# JICA/JST SATREPS FY2024—2028

## The Project for Disaster Risk Reduction of Widespread Volcanic Hazards in Southwest Pacific Countries

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Funded by JICA (Japan International Cooperation Agency)
and JST (Japan Science & Technology Agency)

# What is SATREPS?

## SATREPS:

Science and Technology Research Partnership for Sustainable Development:

A Japanese government program that promotes international joint research, to find solutions for issues of a global scale, such as global warming, bio-resources, natural disasters, and infectious diseases.

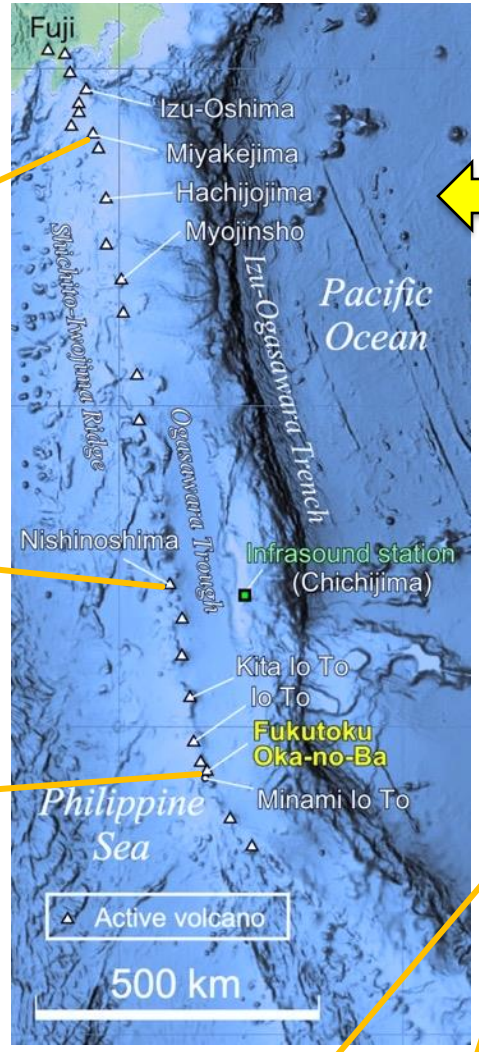
https://www.jst.go.jp/global/english/about.html

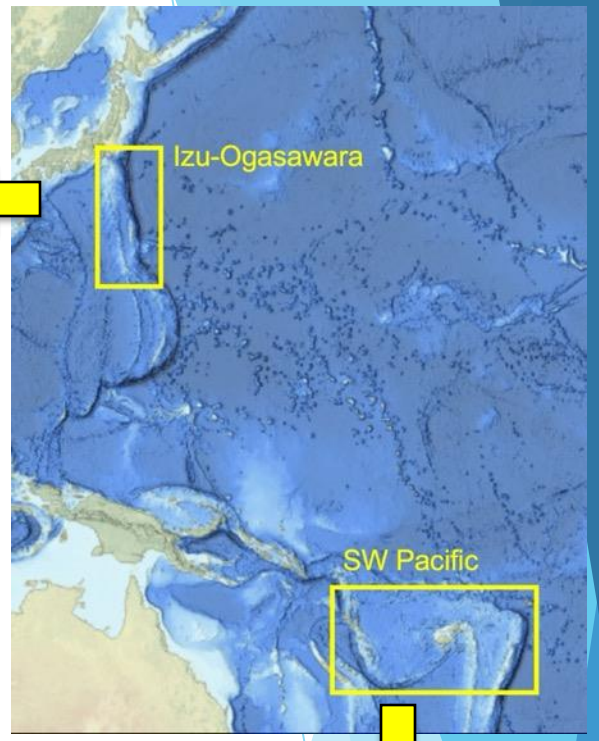
International joint research implemented through collaboration among the Japan International Cooperation Agency (JICA), the Japan Science and Technology Agency (JST)

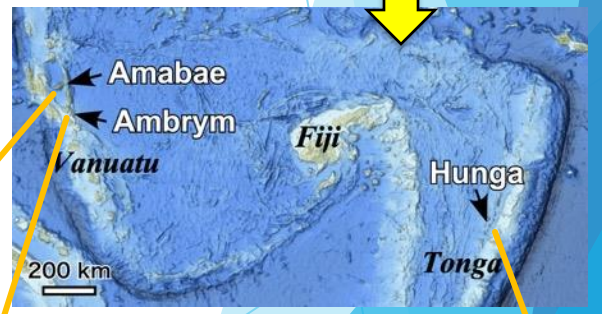
# Background

- **Submarine explosive eruptions are one of the most common and hazardous types of volcanic eruptions on Earth.**
- **In island arcs, many volcanoes erupt in the sea or near the sea, causing a diverse range of surface phenomena and hazards.**

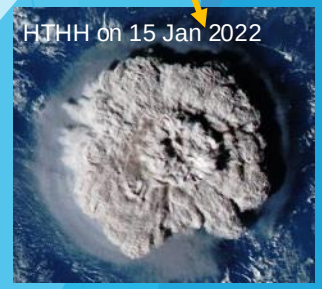




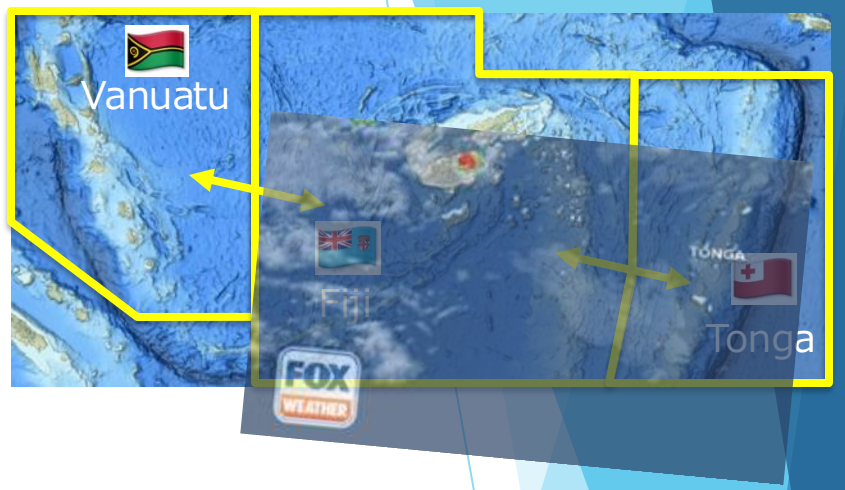

**Island and submarine volcanoes in arcs (as in and around Japan and the SW Pacific) are important research sites for elucidating volcanic activities and associated disasters at plate boundaries.**

