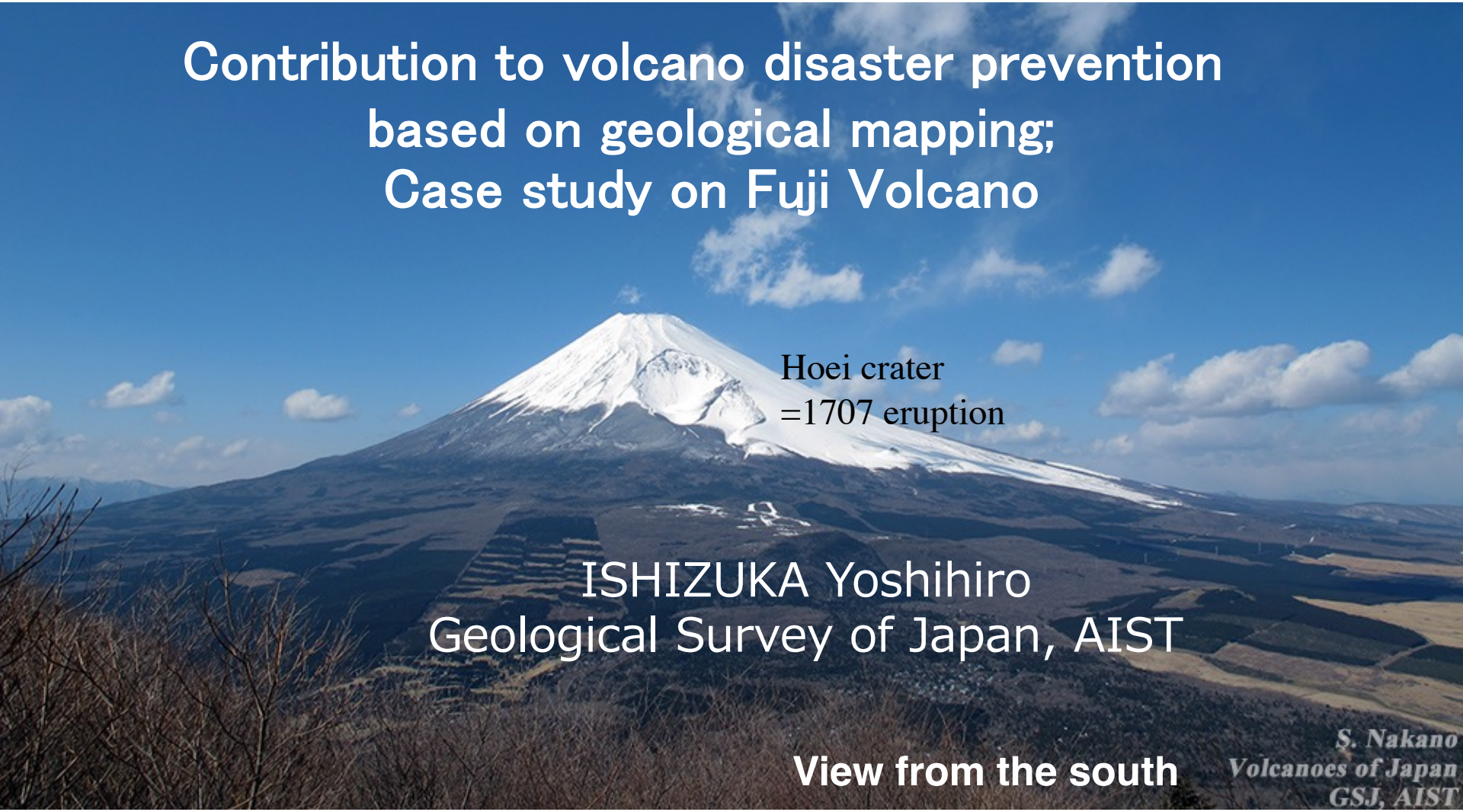
Contribution to volcano disaster prevention based on geological mapping; Case study on Fuji Volcano



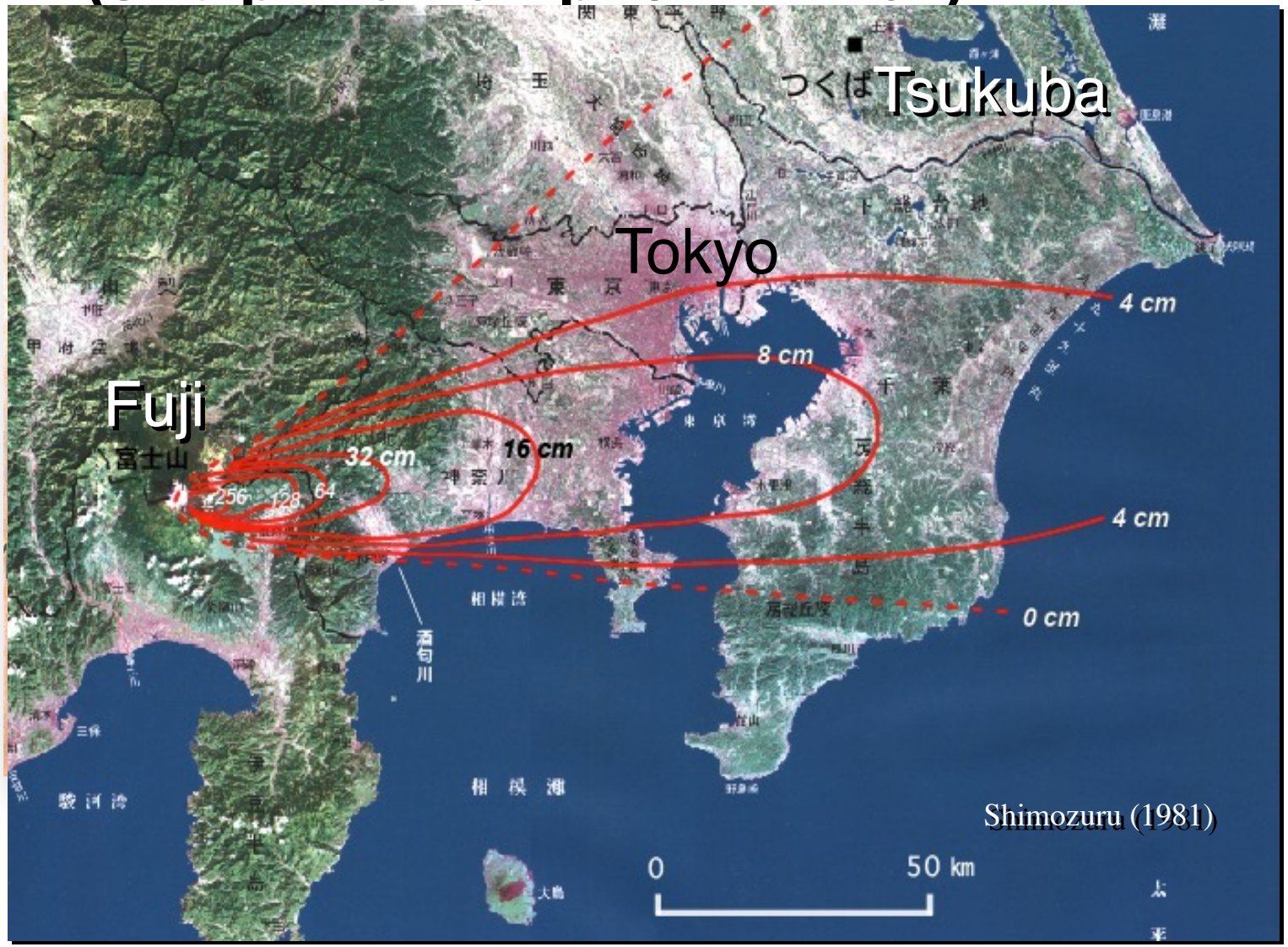
View from the south

ISHIZUKA Yoshihiro
Geological Survey of Japan, AIST

Fuji Volcano

Highest in altitude
Biggest in volume
→ 300,000 climbers/year (July to September)

Last eruption occurred at SE flank (sub-plinian eruption in 1707)



Research system for volcanoes in Japan

Scientific Research

National Institute

Geological Survey of Japan (GSJ)

National Research Institute for Earth Science and Disaster Prevention (NIED)

Meteorological Research Institute

And others

Universities

Earthquake Research Institute (ERI) of Univ. Tokyo

Disaster Prevention Research Institute (DPRI) of Kyoto Univ.

