

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



UN-GGIM-AP

Regional Committee of United Nations
Global Geospatial Information Management
for Asia and the Pacific

3-1

www.un-ggim-ap.org/

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

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



UN-GGIM-AP

Regional Committee of United Nations
Global Geospatial Information Management
for Asia and the Pacific

3-2

www.un-ggim-ap.org/

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



UN-GGIM-AP

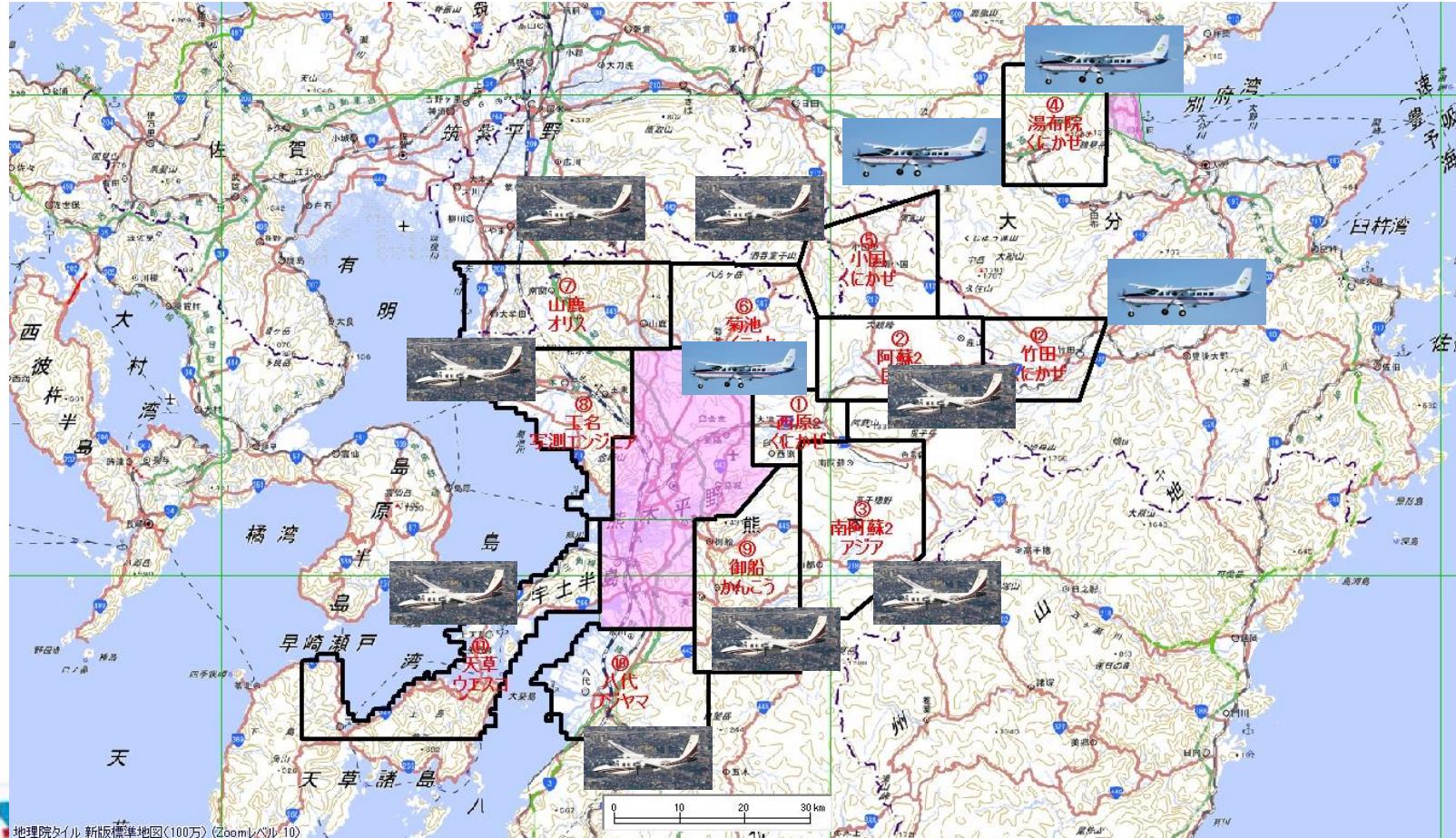
Regional Committee of United Nations
Global Geospatial Information Management
for Asia and the Pacific

3-3

www.un-ggim-ap.org/

Second aerial photo mission

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



UN-GGIM-AP

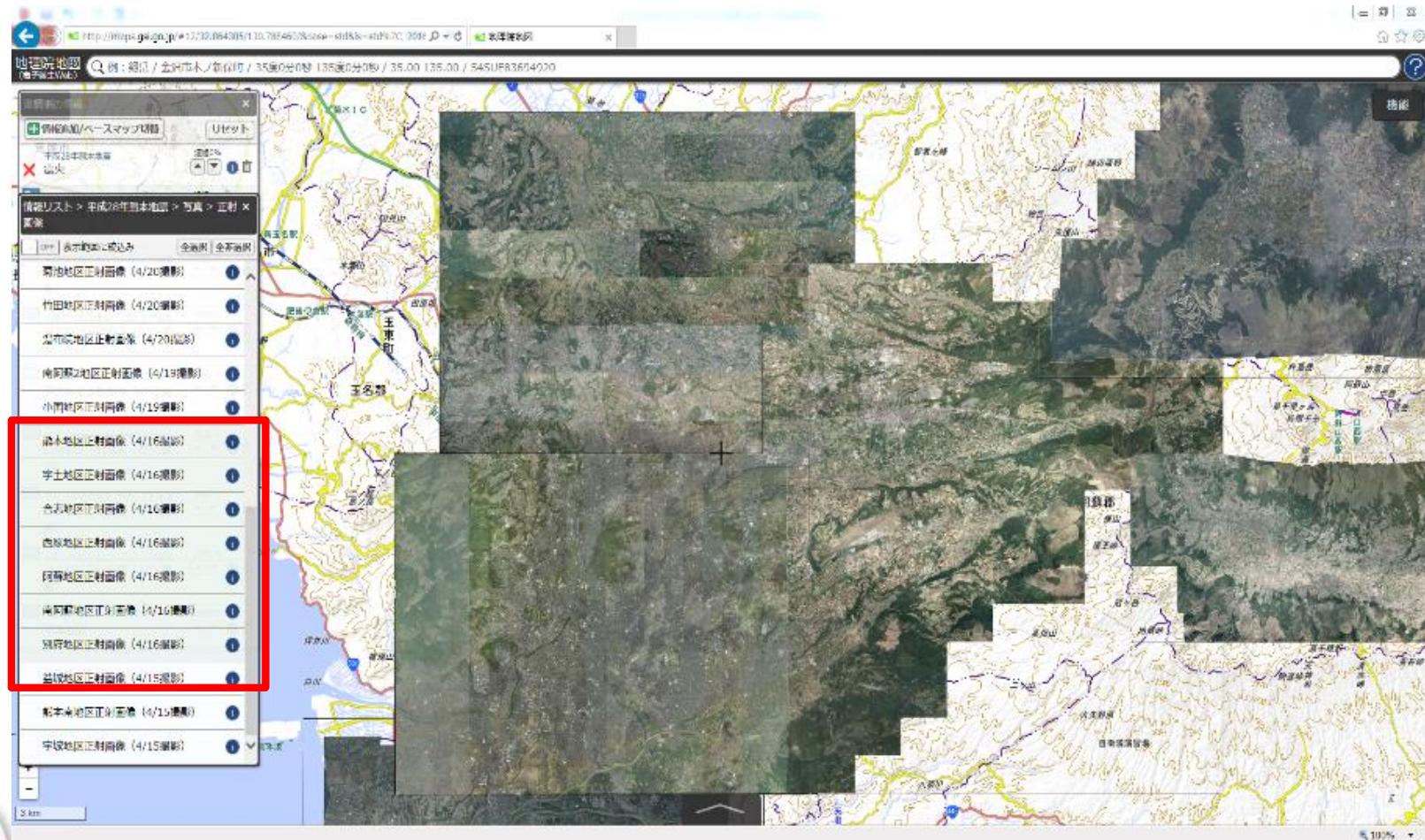
Regional Committee of United Nations
Global Geospatial Information Management
for Asia and the Pacific

