

■ An outline of a torrential rain-caused sediment disaster in Hiroshima Prefecture in August 2014 and subsequent response

Sabo Department

NILIM provided technical support to the Chugoku Regional Development Bureau and Hiroshima Prefecture on prevention of secondary disaster and emergency response in the wake of a torrential rain-caused sediment disaster that struck Hiroshima Prefecture in August 2014.

From the evening of August 19 to the morning of August 20, 2014, torrential rains fell in Hiroshima Prefecture, primarily in the Asakita and Asaminami districts. The rains resulted in a series of debris flows and slope failures that caused great damage, killing 74 people and injuring 44, and completely destroying 133 houses, partially destroying 122 houses, and damaging 174 houses (data announced by Hiroshima City's disaster management office).

Immediately following the disaster, the Sabo (Sediment Disaster Prevention) Department joined with the Public Works Research Institute's Erosion and Sediment Control Research Group to send a total of 114 experts to the affected areas between August 20 and September 17. These experts primarily provided technical support for:

- Secondary disaster prevention activities (see photo)
- Ensuring the safety of search and rescue personnel (police, fire, and Self-Defense Forces)
- Emergency mountain stream assessments by TEC-FORCE (Technical Emergency Control Force)
- Planning of emergency countermeasures work for earth removal and flood control

In particular, the NILIM and PWRI Team advised the search and rescue team to continue watching rain areas and monitor changes in stream turbidity and flow volume, as the search and

rescue personnel had to engage in search operations before the situation upstream could be confirmed.

Emergency mountain stream assessments have been conducted by TEC-FORCE (comprised of experts of the regional development bureaus and NILIM) in a total of 324 mountain streams. These assessments have targeted streams in areas where debris flows tend to be concentrated, streams where debris flows occur frequently, and areas adjacent to those streams. The main items of the assessments were the conditions of sediment in mountain torrents, accumulation of driftwood, and slope changes near homes (e.g., occurrence of collapses, etc.) in mountain streams. Based on the results, the debris flow risk of each stream was assessed. The findings were then released to the public. The released findings were subsequently used in studies of warning and evacuation systems.

Looking forward, the Sabo Department intends to press forward with onsite surveys and analyses of debris flow occurrence, downstream circumstances, sediment accumulation, and other phenomena while also studying solutions as part of measures to prevent sediment disasters.

Details ● Sabo Planning Division webpage "Disaster Information"
<http://www.nilim.go.jp/lab/rbg/>



Photo: Onsite inspection of disaster conditions

■ Using "tweets" to find early warning signs of sediment disasters

Sabo Department, Sabo Risk-Management Division

The Sabo Risk-Management Division is moving forward with a joint public-private sector study toward the practical implementation of methods for detecting "early warning signs" and "actual occurrence" of sediment disasters by receiving "tweets" that can only be issued locally by residents.

It is said that approximately 40% of people killed by natural disasters die in sediment disasters. Indeed, the sediment disaster that occurred in Hiroshima City on August 20 of this year claimed a great many lives. When the risk of a sediment disaster arises, it is important to execute appropriate evacuation in response to the issuance of sediment disaster warning information. In fact, the Cabinet Office sets this as a rough standard for evacuation advisories in its "Guidelines for Producing a Decision and Dissemination Manual for Evacuation Advisories and Orders." However, information on the possibility of sediment disasters are issued at the initial stage when the danger of a landslide first arises, and therefore separate indicators are needed for

subsequent judgments on the situational urgency. Given this, the guidelines list the occurrence of such early warning signs as "mountain rumbling" and "driftwood outflow" among examples of criteria for issuing evacuation orders. For administrative officials to grasp the occurrence of these early warning signs, they must depend on information provided by local residents who detect them. However, reports are rarely provided at the actual times that such signs occur, and this makes them inadequate from the standpoint of use as disaster management information.

