PeakRe

Seasonal Tropical Cyclone Activity Forecast
Northwest Pacific Ocean and South China Sea

August 2025 Update

I. Forecasting Results

Similar numbers of tropical storms (TS) and severe typhoon (STY) are forecasted to form in Pacific Southwest and South China Sea in 2025 compared to past years (with a total of 24-26 and 8-10 respectively). Meanwhile, fewer number of TS are forecasted to make landfall in China (approximately 5-7).

The number of tropical cyclones (TC) expected to impact overall China in 2025 are forecasted to reach 12-14, similar to the LTCA. Though larger numbers of TC (9-12 to be more specific) are expected to impact South China and East China in 2025, slightly higher than the LTCA. Shanghai is expecting a normal year, with a total of 2.5 approximately. The forecast above indicates a significant influence of TC in Southeastern China, while the overall risk of TC disasters in China is close to the LTCA. It is important to pay close attention to the possible impact of extreme TC.

	Event Formation		Event Landfall	TC Impacting to China (Notes 1-2).		
	(>=TS)	(>=STY)	(>=TS)	Countrywide	South	East
1991-2020 EV ± SD	25±4.5	9.5±3.6	7±1.9	13.0±3.6	9.0±3.5	9.5±3.3
2025 Early Season	24-26	8-10	5-7	11-13	9-12	9-12
2025 Mid Season	24-26	8-10	5-7	12-14	9-12	9-12

Table 1. Seasonal forecast for TC activity in 2025

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II. Basis for forecasting

1. Tropical cyclone activity year-to-date

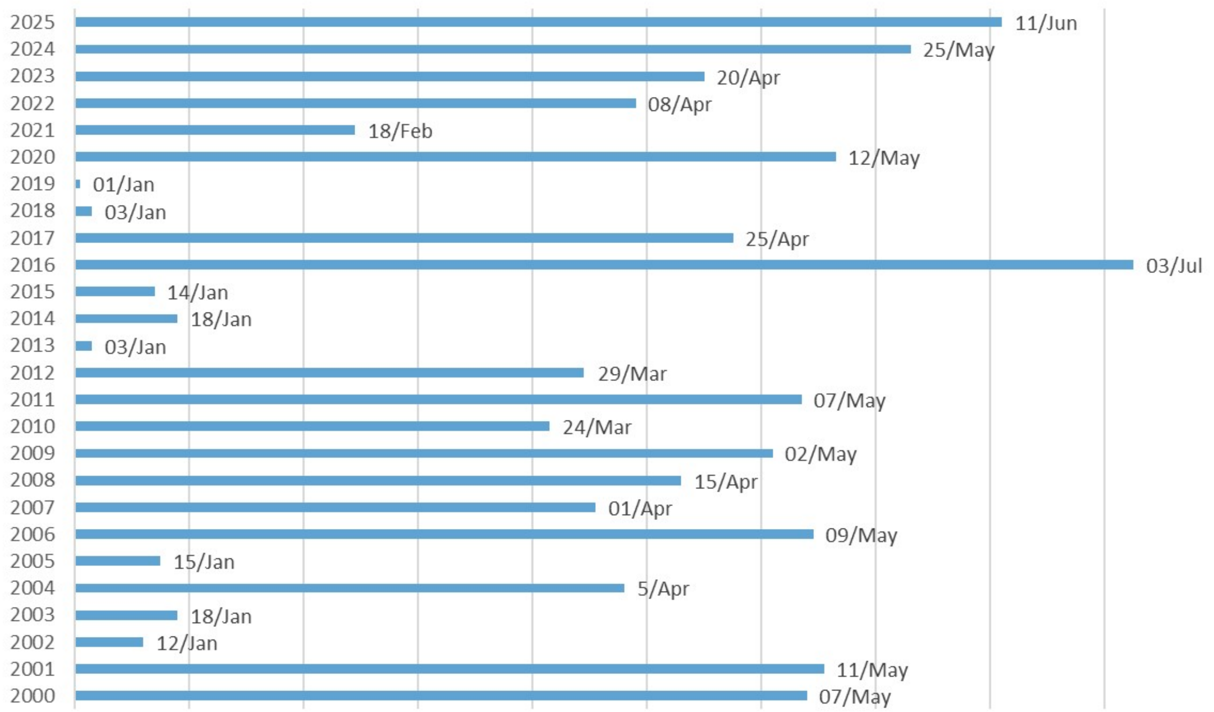

Figure 1. The date of first TS formation in Northwest Pacific and South China Sea in 2000-2025

