International seminar on application of advanced technology in slope engineering
7th of Jan 2025

Applied Slope Engineering Research Association

Hanoi University of Mining and Geology

VISION2033
空間情報技術で社会をつなぎ
地球の未来を創造する

Red Relief Image Map created from DEM data and Embankment disaster in Japan

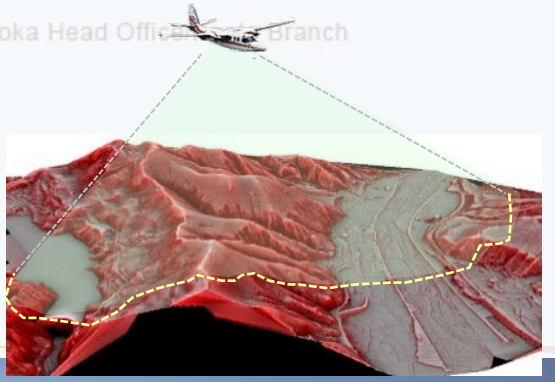
Yasuhide Fujita, Wataru Tachi
[ASIA AIR SURVEY]

History

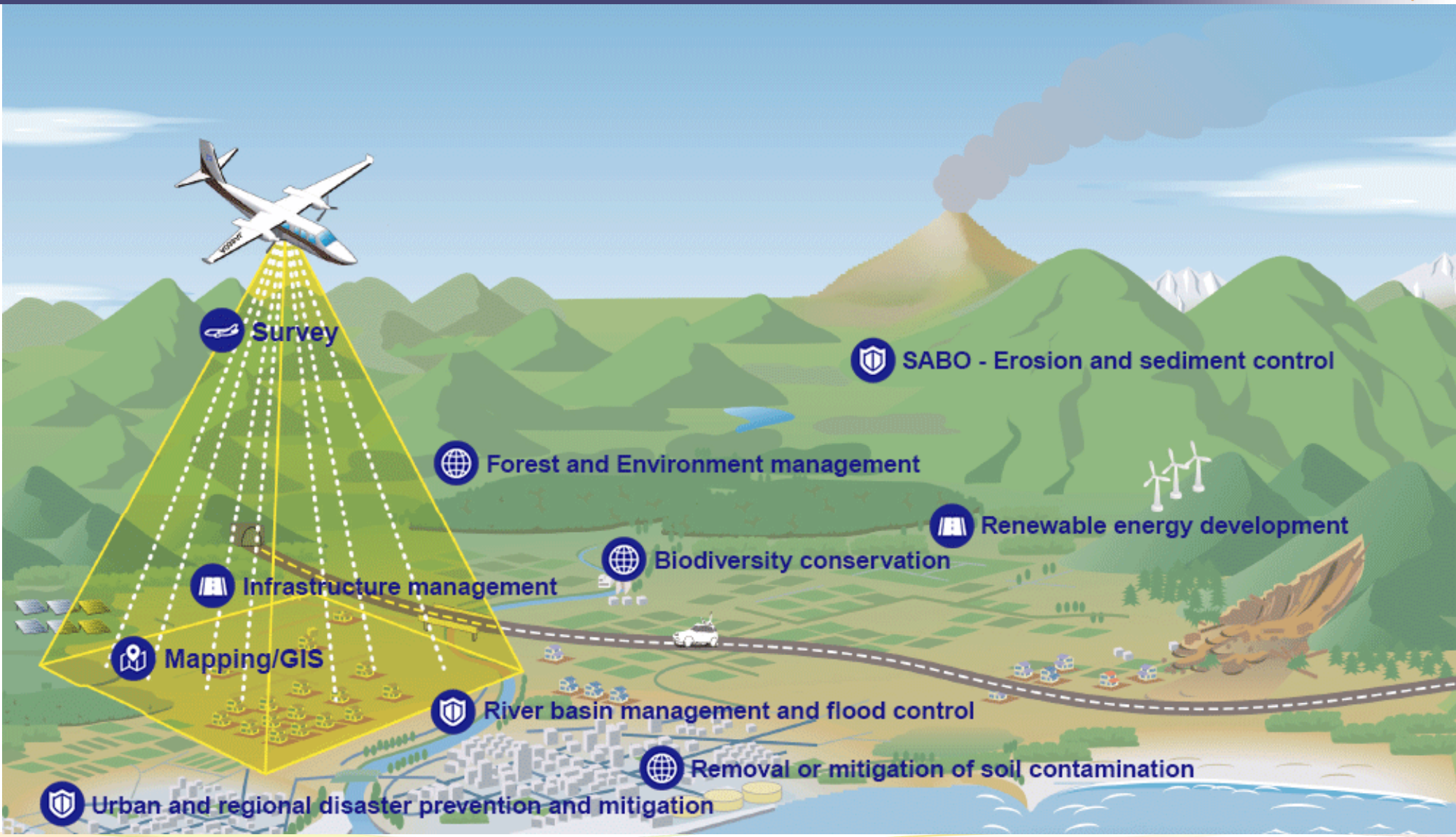
ASIA AIR SURVEY CO.,LTD.

- Asia Air Survey (AAS) was officially established in 1954 as the first fully equipped private aerial survey company in Japan
- AAS has been operating internationally since 1965
- In Japan, AAS has a network of 43 branches and offices
- To date, AAS owns and operates a fleet of 7 aircraft with state-of-the-art equipment

Since1954

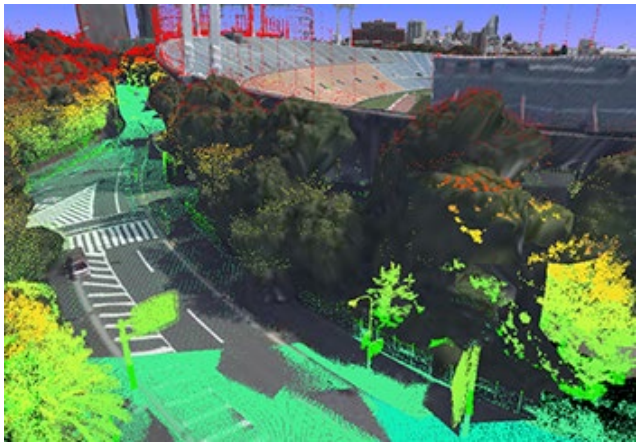


Services

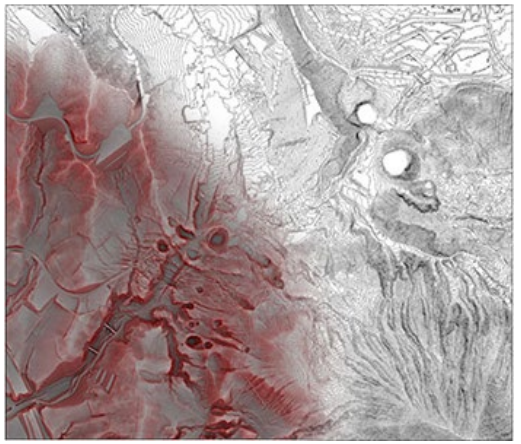

Survey
SABO - Erosion and sediment control
Forest and Environment management
Renewable energy development
Biodiversity conservation
Infrastructure management
Mapping/GIS
River basin management and flood control
Removal or mitigation of soil contamination
Urban and regional disaster prevention and mitigation