Against this backdrop, the Sabo Risk-Management Division is studying the establishment of technologies for quickly analyzing in real time the vast quantities of social media data (so-called "big data") that exist and for grasping information on the early warning signs and sediment disaster conditions that can be found in messages posted by social media users expressing concern or fear about heavy rains, etc. This study is a joint undertaking with Fujitsu Laboratories, Ltd.

The study will make it possible to “narrow down” those regions where danger exists and to quickly ascertain “signs” and “actual occurrence” of sediment disasters. Additionally, it is expected that supplying various types of information quickly and in a pinpoint manner in combination with GIS technology will facilitate quicker decisions by the local governments that issue

evacuation orders as well as independent evacuation by residents, and thereby lower the human cost of sediment disasters.

Details • NILIM web site (press releases)
<http://www.nilim.go.jp/lab/bcg/kisya/journal/kisya20140714.pdf>

■ Publication of research achievements at the 2014 World Congress on ITS in Detroit

Road Traffic Department, Intelligent Transport Systems Division

The 21st World Congress on ITS was held in Detroit, Michigan, U.S.A., from September 7 to 11, 2014. Publications of research achievements by NILIM were included in the schedule.

This year’s World Congress on ITS was held under the theme of “Reinventing Transportation in our Connected World.” It was attended by more than 9,100 experts and concerned persons from 65 countries. It featured enthusiastic discussions of ways for resolving various traffic problems by utilizing vehicle-to-infrastructure and vehicle-to-vehicle communication among other topics.

The Intelligent Transport Systems Division participated in the conference together with the ITS Policy and Program Office of MLIT’s Road Bureau. It took the podium at four Special Interest Sessions and four Technical/Scientific Sessions, and made presentations on research achievements concerning technologies that utilize probe data and technologies that support the appropriate operation of heavy vehicles. It also took advantage of the opportunity presented by this gathering of ITS personnel from around the world to gather information, and it held separate meetings with participants from the United States, European Commission, Germany, the Netherlands, Austria, China, and South Korea for the purpose of exchanging information and views.

This year’s conference featured a large number of research talks and case presentations, particularly on automatic driving and other cutting-edge technologies as well as on cloud-based services that utilize smartphones and the collection and analysis of “big data.” It also included numerous discussions on “business models” for diffusing and developing these ITS technologies.

Using the fruits of its participation in the conference as a reference, the Intelligent Transport Systems Division will move forward with surveys, research, and development to further refine and defuse Japan’s ITS technologies, which are leading the way in terms of practical application in Cooperative ITS services, for road users.



Photos: Presentations in an individual meeting and a Special Session

■ Launch of a Northern Sea Route webpage: Analyzing actual navigational conditions using Satellite AIS

Port and Harbour Department, Port Planning Division

On September 17, the Port Planning Division of the Port and Harbour Department launched a new webpage for Satellite AIS-based analysis of actual navigational conditions in Northern Sea routes within the NILIM website.

In recent years, reduced sea ice area in the Arctic Ocean during the summer months has made it possible for ships to navigate through it. This is attracting attention in terms of commercial use, as the distance between Europe and Asia is shorter along the Northern Sea route than through the Suez Canal.

NILIM and the Japan Aerospace Exploration Agency (JAXA) are engaged in joint research to ascertain actual navigational conditions in the Arctic Ocean by receiving from satellites Automatic Identification System (AIS) signals that are transmitted by ships. The conventional method for grasping the actual navigational conditions of ships is to use AIS signals acquired from land bases. However, utilizing this satellite technology has made it possible to ascertain navigational details (position, speed, etc.) over a broad area without the need to establish land bases.

Against this backdrop, the Port Planning Division launched a webpage that presents analyses that have been conducted thus far. Its plan is to present new analytical results and other information on the webpage as they become available. The chart at right was prepared by overlaying ship speeds on top of a sea ice conditions (sea ice concentration) in July of this year. By displaying

green areas that turn yellow at points where ships cross sea ice, for example, it shows how ship speeds in the region decrease. Moreover, the division plans to conduct quantitative analyses of the relationship between sea ice conditions and ship speed. It is also continuing its joint research in a reinforced manner with the addition of the Hokkaido Regional Development Bureau and Aomori Prefecture as partners since October.

