ESCAP/WMO Typhoon Committee
ESCAP Economic and Social Commission for Asia and the Pacific
WMO
ESCAP/WMO Typhoon Committee
Fifty-sixth Session
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Prepare for the fourth assessment report on impacts of climate change on tropical cyclones in the Typhoon Committee region

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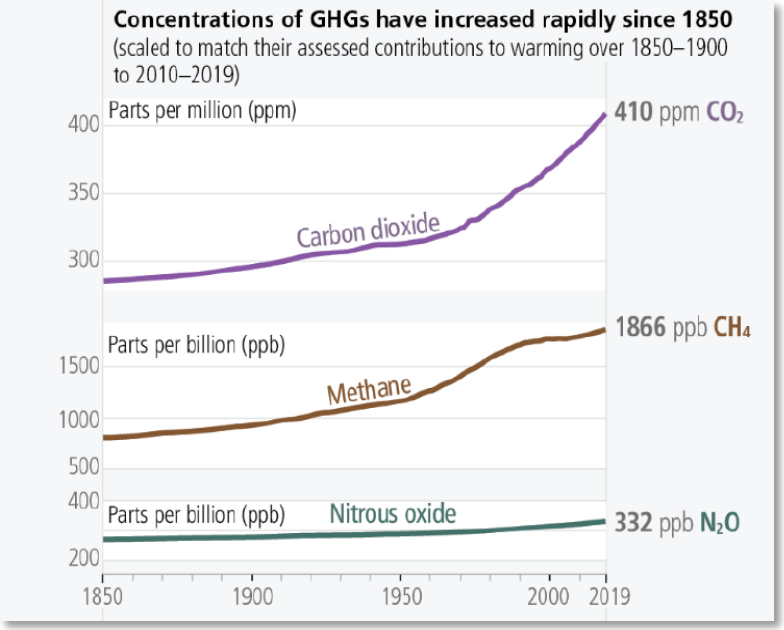
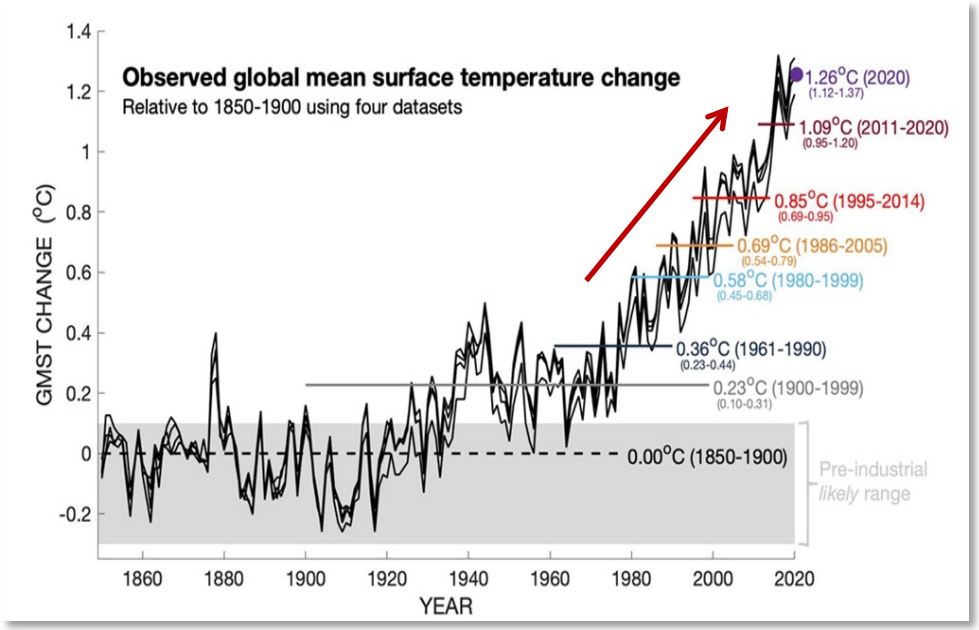
Background



