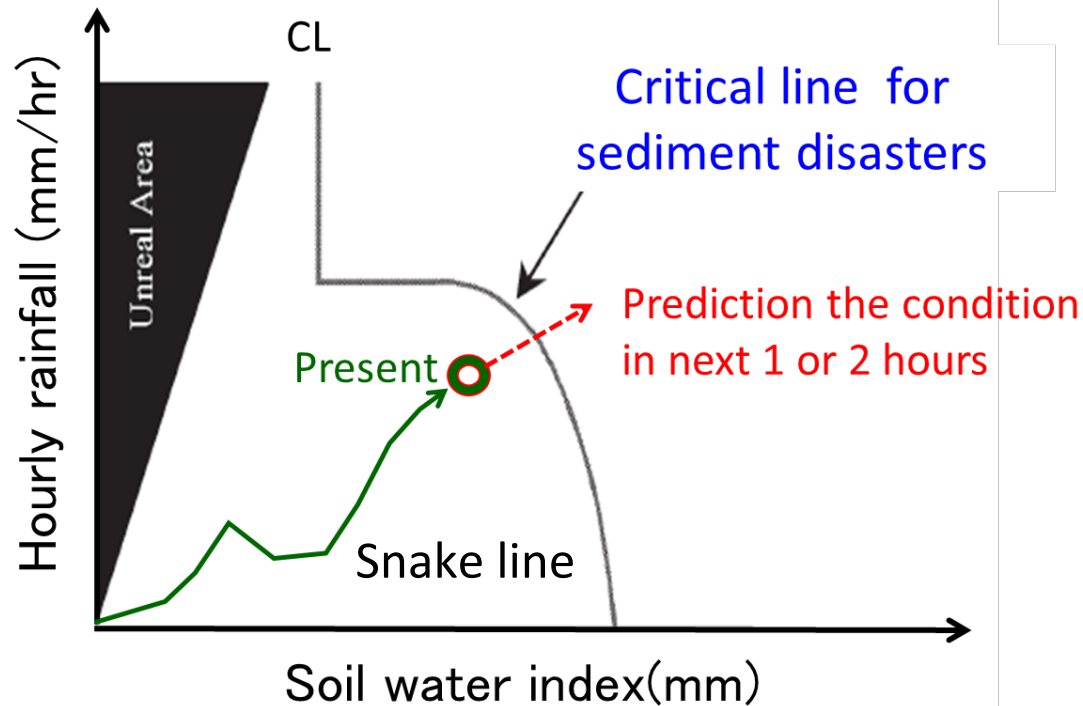


Warning Information by a Critical Line Method

Masaharu FUJITA

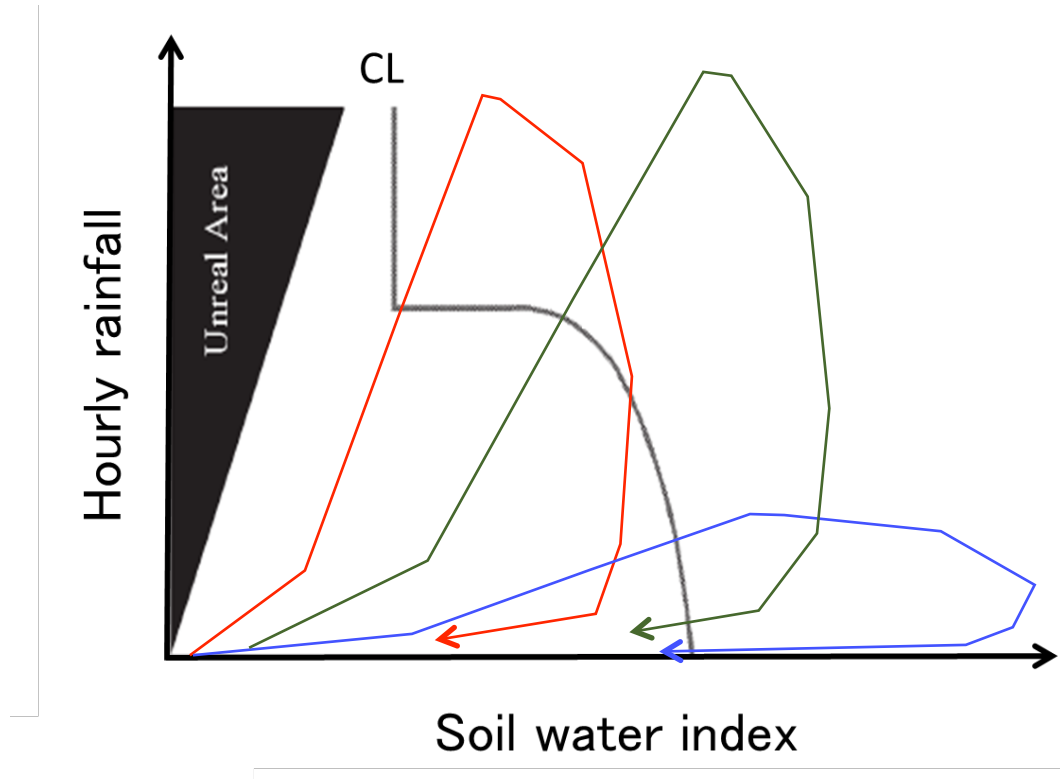
Disaster Prevention Research Institute, Kyoto University

