Heavy Rain and Landslide Disaster of July 2018 in Western Japan

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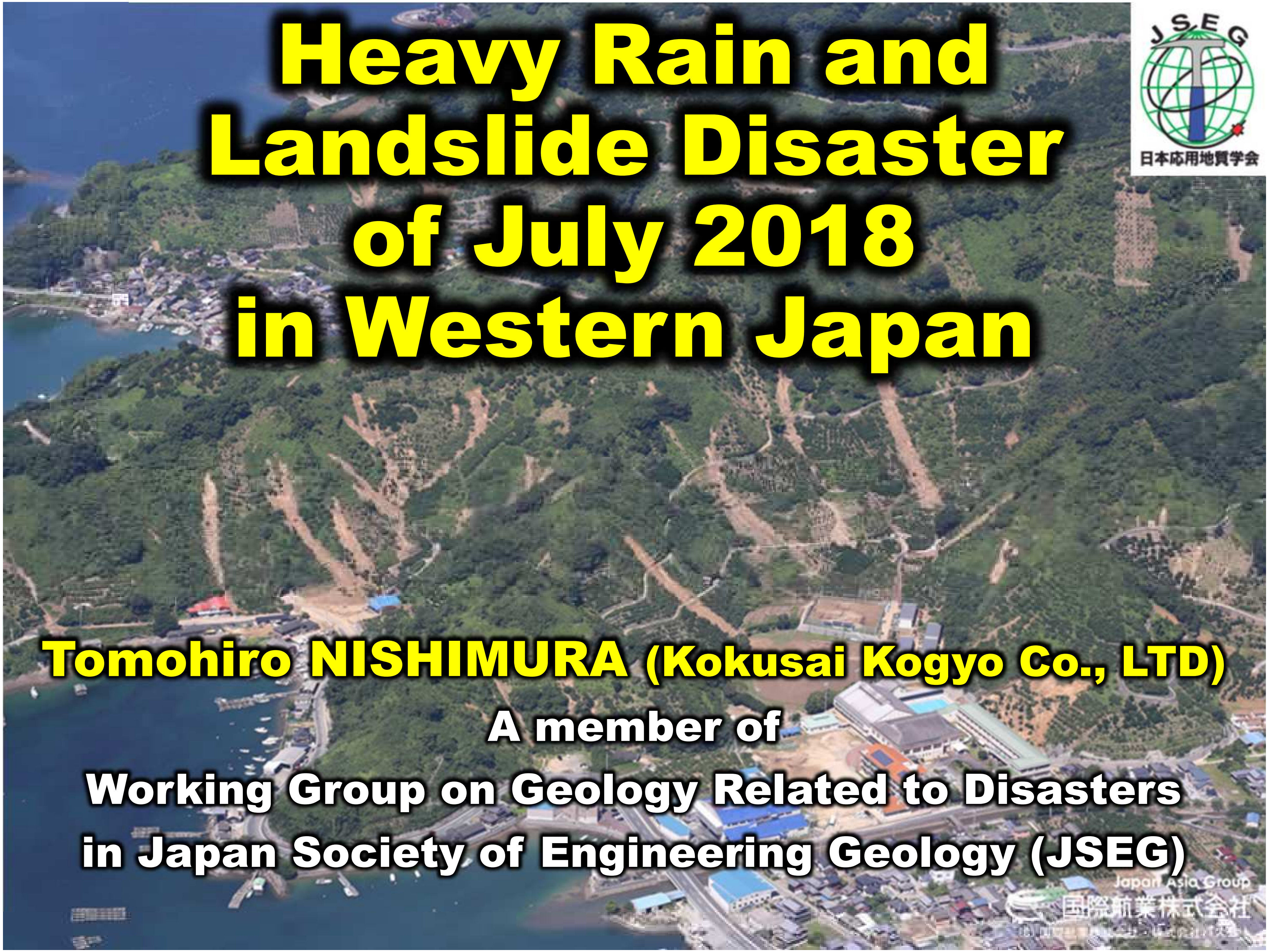
A member of

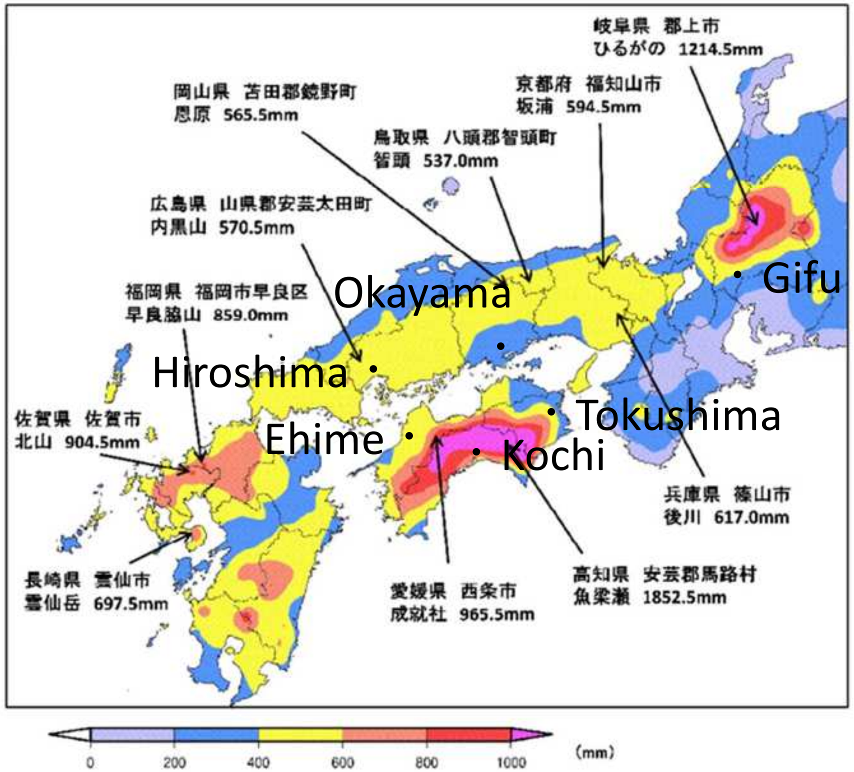
Working Group on Geology Related to Disasters in Japan Society of Engineering Geology (JSEG)



Today's topics

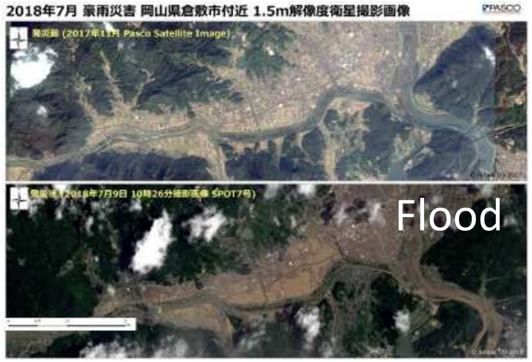
1. Overview of Heavy Rains of July 2018
2. About the Disaster Research Team of JSEG
3. Our Base Technology
4. Debris flow disasters in Hiroshima Prefecture
5. Flooding in Okayama Prefecture
6. Landslide disasters in Ehime prefecture
7. Return of our Survey Results to Society
8. Efforts to Standardize Research Methods at JSEG

1. Overview of Heavy Rain of July 2018 in Western Japan

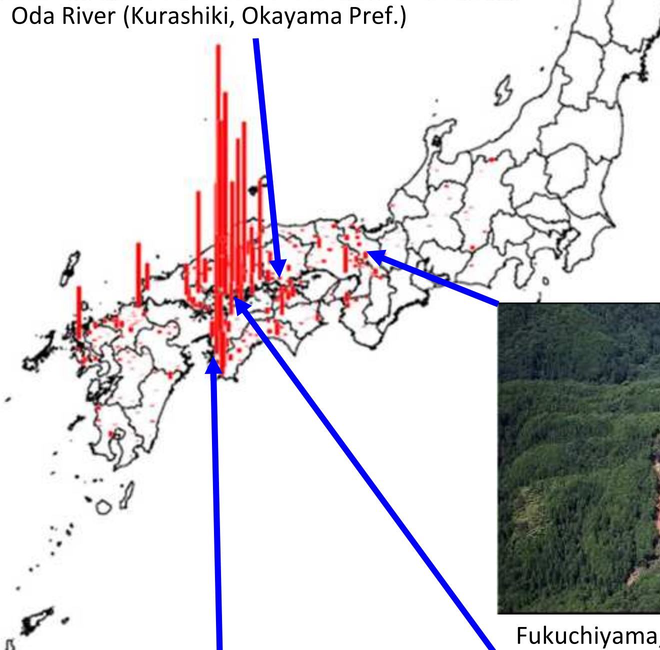


Period precipitation distribution map
(from 0:00, 28/Jun to 24:00, 8/Jul : JMA)

- Total rainfall exceeded 500 mm over a wide area in western Japan
- Especially in Gifu, Kochi and Tokushima prefectures, the total rainfall exceeded 1000mm
- In Okayama, Hiroshima and Ehime prefectures where the damage was concentrated, the total rainfall was 400-600 mm



Oda River (Kurashiki, Okayama Pref.)



