Introduction of NIED and Disaster Responses in 2018

National Research Institute for Earth Science and Disaster Resilience (NIED)

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Nov 1st, 2018
National Research Institute for Earth Science and Disaster Resilience

History of NIED
1963.4 - National Research Center for Disaster Prevention (NRCDP) was established at Tokyo.
1978.4 - Headquarters moved from Tokyo to Tsukuba.
1990.6 - NRCDP was re-organized as National Research Institute for Earth Science and Disaster Prevention (NIED).
2016.4 - NIED was re-organized and re-named as National Research Institute for Earth Science and Disaster Resilience.

PRESIDENT : Dr. Haruo Hayashi
Number of Staff : 249 (As of 2016.4.1)
Budget : 9.2 billion yen
Observation of earthquake and tsunami

- **Earthquake observation networks**
  NIED’s seismograph networks cover the entire Japan to monitor all types of earthquakes. The observed data are shared with JMA in real time to be used for the earthquake early warning.

- **S-net**
  The network composed of 150 observation units, each of which contains a seismograph and a tsunami sensor, is installed at the deep ocean bottom along the Japan Trench off Tohoku, observes earthquake and tsunami that occur in the area.

- **DONET (Dense Ocean Floor Network System)**
  DONET monitors earthquake and tsunami that could occur at the Nankai Trough earthquake rupture zones.
Large-scale experiment facilities

- **E-Defense**
  The world’s largest 3-D shaking table of E-defense (20m × 15m) is used to verify the seismic performance of a life-size structures.

- **Large-scale Earthquake Simulator**
  It enables large-scale earthquake-proof experiments with the second largest shaking table of the world (14.5m × 15m).

- **Large-scale Rainfall Simulator**
  The facility can simulate near natural rainfalls (15mm-300mm) to study the water disasters caused by the heavy rainfalls.
Other major research areas

• **Cryospheric Environment Simulator (CES)**
  CES can create natural cryospheric environment by simulating near natural snowfall.

• **X-Band Multi-Parameter Radar System (MP Radar)**
  MP Radar enables accurate rainfall estimate from raindrop shape and their drop-size distribution.

• **Volcanic activity monitoring**
  NIED observes volcanic activities accurately with Volcanic observation network (V-net). The data recorded by V-net are used for estimating the behavior of magma and the eruption.
NIED implement its research outcomes in society.

**Earthquake Early Warning**
JMA and NIED jointly developed Japan’s earthquake early warning system. 80% of ground motion data used for EEW are observed by NIED’s seismographs.

**Network for detecting heavy rain**
NIED developed high-resolution X-band MP radar to detect localized and sudden heavy rain and tornado.

**Web-based information system**
NIED is developing a web-based GIS platform that can integrate various disaster information and share it with stakeholders for disaster response activities.
Information Support Team (ISUT)

- **ISUT** was established by Disaster Management, Cabinet office. Started from Apr 2018.
- Mission is to build the common situational awareness of the disaster situation between various disaster response organizations using GIS. NIED is a main member of ISUT.

**ISUT Works**

- Gathering of observation and survey data, etc.
- Integration and processing of data
- Fast, integrative information provision

**Utilization of information in disaster areas**

- National government disaster response headquarters
- Prefecture disaster response headquarters
- Disaster response agencies and organizations
- Various support groups

**Web Maps**

- Automatic reception of data from the organizations
- Creation of map data by ISUT members
- Data registration in standard format.

**Web-GIS**

- Collection of various disaster information

**Paper Maps**

- Utilization of information in disaster areas
Heavy rain in July 2018

- Heavy rain occurred from 28 June to 9 July in western Japan.
- The torrential rain triggered landslides and flash flooding. 225 people died.
Heavy rain in July 2018

- ISUT member were dispatched to Hiroshima Prefectural Disaster Response Headquarters (7 Jul - 6 Aug). Shared maps to various support groups through Web-GIS and Paper maps.
Gathered and Shared Information

- Evacuation Shelter Status
- Road Closure
- Water outage area
- Blackout area
- Water supply spot
- Hospital status
- Communication possible area
- Relief Supply space
- Volunteer center status
- Disaster declaration
- Landslide Distribution

Heavy rain in July 2018

Web map application shared by ISUT

Shelter Status Map
Satellite Imageries and Aerial Ortho Photos

- Satellite imageries were provided from JAXA and Sentinel Asia.
- Aerial ortho photos were provided from GSI (Geospatial Information Authority of Japan)

Heavy rain in July 2018
Satellite Images and Aerial Ortho Photos

- Satellite images and orthophotos are shared from web maps.

- Printed maps are shared to disaster response headquarters.
Heavy rain in July 2018

Comparing pre / post aerial photos
Earthquake in Hokkaido, Eastern Iburi

- Heavy earthquake (Mj 6.7 / Mw 6.6) occurred on 6th September in Hokkaido (Northern Japan). Due to landslide and collapse of houses, 41 people died.
Earthquake in Hokkaido, Eastern Iburi

- **ISUT** member were dispatched to Hokkaido Prefectural Disaster Response Headquarters (6 Sep – 31 Sep). Shared maps to various support groups through Web-GIS and Paper maps.
Earthquake in Hokkaido, Eastern Iburi
Satellite Images and Aerial Ortho Photos
**Summary**

- **NIED** mission is to conduct the comprehensive basic study and comprehensive research & development to increase the level of science and technology for disaster risk reduction and resilience.

- **NIED** contribute to disaster management of national and local government using Geographic Information System (GIS) and Remote Sensing Technology.

- **NIED** plan to conduct new research using remote sensing data.
  - Goal is to observe damaged area correctly and share remote sensing data & analyzed data rapidly to the various support group such as government and company.

- Satellite images from Sentinel Asia are essential data for disaster response in Japan to grasp damaged area widely.