

從全球暖化引起極端氣候 突變對飛航安全之影響



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經濟部水利署災害應變服務計畫 氣象顧問

行政院農委會水保局 氣象諮詢顧問

臺灣飛安基金會 氣象諮詢委員

熊航 氣象諮詢專業顧問

台欣航太科技公司 氣象諮詢專業顧問

台北市、新北市政府防災應變中心 氣象諮詢顧問

高雄市、連江縣政府防災應變中心 氣象諮詢顧問

基隆市、宜蘭縣政府防災應變中心 氣象諮詢顧問

台北科技大學建築與都市設計研究所 兼任助理教授

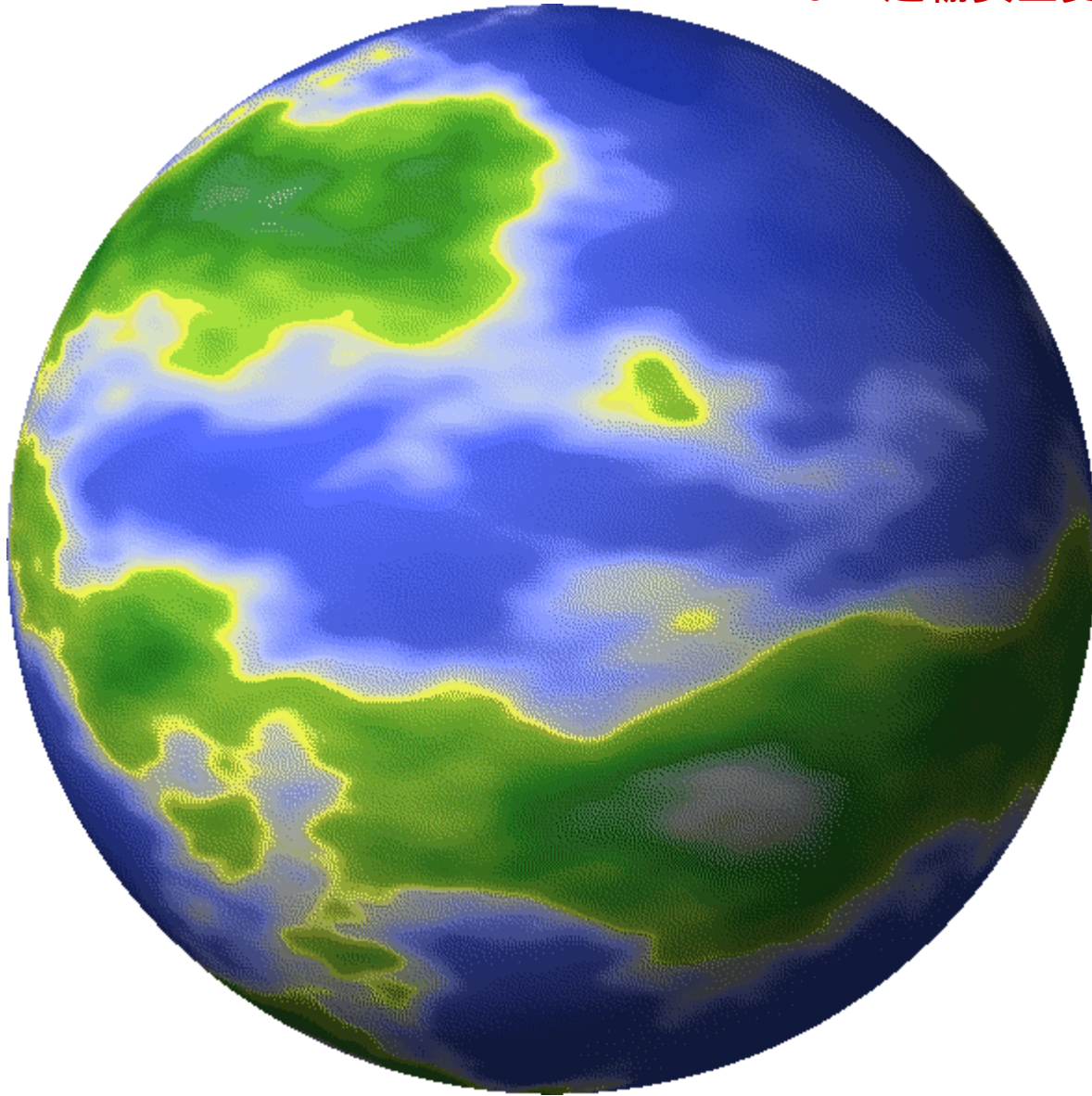
