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Preface for the thematic issue “Early Warning of Landslides”

Landslide risk reduction is a pressing societal need in mountainous countries and along many coasts, lakes and rivers in other areas. Engineering measures to stabilise dangerous slopes can be costly or impractical in many cases. Warning is the most economical risk-reduction measure for rapid landslides, and development of early warning systems for mitigating natural risks is a topic of much research around the world. Asian members of the International Consortium on Landslides (China, Indonesia, Japan, Korea, Philippines, and Thailand) jointly proposed the project “Early Warning of Landslides” to the International Programme on Landslides (IPL). The project with aspects of research and capacity development was approved as project C105 of the IPL, and obtained funding from the Japanese Ministry of Education, Sports, Science and Technology as the Asian Joint Project on “Early Warning of Landslides”. Collaboration was obtained with researchers from Italy, USA, Canada, and New Zealand. Some early results were presented in Session 13 “Monitoring, prediction and early warning” at the first World Landslide Forum (Sassa et al. 2008). *Landslides* herein dedicates this full issue of 11 papers to the internationally important topic of early warning.

Sassa et al. (this issue) present a study aimed at developing a new computer simulation code integrating the initiation and motion of rapid landslides triggered by earthquake, rain, or their combined effects. The initiation process is the target of *stability analysis* through the limit-equilibrium method and the finite-element approach, while *runout analysis* targets the post-failure motion. This integrated simulation can be an effective tool to evaluate landslide risk for a targeted area.

The paper by Apip et al. (this issue) concerns early warning of shallow landslides and floods at a catchment scale using the half-hourly interval rainfall data from satellite monitoring by the Climate Prediction Centre of the National Oceanic and Atmospheric Administration in a hydrological-geotechnical model. The proposed method is applied in Citarum River watershed in Indonesia. This research shows the possibility of early warning of shallow landslides in areas where radar rain gauges are not yet available.

Another method for the factor of safety mapping and early warning of shallow landslides using the National Aeronautics and Space Administration Rainfall Measuring Mission and the 30-m Advanced Spaceborne Thermal Emission and Reflection Radiometer DEM is reported by Liao et al. (this issue) with reference to the Indonesian island of Java.

Various ground-based landslide-monitoring methods are implemented. Casagli et al. (this issue) applied ground-based radar interferometry to monitor the movement of a large creeping mountain slope and a landslide on the flanks of Stromboli volcano. Yin et al. (this issue a) discuss the large-scale implementation of real-time monitoring in the relocated Wushan town

beside the Three Gorges Reservoir, China. In Yin et al. (this issue b), the group of the China Geological Survey compares and integrates landslide-monitoring results from GPS and InSAR in collaboration with the Geological Survey of Canada.

Baum et al. (this issue) present an early warning system for rain-induced shallow landslides and debris flows which are successfully managed in the USA West Coast. Osanai et al. (this issue) present the Japanese early warning system for debris flows and shallow landslides using telemetered rainfall measurements, weather radar, rainfall forecasting and a soil-water index model for all of Japan. The warnings issued by the Ministry of Land, Infrastructure, Transport and Tourism and the Japan Meteorological Agency are for publicly distributed through news media and the internet.

Pagano et al. (this issue) study the time prediction of shallow landslides in Italy in unsaturated pyroclastic soils which may fail by loss of suction during rainfall. Massey et al. (this issue) report a successful early warning procedure for an out-burst flood triggered by a retrogressing landslide in New Zealand.

Uchimura (this issue) describes a simple, low-cost slope-monitoring and data-transfer system for early warning of landslides, and discusses its performance in an indoor model experiment and in monitoring a real slope.

Many early warning papers are already published and many more are going to be published in *Landslides*. No single thematic issue can be large enough to present the many aspects of early warning, but the guest editors expect this issue to stimulate further research in this important field of landslide-disaster risk reduction. Early warning can only be effective when combined with wider capacity development including public awareness and training of evacuation procedures in close collaboration with local communities. These scientific and social efforts contribute to the Hyogo Framework for Action 2005-2015, “Building the Resilience of Nations and Communities to Disasters” adopted by the United Nations World Conference on Disaster Reduction.

References

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