Services

Geospatial Survey

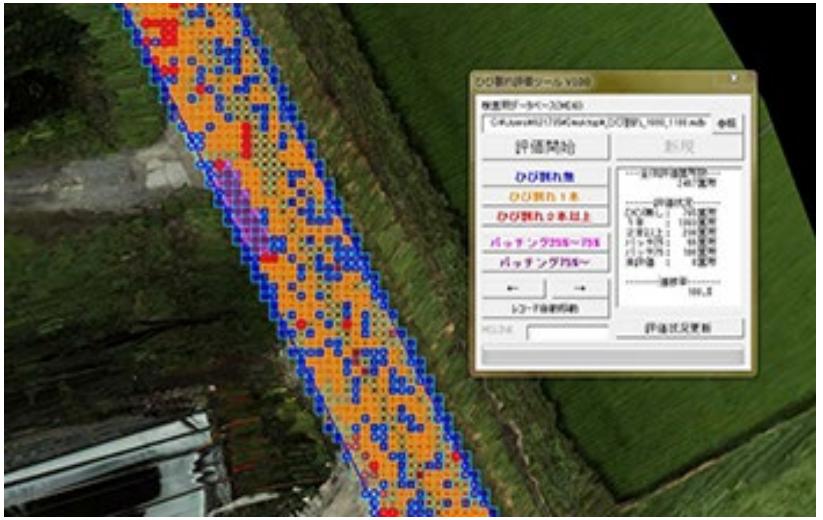


Mapping/GIS/System

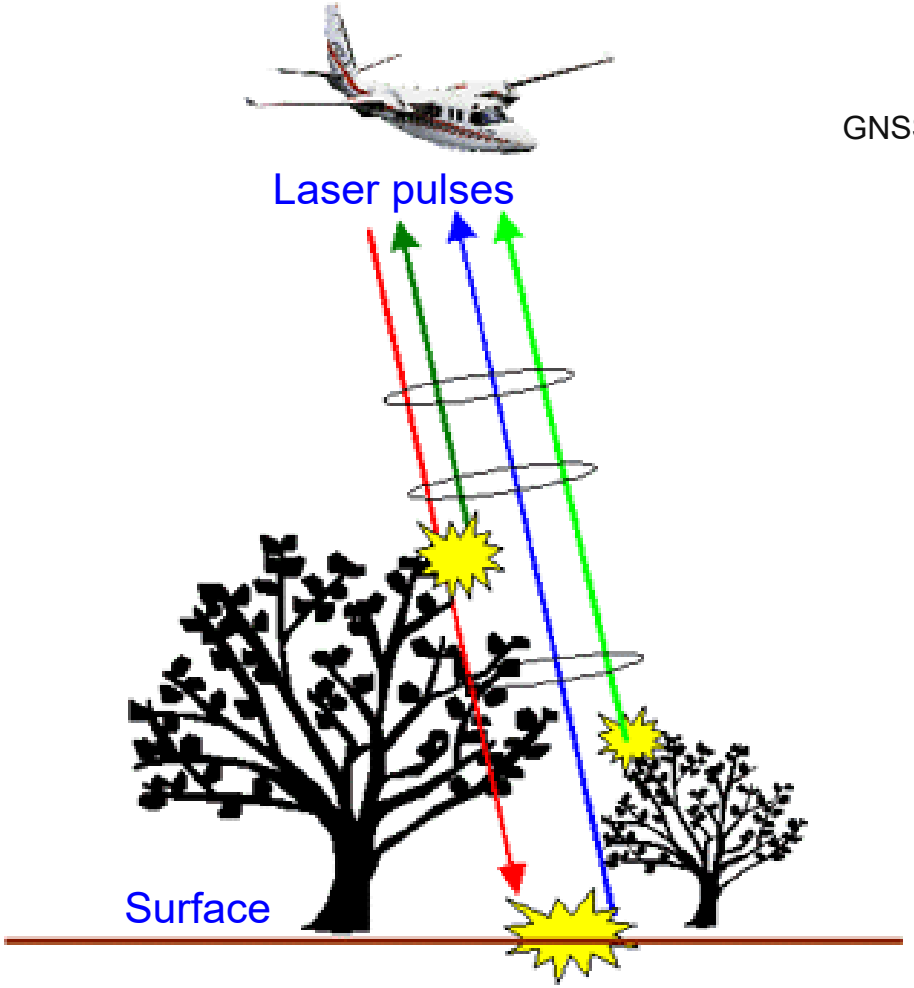


Disaster Management

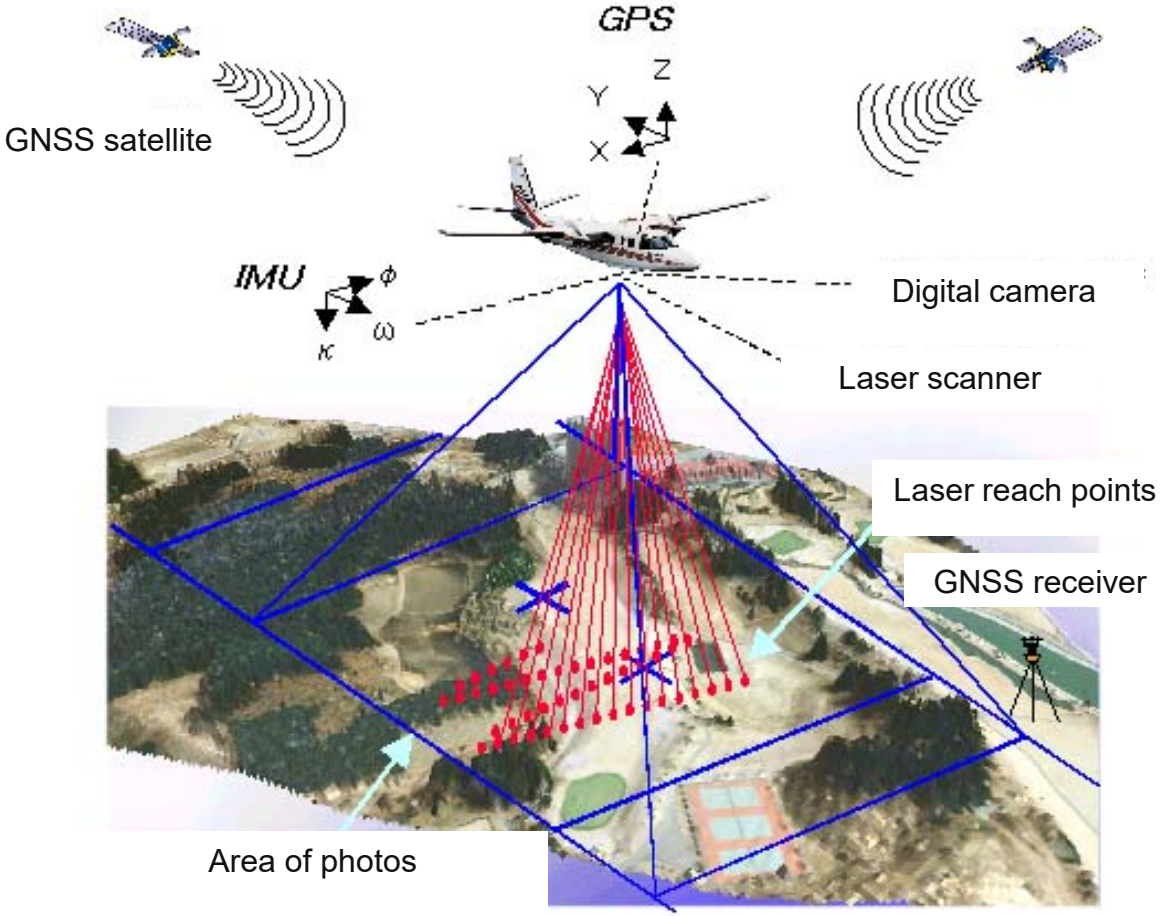
Infrastructure Asset Management



Airborne Laser Scanning (ALS)

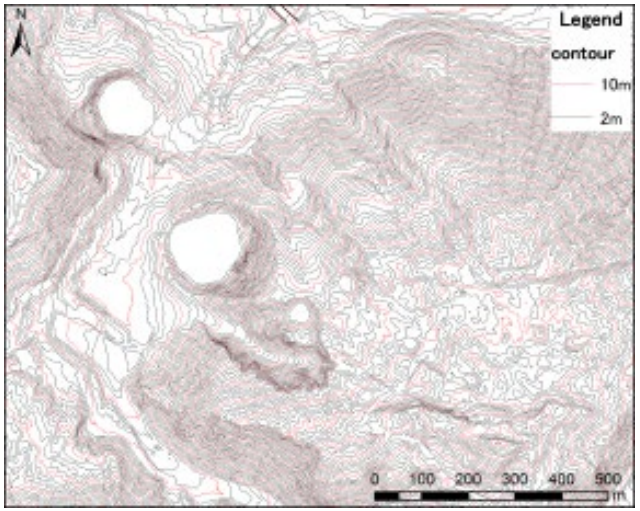


Some laser pulses can reach to the surface and data is obtained from reflected ones

