

Progress Report Form of ICL Networks 2015
January to December 2015

1. Project Title of Network: North East Asia ICL Network (NEA-ICL)

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3. List of member organizations

1 Korea Institute of Geoscience and Mineral Resources (KIGAM)

2 National Institute of Forest Science (NIFoS), Republic of Korea

3 China Geological Survey

4 Northeast Forestry University, China

5 Bureau of Land and Resources of Xi'an

6 Institute of Mountain Hazards and Environment, Chinese Academy of Sciences

7 Tongji University, China

8 Japan Landslide Society

9 University of Tokyo: Geotechnical Engineering Group, Civil Engineering

10 Niigata University: Research Institute for Natural Hazards and Disaster Recovery

11 Forestry and Forest Product Research Institute (FFPRI)

12 Kyoto University: Disaster Prevention Research Institute (DPRI)

4. Progress report of activities up to 2015

This year (2015) there was no meeting for NEA Network. However, each member conducted the following activities.

4.1 Korea Institute of Geoscience and Mineral Resources (KIGAM)

Development of Integrated Landslide Monitoring Sensors and Construction of Landslide Monitoring System in Korean National Parks:

- 1) To enhance the effectiveness of landslide field monitoring, KIGAM has developed two integrated monitoring sensors of landslide by a research project performed since 2014. One of the integrated monitoring sensors is composed of a volumetric water content (VWC) sensor, a temperature sensor, and a tiltmeter. Another is composed of a VWC sensor and a matric suction sensor. The sensors can measure changes of physical and mechanical properties in the soil that are changed by rainfall infiltration. They have been installed to verify the performance under the field condition at the two test-beds that are located in National Park areas, Korea.
- 2) As a continuous research activity to construct landslide monitoring systems in Korea, KIGAM installed three monitoring sites of landslides at three National Parks such as Mt. Seorak, Mt. Sokri, and Mt. Joowang in 2015. In total, KIGAM operates seven landslide monitoring system on natural terrain since 2014. The results will also be applied to develop landslide early warning system in the future.

4.2 National Institute of Forest Science (NIFoS), Republic of Korea (former Korea Forest Research Institute)

- 1) To install sets of sensors, mainly soil moisture sensors and tensiometers, for landslide early warning at two landslide-prone sites
- 2) To evaluate functions of two types of debris barriers for urban areas through flume tests

- 3) To develop an integrated decision support system for allocating check dams and debris barriers cost- and functional-effectively
- 4) To monitor bed-load transportation using hydrophone systems in small forested watersheds, and install the system at three new sites

4.3 China Geological Survey (CGS)

- 1) Organizing Seminar on Geologic Hazard Prevention for urbanization in Lanzhou in April. Published a special issue.
- 2) Emergency investigation, rescue and assessment on: Geohazards in Tibet Region adjacent to Nepal Tragedy Ms8.1 Earthquake on April 25, 2015; Major massive rockslide geohazards in Shanyang County, Shaanxi Province on August 15, 2015; and Major landfill wasteslide in Shenzhen City, Guangdong Province on December 21, 2015
- 3) Research on rainfall-induced landslide funded by national projects.
- 4) Monitoring and warning on the landslides in the Three Gorges.
- 5) Emergency prevention on the huge landslide hazard at Coal Mining open pit, Fushan, Liaonin.
- 6) Community-based early warning and training on evacuation for the landslide hazard at Zhenxiong, Yunnan Province.

4.4 Institute of Mountain Hazards and Environment (IMHE), CAS

- 1) The IMHE send a team to Nepal after the Gorkha earthquake occurred on 25th April, 2015 to conduct detailed investigation on earthquake-induced geological hazards.
- 2) A seepage model considering preferential flow was developed and the corresponding initiation model of rainfall induced landslides was also developed.
- 3) A numerical model of landslide movement that can consider erosion was developed. A two layer model was developed to simulate the procedure when a landslide enter a river. The corresponding surging effect can also be simulated.
- 4) Software named “Mass Flow” was developed, which can simulate both landslides and debris flows.

4.5 Tongji University

Tongji University continued monitoring a giant landslide in Li County (Sichuan Province, China) that was considered as a co-seismic area resulting from the Wenchuan Earthquake. The monitoring strategy has been intensified with the implementation of a spatial sensor network that integrated both space-borne, aerial, terrestrial and internal observation approaches. The monitoring results revealed a relative stable condition for the whole landslide during the whole year, although some very slow surface displacements were identified by the InSAR technique.