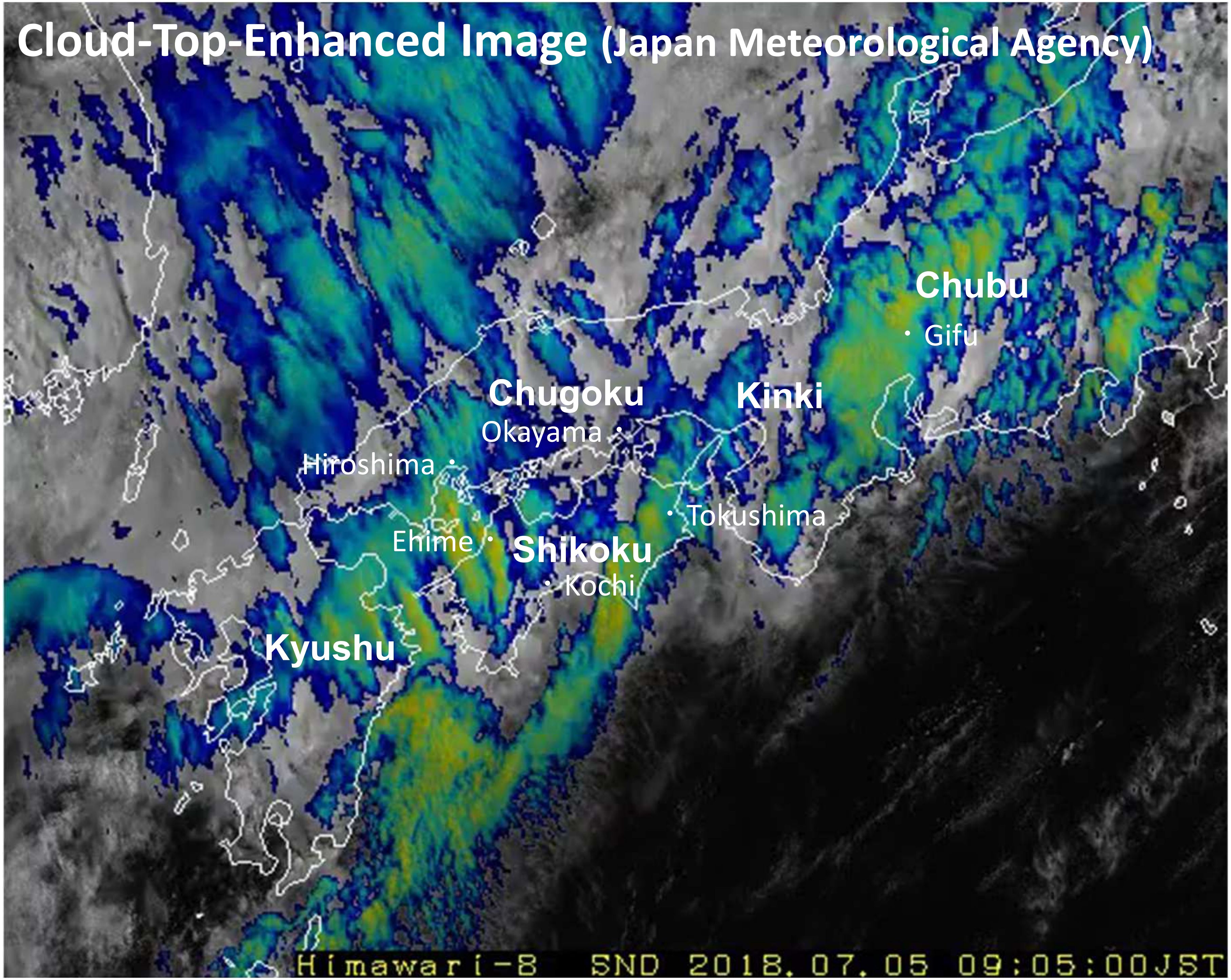
Flooding
315 River
Sediment disaster
2,581 cases
Dead or missing
245 persons

Fukuchiyama, Kyoto Pref.

Uwajima, Ehime Pref.

Kure, Hiroshima Pref.

Distribution map of sediment disasters by municipality


Cloud-Top-Enhanced Image (Japan Meteorological Agency)
Chubu
Gifu
Chugoku
Kinki
Okayama
Hiroshima
Tokushima
Ehime
Shikoku
Kochi
Kyushu
Himawari-8 SND 2018.07.05 09:05:00JST

2. About the Disaster Research Team of JSEG

日本応用地質学会

Japan Society of Engineering Geology (JSEG)

Disaster Research Team

Team Leader

Prof. Shigeyuki SUZUKI (Okayama Univ.)

Deputy Team leader

Dr. Hideki INAGAKI (Kankyo Chishitsu Co., LTD.)

Secretary-General

Mr. Tomohiro NISHIMURA (Kokusai Kogyo Co., LTD.)

Team Member

73 experts

(Mainly consists of University Researchers and Geological Survey / Spatial InformationConsultants)

Conducted surveys in many fields

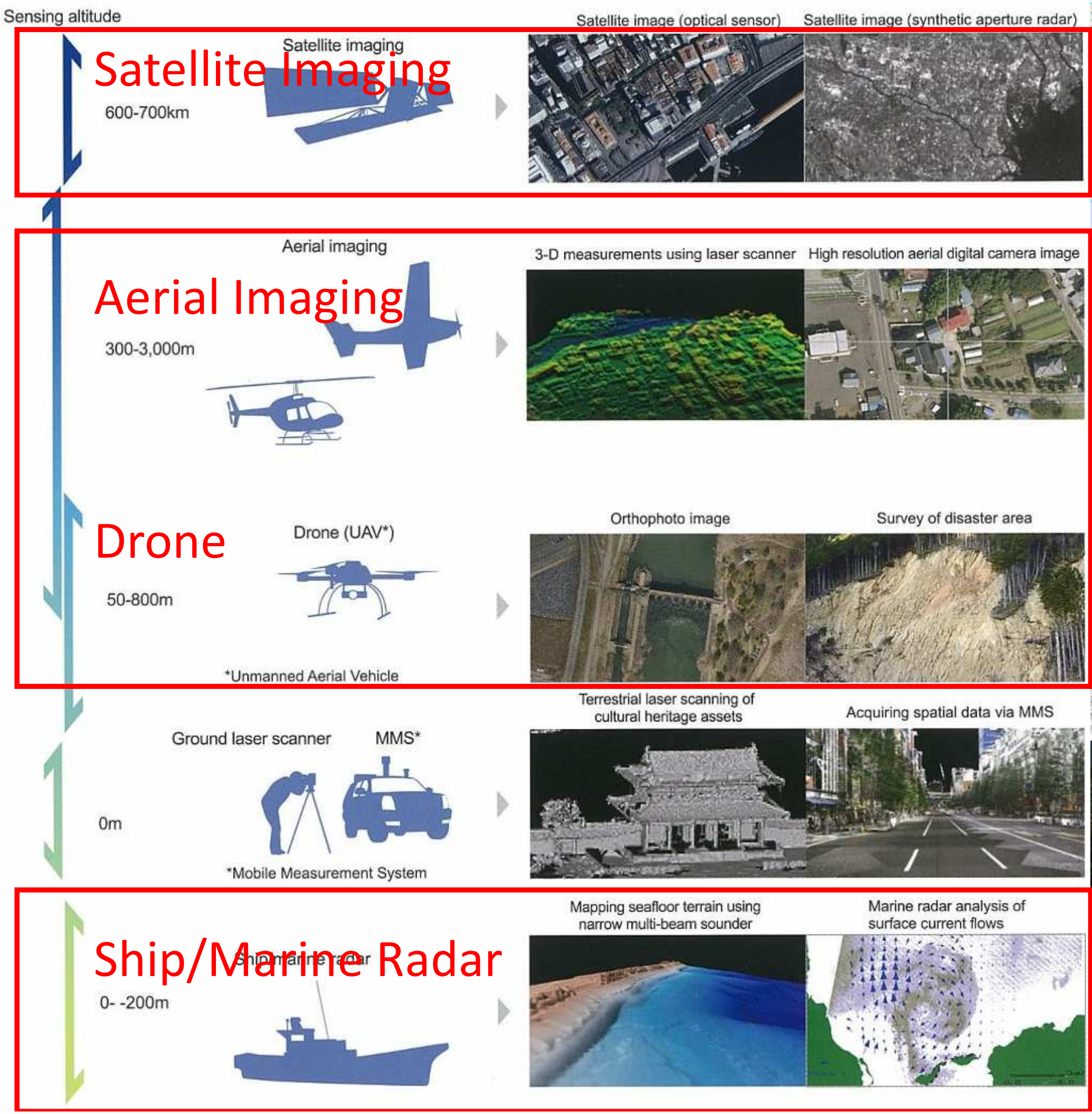
> Detailed records of disaster
> Cause of disaster
> Recovery after disaster
> Damage situation of countermeasures
> Evacuation behavior

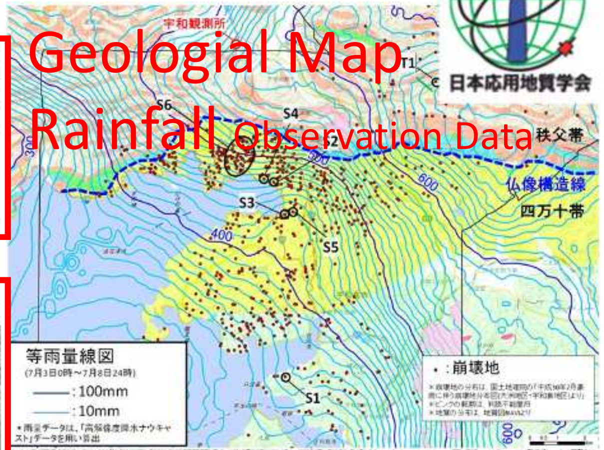
29 survey results in one report

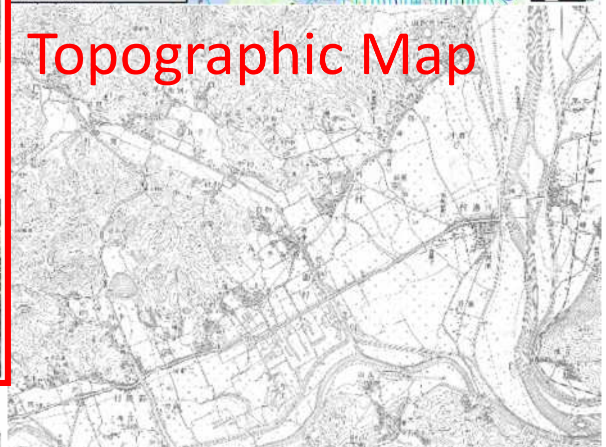
Report of the Research Mission on the Heavy Rain Disasters of July 2018