Other universities

ADVICE

Disaster prevention authority

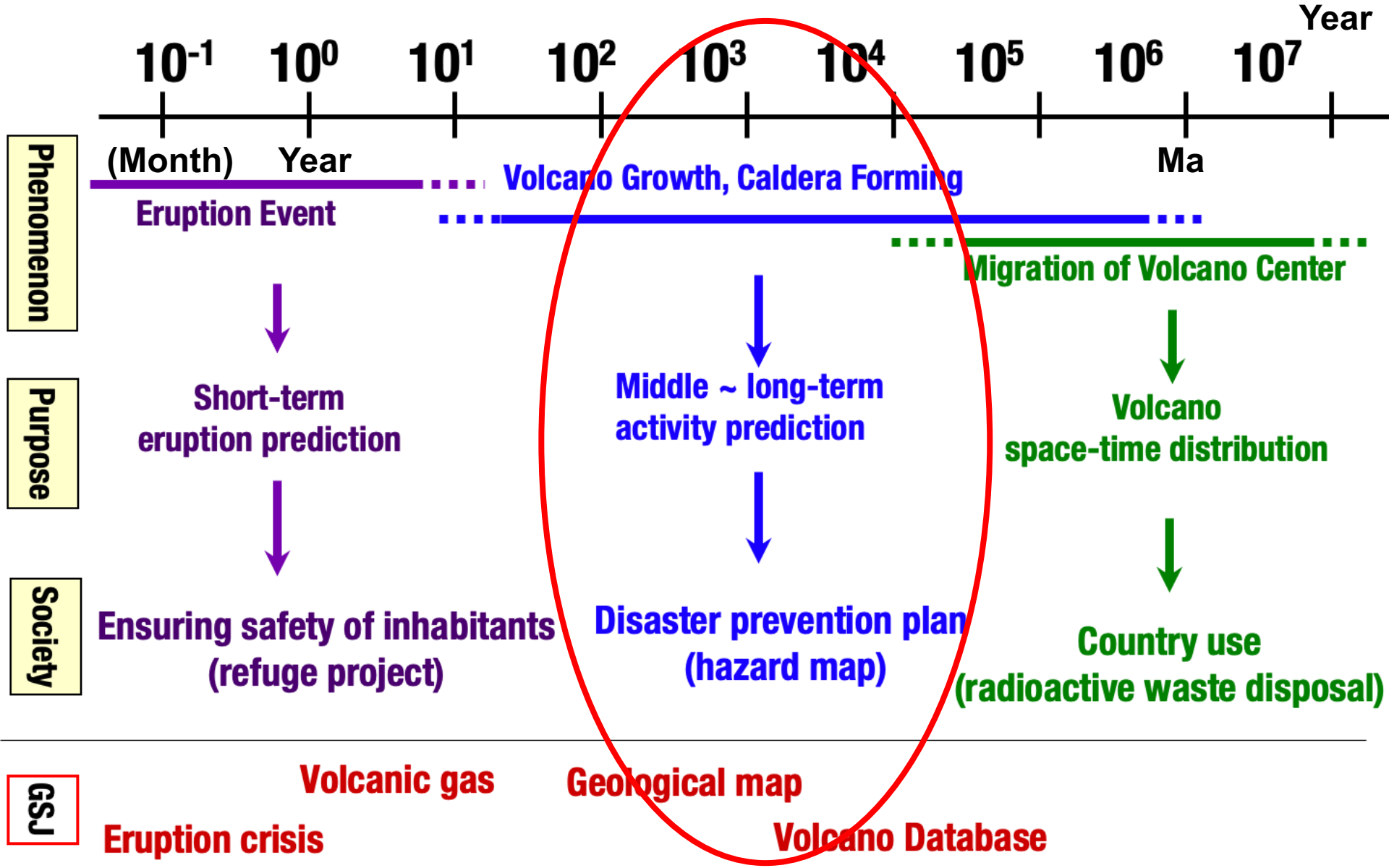
Monitoring and Alert authority :

Japan Meteorological Agency (JMA)

Evacuation and risk management:

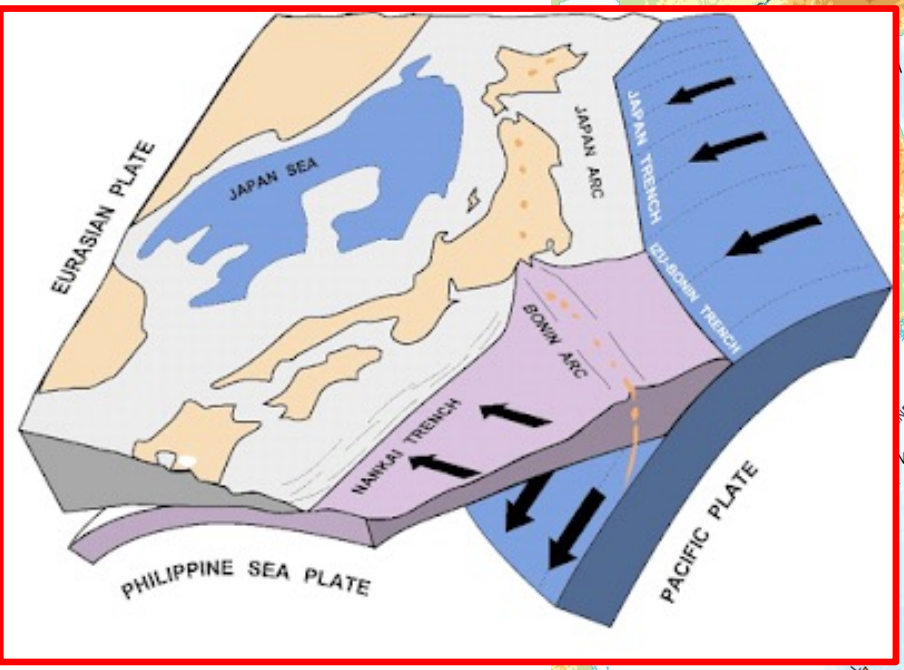
Local Government

Study volcanic phenomena on various time scales



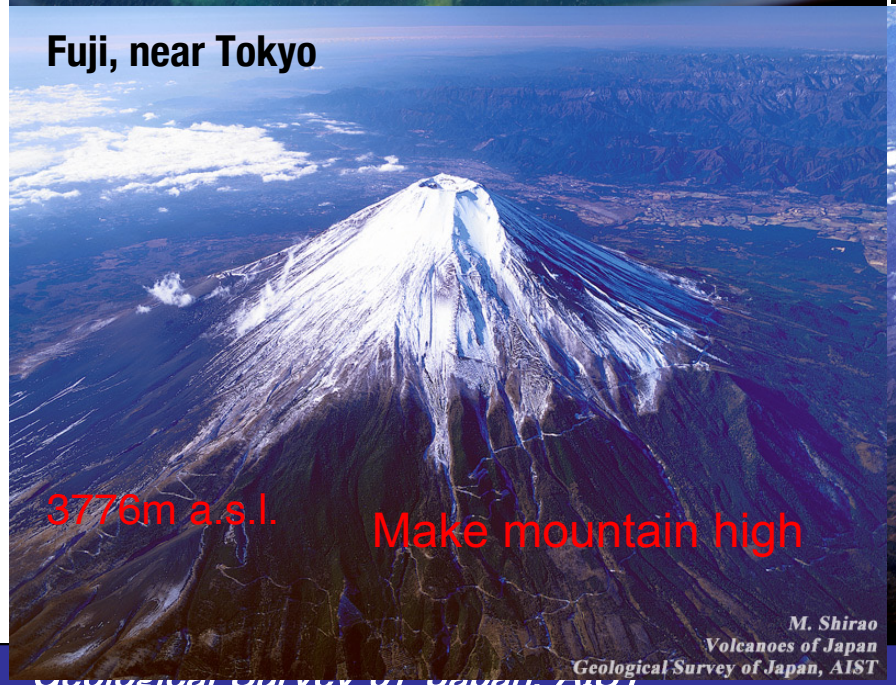
Volcanoes in Japan

- More than 460 Quaternary volcanoes (from 2.6 Ma to present)



