《2024 International Virtual Science Symposium Report》

Seasons and Relative Humidity

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Observation analysis time ：
2018.1.11~2022.1.11

《Abstract》

- This report will explain the relationship between the relative humidity of the four seasons from the beginning of 2018 to the beginning of 2022 due to other meteorological factors. It mainly uses a hygrometer placed in the shutter to measure the relative humidity. It is hoped to understand its changes in each season, and the results are related to factors such as temperature and monsoon.

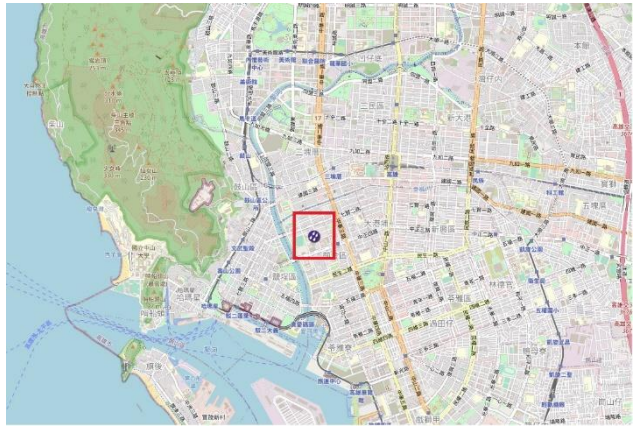
《Research Questions》

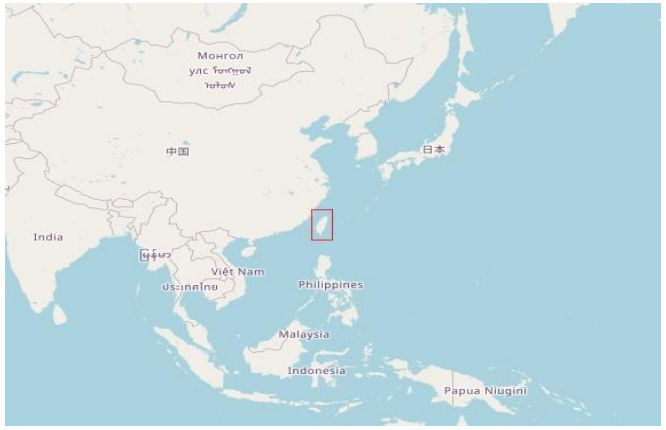
- According to the relationship between temperature, rainfall, monsoon and other factors and relative humidity in each season.

Kaohsiung Municipal Cianjin Junior High School

Site Information

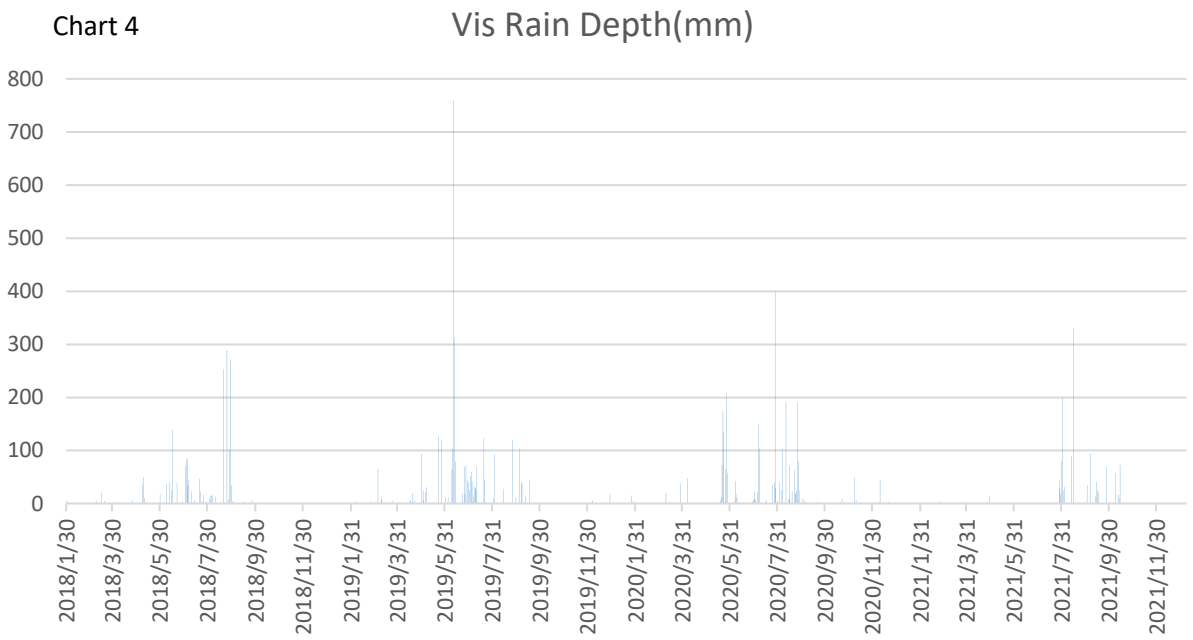
Site ID	104218
Name	Cianjin 1
Latitude	22.630026°
Longitude	120.291204°
Elevation	6.8m
Location Source	other





