

# Monitoring the 2021 Fukutoku-Oka-no-Ba volcano eruption by means of HIMAWARI-8/AHI observations

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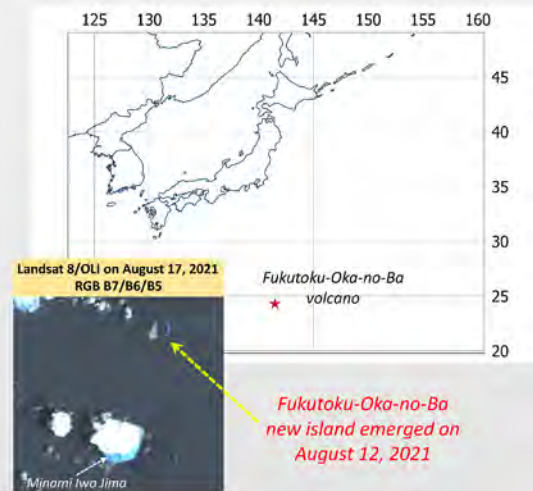
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On August 2021, the **Fukutoku-Oka-no-Ba volcano**, which is a submarine volcano located in the Pacific Ocean about 1,000 kilometers south of the Japan, erupted forming a new island of about 1 km of diameter. During the eruption, ash plumes high up to 16 km and a notable pumice raft were observed by JMA.

Here, we will show the results of satellite investigations performed at the time of Fukutoku-Oka-no-Ba volcano eruption using thermal infrared observations from the **AHI (Advanced Himawari Imager)** onboard **HIMAWARI-8** Japanese geostationary satellite.

The **Robust Satellite Techniques** (RST; Tramutoli 1998, 2007) detection scheme is used for this purpose by analyzing Middle InfraRed (MIR) data acquired in August over the Pacific Ocean (at 10 minutes temporal resolution) from 2015 to 2021.

Results reveal the start time of the **Fukutoku-Oka-no-Ba eruption (on August 12, 2021 at 21:10 UTC)**, and the capacity of the used system in monitoring the space-time evolution of thermal anomaly associated with volcanic activity.



## RST methodology

The RST methodology analyses time-series of satellite images acquired under the same observational conditions (e.g., same sensor, same month and time of the day) to detect perturbing events.

In the RST scheme, a variation of the signal is considered as 'anomalous' when it deviates significantly from its "normal" behavior as measured at a specific place  $(x,y)$  and time of observation  $t$ .

Volcanic thermal anomalies are identified using the statistically-based index ALICE (Absolutely Local Index of Change of the Environment; Tramutoli 1998) signal anomaly being computed as follow:

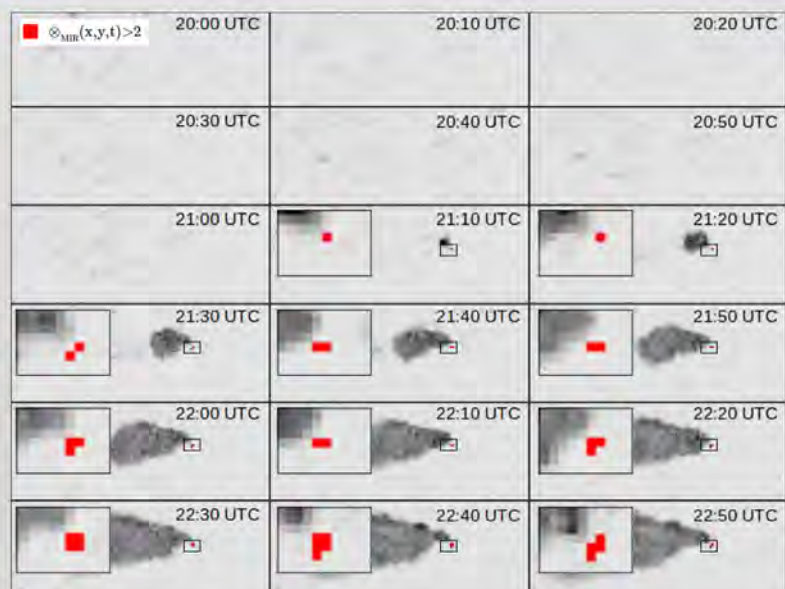
$$\otimes_{MIR}(x, y, t) = \frac{V(x, y, t) - \mu_V(x, y)}{\sigma_V(x, y)}$$

where:

- $V(x,y,t)$  is the value of the variable  $V$  measured at location  $(x,y)$  and time  $t$ ;
- $\mu_V(x,y)$  and  $\sigma_V(x,y)$  are respectively the expected value (usually the time average) and the standard deviation of  $V(x,y,t)$  computed on locations declared as cloud-free and belonging to the chosen data set  $\tau$ , where  $\tau$  determines the homogeneous temporal domain of multi-annual satellite imagery.

For volcanic hot spot detection the  $V$  variable is corresponds to AHI radiances collected in the MIR spectral band, the one where the signal from high temperature bodies reach the maximum of intensity.

## INVESTIGATIONS OVER FUKUTOKU-OKA-NO-BA DURING AUGUST 12, 2021 BY USING HIMAWARI 8/AHI OBSERVATIONS



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