The existing warning alert method



Meteorological Agency and local government issue the sediment disaster alert in Japan.

A snake line expresses the process of sequential hazards

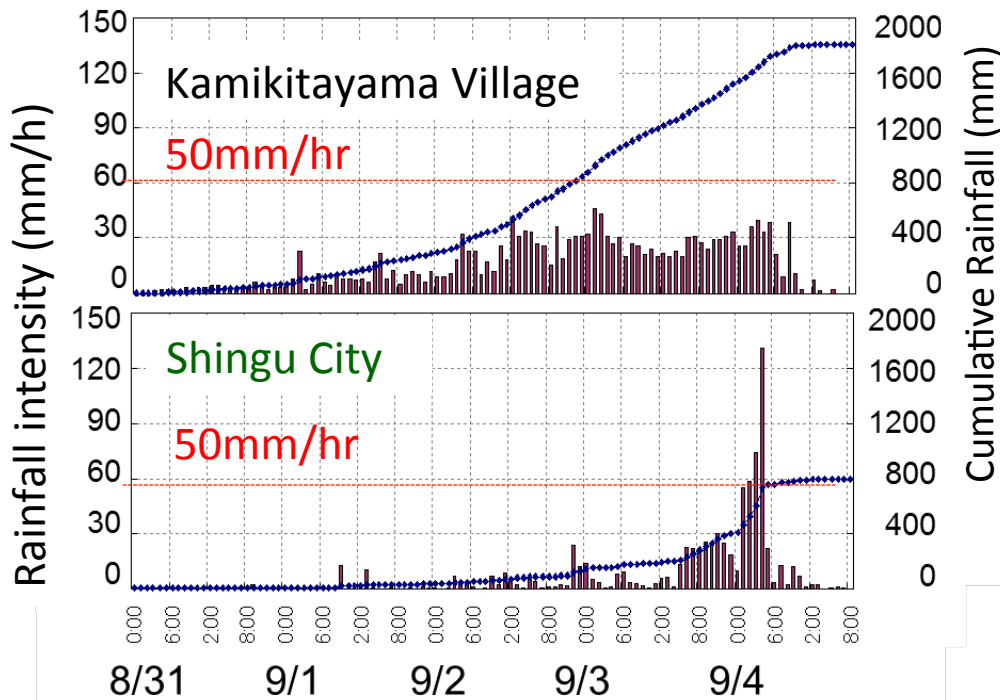


Only whether `sediment disaster risk is high or low is informed. However, actually this figure includes much information on sediment and water hazards.

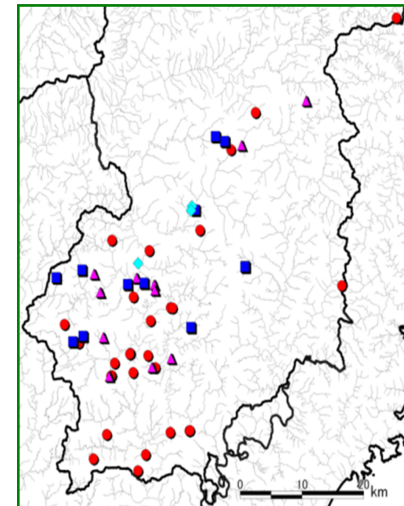
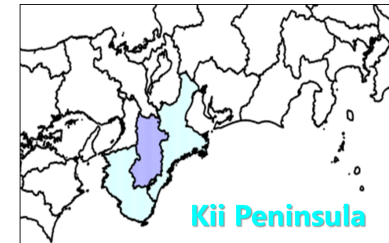
Example 1

