Monitoring of Seismic and Volcanic Hazards Using ALOS-PALSAR

Makoto MURAKAMI,

Mikio TOBITA, Hiroyuki NAKAGAWA, Hiroshi YARAI, Takuya NISHIMURA, Shinzaburo OZAWA, and Satoshi FUJIWARA

The Geographical Survey Institute

Ministry of Education, Culture, Science and Technology

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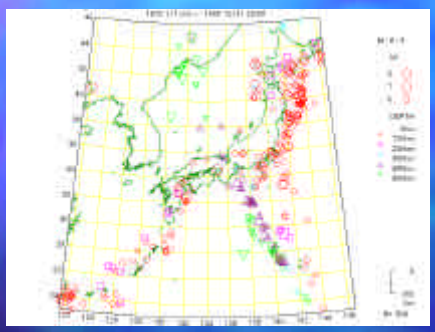
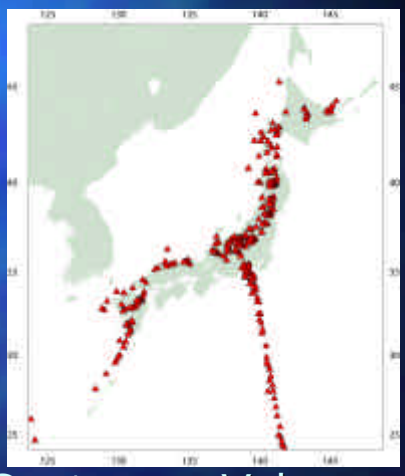
Clear and Present Threats in Japan

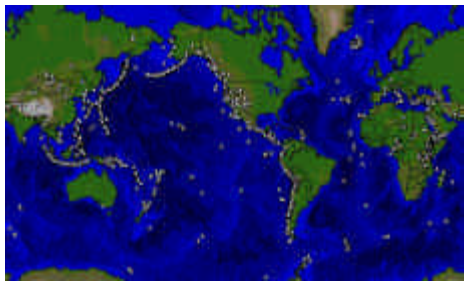


Seismicity (M>6)
1970-1995
JMA

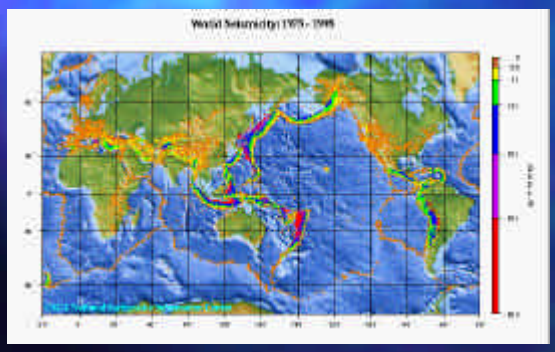


Quaternary Volcanoes
Committee for Catalog of Quaternary Volcanoes in Japan

Seismic and Volcanic Hazard of the World



World Seismicity
USGS



Volcanoes
of theWorld
Smithsonian Institution

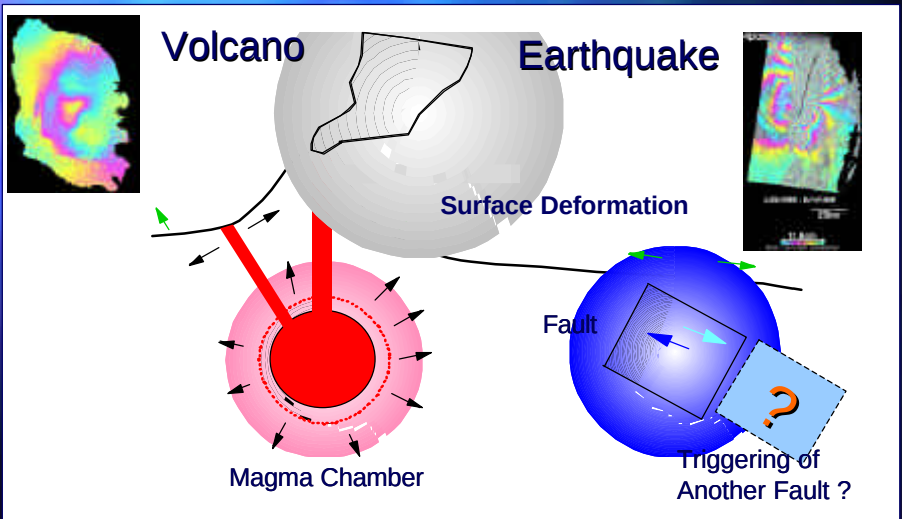
Natural Disasters in 2000 (Japan)

