

# Muon radiography in Japan

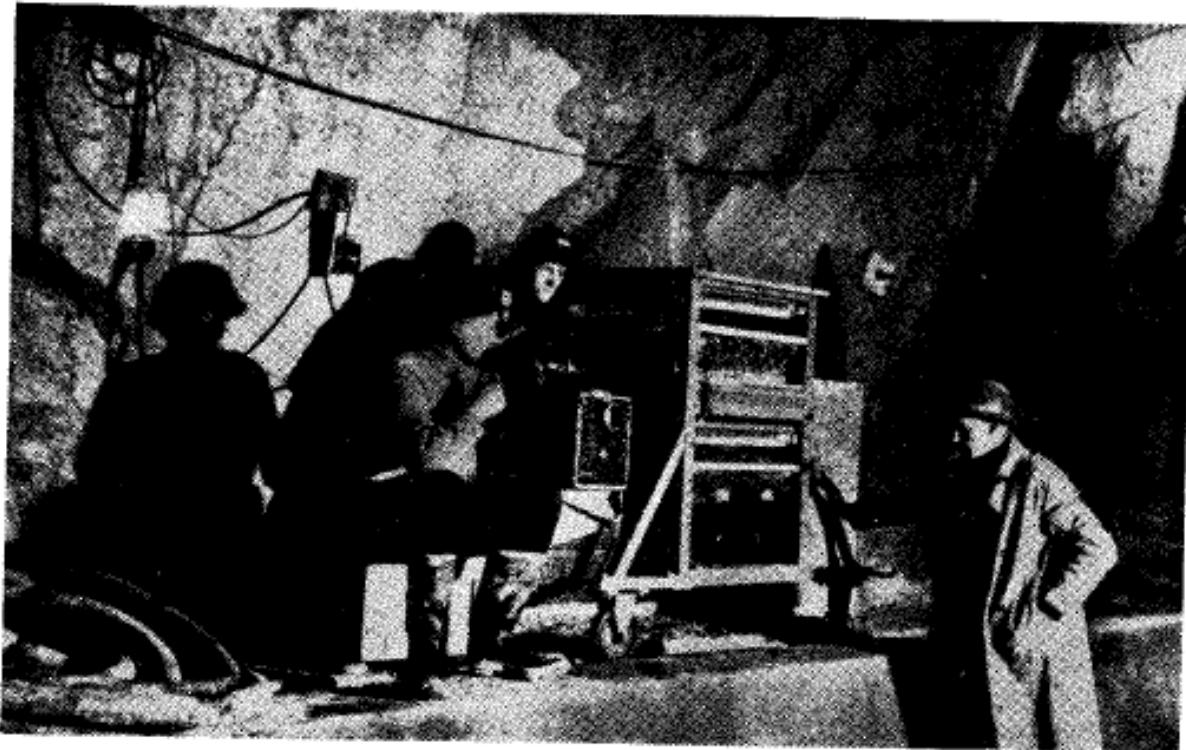
# First muon radiography

Commonwealth Engineer, July 1, 1955

455

## Cosmic Rays Measure Overburden of Tunnel

● Fig. 1—Geiger counter "telescope" in operation in the Guthega-Munyang tunnel. From left are Dr. George and his assistants, Mr. Lehane and Mr. O'Neill.



Geiger counter telescope used for mass determination at  
Guthega project of Snowy Scheme . . . Equipment described

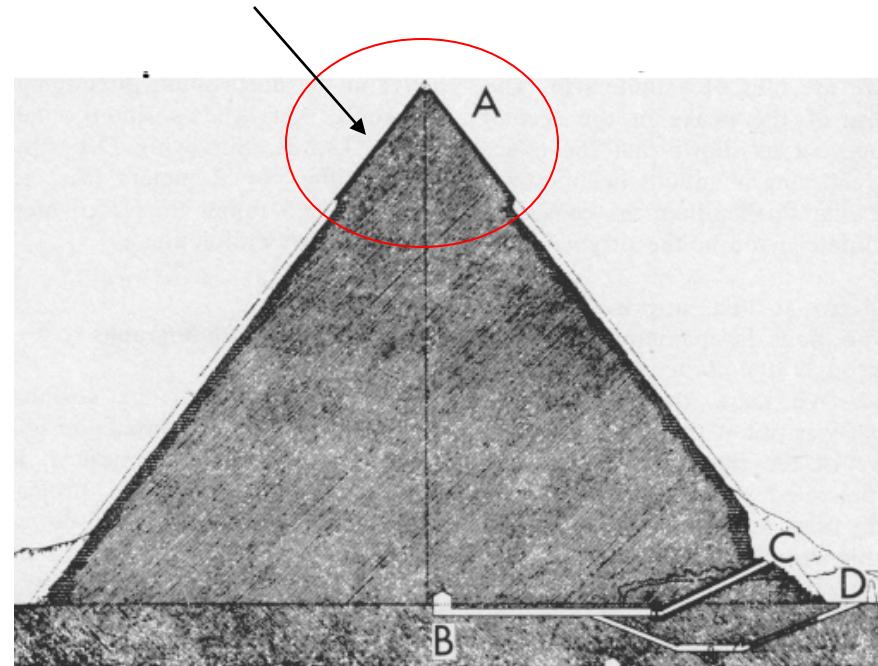
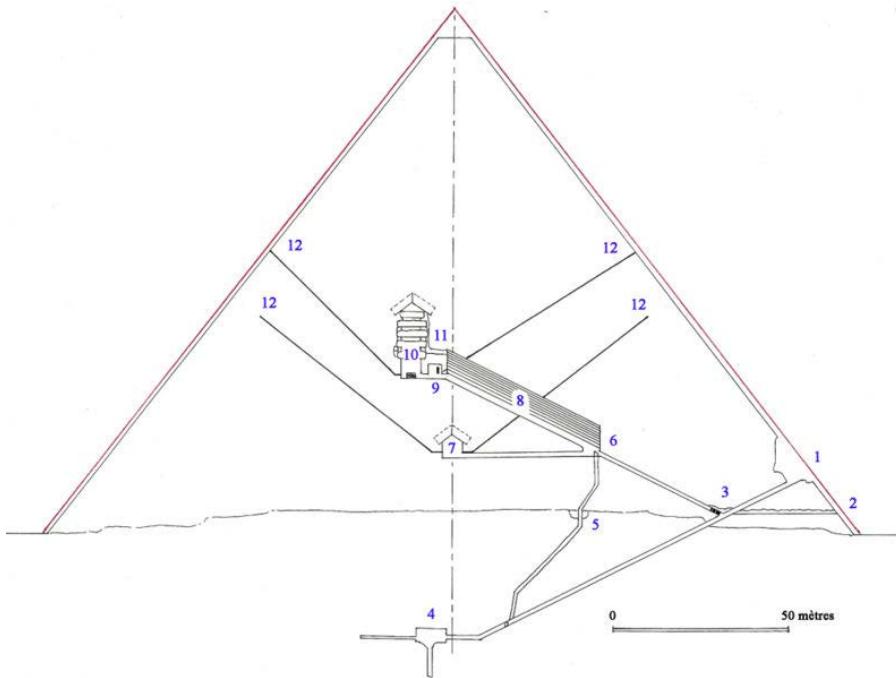
1955