# Why SW Pacific?

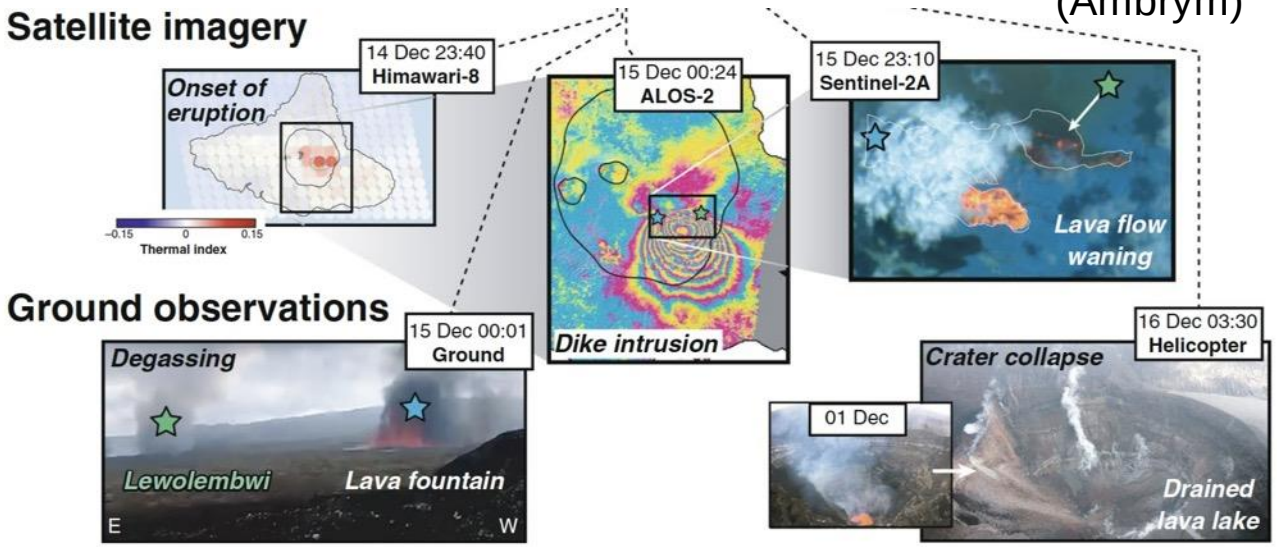
- Similarities with volcanoes in the Izu-Ogasawara Arc, Japan.
- Expectations for new data acquisition and a better understanding of volcanic activities by applying conventional survey, observation, and exploration methods.
- Common issues for widespread disasters caused by volcanic eruptions: explosions, tsunamis, volcanic ash, and drifting pumice

➔ An ideal place for research on island/submarine volcanoes.

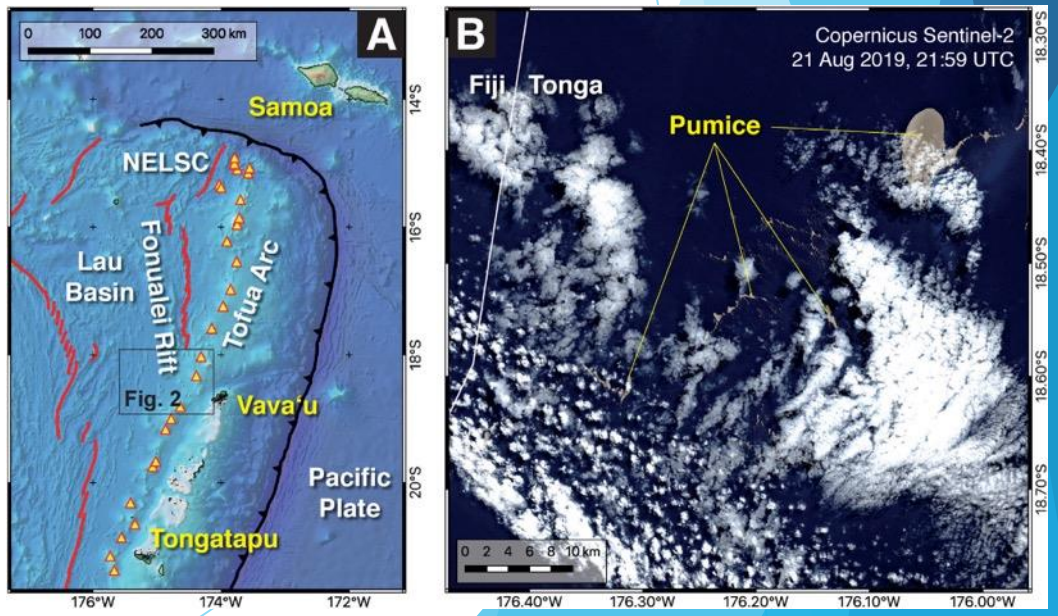
Eruption plumes and tsunamis from a giant eruption in 2022 (Tonga)




Fissure eruption and phreatomagmatic explosions near coasts (Ambrym)




Submarine eruption and drift pumice (Volcano F, Tonga)