- According to the Köppen climate classification, most of Kaohsiung City belongs to the tropical monsoon climate . The yaverageear- round climate is warmer than the subtropical monsoon climate north of Tainan . At the same time, because it is located in the southern part of Taiwan , and the Taiwan Strait is narrow in the north and wide in the south, when the cold current from Siberia goes south in winter and crosses the Taiwan Strait, it is easier to be caught by the The warm ocean air flow in the western Pacific is offset, so the winter temperature in Kaohsiung City is significantly warmer than that of large cities at the same latitude.

Chart 4


Vis Rain Depth(mm)
800
700
600
500
400
300
200
100
0
2018/1/30
2018/3/30
2018/5/30
2018/7/30
2018/9/30
2018/11/30
2019/1/31
2019/3/31
2019/5/31
2019/7/31
2019/9/30
2019/11/30
2020/1/31
2020/3/31
2020/5/31
2020/7/31
2020/9/30
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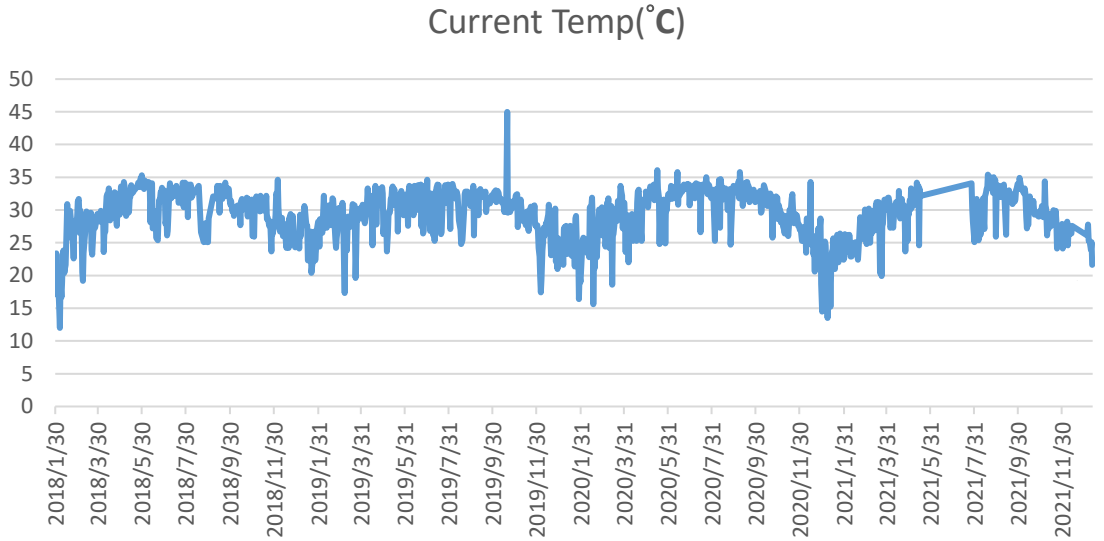
2021/7/31
2021/9/30
2021/11/30