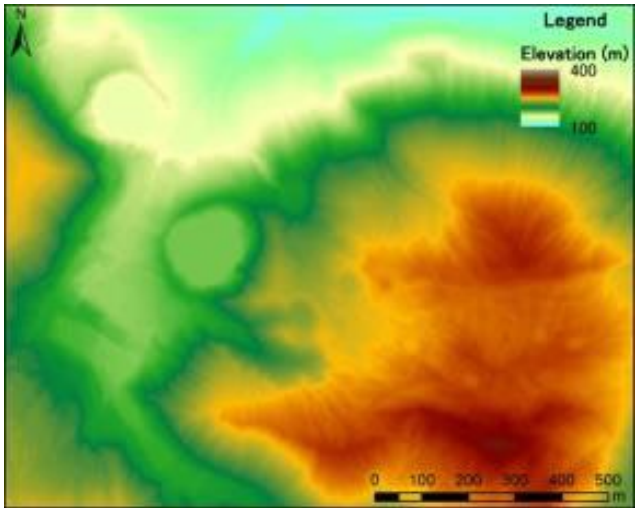


Map-making by DEM

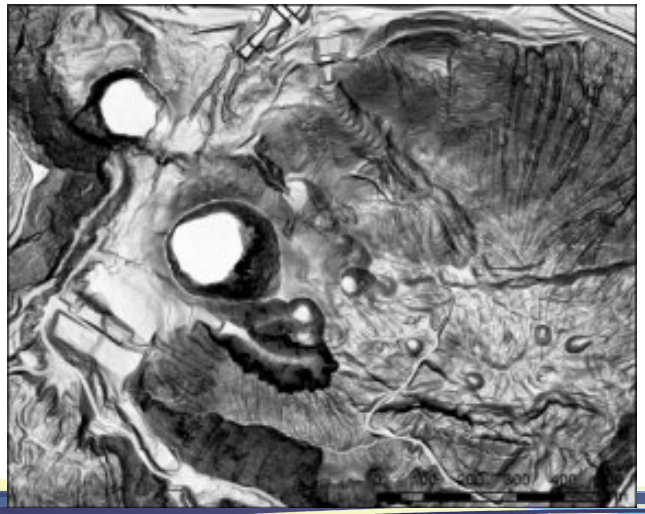
Contour Map



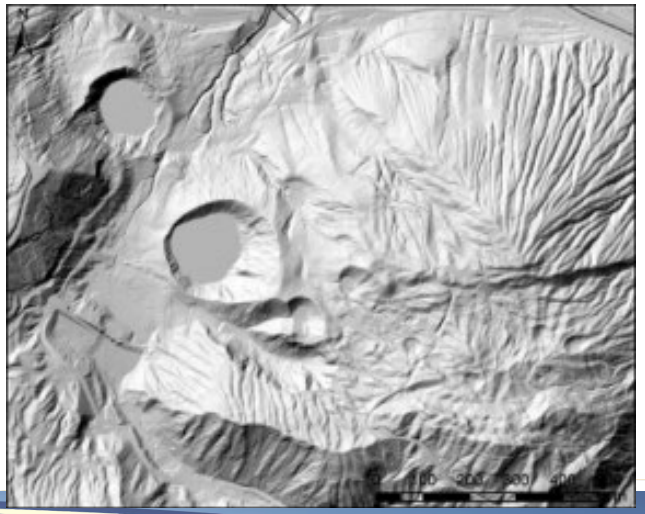
Hypsometric tint