Brandl+ 2020

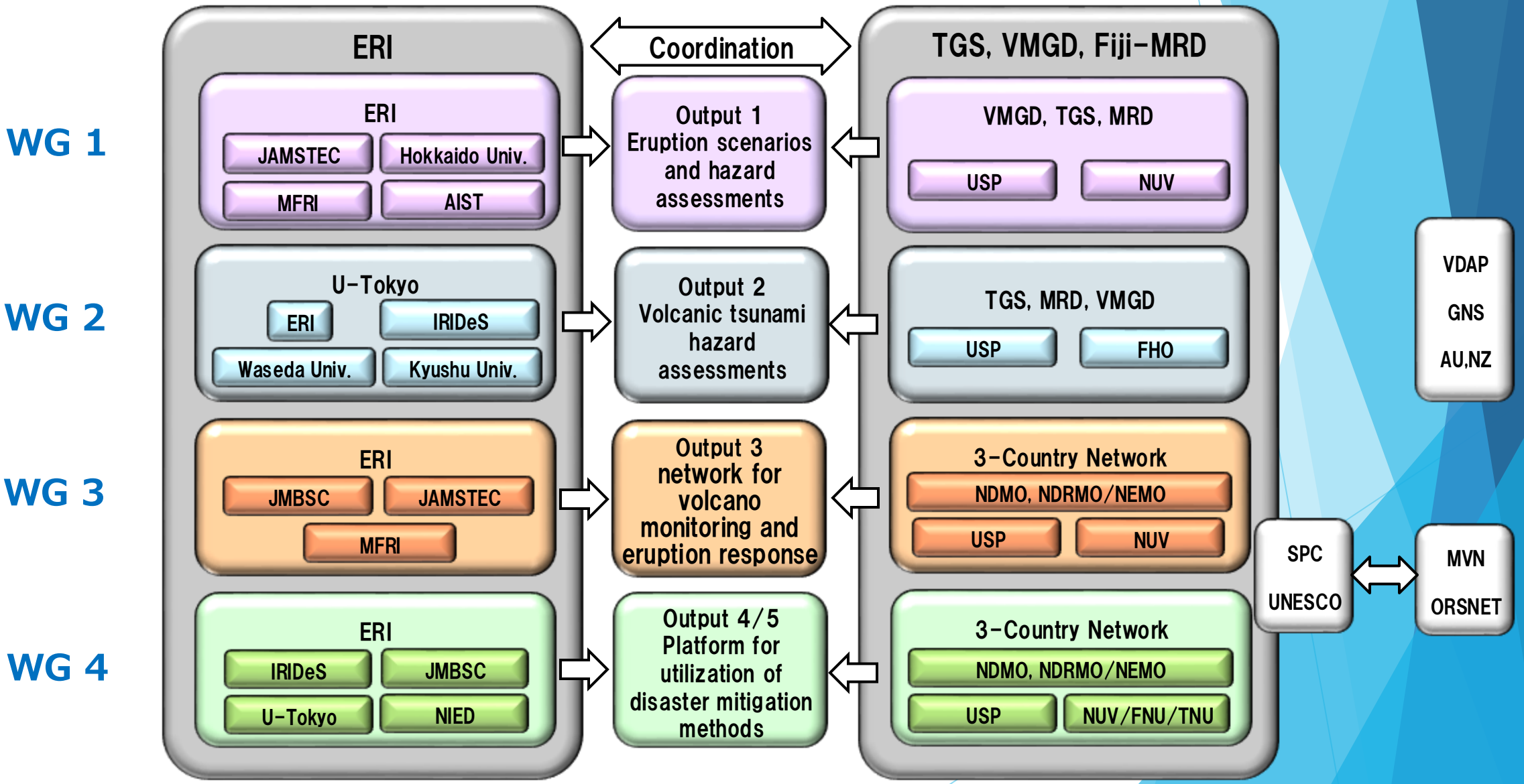
# Aim and Scope


Large eruptions are rare but can cause widespread disasters.

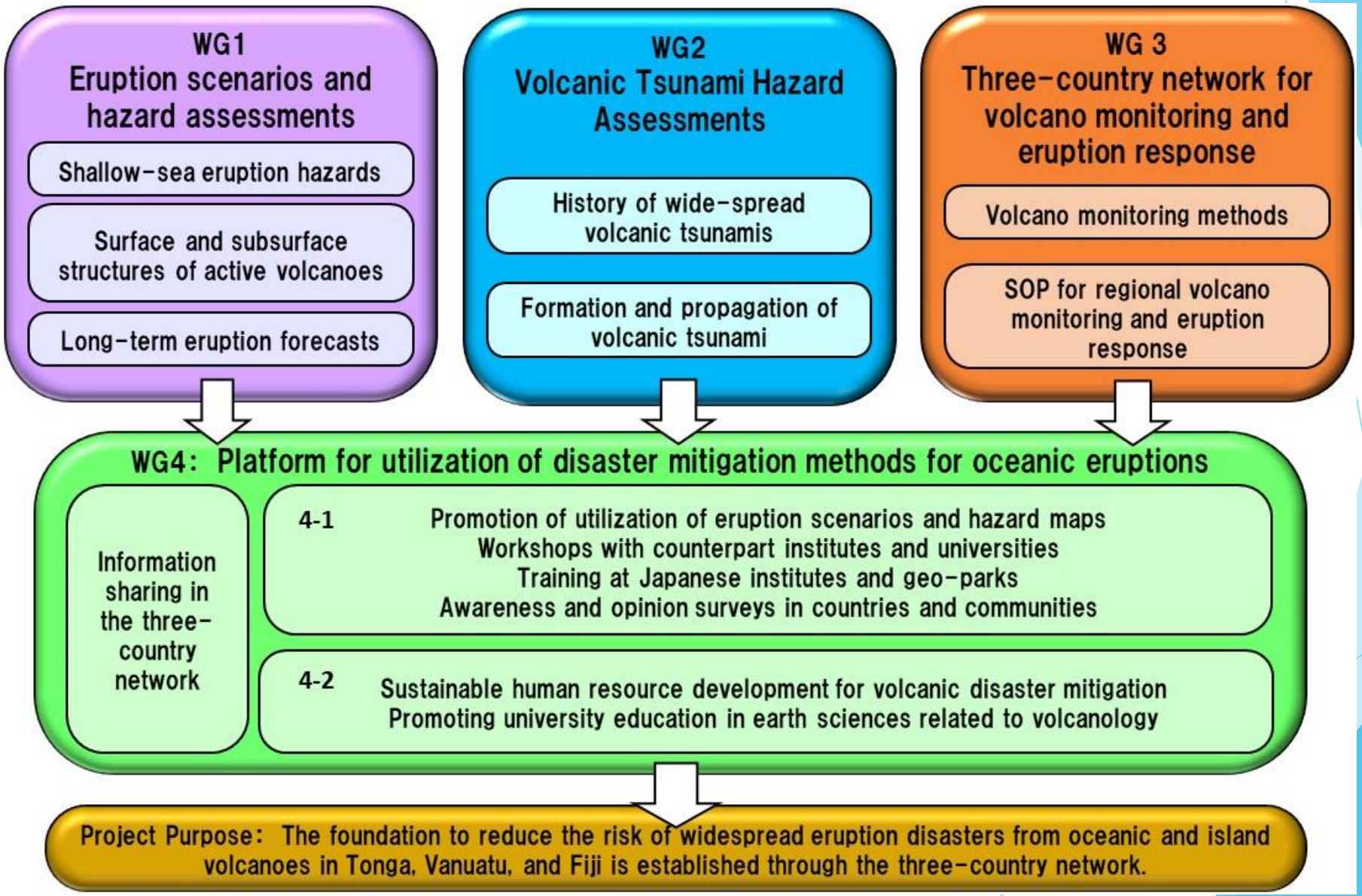
Much is still unknown, especially about eruptions on isolated islands and the ocean.