Variations of volcanoes in Japan

From basaltic small volcanoes to large silicic calderas



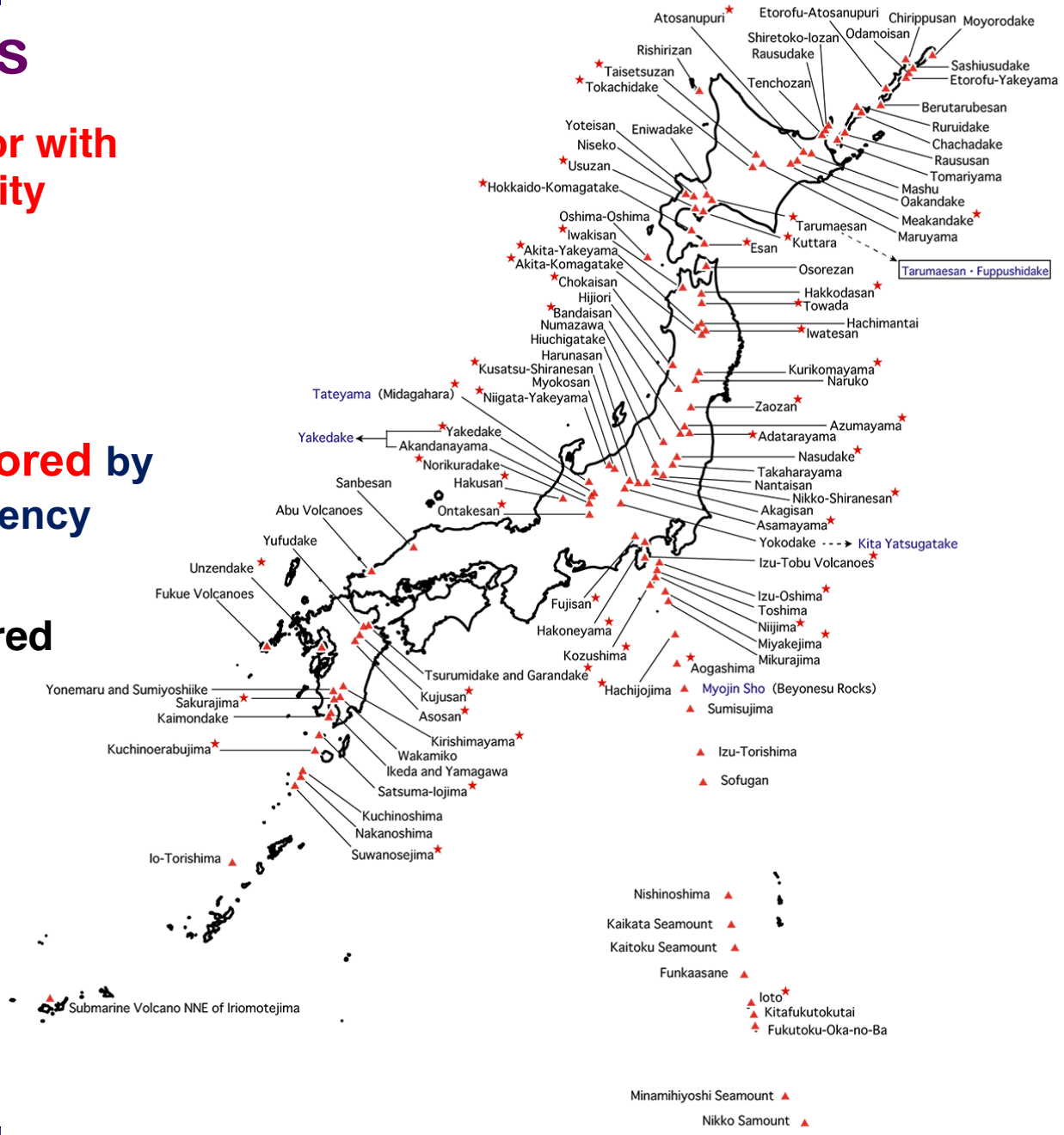
Active volcanoes

= the past 12,000 years or with vigorous fumarolic activity

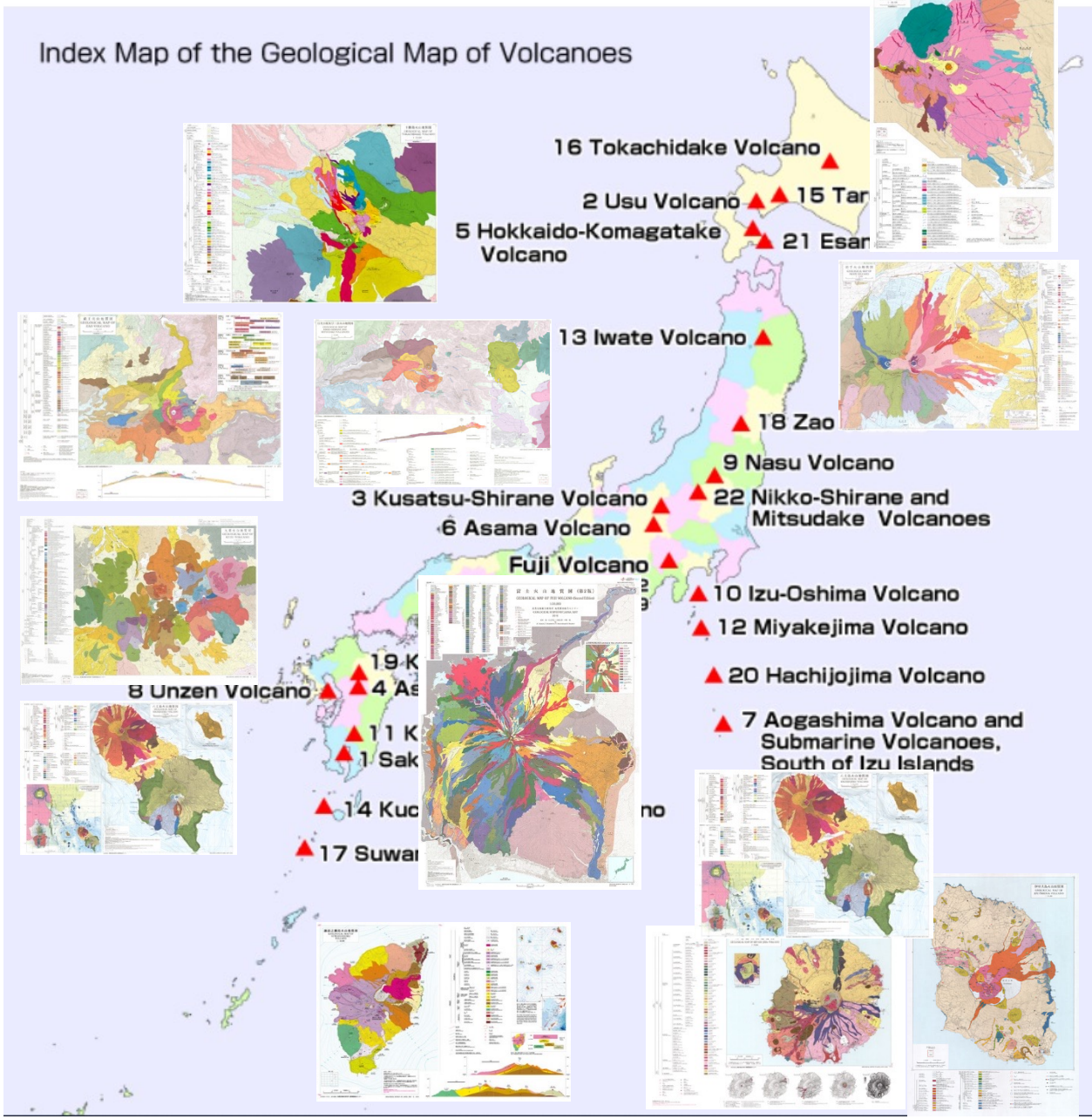
- **111 active volcanoes**

★ Continuously monitored by Japan Meteorological Agency (JMA)