Sediment Disasters in Kii Peninsula due to Typhoon TALAS

Rainfall intensity and cumulative rainfall in 2011



A report by JSECE



A large number of **deep seated landslide** in Nara Prefecture

Example 2

Sediment disasters in Izu-ohshima, 2013



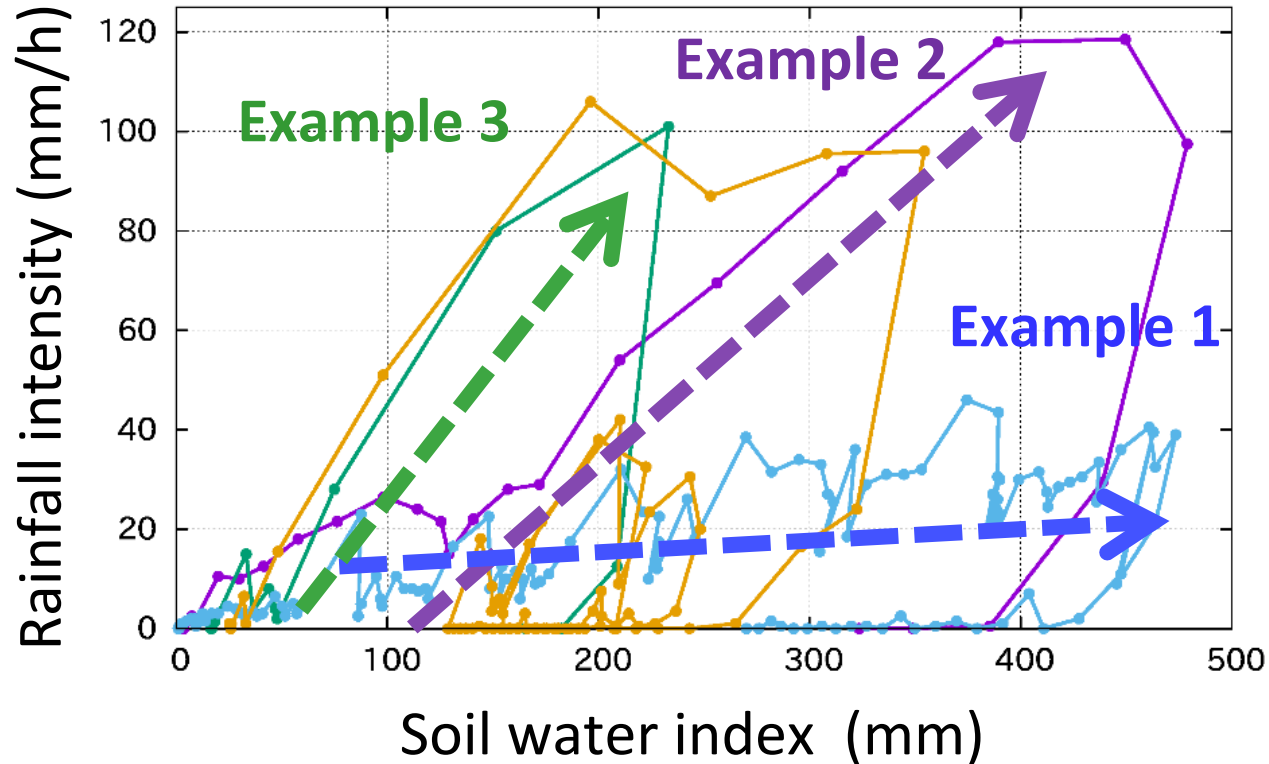
Shallow landslides in the wide area and **huge floods** with sediment and woody debris **in short time**