29 survey results in a report

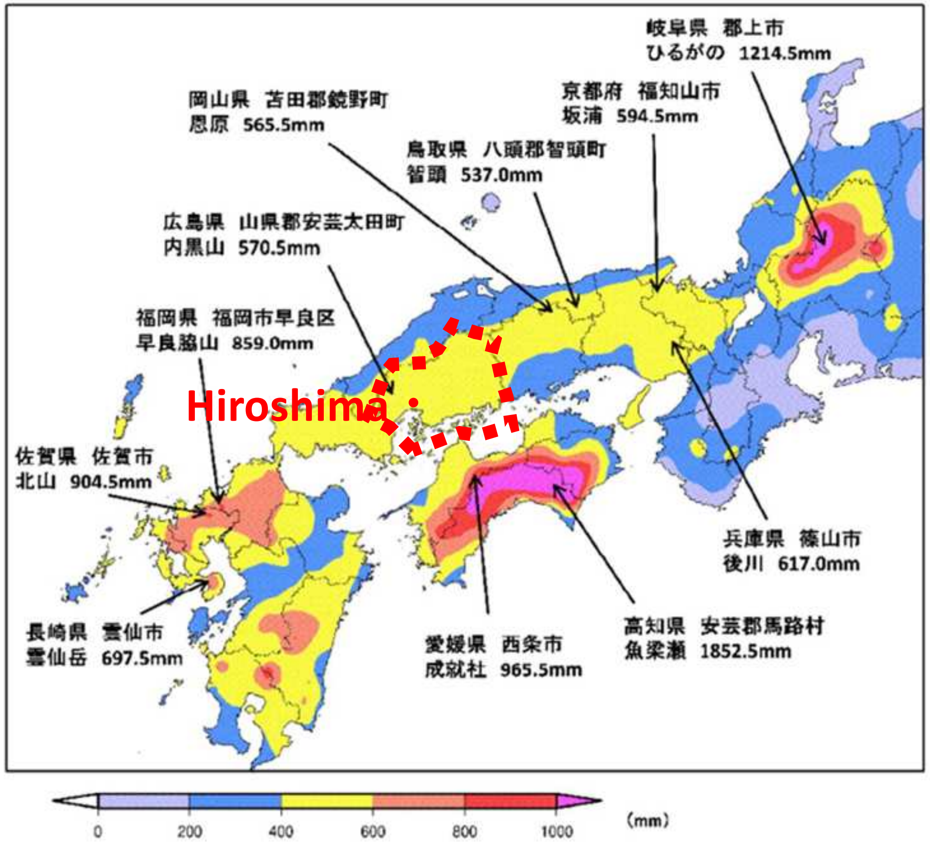
3. Our Base Technology : Geospatial Information + Field Work



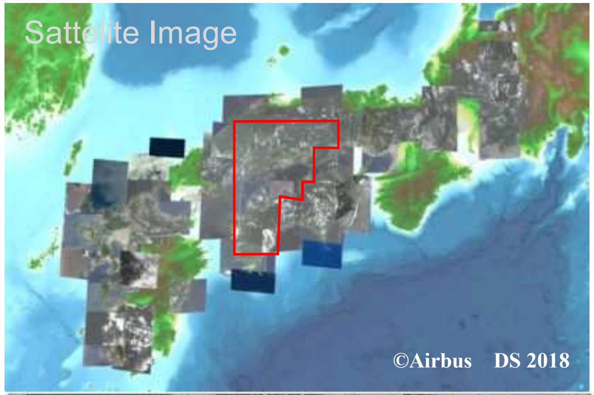


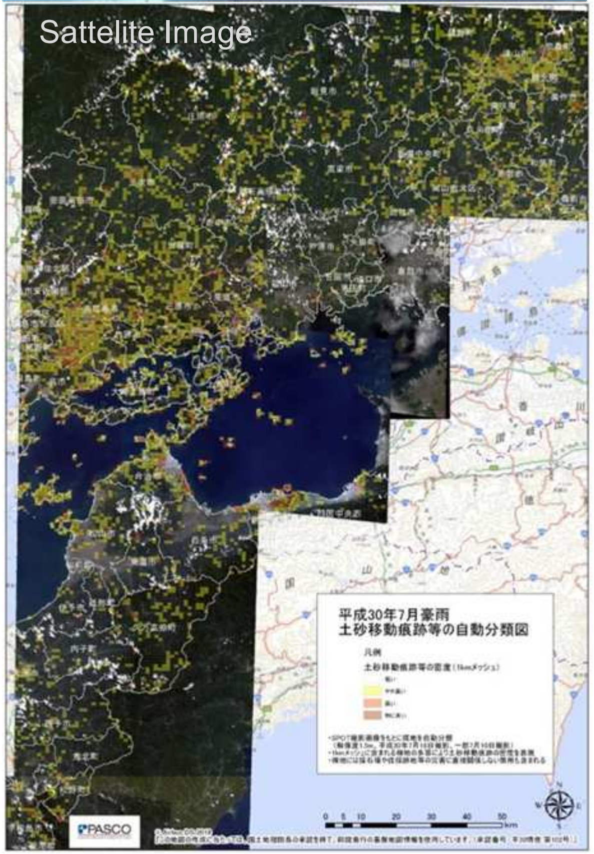


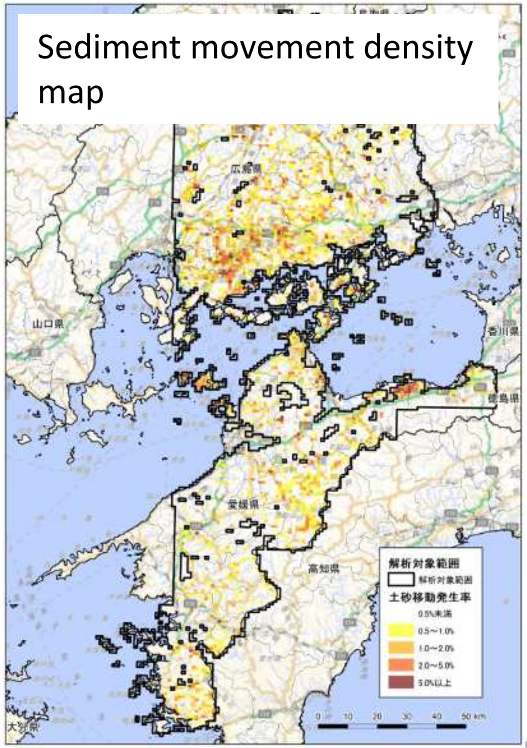
4. Debris flow disasters in Hiroshima Pref.

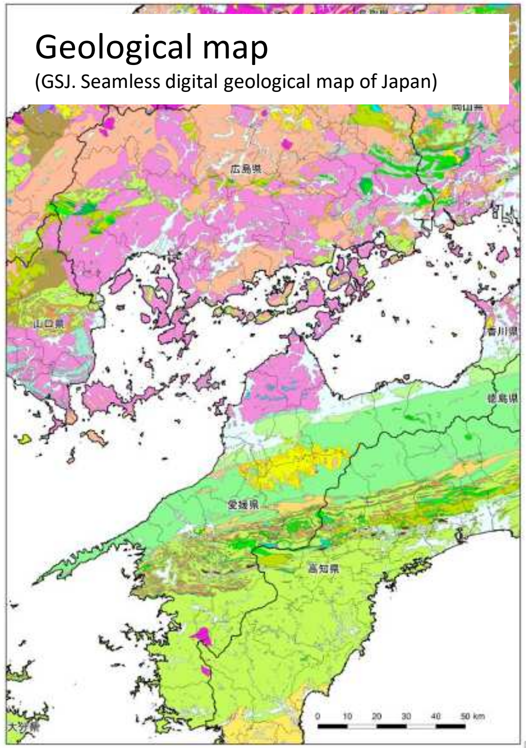


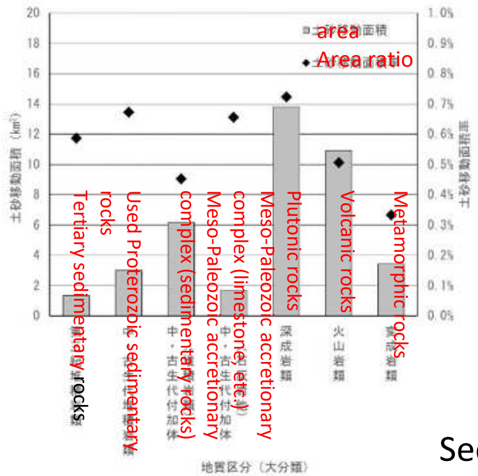
Estimation of Wide Area Distribution of Sediment Disasiter Using Optical Satellite Images