- **50 continuously monitored volcanoes**

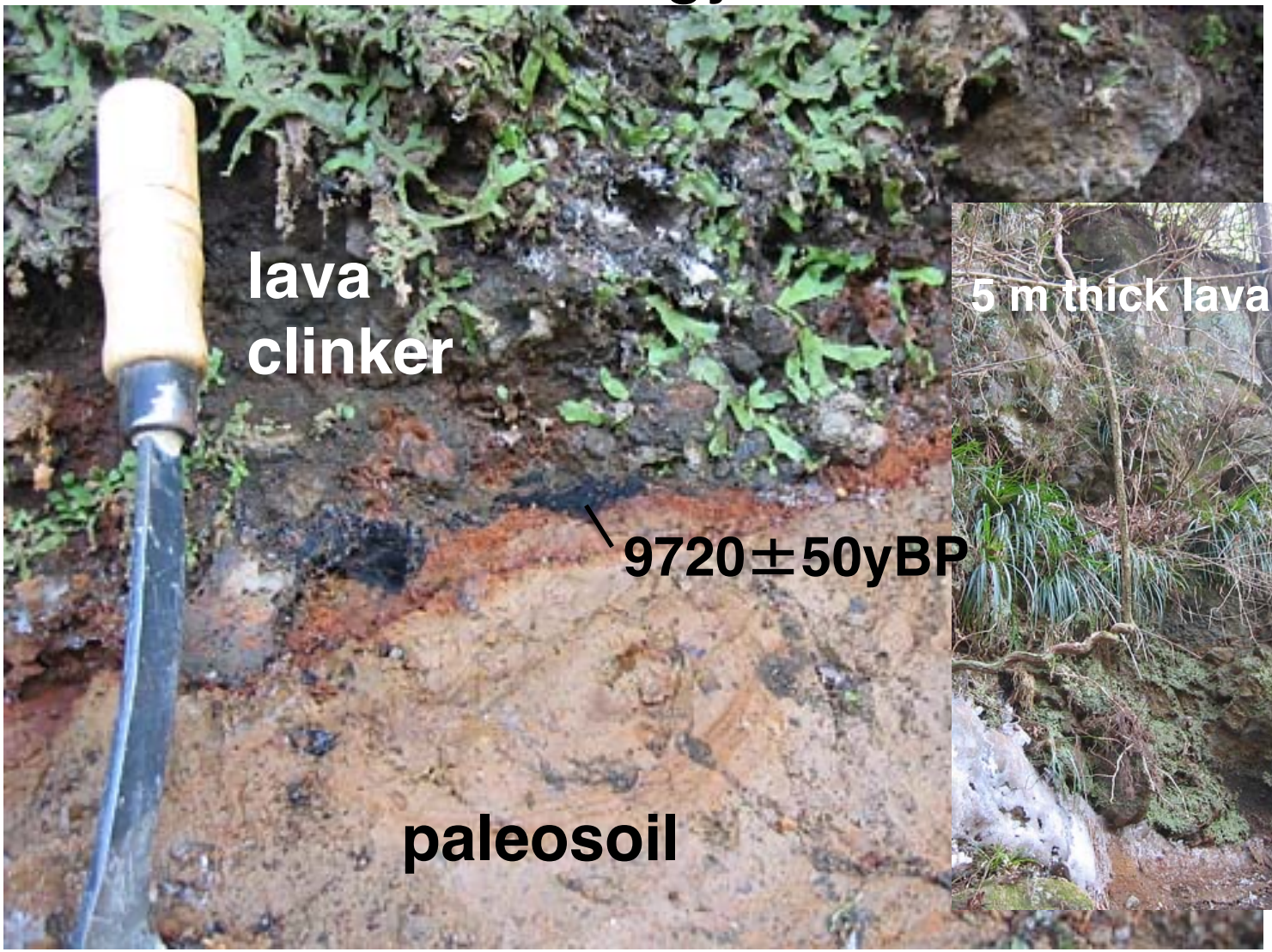


Geological Maps of Volcanoes



Using a small excavator

Chronology in the foot area

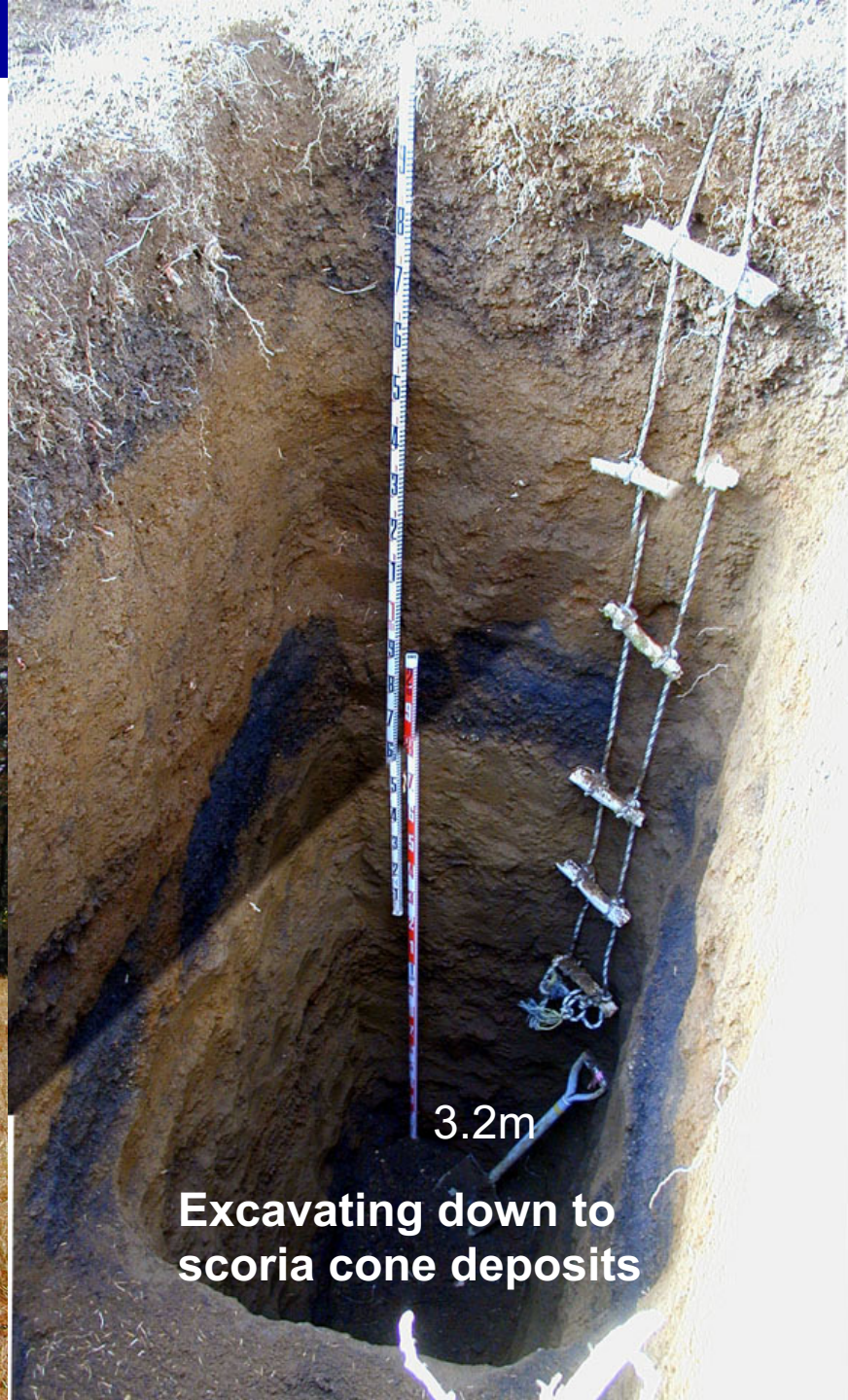


At 146 sites, charcoals/paleosoil were determined the age of eruption for Fuji.

