

Start-up of a SATREPS project: Enhancement of earthquake and tsunami disaster mitigation technology in Peru

Fumio Yamazaki, Shoichi Nakai, Yoshihisa Maruyama
Graduate School of Engineering, Chiba University, Japan

Carlos Zavala, Zenon Aguilar, Miguel Estrada
CISMID, National University of Engineering, Peru

Shun'ichi Koshimura
Graduate School of Engineering, Tohoku University, Japan

Taiki Saito
Building Research Institute, Japan

Saburoh Midorikawa, Hiroaki Yamanaka, Hiroyuki Miura
Center for Urban Earthquake Engineering, Tokyo Institute of Technology, Japan

ABSTRACT: This paper introduces the Japan-Peru earthquake and tsunami disaster mitigation research project sponsored by JICA and JST. Five main research activities are the followings: 1) Strong motion and seismic microzonation; 2) Tsunami simulation and countermeasures; 3) Seismic resistance of buildings; 4) Spatial information database and earthquake damage assessment; 5) Earthquake and tsunami disaster mitigation plan. After signing of the Record of Discussion (R/D) in January 2010 by the responsible organizations of the two nations, the project has just started and will continue for the five year period.

1 Introduction

A new international research program named “Science and Technology Research Partnership for Sustainable Development (SATREPS)” has started since 2008 under the joint sponsorship of Japan Science and Technology Agency (JST) and Japan International Cooperation Agency (JICA). Our proposal “Enhancement of Earthquake and Tsunami Disaster Mitigation Technology in Peru” was selected as one of the projects in the field of natural disaster prevention in April 2009. The Record of Discussion (R/D) was signed on 15 January 2010 by JICA and National University of Engineering (UNI) in Lima, Peru. Then the project has formally started and will continue for the five year period. This paper describes the overall objectives and research plan of the project.

2 Background and objectives of the project

Peru locates in the circum-Pacific seismic belt with high seismic and tsunami risks. Figure 1 shows the tectonic settings and the epicenters of earthquakes in Peru and the surrounding region. It is seen that both Peru and Japan are located in a similar seismic environment, frequently hit by damaging earthquakes and tsunamis. In this region, large plate-boundary earthquakes occurred recently in the offshore of Atico (Mw=8.4, 23 June 2001) and in the offshore of Pisco (Mw=8.0, 15 August 2007).

A large number of buildings and infrastructures were destroyed, hundreds of people were killed, and tsunamis were also generated by these events. Thus, earthquake and tsunami disaster mitigation draws considerable attentions in Peru.

Japan-Peru Center for Earthquake Engineering and Disaster Mitigation (CISMID) was established within UNI in 1987 by the support of Government of Japan. CISMID became the leading center of earthquake engineering research in South America.

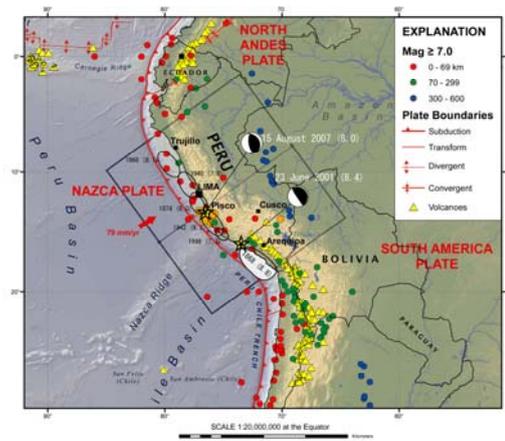


Fig. 1 Tectonic setting and the epicenters of earthquakes in Peru and the surrounding region (modified from USGS (2007) and Chlieh et al. (2004))

3 Research plan and organizational structure

In this research project, a comprehensive research towards earthquake and tsunami disaster mitigation in Peru will be carried out under strong collaboration among researchers of Peru and Japan. Figure 2 shows the organizational structure of this five year projects. The joint research will be carried out in five main research topics: 1) Strong motion prediction and development of seismic microzonation; 2) Development of tsunami countermeasures based on numerical simulations; 3) Enhancement of seismic resistance of buildings based on structural experiments and field investigation; 4) Development of spatial information database using remote sensing technology and earthquake damage assessment for scenario earthquakes; 5) Development of earthquake and tsunami disaster mitigation plan and its implementation to the society.

