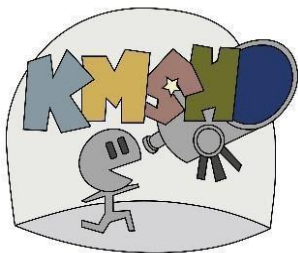




# The Relationship Between the Frequency of fogging and Factory shutdown in Kinmen

---



National Kinmen Senior High School  
Taiwan Partnership

## *Our Final Team Photo*

---



### **Students**

Lin, Yi-Hao

Zhang, Zhi-wei

Zhang, Bo-Xiang

Huan, Qian-Pei

### **Teacher**

Lee, Yu-Hsien

# 1 Abstract

---

1. we observe and analyze the chain effect of the decline in the number of foggy days in Kinmen due to the decline of production capacity in mainland factories over the past few years due to COVID-19.

2. Our experiment found that the PM<sub>2.5</sub> value of pure water fog is also very high, indicating that the high value of PM<sub>2.5</sub> measured during fogging is mainly the effect of water particles.

# 2 Research Questions

---

1. Analyze the relationship between the foggy days in Kinmen each year and the situation of air pollution.
2. Analyze the relationship between COVID-19 and the change in the situation of air pollution.
3. Understand the changes in the air pollution situation in each year

# 3 Introduction and Review of Literature

---

In 2020, due to the impact of the new crown epidemic, and man-made PM2.5 and other pollutants have also decreased. The location of Kinmen is just right to measure the pollution emitted by the mainland. We also did experiments to understand the relationship between PM2.5 and fog, to see if aerosols were enough to serve as cloud condensation nuclei, and we began to study whether the frequency of fog on the ground was related to the shutdown of factories.





