Sixth Plenary Meeting of UN-GGIM-AP

Special Session on Geospatial Information for Disaster Response

-Case Study on 2016 Kumamoto Earthquake-

Part 3 Emergency Disaster Response Activities

9:15am-10:15am, 18th October 2017

The time supposed is 8:00am,16 April 2016 (Saturday)

- GSI re-started response activities, based on the renewed strategy by GSI Director-General

Assistance to other organizations

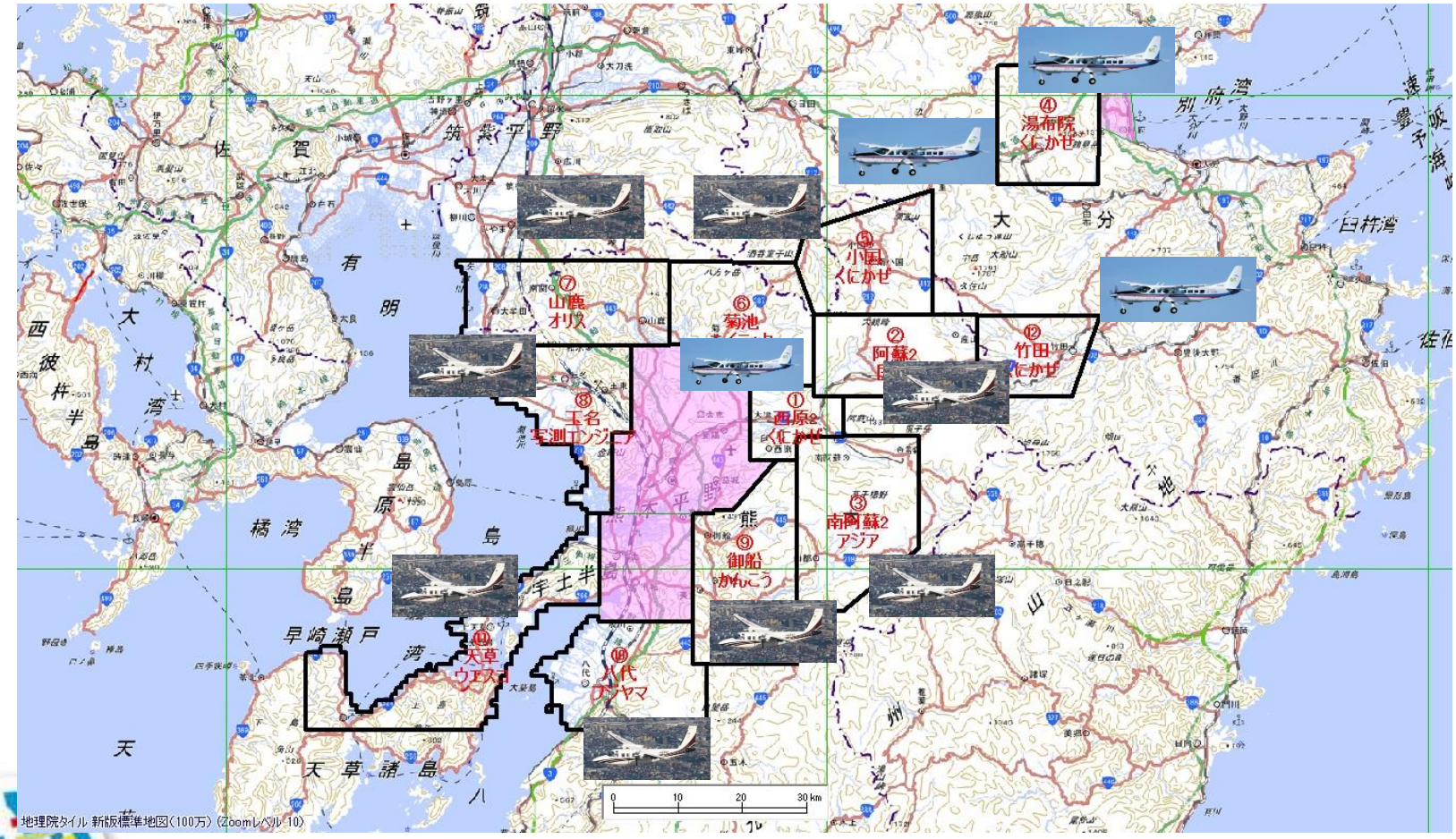
- GSI provided assistance to ODMHQ and relevant organizations
- Surrounding RSDs deployed their staff members to Kyushu-RSD as well as ODMHQ