3-4

www.un-ggim-ap.org/

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

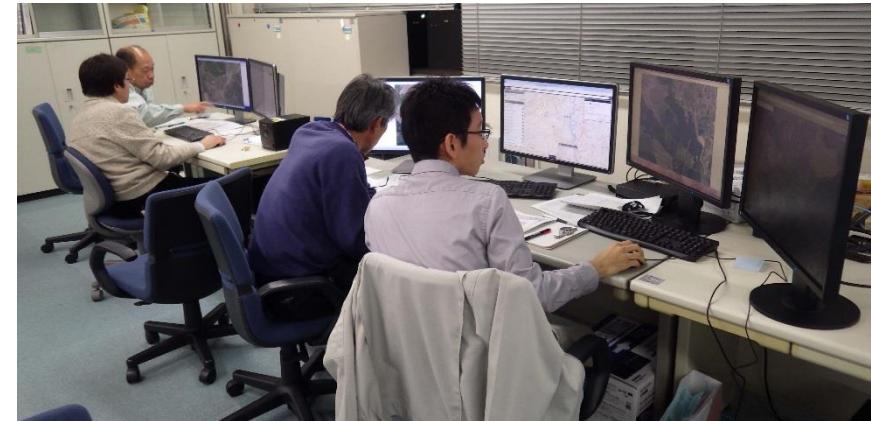


Photo-interpretation works
at GSI Headquarters office

Start interpretation:

11:10pm 16 April

Draft map:

03:00pm 17 April

1st version release:

12:00pm 18 April



UN-GGIM-AP

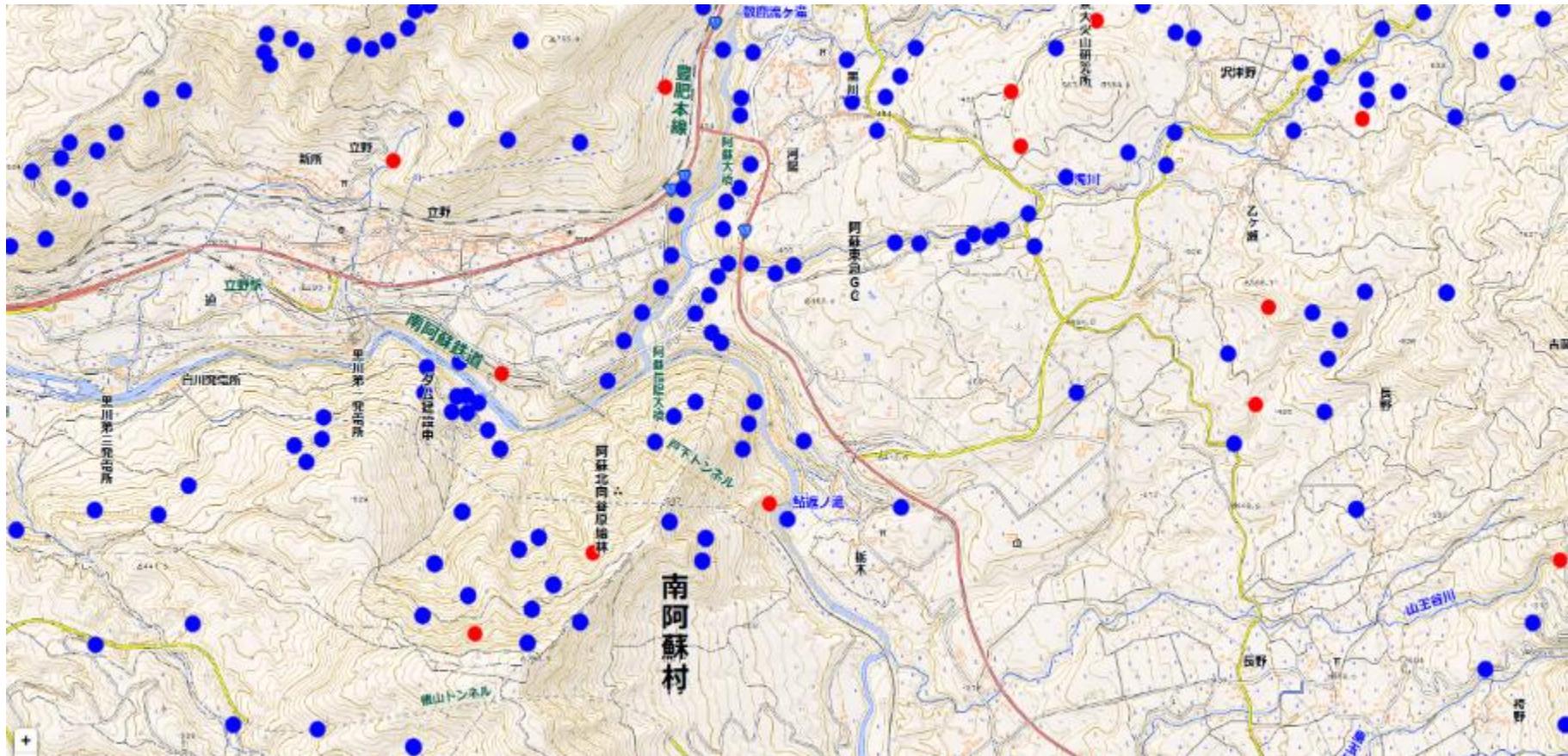
Regional Committee of United Nations
Global Geospatial Information Management
for Asia and the Pacific