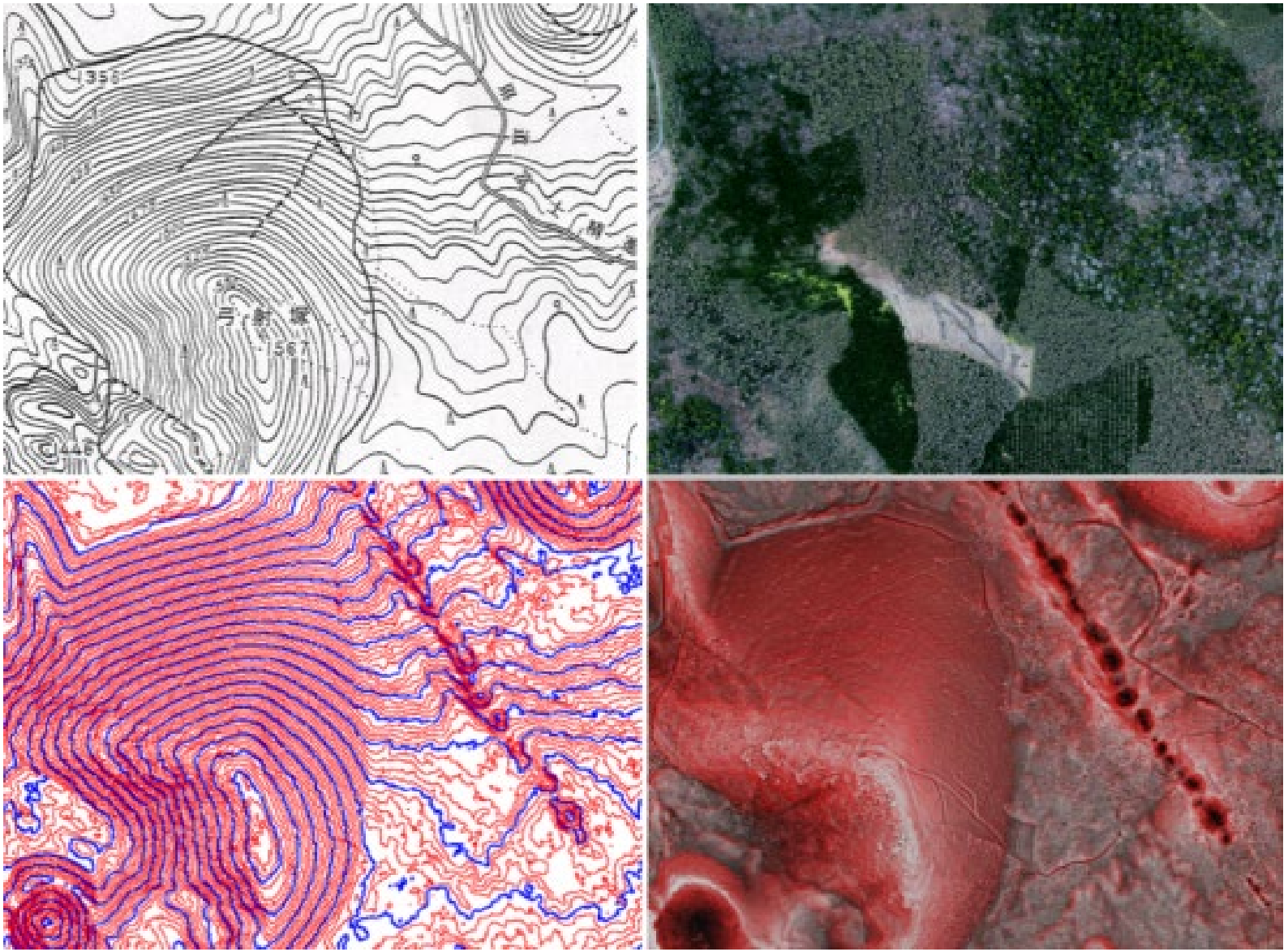
Slope Map



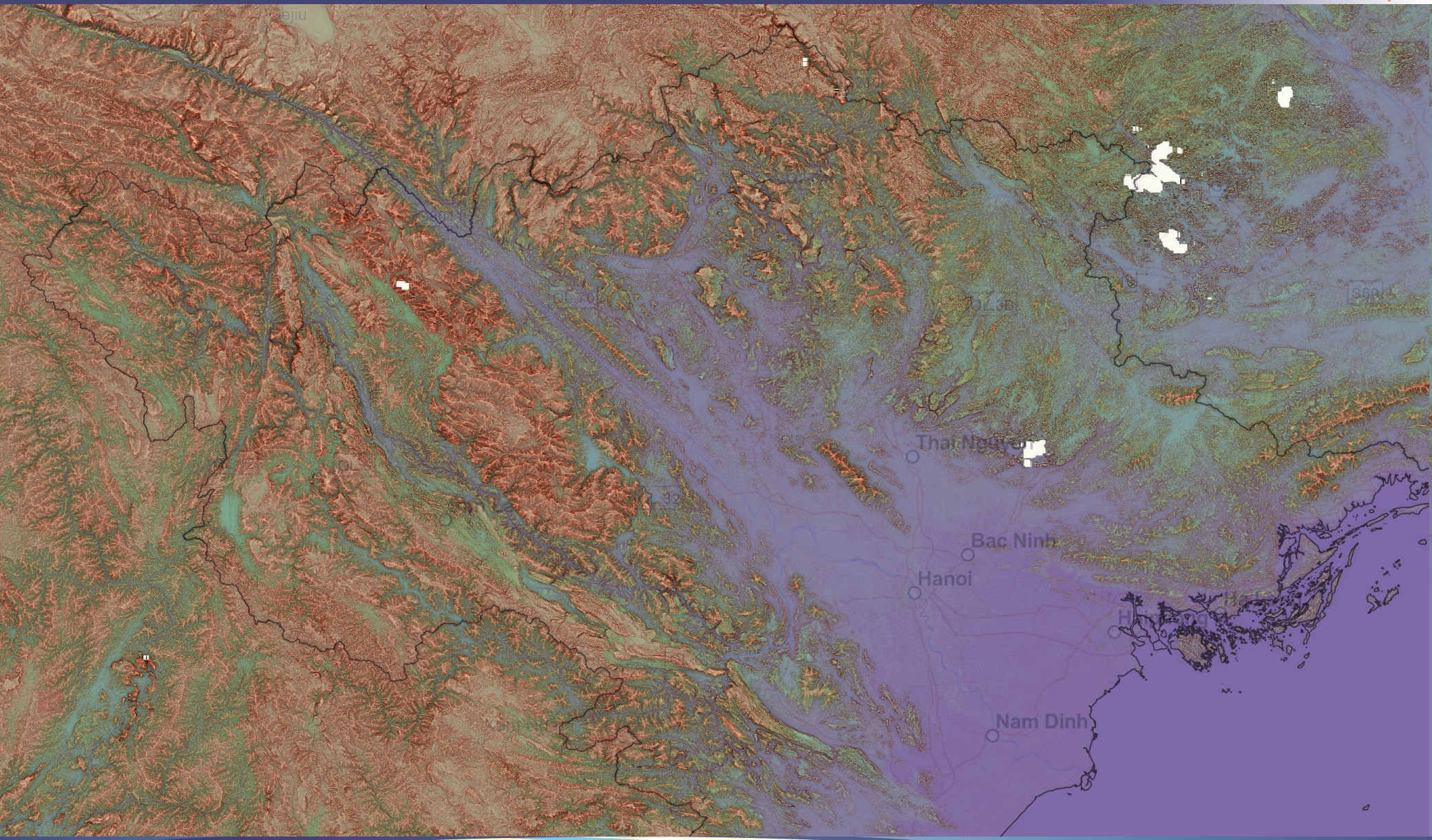
Shaded relief



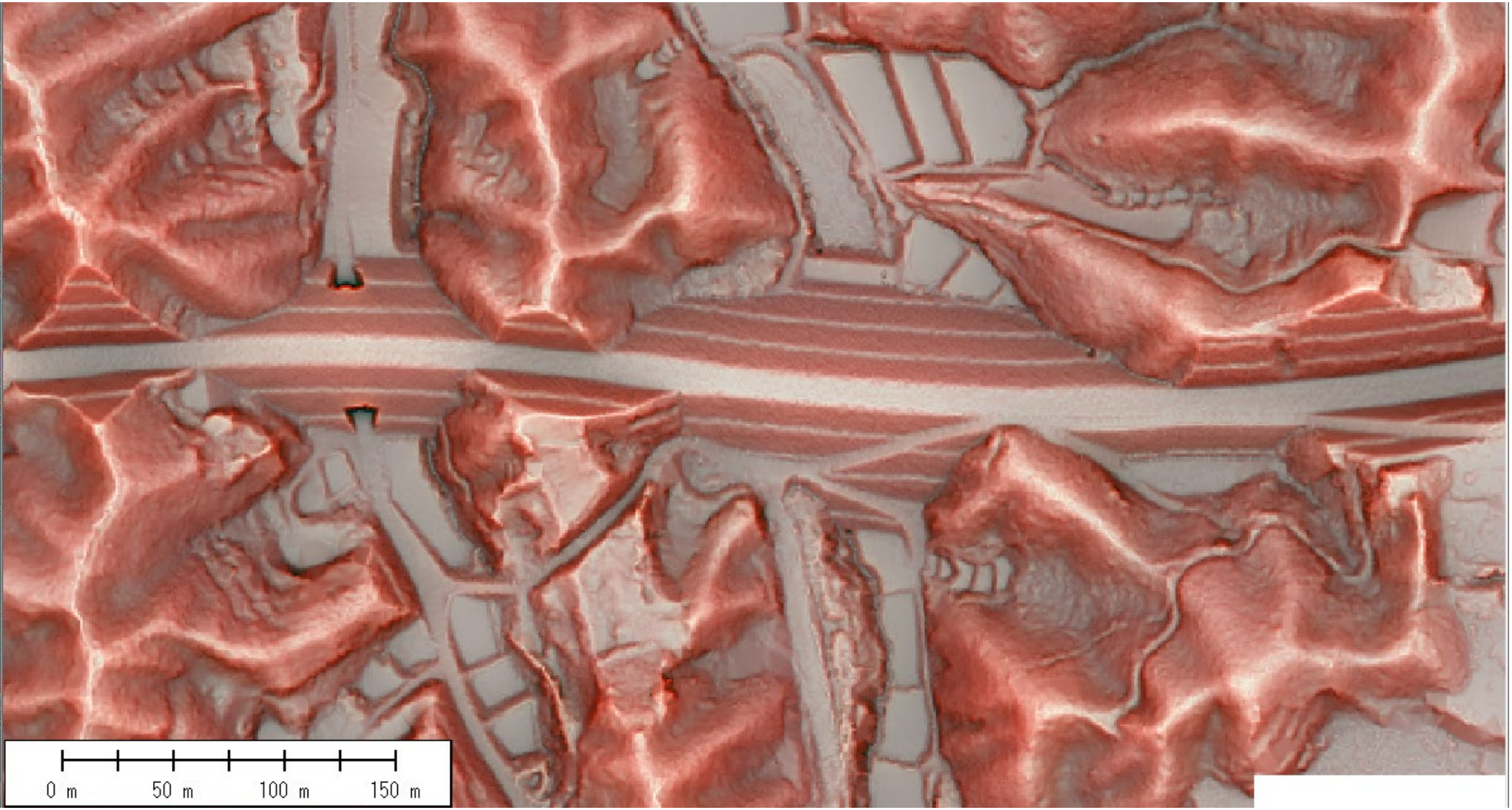
RRIM (Red Relief Image Map)