Example 3

Sediment disasters in Hiroshima city, 2014



The snake lines



Example 1 (Kii Peninsula): Strong and 2 to 3 days

Deep-seated landslide

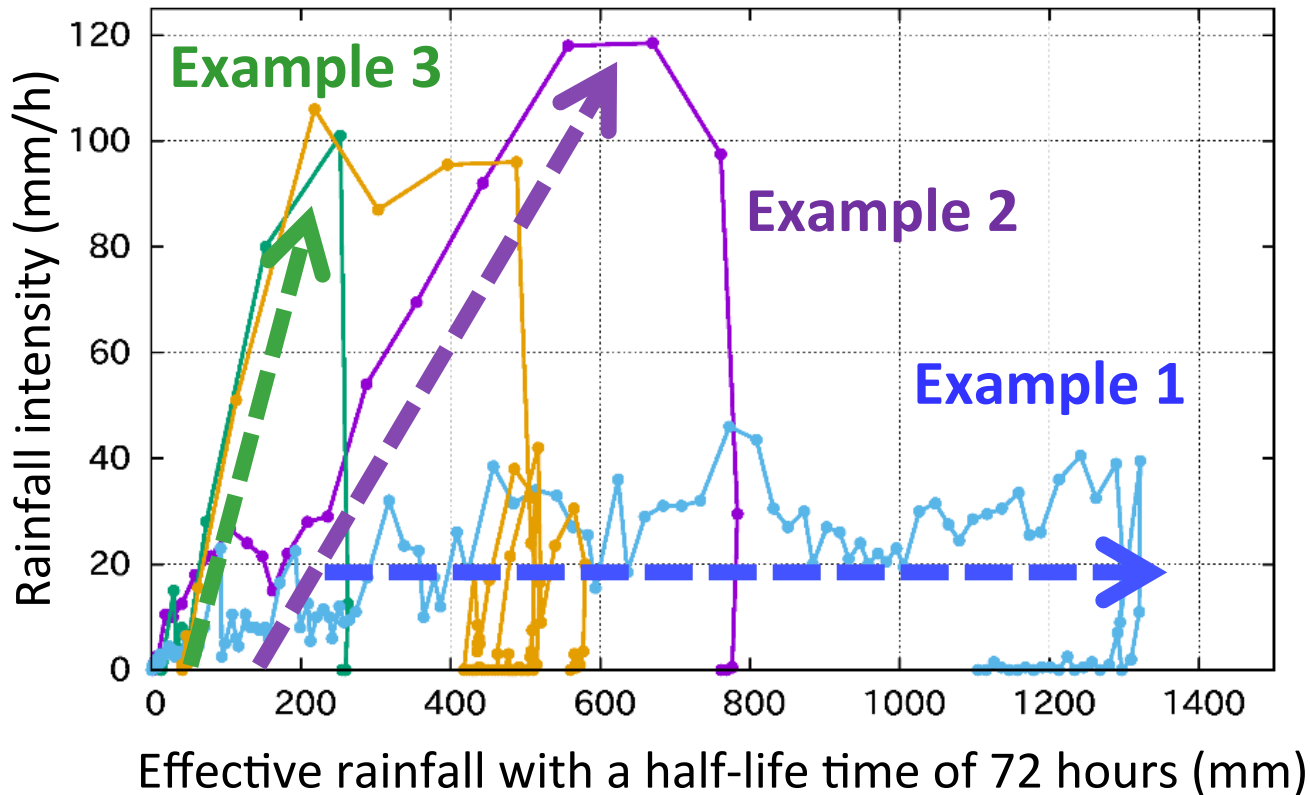
Example 2 (Izu-ohshima): Very strong, quick increase and 6 hours