ODMHQ Office

ODMHQ Daily Meeting

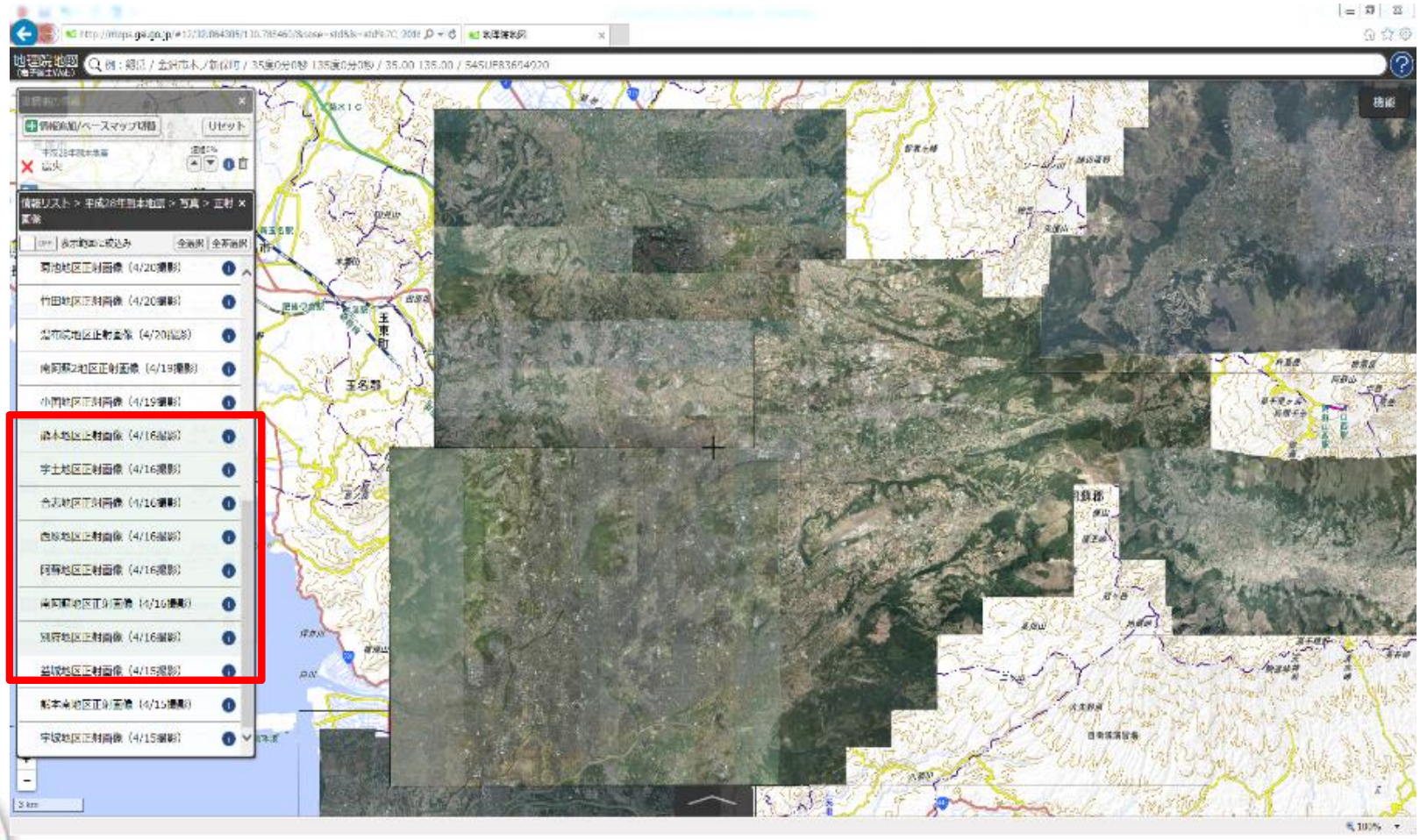
Second aerial photo mission

- Expanded Coverage for affected areas by the Mainshock
- GSI and several private companies joined the mission



Aerial photo provision through “GSI Maps”

- Once taken, photo data were transmitted to GSI and processed
- The photo data was subsequently released through “GSI maps”



Landslide mapping by photo interpretation

- Numerous landslides were caused by the Mainshock
- Landslide distribution was interpreted and mapped out

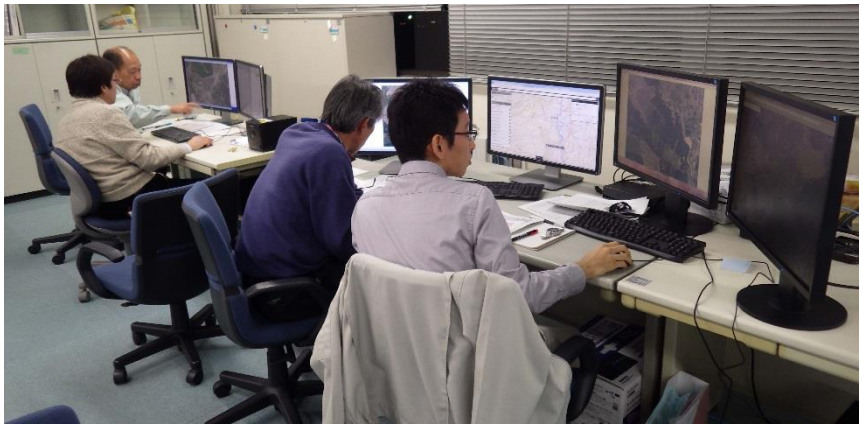
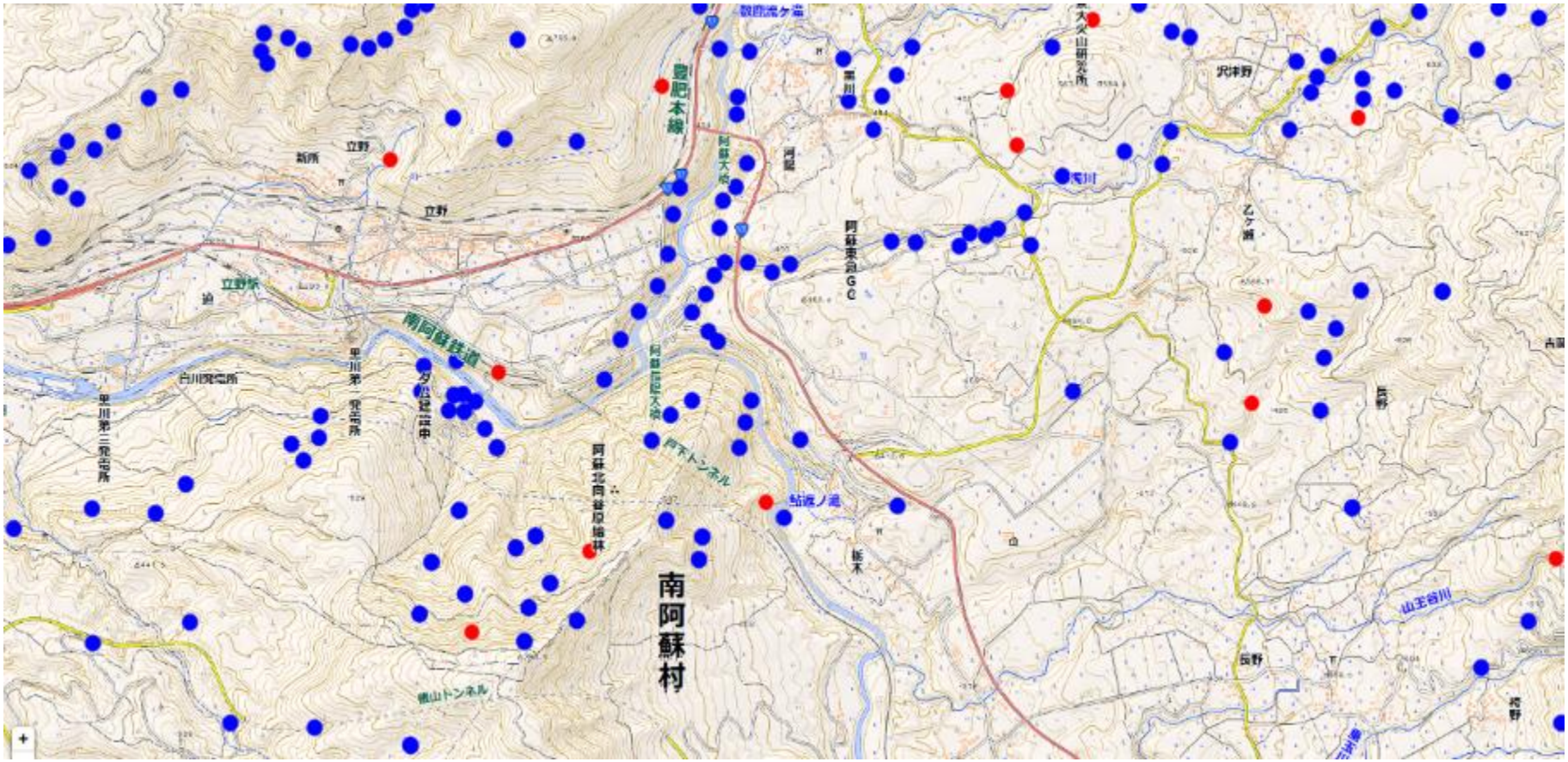


Photo-interpretation works at GSI Headquarters office

Start interpretation:	11:10pm 16 April
Draft map:	03:00pm 17 April
1st version release:	12:00pm 18 April

Landslide distribution map

- Released for the public, in the midnight, 18 April



● Small landslide
● Large landslide

UAV imagery

- GSI sent GSI-LB (Land bird) team members from 15 to 19 April
- They acquired imagery of seriously damaged features, like landslides, emerged faults on the ground.