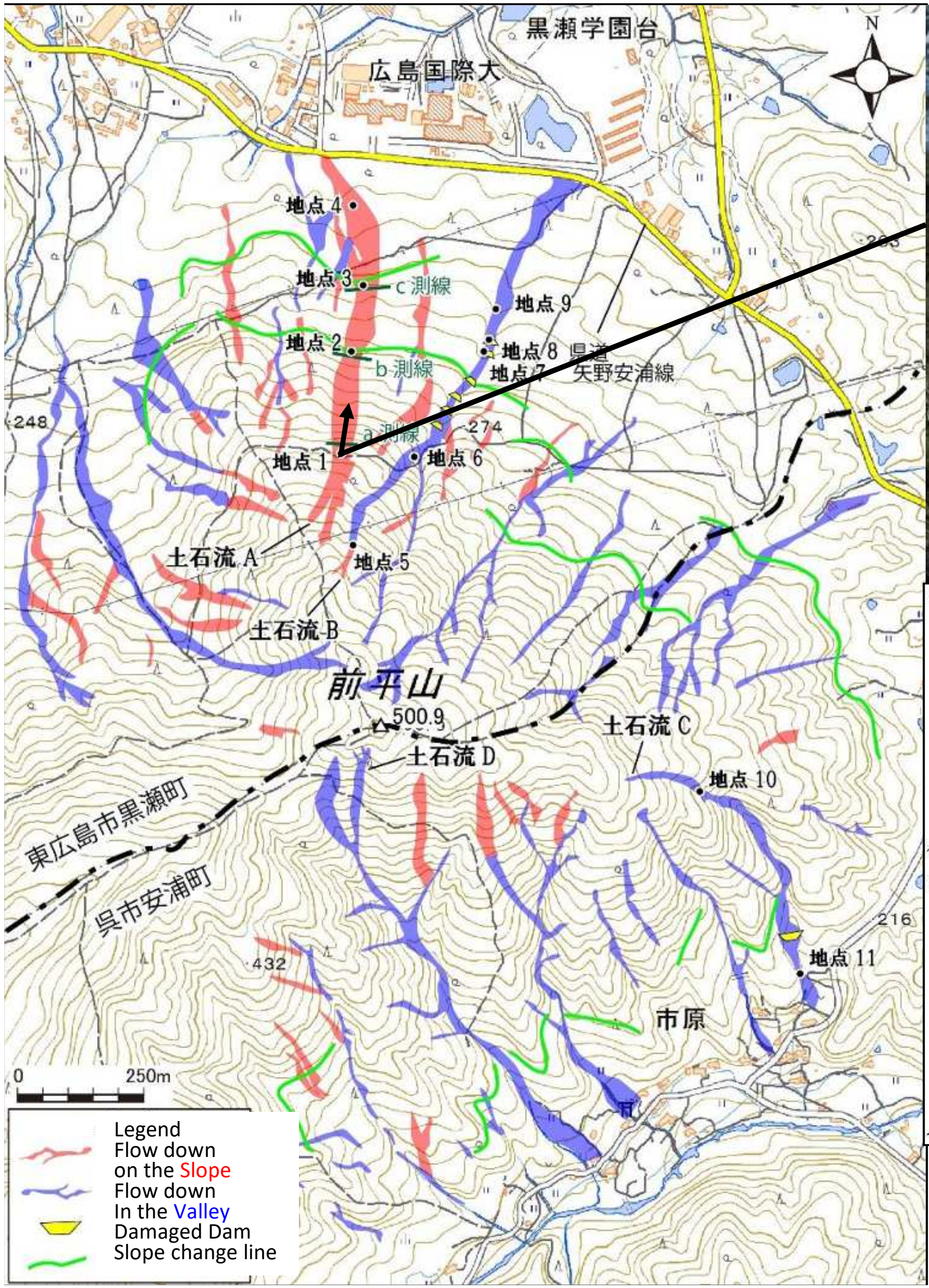


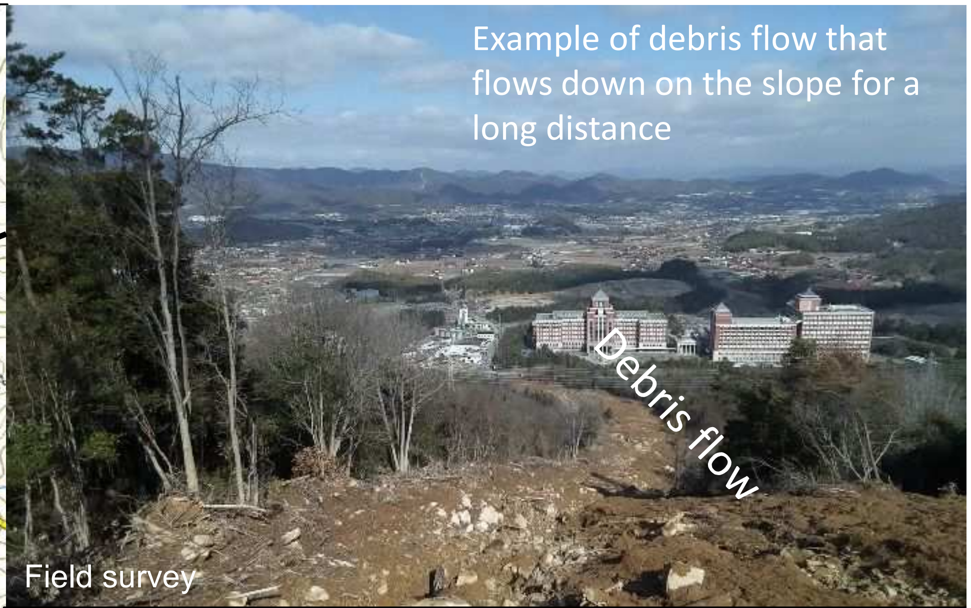
The amount of sediment movement by geology was investigated by overlaying the sediment movement density map and the geological map.

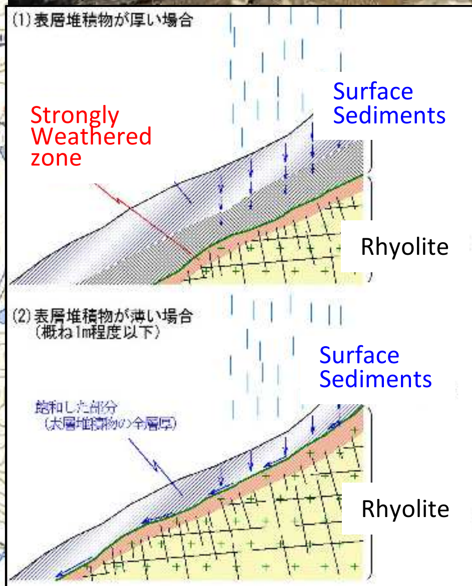
>> Most frequently occurring in plutonic rock (granite) areas