Figure 3 shows the research topics and items of the project and the groups in charge the items. Based on the research outputs from the four groups (G1-G4), the disaster mitigation plan group (G5) will propose and implement earthquake and tsunami disaster mitigation plans to case study areas in Peru. Three case study areas will be decided soon after preliminary surveys. A part of Metropolitan Lima including Callao has already selected as one of the study areas. The other two areas are still in discussion; currently, Chimbote in the north and Moquegua or Tacna in the south are possible candidates. Other than these areas, the affected areas due to the recent earthquakes, Pisco (the 2007 event) and Camana, Arequipa etc. (the 2001 event), will also be considered in developing hazard and damage assessment models.

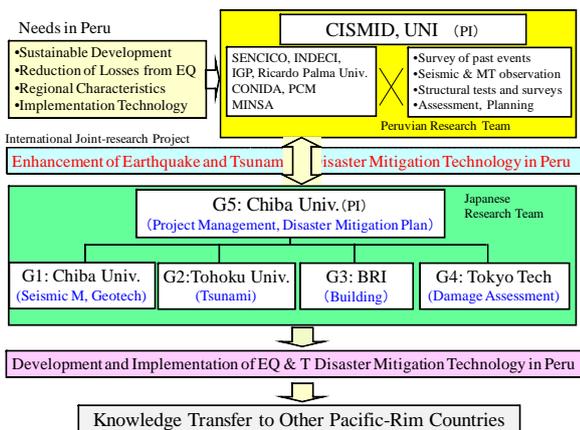


Fig. 2 Organizational structure of the project

4 Implementation and prospected outputs of the project

The Japanese Detailed Planning Survey Team organized

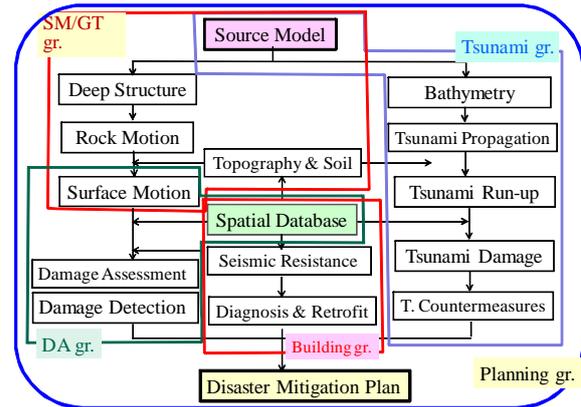


Fig. 3 Research topics and items of the project and the groups in charge the items

by JICA visited Peru from August 5 to 13, 2009. During its stay in Peru, the team exchanged views and had a series of discussions with the Peruvian organizations concerned, led by CISMID/UNI. As a result, the team and the Peruvian organizations concerned agreed on the matters referred to in the document (JICA, 2009).

The objective of this project has agreed as “To develop technologies and measures for assessment and mitigation of earthquake/tsunami disasters caused by large-magnitude inter-plate earthquakes occurring off the coast of Peru.” It is further envisaged that such technologies should be widely used in Peru, and also disseminated and applied to pacific-rim countries, especially to neighboring countries, facing the risks of large-magnitude inter-plate earthquakes and tsunamis. In addition, the project is expected to contribute to the enhancement of capacity as well as the advance of research for both Peruvian and Japanese research institutes involved in this project.

The progress of the project will be presented in the near future.

5 References

Chlieh, M. et al. (2004), Crustal deformation and fault slip during the seismic cycle in the North Chile subduction zone, from GPS and InSAR observations, *Geophys. J. Int.*, 158, Japan International Cooperation Agency (2009), Minutes of meeting between JICA detailed planning survey team and the National University of Engineering. USGS (2007), Poster of the Ica, Peru Earthquake of 15 August 2007 -Magnitude 8.0, Earthquakes Hazard Program USGS," <http://earthquake.usgs.gov/earthquakes/eqarchives/poster/2007/20070815.php>