

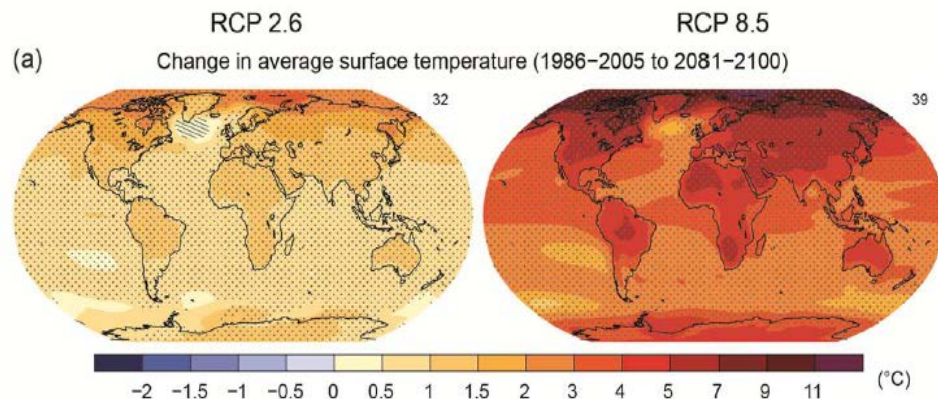
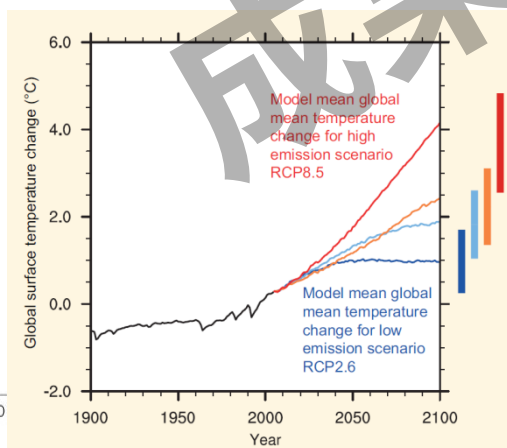
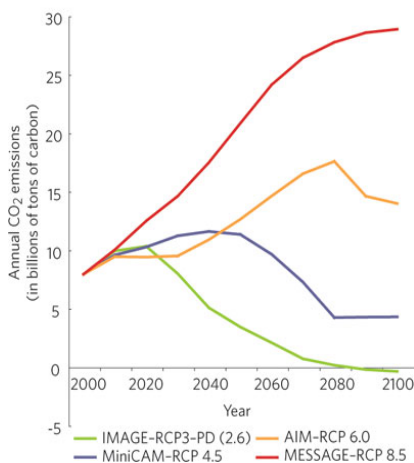
全球暖化趨勢下的氣候變遷

— 東亞鋒面、台灣熱浪、西太平洋颱風

許晃雄、陳英婷、李庭慧、邱品竣

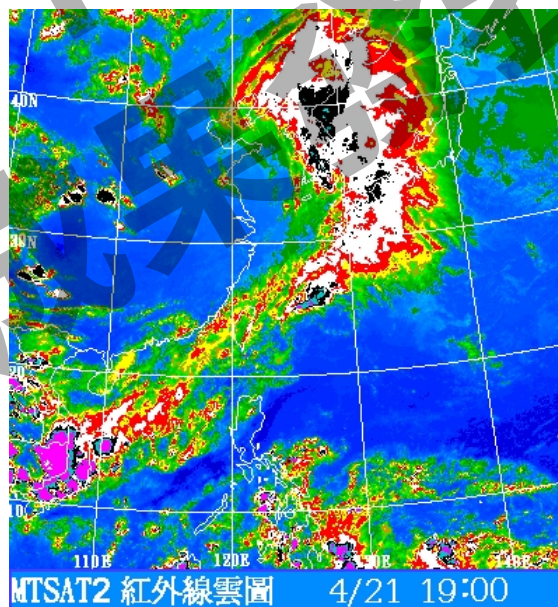
中研院環境變遷研究中心

國家災害防救科技中心



鋒面變遷分析

陳英婷、許晃雄



鋒面 客觀偵測法

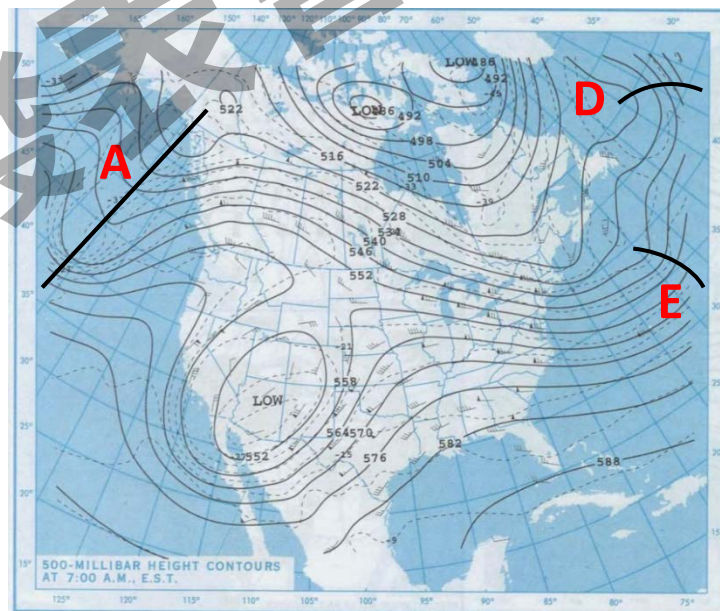
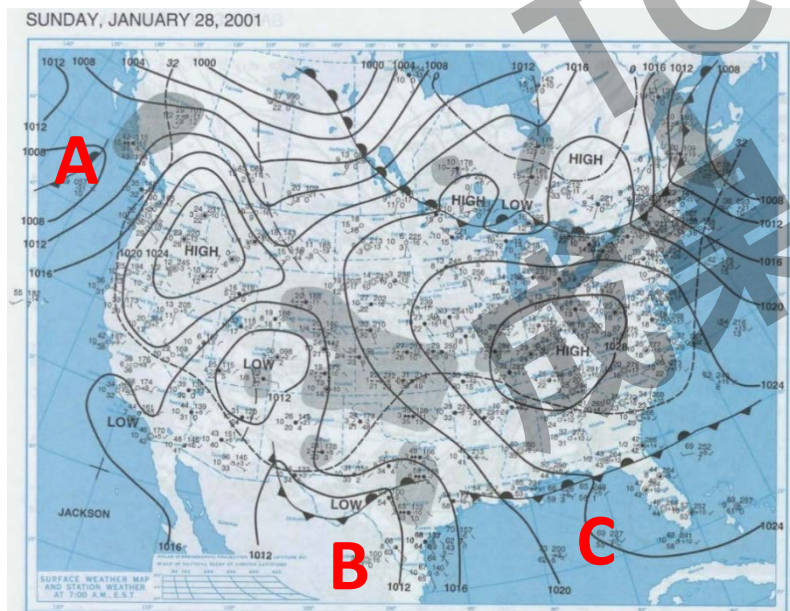
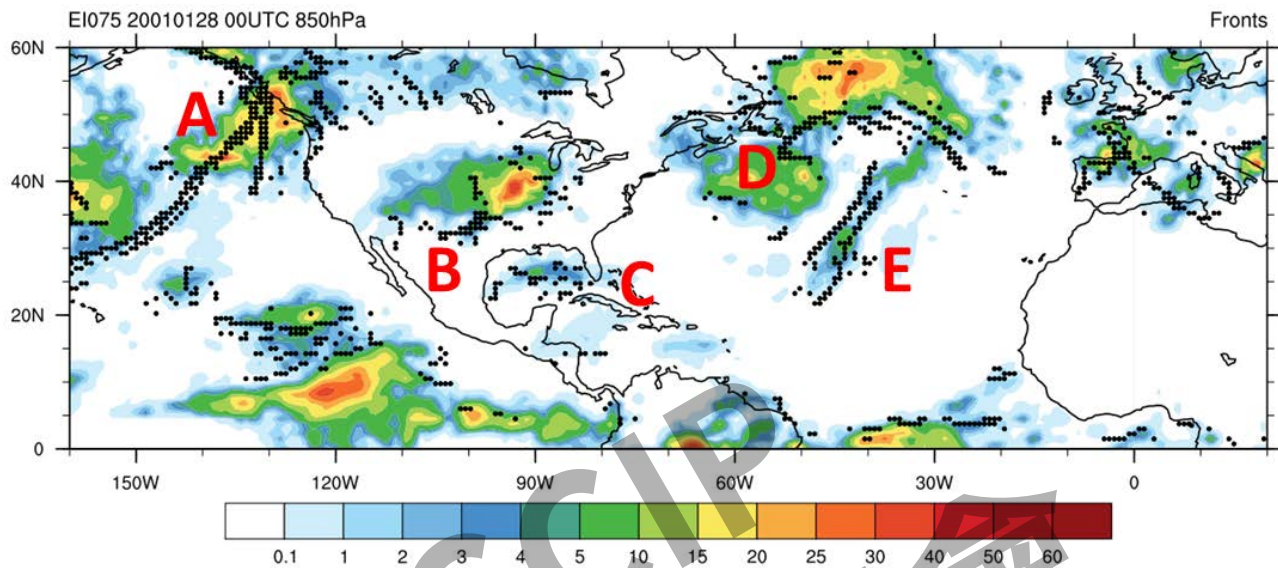


Figure1. (a) Example from ERA-Interim dataset showing front location. Each alphabet indicates a front. (b) Surface and 500hPa weather map on 10 January 2001 (From NOAA Central Library).