臺灣永續建築環境促進會 會員發展委員會主委

教育部年度區域防災教育服務團 諮詢委員

教育部永續校園防災與水資源保育 種子教師

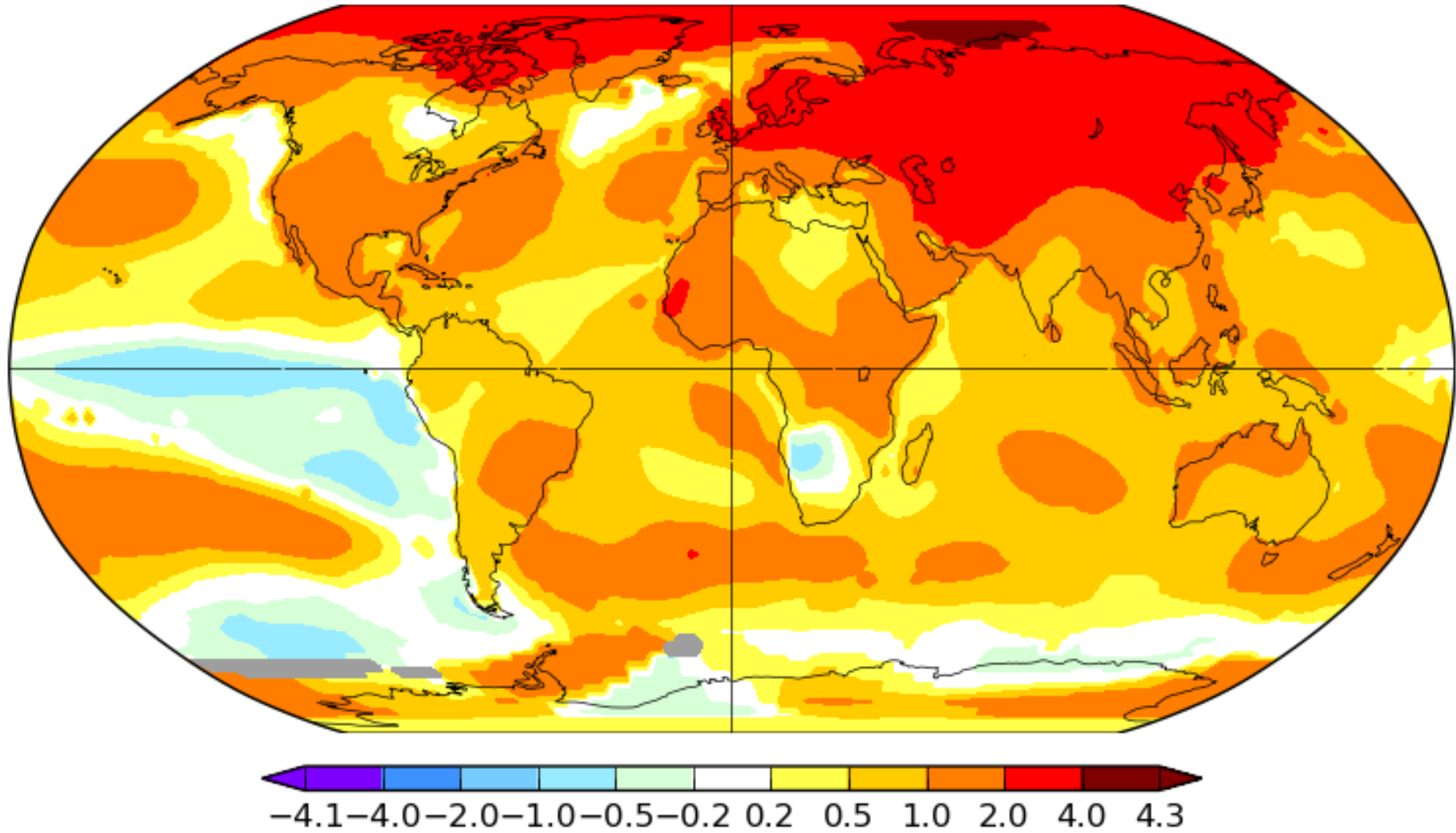
財團法人中華民國臺灣飛行安全基金會 航空氣象委員



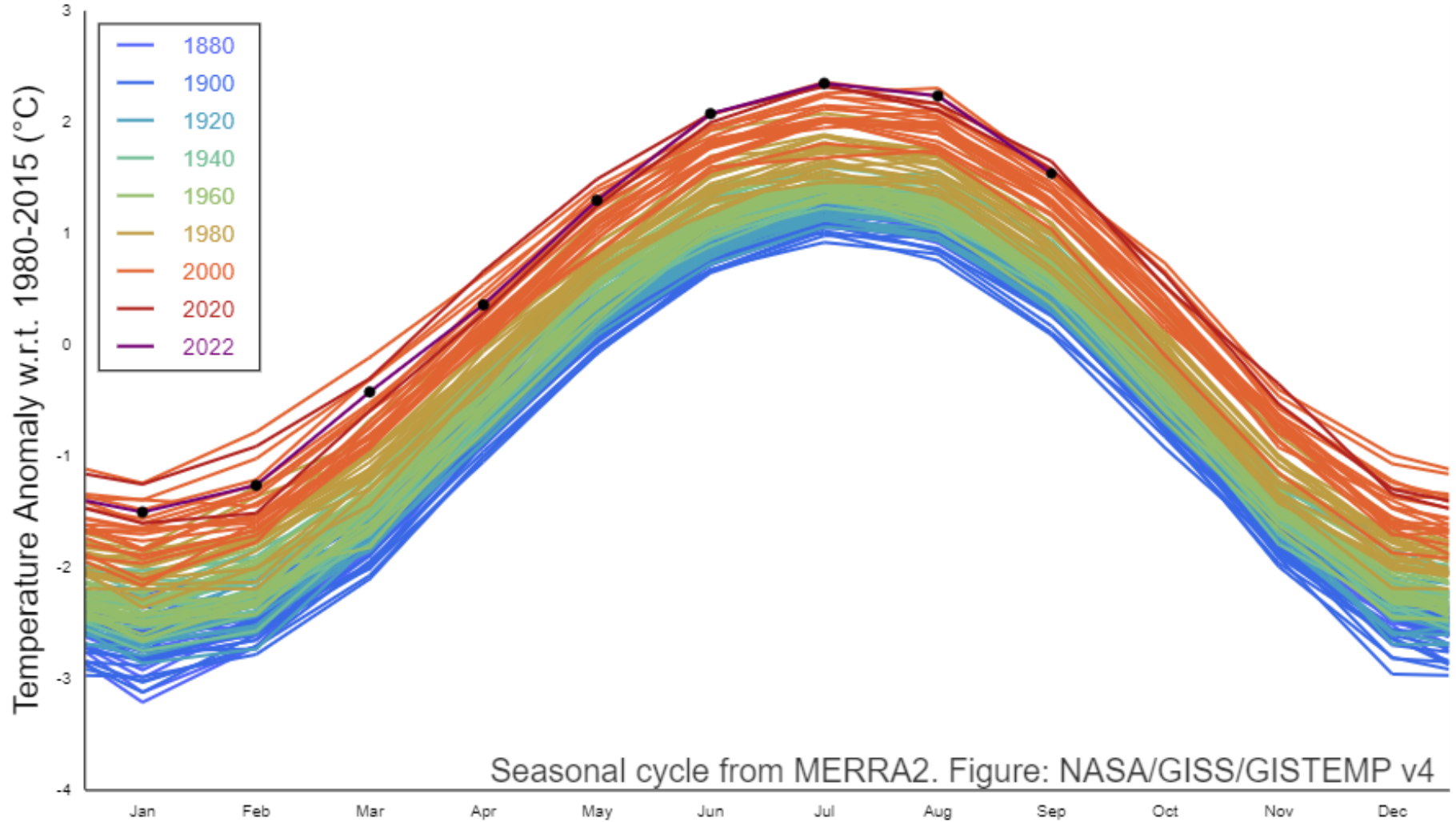


1.Global warming

Nov 2021-Apr 2022 anomaly vs 1951-1980



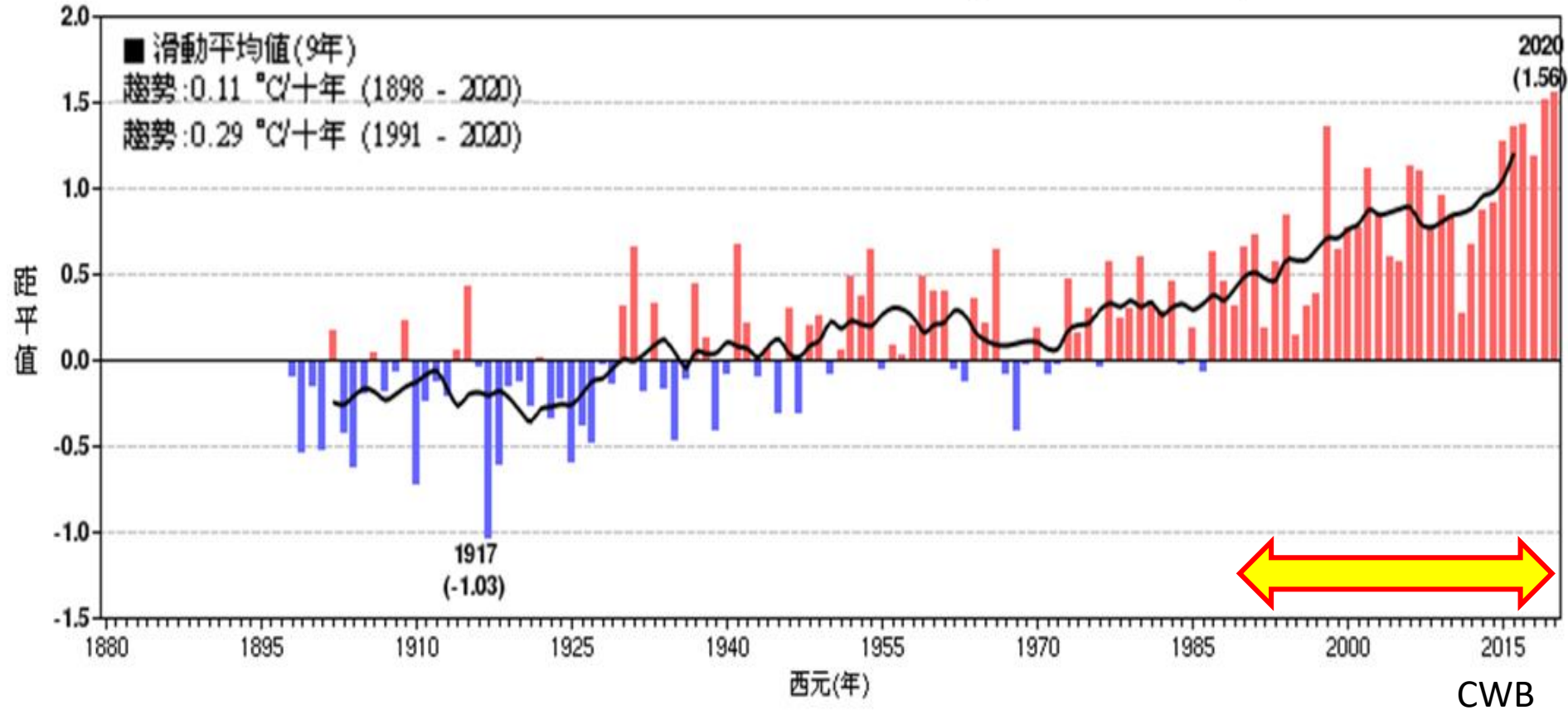
1.Global warming



