Advisory Report on the Second Year Meeting of NEAREST in Berlin

Hitoshi Mikada Department of Civil and Earth Resources Engineering Graduate School of Engineering Kyoto University

This report summarizes the impression and opinions to the past activity for the past two years and possible directions of the European Project NEAREST (Integrated observations from NEAR shore sourcES of Tsunamis: towards an early warning system) for the remaining one year.

As mentioned in my report submitted in 2007, every members of the NEAREST Project has done a lot of work since the initiation of the project in 2006. The research group has been slightly modified to form eight subgroups: (1) Tsunami source identification (formerly WP1) and Tsunami source characterization that seem merged (WP2), (3) Seismological monitoring (WP3), (4) Tsunami signal detection (WP4), (5) Data integration / Integrated Tsunami Detection (WP5), (6) Paleotsunami and Paleoseismic records (WP6), (7) Modeling of tsunami impact in SW Portugal (WP7), (8) Feasibility study and prototype for an EWS (WP8), and (9) Circulation of project information to end-users (WP9).

WP2 keeps studying tectonic settings surrounding the gulf of Cadiz using various structural survey data, WP3 conducted earthquake observation experiment in the gulf of Cadiz using newly introduced OBS'es with a GeoSTAR supplied by WP4, WP4 joined the earthquake observation, WP5 extended earthquake observation network of the area after the installation of broadband seismic sensors and plans further extension for precision enhancement, WP6 is reconstructing the 1755 Lisbon and much older tsunami deposit in the shore sediments using fossil geological records, WP7 started looking into software for processing tsunami signal, WP8 started looking into the generation mechanism of tsunamis by seafloor deformation, and WP9 keeps planning the project. Comparing the impressions I have had in the first year meeting, I think much deeper concerted actions have been taken in the past second year towards the common objectives. Notably, the contribution from Moroccan researchers is clearly visible in terms of fault identification on the southern side of the gulf of Cadiz, and the extension of earthquake observation network.

On this occasion at the end of the second year activity, I would like to summarize my impression and to suggest the following issues.

- (1) At the first year meeting, I suggested to take hypothesis-based approaches to plan surveys and observations. Fortunately, the members of the project discuss the issues of further survey lines, the location of tsunamogenic faults on the seafloor, or tsunamogenic processes before identifying the location of surveys. This approach could be fundamental in terms of future funding and of improved efficiency for future surveys. I would like to suggest to keep this basic approach in the future NEAREST meetings.
- (2) The discussions of tsunamogenic processes were not so active in the course of this meeting except for the ones to discuss the utilization of acoustic waves associated with seafloor deformation. The members have identified the necessity to locate where the 1755 tsunami was generated with respect to seafloor topography and tectonic implications, and are possibly looking into numerical modeling of tsunami or tsunami inversion. My suggestion for this problem is to keep the current direction as it is now.
- (3) In the first observation experiment using LOBSTAR and GeoSTAR, twenty-four and one OBS'es were deployed, but some technical problems were also observed. A time-synchronization problem that took place in nine instruments seems caused by the mixture of some software shortcomings in the leveling driver and the battery decoupling problem due to a limited space in the instrument. The leveling problem appeared even without time-synchronization problems. Looking at the symptoms, I had impression that the first experiment suffered from very minor hardware shortcomings.

Although many of the troubles could be recovered, it may be suggested that the careful debugging of software and continuous development of the instruments to decouple power supplies to three major part of the intrument, i.e., releaser, clock, and sensor, needs to be attempted to avoid future troubles.

- (4) Engineering Development (WP4): Unfortunately, some problems have been reported. Since OBS'es and GeoSTAR has a key to the success of the future tsunami disaster mitigation, these problems needs to be solved as early as possible. Continuous improvement of the GeoSTAR system needs to be planned.
- (5) International Collaboration with Moroccan researchers should be continued. Their contribution as the first year product reflects their efforts for a year. Since the Moroccan seismic network and surveys are limited in numbers and spatial scale, continuous efforts to enhance the current level of contribution need to be taken. The interpretation of industry reflection data in the offshore could be a good candidate for adding values to the efforts of NEAREST if it is applicable.
- (6) It is suggested that the efforts of participating organizations and members need to be kept after the end of the project. Some possible directions need be proposed to keep the current "centripetal force" towards the realization of future tsunami early warning system in the gulf of Cadiz.

I believe that the realization of the project objectives would surely rely on the coordination among subgroups. Although it is not a simple task, I would like to encourage to keep up the existing level of the individual efforts and to sustain the collaboration among the individual groups for common or coalescent objectives.