Figure 2. Characteristics of Tropical Cyclone Activity No.2501 and No.2502 in the Northwest Pacific and South China Sea in 2025

Only 2 TS have formed in Northwest Pacific and South China Sea in 2025 until now (Figure 2), significantly lower than the average frequency from 1991 to 2020. Meanwhile, the first formation of TS in 2025 is noticeably later than the climatological average. According to the collected data, only in 2016 did the first TS form later (July 3) than this year (Figure 1). In 2025, The first TS Wutip (No.2501) formed in South China Sea in early June and made landfall in Hainan and Guangdong provinces. Wutip then gradually weakening afterward while continuing to affect South China. The second TS, Sepat (No.2502), formed in southeast of Japan and moved northwestward, with no impact on China.

2. Ocean Atmosphere Conditions and Outlook

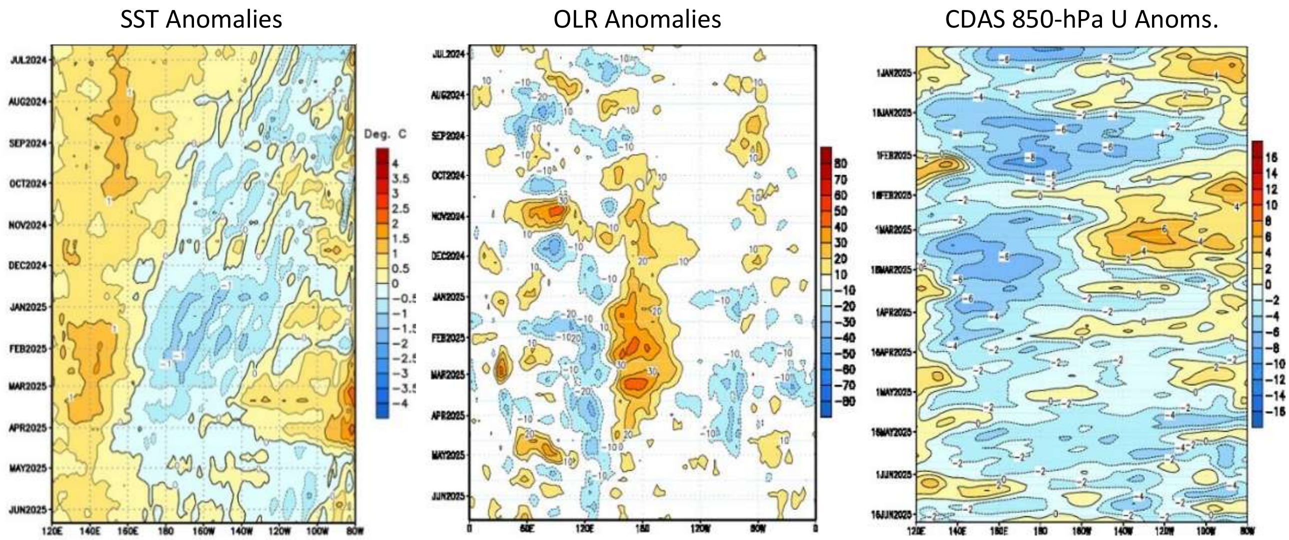

Figure 3. The Evolution of Sea Surface Temperature Anomalies in the Equatorial Pacific (5°S–5°N) (Left), OLR anomalies (Center) and 850hPa zonal wind anomalies (Right) (Image Source: CPC)

According to monitoring data, the La Niña events for 2024/25 weakened during the spring (Figure 3). Sea surface temperature anomalies in the equatorial Pacific have significantly diminished, and both convective activity and zonal winds in the Middle East equatorial Pacific have also weakened. These observations indicate that the La Niña phase has transitioned into a neutral phase.