IPCC(CMIP5)氣候模式的氣候平均場：SLP、850 hPa wind

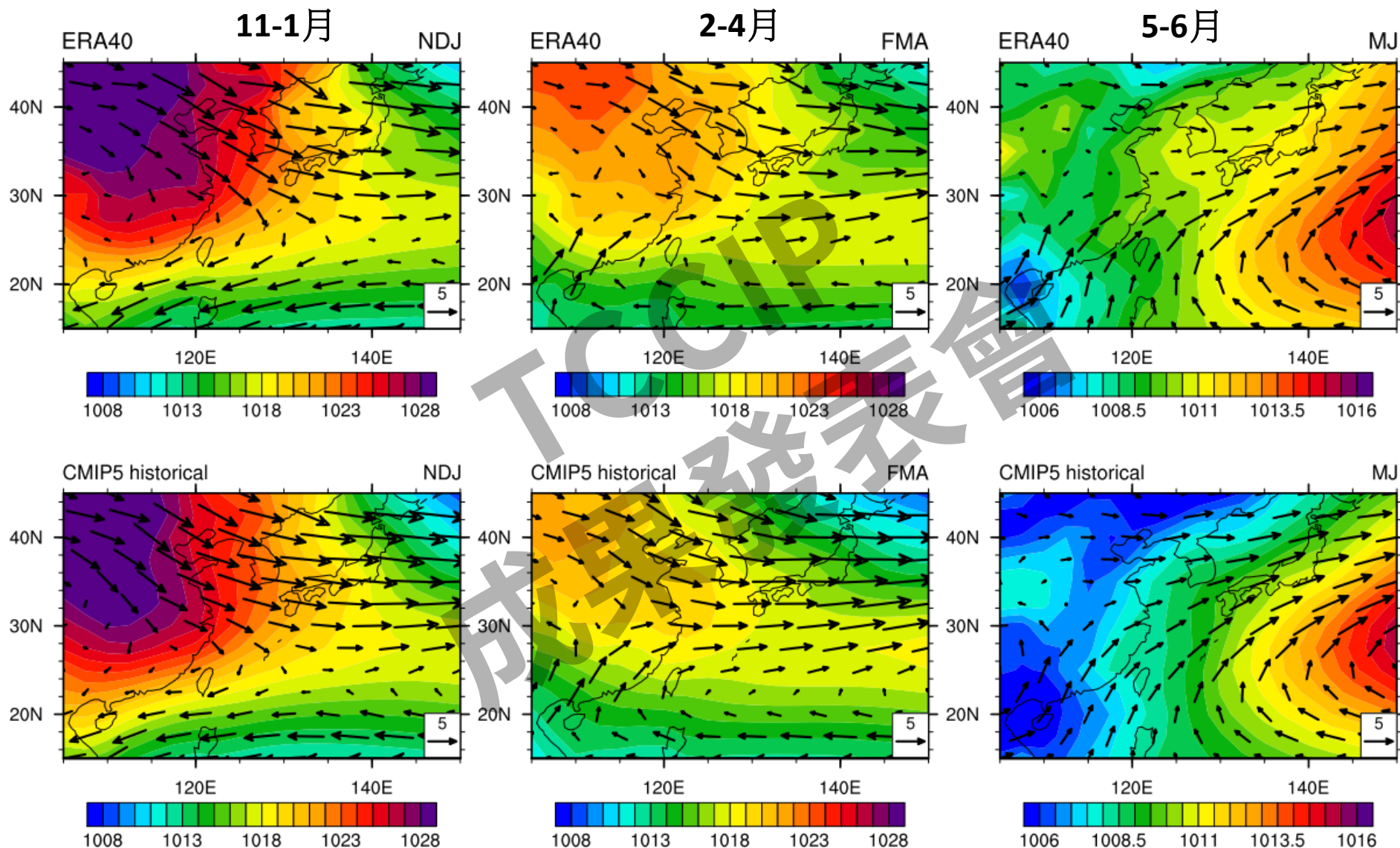


Figure 6: SLP+850md wind (observation and historical)

CMIP5 模擬的鋒面活躍區與頻率 (5-6月為例)

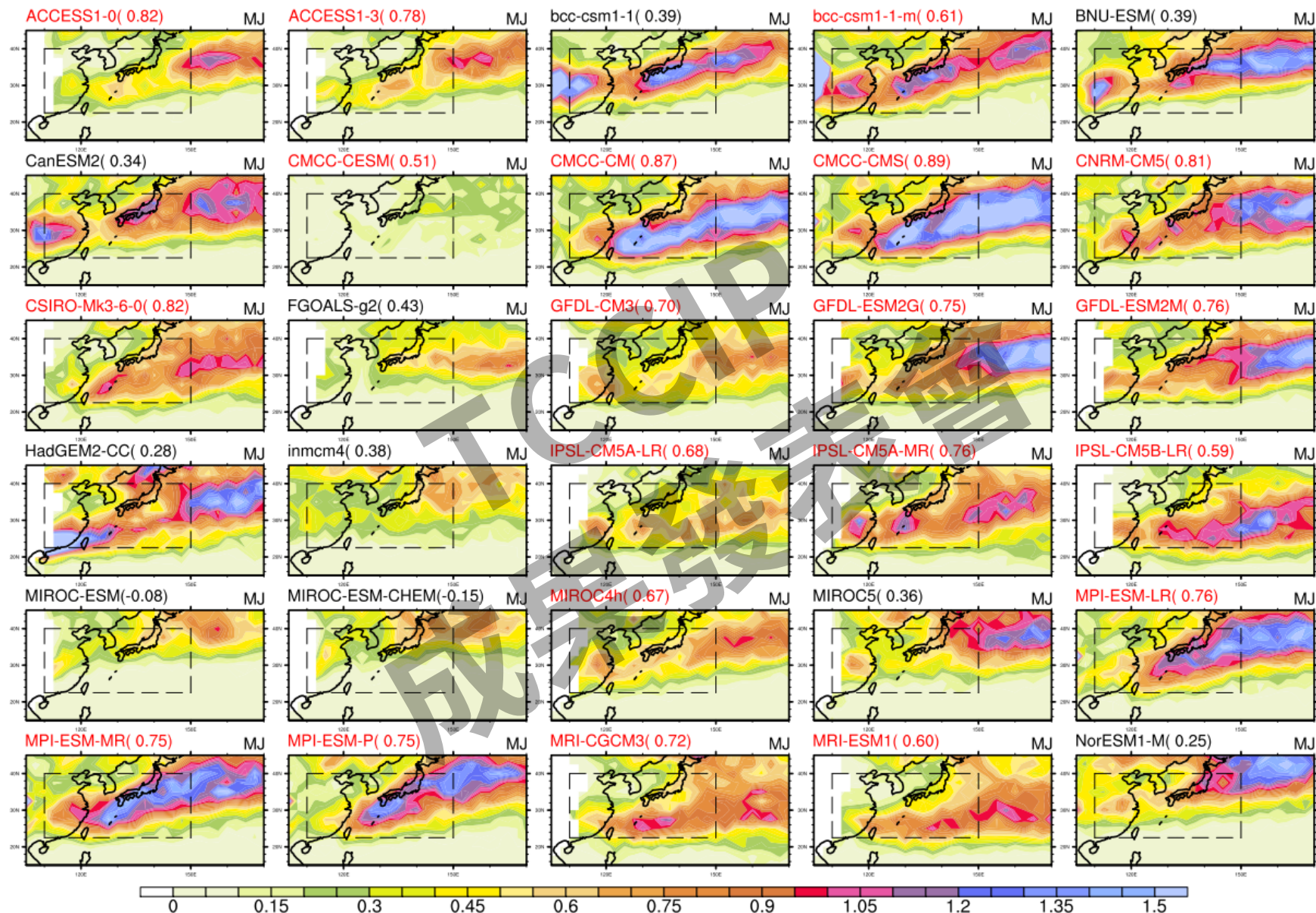


Figure3. Seasonal mean of front frequency of CMIP5 historical simulation, unit: days/month. (a) NDJ, (b) FMA, (c) MJ. Pattern correlation with ERA40 marks after each model name title. If coefficient greater than 0.5, highlight by red color.