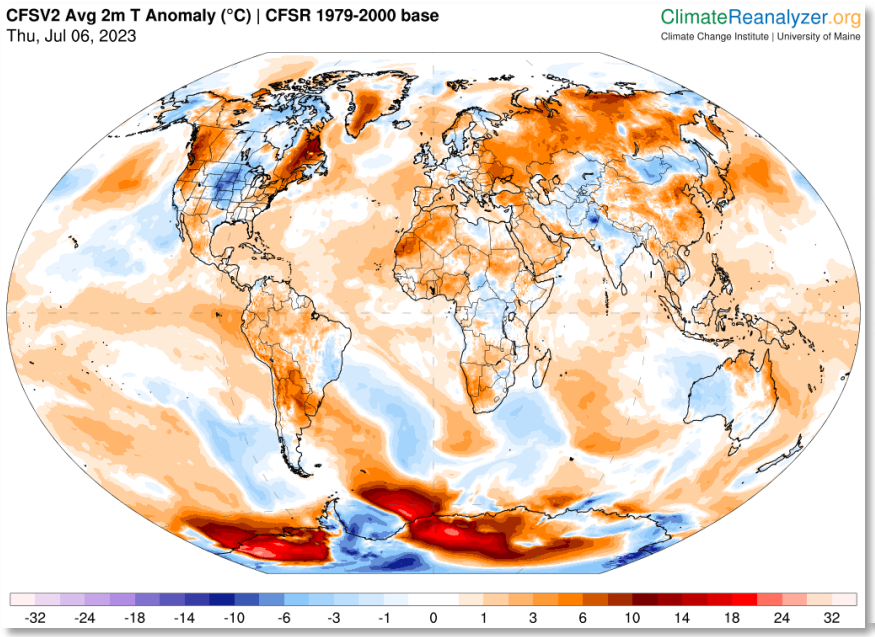


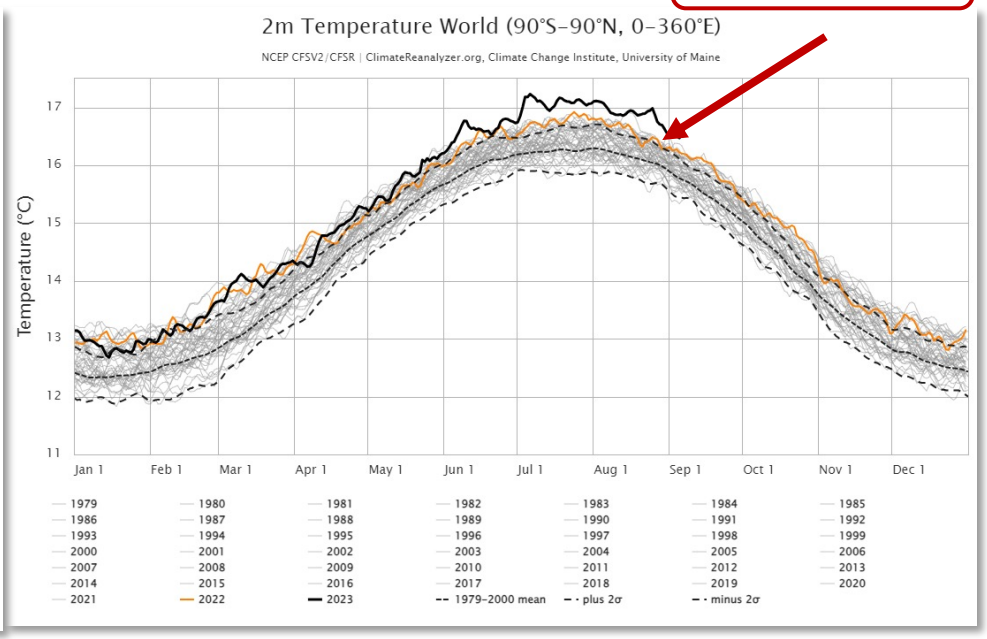
(IPCC AR6)

- **Rapid increases in well-mixed greenhouse gas (GHG) concentrations since 1850 are *unequivocally* caused by human activities.**