This project aims to establish a foundation for reducing the risk from oceanic and island volcanoes through **collaborations and networking among countries facing common risks.**

# Project Structure



# Project Plan



# Eruption scenario and hazard assessments [WG1]

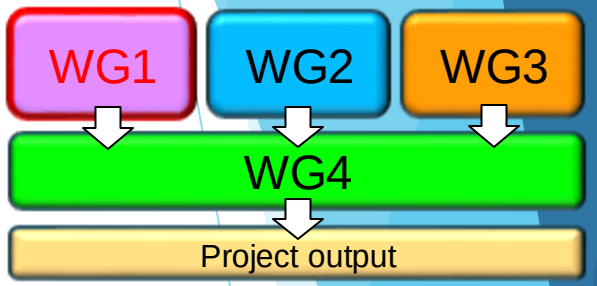
Leader: F. Maeno

1. **Eruption behaviors of island volcanos**

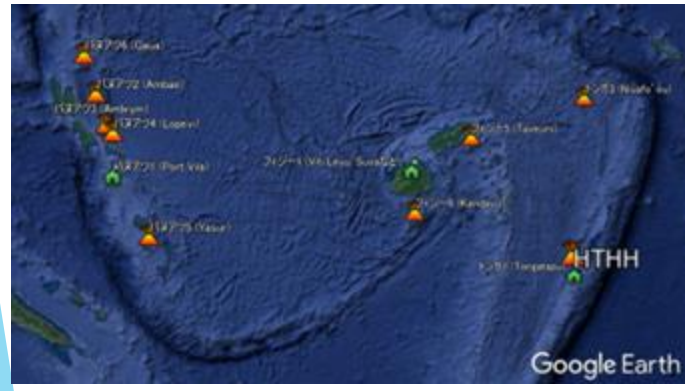
   Eruption scenario and hazards

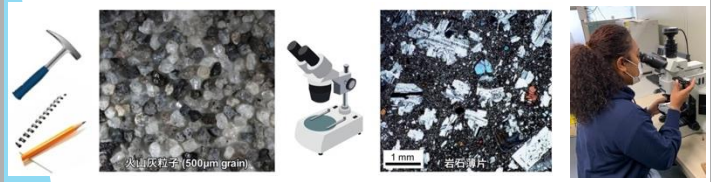
2. **Surface near-surface structures**

   Past eruptions and current conditions




## Geological survey

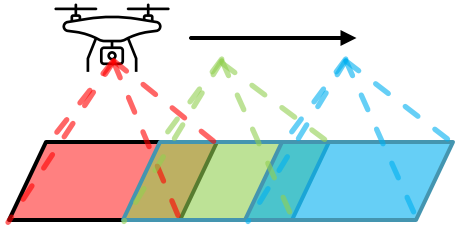


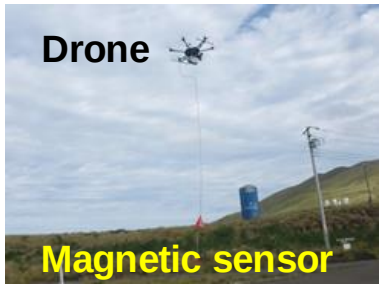
→ Eruption scenarios

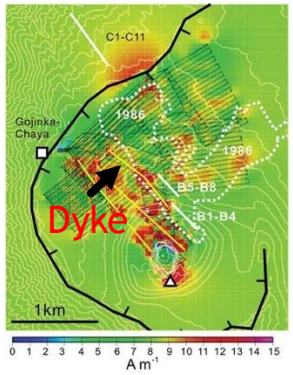
## Topographic and Magnetic survey

### Drone measurement



High-resolution DEM

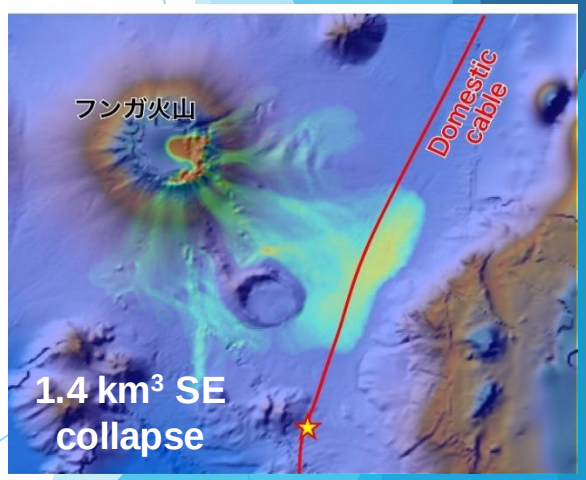



Estimating shallow dykes and their cooling conditions

Study at Izu-Oshima (Koyama et al.)