By Dr. E. P. George<sup>1</sup>  
University of Sydney, N.S.W.

# Muon radiography by Alvarez

1968

limestone cap with a thickness of 2 m

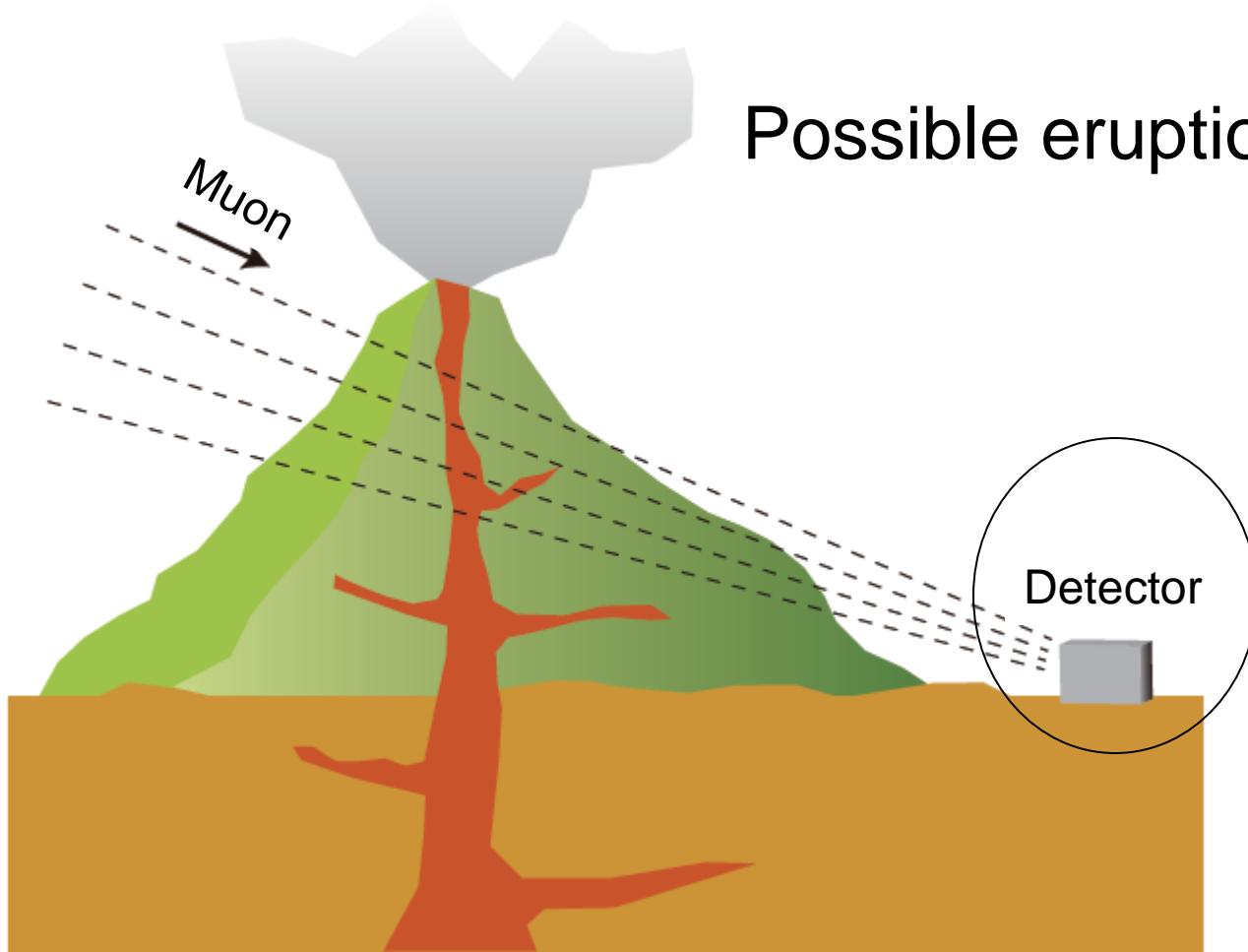


He wondered why Chephren's pyramid only has a small room although Khufu's pyramid has many spaces such as "King's chamber", "Queen's chamber", "Grand gallery".