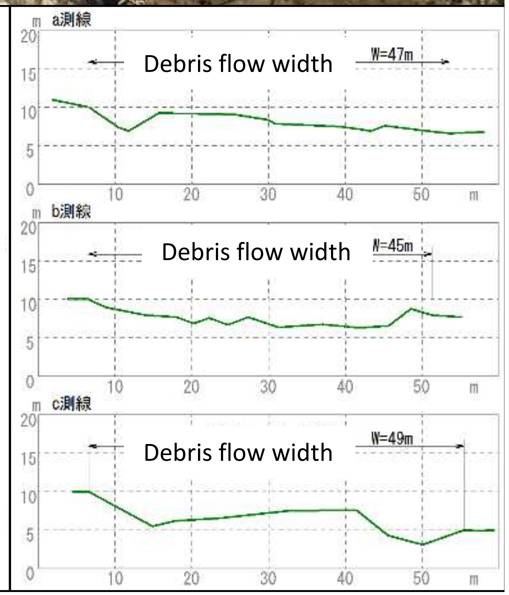
Sediment transfer rate by geology

Specific characteristics and disaster situation of debris flow



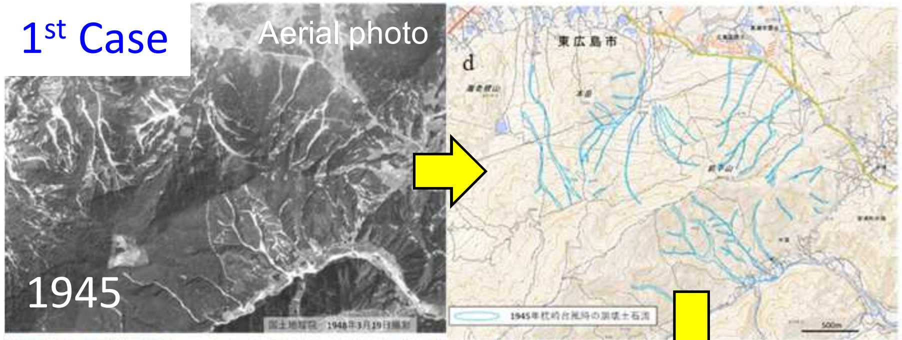


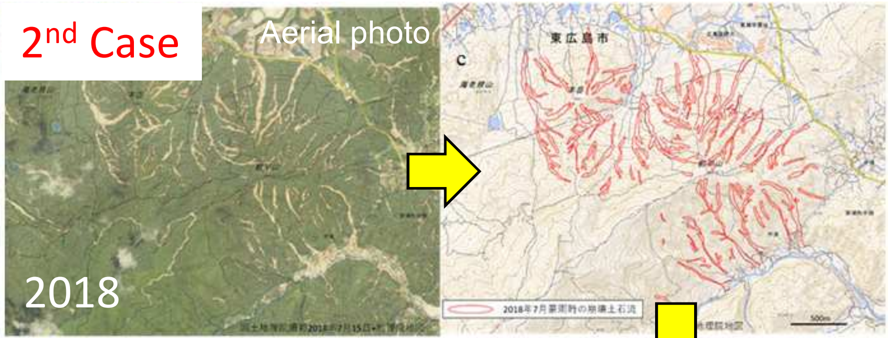


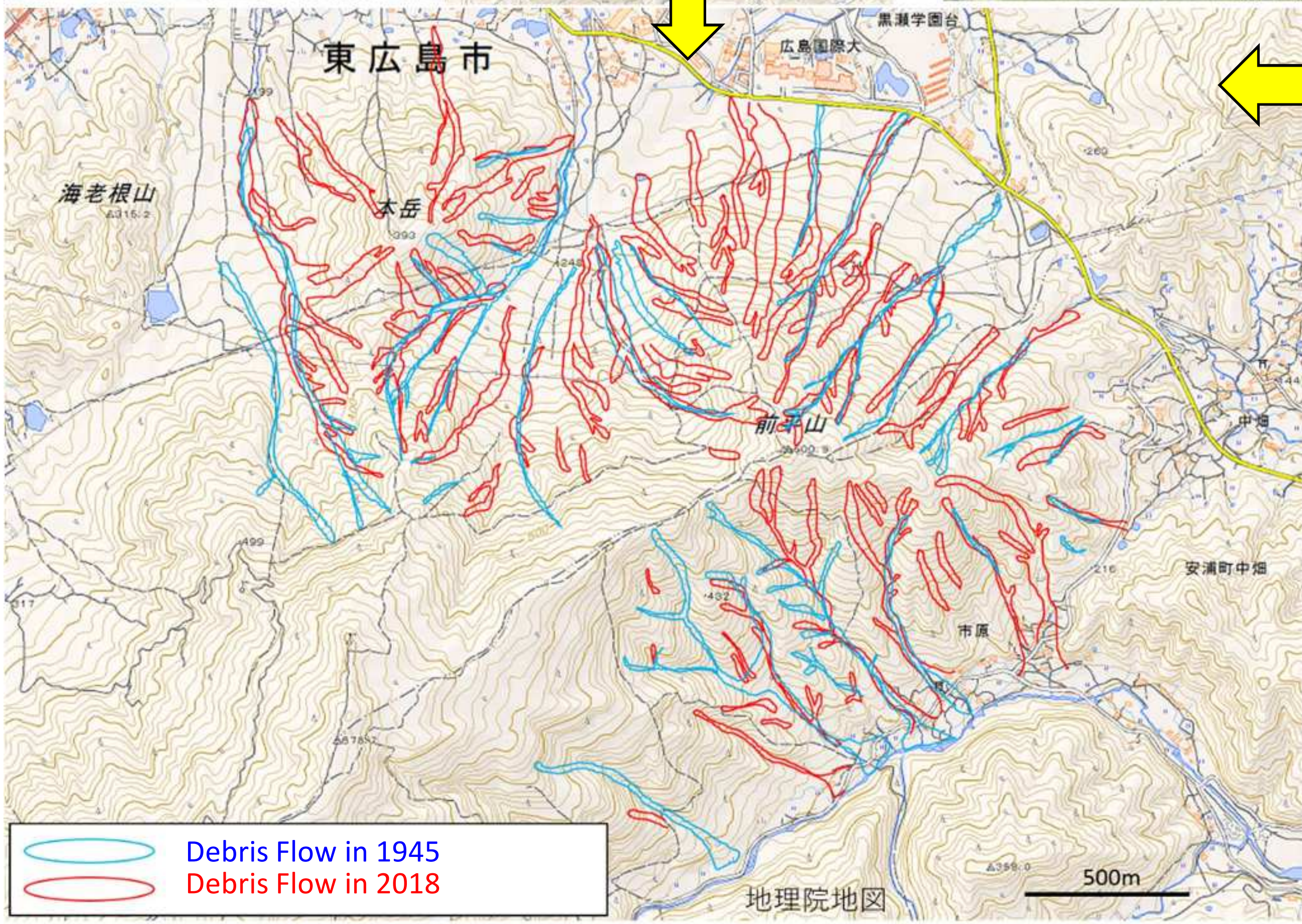


In the area where Rhyolite is distributed, it was observed that the shallow landslides that occurred on the hillside flows down on the slope for a long distance instead of valley.

Comparative study of debris flows that occurred twice in the past in the same area

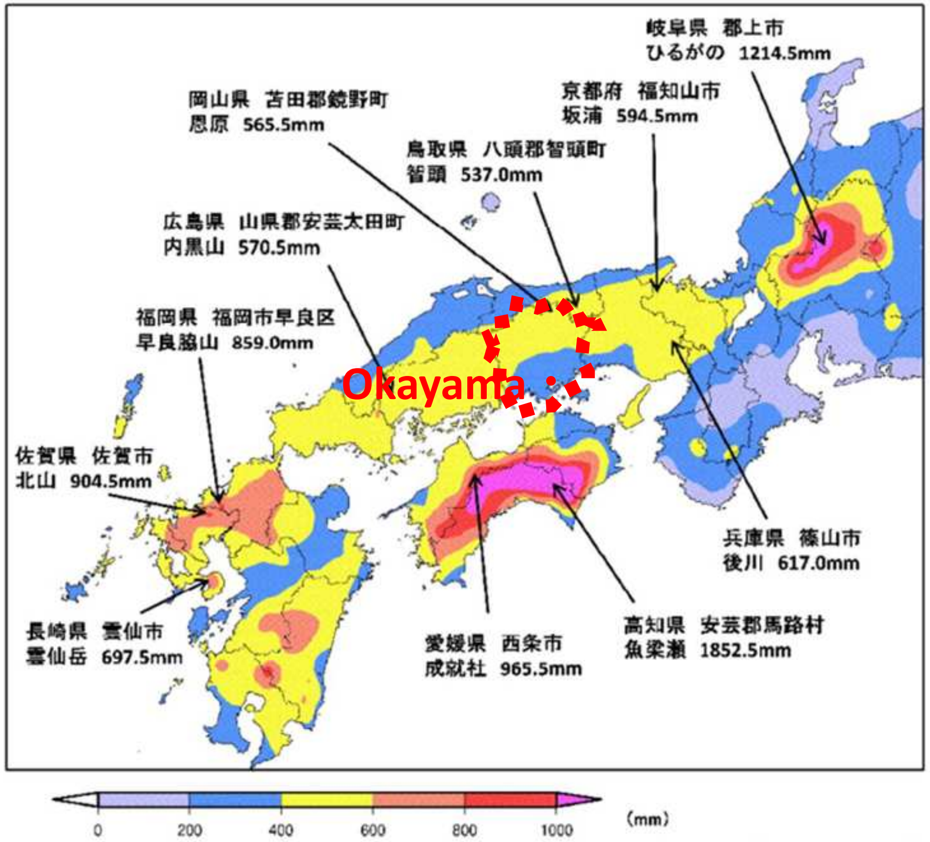


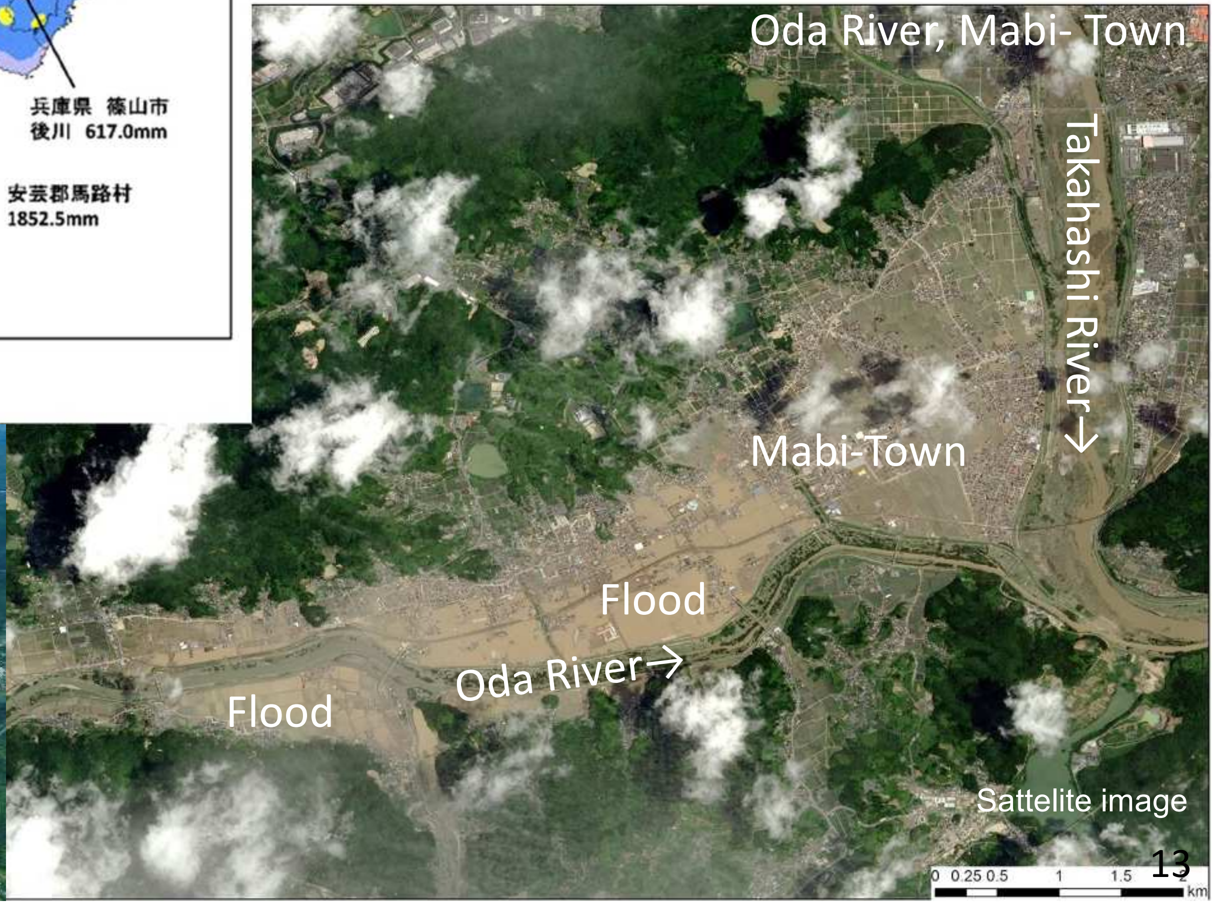




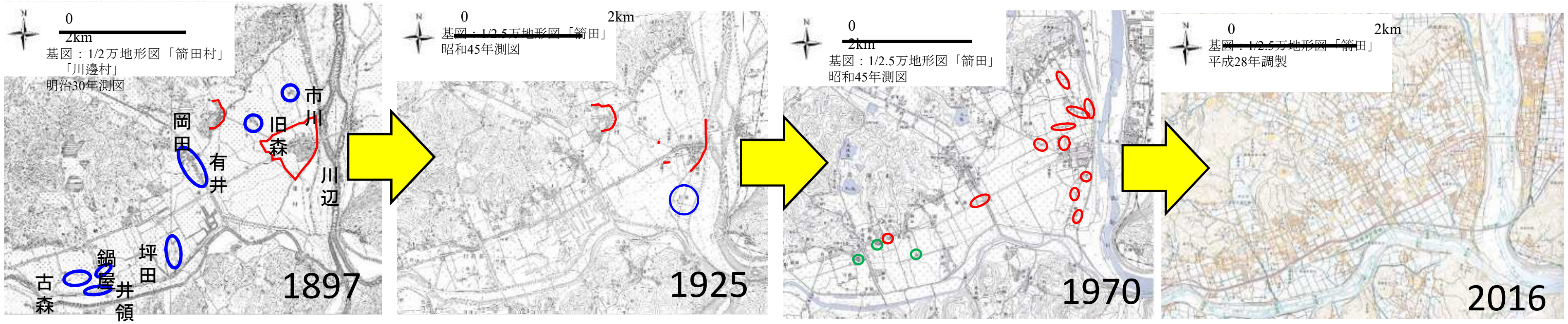
As a result of comparing the 1st and 2nd disasters, Many debris flows occurred in the same channel.
But the location of the landslides that became resource of debris flows were different.