Seasonal cycle from MERRA2. Figure: NASA/GISS/GISTEMP v4

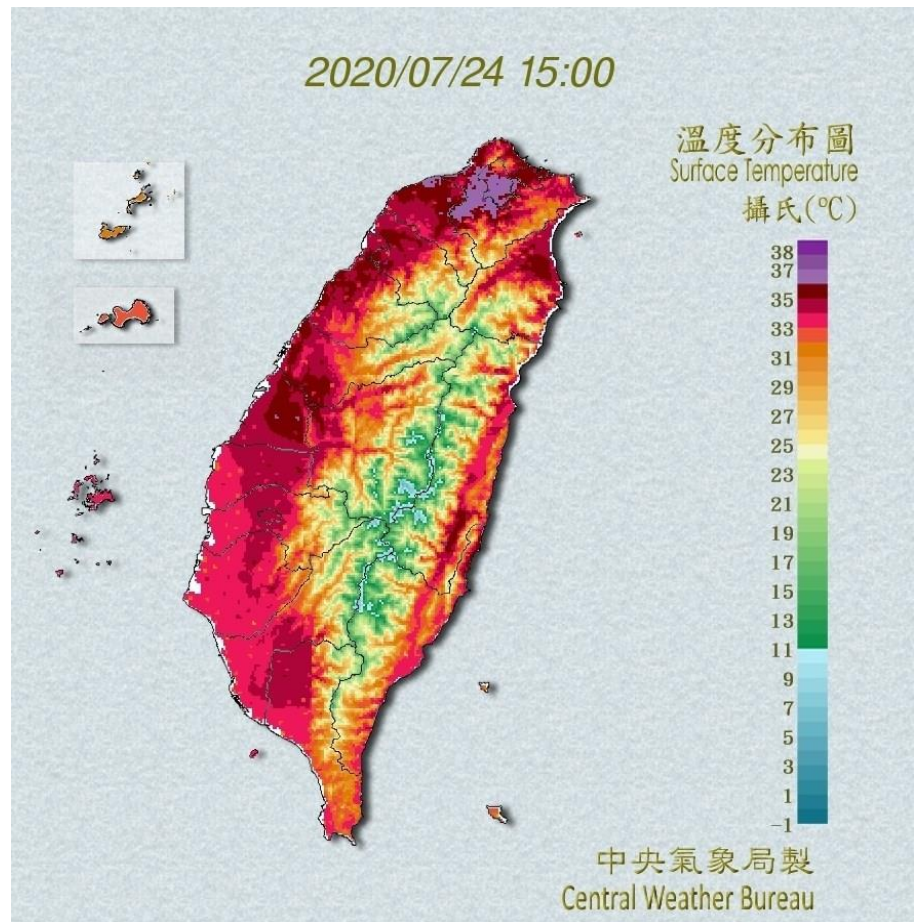
1.Global warming

13站平地站 年平均氣溫 1898年 ~ 2020年 (平均值: 1901-2000)

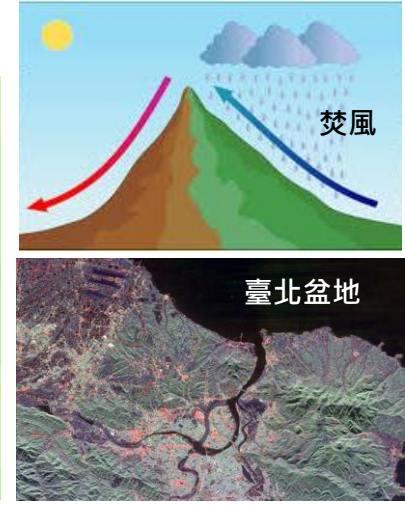
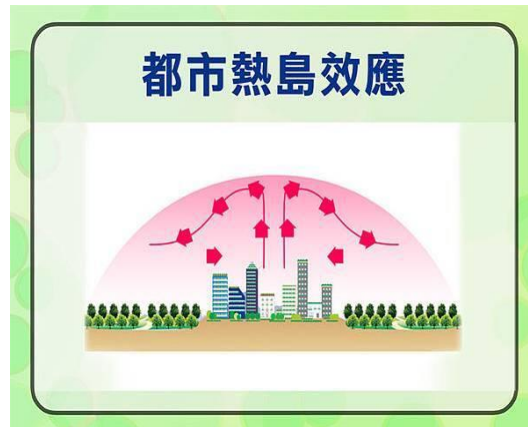
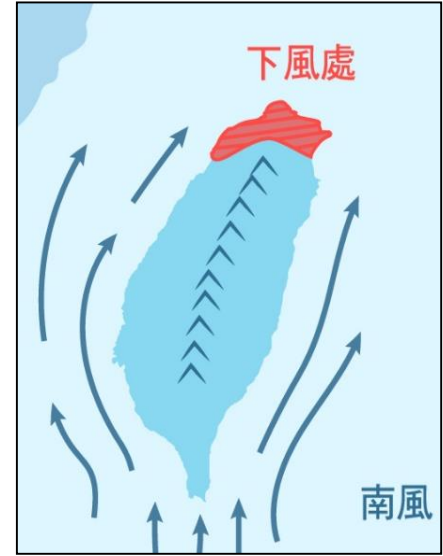
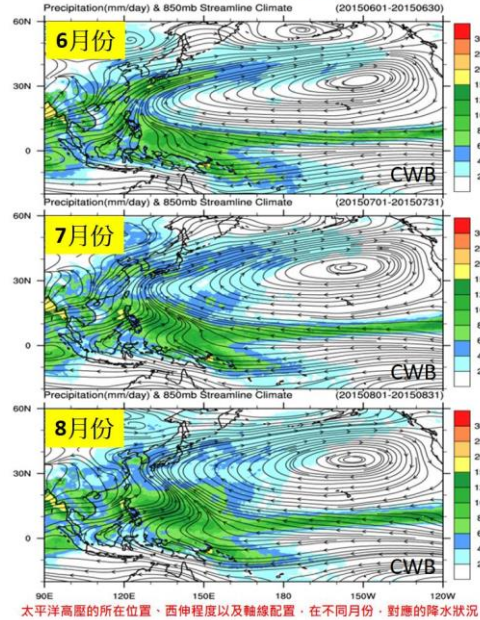