- **Global surface temperature in 2011–2020 was 1.09 ℃ higher than 1850–1900.**

Background

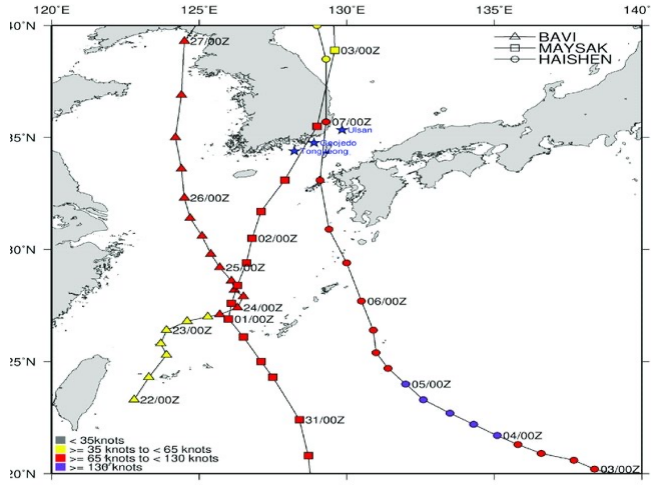




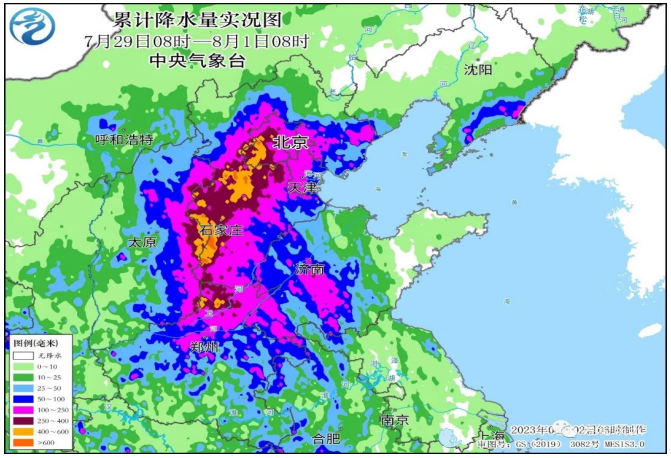
- Global surface temperature reached a record high of 17.23 ℃ in July 6th, 2023.
- The maximum temperature in Beijing on that day reached 41 ℃.

Background

Typhoon Bavi, Maysak and Haishen in 2020 consecutively strike the northeastern Asia

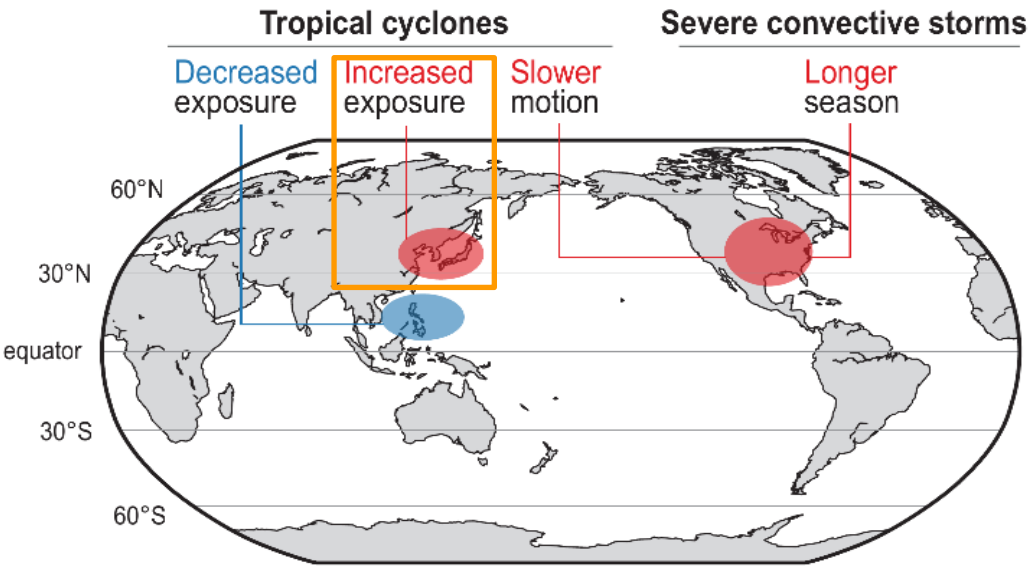


Typhoon Doksuri (2023) led to widespread destruction in China and Philippines



- **Anomalous TC activities and their regional influence attract much attention from scientific communities, public and policy makers.**