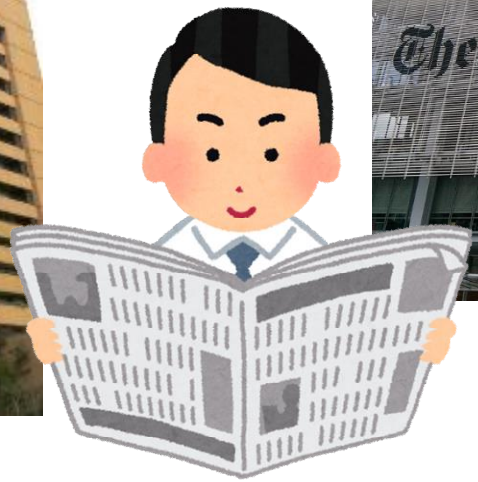
A big landslide captured by UAV*

*UAV: Unmanned Aerial Vehicle

UAV images media coverage

- A number of media (TV, newspaper, web-portals) covered UAV imagery taken by GSI

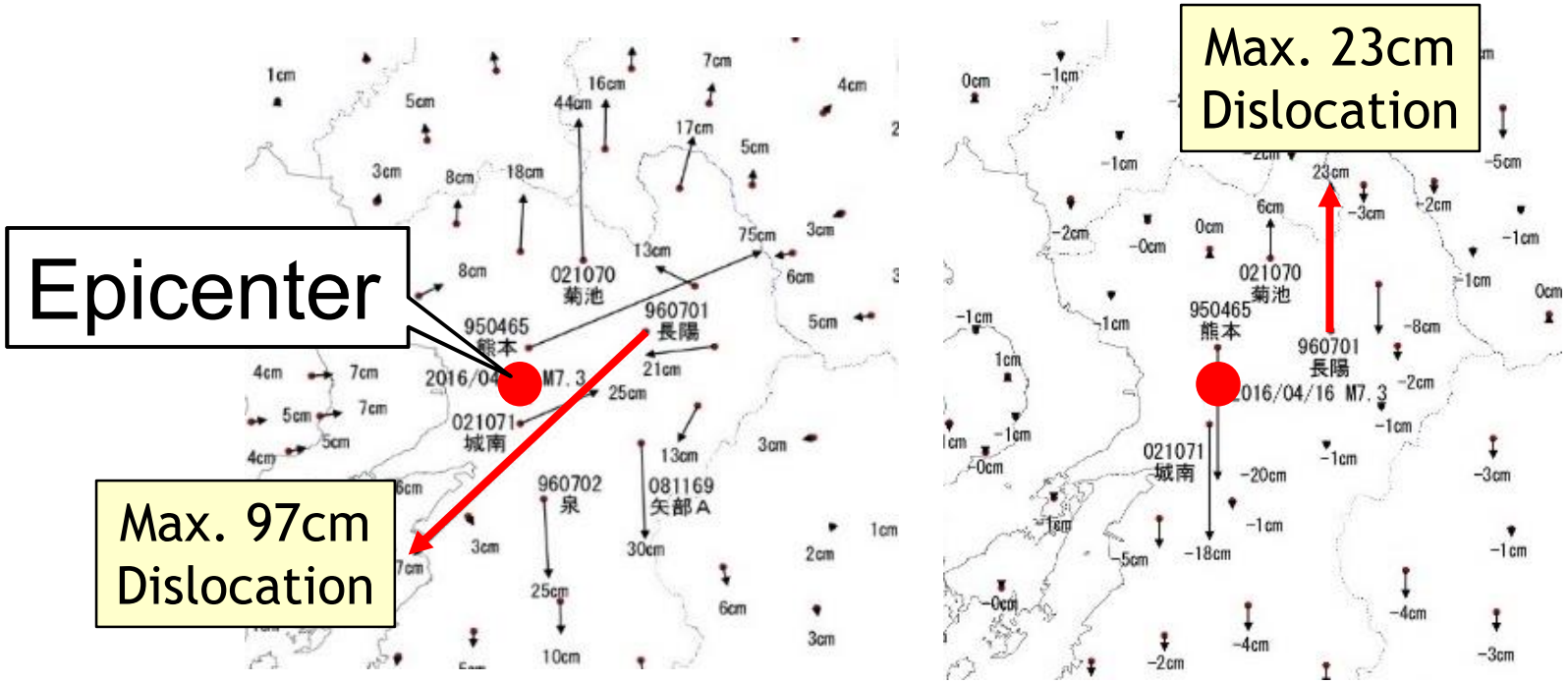
The Asahi Shimbun



The New York Times

Crustal movements of the mainshock

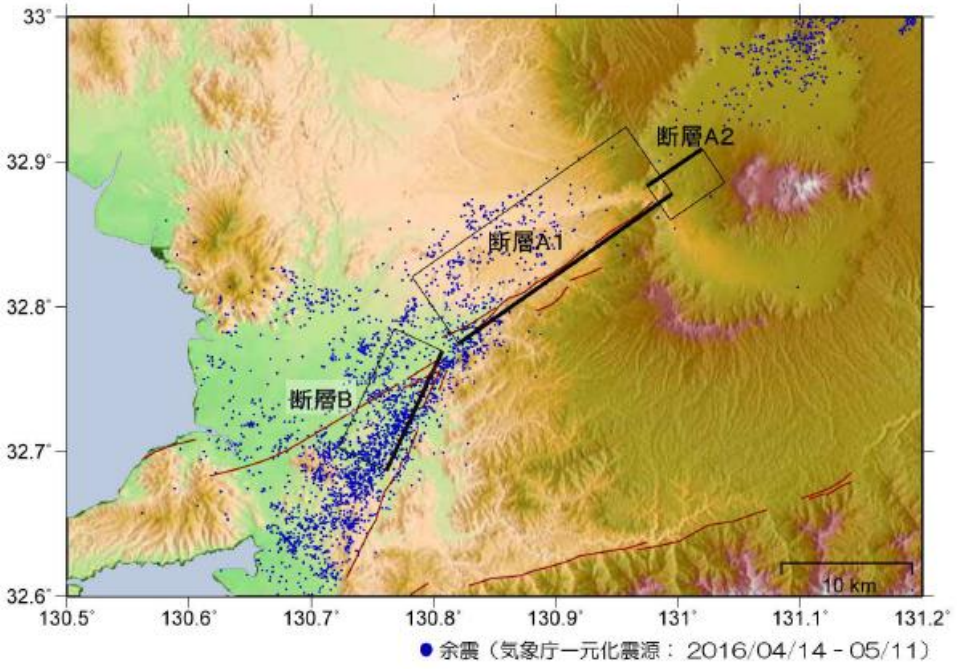
- Much larger crustal movements were observed by the GEONET after the Mainshock