Current Temp(˚C)
50
45
40
35
30
25
20
15
10
5
0
2018/1/30
2018/3/30
2018/5/30
2018/7/30
2018/9/30
2018/11/30
2019/1/31
2019/3/31
2019/5/31
2019/7/31
2019/9/30
2019/11/30
2020/1/31
2020/3/31
2020/5/31
2020/7/31
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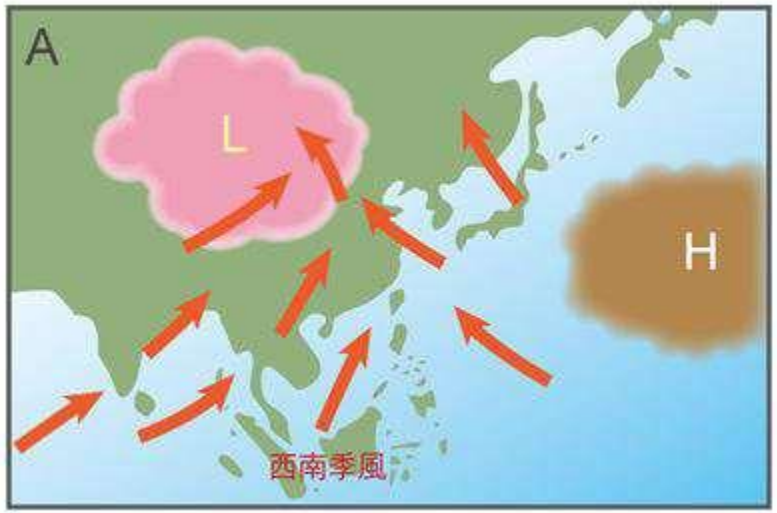
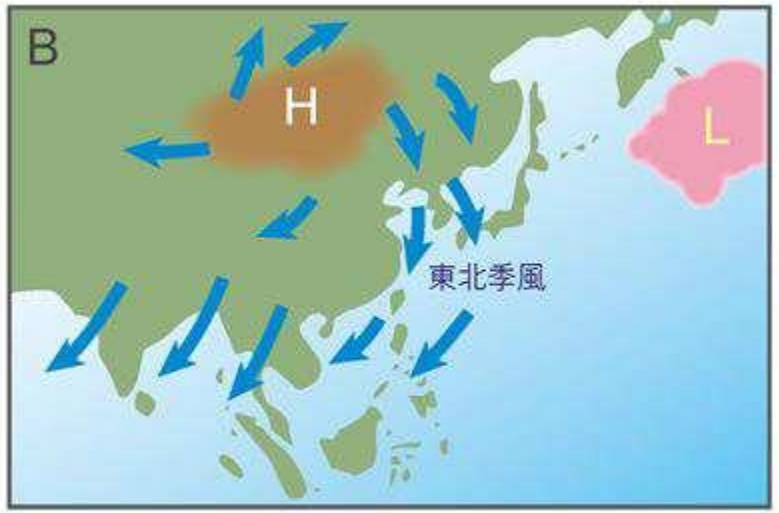
2021/7/31
2021/9/30
2021/11/30


A
L
H
西南季風


B
H
L
東北季風

《Introduction & Review of Literature 》

Most sudden drops in temperature are accompanied by low *relative humidity*, meaning there's less moisture in the air.
—Jocelyn Solis-moreira, *Discover Magazine*, 14 Feb. 2022