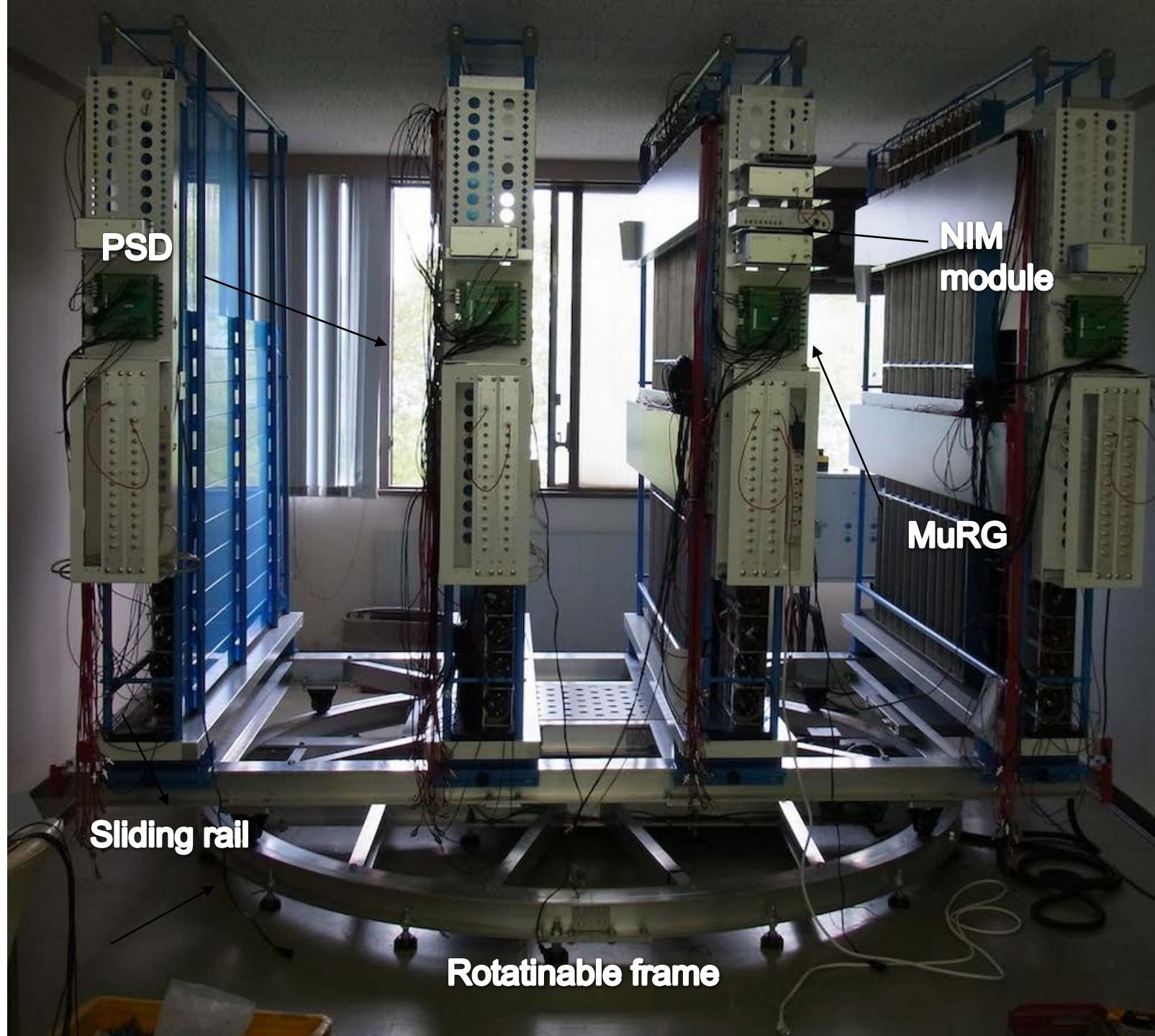
# Can we apply muon radiography for other targets?

- Volcanoes
- Geologic faults (seismic/landslide)
- Industrial plants
- Extraterrestrial geological objects