IPCC(CMIP5)氣候模式：鋒面活躍區

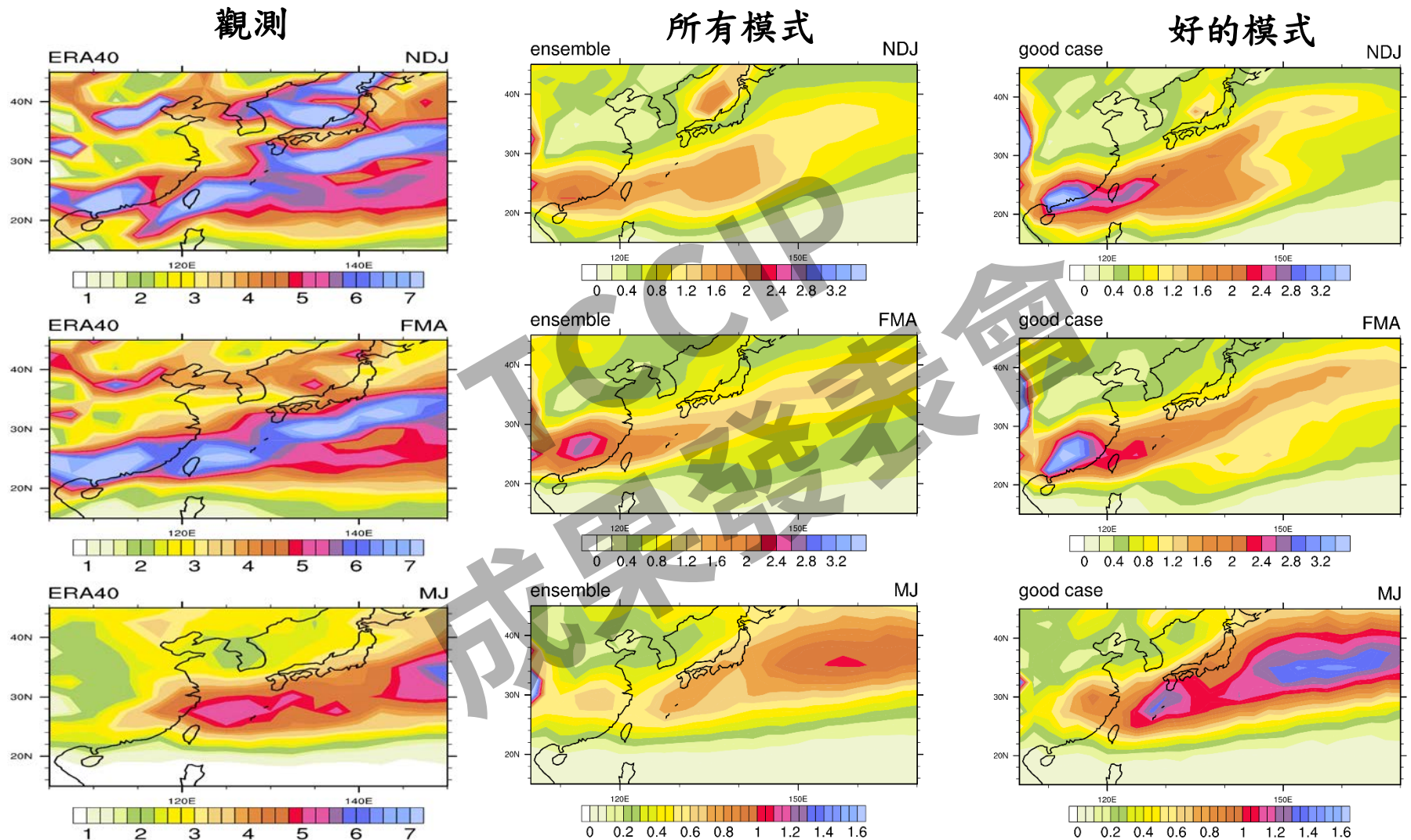


Figure5. Seasonal mean of front frequency of CMIP5, unit: days/month, (a) Ensemble mean, (b) composite of good performance models.

極劣情境(RCP8.5)下，21世紀末，鋒面活躍度變遷

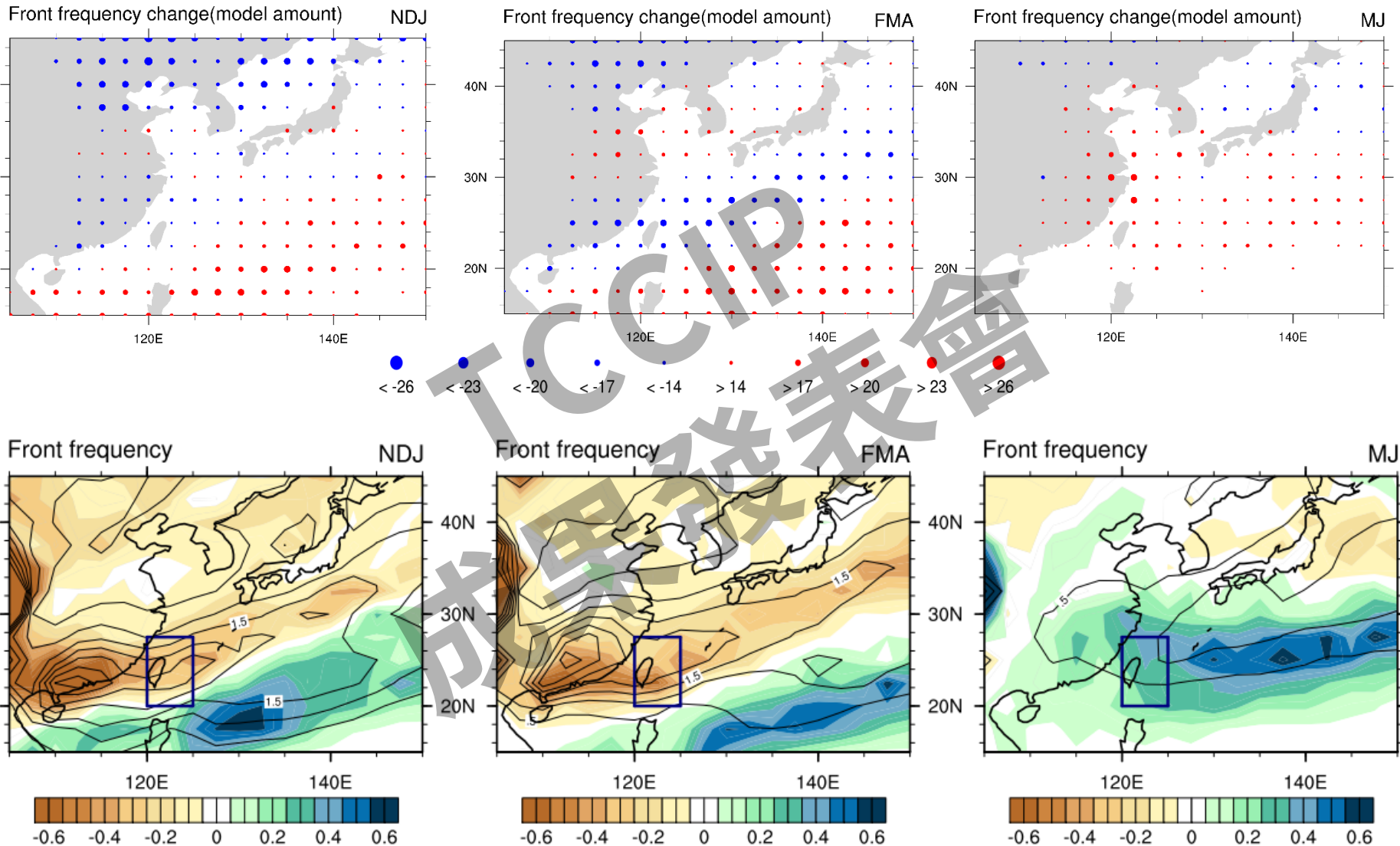


Figure7. (a) CMIP5 front frequency change, Red (blue) circles shows positive (negative) change, unit: model amount. (b) As (a), but is difference of historical and RCP85 experiment. Contour is historical simulation, from 0.5 to 3.5 days/month, interval is 0.5.