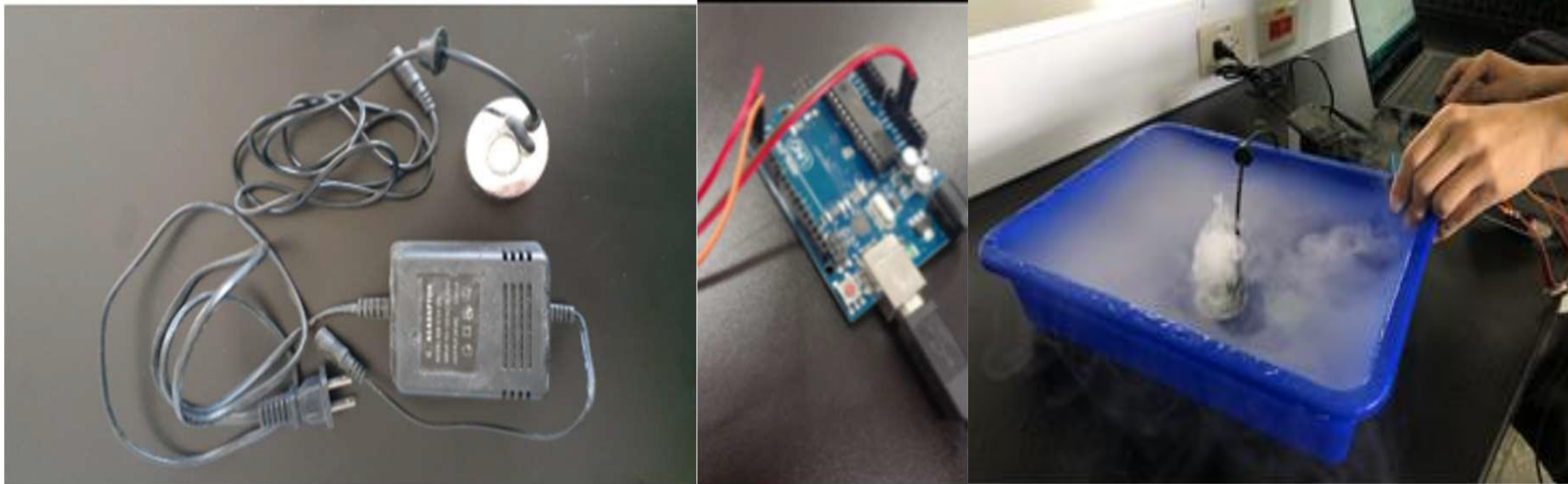
# 4 Research Methods

---

# METHOD ONE- Step 1

---

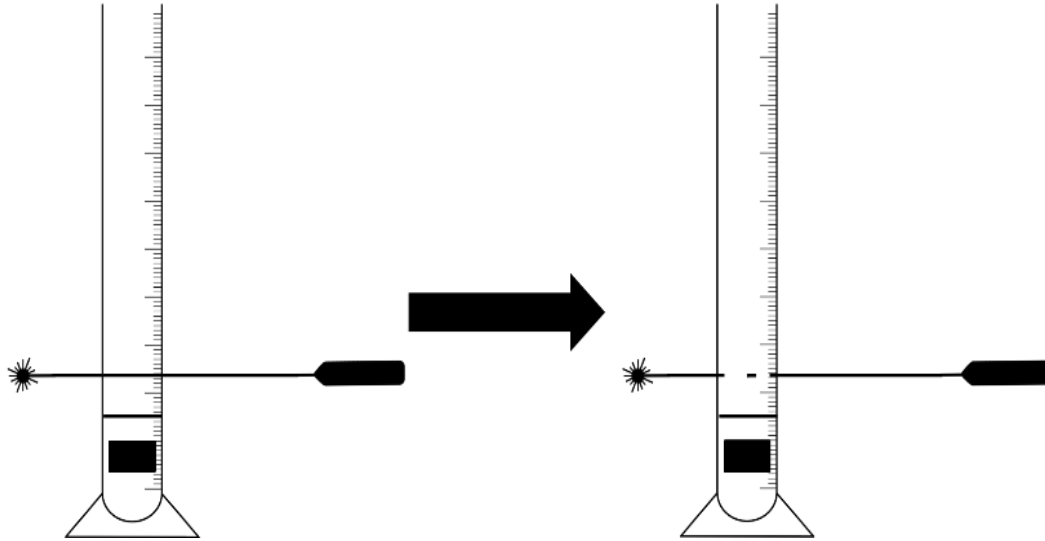
We use an ultrasonic fogger (left picture) to artificially create a fog, which is convenient for experiments.



# METHOD ONE- Step 2

---

After the fog is successfully generated, the PM detector will be used to obtain various data of the air pollutants at that time.



