# 国際大会で発表したポスター 台湾国際科学フェア(TISF) 化学部門第3位

### Introduction

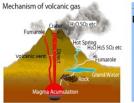


Table 1 Volcanic gases emissions

Gases	Release quantity			
H <sub>2</sub> O	7500	-	15000	ton/day
CO <sub>2</sub>	1100		2200	ton/day
SO2	1000		2000	ton/day
HCI	180	-	360	ton/day
HF	1	-	2	ton/day
H <sub>2</sub>	38		76	ton/day
N <sub>2</sub>	200		400	ton/day
co	2	-	4	ton/day
Total	10021	-	20042	ton/day

Hirabayashi estimated by using data of Surtsey Volcano (アイスランドの南にある人山泉) (HF/HCI=0.01 HCI/SO2=0.4)

Sakurajima Volcano (Lat.: 31' 35 '19 "N Lon: 130' 39' 17" E Saku



https://www.asahi.com/corporate/nie/

Location of volcanos around

Sakuraiima Volcano is one of the world's greatest active volcanoes. It had 235 eruptions in 2022. It always releases large amounts of volcanic gases such as H,O,SO,,HCl and HF. Dr. Hirabayashi of Tokyo Institute of Technology reported a relation between the composition ratio of volcanic gases and volcanic activity.

## Purpose

It is important to observe volcanic gases from perspective of volcano disaster prevention.

However

Only sulfur dioxide is measured at atmospheric observation stations, making it impossible to determine the composition of volcanic gases.

- 1. We made an alkaline filter method for the collection of volcanic gases. 2. We also made a method for their
- determination using a self-made absorbance photometer. We compared the composition of the
- volcanic dases and the number of eruptions.
- We made a model of volcanic gases emission at Sakurajima volcano.

Ultimately, we would like to predict volcanic activity based on volcanic gases composition.

### Method

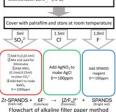




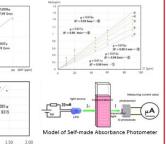
#### 2.Self-made Absorbance Photometer

We made a simple method with absorbance photometer SO2→Barium sulfate turbidimetric method HCl→Silver chloride turbidimetric method

HF→SPANDS method Cover with palrafilm and store at room temperatu



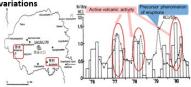
We prepared samples from the alkaline filter paper from which we had finished sampling and measured the concentration of volcanic gases dissolved in the samples.



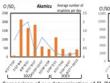
## **Results and Discussions**

y = 0.091x $\Re^2 = 0.9315$ 

1 Verification of the relation between volcanic activity and eruptions and HCI/SO<sub>2</sub> variations



Dr. Hirabayashi reported that volcanic activity increased when the HCI/SO<sub>2</sub> ratio increased in the 1980s, when the volcano was more active than today. Dr. Hirabayashi also reported that the neak in 1979 was a precursor to an eruption



0.120

0.100 0.080

0.040

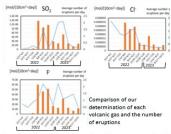
0.020

Comparison of our determination of CI-/SO<sub>2</sub> and the number of eruntions The number of eruptions In April at Arimura, Cl-/SO, values was found to be larger were large even though there was when Cl-/SO<sub>2</sub> values were no eruption large, this is consistent with Dr. Hirabayashi's results. It is considered to be a sign of an

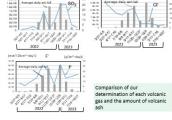
eruption

#### 2 Evaluation of each volcanic gas as a precursor phenomenon

The period of low SO<sub>2</sub>(4/17-7/10 in 2022) might be a precursor to subsequent volcanic activity. Also, the amount of deposition in April 2022 may be a precursor to an eruption around August, and the variation in Cl and F deposition may serve an indicator of volcanic



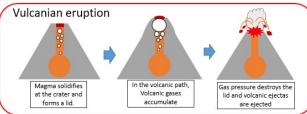
#### 3 Comparison of each volcanic gases and ash fall and modeling of volcanic gas component emissions



The period of high ash fall coincides with the period

It can be seen that the behavior of SO2 and volcanic ash is almost the same.

However, The behavior of volcanic ash and Cl and F- is not always the same.



## The modeling of volcanic gases emission

Based on these results and Mechanism of Eruption of Sakuraiima.

we constructed a volcanic gases emission model as shown in these figures Rise in concentrations of HF and HCl and increased Cl<sup>-</sup>/SO<sub>2</sub> may be HF H<sub>2</sub>O precursor phenomena to an eruption HCI After the eruption, volcanic HF H<sub>2</sub>O gases Lighter volcanic gases HCI are carried away by air currents SO2, which is The crater is covered, heavier than air SO<sub>2</sub> bubbling from the is carried away magma accumulates with volcanic ash but HCI and HF are carried away by released. air currents

### Conclusion

- · A precursor to an eruption was observed after an increase in the CI-/SO2 ratio, a trend similar to that seen in the 1980s, when volcanic activity was more active than now.
- · Also, eruptions occur after increases in HF and HCl deposition, which may be a precursor to eruptive activity, but more research is needed.
- We found that HCl and HF are constantly ejected from the crater, and that SO2 is emitted in large quantities from the crater along with volcanic ash during an eruption. Based on these, we created a model for the emission of volcanic gas components before and after an eruption.

## **Future plan**

Future tasks include

Increasing the number of observation sites closer to the crater. Directly collecting and chemically analyzing volcanic gases and ash. Making continuous measurements using gas sensors

By doing these things, we hope to make progress in chemical eruption prediction.

## Reference

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