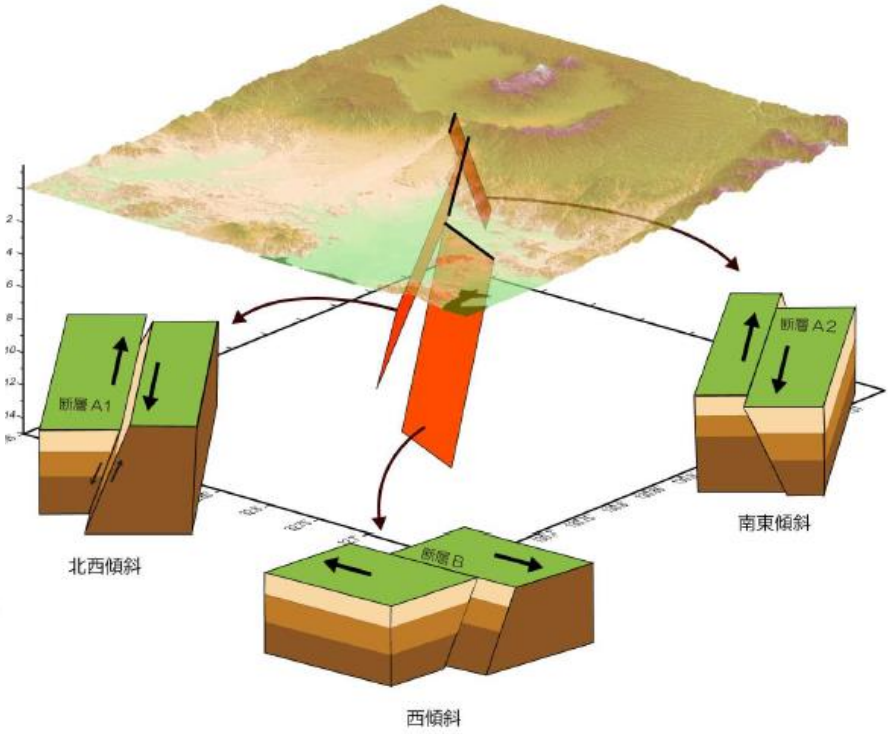


Horizontal **Vertical**

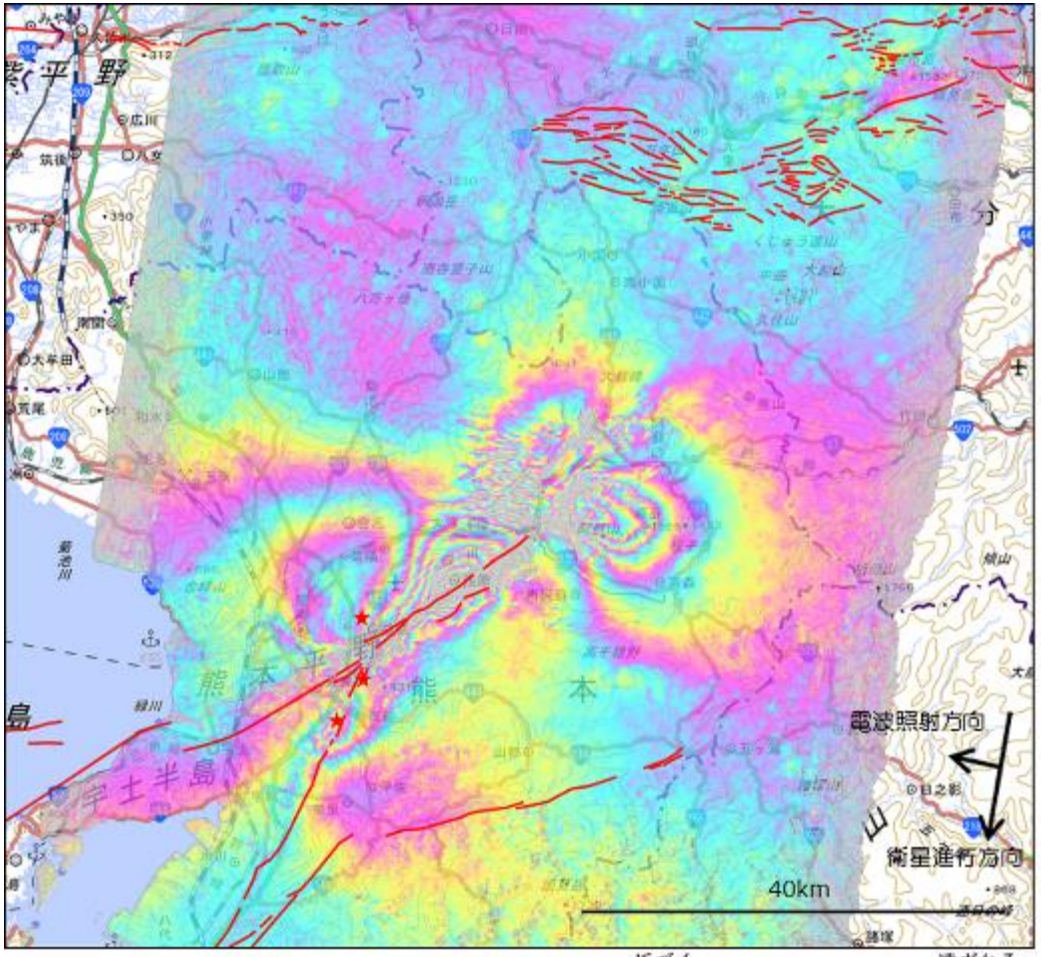
Fault modeling using CORS data

- Three fault slips, totally extending 30 km, were assumed to be compatible with the CORS movement data.





SAR interferometric analysis



- Spatial distribution of crustal movements caused by the two shocks.
- Revealed by In-SAR analysis, using ALOS-2 radar satellite launched by JAXA*
- Narrow banded spectral structure indicates large surface dislocation caused by the earthquakes.