雨量、850hPa濕球位溫梯度($\times -1$)與水氣通量變遷

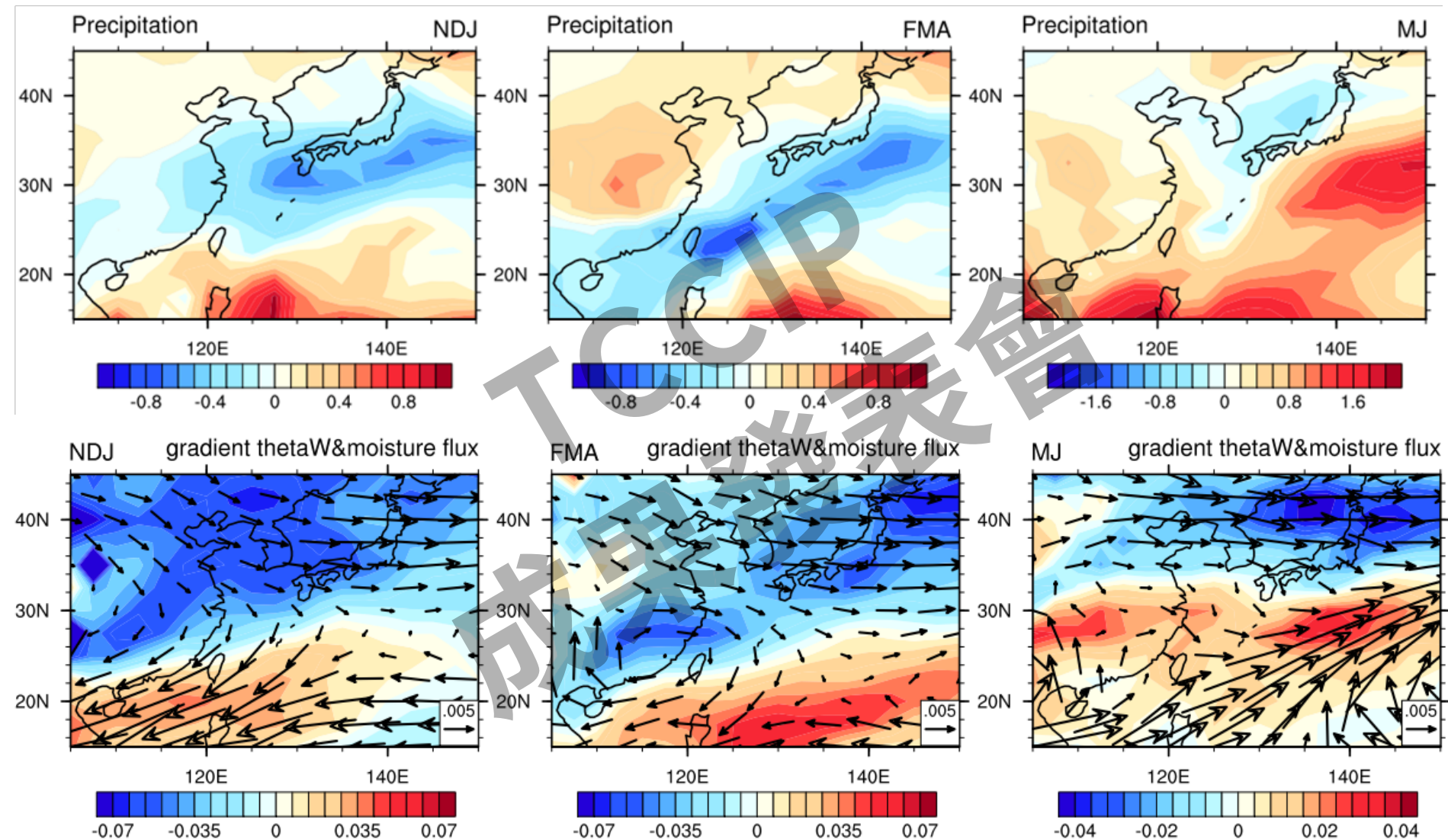
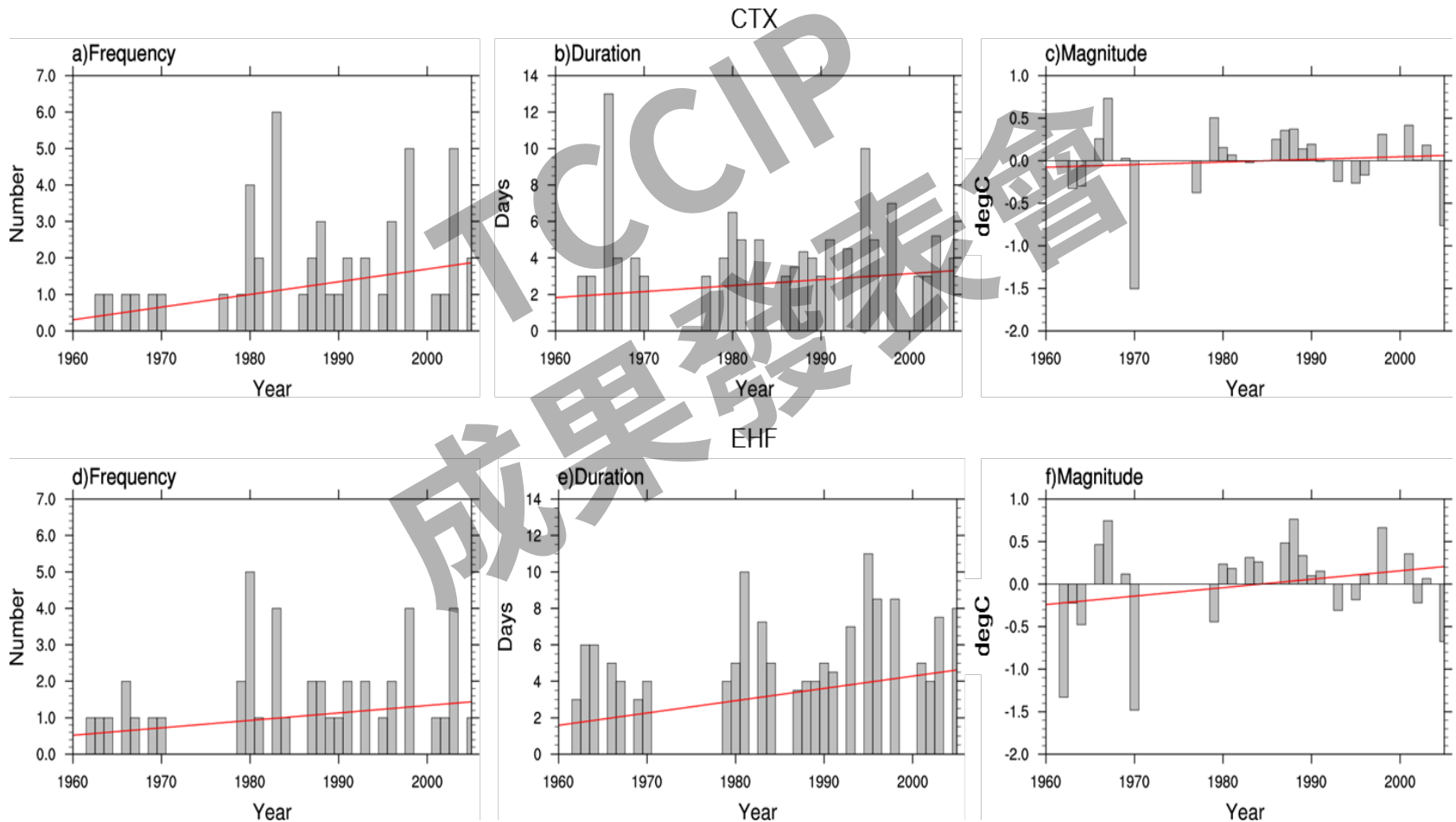


Figure 9: SLP+850mb wind, θ_w gradient($\times -1$) +850mb moisture flux (RCP85 minus historical)