Đồng bằng sông Hồng : Red River Delta



Application to infrastructures facilities

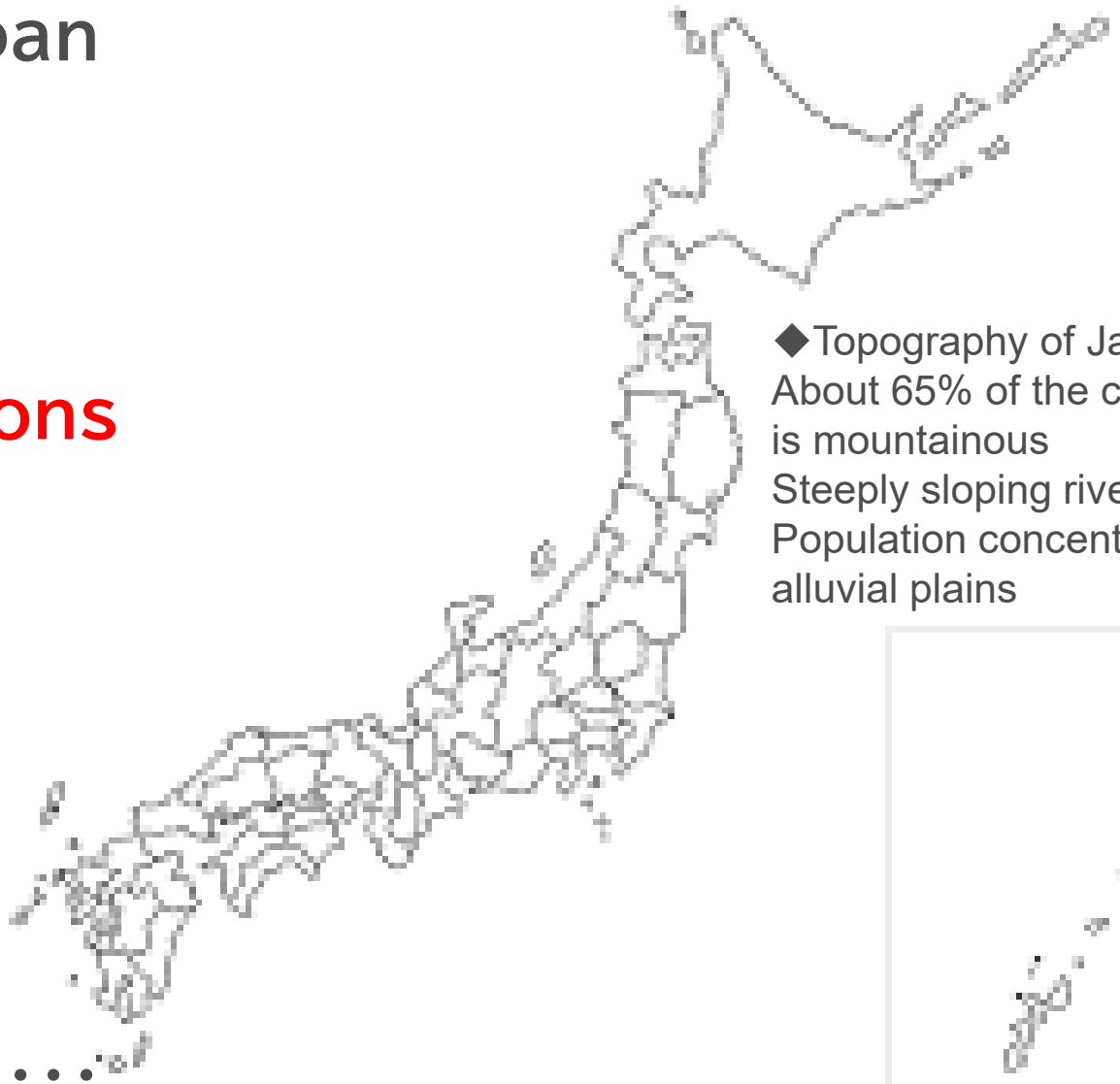


Increasing frequency of Landslides

Disasters in Japan

Earthquake
Heavy rainfall,
Volcanic eruptions
Typhoon

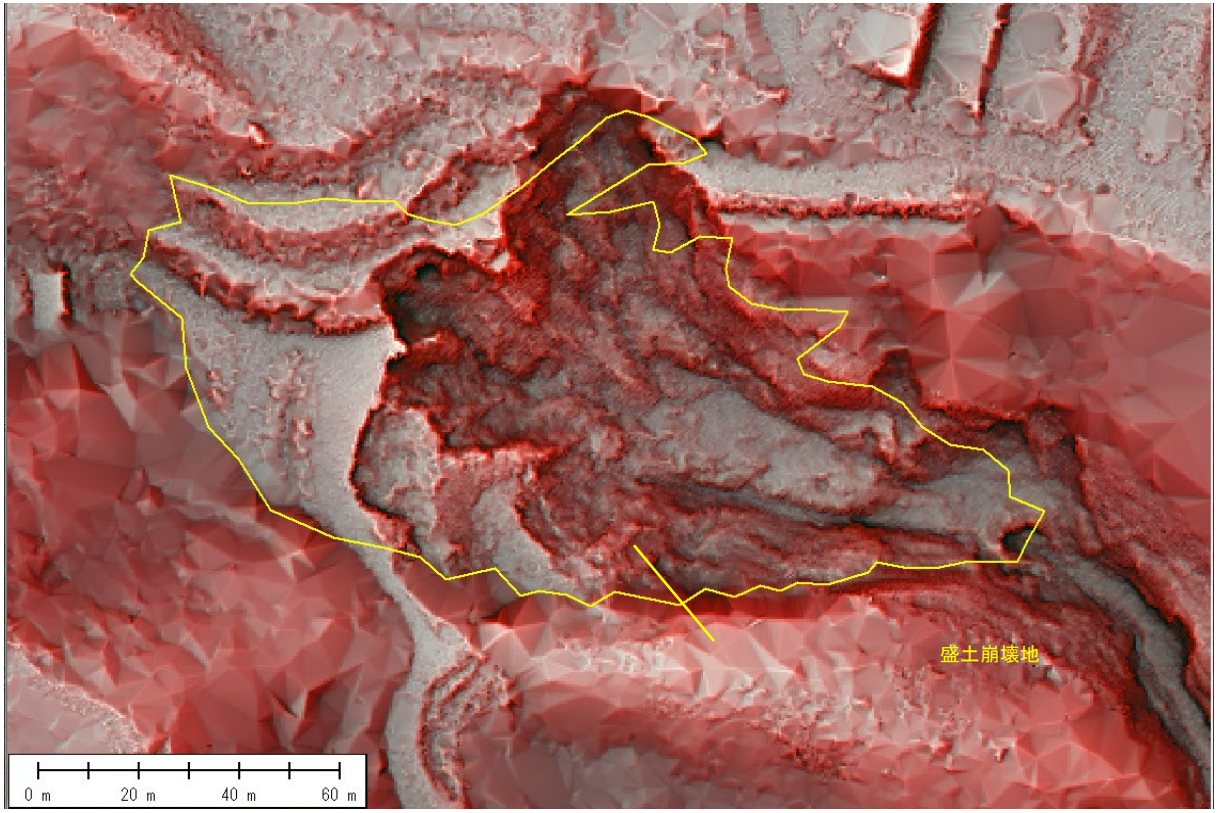
Landslide
Debris flow
Collapse
liquefaction
tsunami, flood
・・・