3-6

www.un-ggim-ap.org/

Landslide distribution map

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



● Small landslide
● Large landslide



UN-GGIM-AP

Regional Committee of United Nations
Global Geospatial Information Management
for Asia and the Pacific

3-7

www.un-ggim-ap.org/

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



UN-GGIM-AP

Regional Committee of United Nations
Global Geospatial Information Management
for Asia and the Pacific

3-8

www.un-ggim-ap.org/

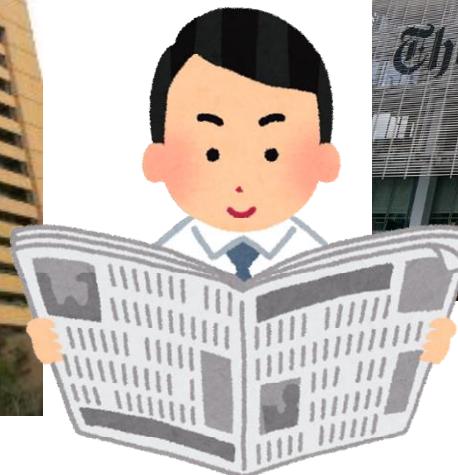
UAV images media coverage

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

The Asahi Shimbun



The New York Times



UN-GGIM-AP

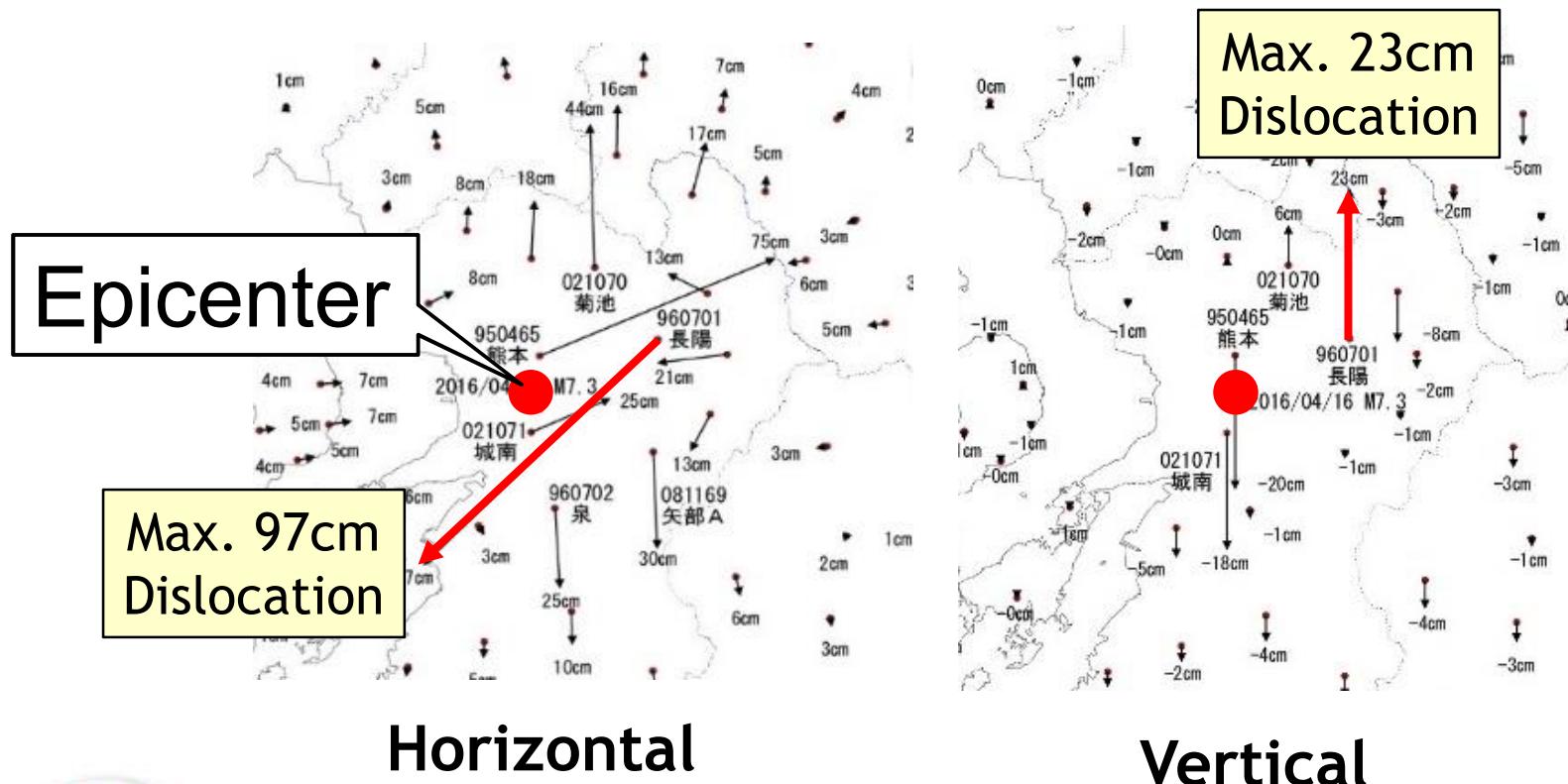
Regional Committee of United Nations
Global Geospatial Information Management
for Asia and the Pacific