Background

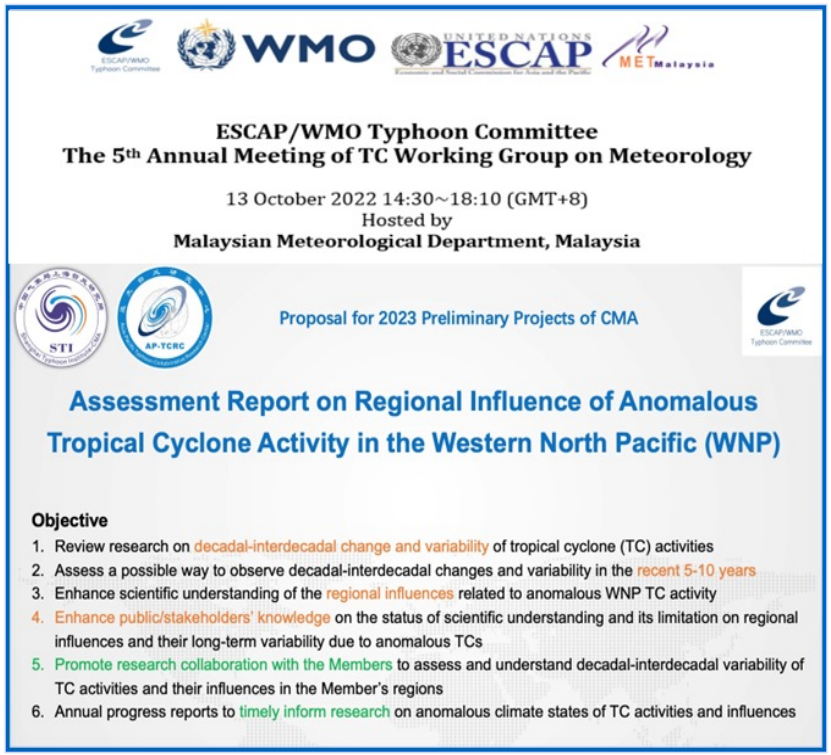


(IPCC AR6)

- ✓ **Proportion of major (Category 3–5) tropical cyclone has increased over the last four decades *(likely)*.**
- ✓ **Latitude where tropical cyclones in the western North Pacific reach their peak intensity has shifted northward *(very likely)*.**
- ✓ **Heavy precipitation associated with tropical cyclones increased by human activities *(high confidence)*.**

- **The ongoing climate change has already affected many weather and climate extremes across the globe, including tropical cyclones.**

