proposal of tsunami disaster mitigation measures

Group 3: Development of Precise Tsunami Warning Methods
- Development of precise warning methods
- Data incorporation of seismometers and offshore tsunami meters
- Development of tsunami scenario database
- Development of information dissemination method

Group 4: Proposal of Programs to Create Well Prepared/Resilient People and Community
- Development of programs to create well prepared/resilient people [G4a]
  - Evacuation method, Disaster education method, Risk assessment, Program for disaster management leaders
- Development of methodology to improve recovery capacity by utilizing ports and harbors after a tsunami [G4b]
  - Utilization of ports and harbors after tsunamis in Japan
  - Methodology of port business continuity management

Consideration of tsunami responding capacity of local system
Detailed questionnaire and hearing studies about past experiences of evacuation were carried out for the 2010 earthquake in Maule, the 2014 earthquake off Iquique, the 2015 earthquake off Illapel, and the results were compared with the experiences of the 2011 earthquake in Japan.

Also, an evacuation simulation was implemented in Iquique, and adequate measures of evacuation were studied.

Based on the results of a series of research activities, a seminar was performed in Free Trade Zone of Iquique (Zona Franca de Iquique: ZOFRI).

Seminar in ZOFRI
Aug. 2015
3 Earthquakes and Evacuation, off Iquique, 2014

Strength of the shaking:
- **Foreshock of Mar. 16**
  - 89.8%
  - 7.5%
  - 2.1%
  - 0.5%

- **Main shock of Apr. 1**
  - 45.6%
  - 49.6%
  - 1.7%
  - 3.0%

- **Aftershock of Apr. 2**
  - 61.2%
  - 37.9%
  - 0.2%
  - 0.5%

- **Yes, I evacuated**
  - 61.2%

- **No, I did not**
  - 37.9%

- **No, I could not**
  - 0.5%

- **Other**
  - 0.2%

- **Other**
  - 0.2%

- **Don't know (Don't read)**
  - 0.2%
Comparison of Time to Start Evacuation between Chile and Japan

**Iquique (N=419)**
- Fast evacuation in Iquique, with threat of early tsunami hitting within 15 min.

**Kesennuma city (N=7999)**
- Delayed evacuation in Kesennuma, hit by tsunami 37 min. after the 2011 eq.
Evacuation Simulation: using STOC-CADMAS-AGENT

Tsunami outbreak and propagation

Arikawa and Oie (2015)

Tsunami inundation

Applied in Iquique
- Tsunami rise speed is 0.75m/min.
- 4000 people start to evacuate 10 minutes after shaking with speed of 1m/s.
With new evacuation points

- Tsunami rise speed is 0.75m/min. People start to evacuate 10 minutes after shaking.
A Japanese style hazard map was introduced in Talcahuano, which includes various information related to disaster mitigation and evacuation against tsunami.
Disaster Education Method
(Prof. Takahashi, Miura, Cifuentes and others)

- **Seminars** were held to introduce disaster prevention education in Japan.
  - History
  - State of the art
  - Future

- **A guideline on disaster education** developed by Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan was translated into English to share with Chilean members.

- **2 elective courses**, such as in legal system related to disaster risk management in Chile and in pedagogy of disaster education, for students majoring in education were developed and realized in Concepción University.
Disaster Imagination Game (DIG) was introduced in Chile and implemented in Talcahuano, Valparaíso, Iquique and Viña del Mar.

Reflecting the results of the local application, a guideline of DIG will be published to promote its application all through Chile.

Professor Mauricio Reyes;
Introduction and performance of DIG in Chile
Chilean members developed a program to foster community leaders, “Workshop for Strengthening Capacities in Integrated Risk Management for Community Leaders” drawing on the information shared with Japanese researchers.

The program was implemented in San Pedro de la Paz collaborating with the local government.

Professor Oscar Cifuentes;
Disaster education program and performance in Chile
Thank you very much for your kind attention!