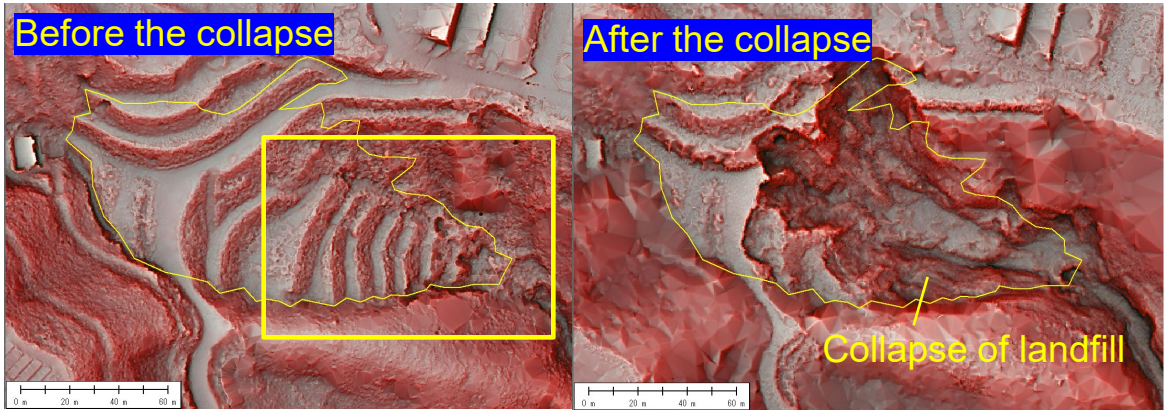
◆Topography of Japan
About 65% of the country's land is mountainous
Steeply sloping rivers
Population concentration on soft alluvial plains

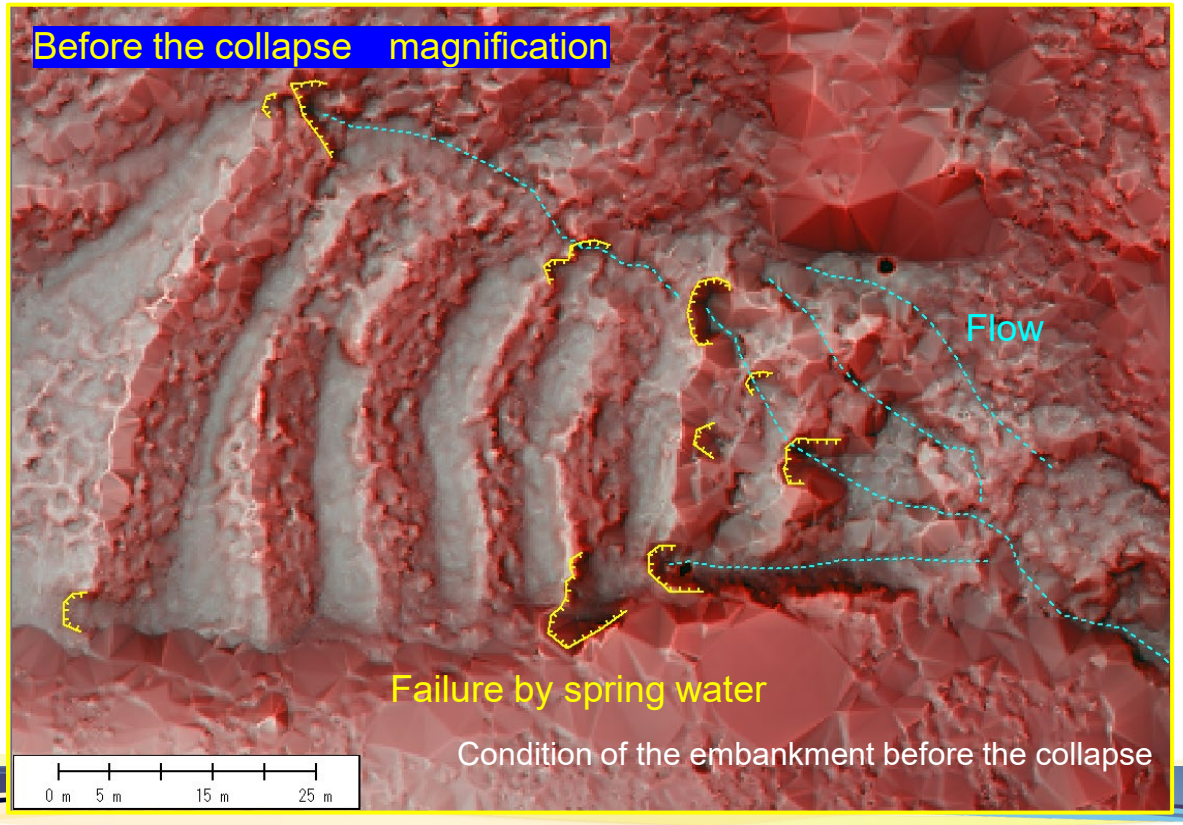
Disaster caused by embankment(landfill) collapse

In July 2021, heavy rains caused the soil to collapse in a valley in the mountains, resulting in a mudslide that swept down the valley. It was a catastrophe that killed 28 people.



Application example (Atami City, Shizuoka)





Condition of the embankment before the collapse

Enactment of the Embankment Regulation Act
(Establishment of Regulatory Areas and Extraction of existing embankments)

In May 2024, the Embankment Regulation Law was enacted in Japan.

【Main contents】

1)Regulation without gaps

2)Ensuring the safety of embankments, etc

(Establishment of permit criteria and implementation of inspections)

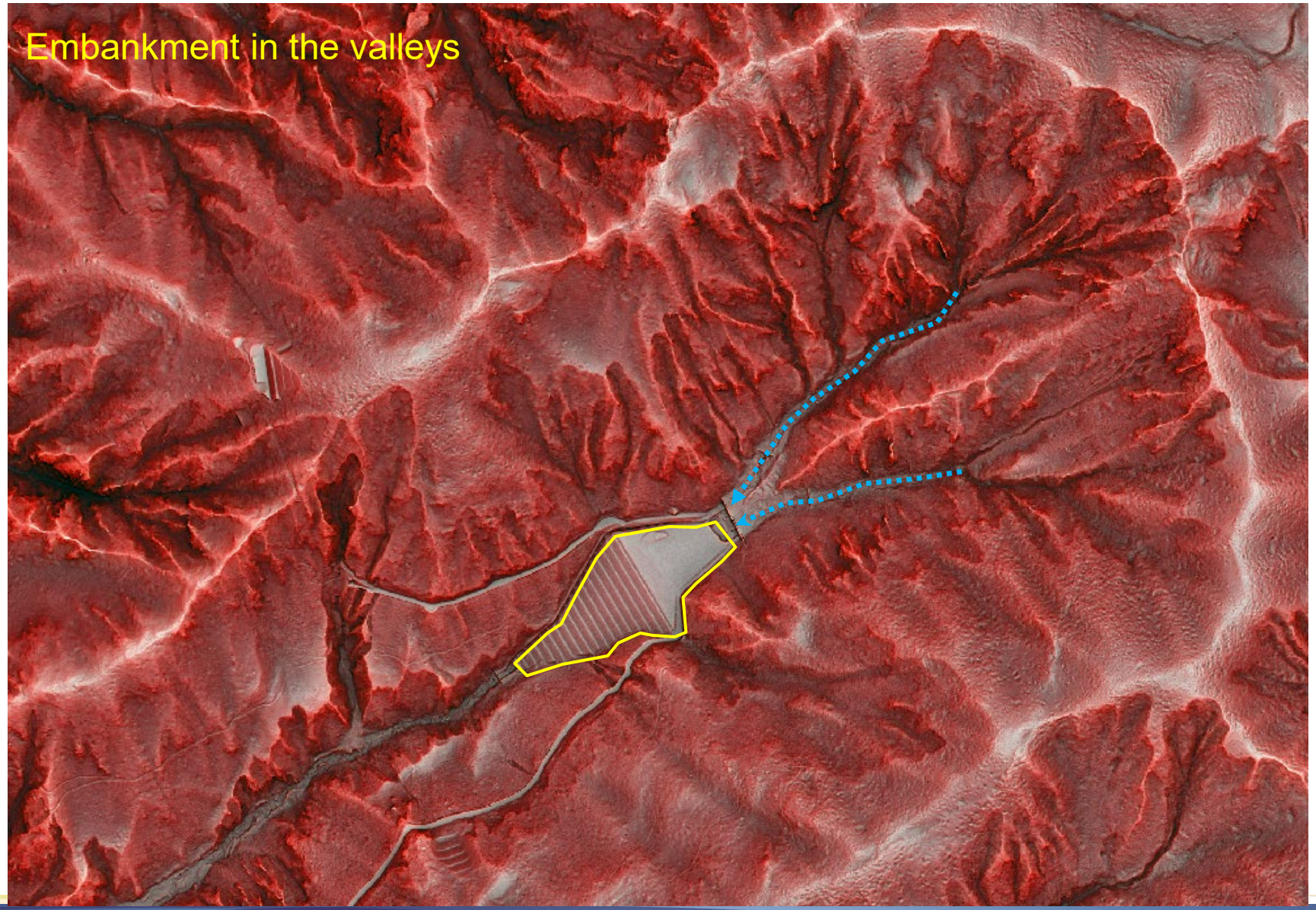
3)Clarification of Responsibilities

4)Effective Penal Measures

【Goals and Effects】

Comprehensively regulate dangerous embankments, etc., and prevent disasters associated with embankments, etc.