3-9

www.un-ggim-ap.org/

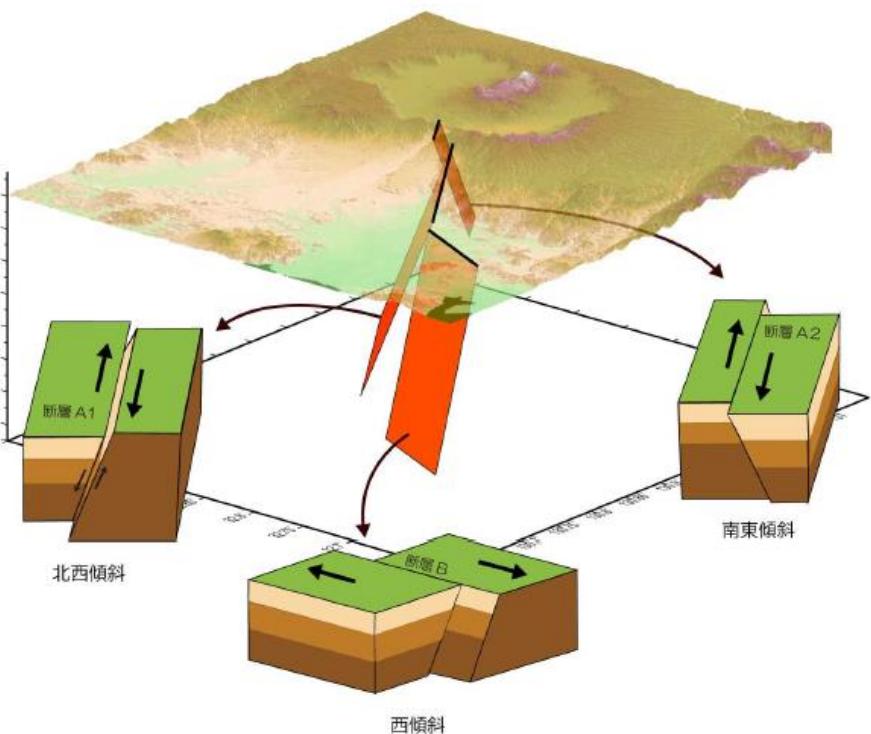
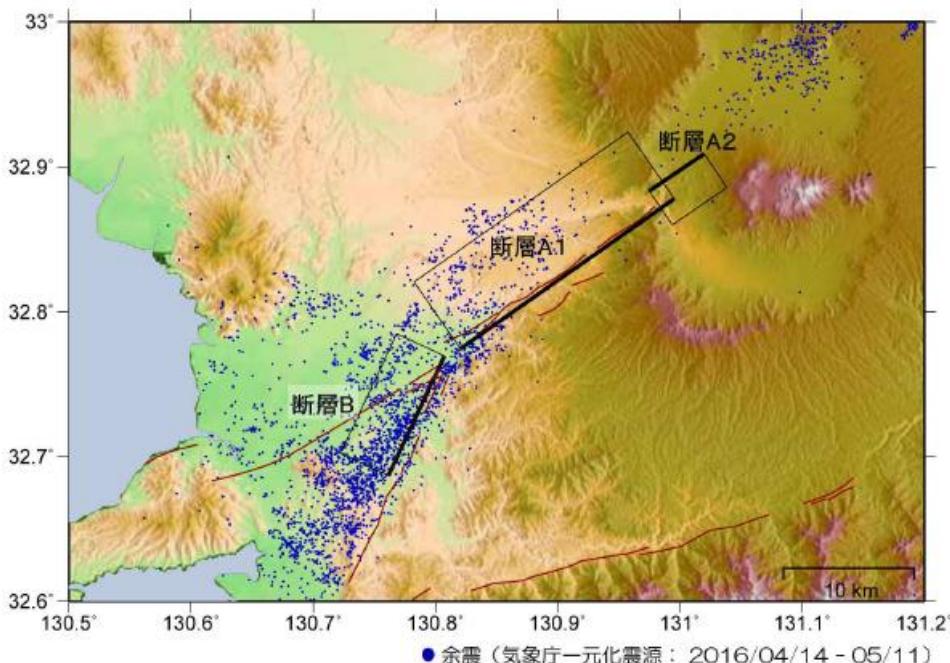
Crustal movements of the mainshock

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

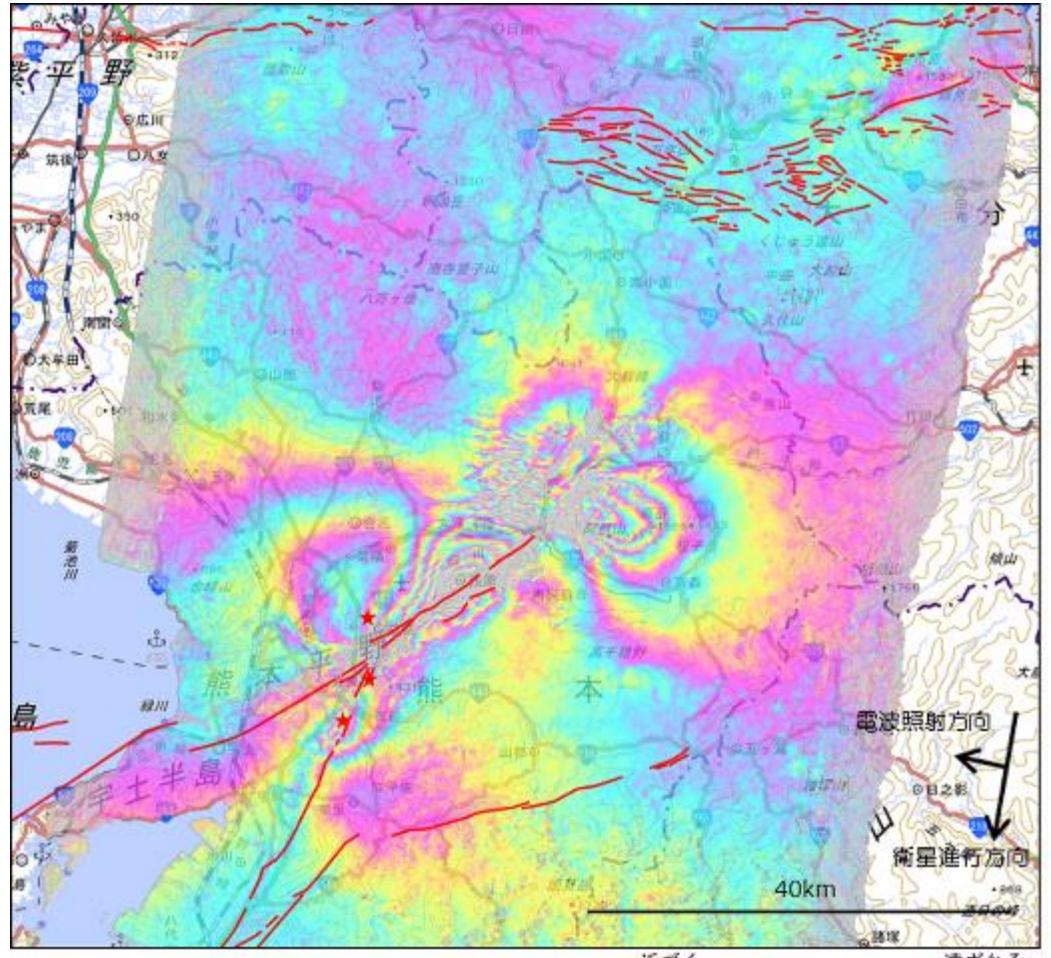


Fault modeling using CORS data

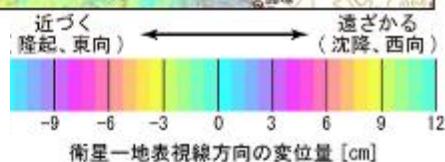
- Three fault slips, totally extending 30 km, were assumed to be compatible with the CORS movement data.