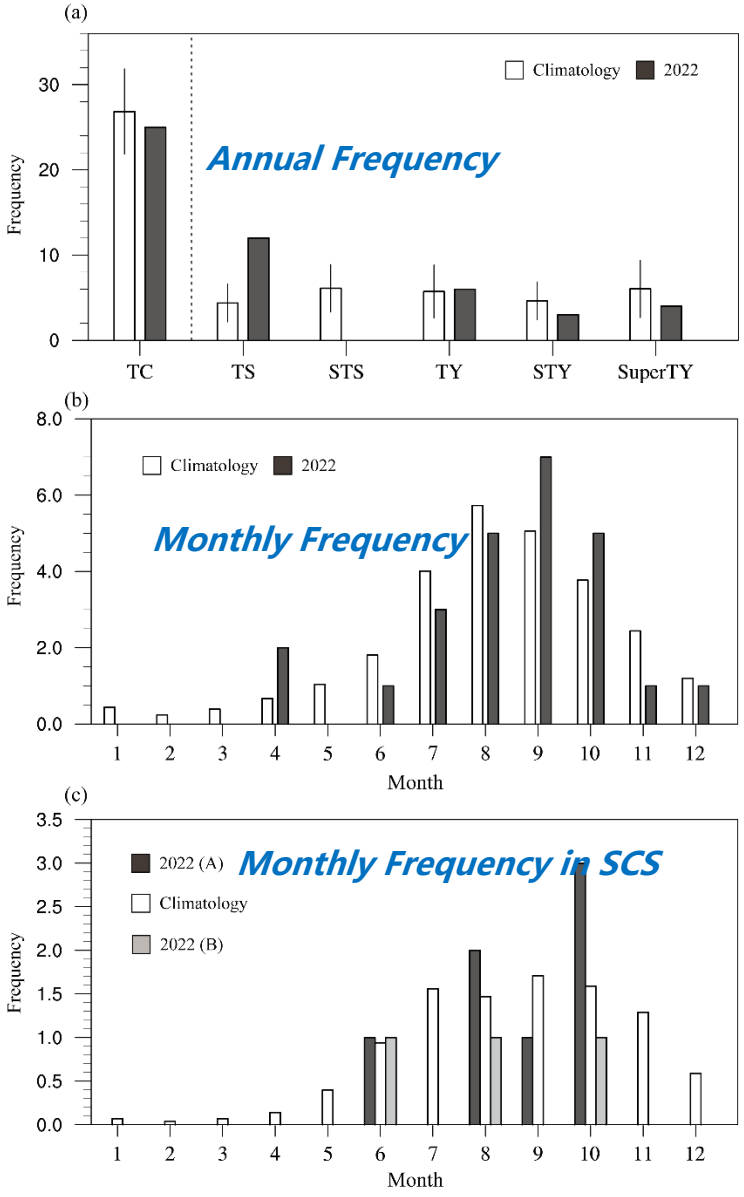
Progress of 2023 Preliminary Project

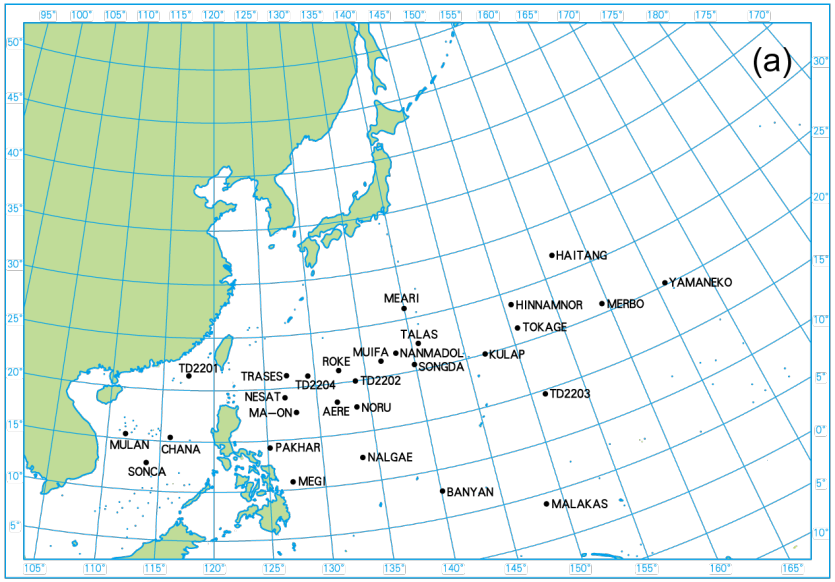


- **To assess regional influence of anomalous tropical cyclone activity in the western North Pacific, STI/CMA proposed a new PP in 2023.**

- Best-track dataset from the Shanghai Typhoon Institute (STI/CMA).
- Analysis of tropical cyclone activities in the Western North Pacific (WNP) and the South China Sea (SCS) for 2022.
- Anomalous conditions are compared to the historical climatology from 1951-2020.

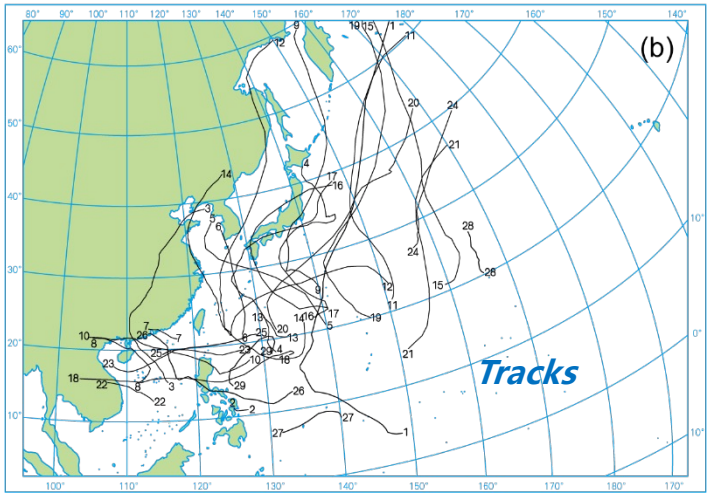
Progress of 2023 Preliminary Project



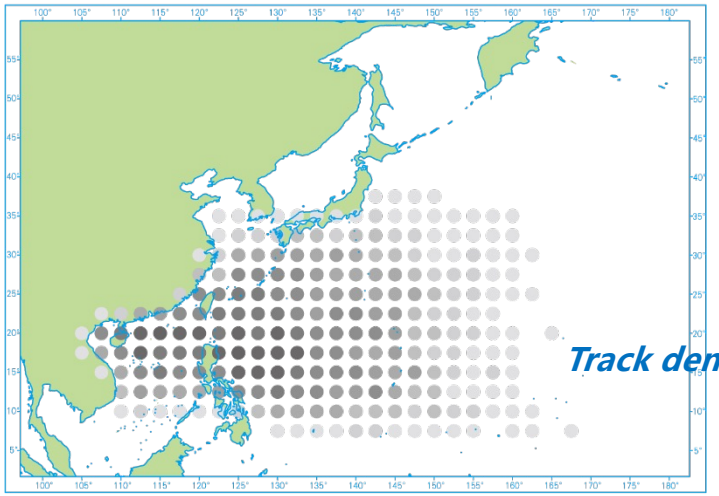


- *Overall frequency is slightly lower than normal, but the multiple TC events have a very high frequency of occurrence.*
- *Origin locations of TCs, i.e. the starting points of their paths, show a large westward and northward deviation from climatology.*