In particular, be careful of valley fill embankments where water collects.



MORIDO in Japan(embankment、Fill、Landfill)

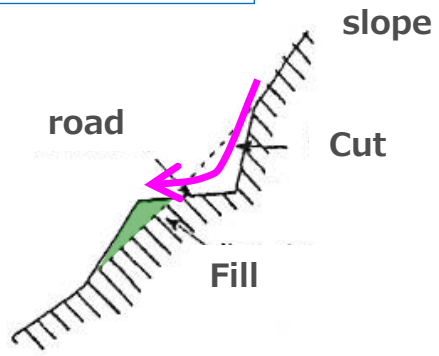
In Japan, embankment disasters have occurred due to large earthquakes and heavy rains.

In Japan, many embankments are made with high quality control and technology.

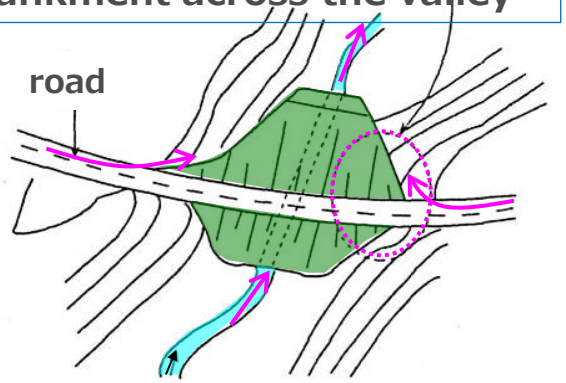
But Water may seep into the embankment and deteriorate.

In addition, there are some embankments that are not technically managed.

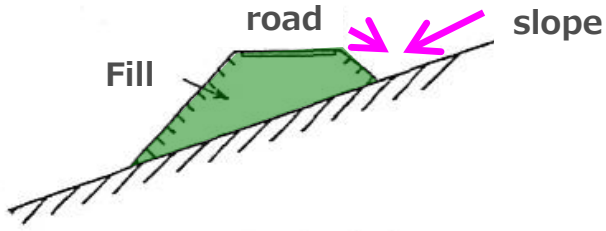
Cuts and fills



Embankment across the valley

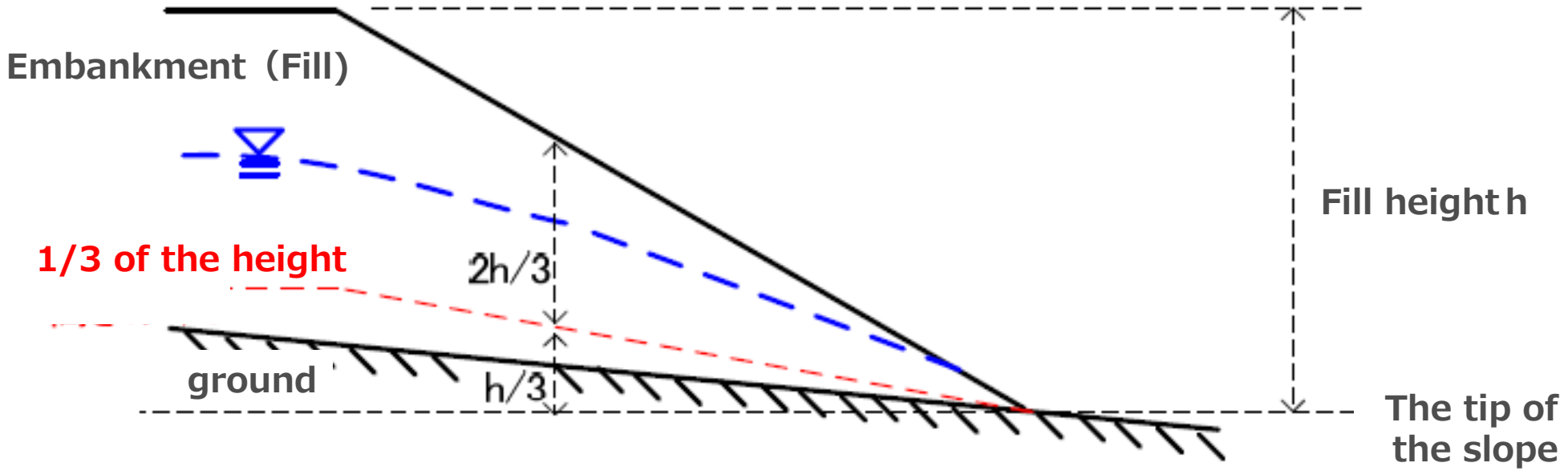


Embankment on a slope



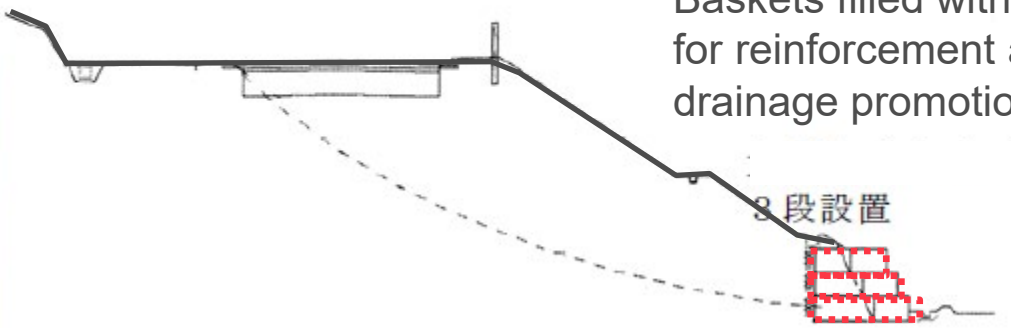
Embankment lowers groundwater levels and improves safety

If the groundwater level in the embankment is higher than 1/3 of the height above the threshold, it is ”high”. Groundwater levels above 1/2 are more likely to collapse in the event of an earthquake.



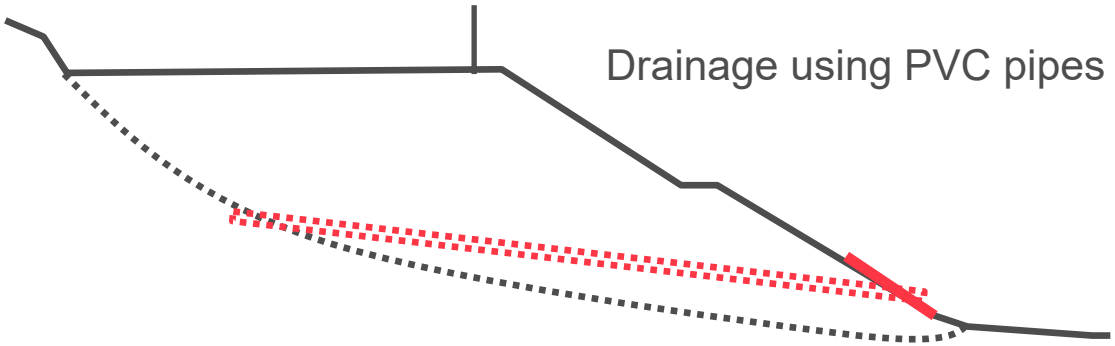
Measures for Existing embankments

①Example of installation of a basket filled with large stones in the buttocks of the law