From 1911 to 2020, the annual average temperature in Taiwan has risen by 1.6°C

1.Global warming



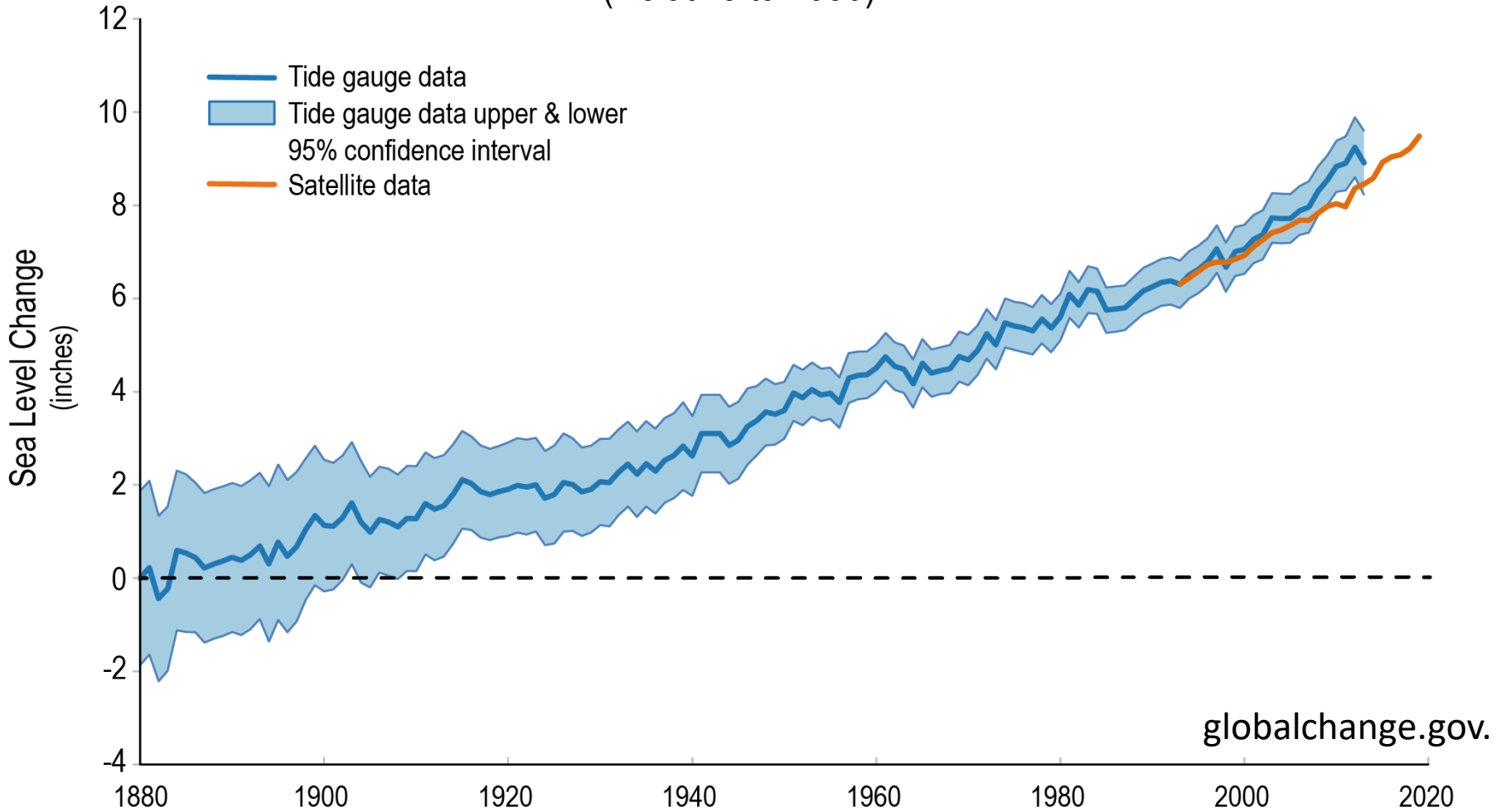
太平洋高壓角色重要！



39.7°C

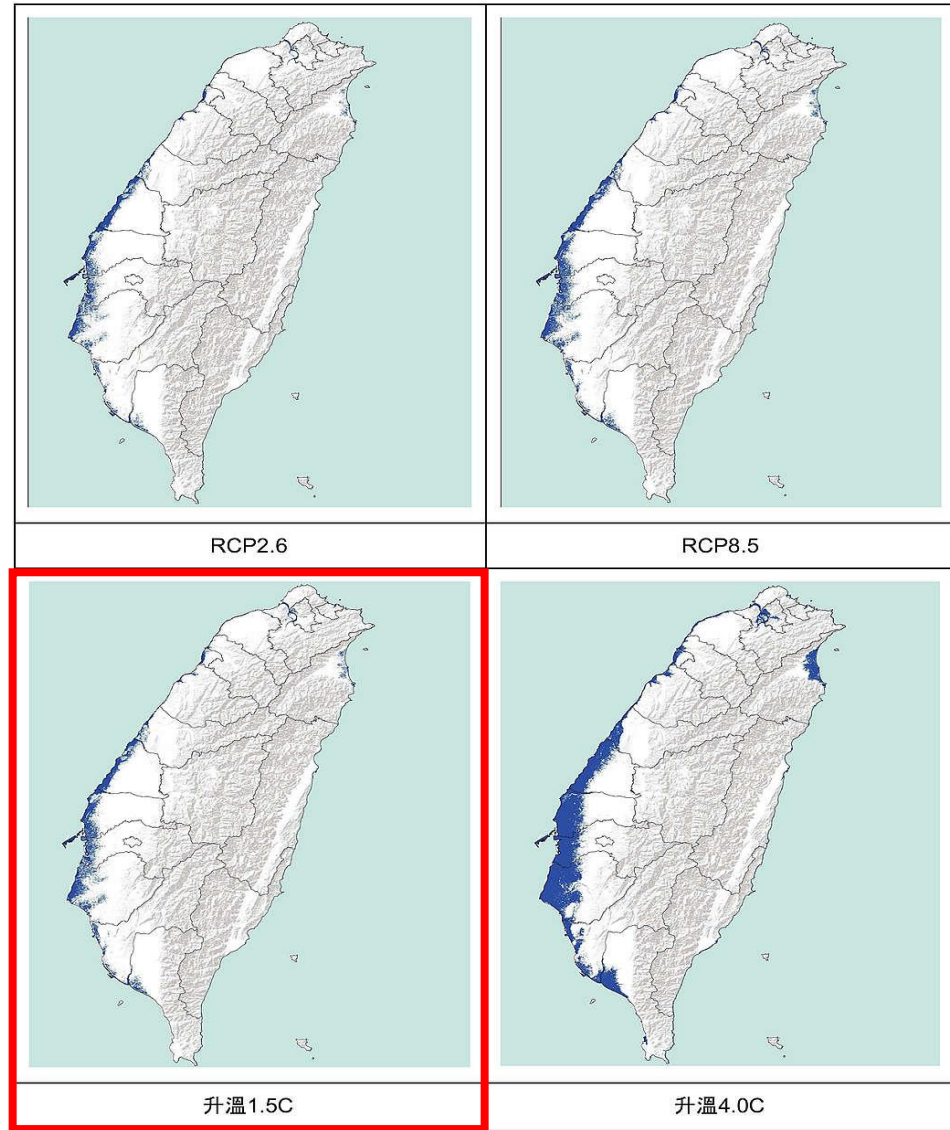
2.Sea level rise

Global Average Sea Level Change (Relative to 1880)



2.Sea level rise

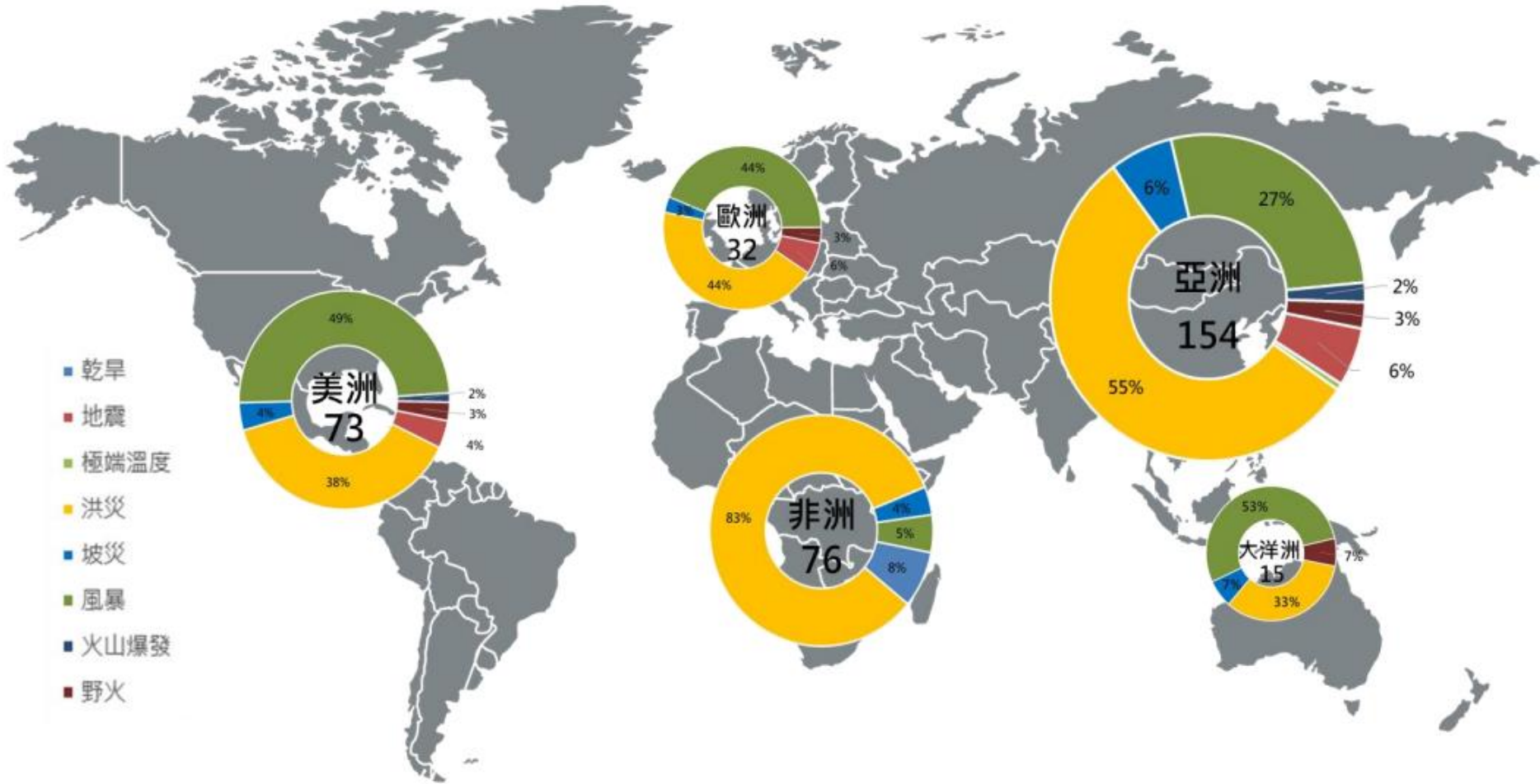
sea level rise (m)	submerged land area (km ²)
1	142
3	780
5	1599
6	1929
7	2259
10	3177



greenpeace.org.