Absolute humidity is simply a measurement of the amount of water vapor present in the air at any one time.
Relative humidity measures the density of water vapor in a space relative to the temperature in the same space. Scientists describe relative humidity in the Journal of Applied Meteorology and Climatology as the "degree of saturation of the air" with water. So, if there's 100% humidity, the air can't hold any more moisture.
— Lawrie Jones,13 Oct. 2022

2021年												
月份	測站	溫度 (℃)			雨量	風速 (公尺/秒)/ 風向 (360˚)/日期		相對溼度 (%)		測站氣壓	降水日數 >=0.1毫米	日照時數
		平均	最高/日期	最低/日期	(毫米)	最大十分鐘風	最大瞬間風	平均	最小/日期	(百帕)	(天)	(小時)
五月	KAOHSIUNG	29.1	33.6/14	23.0/01	31	6.3/190.0/19	11.1/140.0/15	76	50/14	1009.9	3	282.1
六月		28.2	33.8/03	24.1/23	911	7.1/190.0/06	13.9/190.0/06	84	Nov-55	1007.1	22	148.7
七月		29.1	34.3/04	24.7/31	476.5	7.2/150.0/07	14.9/300.0/23	81	Apr-55	1004.4	17	215.5
八月		28.4	33.2/27	24.6/01	869	9.1/290.0/07	20.6/300.0/07	84	57/29	1006.9	17	174.3

https://www.cwb.gov.tw/V8/C/C/Statistics/monthlydata.html Contral Weather Bureau
—2021missing information source

《Research Methods》

measuring equipment

Relative humidity

• Precautions:

Place the instrument 15 minutes before the observation
In the leaf box, please take it back indoors after observing
Store in a dry place.[don't take a long time
Put this instrument in a shuttered box!] If it is raining or foggy,
Do not observe humidity and will be in data
Write the humidity 100% on the sheet, and
Write 100% yes in the comment
Because the air is saturated.

• Observation method:

1. Place it in a shutter box and read the relative humidity of the atmosphere
value.
2. Reading value
1) What first appeared was the current atmospheric temperature and humidity.
2) Click "MAX/MIN" => maximum temperature, Humidity (MAX will appear next to the value).
3) Press "MAX/MIN" again => maximum temperature
degree, humidity (MIN will appear next to the value).
4) Press "MAX/MIN" again => return to current temperature and humidity. 3. If there is an external sensor, the sensor can only measure Just the temperature! And this sensor value can be pressed "OUT"
This key is displayed.
4. If it is raining or foggy, please do not watch Measure the humidity, and write the humidity in the data sheet
Degree 100%, and write in the comment
100% because the air is saturated.

相對溼度

What is relative humidity?

To put it simply, when the pressure is constant, the saturated vapor pressure at each temperature is the same, the higher the temperature, the greater the saturated vapor pressure, because the higher the temperature, the faster the evaporation rate, the greater the vapor pressure, and the relative humidity is the actual water vapor pressure divided by the saturated vapor pressure, so when there is not enough water in the atmosphere, the actual water vapor pressure will be less than the saturated vapor pressure, so when the water vapor is constant, the actual water vapor pressure remains unchanged, the higher the temperature, the higher the saturated vapor pressure, and the lower the relative humidity; The higher the humidity.