# METHOD TWO

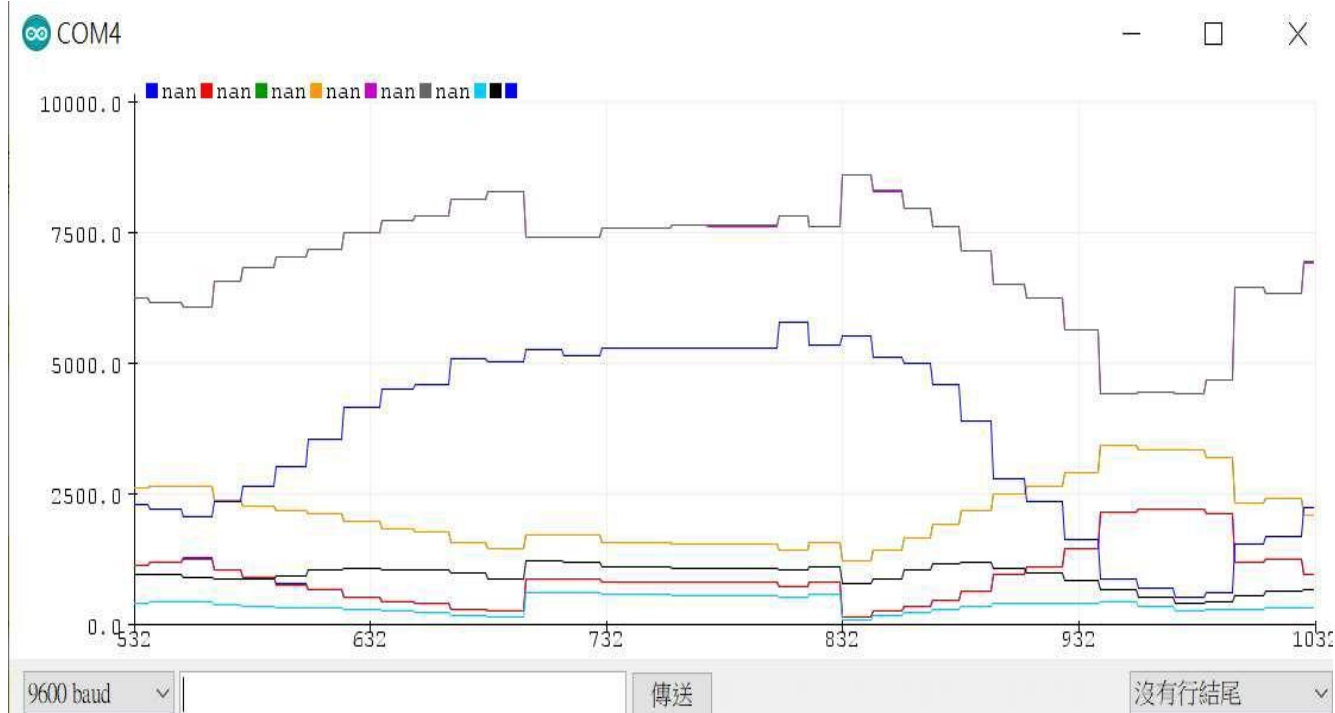
---

In addition to the experiment, we also capture the data of PM10, PM2.5, SO<sub>2</sub>, NO<sub>x</sub>, CO and the number of foggy days through the information of the Central Meteorological Bureau. After drawing a line chart for 2018-2021 based on the values, try to find the trend of both.