Trench by man power

Can not use excavators

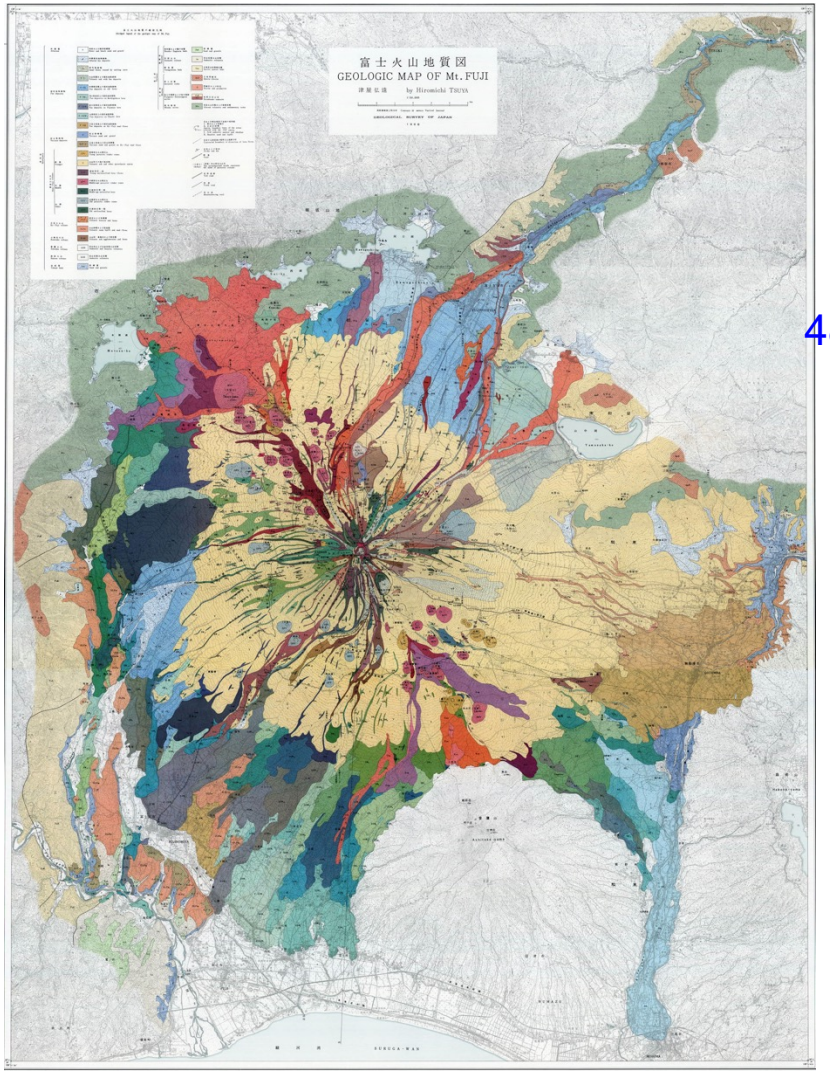
Top of a scoria cone



Excavating down to scoria cone deposits

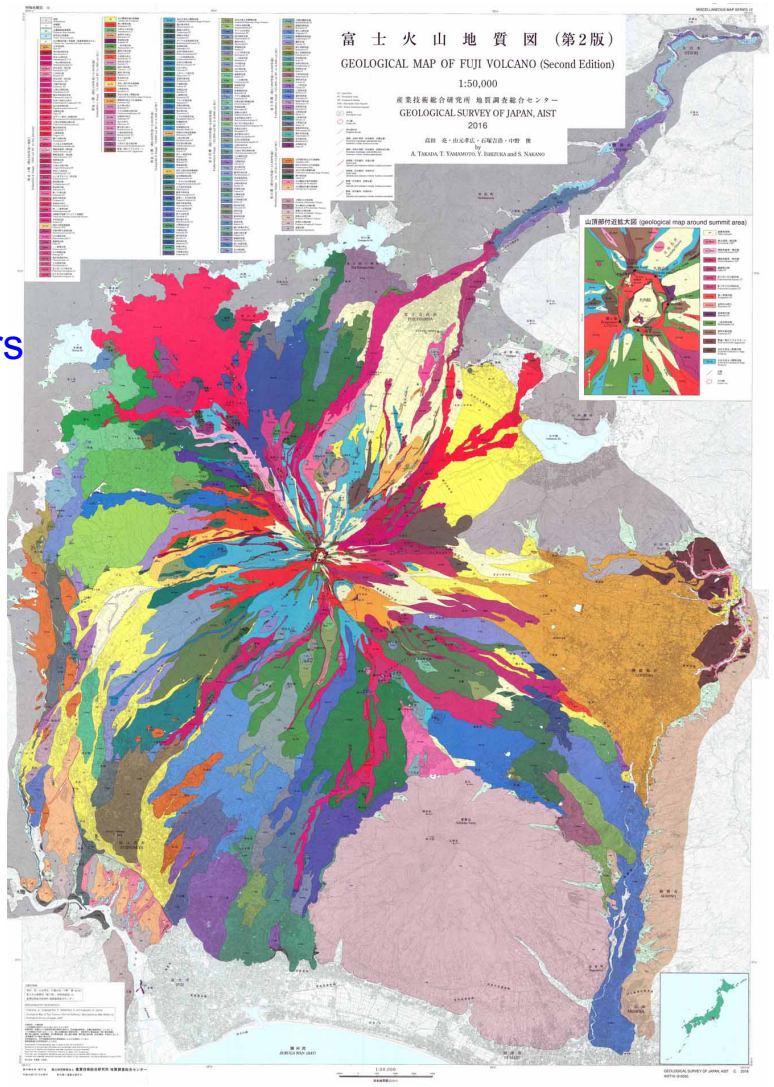
Revised Geological Map of Fuji Volcano

First Edition in 1968

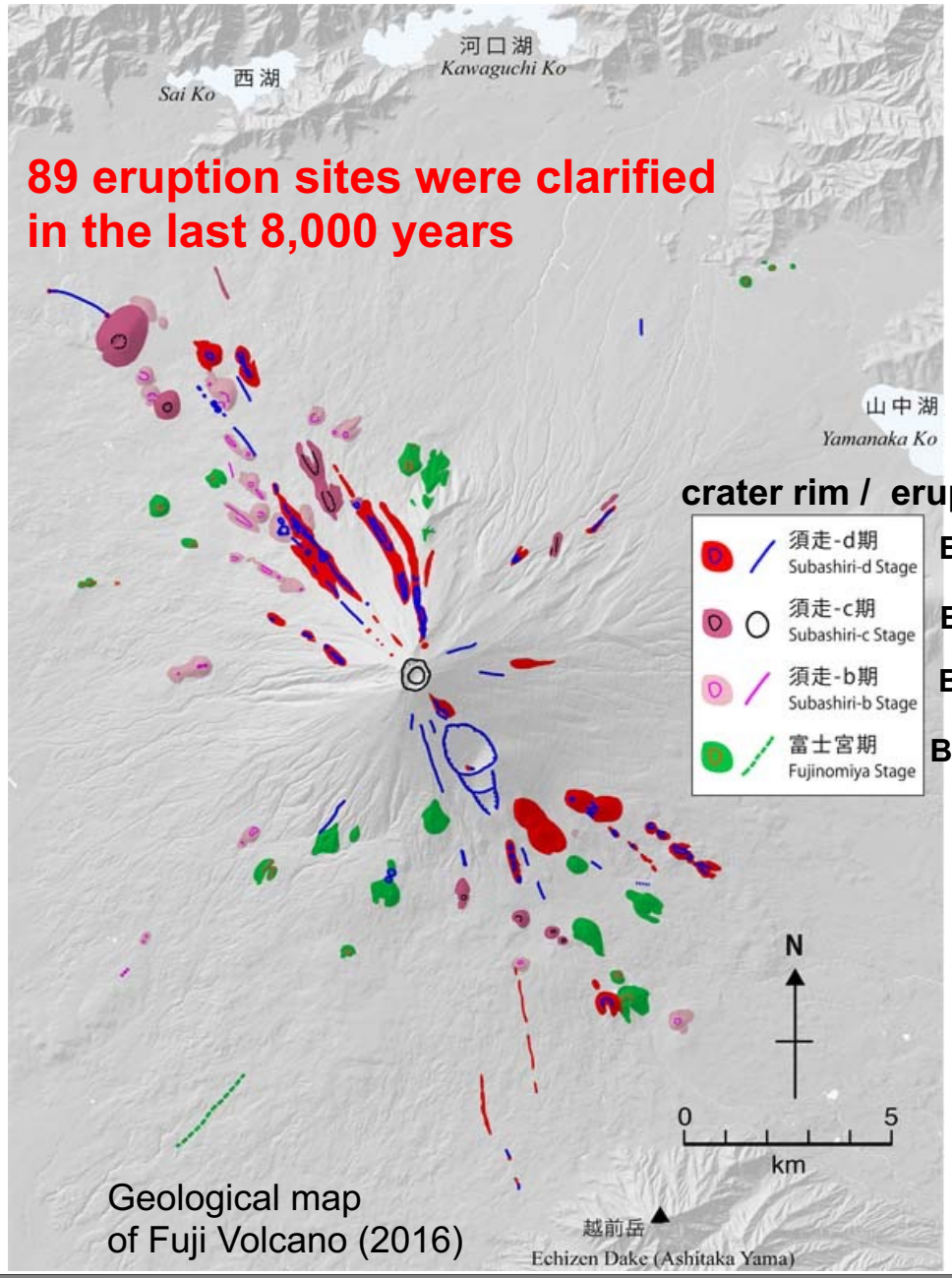


48 years