*JAXA: Japan Aerospace Exploration Agency

Topics for discussion #3

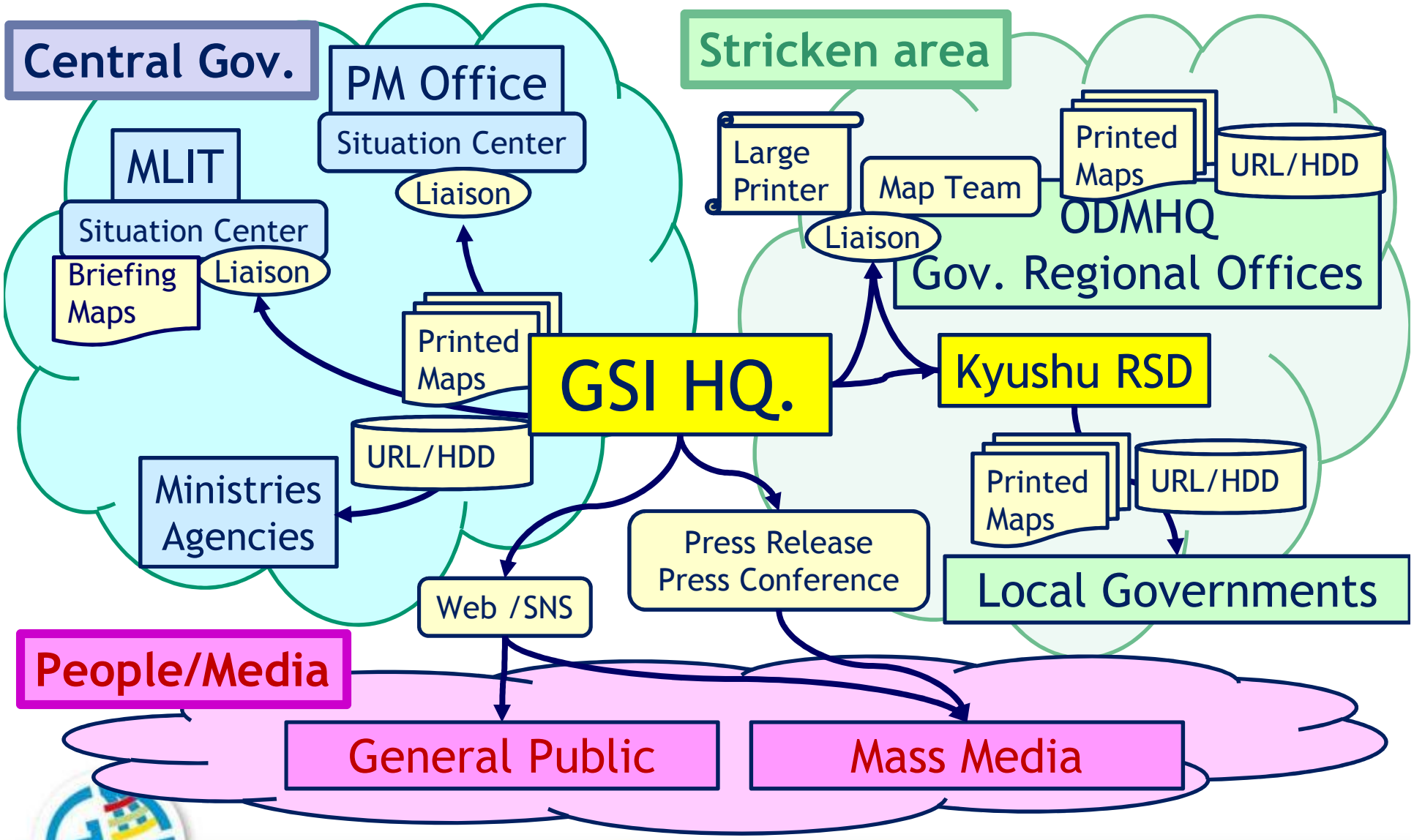
- How should we adequately catch the geospatial needs of relevant organizations and local residents?

- How can we best provide geospatial information to stakeholders, under the fast changing circumstances at the outset phase of a disaster?

Meeting the needs of stakeholders

- Providing geospatial information - NGIA's basic mandate
- Finding out stakeholders' needs – crucial for effective disaster response
- Geospatial information provision
  - When: the best timing?
  - What: map? air-photo? interpretation results
  - To whom: government? media? public?
  - Why: objective of data use.
  - How: through liaison, push mail, website.

Outreach toward stakeholders

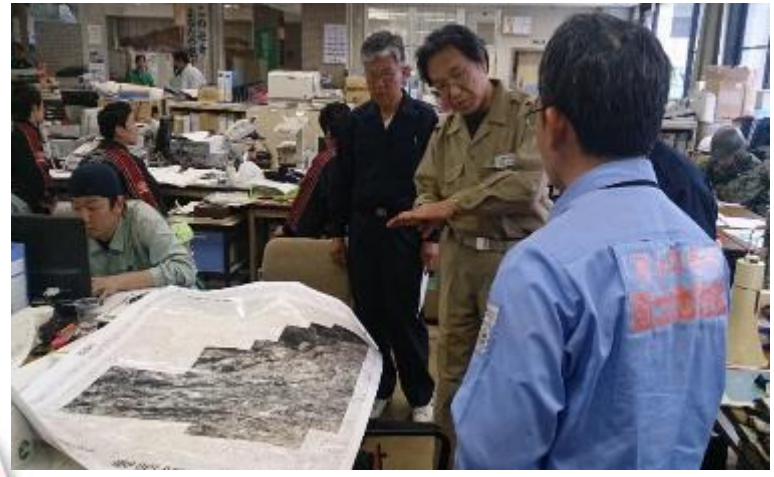


Information provision to ODMHQ

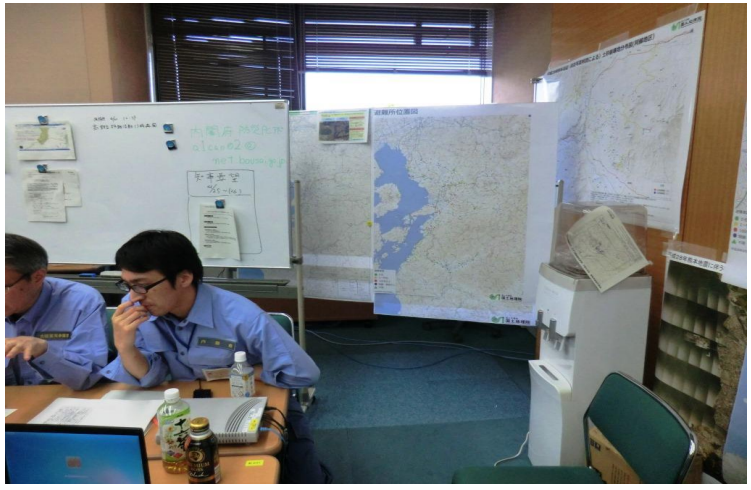
GSI brought a large printer in ODMHQ for service