Earthquake Mw 6.8 October 2000

Eruption of Mt. USU March 2000

Eruption of Miyakejima August 2000

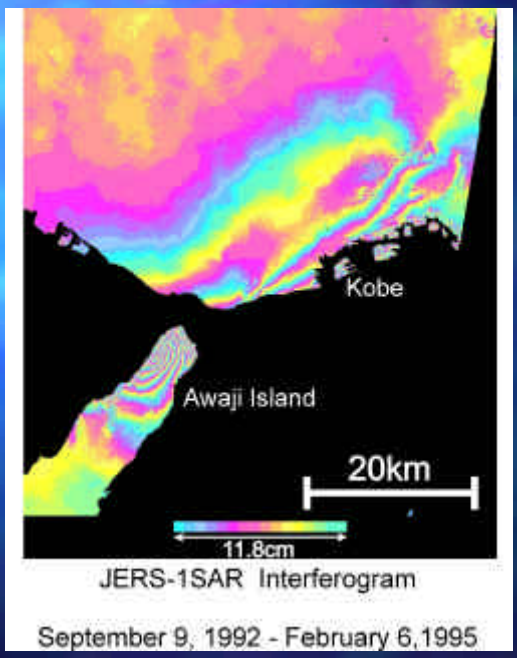
Monitoring of Earthquake and Volcanic Eruption by InSAR



L-band Spaceborne InSAR

- High Coherence (Temporal, Spatial)
- Acceptable Sensitivity (~ 1 cm)
- Acceptable Resolution(~ 20 m)
- Repeated Measurements (Time Series)
- 3-D Measurements of Deformation