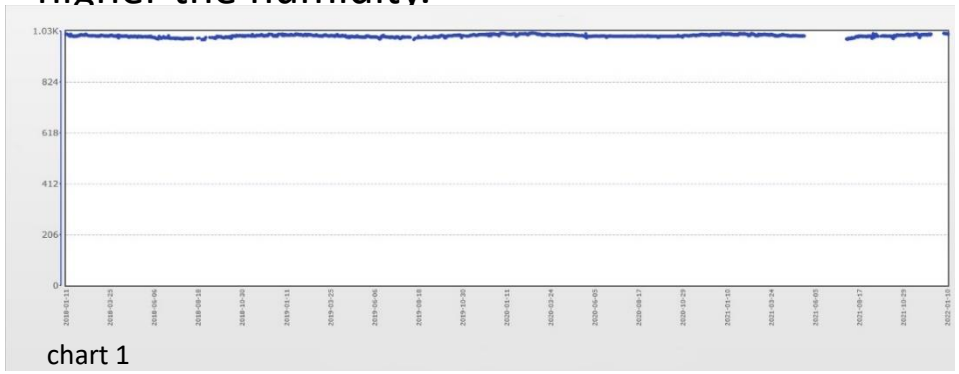
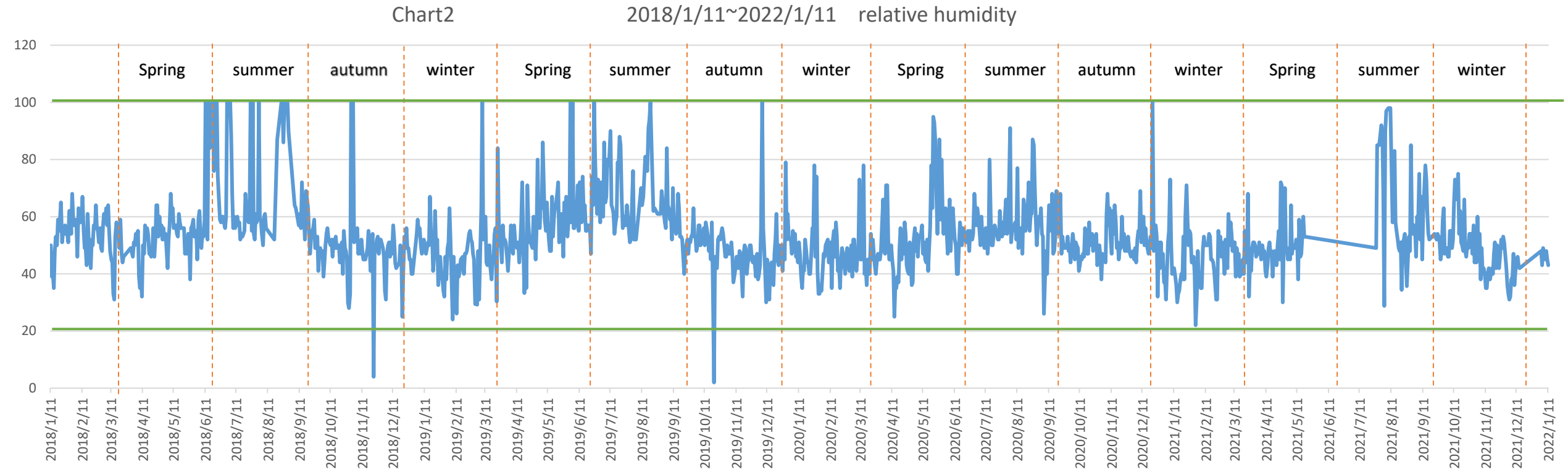


chart 1

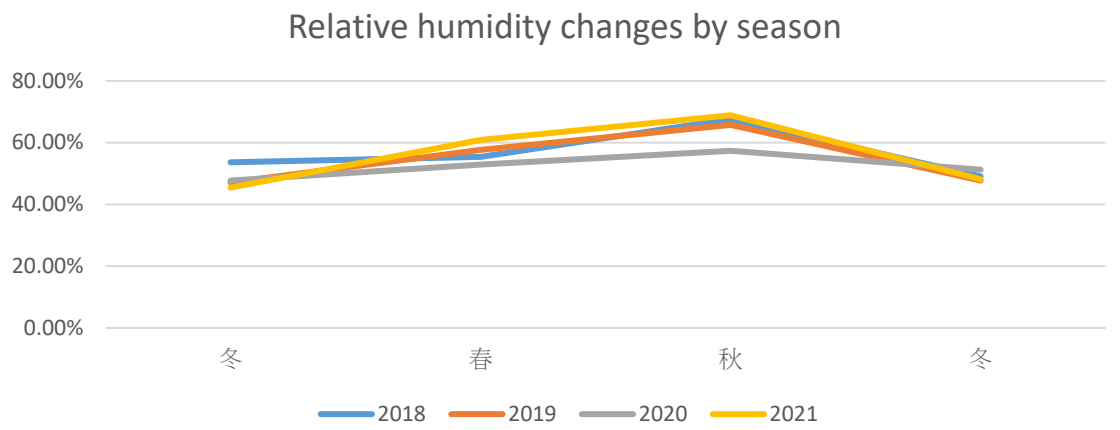
$$\text{Relative Humidity} = \frac{\text{Actual Vapor Density}}{\text{Saturation Vapor Density}} \times 100\ \%$$