According to global sea surface temperature anomalies from mid-May to mid-June (Figure 4), sea surface temperatures in the central equatorial Pacific were close to the average, while some areas in the eastern Pacific were slightly below average. In contrast, the subtropical North Atlantic, the northwestern Pacific, and the southern Indian Ocean experienced significantly above-average SST. This suggests that extratropical ocean-atmosphere signals are relatively strong, and merit continued observation particularly regarding their evolving characteristics and potential impact on TC activity.

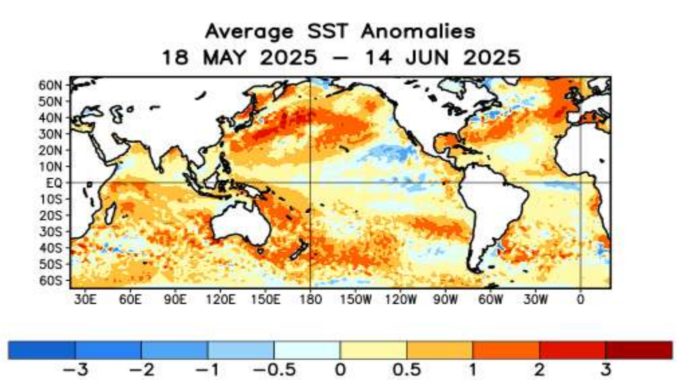

Figure 4. Global Sea Surface Temperature Anomalies from Mid-May to Mid-June 2025 (Image Source: CPC)

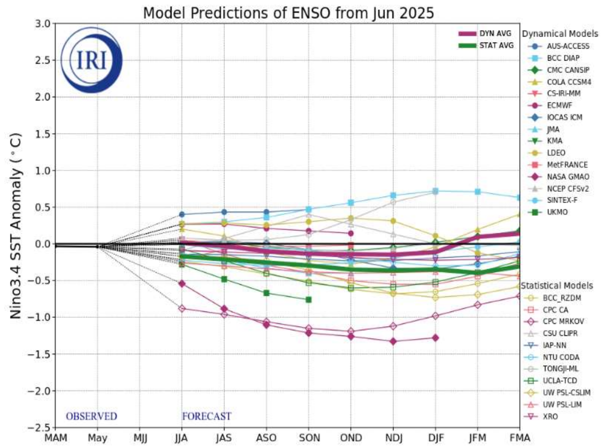

Figure 5. Multi-model forecast of sea surface temperature anomalies in the Nino3.4 region of the tropical Pacific for 2025 (Image source: IRI)

According to multi-model ensemble forecasts from domestic and international sources (Figure 5), ENSO is expected to remain neutral to cool phase during summer and autumn seasons. Nonetheless, there is considerable uncertainty in the predicted values of the Nino3.4 indices.

Probabilistic forecasts suggest that ENSO is highly likely to remain in a neutral phase during summer, with the greatest likelihood of continuing in a neutral phase through autumn. However, a significant chance of development into a La Niña event still remains, and the possibility of an El Niño event cannot be ruled out. As late summer and early autumn mark a peak period for tropical cyclone activity, a neutral ENSO phase in the tropical Pacific implies that the ocean-atmosphere coupling system in tropical regions may exert a climatologically typical influence on tropical cyclone activity. Therefore, attention should be paid to the effect of other oceanic and atmospheric factors.

Considering the current La Niña phase was preceded by a comparatively severe El Niño event, combined with the characteristics of the ENSO cycle, we have identified historical years with similar transitions (see Table 2), where a severe El Niño event weakened to a neutral phase and subsequently developed into a La Niña phase or event, based on the analysis of the evolution of the Nino3.4 indices from the winter of 2023/24 to the present. Among the four analogous years, the evolution of the Nino3.4 indices in 1966/67 most closely resembles the pattern observed from 2024 to the present, with conditions remaining in a neutral or La Niña phase thereafter.