# 5 Results

---

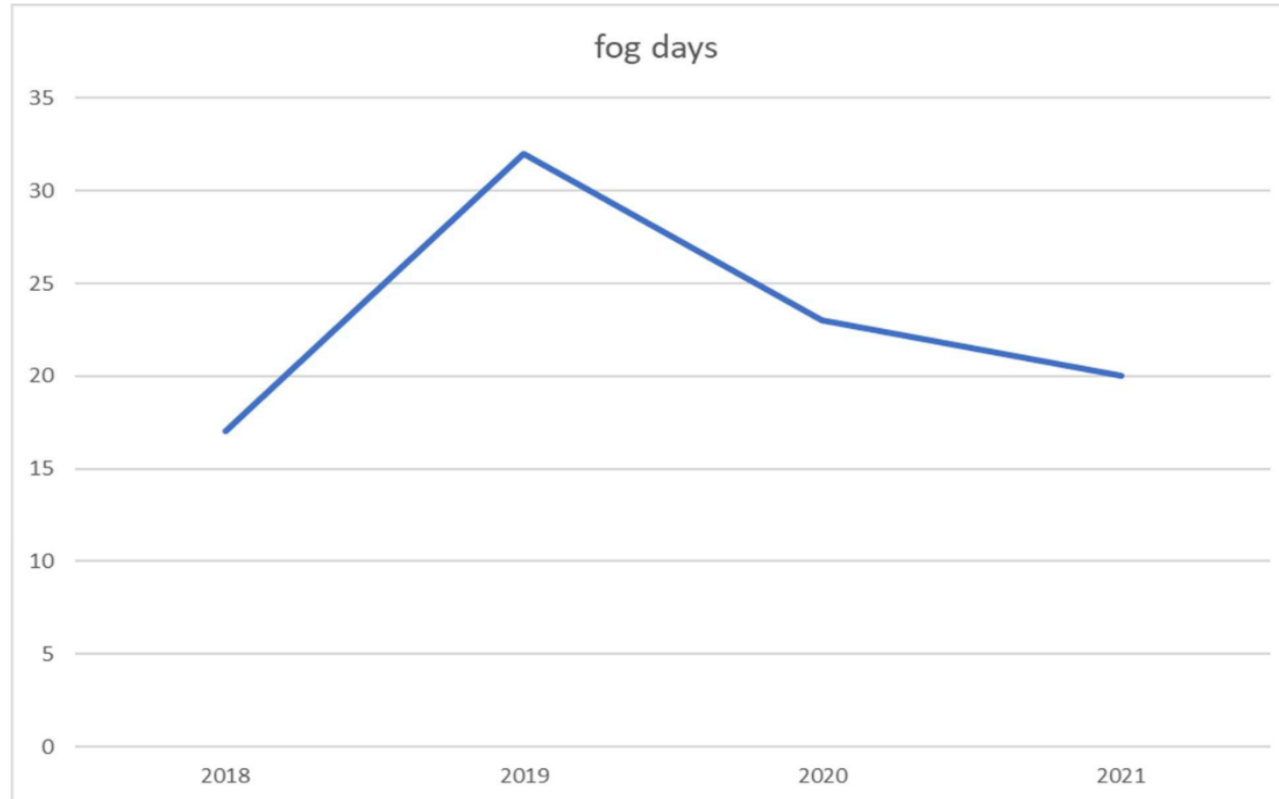
# METHOD ONE



That is, when the fog is produced, the values all rise at the same time, even when the fog is produced by pure water.

The gray line is PM10, and the dark blue is PM2.5.

# METHOD TWO



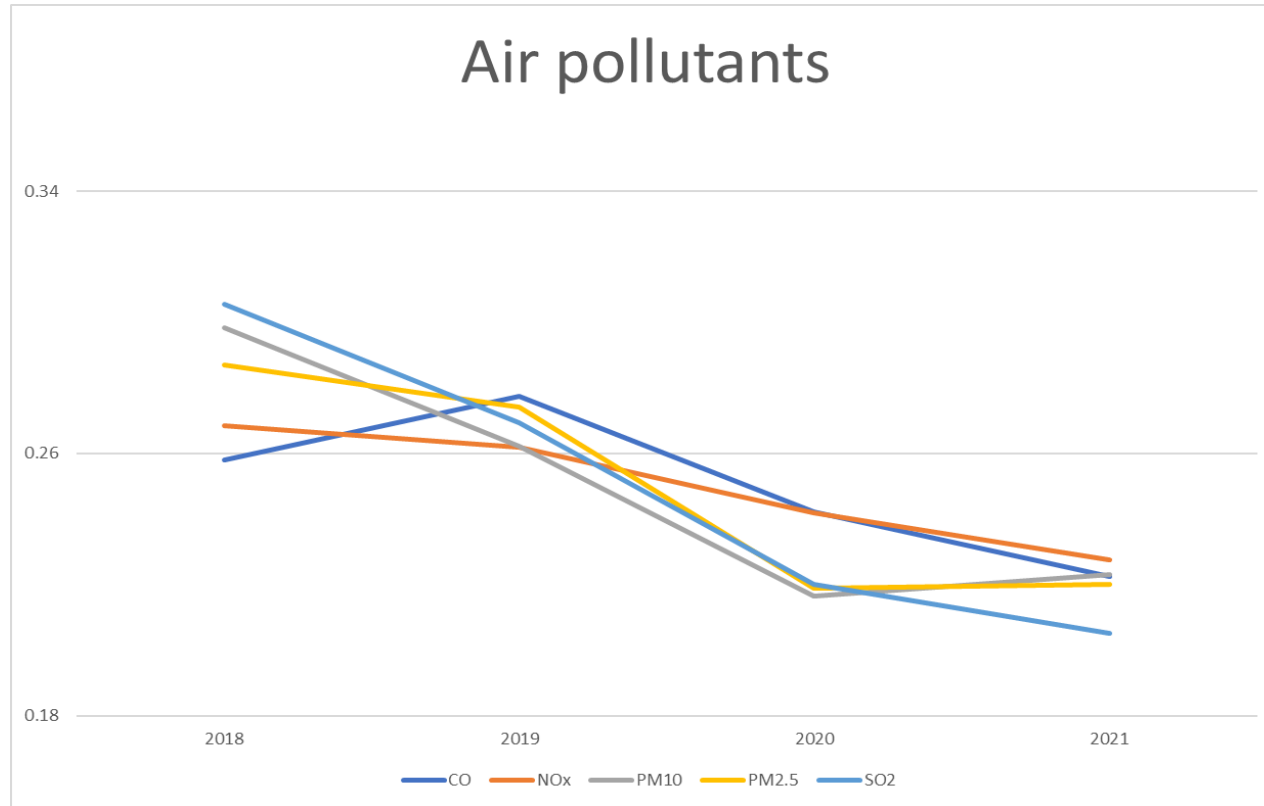
During these four years, the number of foggy days in Taiwan has slowly decreased.