# There are density anomalies in a volcano

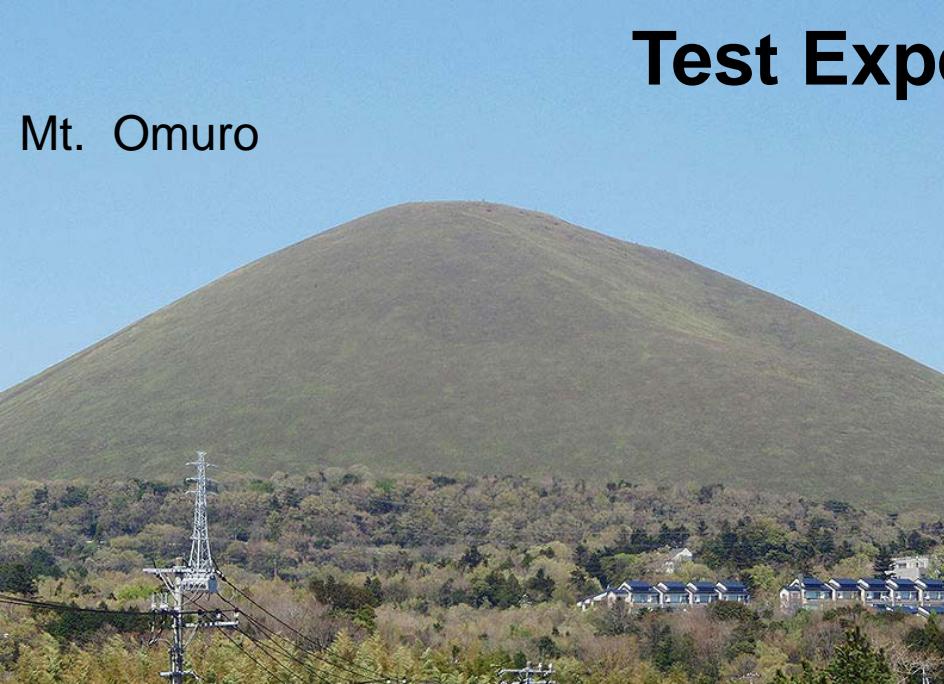






# Test Experiment

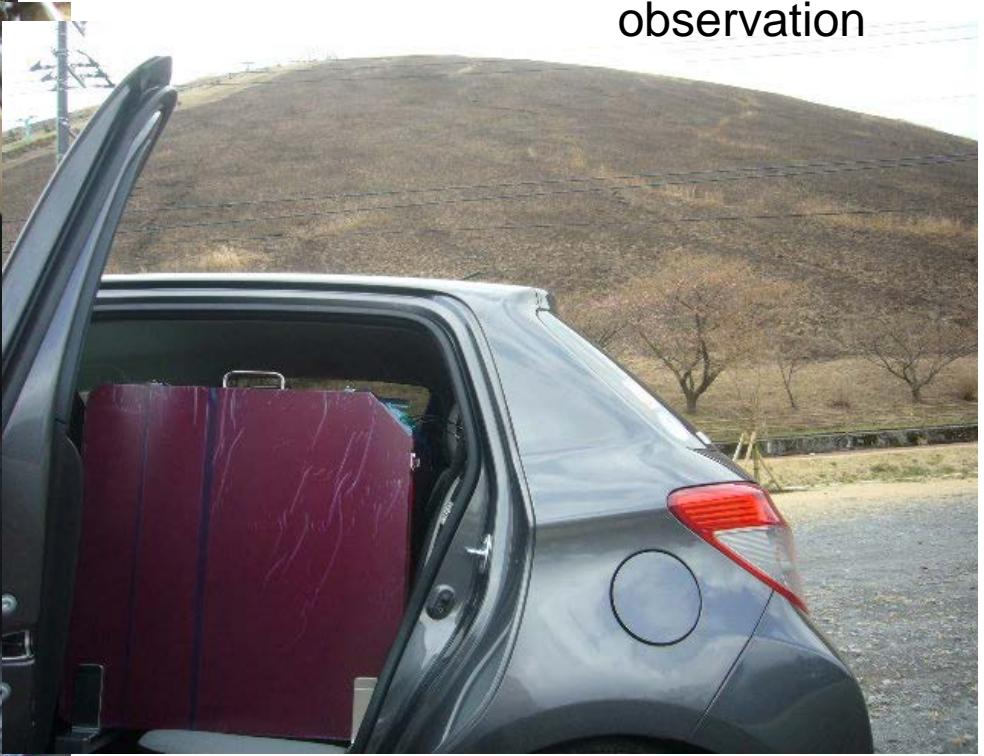
Mt. Omuro