## Evaluation of flank collapse

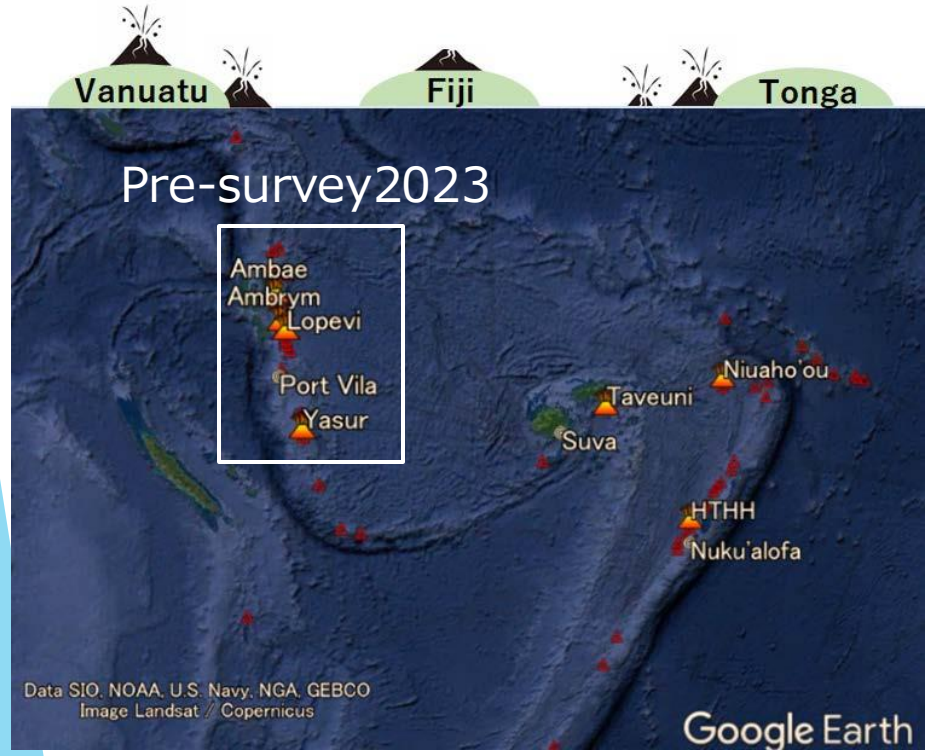



Submarine gravity flows from the HTHH eruption

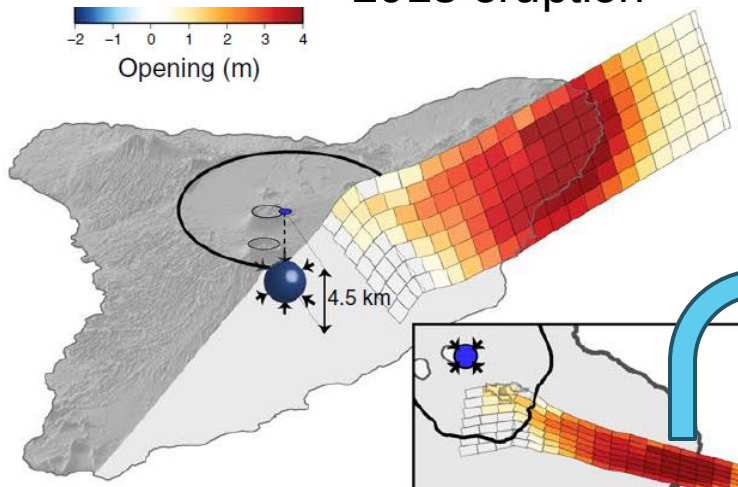
# Preparation for volcano surveys [WG1]

Site surveys at Ambrym and Yasur volcanoes, Vanuatu, in Sep 2023

Maeno, Koyama, Tanaka, William, Niroa, Aru, et al.

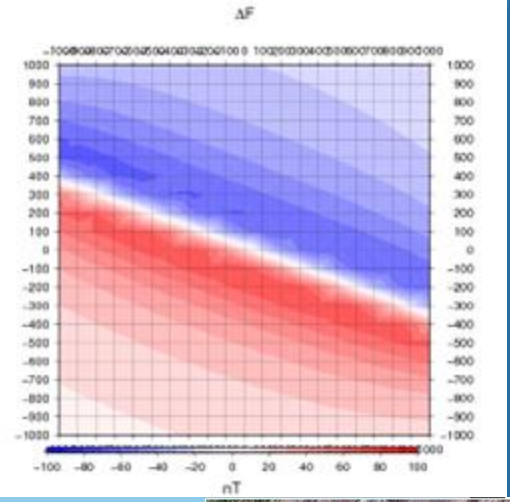



2018 eruption

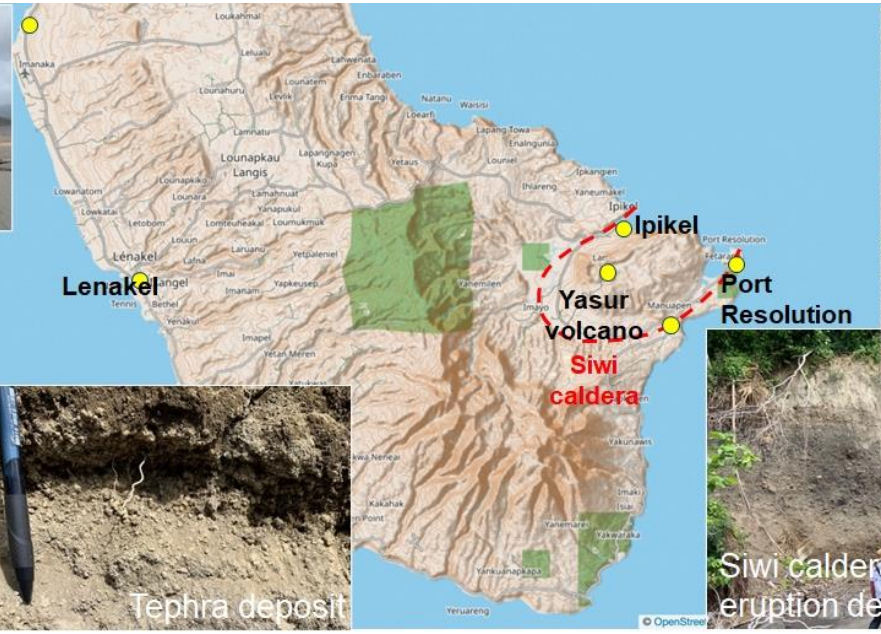



Shreve et al., 2019

Theoretical magnetic anomaly due to dike intrusion.