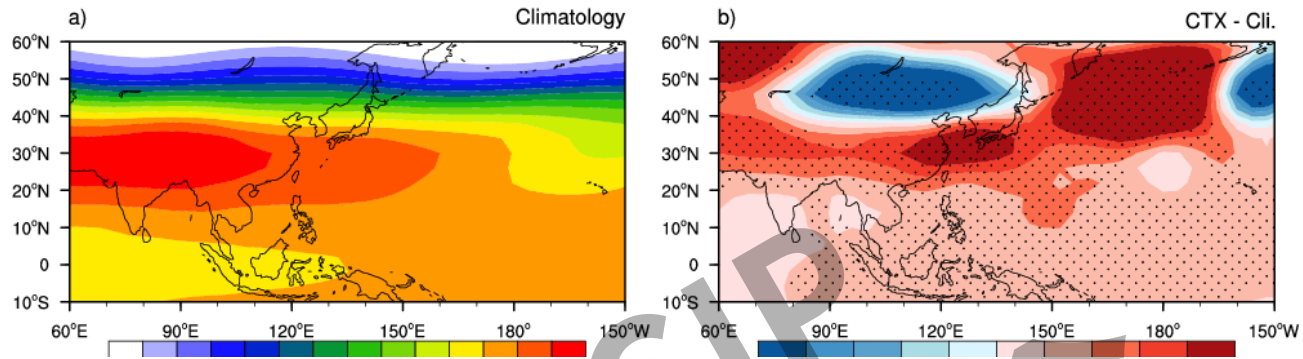
台灣熱浪分析

李庭慧、許晃雄

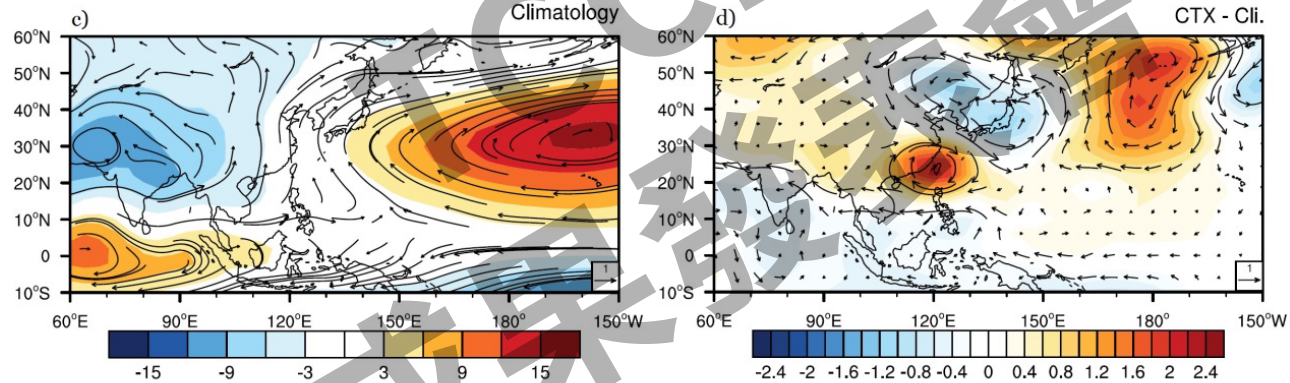


熱浪發生時的大氣環流

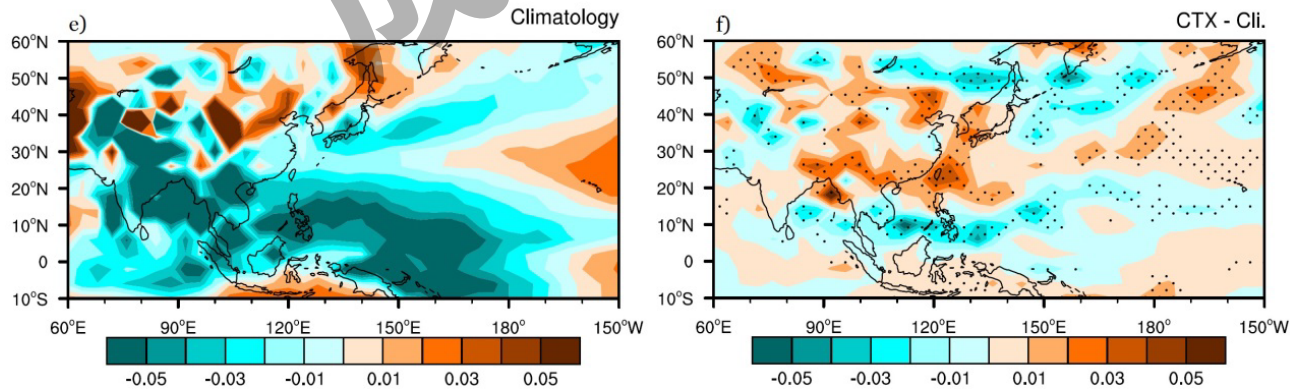
Geopotential Height (200hPa)



850hPa Rotational Wind & Streamfunction (10^6)



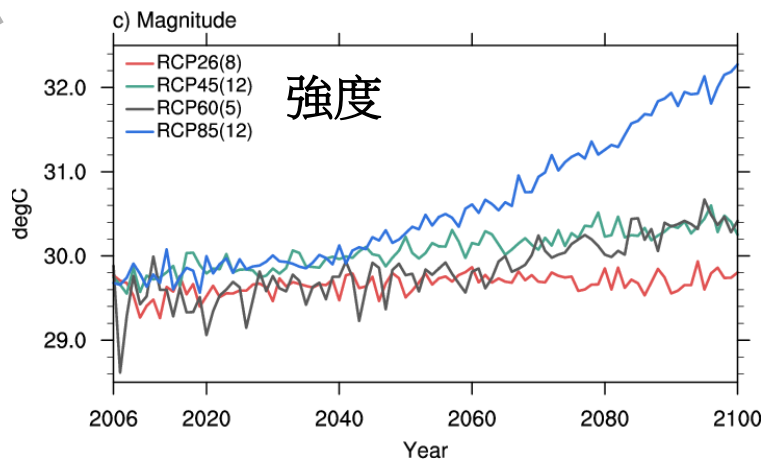
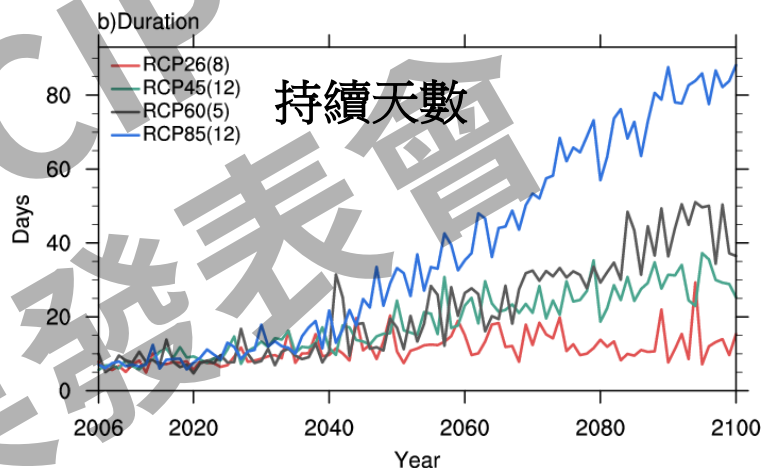
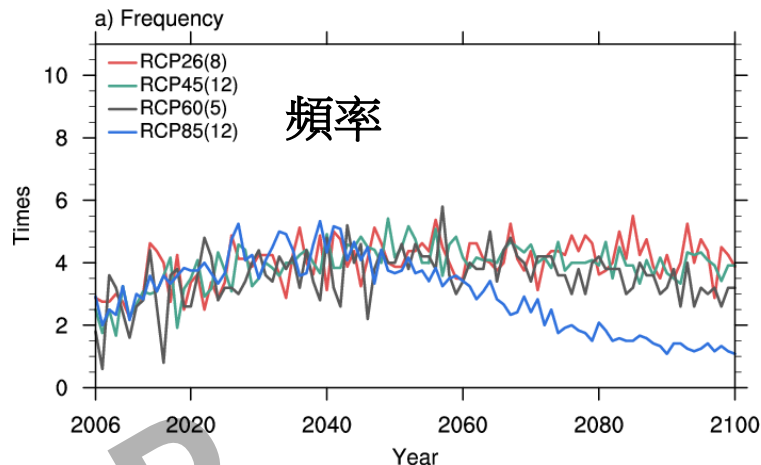
Omega (500hPa)