In 1983/84 and 2016/17, La Niña events weakened to neutral during the summer, followed by a re-evolution into La Niña events. In contrast, such neutral phase transitioned gradually into an El Niño event in 2005/06. Across these analogous years, the frequency of TS generally remained within normal probability ranges, while the frequency of STY tended to be above normal. The number of TS making landfall in China was above the normal levels. The frequency of TC affecting overall China, as well as East and South China, was generally above normal, whereas the frequency of TCs affecting Shanghai remained within normal probability ranges.

ENSO Evolution	Analogous Years	Subsequent Evolution	TS Formation	STY	TS Landfall	Impact Countrywide	Impact South China	Impact East China
Evolve into NE	1966/67	Remained Neutral	40	25	9	16	11	12
Evolve Into LN	1983/84	Evolves into LN in Autumn	26	14	7	17	10	11
	2016/17	Evolves into LN in Autumn	25	12	9	21	18	13
Evolve Into EN	2005/06	Evolves into LN in Autumn	23	14	5	16	13	8

Table 2. Tropical Cyclone Activity Statistics for ENSO Analog Years

3. Objective Methodologies and Regional Model Forecast Results

3.1 Deterministic Forecasting with Statistical Model

The statistical forecasting approach involves constructing regression models based on ocean-atmospheric environmental fields that are closely correlated with the forecast target. Specific results are presented in Table 3: In 2025, some divergence exist in the projected frequency of TS formation, which overall forecast suggests a range from normal to slightly below normal. The frequency of TS landfalls is projected to be normal. The frequency of TC affecting overall China, East and South China is expected to range from normal to above normal. The frequency of TCs affecting Shanghai is forecasted to remain within normal ranges.

	TS formation	TS landfall	TC impacting to China (Notes 1-2)		
			Country wide	South	East
1991-2020 EV ± SD	25±4.5	7±1.9	13.0±3.6	9.0±3.5	9.5±3.3
2025 forecast (Regression model)	26.1/22.3	6.6/6.9	15.4	11.8	10.3

Table 3. Annual tropical cyclone forecast results of the statistical models in 2025

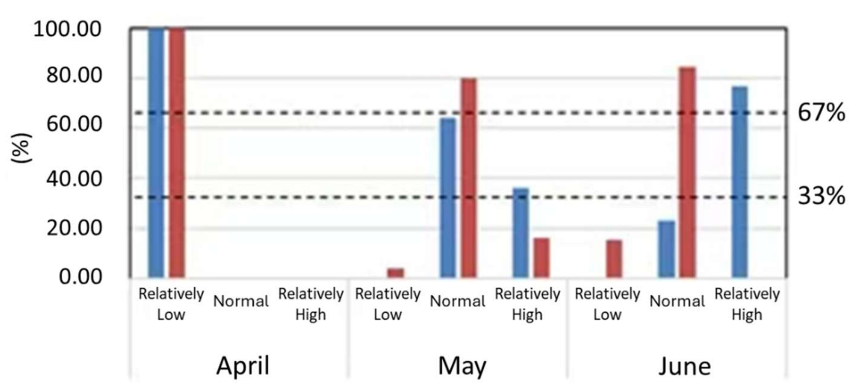

Table 6. Probabilistic forecasts of annual frequencies of TS (blue) and STY (red) over the NP and SCS in 2025, based on the hybrid dynamical-statistical model. The horizontal axis represents the month of forecast initialization

3.2 Mixed Dynamic-Statistical Model

Using sea surface temperature anomalies, vertical wind shear, and low-level vorticity data for spring and summer 2025 predicted by NCEP/CFS, along with a statistical model constructed based on the relationship between key regional factors TS activity, a hybrid dynamical-statistical forecast was conducted.