5. Flooding in Okayama Pref.



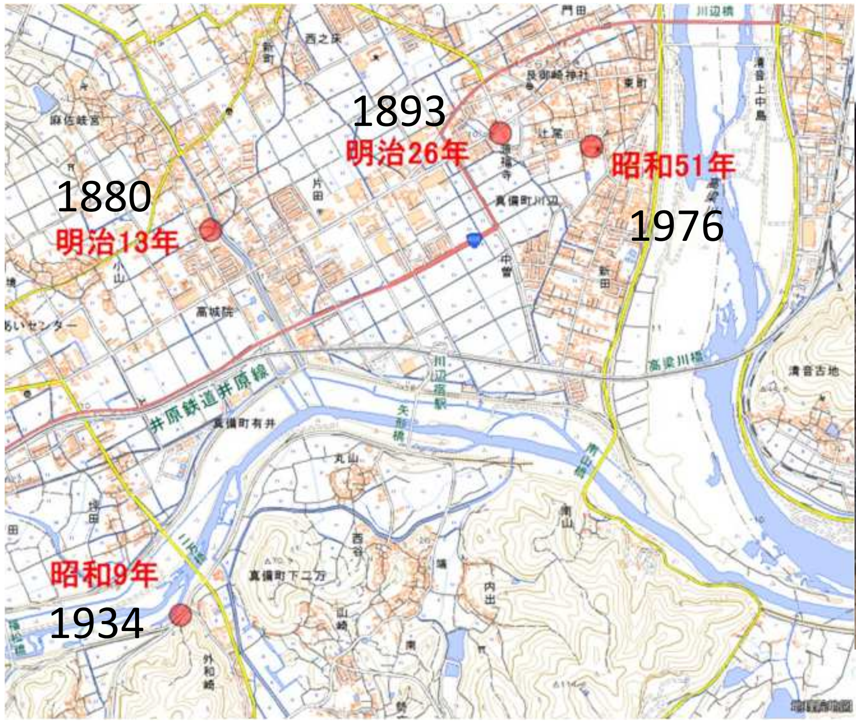


Changes in land use for 120 years and Monument showing flood damages in Mabi-town



Changes in land use

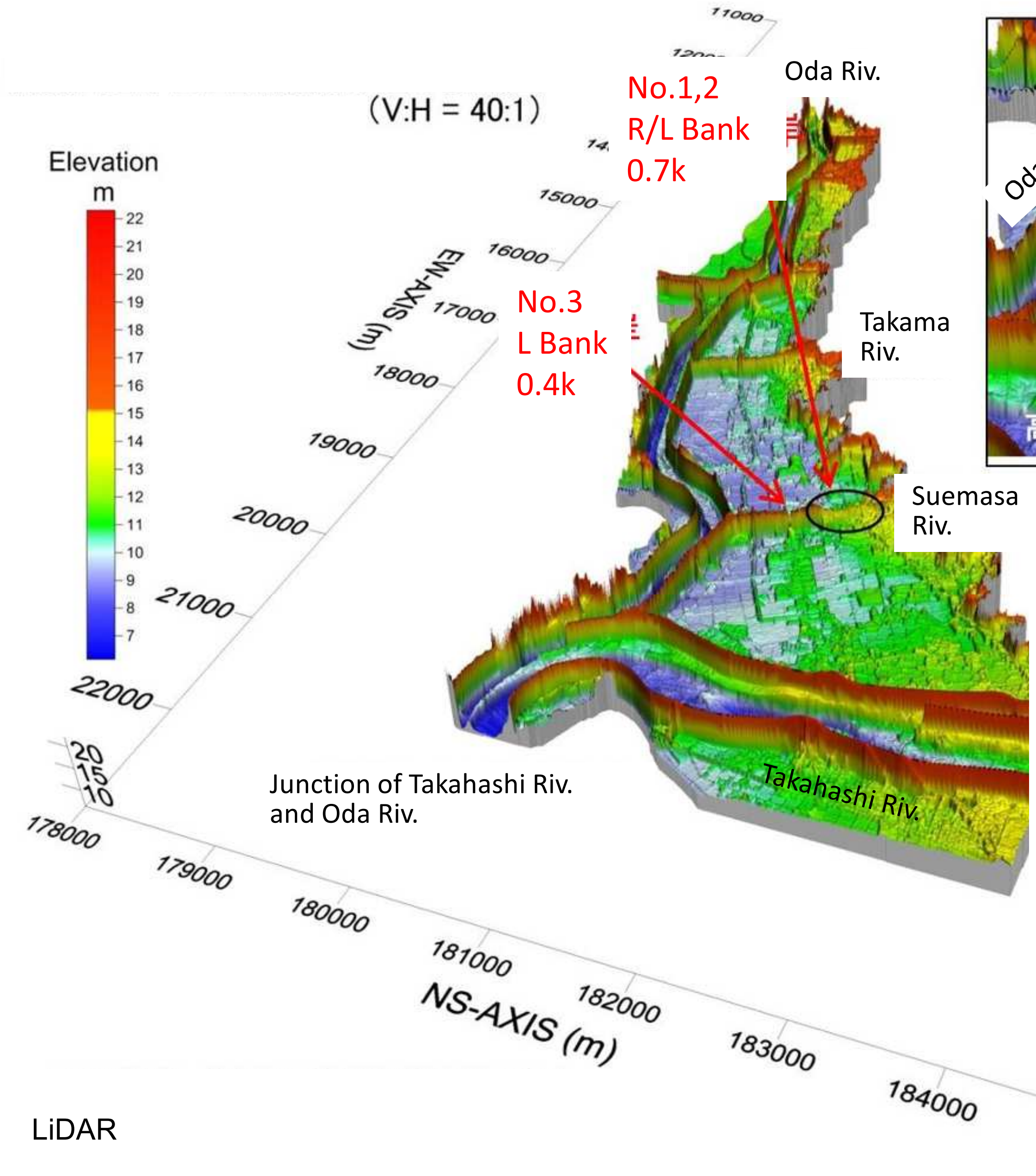
In recent years, wetlands and rice fields have rapidly become urbanized

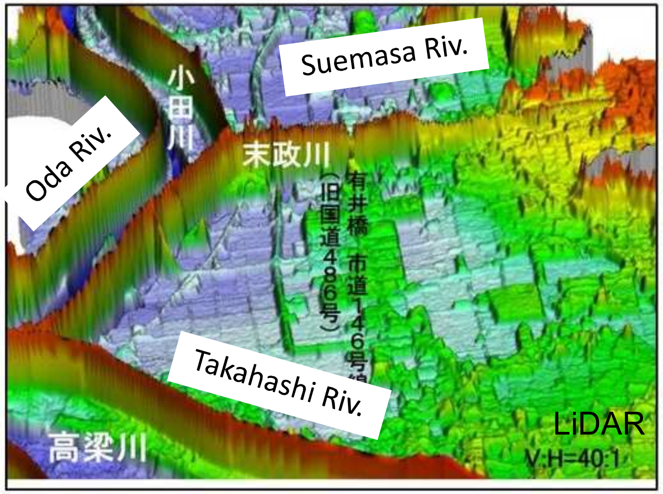


Monuments showing flood damages

Bird view around the junction of Takahashi River and Oda River

Base data: 5m mesh DEM from LiDAR provided by Geospatial Information Authority of Japan