台灣熱浪未來變遷趨勢

RCP8.5變遷最顯著

1. 整個夏天都是“熱浪”
2. 熱浪平均溫度上升2.4C

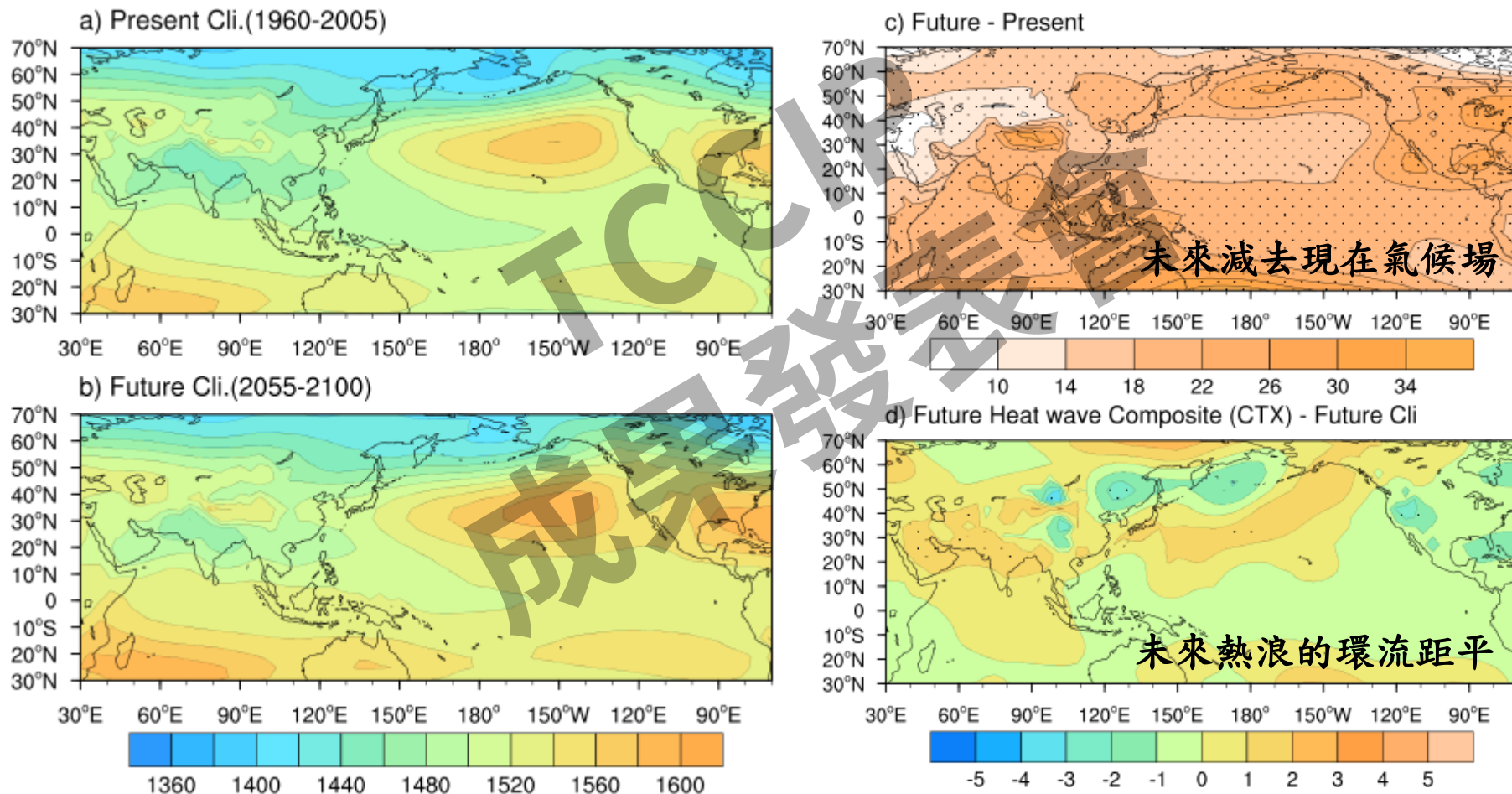


最劣暖化情境(RCP8.5)下，造成台灣熱浪的環流變遷

－ 波狀擾動不再是主因，而是全面增溫造成的

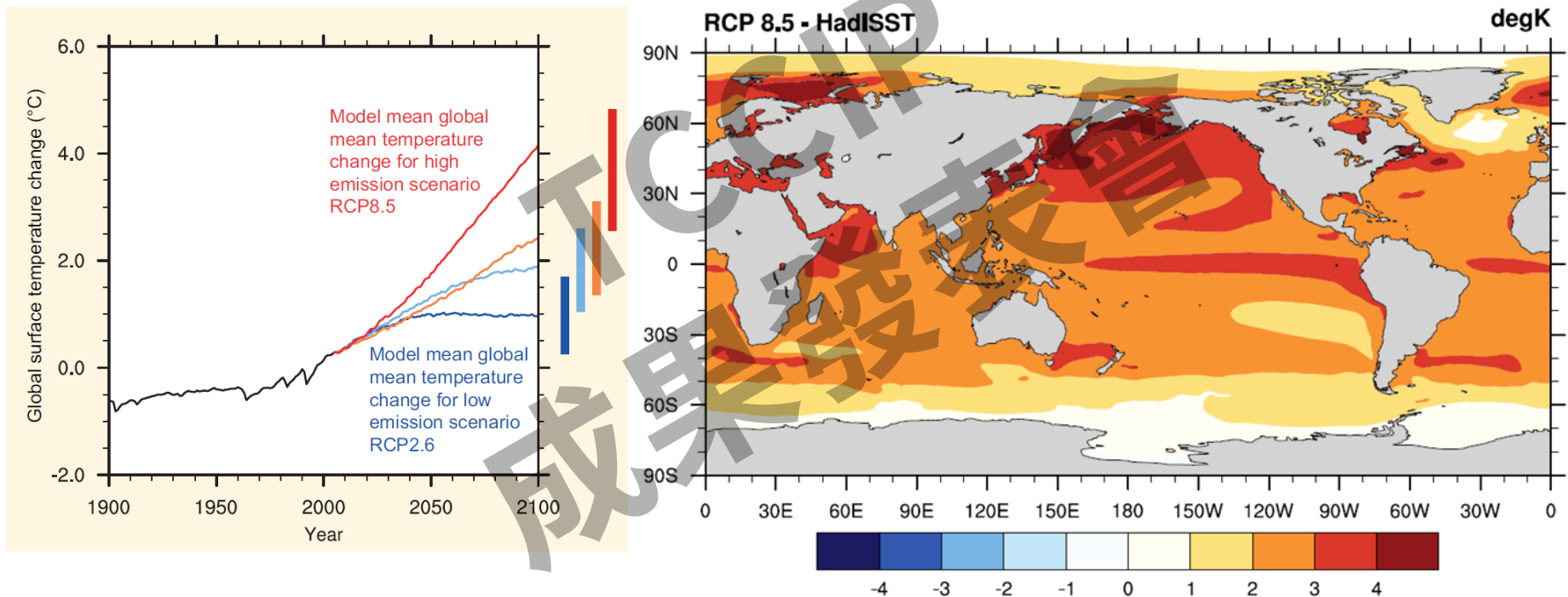
Good Models Composite (850hPa HGT)

850百帕高度場



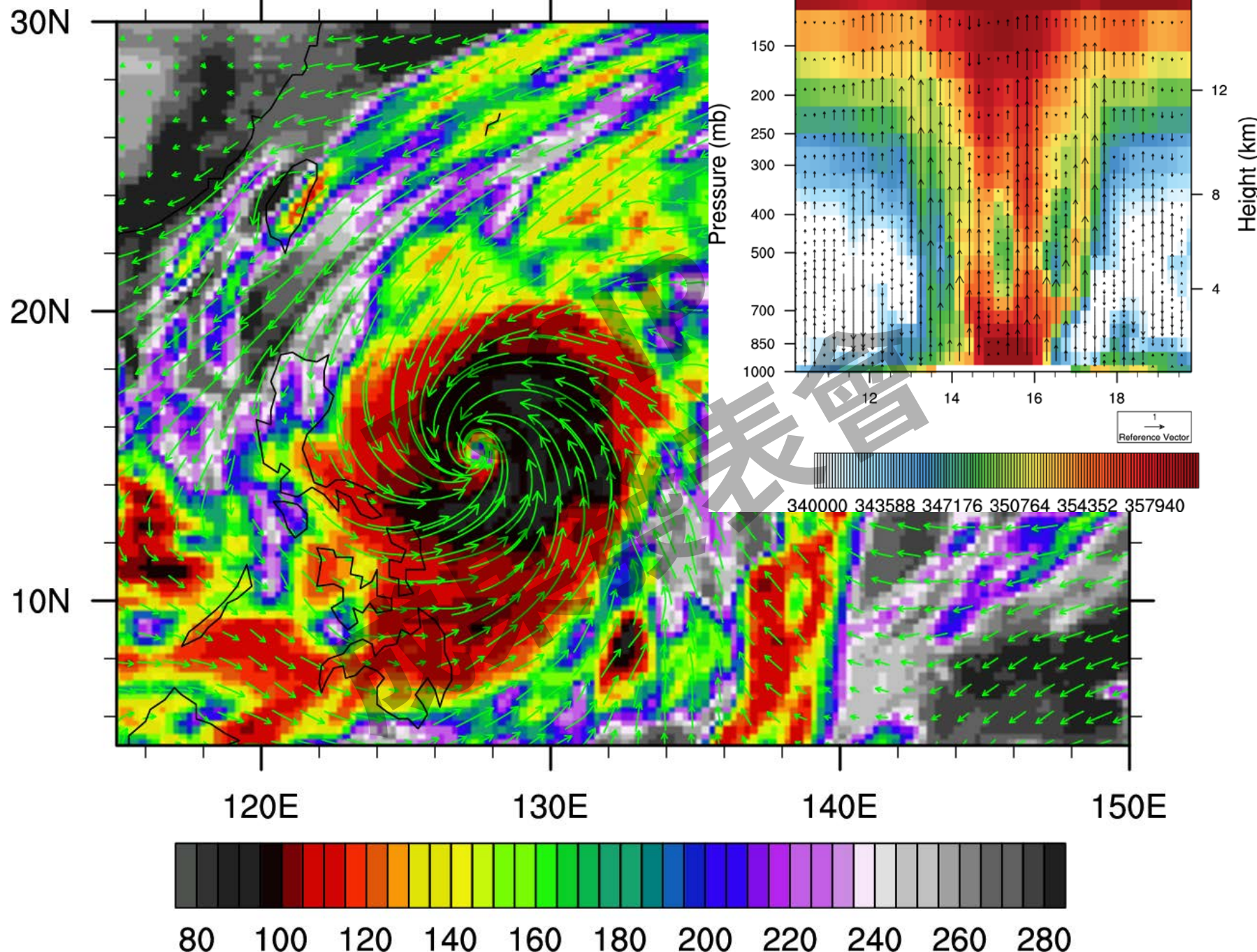
西北太平洋颱風變遷

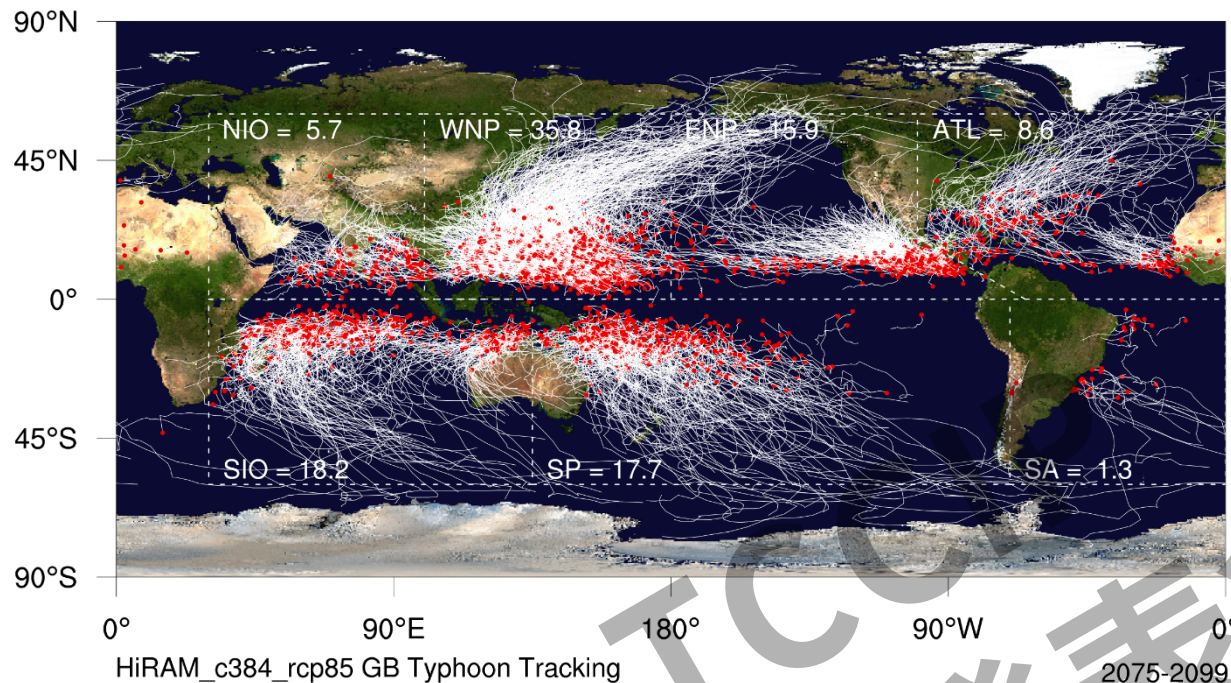
邱品竣、許晃雄、...