Shallow landslides and huge floods

Example 3 (Hiroshima): Very strong, quick increase and 3 hours

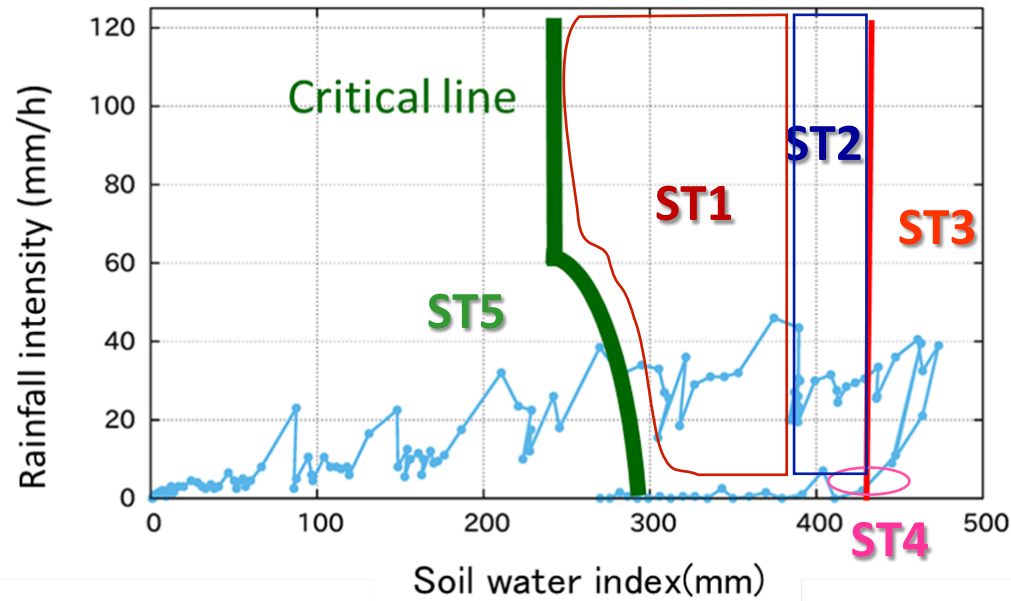
Sudden landslides and debris

Effective rainfall of a half-life time



- Example 1 (Kii Peninsula): Strong and 2 to 3 days
Deep-seated landslide
- Example 2 (Izu-ohshima): Very strong, quick increase and 6 hours
Shallow landslides and huge floods
- Example 3 (Hiroshima): Very strong, quick increase and 3 hours
Sudden landslides and debris

Sediment disasters in Kii Peninsula, 2011



Stage 1: Difficult evacuation due to small debris flows, rock falls, local inundation

Stage 2: High risk of large scale landslide and huge flood

(Bank erosion, Bridge flushed)

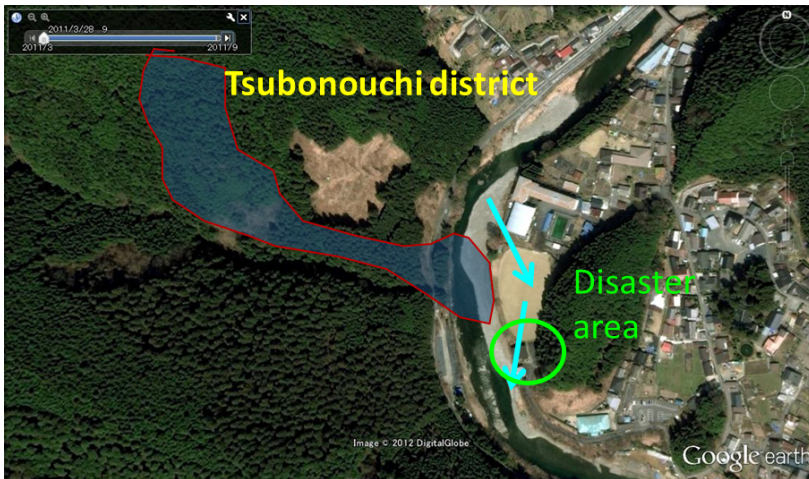
Stage 3: High risk of deep-seated landslide and huge flood by the collapse

Stage 4: Still high risk of deep seated landslide

Stage 5: Safe condition

At the Stage 3, hazards due to deep-seated landslides come from all directions.