The number of foggy days from 2018 to 2021

# METHOD TWO

---

We want to compare it easy, so using Type/average as follow



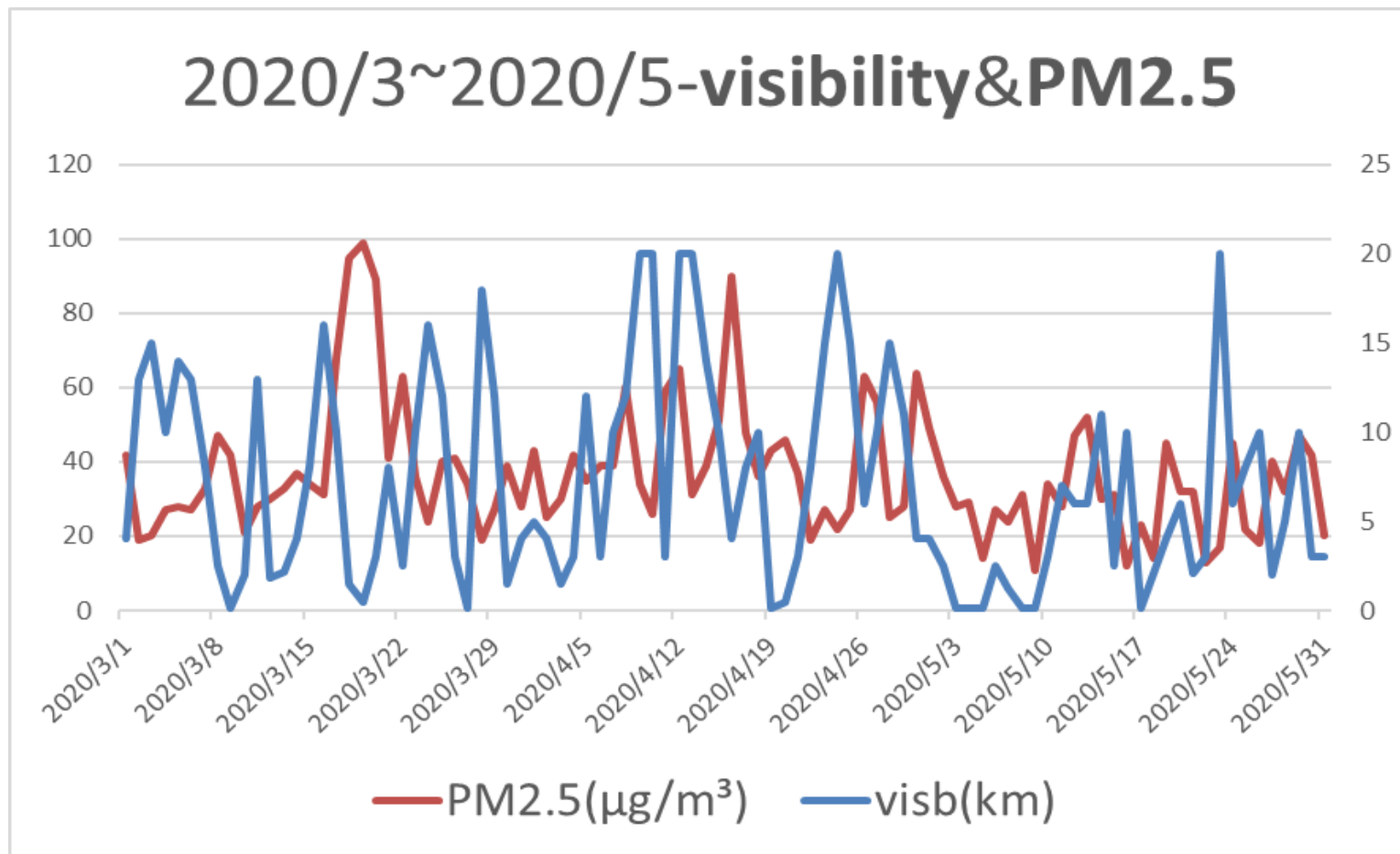
PM10 and PM2.5 have fallen more in 2020, but they will rebound in 2021.