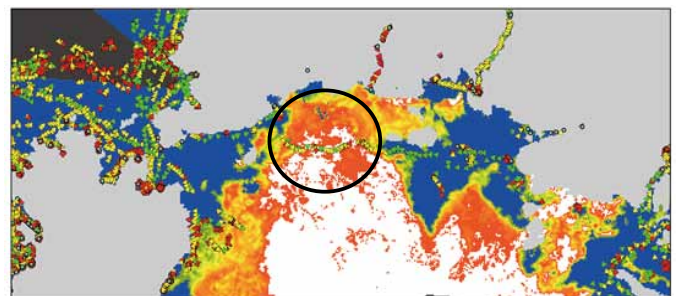


Figure: Relationship between sea ice and ship speeds (July 19 to 25, 2014)

Notes: Ship speed (△) Red: 5 knots or slower; yellow: 5 to 10 knots; green: 10 knots or higher
 Sea ice: White indicates the highest density of sea ice; the density falls as the color changes from orange to green.

Details • NILIM web site
<http://www.ysk.nilim.go.jp/kakubu/kouwan/keikaku/ais.htm>.

■ Technical Information and Web Programs on Energy-saving Standard

Housing Department, Residential Environment Planning Division

The Residential Environmental Planning Division presents technical information and web programs on energy-saving standards for housing and other buildings. The web programs were updated in October.

Primary energy consumption was added as a new indicator to energy-saving standards for housing and other buildings that were publicly announced in January 2013. This now makes it possible to evaluate building envelop performance (insulation, screening of solar radiation, etc.) and performance of heating and air-conditioning, ventilation, water heating, lighting, and other factors in an integrated manner for an entire building. This in turn makes it easier to make objective comparisons of buildings' energy-saving performance.

NILIM¹ and the Building Research Institute have developed methods and web programs for calculating building envelope performance and primary energy consumption in cooperation with academic experts and persons with practical experience. They are made available as technical information on energy-savings standards and other items via a webpage (left rear of the figure). These web programs that quantifiably calculate primary energy consumption in accordance with design details are expected to be more than just tools for evaluating conformity with standards. They will also be used as design tools in, for example, studies of the cost effectiveness of energy-saving technologies (comparison of initial costs and operational cost; right front of the figure). The web programs were updated in October.

These tools are being used by a great number of people. At the beginning of October 2014, the average number of weekday visits to the website was 1,499, while the number for the web program for calculating primary energy consumption for housing

and that for the web program for non-housing were 696 and 272, respectively.

Because energy-saving technologies come in a broad variety of forms, the Residential Environmental Planning Division will continue research activities and program updates for the further enhancement of evaluation and calculation methods.

Note: Residential Environment Planning Division, Housing Department, and Environment and Equipment Standards Division, Building Department



Figure: Sample views of the webpage (left rear) and web programs (right front)

Details Technical information on the energy-saving standards for housing and other buildings and certification standards of low-carbon buildings. (Building Research Institute web site) <http://www.kenken.go.jp/becc/index.html>

■ Exhibition to Techno-Ocean2014

Administrative Coordination Department, Planning and Coordination Division

NILIM joined with the Kobe Research and Engineering Office for Port and Airport (Kinki Regional Development Bureau) to organize an exhibition presenting research and project details concerning port and harbor environment projects at "Techno-Ocean 2014," held at the Kobe International Exhibition Hall from October 2 to 4.

Techno-Ocean is Japan's only convention concerning the ocean. This year's convention, the 15th organized thus far, was held under the theme "Mother Oceans." Featuring not only exhibits but also organized sessions, a "student poster session," an underwater robots competition, and an exhibition of sea-related art, it attracted more than 9,000 visitors who were representatives of private enterprises, universities, research institutes, and the public sector as well as private citizens and children.