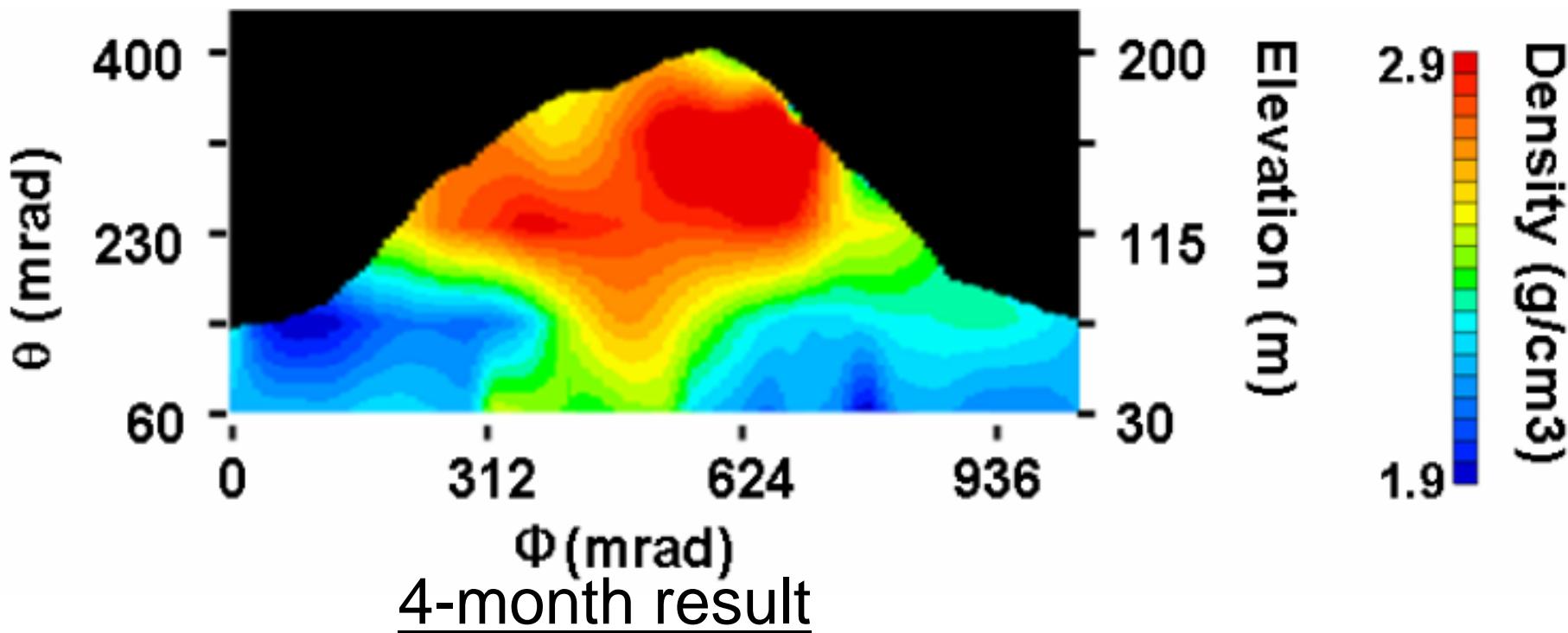
Crater on the top



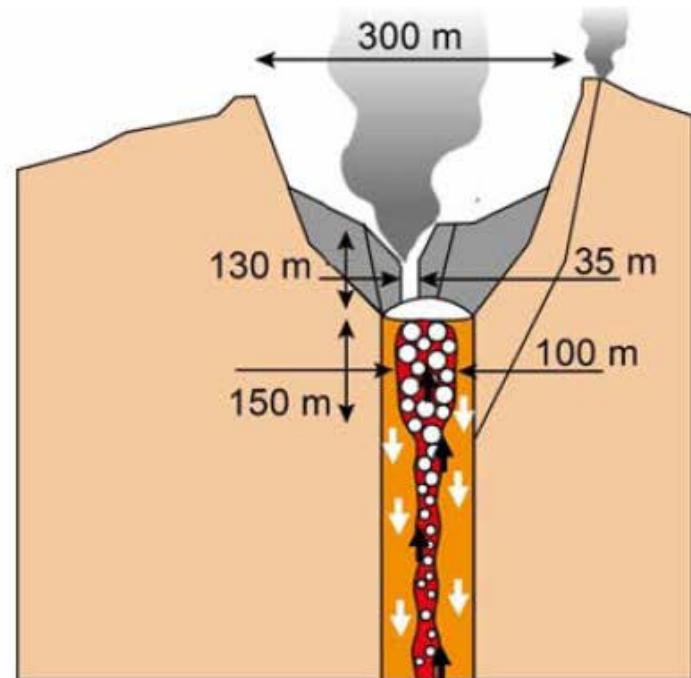
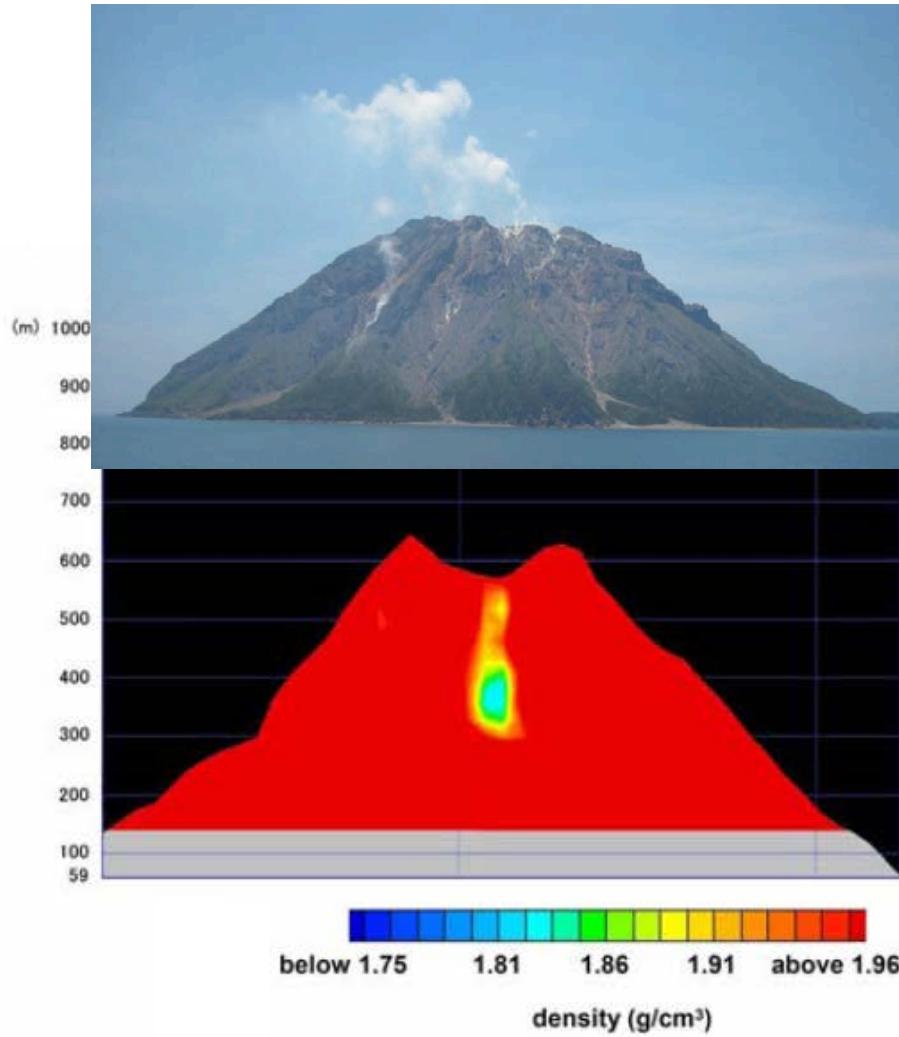
Mobile  
observation