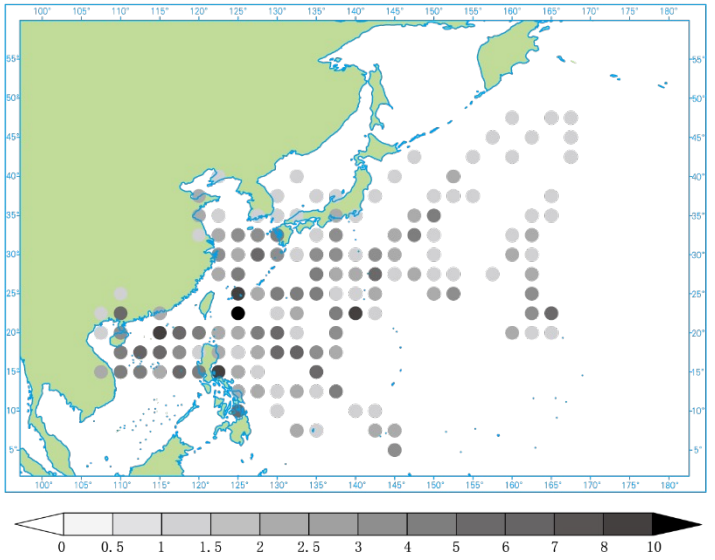
Progress of 2023 Preliminary Project



(a) Climatological TC track density

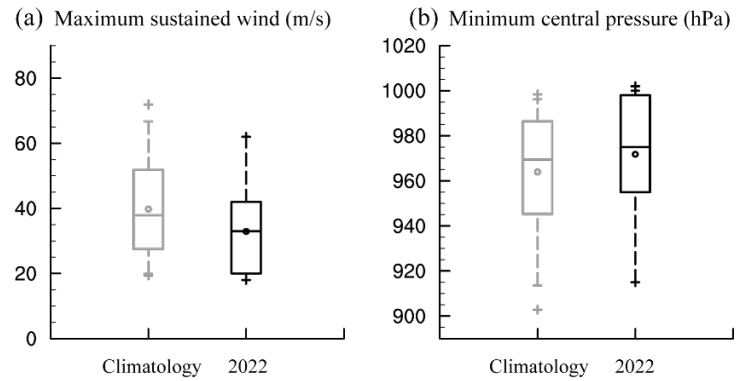


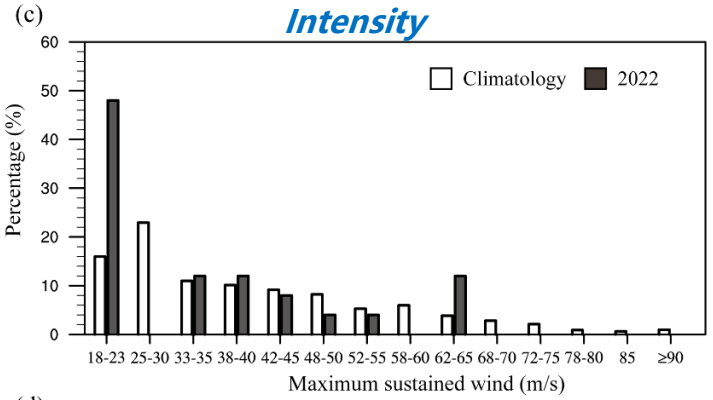
(b) TC track density in 2022

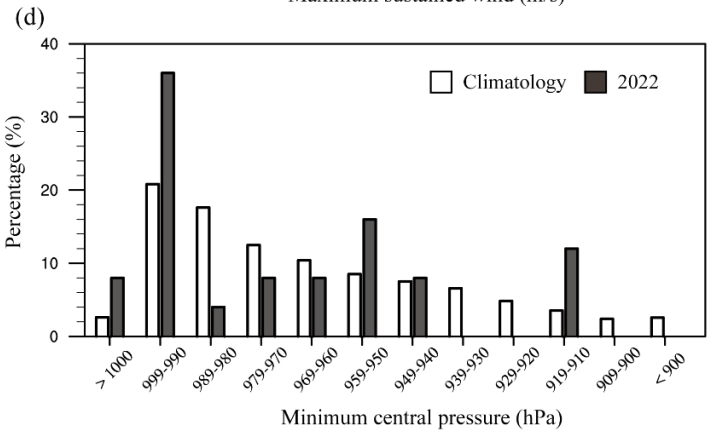


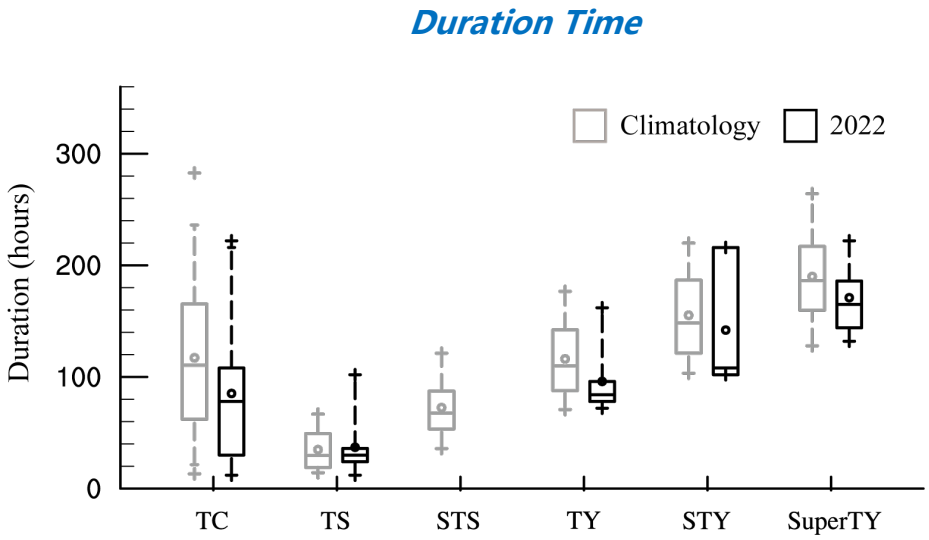
- *Around 40% of the named TCs exhibit a shift in their direction of movement from westerly to easterly.*
- *Track density of the named TCs is more pronounced than climatology in the southeastern East China Sea, extending to the eastern region of Taiwan, as well as in the northern part of the SCS.*

Progress of 2023 Preliminary Project





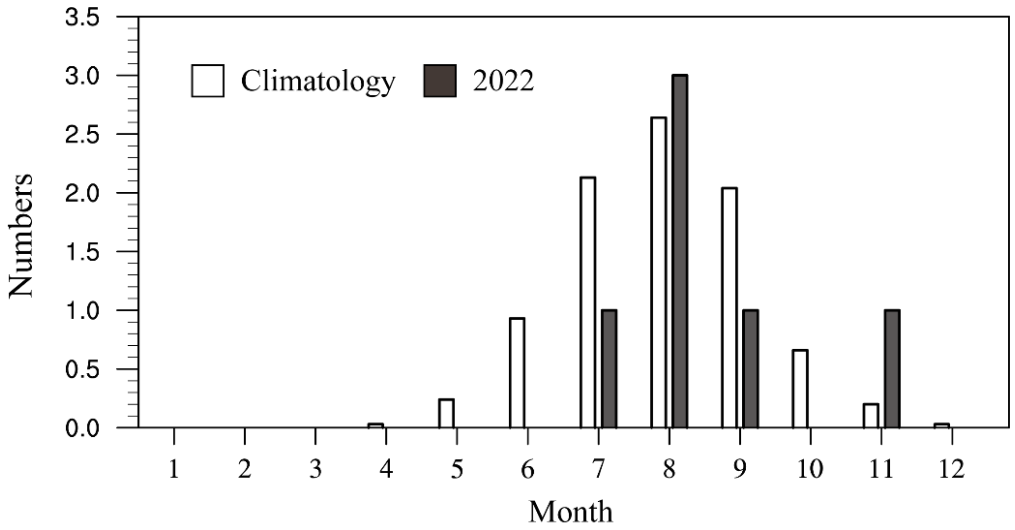




- *Intensity of TCs is generally lower than the climatology.*
- *Duration of TCs at tropical storm intensity or above being shorter than usual.*

Progress of 2023 Preliminary Project

Characteristics of landfall TCs
(China as an example in the first version)



- *Fewer incidence of TC landfalls in China in 2022.*
- *But, with a geographical concentration in Guangdong Province.*

Tropical Cyclone		Numbers of Landfall	Landfall Province	Landfall Intensity
Chaba	**2203**	1	Guangdong	TY
-	-	1	Guangdong	TD
Mulan	**2207**	1	Guangdong	TS
Ma-on	**2209**	1	Guangdong	STS
Muifa	**2212**	4	Guangdong	TY
			Zhejiang	TY
			Shanghai	TY
			Shandong	TS
			Liaoning	TS
Nalgae	**2222**	1	Guangdong	TD

Progress of 2023 Preliminary Project

■ Summary

- *Overall frequency is slightly lower than normal, but the multiple TC events have a very high frequency of occurrence.*
- *Origin locations of TCs, i.e. the starting points of their paths, show a large westward and northward deviation from climatology.*
- *Around 40% of the named TCs exhibit a shift in their direction of movement from westerly to easterly.*
- *Intensity of TCs is generally lower than the climatology, with the duration of TCs at tropical storm intensity or above being shorter than usual.*
- *Fewer incidence of TC landfalls in China, but with a geographical concentration in Guangdong Province.*