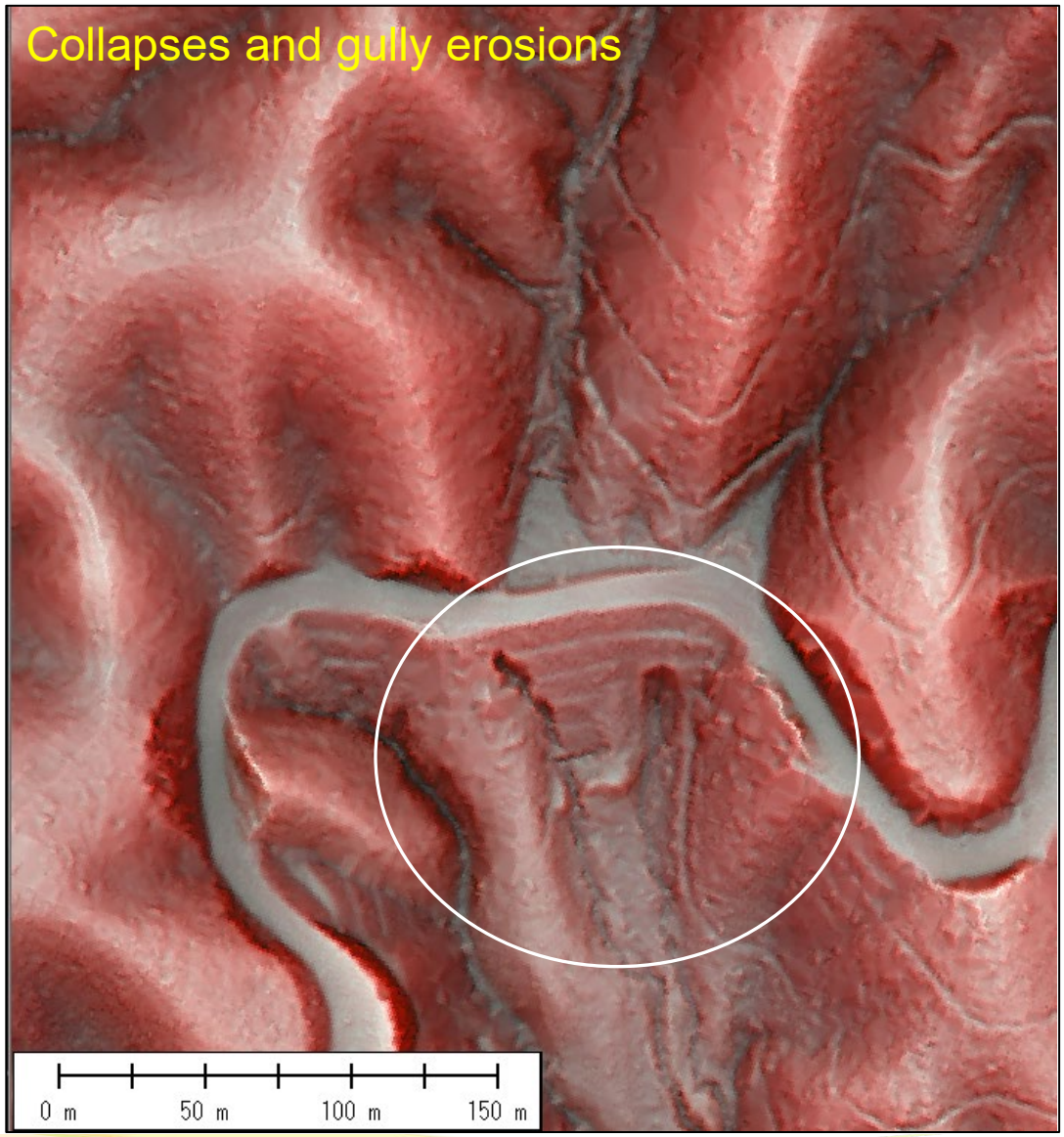
Baskets filled with stones for reinforcement and drainage promotion

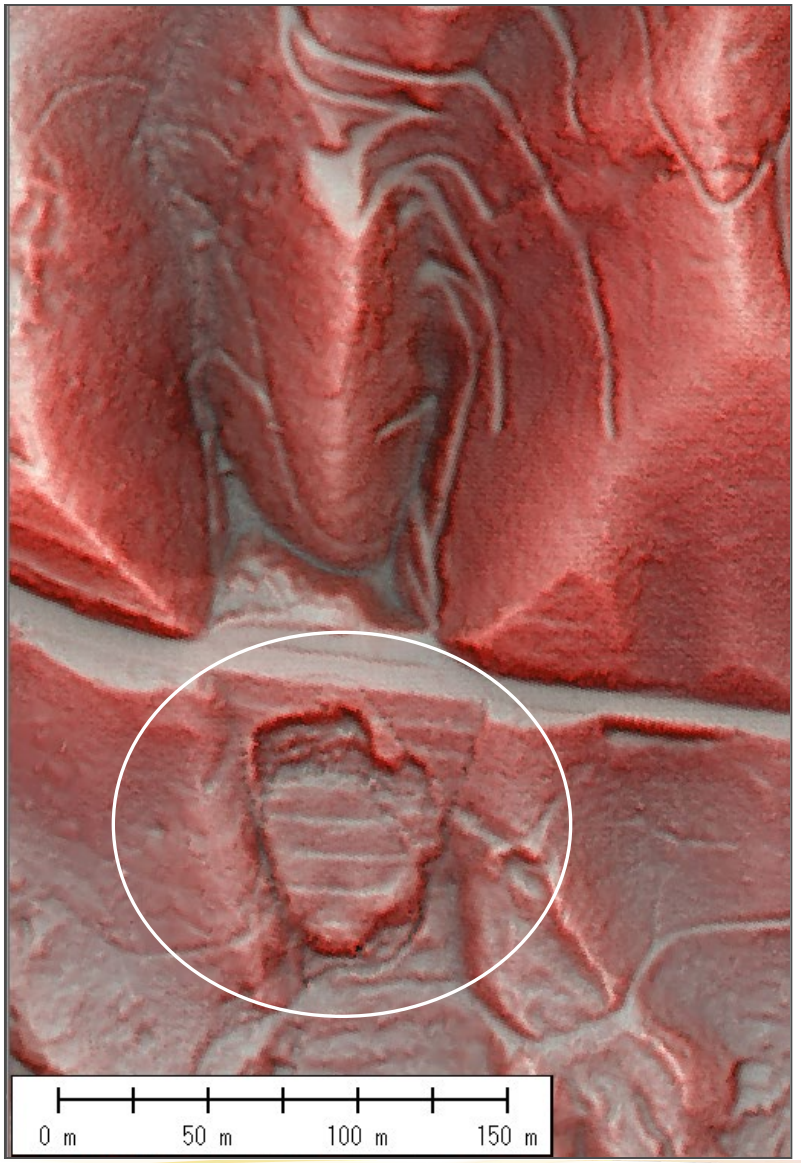
②Example of drainage boring



Drainage using PVC pipes

RRIM can check the deformation of the slope surface of the embankment.(ex.road)





Summary

- Embankments that are not public facilities must be managed by the landowner. When dangerous embankments on private land become a source of catastrophe, they cannot be ignored.
- The cause of the collapse of the embankment is the water flowing into it. To reduce collapse, it is important to lower the water level in the embankment. Pay particular attention to the water level on the toes of the slopes.
- By mounding the soil, the groundwater level rises. The performance of the embankment can be improved by providing sufficient drainage equipment.
- Embankments need to be inspected and repaired regularly.
- RRIM, which can represent detailed topography, is an effective tool for accurately extracting embankment and other disaster risks.

AAS analyzes and provides high-quality geospatial data from digital sensors mounted on aircraft, satellites, and other devices.

Thank you

We would like to challenge further technological innovation together with you.

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