Sea level rise and its impact on the western coastal areas of Taiwan

3. Extreme rainfall



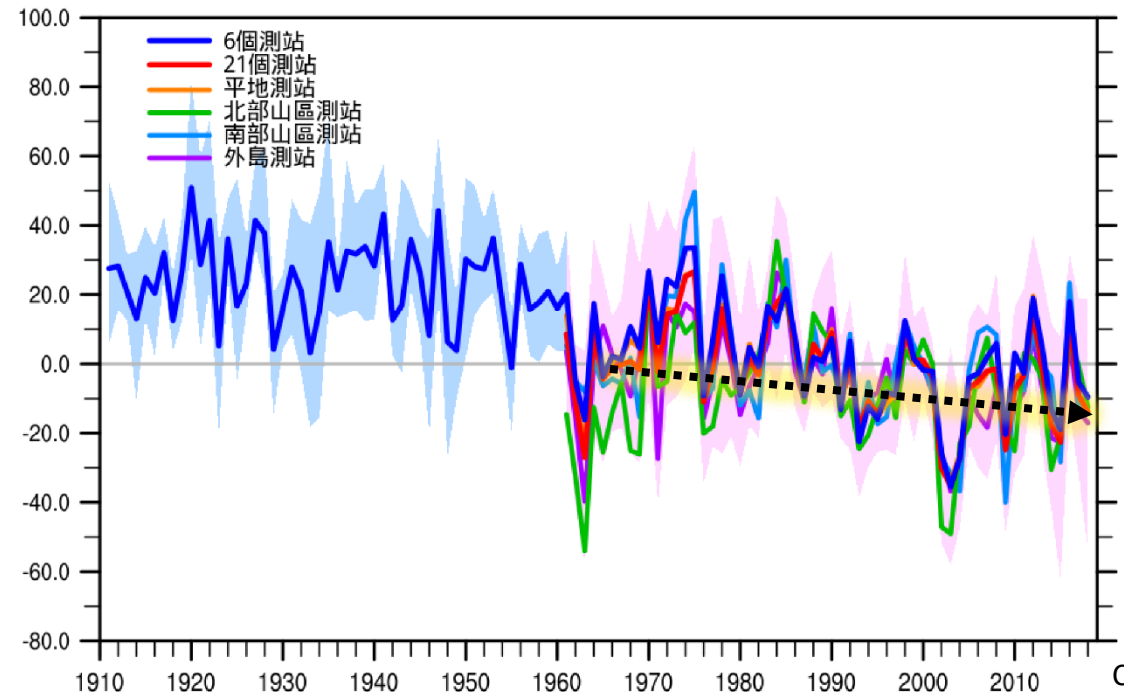
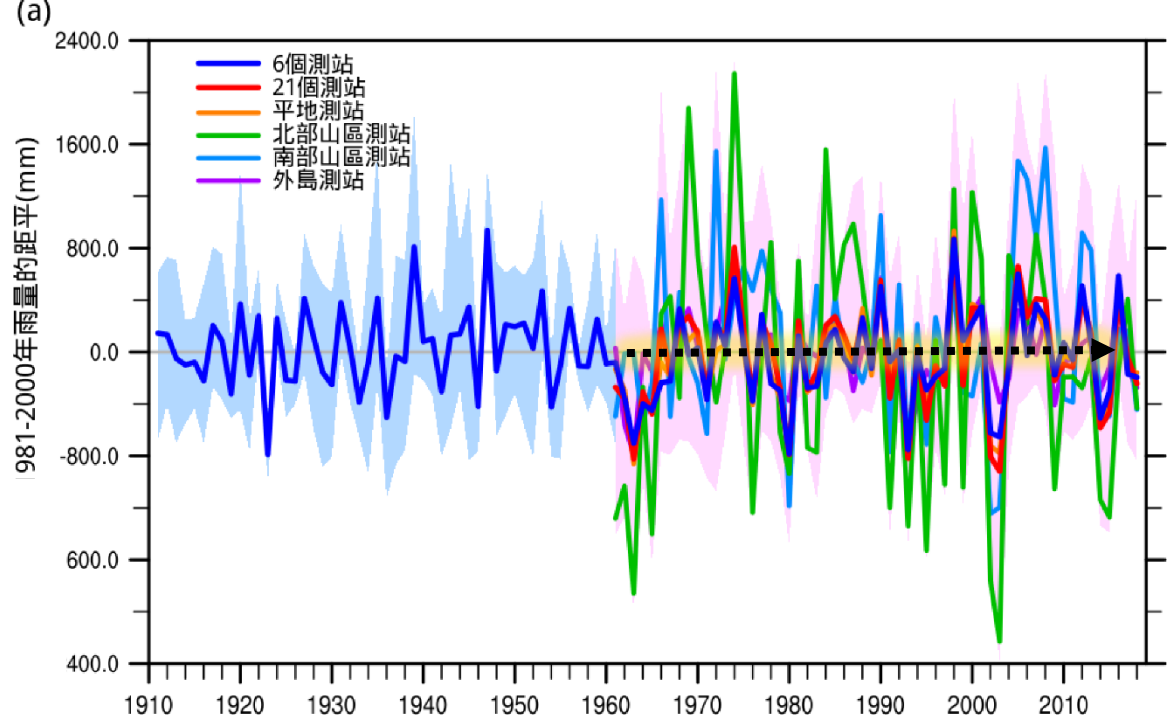
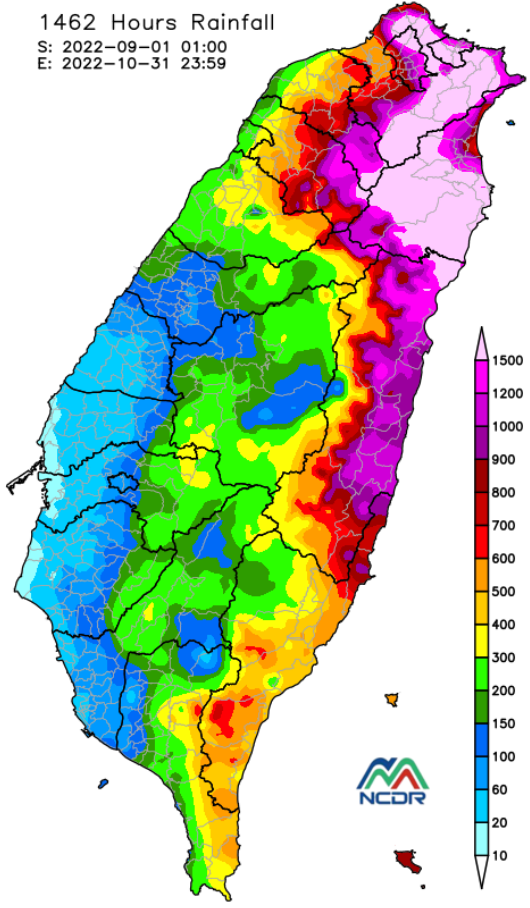
NCDR