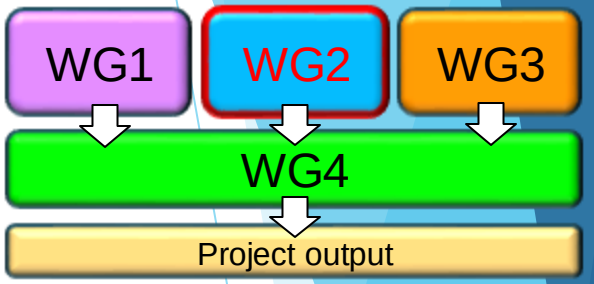






# Volcanic tsunami hazard assessments [WG2]

Leader: K. Goto



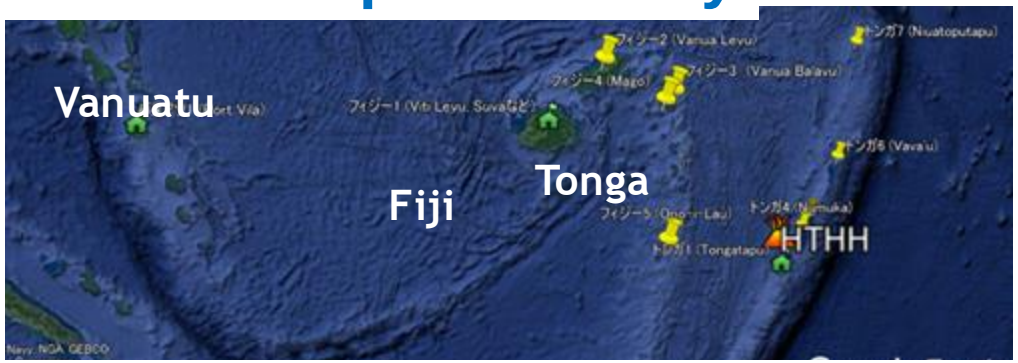

## 1. Paleo Tsunami Survey

### Volcanogenic tsunamis in South Pacific

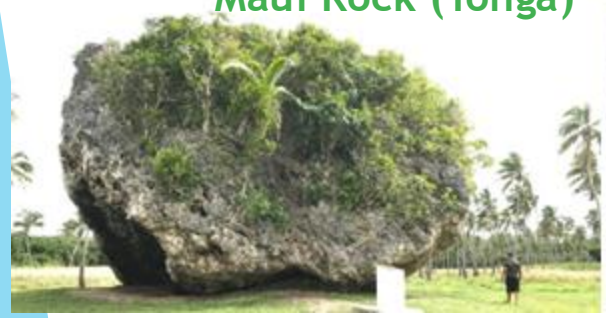
## 2. Generation and propagation

### Improve tsunami forecast

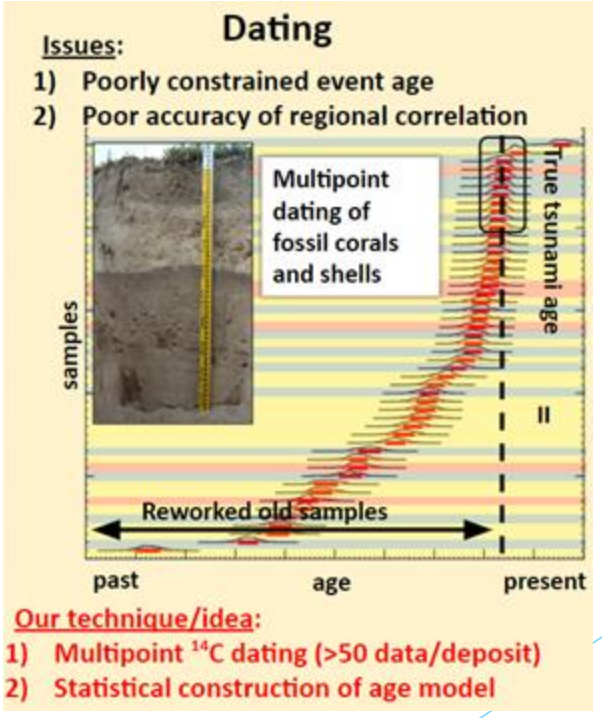
## Tsunami deposit survey




Maui Rock (Tonga)

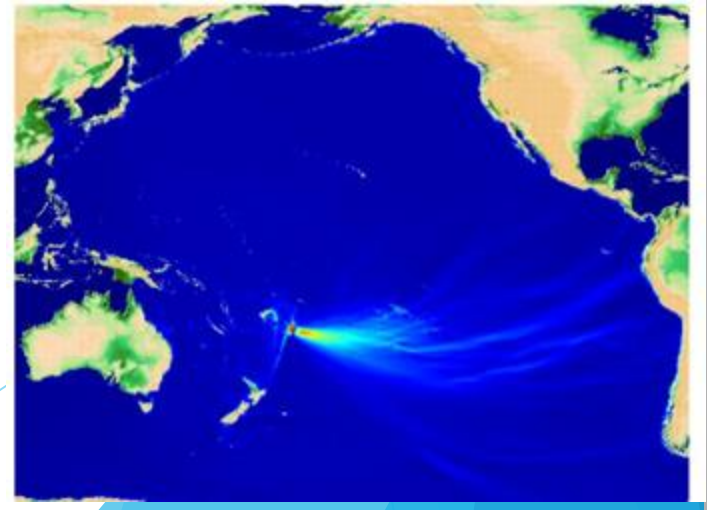


## Analyses



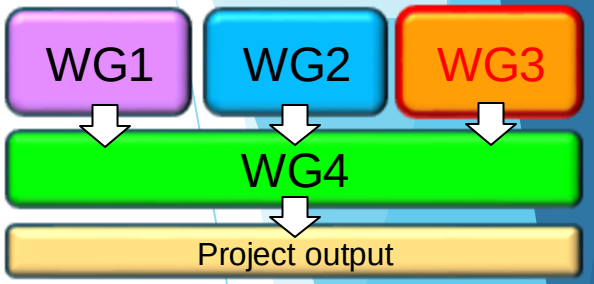

## Tsunami simulation

### Evaluation of tsunamis in the past and future volcanic tsunami modeling



# Regional network for volcano monitoring and eruption response [WG3]

Leader: M. Ichihara




## 1. Regional volcanological network

### Effective monitoring methods

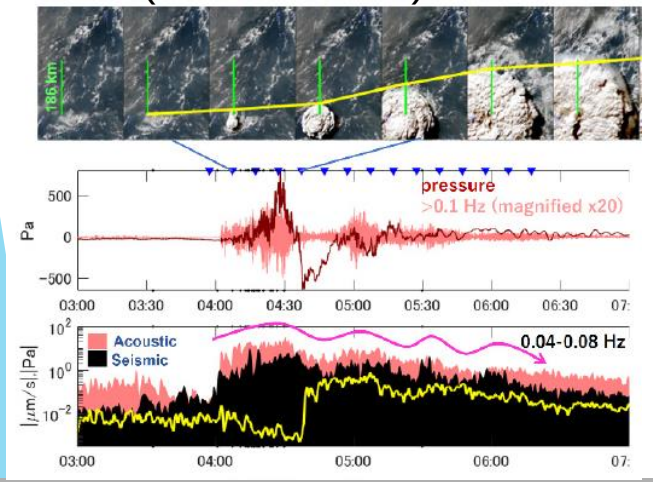
## 2. Risk communication

### Expand Earthquake Tsunami SOP

## Multi-parameter methods

**Effective usage of existing small number of stations.**

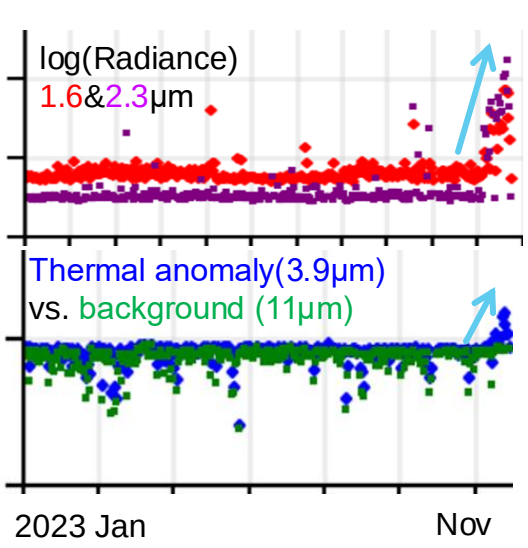
HTHH eruption analyses using Fiji station (Ichihara et al.)