■ Progress & Plan

- Already reported in the 2023 annual meeting of Typhoon Committee WGM.
- Annual report has been submitted to the *Tropical Cyclone Research and Review (TCRR)*.
- In future, the STI/CMA and the AP-TCRC plan to jointly publish a series of annual report in the *TCRR* regularly.
- **The AP-TCRC plans to enhance global scientific cooperation, especially promote research cooperation with Typhoon Committee Members.**

Proposal for AOP in 2024

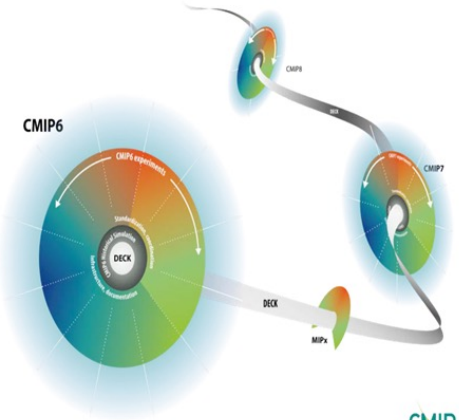
■ Objective

- Prepare for the fourth assessment report on impacts of climate change on tropical cyclones in the Typhoon Committee region.

Development of IPCC Assessment Report

- **The Sixth IPCC Assessment Report (AR6) has been finalized in 2023.**
- **The 7th IPCC assessment cycle has started.**

A common suite of experiments for each phase of CMIP provides an opportunity to construct a multi-model ensemble using model output from various phases of CMIP



Eyring et al., CMIP6 Experimental Design and Organization, GMD, 2016

Proposal for AOP in 2024

Development of the assessment report

Tropical Cyclone Research and Review

Third assessment on impacts of climate change on tropical cyclones in the Typhoon Committee Region – Part I: Observed changes, detection and attribution

Tropical Cyclone Research and Review

Third assessment on impacts of climate change on tropical cyclones in the Typhoon Committee Region – Part II: Future projections

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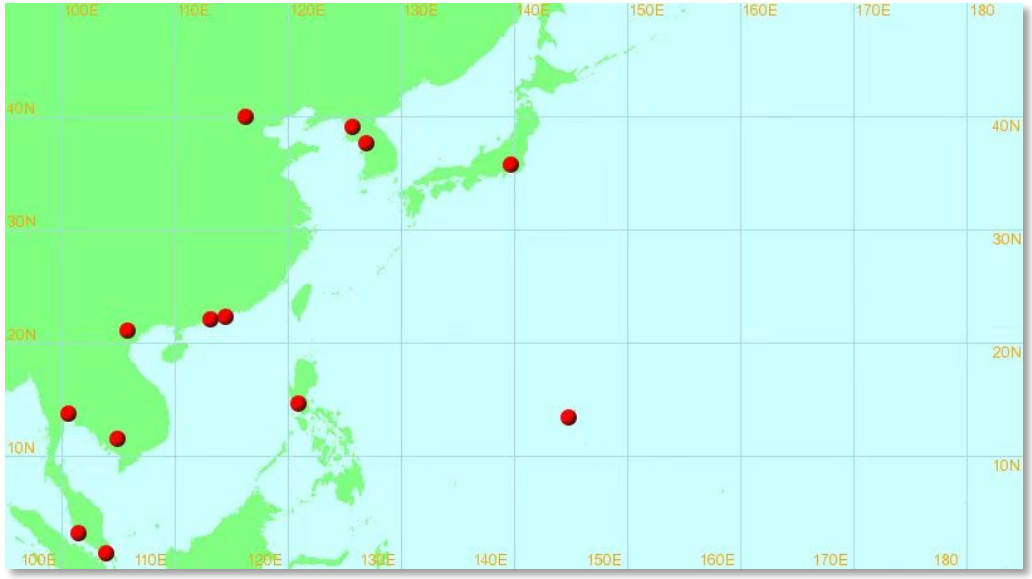
- ✓ **In the past decade, the first to third TC assessment reports have been jointly developed.**
- ✓ **The 1st and 2nd assessment reports have been cited by the IPCC AR5.**
- ✓ **Two papers published in the *TCRR* related to the 3rd assessment reports have been cited by more than 75 times in past 5 years.**

- ***Considering the increasing attention from scientific community, public, and policy makers on impacts of climate change on tropical cyclones, along with the start of the 7th IPCC assessment cycle, we hope to start the fourth TC assessment report in 2024.***

Future Plans



- The AP-TCRC will offer scientific guidance, project fundings and international cooperation opportunities for the AOP.
- Looking forward to enhancing research cooperation among the Typhoon Committee Members by the proposed AOP.

Interested in participating?
Feel free to discuss with me anytime!

Thank You!

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