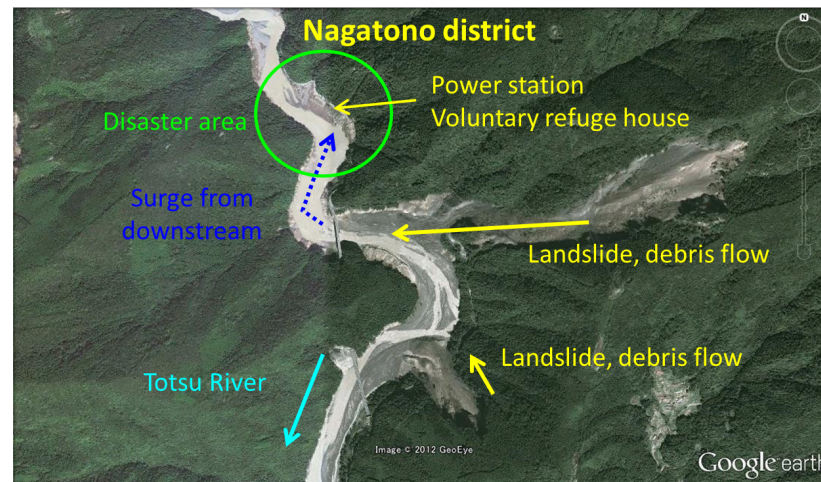
From upstream



Hazard from ahead



Hazard from downstream



Another utilization of snake line

Single location:  A rain gauge

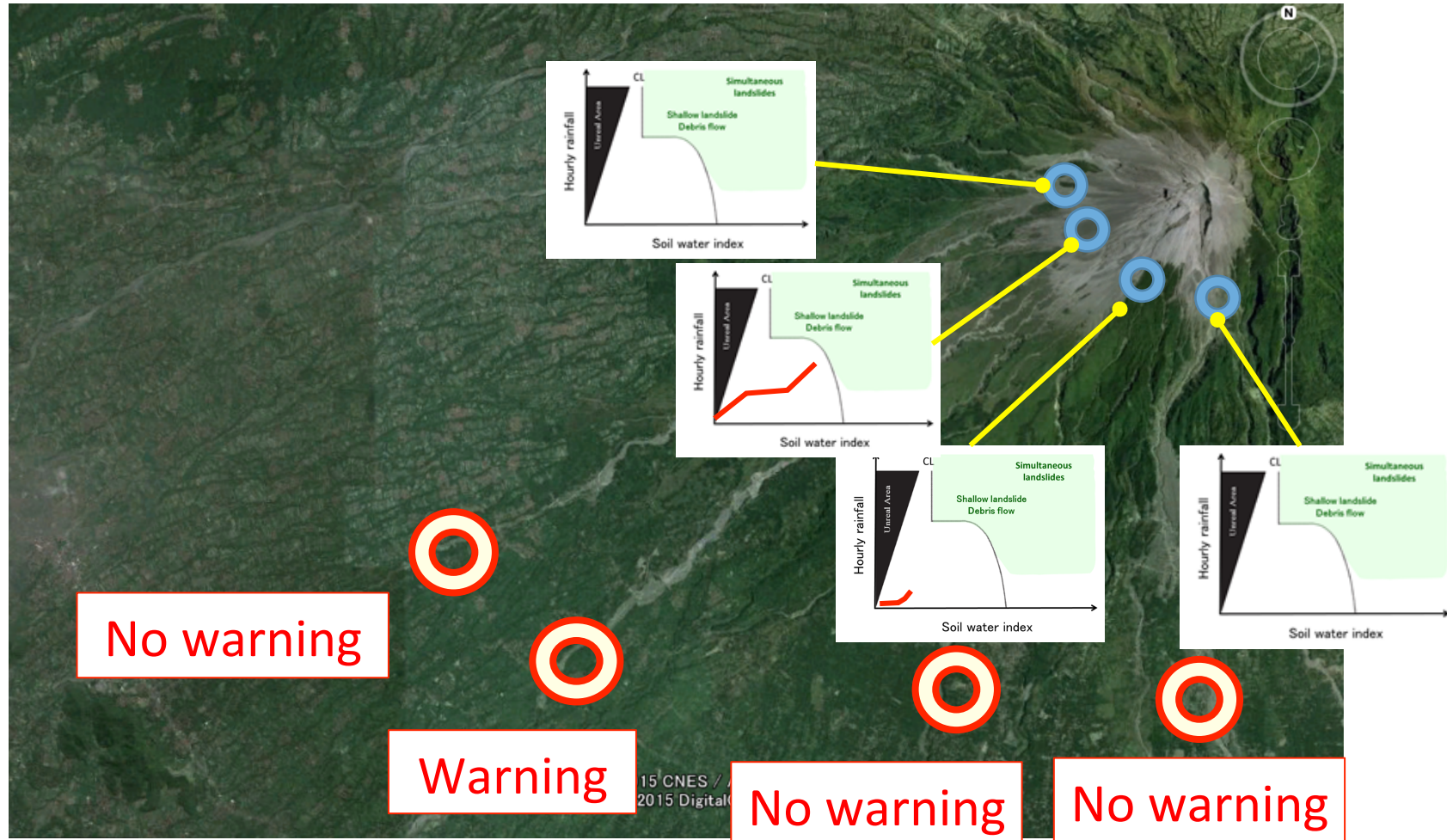
Information on sediment and water hazards **in the location**