Deviation of Ensemble-mean SST (RCP8.5) from present

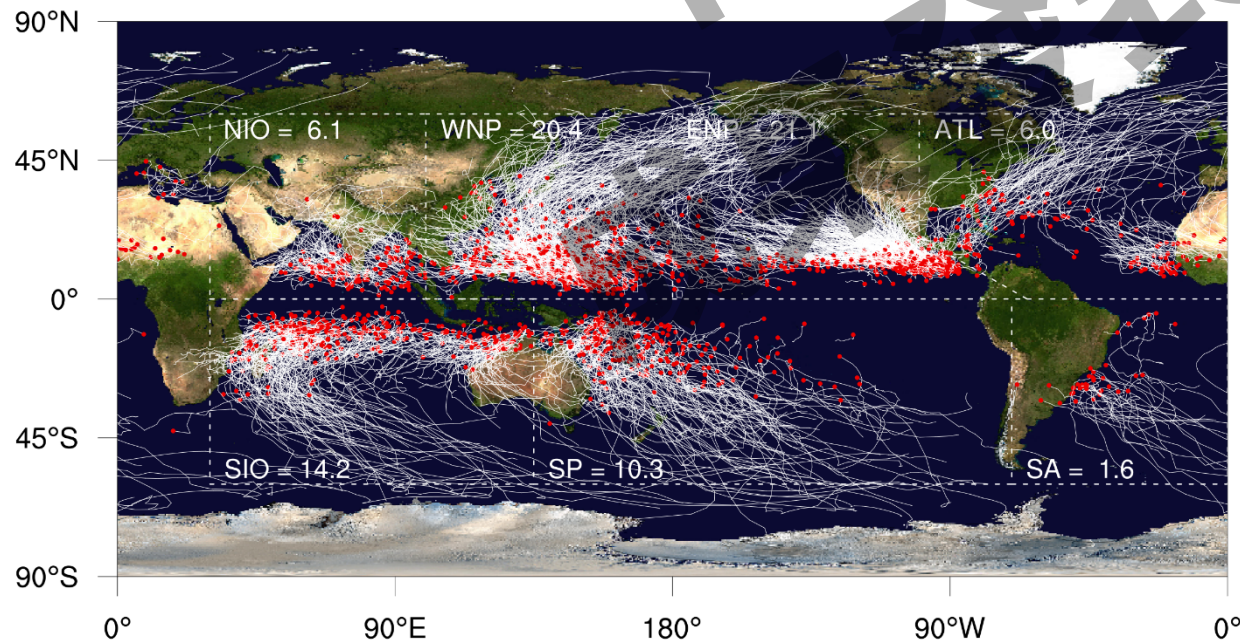
C384 wnp olr 2001-11-10-06Z





HiRAM c384

TC Counts	AMIP	RCP8.5
NIO	5.7	6.1
WNP	35.8	20.4
ENP	15.9	21.1
ATL	8.6	6.0
SIO	18.2	14.2
SP	17.7	10.3
SA	1.3	1.6

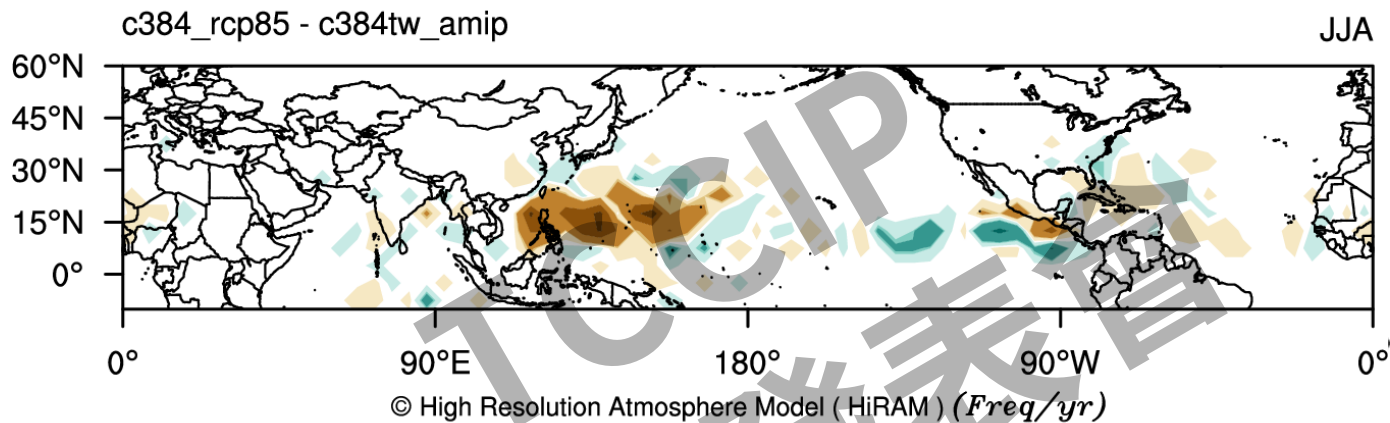


颱風生成與路徑變遷

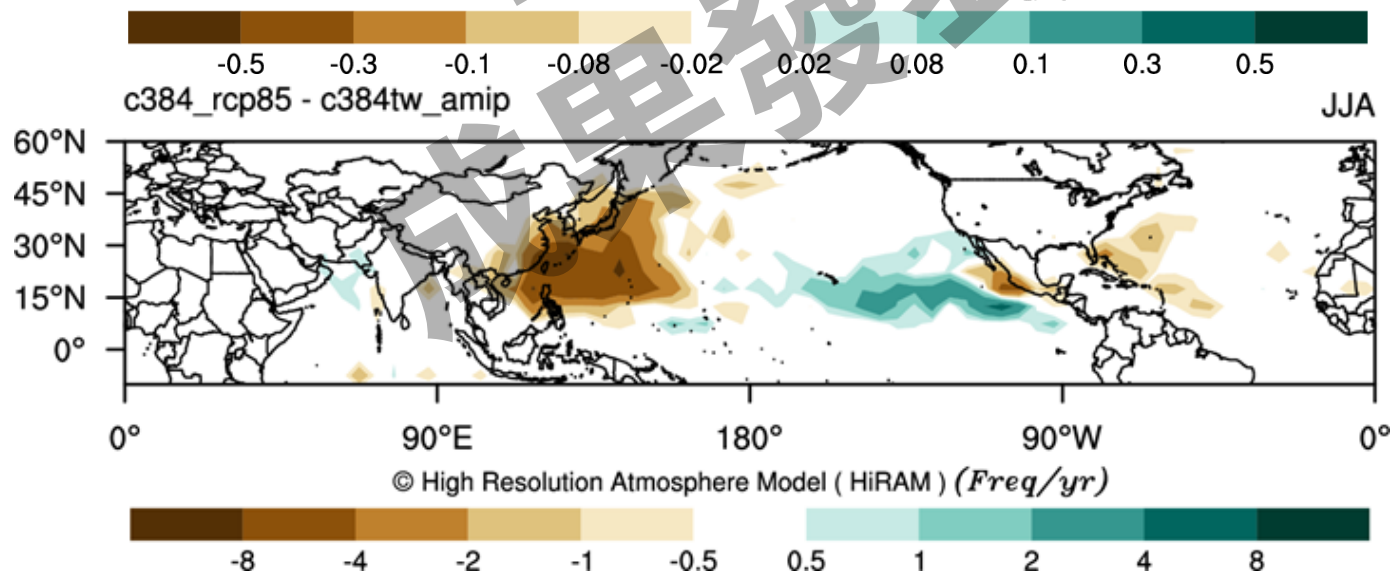
RCP8.5 (2075-2099) – Present (1979-2003)

Genesis (upper) and Tracks (lower)