# Showa-shinzan lava dome

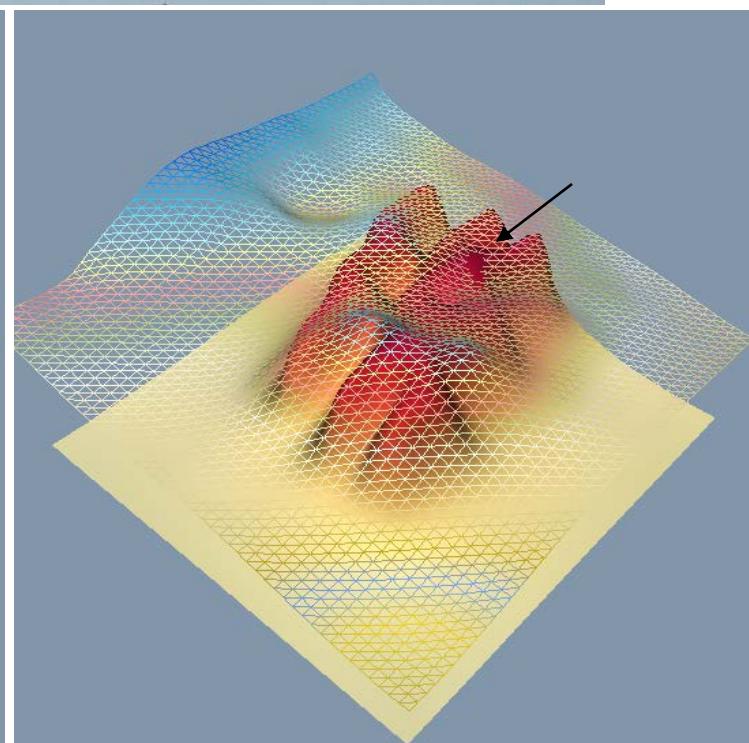
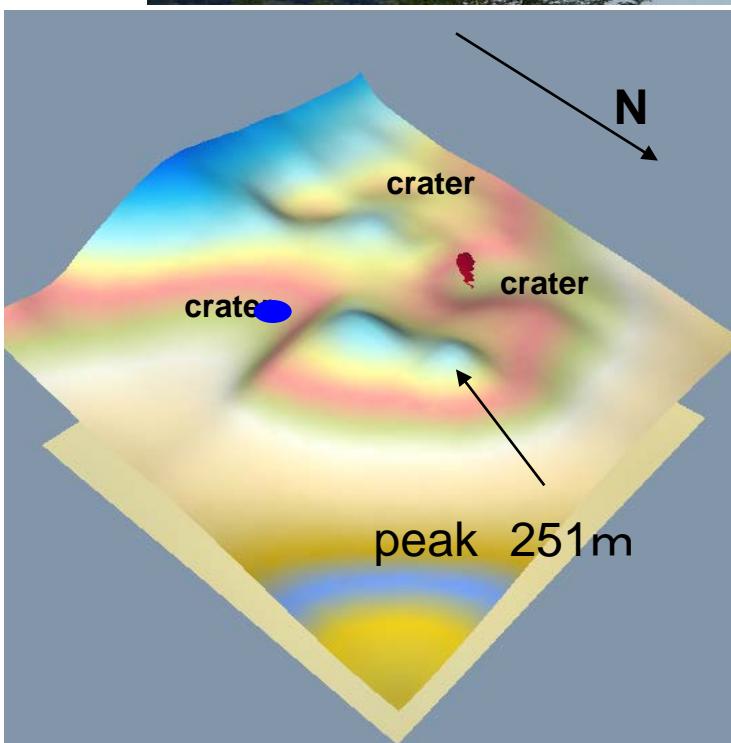