SAR interferometric analysis



★ Epicenters of Earthquakes
— Active Faults



- 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



UN-GGIM-AP

Regional Committee of United Nations
Global Geospatial Information Management
for Asia and the Pacific

3-12

www.un-ggim-ap.org/

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?



UN-**GGIM-AP**

Regional Committee of United Nations
Global Geospatial Information Management
for Asia and the Pacific

3-13

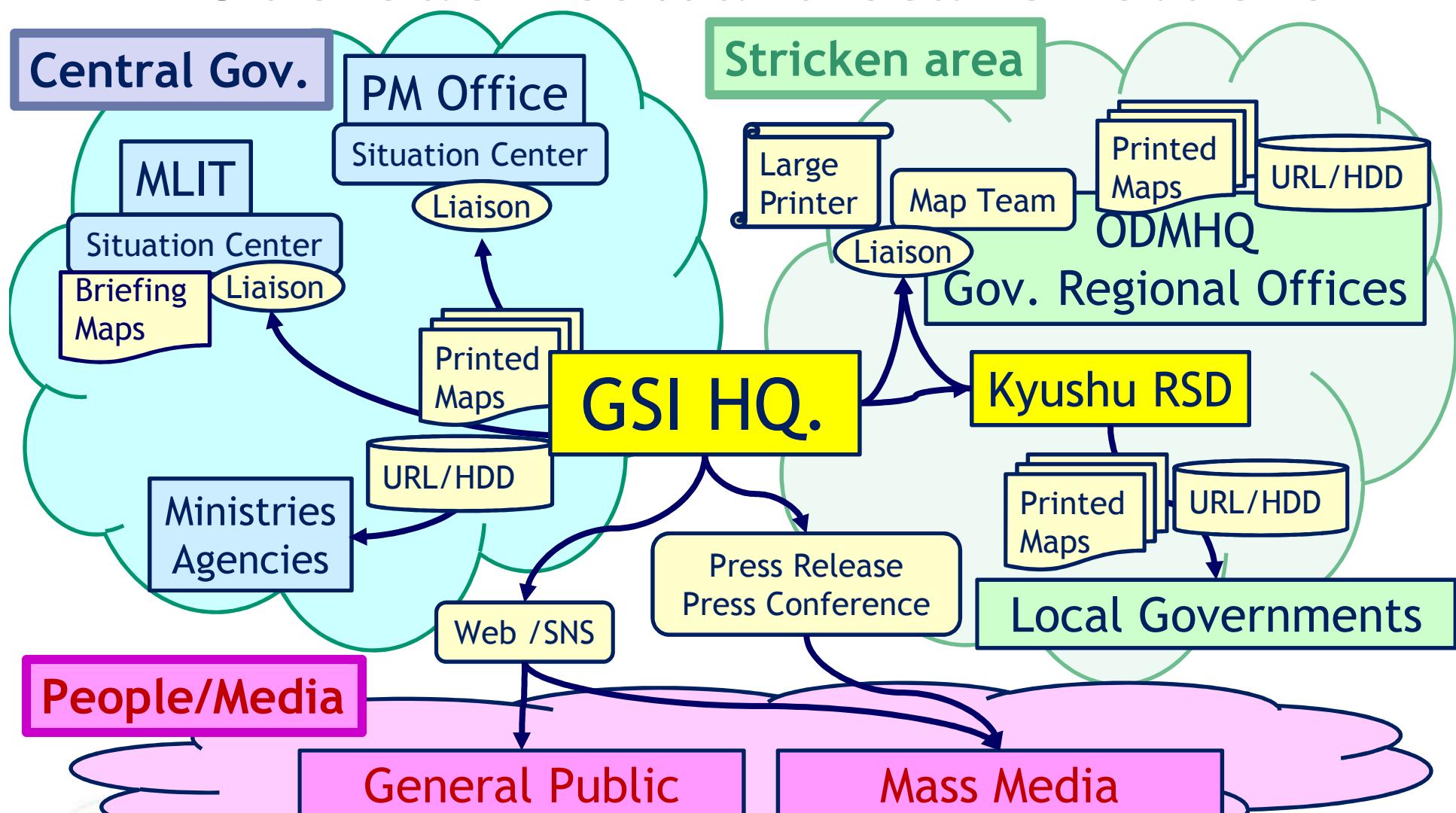
www.un-ggim-ap.org/

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

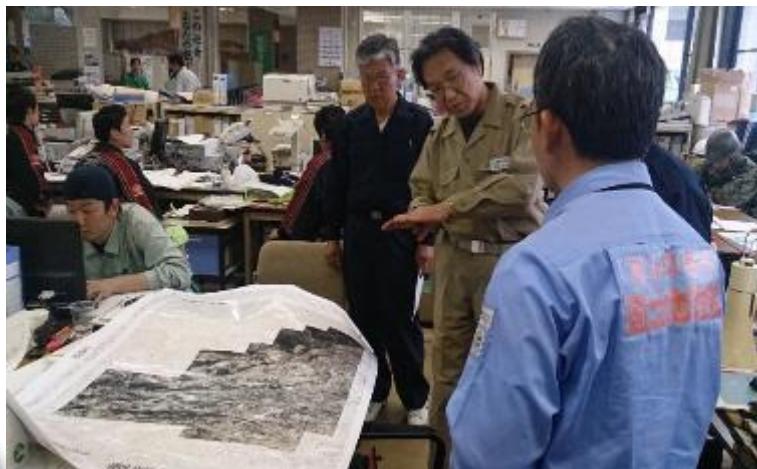


Information provision to ODMHQ

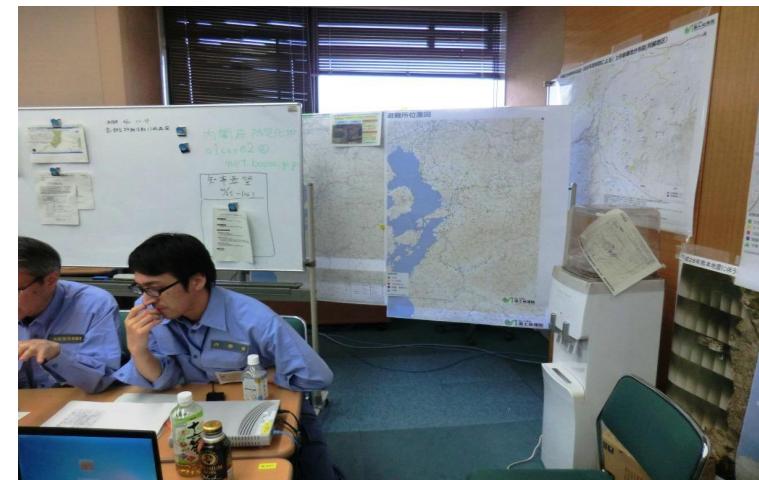


GSI brought a large printer in
ODMHQ for service