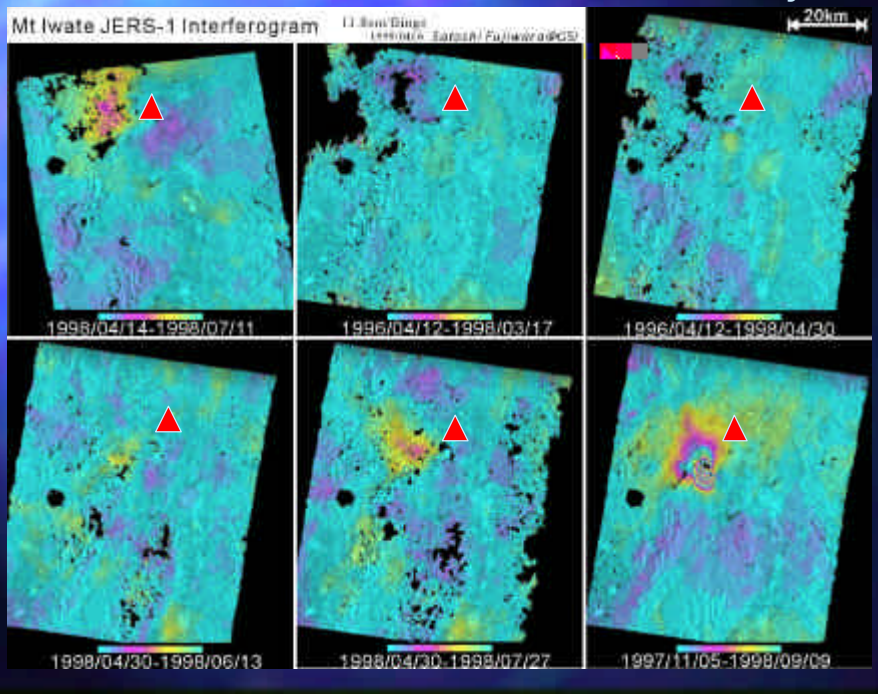
L-band InSAR



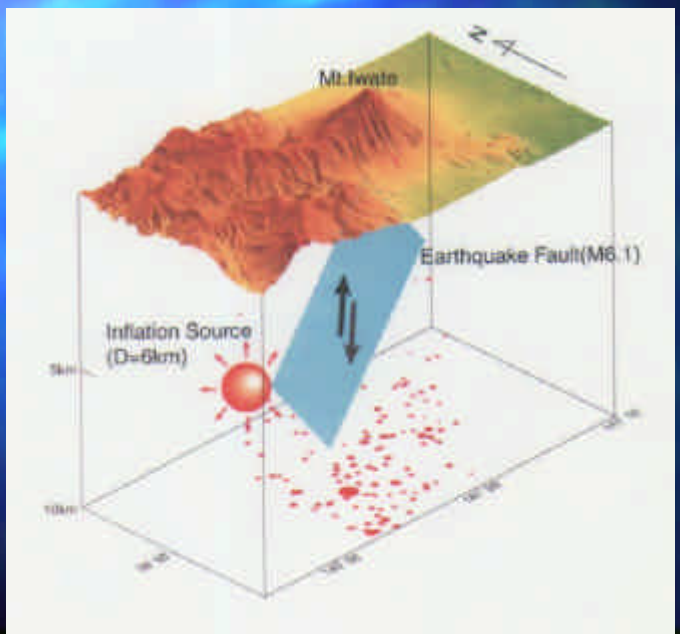
JERS-1SAR Interferogram

September 9, 1992 - February 6,1995

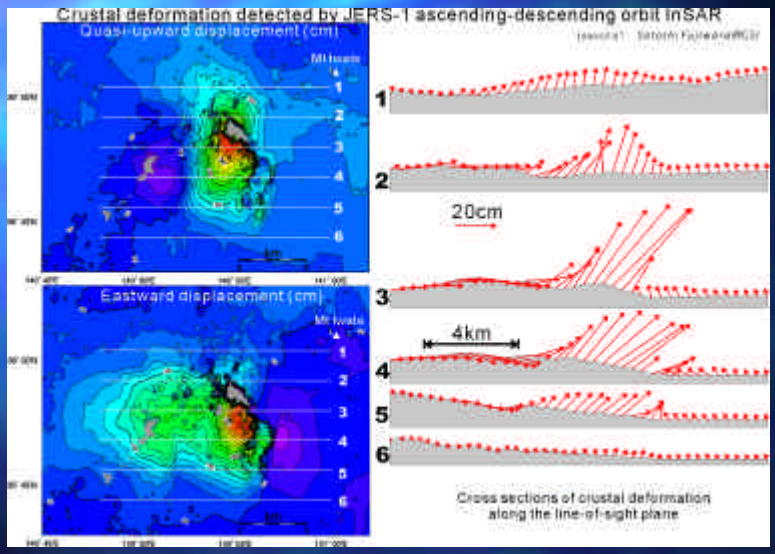
Volcanic Inflation and Co-seismic Deformation by JERS