Based on samples initiated in April, May, and June from the CFSv2 model, deterministic and probabilistic forecasts for TS and STY frequencies were integrated. The deterministic forecast results are presented in Table 4: the frequency of TS formation during the typhoon season in 2025 (July–December) is expected to be normal, while the frequency of STY formation is forecasted to be slightly below normal.

The probabilistic forecast results (Figure 6) are consistent with these findings: the TS formation frequency during the 2025 typhoon season is most likely to range from normal to above normal, while the STY formation frequency is expected to remain within normal probability ranges.

2025 Forecast	Reporting month	April	May	June	1991-2020 EV ±SD
TS Formation	Whole year	16.2	24.1	26.4	25±4.5
	Jul - Dec	14.2	22.1	24.4	21±4.5
STY Formation	Whole year	3.7	8.4	7.3	9.5±3.5
	Jul - Dec	3.7	8.4	7.3	8.3±3.4

Table 4. Forecast results of mixed dynamic-statistical model 2025

3.3 Forecast Results of Dynamical Downscaling Model (iRAM2)

Regional model iRAM2 makes forecasts with five output data points (marked E1 to E5) from CFSv2 as the drive (00:00 on Jun 1, 3, 5, 7, and 9, 2025), The forecast begins at 00:00 on Jun 14, 2025, the results of each data point and the mean are shown in Table 5: 24 TS are expected to form from July to December (mean value), considering the forecast results produced by this method usually overestimate the observed values by approximately 3-4 TS, the frequency of TS formation for 2025 is expected to be close to the LTCA (The LTCA for the period 1991–2020 is 21 TS per year).

Data Point	E1	E2	E3	E4	E5	Mean	LTCA
TS formation	27	23	18	28	24	24	21

Table 5. Forecast results of TS formation (Jul to Dec) with the dynamic-downscaling regional model (iRAM2)

4. Tropical Cyclone Induced Natural Disaster and Risk Assessment

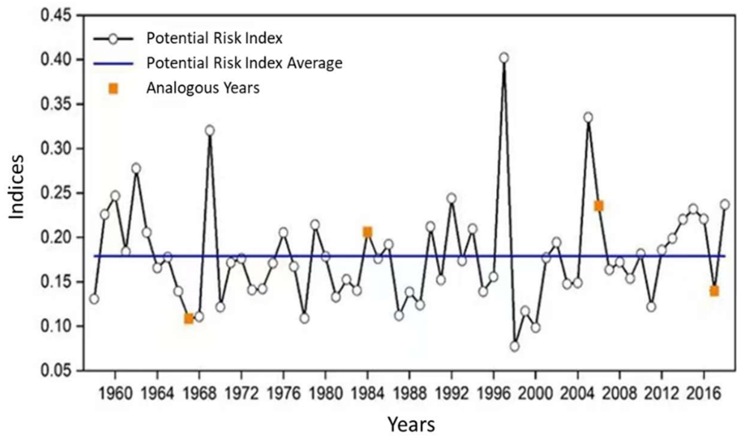

Figure 7. TC Potential Risk Index affecting China from 1960 to 2018

As mentioned above, based on the influence of ENSO on TC activity, four analogous years have been identified, ranked by similarity are: 1967, 1984, 2017, and 2006. The TC Potential Risk Index indicates the potential for disaster-induced impacts. As shown in Figure 6, the average index for the period 1958–2018 indicates that the disaster risk in 1967 and 2017 was below average, while in 1984 and 2006 the risk was above average. Both precipitation and gust risks exhibited similar patterns.

In the two analogous years with higher disaster risk, Typhoon Freda (No.8408) made landfall in Luoyuan County, Fuzhou, Fujian Province, and tracked northward, bringing rare typhoon-induced rainstorm to North and Northeast China. The event resulted in 125 fatalities, damage to 1.2473 million hectares of crops, and direct economic losses of RMB 810 million. Typhoons Bilis (No.0604) and Saomai (No.0608) triggered severe flooding, landslides and mudslides, causing 848 and 483 deaths respectively. These two events alone accounted for 42.2% of the total disaster-caused fatalities nationwide.