2020

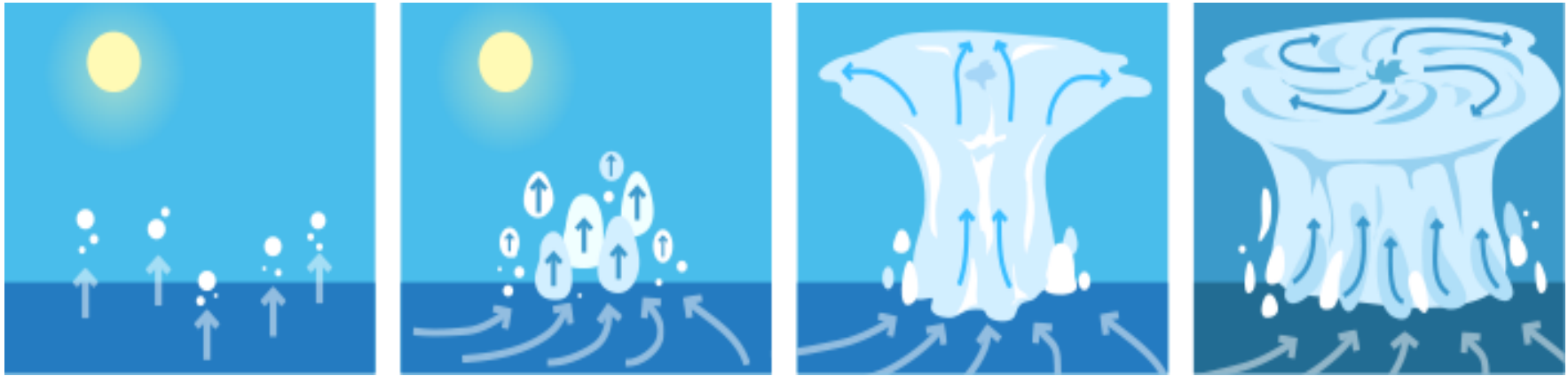
3. Extreme rainfall

2022.9.1.至2022.10.31.
累積降雨量

1462 Hours Rainfall
S: 2022-09-01 01:00
E: 2022-10-31 23:59



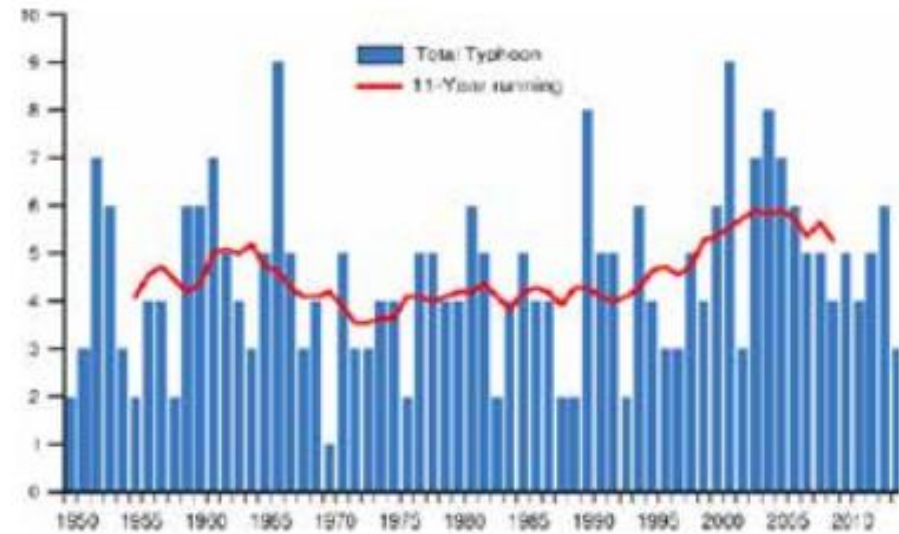
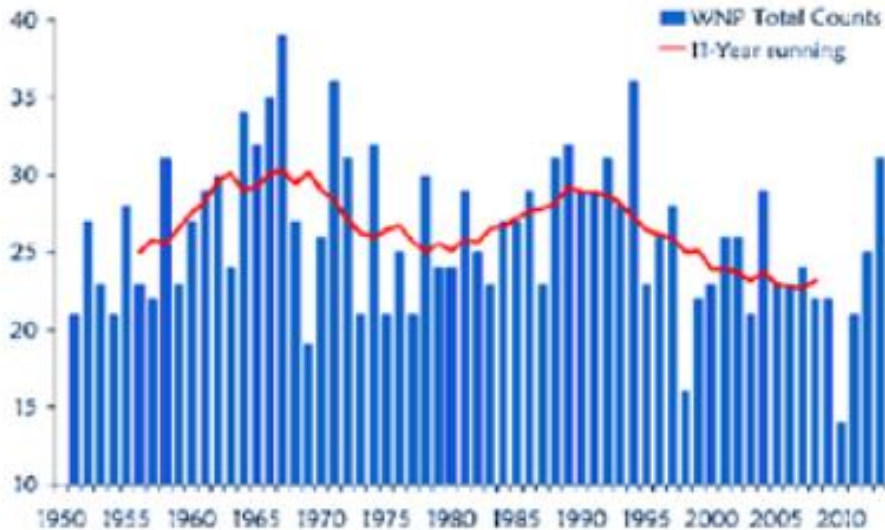
4. Tropical disturbance



a) 西北太平洋颱風生成個數

b) 侵台颱風個數

CWB



TCCIP, NCDR

The number of typhoons worldwide has dropped by about 13% each year.

Influence of Global warming on Aviation safety

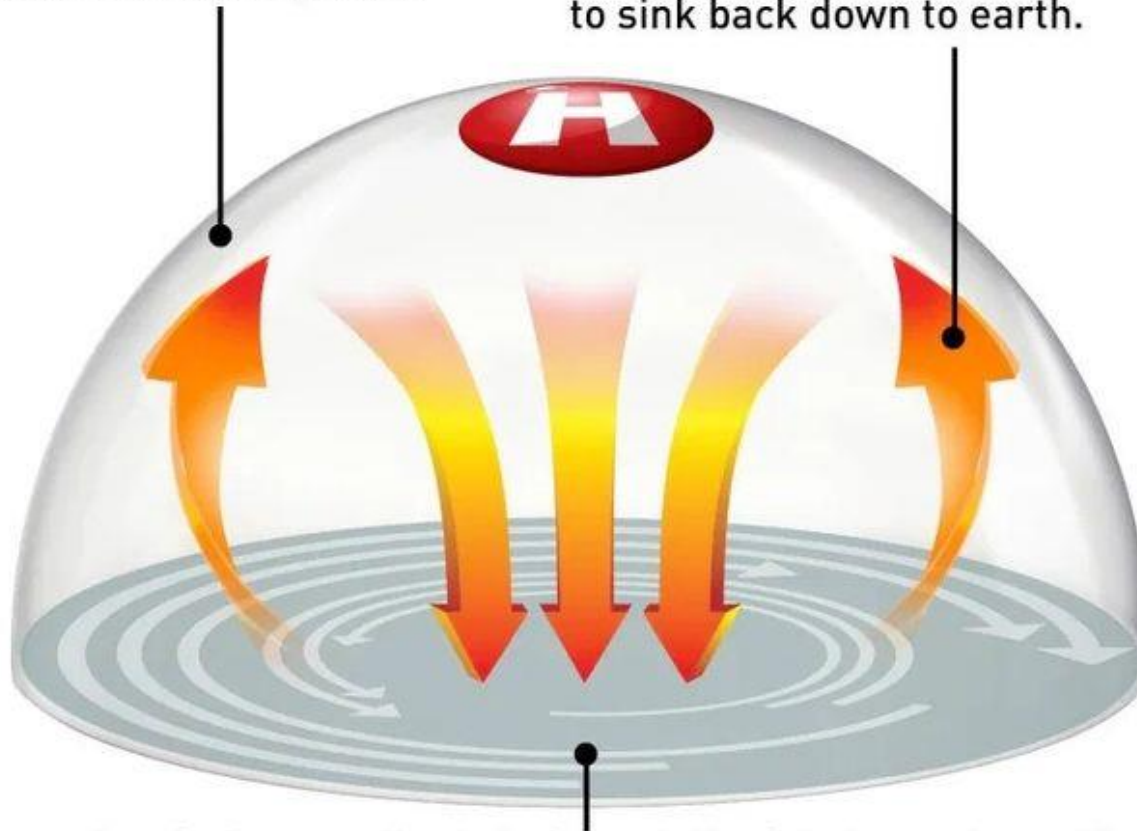


1.Global warming

Heat Dome

High-pressure atmospheric conditions combine to **act as a lid** on the atmosphere.

In a process known as **convection**, warm air attempts to escape but the high-pressure dome causes it to sink back down to earth.



As winds move the hot air east, the jet stream traps the air where it sinks, resulting in **heat waves**.