# Radiograph in Iwojima



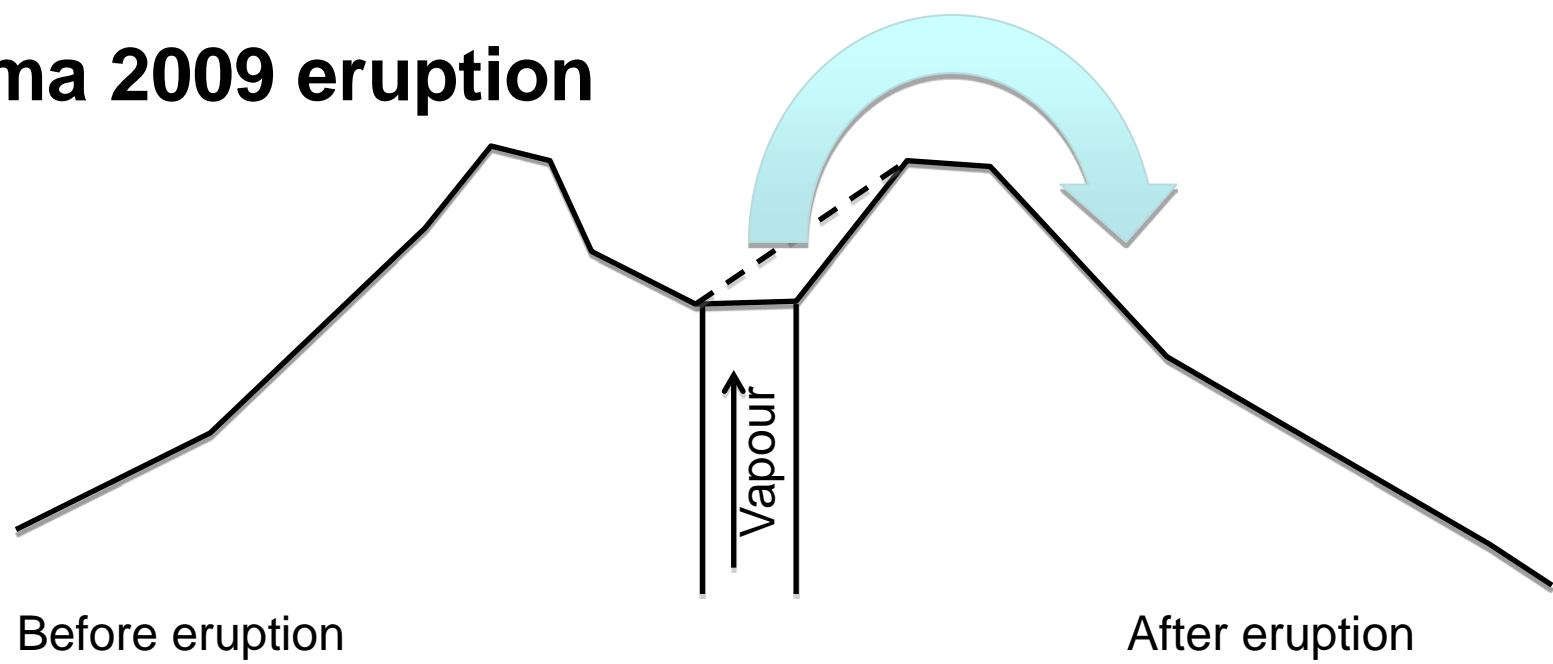
40 days result

# Meiji-shinzan lava dome



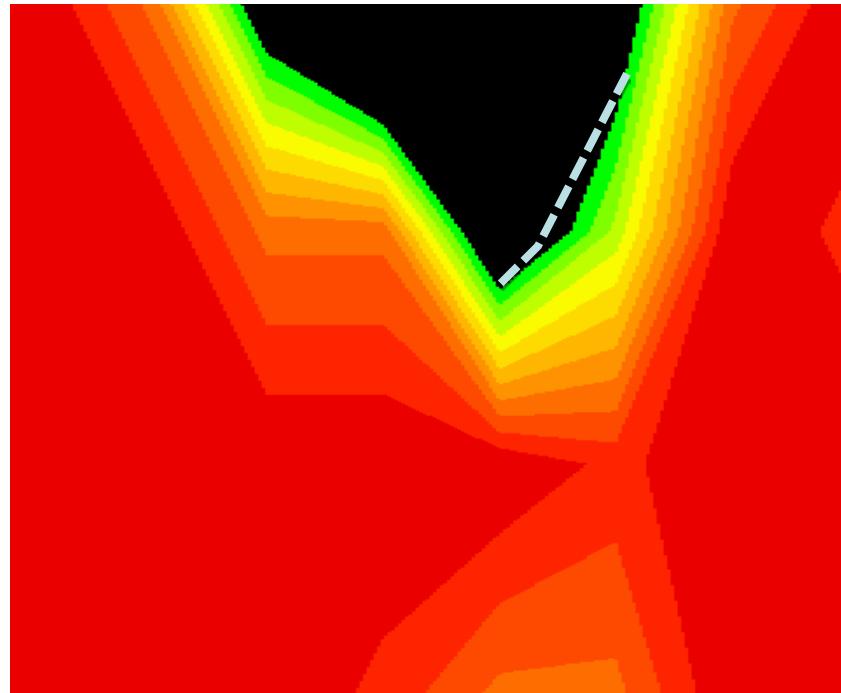
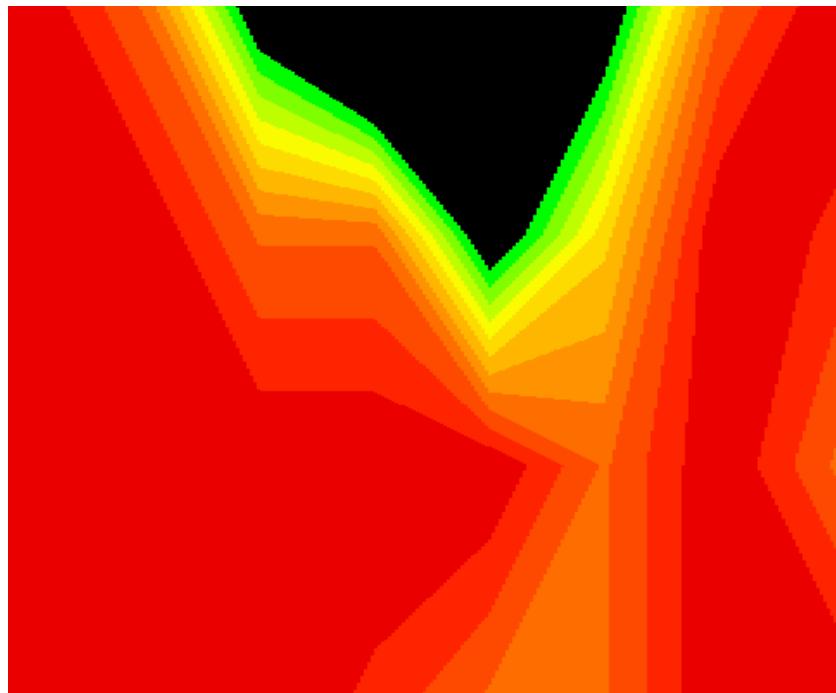
10 days result