Even in the two analogous years with lower disaster risk, extreme typhoon events still occurred. Typhoon Carla (No.6718) brushed past Taiwan, bringing an extreme rainstorm with a daily precipitation of 1,672.6 mm to Xinliao, Yilan County. Typhoon Hato (No.1713) rapidly intensified nearshore and made a direct and powerful landfall in the Pearl River Delta region of Guangdong, affecting 2.478 million people, prompting the emergency evacuation of 237,000 individuals, damaging 123,200 hectares of crops (including 11,000 hectares of total crop failure), demolishing 2,000 houses, and causing direct economic losses of RMB 29.03 billion.

5. Summary

In summary, the La Niña event of 2024/25 has ended, and the likelihood of maintaining a neutral ENSO phase throughout the summer is relatively high. Whether ENSO neutral phase will evolve into a La Niña event in autumn and winter remains uncertain and requires continuous monitoring. Additionally, strong signals from extratropical ocean-atmospheric systems have been observed, and their subsequent evolution warrants close attention.

Based on subjective analysis, combined with objective statistical methods and dynamical-downscaling model forecasts, it is forecasted that the frequency of TS and STY formation over Northwest Pacific and South China Sea in 2025 will be close to the LTCA. The number of TS making landfall in China is expected to be below normal. The overall frequency of TC affecting China is projected to be near normal, with TC activity in East and South China likely to be above normal. The frequency of TC impacting Shanghai is expected to remain close to the LTCA. Overall, TC activity is forecast to be relatively active in southeastern China.

Drawing from historical analogues, the overall disaster risk associated with TC affecting China in 2025 is expected to be near the long-term average. Meanwhile, regions with potentially more severe impacts are likely to be concentrated in South and East China. Particular attention should be paid to the possible effects of potential extreme scenarios, such as extreme winds and storm surges along the coast, floods and secondary disasters caused by extreme rainstorms and localized sudden heavy rainfall.

Notes:

1. A TC with major impact should satisfy at least one of the three following conditions: (1)aggregate precipitation in the given area is over 50mm; or (2)average wind level ≥ 7 (or a gust ≥ 8) in the given area; or (3)aggregate precipitation is over 30 mm and an average wind scale ≥ 6 (or a gust ≥ 7) in the given area.
2. South China includes Guangdong, Guangxi and Hainan provinces; East China includes Fujian, Jiangxi, Zhejiang, Anhui, Jiangsu and Shandong provinces and Shanghai.

About Peak Re

Peak Reinsurance Company Limited ("Peak Re" or the "Company") is a Hong Kong-based global reinsurance company. Since commencing operations in 2012, the Company has grown steadily to rank 27th among global reinsurance groups in terms of net reinsurance premiums written.[1] For the year ended 31 December 2024, Peak Re reported a reinsurance revenue of USD1.16 billion and a net profit of USD187 million. With net assets of USD1.43 billion as of 31 December 2024, Peak Re is rated A- by A.M. Best.

Peak Re is authorised by the Insurance Authority of Hong Kong under the Insurance Ordinance (Cap. 41). The Company offers both Property & Casualty ("P&C") and Life & Health ("L&H") reinsurance. It provides innovative and tailored reinsurance, risk management and capital management solutions to clients around the world.

[1] Source: S&P Global Ratings Top 40 Global Reinsurers And Reinsurers by Country: 2022, S&P Global, 2022

About STI

Shanghai Typhoon Institute (STI) is a state-level institution founded with the approval of the Ministry of Science and Technology, the Ministry of Finance and the State Commission Office for Public Sector Reform. Its mission is to undertake basic and applied research related to tropical cyclones. As one of the research units providing the best route predication for tropical cyclones in East Asia, STI has developed and maintained a database of meteorological information specific to cyclone activities in China. Since 2015, Peak Re has partnered with the Shanghai Typhoon Institute (STI) on research projects related to North-West Pacific basin and South China Sea tropical cyclones.

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