2.Sea level rise

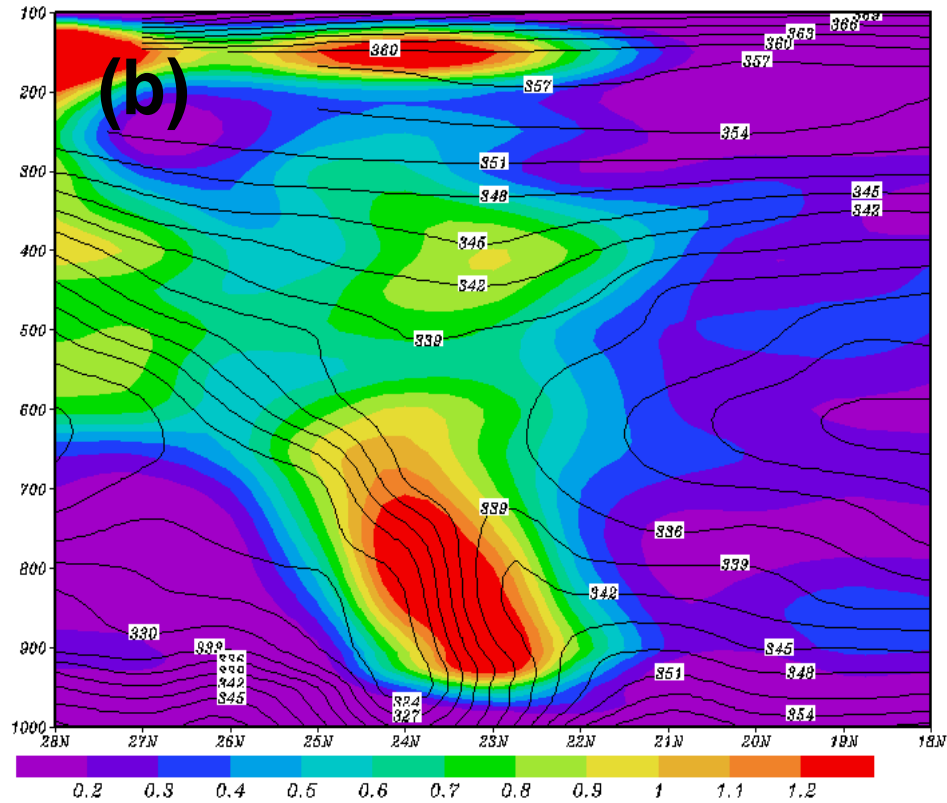
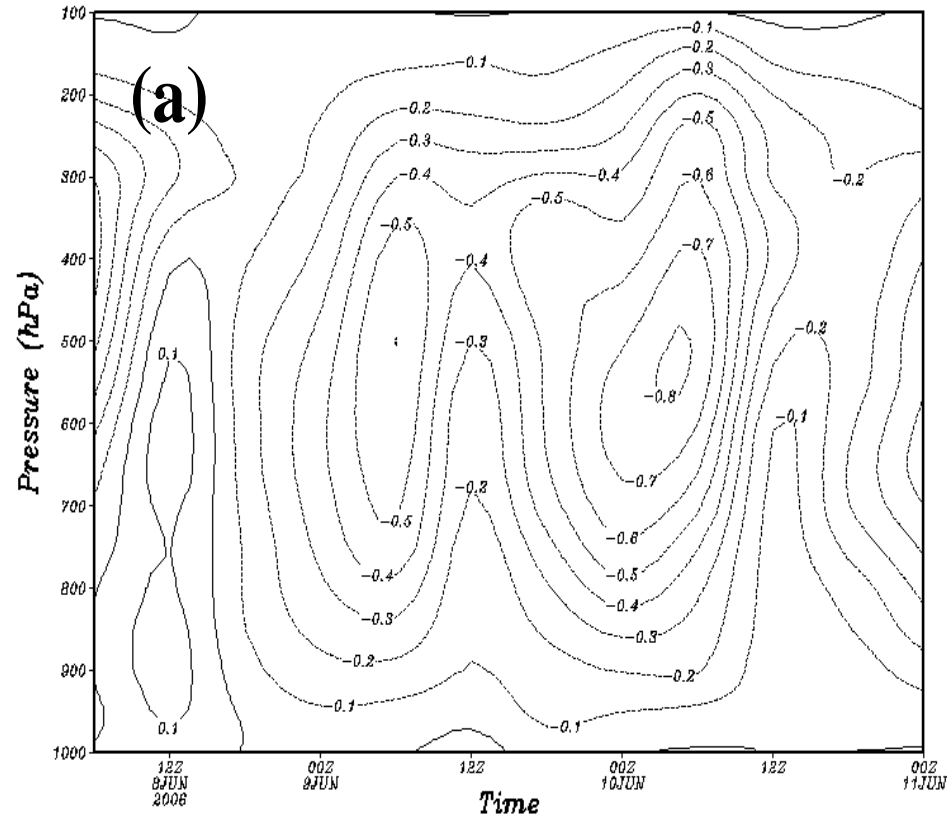


Typhoon Jebi (2018) generated a storm surge that reached almost 11 feet, a record for Osaka Bay.

3. Extreme rainfall

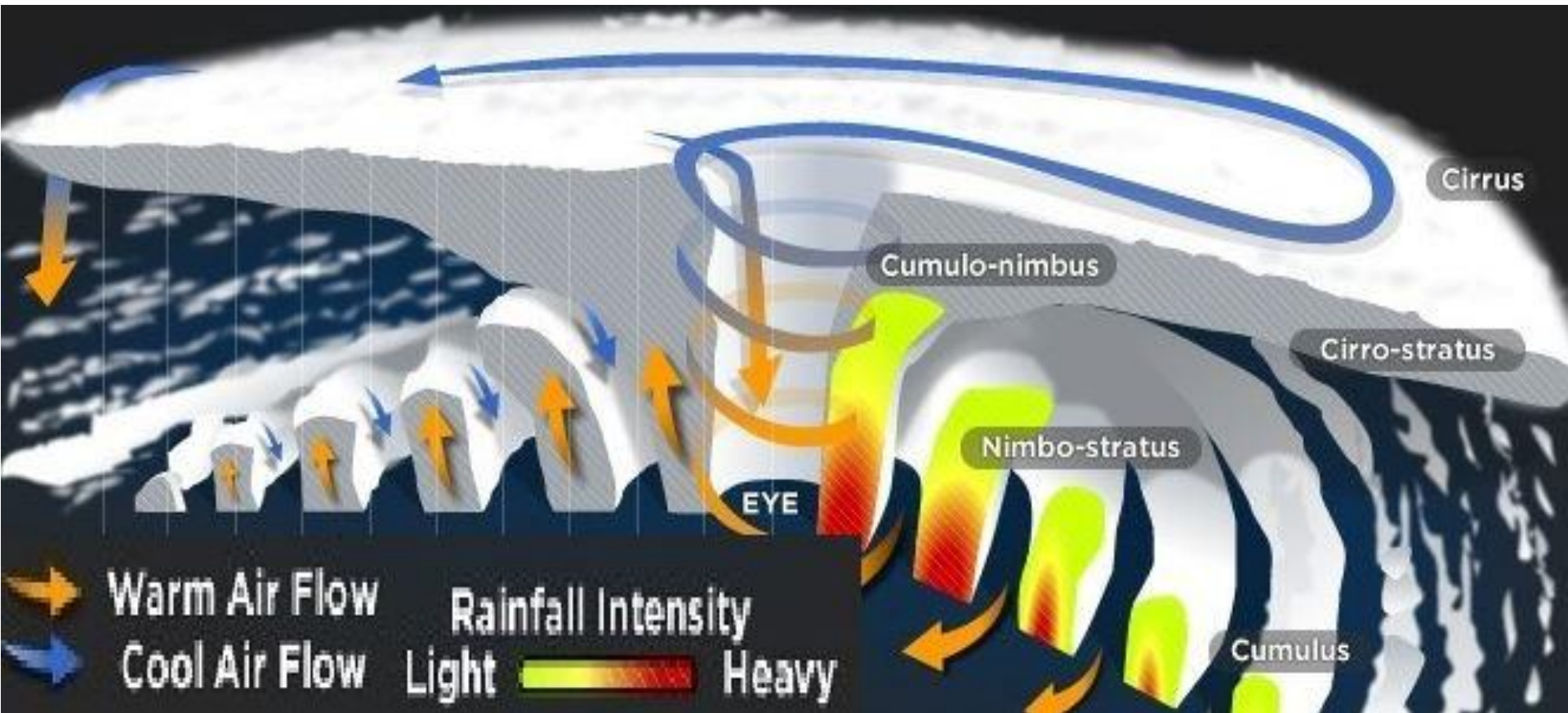
Potential vorticity,
Equivalent potential temperature