Second Edition in 2016



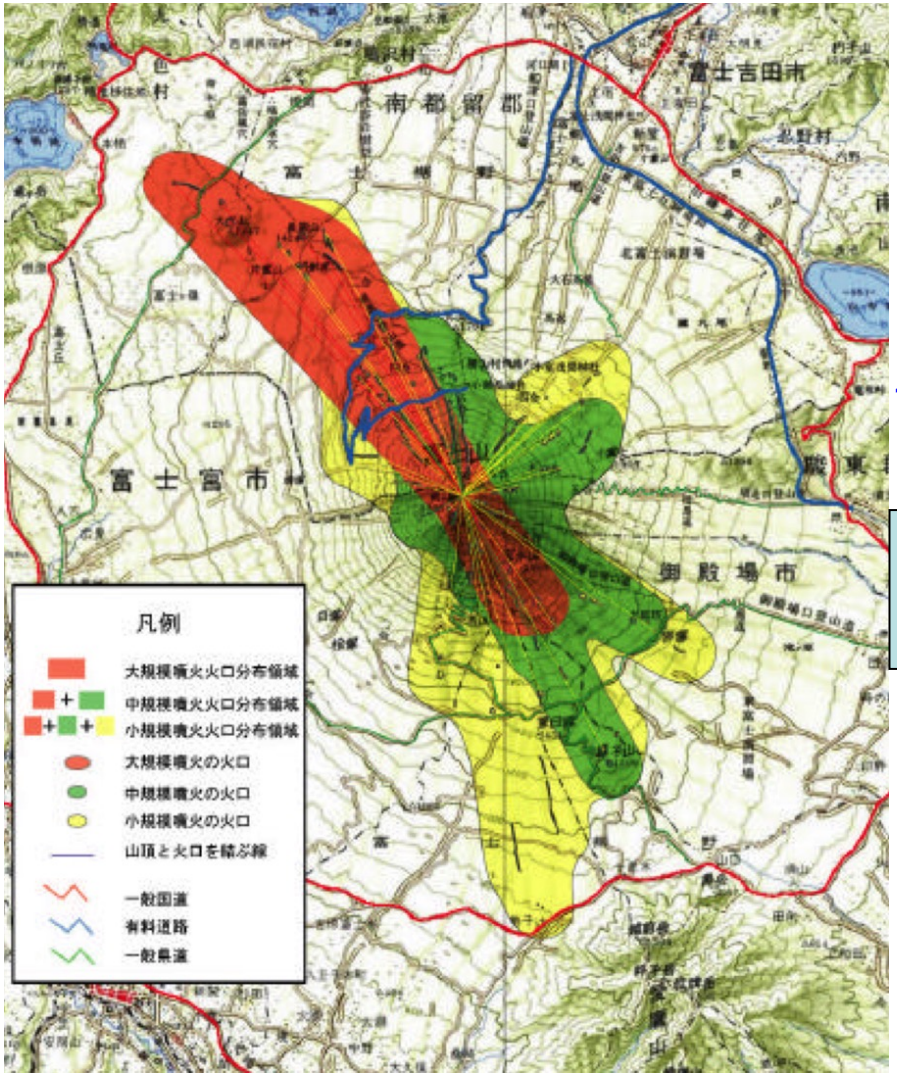
Used for hazard map revision



Geological map of Fuji Volcano (2016)

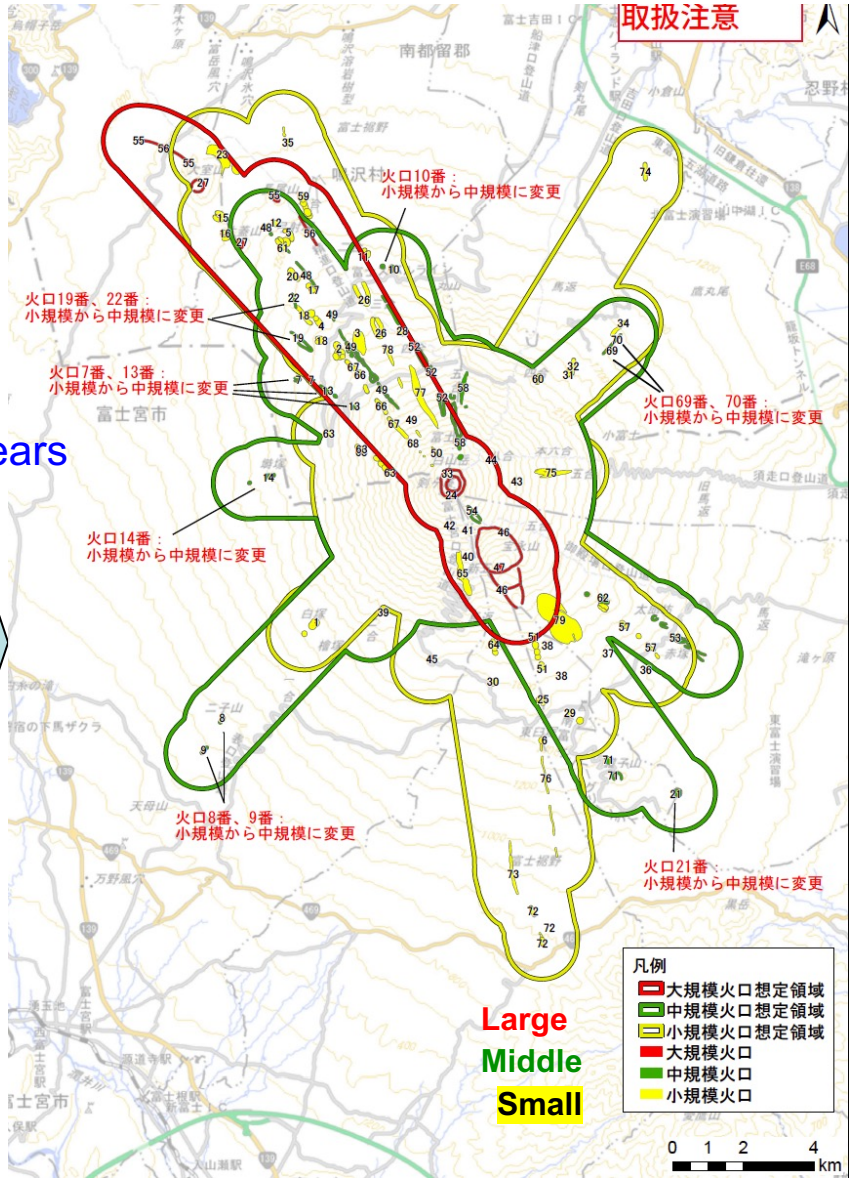
Eruption sites, ages and scales were revised in this geological map, and local governments were reflecting it in hazard map revision in 2021.