Chart 1 is the atmospheric pressure of this station in the past four years. From this, it is known that the atmospheric pressure here is almost the same, and the error is extremely low. The subsequent content has been analyzed at atmospheric pressure, and only discusses the saturated vapor pressure affected by temperature.



1. In chart 2 that the relative humidity in summer is generally higher than that in other seasons; the relative humidity in winter is generally lower than other seasons, which shows that relative humidity is affected by temperature.
2. The rainy season is around the turn of spring and summer. Due to the abundant water vapor brought by the stagnant front, the relative humidity rises, so the rain is more abundant. The relative humidity in spring is second only to summer, while winter is the dry season in Kaohsiung, so there is less rainfall. From this, it can be guessed that the rainfall may change due to the amount of relative humidity. The higher the relative humidity, the more rainfall; the lower the relative humidity, the less rainfall. Chart 4
3. Because the northeast monsoon hardly brings moisture to Kaohsiung, and there is no main reason for bringing moisture in winter, the relative humidity in winter is less than that of the other three seasons, and the rainfall is also less than the other three seasons.

Chart 3	Kaohsiung Municipal Cianjin Junior High School			
relative humidity average(%)				
	winter	spring	summer	autumn
2018	53.64	55.41	67.57	49.09
2019	47.07	57.66	65.77	47.7
2020	47.69	52.92	57.37	51.2
2021	45.47	60.9	68.87	48.15



In chart 3
Relative humidity in 2018: summer > spring > winter > autumn
Relative humidity in 2019: summer > spring > autumn > winter
Relative humidity in 2020: Summer > Spring > Autumn > Winter
Relative humidity in 2021: Summer > Spring > Autumn > Winter
Two points can be analyzed
1. Winter & Summer: In chart 3 that the average relative humidity in summer over the years is much higher than that in winter. The temperature in Kaohsiung in winter is lower than that in summer, but the average relative humidity in winter is much lower than that in summer. It can be seen that Kaohsiung has less water vapor in winter and more water vapor in summer, so the average relative humidity in winter is lower than that in summer.
2.spring & autumn:The average temperature in spring and autumn is about the same, so it is deduced that the factor that affects the average relative humidity in spring and autumn is the water vapor content, and the main source of precipitation in spring is the rainy season in May and June, when the rainfall is abundant and stable, so the water vapor content is high; in Kaohsiung in autumn, because the northeast monsoon is blocked, there is less water vapor than in spring, so the average relative humidity in autumn is lower than the average relative humidity in spring.

《Conclusion》

From the observation data of the past four years, we have analyzed and discussed, and found that the moisture in the atmosphere is different in each season due to different meteorological factors, and the difference in temperature makes the relative humidity of each season different.

《Bibliography/Citations》

Central Weather Bureau https://www.cwb.gov.tw/V8/C/C/Statistics/monthlydata.html

The Globe Program https://www.globe.gov/

《Optional Badges》

1. I am a collaborator

Carry out observation tasks together, and divide labor for analysis, find data and make reports.

2. I have influence

By analyzing the data of these four years, the possible reasons for the local relative humidity changes were analyzed.

3. I am a data scientist

Through the change of relative humidity in the past four years, find out the relationship between relative humidity and temperature, rainfall and other factors.