Multi locations:  A X band MP Radar

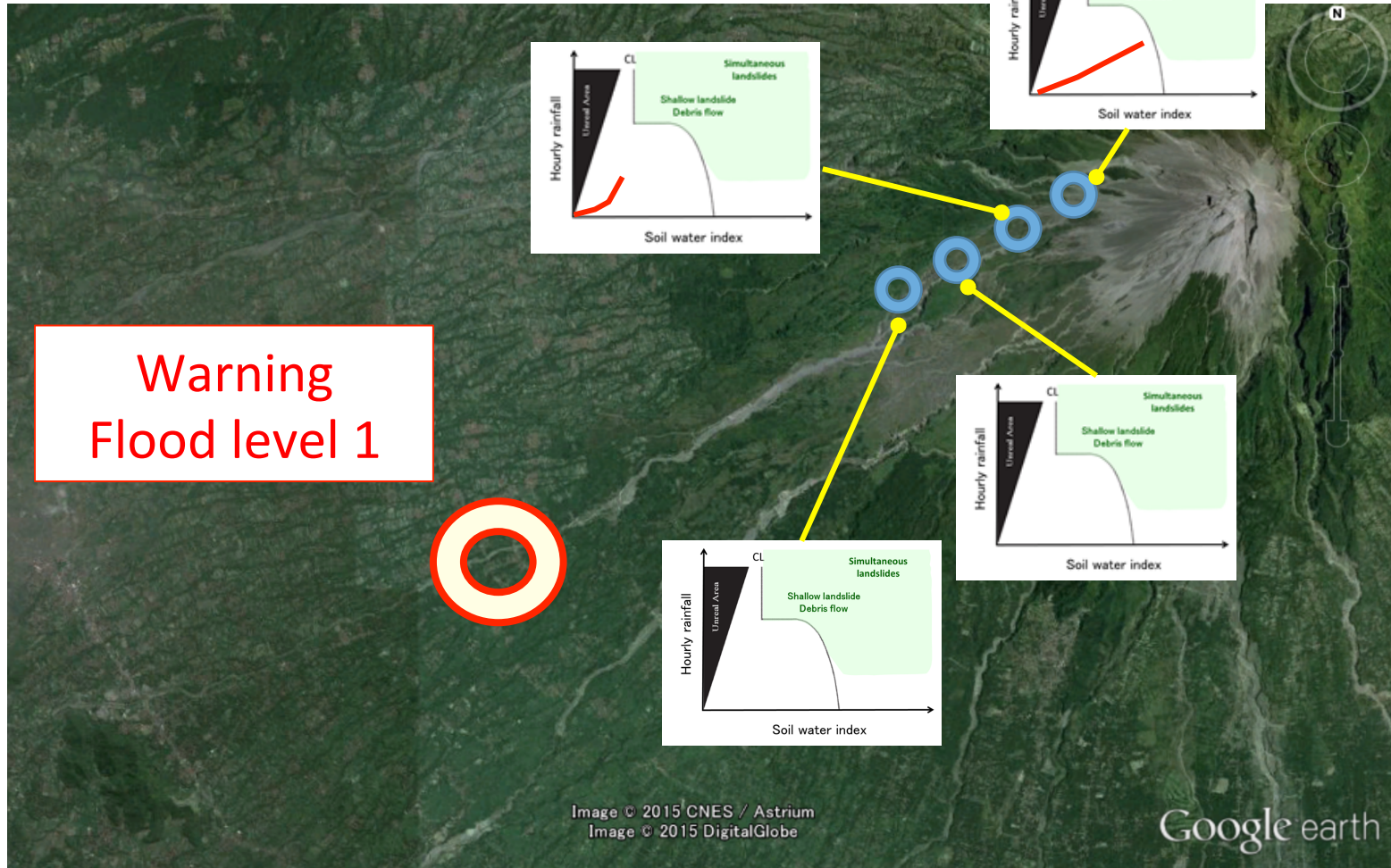
Information on sediment and water hazards **in a basin scale**