→ Unique contribution of NGIA

Map provision to local governments



Reference wall maps at ODMHQ



UN-GGIM-AP

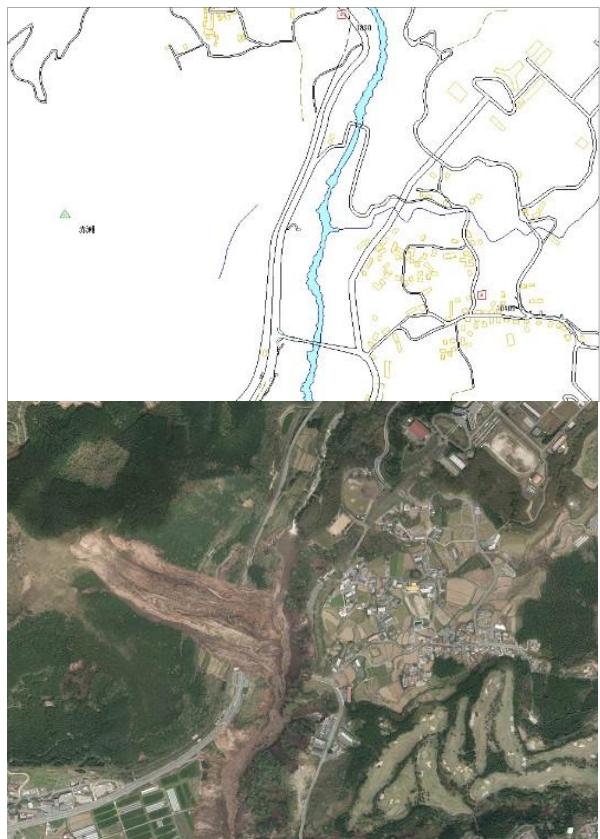
Regional Committee of United Nations
Global Geospatial Information Management
for Asia and the Pacific

3-16

www.un-ggim-ap.org/

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



UN-GGIM-AP

Regional Committee of United Nations
Global Geospatial Information Management
for Asia and the Pacific

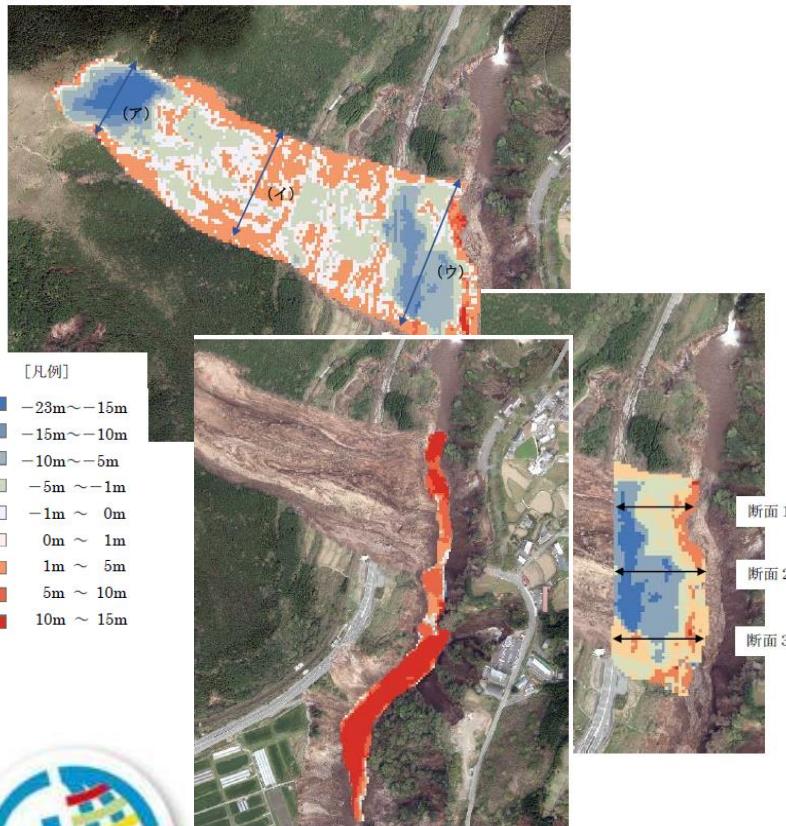
3-17

www.un-ggim-ap.org/

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/st60000.html>



UN-GGIM-AP

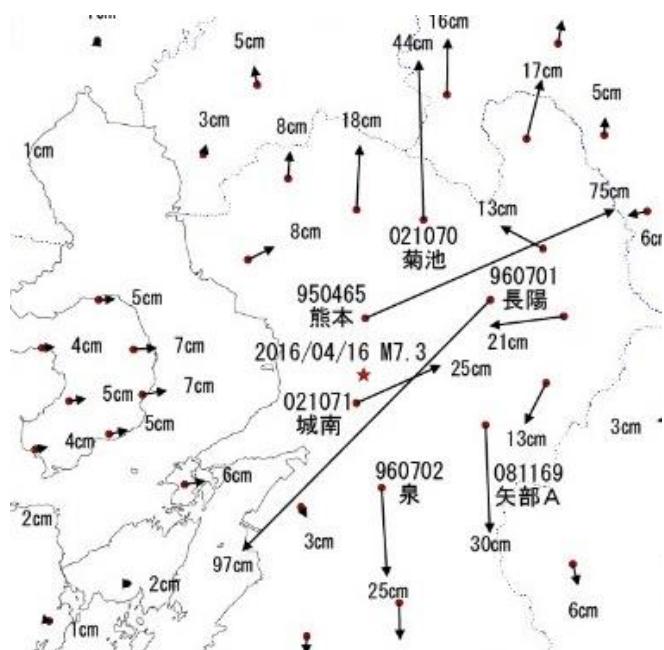
Regional Committee of United Nations
Global Geospatial Information Management
for Asia and the Pacific