→ **Unique contribution of NGIA**

Map provision to local governments

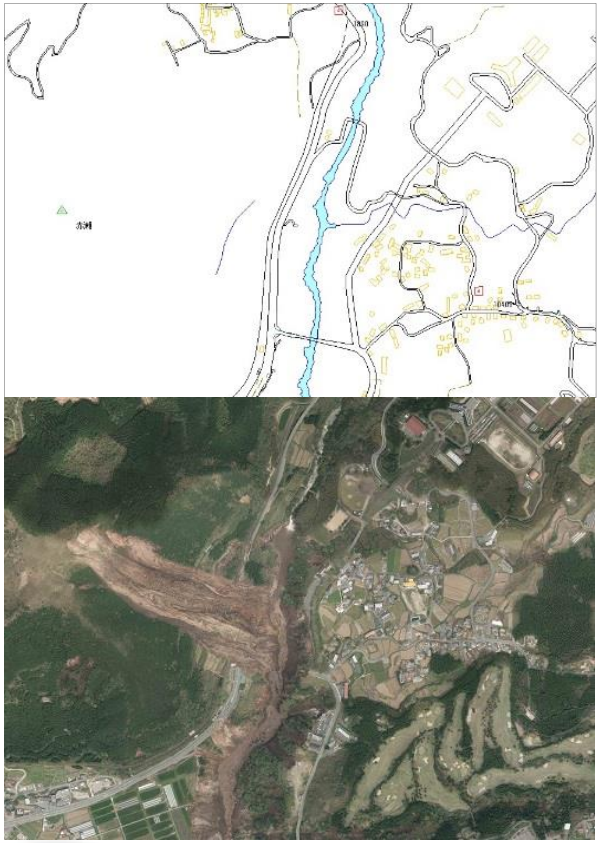


Reference wall maps at ODMHQ



Info. provision for rescuing

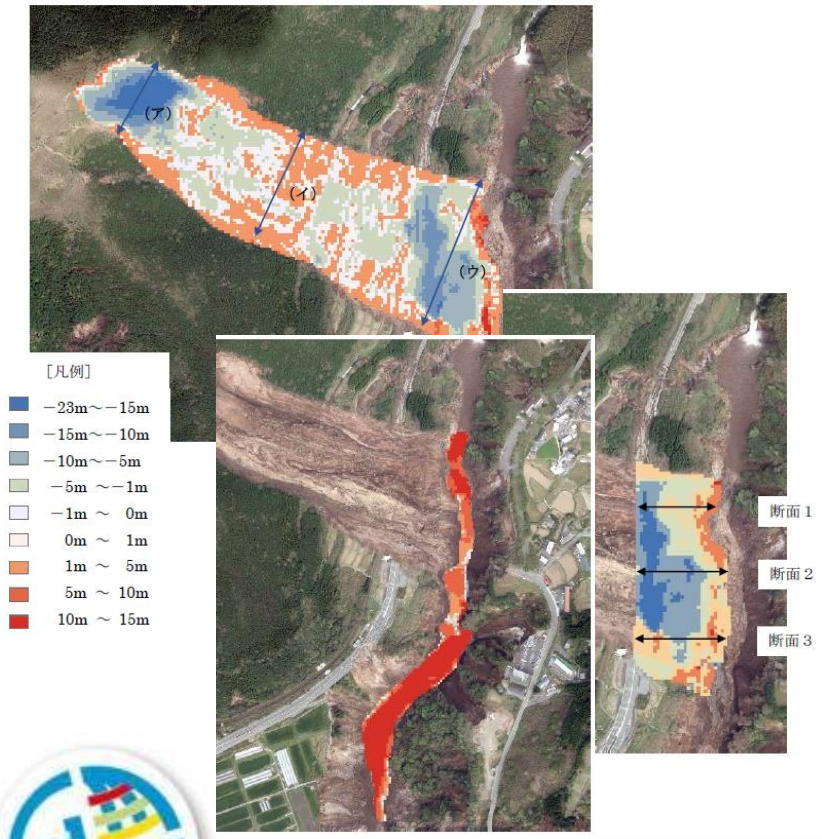
GSI provided line map data and imagery



Ground Self Defense Force compiled a map-series for the staff for rescuing and searching

Info. provision for searching

GSI estimated the volume of debris of a large landslide

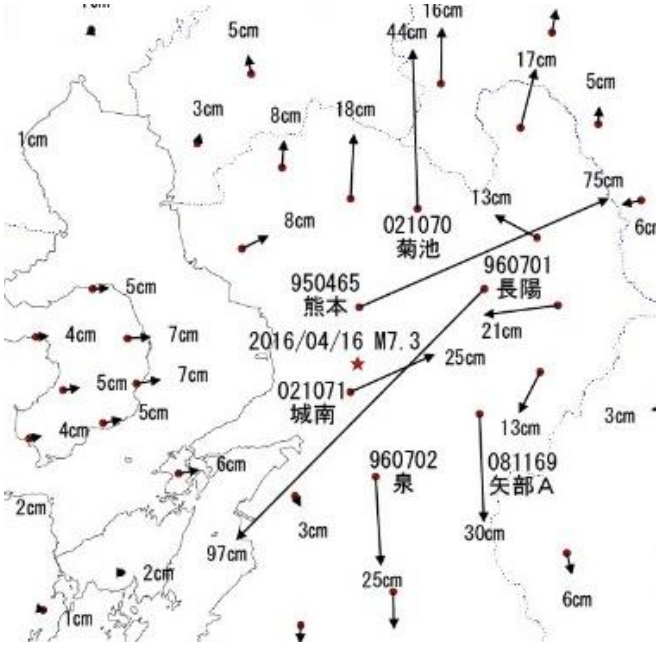


Police used the results for removing debris in search for a missing person

Ref. National Police Agency
https://www.npa.go.jp/hakusyo/h28/honbun/html/st600000.html

Info. provision for analyzing

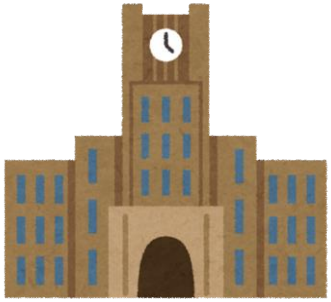
GSI crustal movement results of CORS network