Vertical velocity



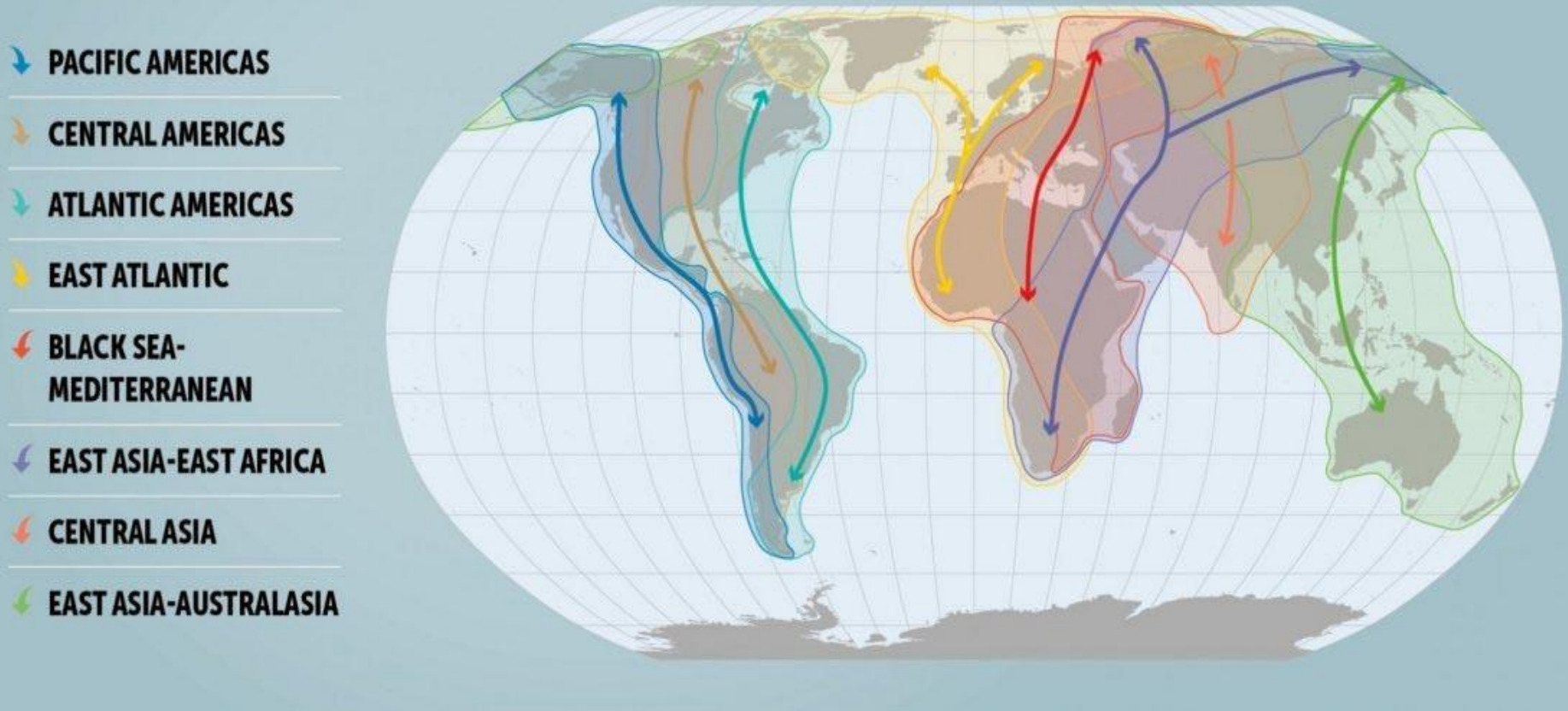
4. Tropical disturbance

the structure of typhoon



5. Bird strikes hazard

THE EIGHT MAJOR MIGRATORY BIRD FLYWAYS



Vermont Institute of Natural Science

Migration time, 1 to 7 days earlier than before, and leave late.

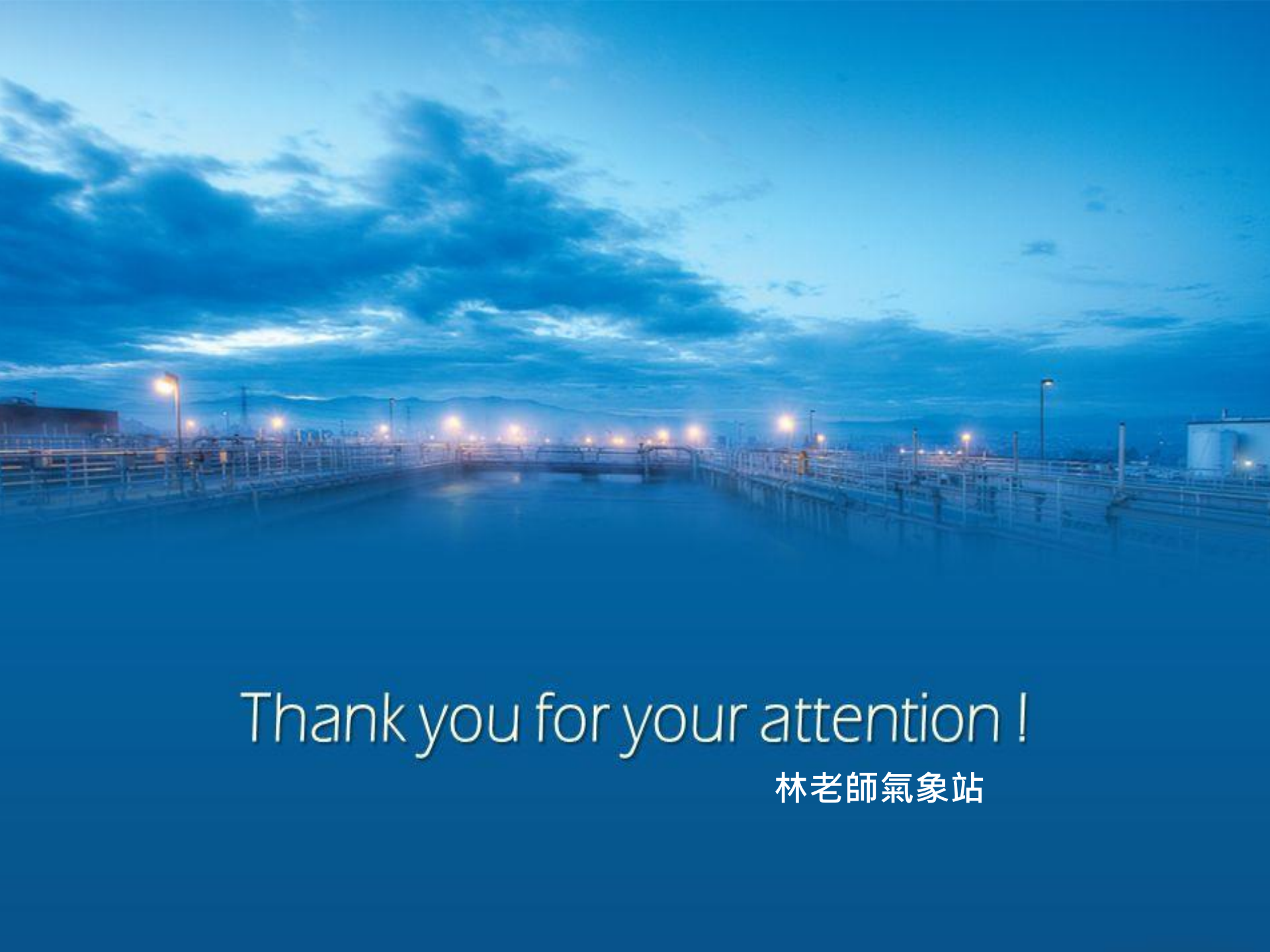


RISK



Aviation safety it possible !





Thank you for your attention !

林老師氣象站