3-18

www.un-ggim-ap.org/

Info. provision for analyzing

GSI crustal movement results of CORS network



UN-GGIM-AP

Regional Committee of United Nations
Global Geospatial Information Management
for Asia and the Pacific

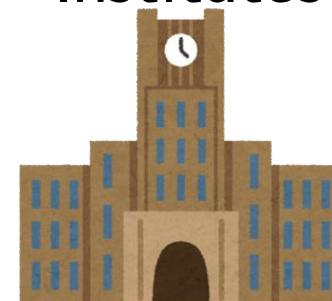
Earthquake Research Committee



Meteorological Agency



Universities, Research Institutes



Info. provision to mass media

Briefing session



What's new on GSI Website

The screenshot shows a news article from the GSI website. The headline reads: '地盤変動に関する取組を始めた報告(国土地理情報局)」(Report on measures taken regarding ground movement (National Land and Geographic Information Institute)). The article details various projects and activities related to ground movement monitoring.

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



UN-GGIM-AP

Regional Committee of United Nations
Global Geospatial Information Management
for Asia and the Pacific

3-20

www.un-ggim-ap.org/

Using SNS for reaching the general public

Youtube



Twitter

国土地理院地理地殻活動研究センター @GSI_Research · 2016年4月17日
だいち2号干渉SARによる変動の検出として、4月18日に追加公表を行いました。
gsi.go.jp/BOUSAI/H27-kum...
熊本地震について、14日の地震、15日の地震、16日の地震及びその余震に伴う地殻変動を明らかにしました。

国土地理院地理地殻活動研究センター @GSI_Research · 2016年4月16日
【4月16日撮影】熊本県南阿蘇河陽地区の空中写真
平成28年熊本地震に伴う被害状況【南阿蘇河陽地区】
撮影日：4月16日



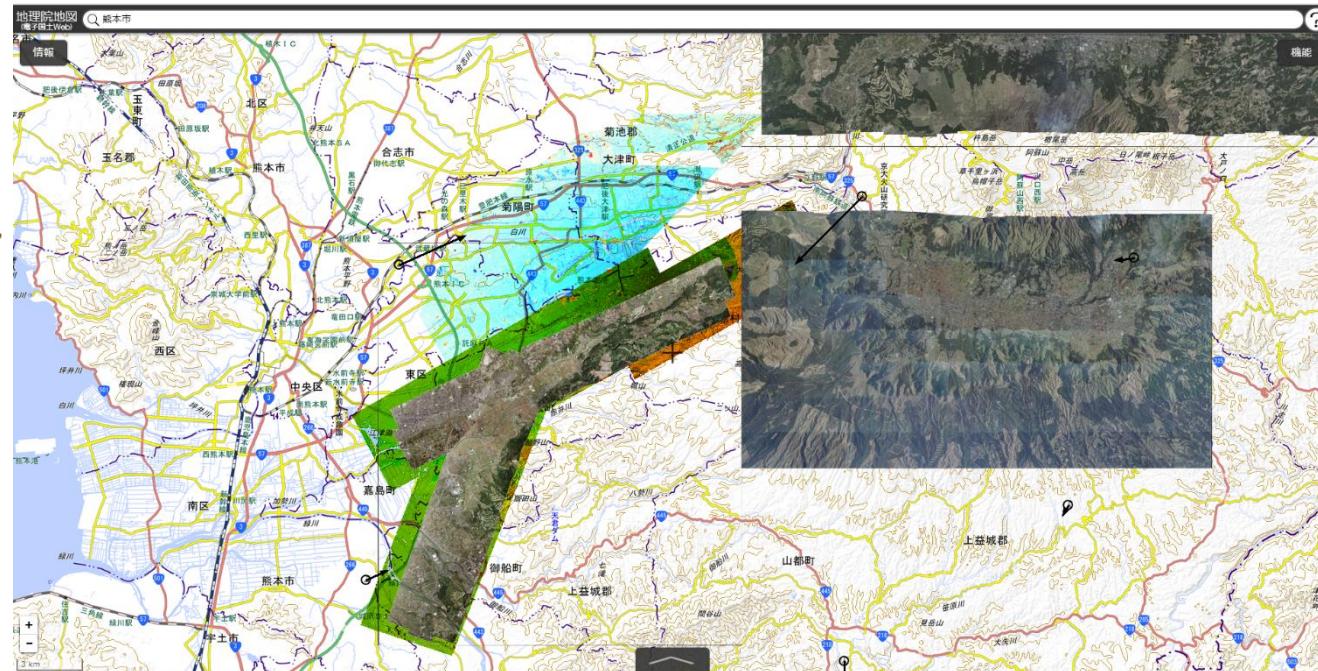
UN-GGIM-AP

Regional Committee of United Nations
Global Geospatial Information Management
for Asia and the Pacific