Earthquake Research Committee

Meteorological Agency

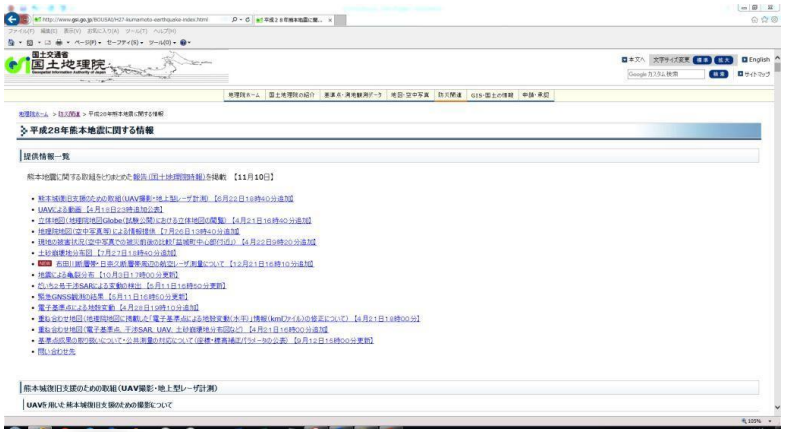
Universities, Research Institutes



Info. provision to mass media

Briefing session

What's new on GSI Website

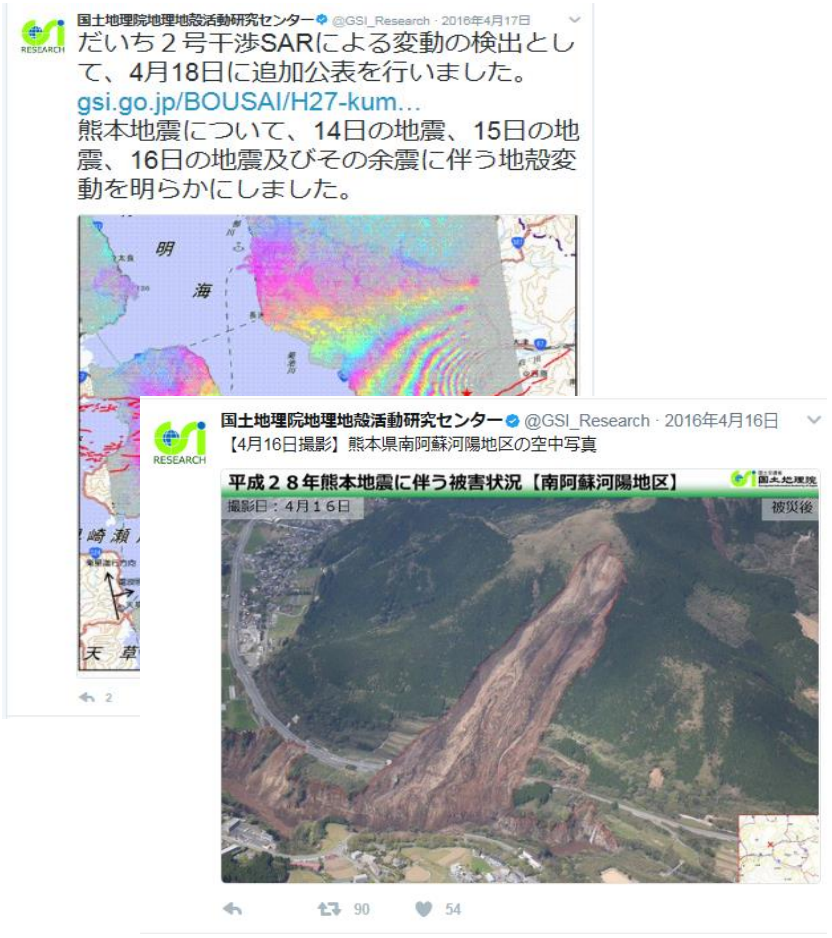


An easy-to-understand explanation is crucial for good media coverage

Using SNS for reaching the general public

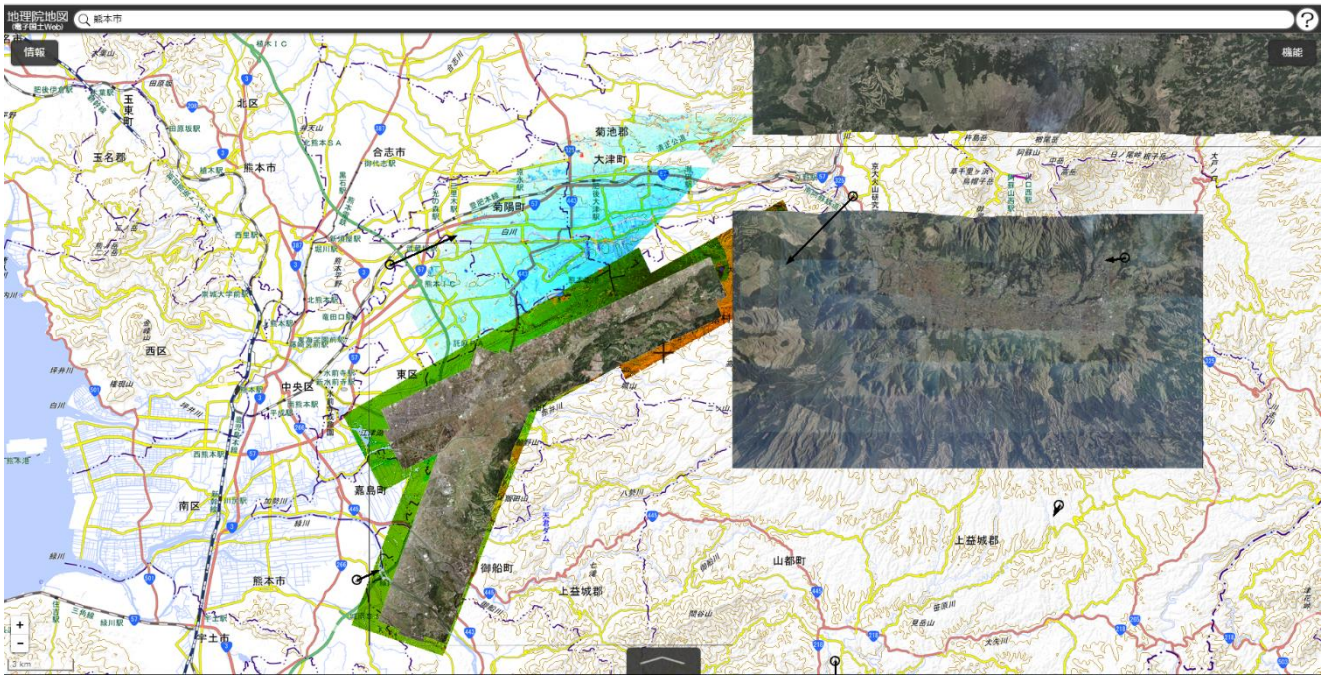
Youtube

Twitter



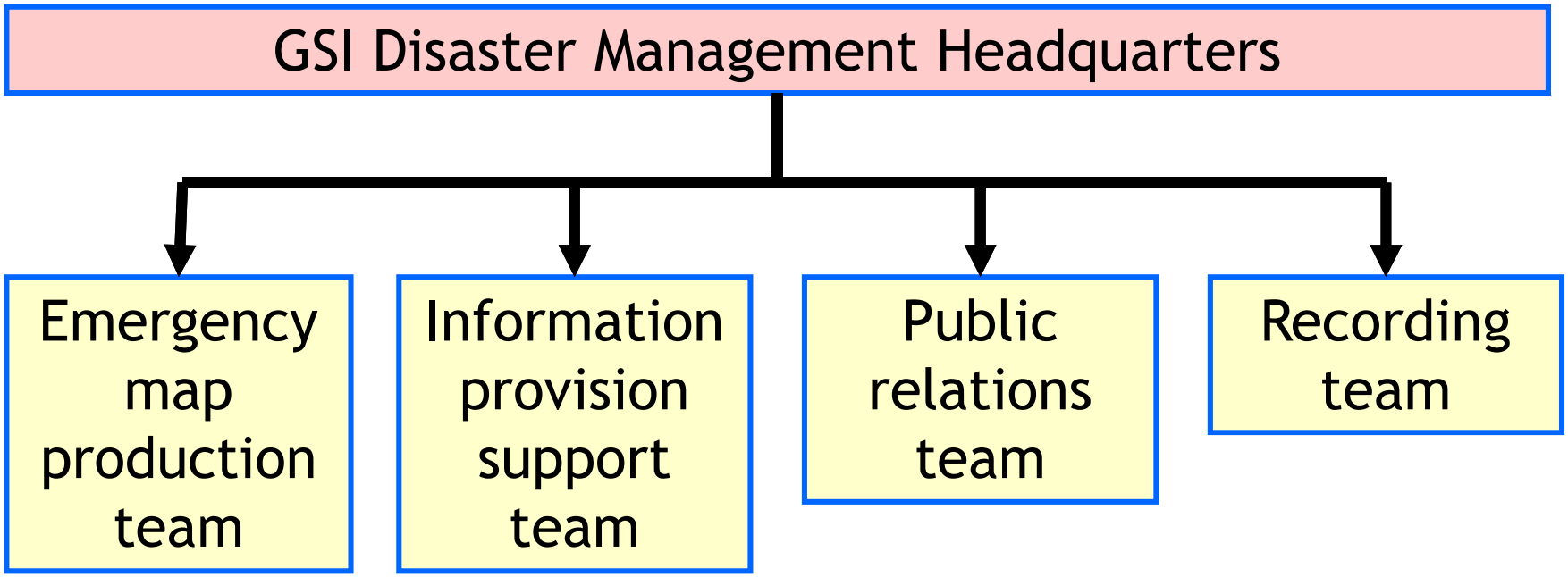
All are on “GSI Maps” for all

- The webmap platform can present all kinds of geospatial information, in a multi-layer manner
- The platform can be browsed from professionals to the local people in the stricken areas



Functional teams for info. provision

- GSI DMHQ sets up specific functional teams in case of a large disaster for info. provision and outreach
- The teams conducts cross-cutting tasks



How GSI responded to emerged geospatial needs in changing situations in Kumamoto

Two episodes

Two rainfalls and numerous aftershocks

Ref. Japan Weather Association, tenki.jp (http://tenki.jp)

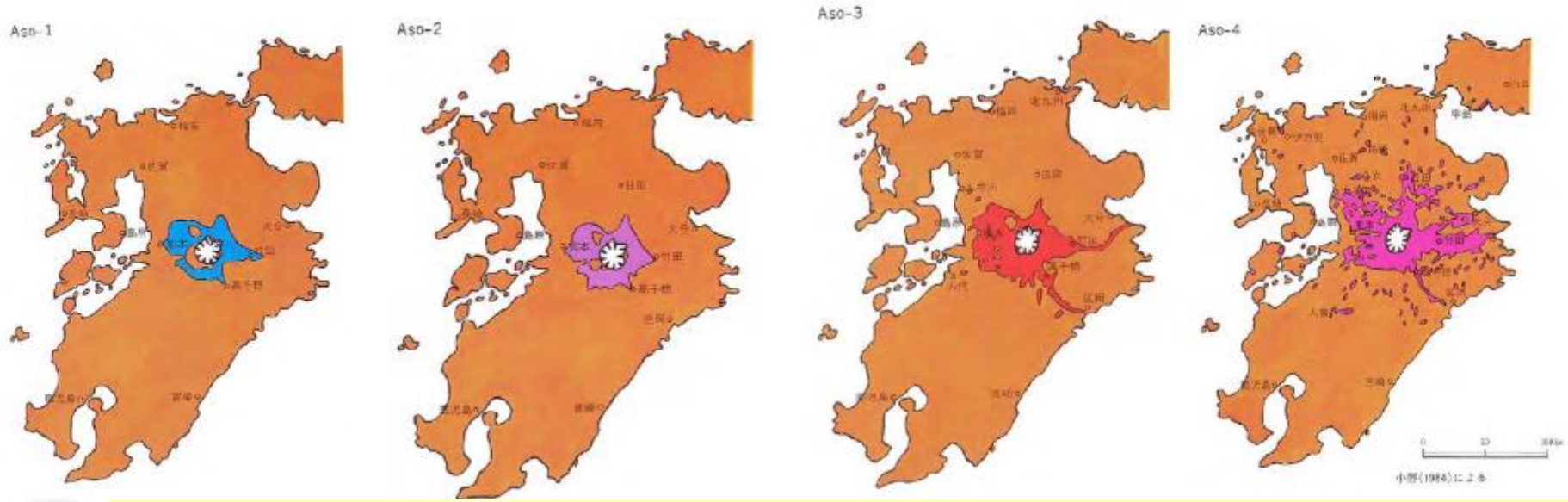
- Two rainfalls after the Mainshock
  - 20mm on 17 April
  - 75mm on 21 April
- In addition, many aftershocks occurred in Kumamoto area

Concerns about further landslides

- Kumamoto area is broadly covered by less-solidified volcanic deposits (ash falls and pyroclastic flows)

Aso volcano pyroclastic flows

Aso-1	Aso-2	Aso-3	Aso-4