NILIM and the Kobe Research and Engineering Office for Port and Airport presented a panel exhibition concerning environmental topics under the banner "protecting the blue ocean." It featured a model of the ocean-surface cleaning and oil recovery vessel "Dr. Kaiyo" that operates in Osaka Bay; activities concerning water-quality surveys, such as the Osaka Bay Environmental Database; and research on marine environments, such as restoration of the natural environments of seashores.

To raise awareness among visitors to the booth, we explained research on marine environments, such as the distribution of shoals in Tokyo Bay, and oil-recovery work following a tanker explosion off the coast of Himeji on May 29 of this year.

It is hoped that the researchers and exhibitors who attended Techno-Ocean 2014 will promote the building of new networks and further advance research and technical development concerning the sea.

NILIM will proactively promote public understanding and public relations activities by being an active participant in many events and presenting research results.



Photo: A View of the exhibition



● **Schedule of Principal Events**

Scheduled Dates	Event Name
December 3	2014 Conference of the National Institute for Land and Infrastructure Management http://www.nilim.go.jp/lab/bbg/kouenkai/kouenkai2014/kouenkai2014.htm

● **Publication (research achievements) < August, 2014-October, 2014 >**

Download from here ● <http://www.nilim.go.jp/lab/bcg/siryuu/index.htm>

PROJECT RESEARCH REPORT of NILIM

No.	Title of Paper	Project Leaders
45	Development of urban system technology to achieve a low-carbon society based on hydrogen energy systems	Director of the Building Department
46	Research on Restoration of Environment for Port and Harbor Regions using Integrated Environmental Planning and Management Systems	Director of the Coastal, Marine and Disaster Prevention Department

RESEARCH REPORT of NILIM

No.	Title of Paper	Names of Divisions
54	Measurement and application of average residence time of marine plastics on beaches	Coastal Zone Systems Division

TECHNICAL NOTE of NILIM

No.	Title of Paper	Names of Divisions
789	Collection of Cases for Electric-pole Elimination	Advanced Road Design and Safety Division
792	Manual for field observation using turbidity meter at mountain river	Sabo Planning Division
793	Proposal on river environment information sharing system to Promote Cooperation with Residents in the Basin for River Management	River Department
796	Sediment conditions and eelgrass (<i>Zostera marina</i>) in Miyako Bay, October 2013	Marine Environment Division
797	Study to Ensure Smooth Passage of Container Terminals through Gates	Disaster and Emergency Management Division
799	A Detailed Analysis on the Vessel Movementsts in the Northern Sea Route byAIS Data	Port Planning Division
800	A study on internationalization of technical standards for port and harbour facilities of Japan (Part 2) - Study Example of efforts to assist in the development of port design standards in Vietnam -	Port Facilities Division
801	An Estimation of Cargo Flow of International Ferries and RORO ships based on a Sacrifice Model	Port Systems Division
802	Guideline for introducing a Technology for highly efficient nitrogen removal using the fixed-bed anammox process	Wastewater and Sludge Management Division
803	Guideline for introducing a technology for low-cost production of sewage sludge solid fuel using waste heat	Wastewater and Sludge Management Division
804	Guideline for introducing utilization of heat from sewage with a pipeline-based heat recovery technology	Wastewater and Sludge Management Division
805	Guideline for introducing a Technology for High Efficiency Phosphorus Recovery from Digested Sewage Sludge	Wastewater and Sludge Management Division
806	Reference book on Road Traffic Noise abatement measures (2014)	Road Environment Division

● **We provide you with research information.**

- 2014 Annual Report of NILIM

This web site introduces NILIM activities throughout the year, including research activities and achievements, future initiatives, etc.

Go to this web site: ● <http://www.nilim.go.jp/english/annual/annual2014/ar2014e.html>

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