生成

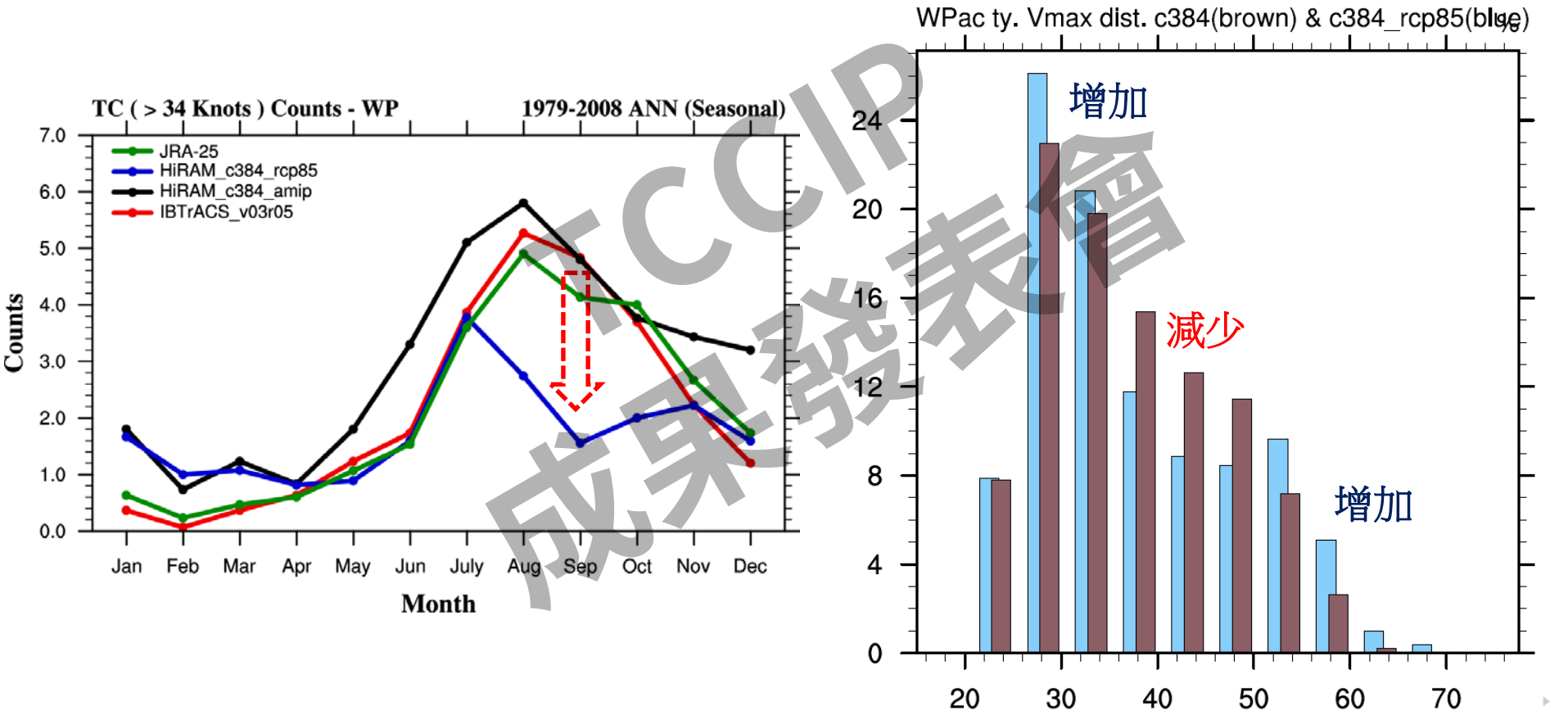


路徑

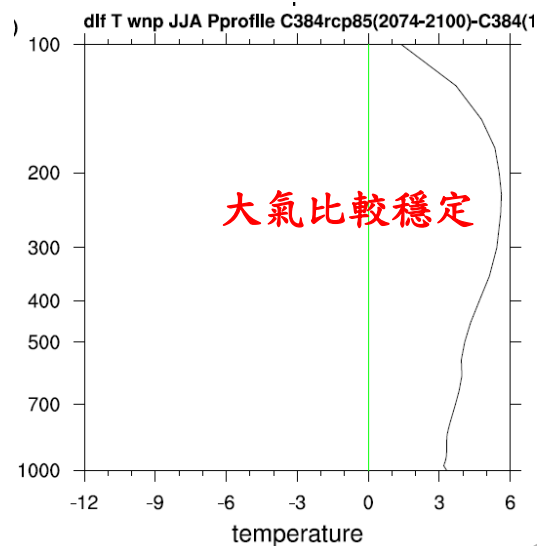


Significant Reduction in TC numbers in WNP

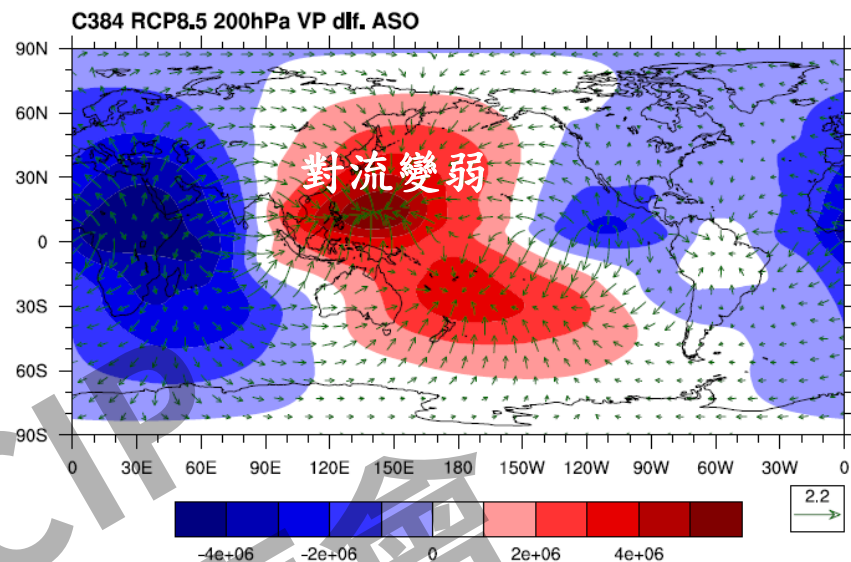
: Less Cat. 1-2 TCs and more Cat. 3-4 TCs and TS



Change in WNP Temp. profile



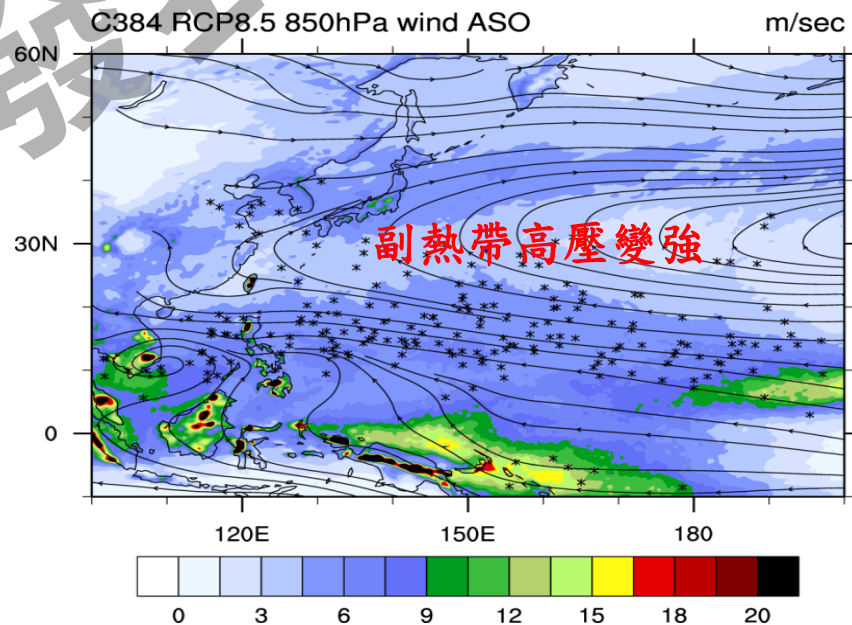
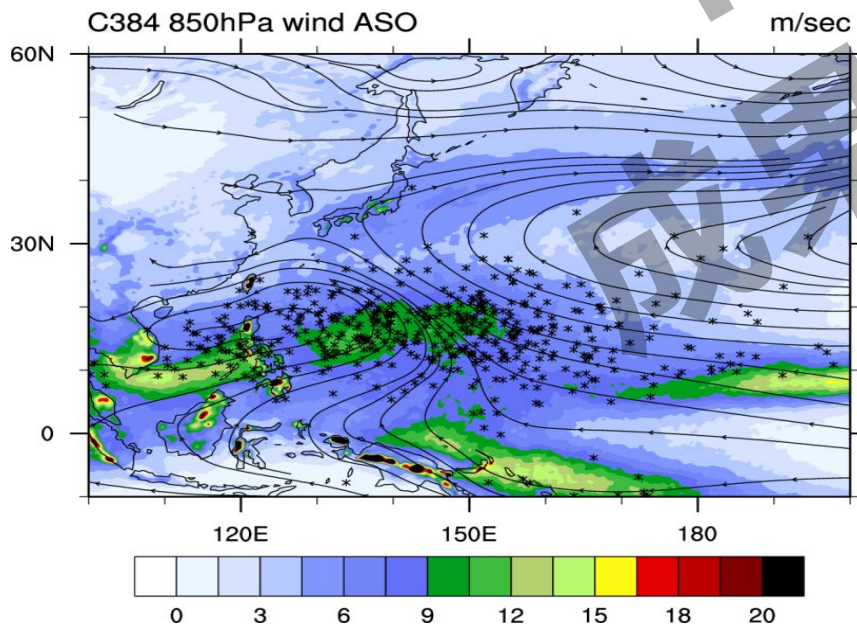
Change in 200 hPa Vel. Potential



Present

850 hPa Geopotential Height

Future



謝謝聆聽

問題？ 建議？