Information on **lahar level**

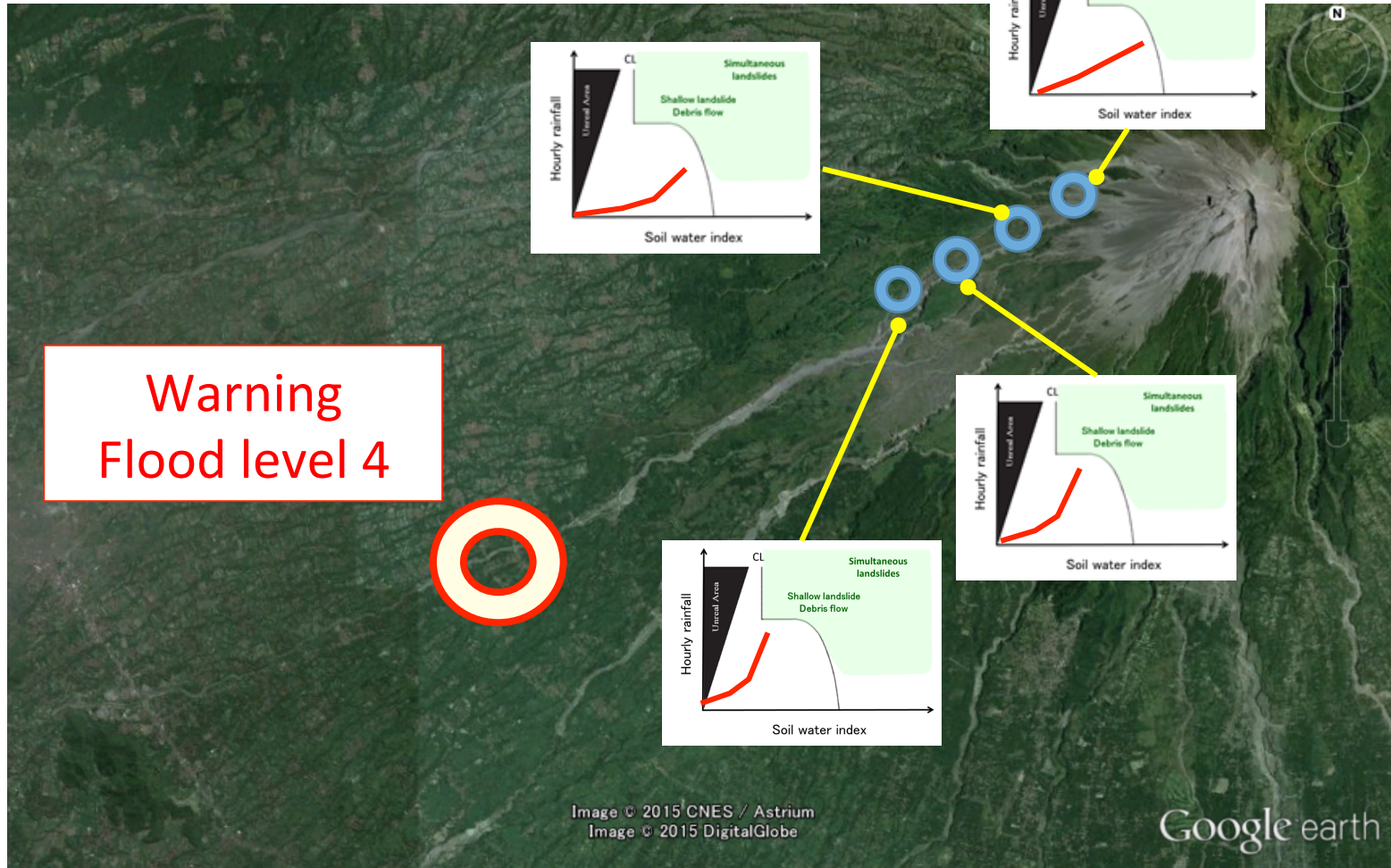
How to utilize the rainfall data by X band MP Radar



How to use the rainfall data by X band MP Radar



How to use the rainfall data by X band MP Radar



Conclusions

- Snake lines express the feature of sequential sediment/water related hazards.
- Sediment disaster information should be based on the features.
- X-band MP radar can provide a special distribution of rainfall. Using the data, we can provide much more detailed sediment disaster information.

Thank you for kind attention!