# 6 Discussion

---

2020 is the most significant and we use it for illustration

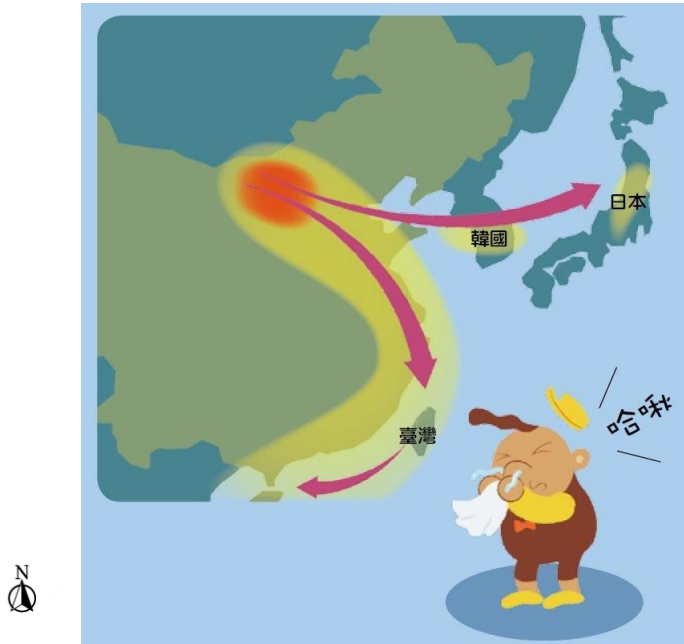


Due to better air quality in mainland China and fewer air pollution sources in the Kinmen region, the relationship between fog and PM2.5 is stronger and leads to an increase in machine readings of PM2.5

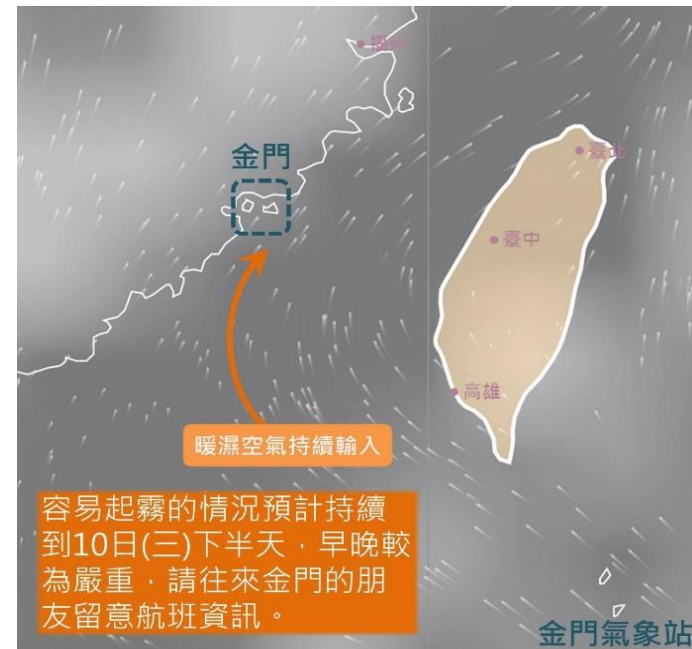
# 7 Meteorological data

---

Combined with our experimental results, PM2.5 may not be able to distinguish between water particles and atmospheric pollution particles of PM2.5. In Kinmen also, it will only be subjected to the exhaust from Chinese factories brought by the northeast monsoon, and the foggy south wind days will only bring pure water, so if PM2.5 is not caused by fog, maybe it is really suspended particles from China.



Northeast Wind  
Taken from Parent-Child World (2018)



Fog day, south wind  
Kinmen Weather Station (2019)

# 8 Conclusion

---

According to the data we analyzed, under the influence of the COVID-19, the air pollution situations have decreased.

We found that PM2.5 values usually increase even when fog is presenting, and with our experimental results, we know that PM2.5 may not be able to distinguish between water particles and air pollution particles of PM2.5.