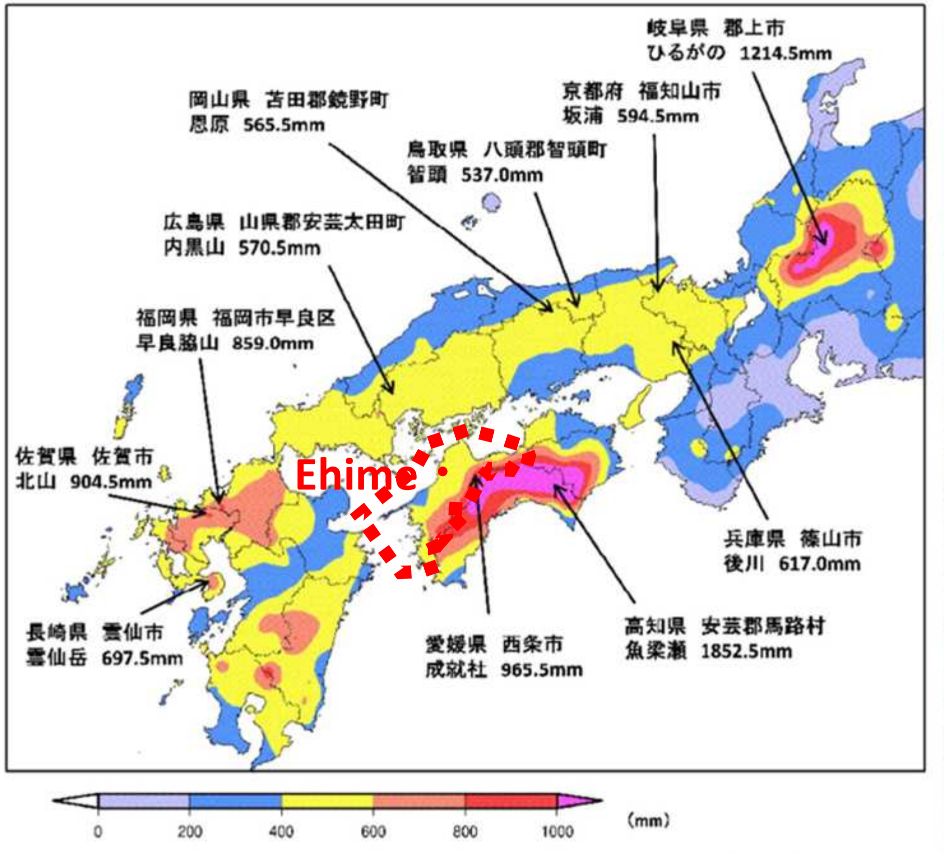


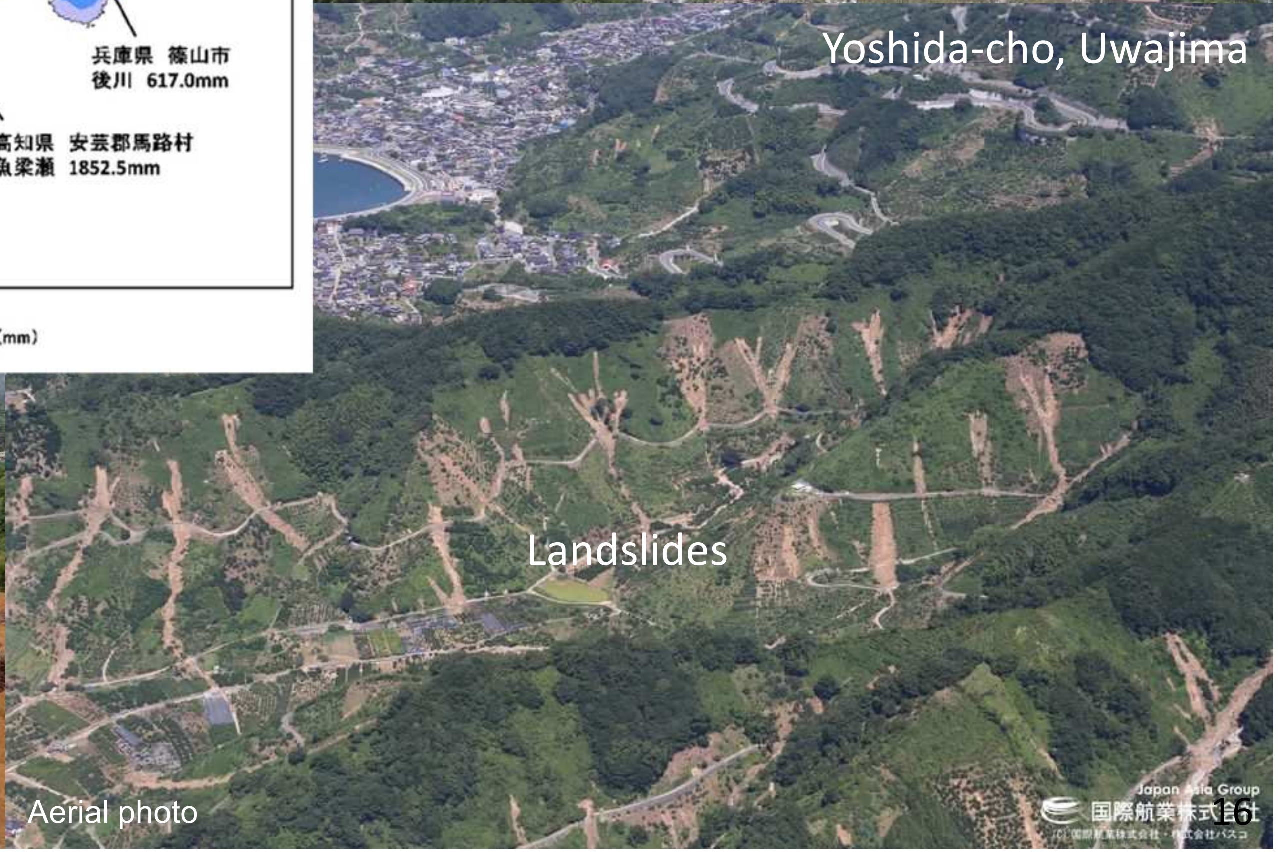


Enlarged view around Suemasa River

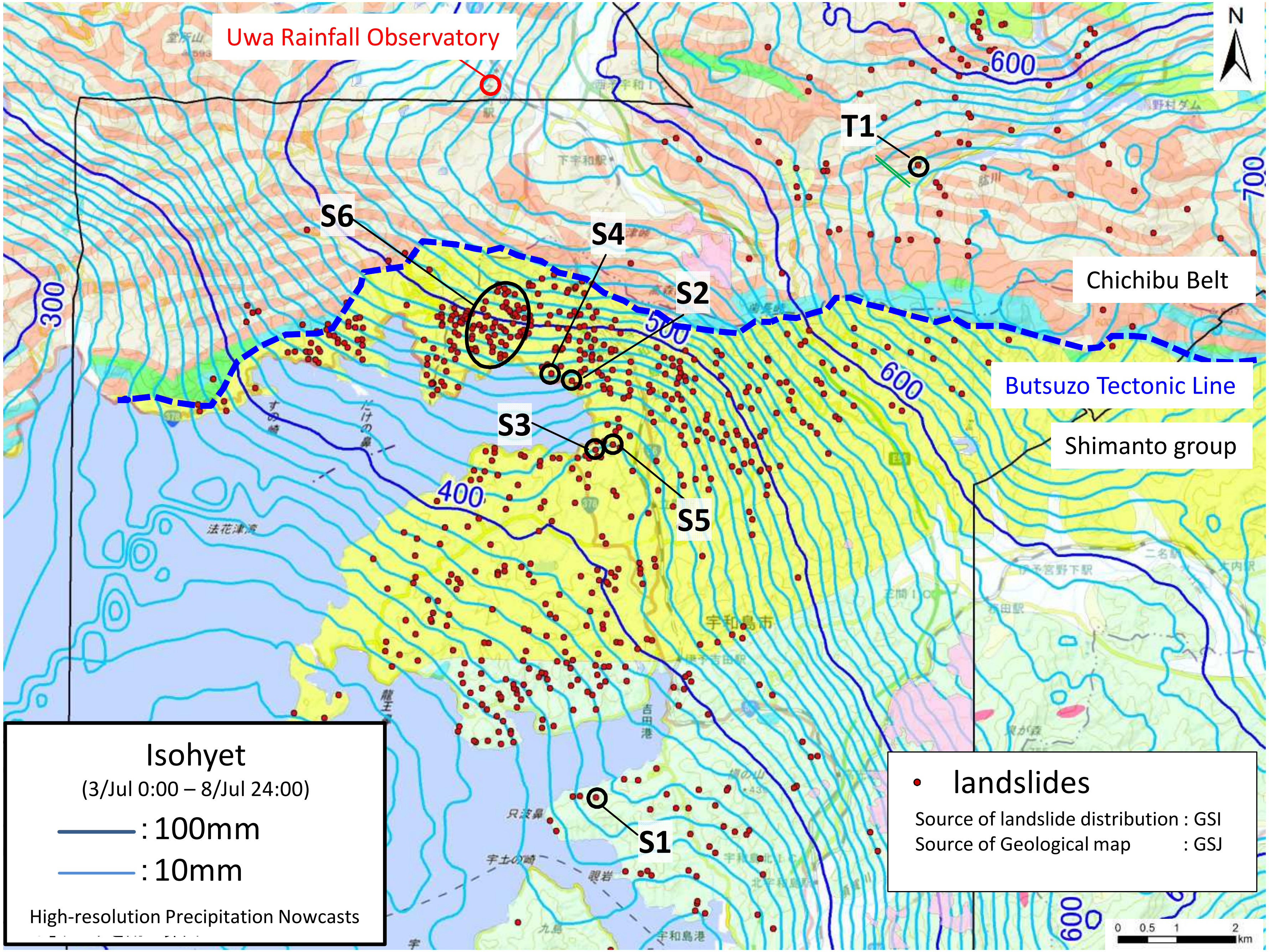
On the upstream side of the Suemasa River, the height of the embankment was low on both the left and right banks (No.1,2). These points are the lowest points in the embankment surrounding Takahashi, Oda and Suemasa rivers. The height of the embankment is also low near Arii Bridge (No.3). It is probable that the overflow started from these points.