3-21
www.un-ggim-ap.org/

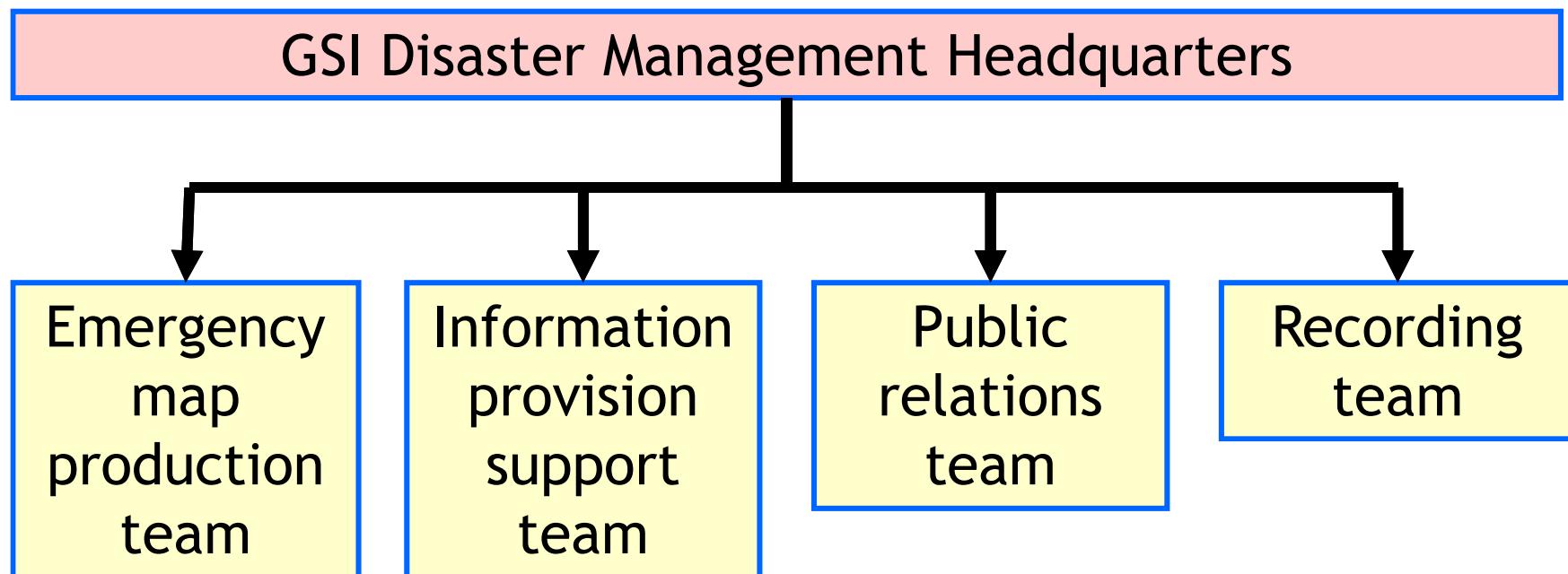
All are on “GSI Maps” for all

- 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



UN-GGIM-AP

Regional Committee of United Nations
Global Geospatial Information Management
for Asia and the Pacific

3-24

www.un-ggim-ap.org/

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



UN-GGIM-AP

Regional Committee of United Nations
Global Geospatial Information Management
for Asia and the Pacific

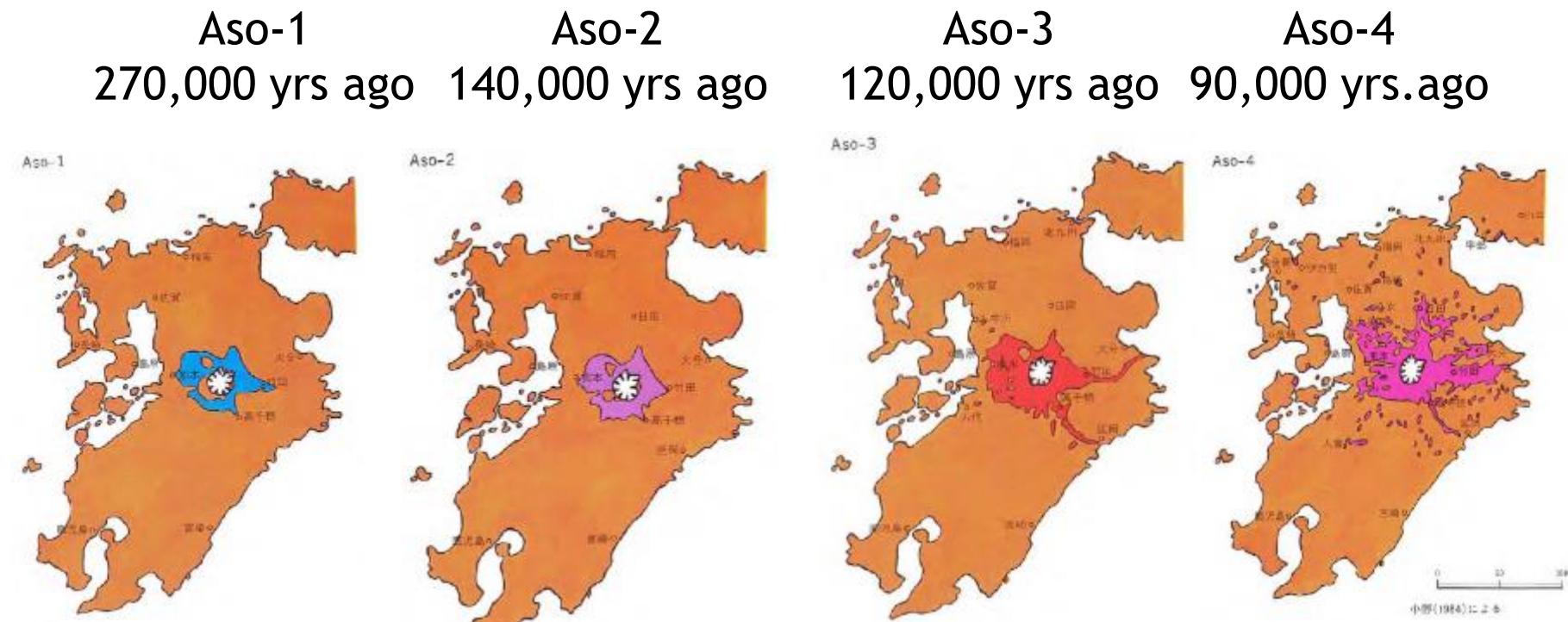
3-25

www.un-ggim-ap.org/

Concerns about further landslides

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

Aso volcano pyroclastic flows

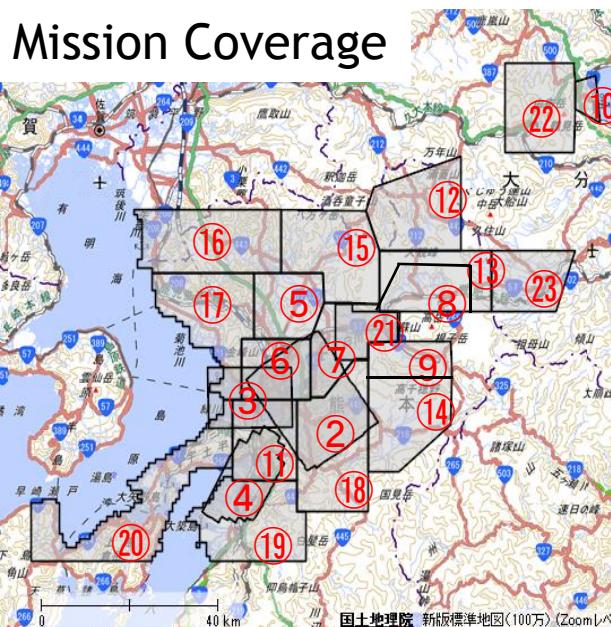


Rainfall and aftershocks may cause further landslides



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



Special Booth for
disaster victim
certificate issuance at
local government office



UN-GGIM-AP

Regional Committee of United Nations
Global Geospatial Information Management
for Asia and the Pacific

3-27

www.un-ggim-ap.org/

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-



UN-GGIM-AP

Regional Committee of United Nations
Global Geospatial Information Management
for Asia and the Pacific

3-30
www.un-ggim-ap.org/