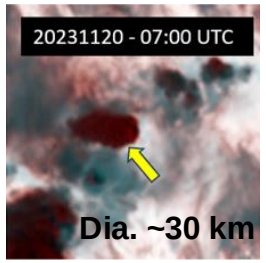

## Satellite monitoring

**Incorporating new satellite data and analysis methods.**

RealVolc data for Ulawun, PNG (Kaneko)



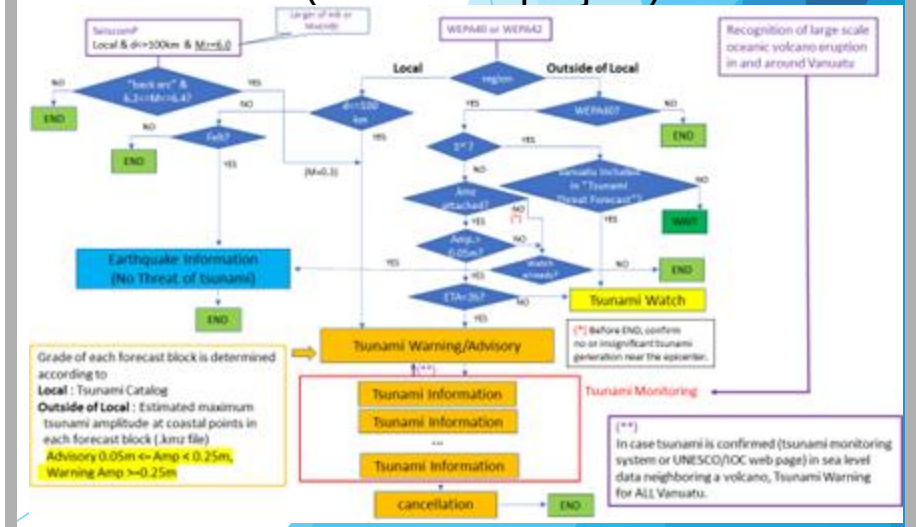





## Volcanic tsunami SOP

**Improve monitoring, knowledge, and communication for volcanic activity.**

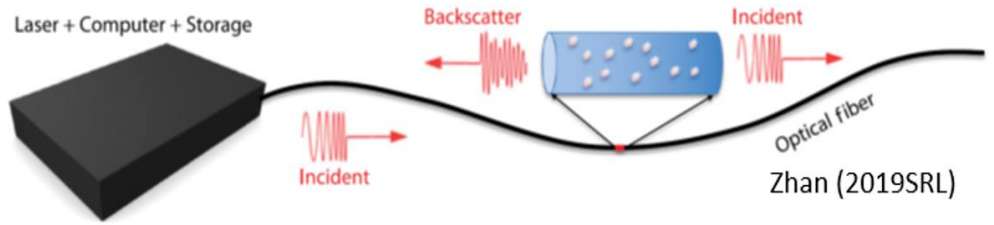
Tsunami SOP (Van-REDI project)