270,000 yrs ago	140,000 yrs ago	120,000 yrs ago	90,000 yrs.ago

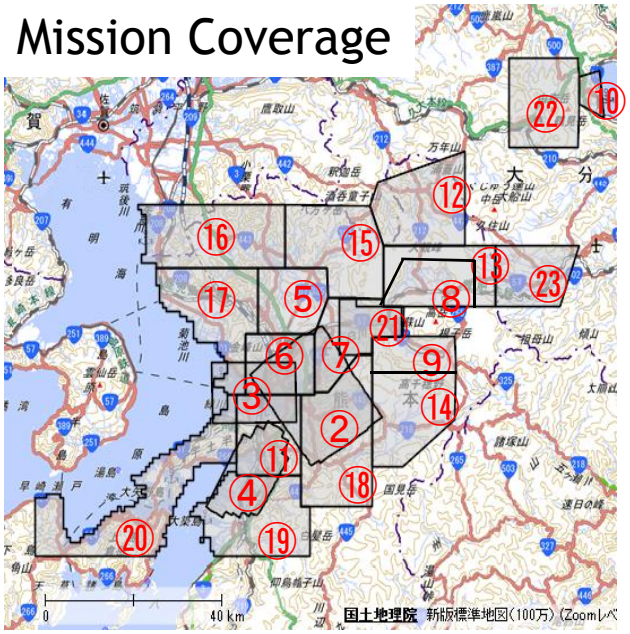


Rainfall and aftershocks may cause further landslides

Third aerial photo mission

- Expanded mission coverage for detect landslides.
- Both GSI and private companies participated in the mission.
- No large landslides was observed.
- Photos were used for fast disaster victim certificate issuance

Mission Coverage



Ref. Mashiki town hall

Special Booth for disaster victim certificate issuance at local government office

Situation of evacuating citizens

180,000 peoples stayed in shelters at peak period

Ref. Mashiki town hall

Some people had to stay outside overnight or in their cars

- **Insufficient goods and harsh environment made people's condition worse**
- **ODMHQ staff could not grasp the location of shelters, unable to supply goods adequately**

Shelter distribution mapping

- ODMHQ Chief asked GSI to prepare shelter maps on 18 April
- GSI provided first shelter map on 20 April.
- The map greatly helped ODMHQ accessibility to shelters for sufficient support

Legend	
Evacuation Center	>100 people
Evacuation Center	1-99 people
Evacuation Center	no people
Evacuation Center	no info
Evacuation Center	Closed,etc

Emergency disaster response activities were mostly conducted within two weeks after the Mainshock.

The time supposed is 12:00pm, 30 April 2016 (Saturday)

-Response phase is about to change-