4.6 Japan Landslide Society (JLS)

- 1) Exhibition and Symposium at the Public Forum of 3rd WCDDR in Sendai (14-18 March 2015): JLS and the Japan Society of Engineering Geology (JSEG) exhibited posters and made presentation “Challenges to Geo-hazards – Thrust for Earthquake Disaster Mitigation” at the Public Forum of 3rd WCDDR. Geo-hazards and their mitigation are introduced as well as challenges such as community-based earthquake disaster mitigation and dissemination actions and development of hazard zonation methods of earthquake-induced landslide. JLS, Ministry of Land, Infrastructure and Tourism, Japan (MLIT) and the Japan Society of Erosion Control Engineering (JSECE) also held the International SABO Symposium on 18th March and have made recommendation to promote sediment disaster risk reduction for sustainable development.
- 2) Disaster survey on the landslide occurrences induced by the Nepal Gorkha Earthquake (May 2015 up to present): Since JLS has investigated disaster management of earthquake-induced landslides, disaster survey teams have been dispatched to Nepal several times and recommended necessary actions to concerning organizations. Earthquake landslides are detected from satellite images and future earth-induced landslide hazards are evaluated.

4.7 University of Tokyo: Geotechnical Engineering Group, Civil Engineering

- 1) A low-cost and easy-to-use wireless monitoring and early warning system for slope disasters is developed. It is deployed for more than 80 slope sites in Japan and other countries.
- 2) The observed behaviors of slopes in pre-failure stage are evaluated, and criteria for early warning is proposed based on continuous tilting rate in a steel rod inserted in surface layer.
- 3) Equipment for multi point monitoring is also developed, and its effective usage is under investigation on site.
- 4) The developed methods are transferred to other countries; International joint researches are going on between Japan and 6 countries (China, Taiwan, Sri Lanka, Indonesia, Thailand, Australia).
- 5) Properties of slope materials are studied to understand the mechanism of pre-failure behaviors to be used for early warning. Slope model tests are conducted to explore effective methods of monitoring for early warning.
- 6) New methods using elastic wave propagation in slope ground are studied for site investigation and monitoring.

4.8 Kyoto University Disaster Prevention Research Institute (DPRI) [, Niigata University and Forestry and forest Product Research Institute (FFPRI)]

- 1) The International Symposium Education Future Leader in Global Safety: Lessons and Practice in the affected areas of Great East Japan Earthquake was held in Sendai on 15 March 2015, as a part of Public Forum of the 3rd UN World Conference on Disaster Risk Reduction. A presentation 'Landslide risk assessment through laboratory experiment and computer simulation' explains landslide disaster distribution in Southwest Japan. An integration method of physical experiment by means of ring shear apparatus and computer simulation using LS-Rapid was introduced.
- 2) Site investigation to the Kii Peninsula on 9-11 May 2015. The 2011 large-scale landslides in the Kii Peninsula was conducted together with Prof. Hiroshi Fukuoka (Niigata University), students and researchers from DPRI. Soil samples were taken at the Akadani and Kuridaira, two biggest landslides there, and tested in the laboratory using the undrained dynamic ring shear apparatus (ICL-2).
- 3) The landslide experiment using flume apparatus has been conducted under collaboration with Dr. Hirotaka Ochiai (FFPRI) on 17-21 August 2015 in Tsukuba, Japan. The aims of the flume experiment was to observe the landslide triggered by prolonged heavy rainfall that given to the sand samples. The sensors installed within flume were: pore-pressure gauges, multi-layer tensiometer, extensometer and dynamic piezometer. After almost one hour fifty minutes of rainfall, the tension crack was found on the top of the flume. Sequentially, landslide occurred in the overall mass inside the flume and accumulated on the bottom part of the flume.
- 4) Study on large-scale landslide near Aratozawa reservoir was carried out to understand its failure mechanism and motion behavior considering that this huge landslide occur due to earthquake and located near to the reservoir. The geotechnical simulation model (LS-RAPID) used the results of ICL-2 ring shear apparatus experiment. The study is still going on, particularly to observe the result of LS-RAPID based on parameters taken from ring shear test results.

5. Plan of future activities

- a. Participating in the ICL-IPL Kyoto Conference to be held in Kyoto University on 8-11 March 8-11, 2016
- b. Preparing for the contributions to the 4th World Landslide Forum to be held from 29 May to 2 June 2017 in Slovenia. Organizing a network meeting. Publication (in Landslides, proceedings, meeting reports, or WEB)
- c. Preparing proposal of WLF5 to be held in Niigata 2020.
- d. Updating the Landslide Teaching Tools in cooperation with other regional and thematic networks.