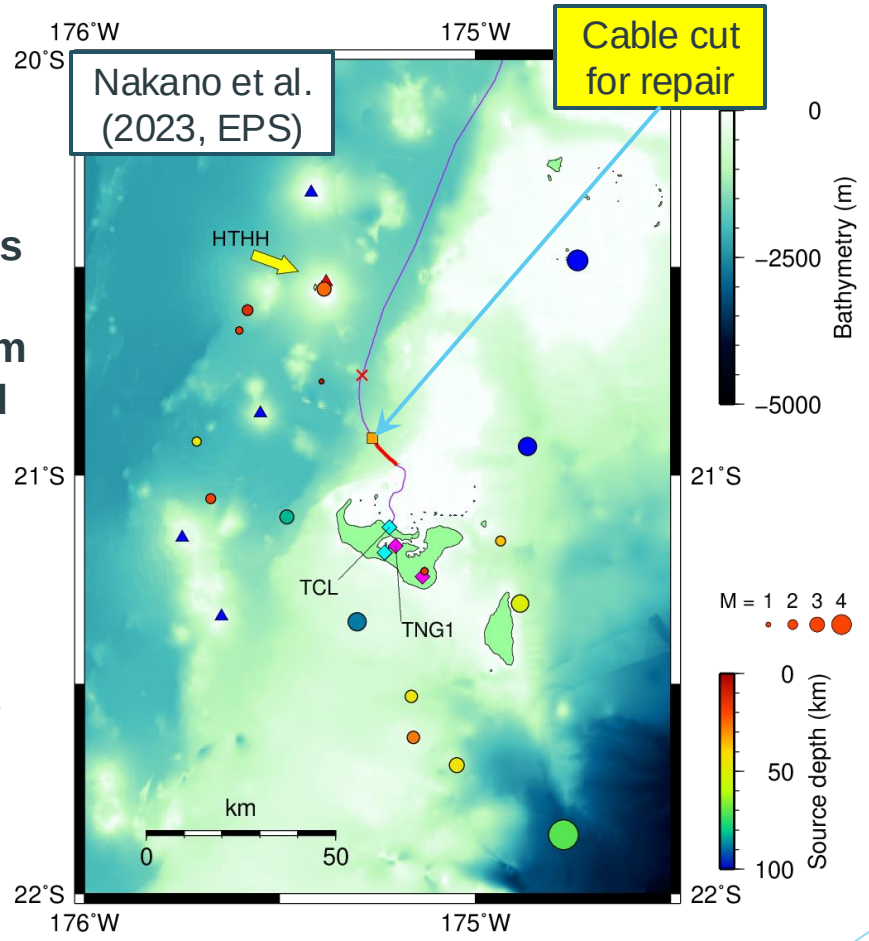


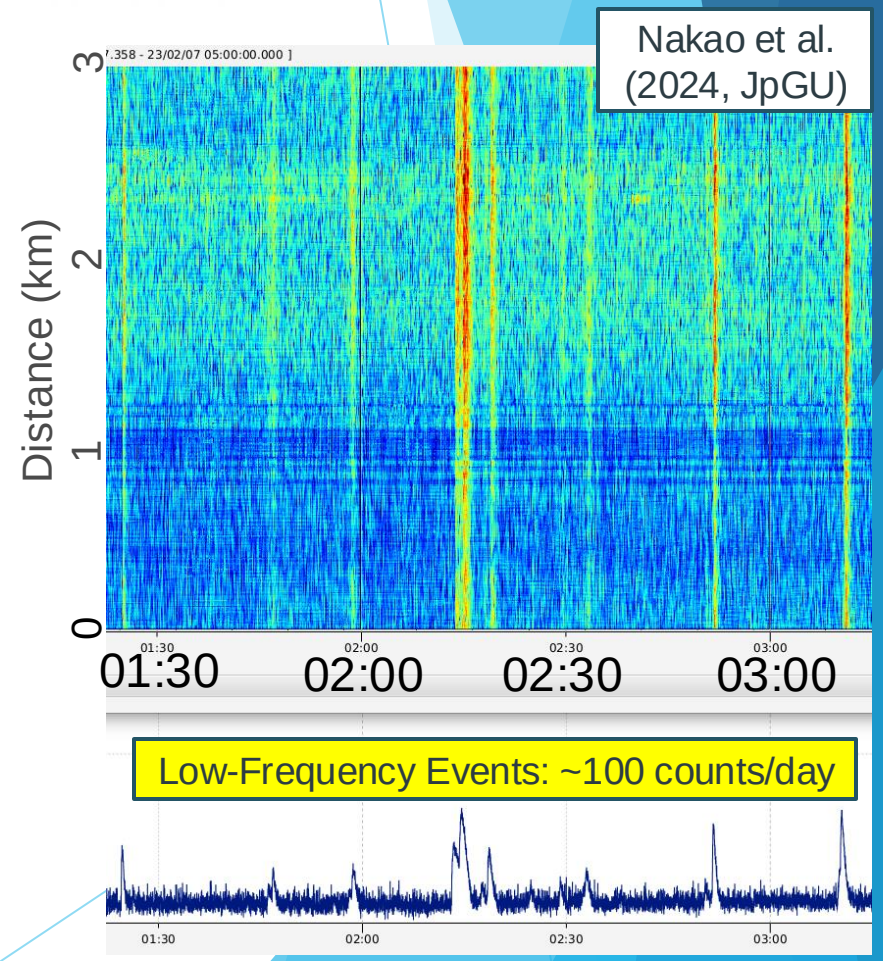
# Distributed Acoustic Sensing methods for volcano monitoring

Shinohara, Nakano, Ichihara, Nakao, Vaiomounga+TGS team with TCL

**- We performed a DAS experiment using Tonga's domestic seafloor cable for Feb 6-13, 2023, when it was waiting for the repair.**
**- We recorded 14960 channels at 2-m intervals and 312.5 kHz, and located 17 earthquakes with M >1, one of which occurred beneath HTHH. We also found ~100 low-frequency events per day. The apparent propagation velocity indicates that they are from the direction of active volcanoes.**
**- Seafloor DAS will be useful for volcano monitoring in ocean areas.**

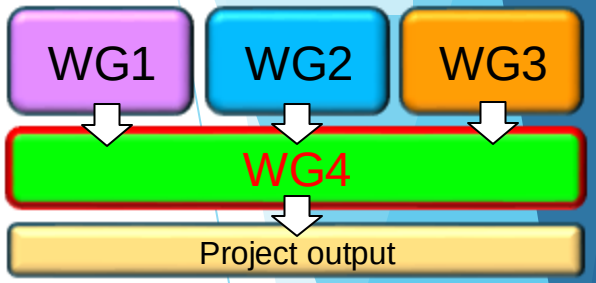


# Platform for utilization of disaster mitigation methods for eruptions [WG4]

Leader: H. Miyake



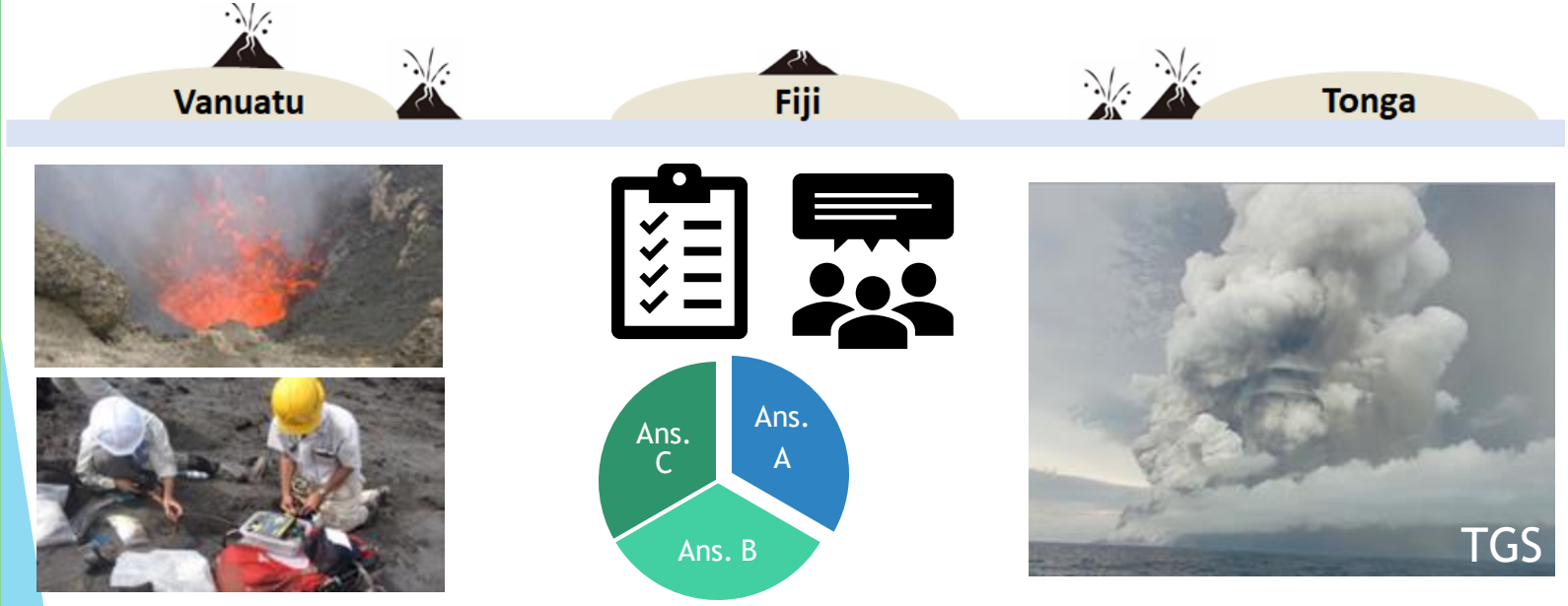

## 1. Promotion of hazard-map usage

Perception surveys and workshops

## 2. Sustainable human resource development

University education

## Promotion of hazard-map usage




Active volcanoes for education and tourism

Wide-spread volcanic hazards perception

Sharing experience of disaster and recovery

## University education

National University of Vanuatu
Government of Vanuatu

FNU FIJI NATIONAL UNIVERSITY

USP THE UNIVERSITY OF THE SOUTH PACIFIC

TNU