6. Landslide disasters in Ehime Pref.



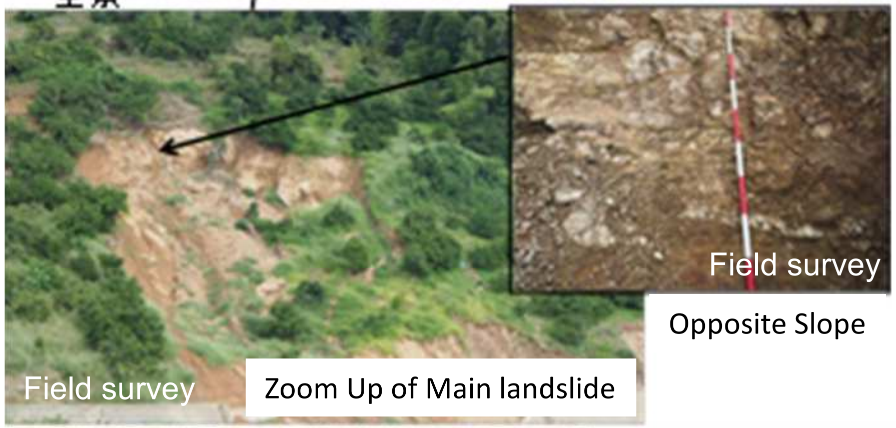


Relationship between distribution of landslides and rainfall



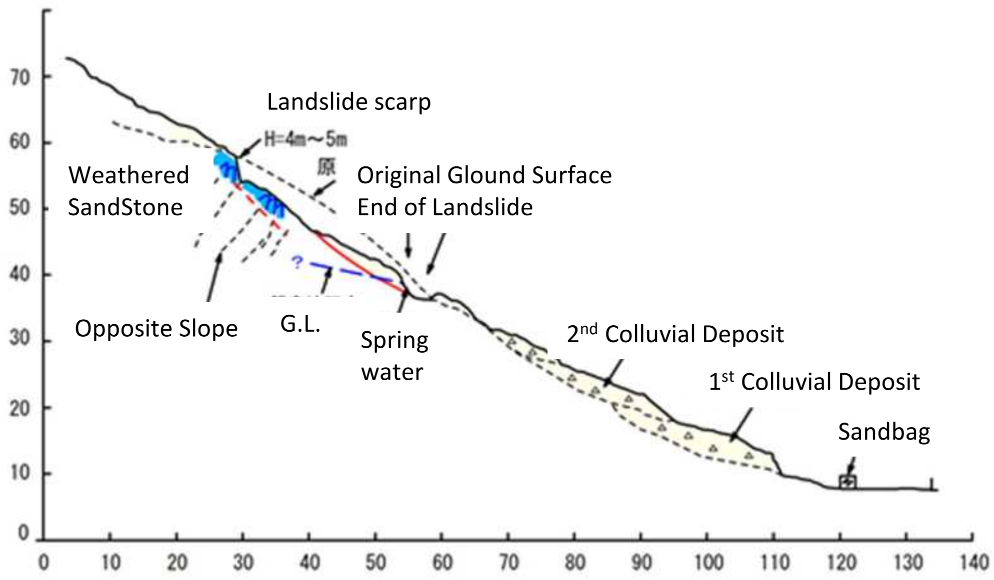
The influence of Laumontite on Landslides

Whole View



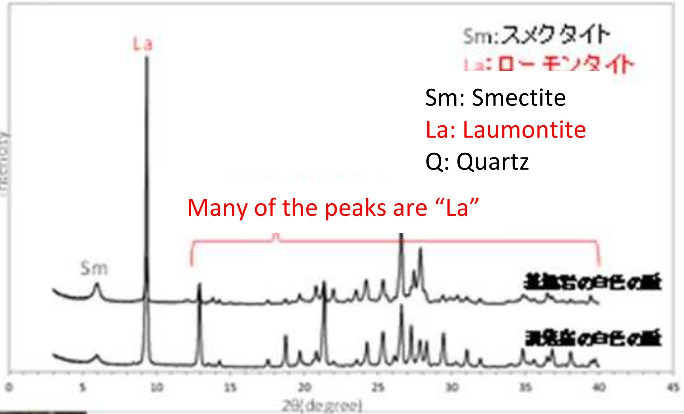
Opposite Slope

Zoom Up of Main landslide



Cross-section of Landslide

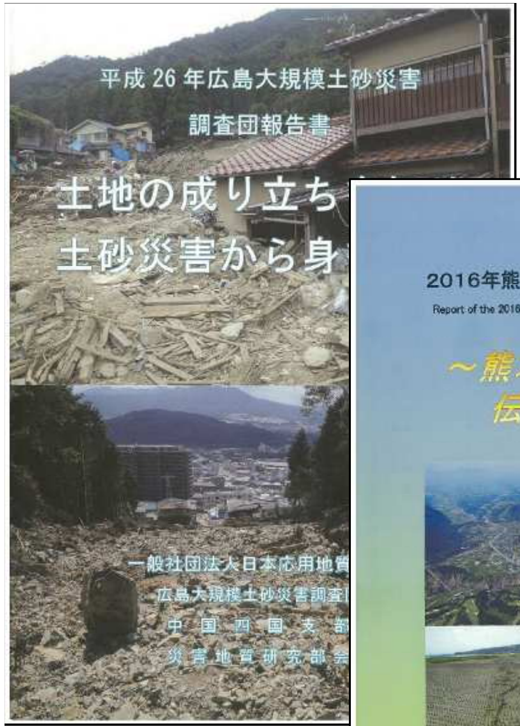
Rocks that make up the bedrock



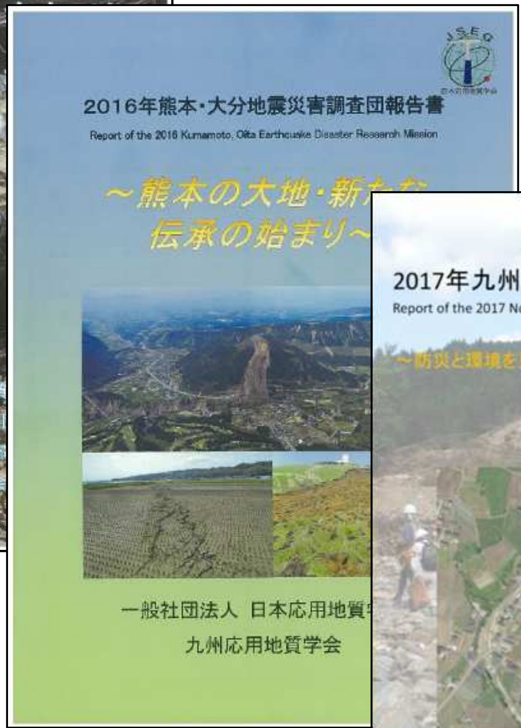
Analysis by X-ray diffraction method

Observation of Landslide scarp and colluvial deposit revealed many white veins in the rocks. As a result of analysis by X-ray diffraction method these veins, it was found that a lot of Laumontite was contained. It is known that the volume change of Laumontite occurs due to dry and wet conditions

7. Return of Our Survey Results to Society



2014 Hiroshima Debris flow Disasters



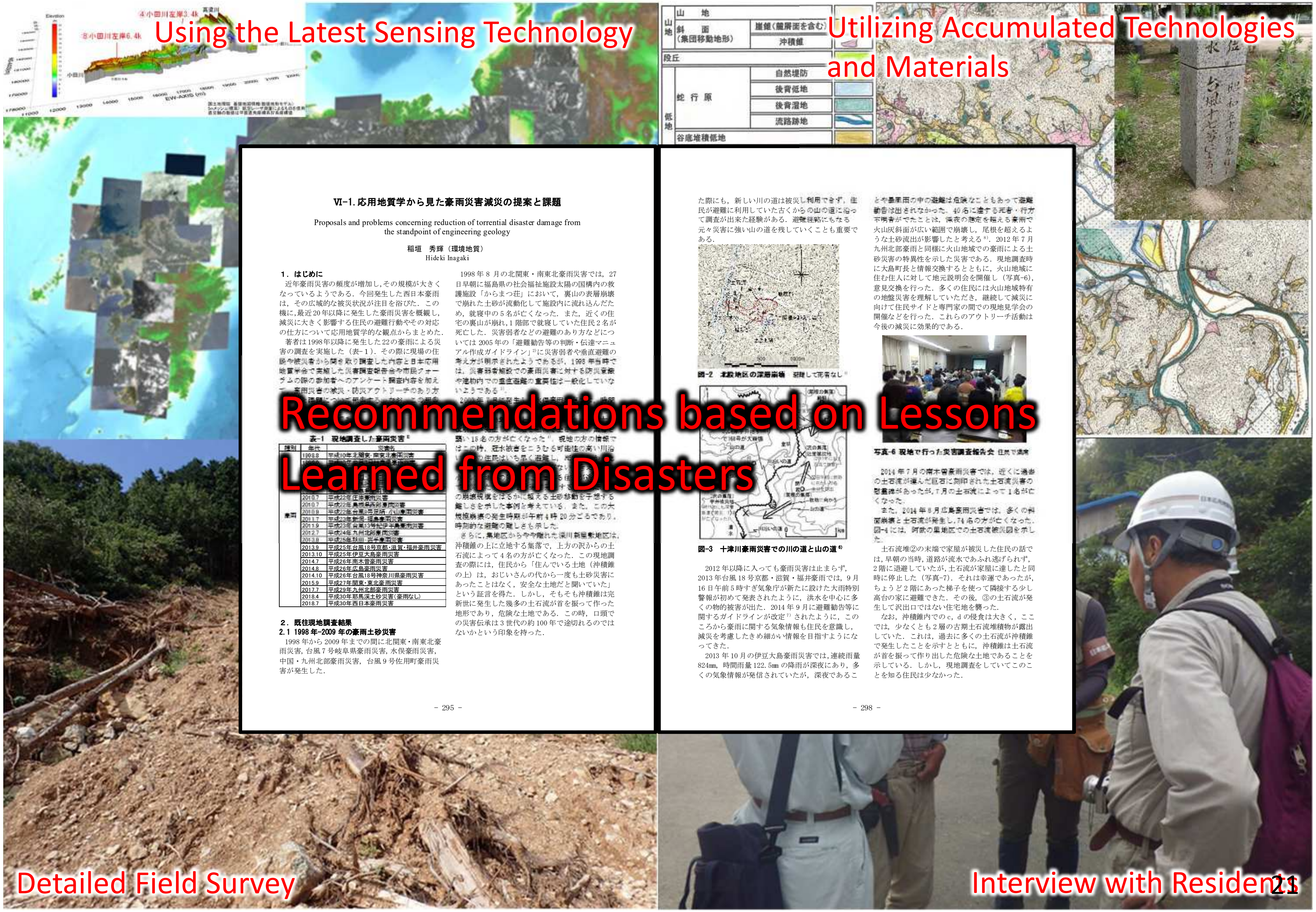
2016 Kumamoto-Oita Earthquake Disaster

2017 Northern Kyushu Heavy Rain Disaster

2018 Hokkaido Eastern Iburi Earthquake Disaster

2019 Typhoon No. 19 disaster

8. Efforts to Standardize Research Methods at JSEG



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Thank you for your attention