A Triggered Earthquake by Volcanic Inflation
1998 Iwate Episode



3-D Measurement of Deformation
Using Ascending and Descending Images

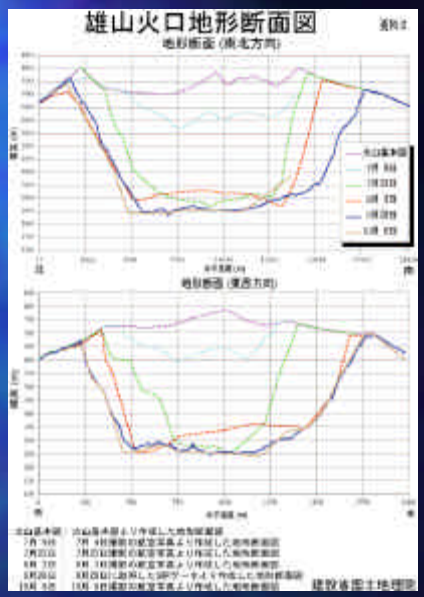


Faults (Discontinuities of Displacement Distribution) Suggested by InSAR

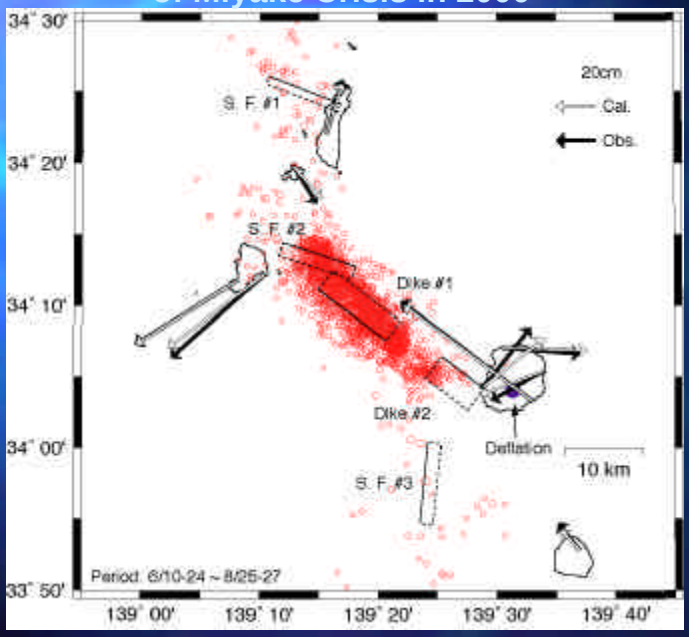
Mt. Iwate

Time Series of Caldera Collapse of Miyakejima Measured by Photogrametry and Air-borne InSAR (X-band)

July 9, 2000 - October 6, 2000

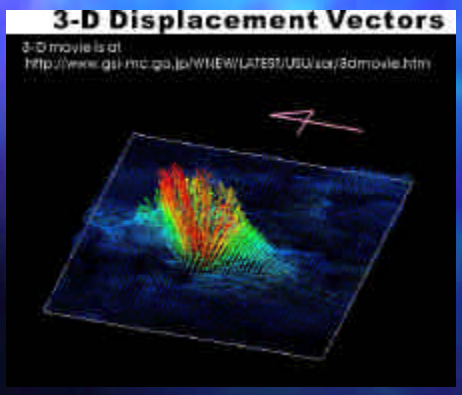


Preliminary Fault Model of Miyake Crisis in 2000



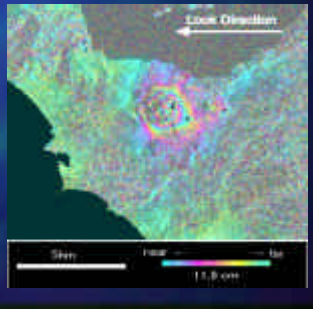
SAR Contributions during 2000 USU Eruption Crisis

Displacements Associated with Crypt-dome Formation 2000 Eruption



Matching of RADARSAT Images

Deformations before 2000 Crisis Detected by JERS L-band InSAR



Monitoring of Seismic and Volcanic Hazard by ALOS PALSAR

- Repeated Measurement of Volcanoes
- Analysis of Magma System (Chamber, Dike, Fissure, etc.)
- Measurement of Displacement Field Immediately after a Large Earthquake (Computation of Possibility of Triggering of Another Earthquake)
- Search for Undetected Deformation
- Discovery of Unknown Phenomena

Technical Challenges

- **Automated Processing**
- **Orbital Data Improvement (SLR)**
- **Handling of Large Amount of DATA**
- **Elimination of Artifacts (Water Vapor)**
- **Complimentary and Collaborative Coordination with Other DATA (GPS, etc.)**
- **Fine DEM for Geomorphology**

Summary

- ALOS PALSAR: Unique Space-borne L-band SAR
- Powerful and Precious Resource for Monitoring of Seismic and Volcanic Hazard of the world

Acknowledgement

JERS and other radar data presented here were provided by NASDA for the usage of ongoing cooperative study between the GSI and NASDA.