# Asama 2009 eruption

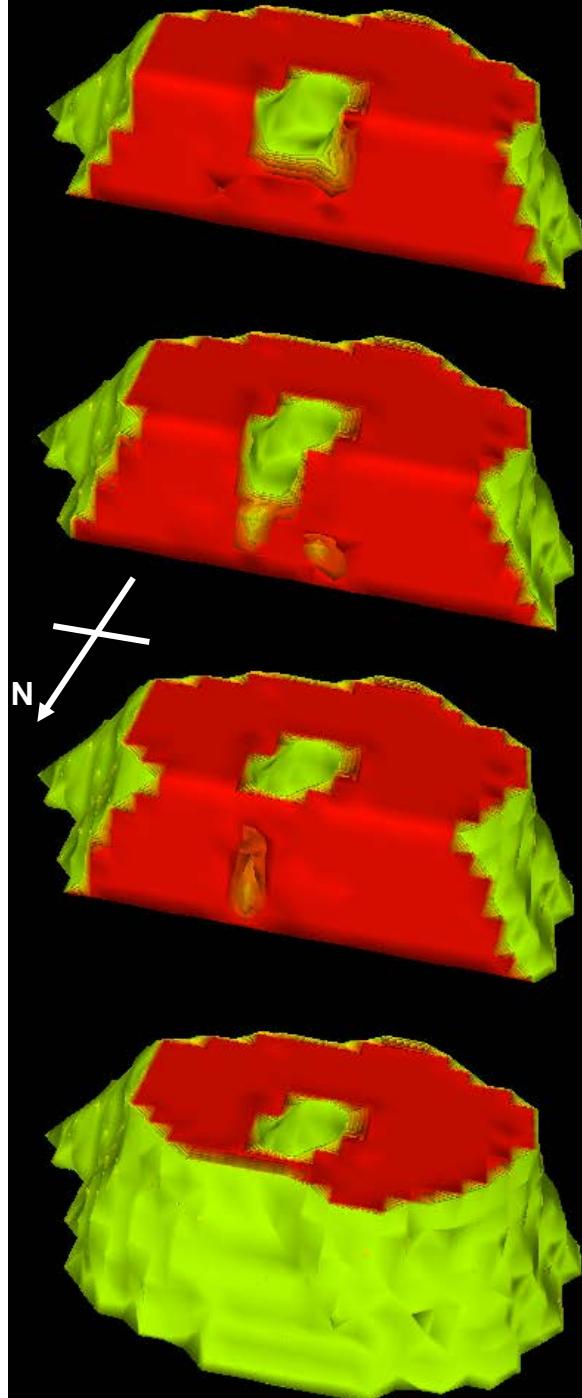
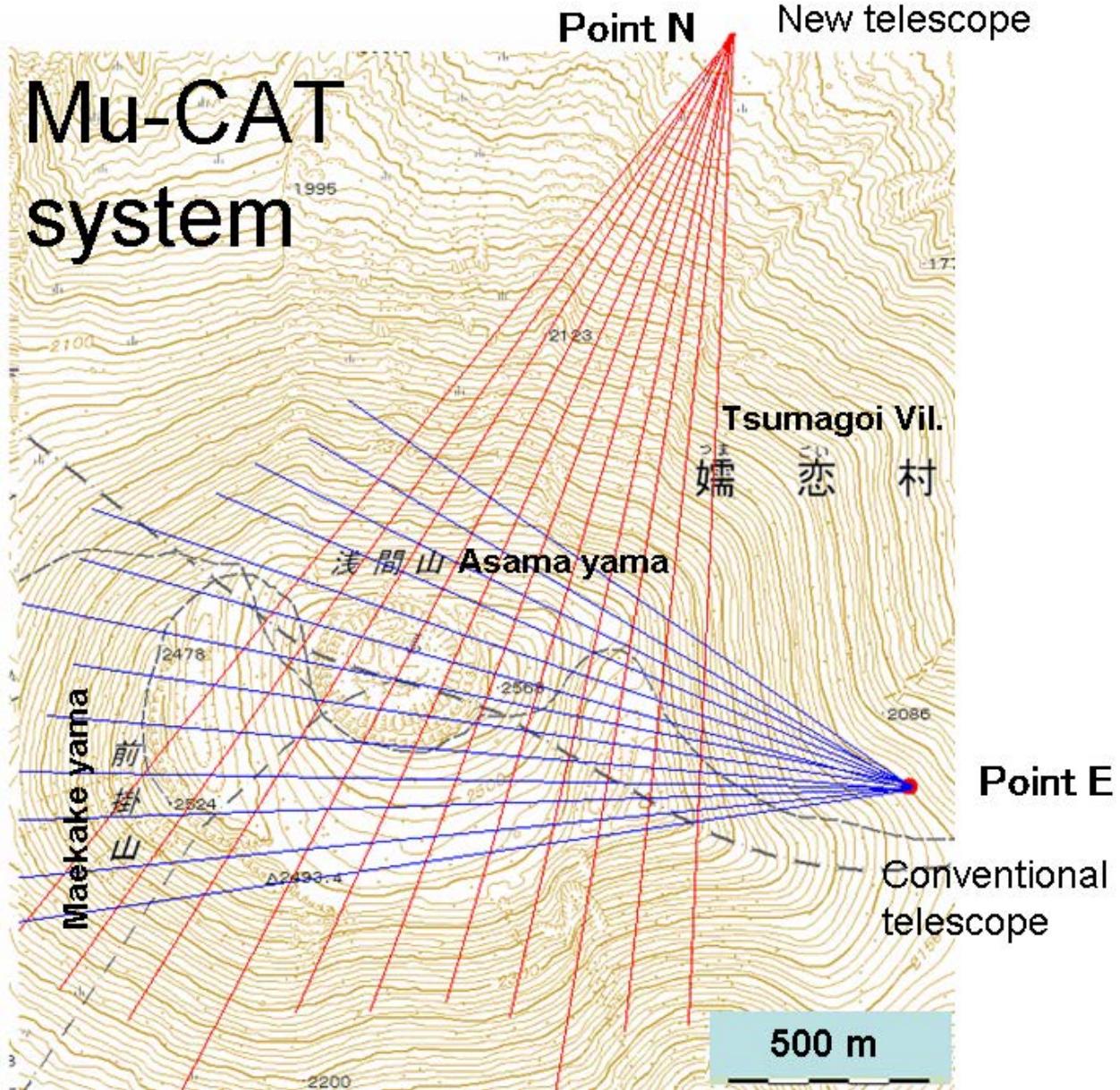


Before eruption

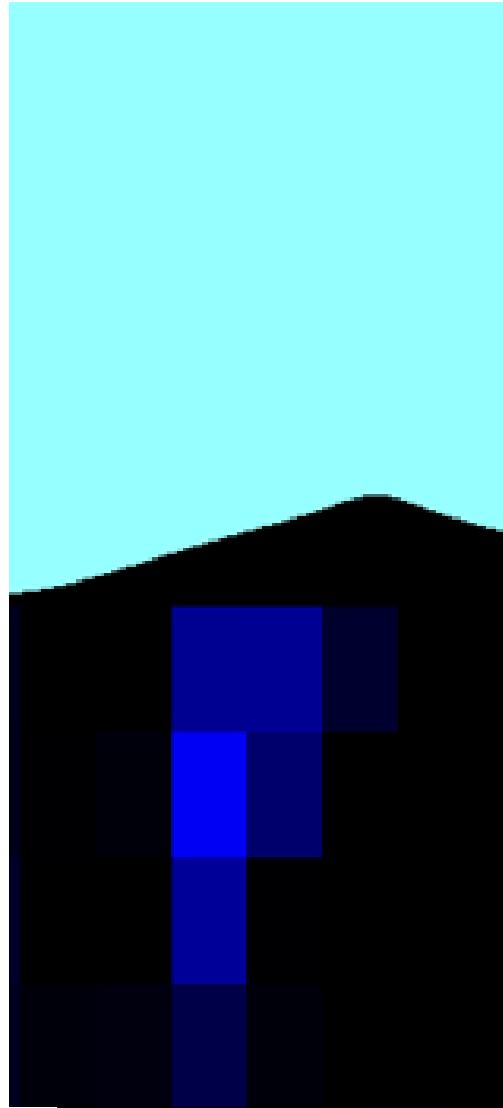
After eruption



# Mu-CAT system



# Seismic fault



# Density distribution from gauge