Assumed crater area and eruption scale



Cabinet Office（2004）

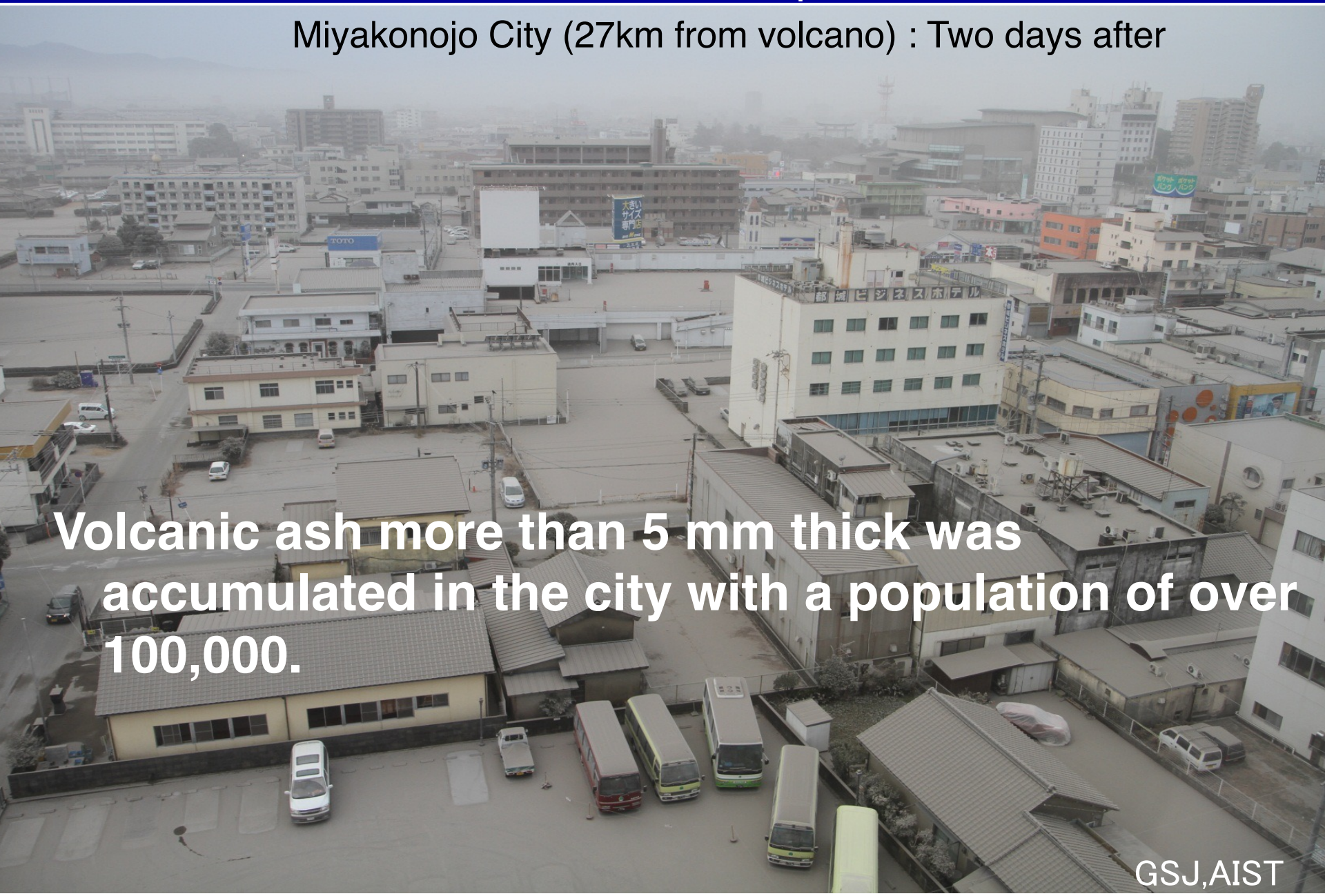
17 years



Revised Hazard map of Fuji Volcano (2021)

2011 Kirishima Eruption

Miyakonojo City (27km from volcano) : Two days after



Volcanic ash more than 5 mm thick was accumulated in the city with a population of over 100,000.

GSJ,AIST

Urgent surveys in eruption crisis

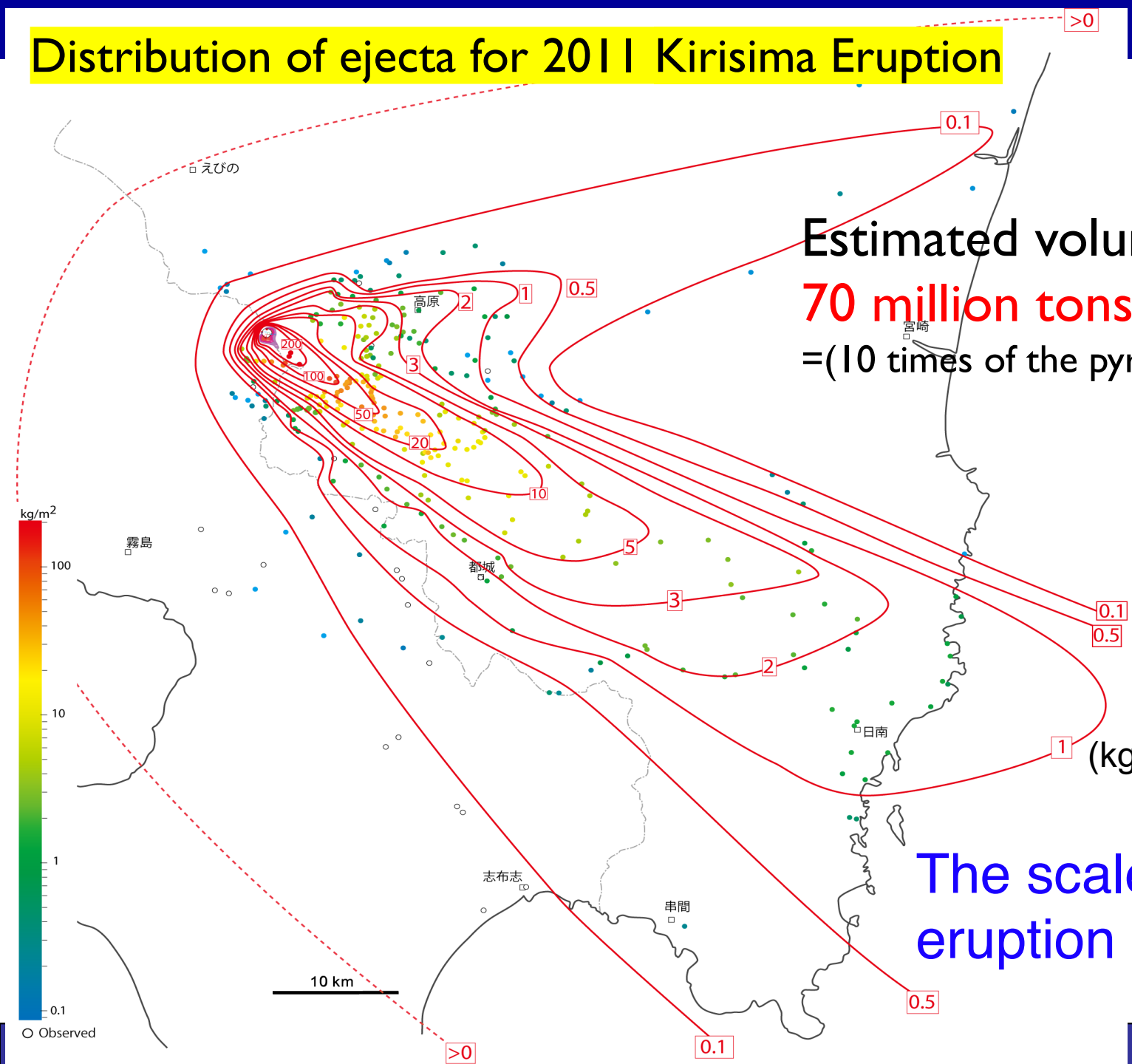
★ **Distribution survey**
- **How large is the eruption?**

★ **Ejecta analysis**
- **Magmatic material involved?**
- **What is the feature of magma?**

Evaluation of eruptive material

Ballistic bombs (broken) and impact crater at proximal area (2km from crater)

Distribution of ejecta for 2011 Kirisima Eruption



Estimated volume about 70 million tons (≒Magma).
=(10 times of the pyramid)

(kg/m²)

The scale of the eruption is”**severe**”.

Ontake Eruption (27 Sep. 2014)

Volcanic disasters

	year	volcano	victims		cause	VEI
1,	2018	Kusatsu-Shirane	1	skier	ballistic bombs	1
2,	2014	Ontake	64	hiker	ballistic bombs	2
3,	1993	Unzen	1	local people	pyroclastic flow	1?
4,	1991	Unzen	43	journalist fireman etc.	pyroclastic flow	3
5,	1979	Aso	3	hiker	pyroclastic flow?	2
6,	1974	Niigata Yaketama	3	hiker	ballistic bombs	1
7,	1962	Tokachidake	5	mining worker	ballistic bombs	3
8,	1958	Aso	12	hiker	pyroclastic flow	1
9,	1955	Sakurajima	1	hiker	ballistic bombs	1
10,	1953	Aso	6	hiker	ballistic bombs	1?
11,	1952	Myojinsho	31	research vessel	phreatomagmatic explosion	?
12,	1950	Asama	1	hiker	ballistic bombs	1
13,	1947	Asama	9	hiker	ballistic bombs	1

Last 70 years, at least 180 were lost in Japan by volcanic eruptions

- **Sudden explosive eruption near crater (mostly phreatic eruption) causes fatal accidents**
- **Visiting people are sacrificed: Eruption alert system for visiting people is not fully provided.**

Summary

Contribution to volcano disaster prevention based on geological mapping

- **Highly accurate geological mapping contributes to hazard maps that lead to the evacuation of residents.**

- **GSJ is using its knowledge of geological mapping to conduct emergency surveys at the eruptions. We provide data to the Japan Meteorological Agency and make the results available to the public and media.**

Thank you

Viewed from the south