

**Verification of Forecasts of Tropical Cyclone Activity over
the western North Pacific in 2002**

Issued on 15 Jan 2003

This is the third consecutive year in which our forecasts are near perfect. In our discussions on 7 May and 28 June 2002, we predicted that tropical cyclone (TC) activity over the western North Pacific (WNP) would be normal to slightly above normal while that over the South China Sea (SCS) would be below normal. As a consequence of the latter, the number of landfalling TCs over South China was predicted to be below normal. Such activity patterns are typical of an El Niño (warm) event; the likelihood of its occurrence was generally confirmed by June 2002.

Indeed, a summer-type warm event (Xu and Chan 2001) did take place in 2002 and the predicted deviations of TC activities from normal were all correct (Table 1). The number of all tropical cyclones over the western North Pacific was above normal while a normal number of TCs with tropical storm intensity or greater and of typhoons occurred over the WNP. All these three numbers were correctly predicted. As for the SCS, the number of tropical cyclones and that of tropical storms and typhoons are quite below normal. Both numbers fall just outside (*by one*) of the range of errors of our predictions. Nevertheless, we would consider our forecasts to be correct since a below-normal activity was predicted. Finally, we correctly predicted the number of TCs making landfall along the South China coast.

A further examination of the locations of TC formation in 2002 demonstrates the dominant influence of the El Niño event. The mean location in 2002 during the main season (July to December) was very close to those of other warm event years (Fig. 1c), which mainly results from that in the peak season (Fig. 1a). The late season, however, was dominated by high-latitude cyclones (Fig. 1b), which is similar to two other summer-type warm events (1977 and 1994).

To summarize, the El Niño event of 2002 apparently controlled most of the variability of tropical cyclone activity over the western North Pacific and the South China Sea during the year. Thus, our predictions were near perfect since we have included in our schemes indices that represent the El Niño component. Previous experience and research results (Chan 2000) suggest that in the year following an El Niño event, tropical cyclone activity over the western North Pacific is likely to be below normal. Thus, we might expect this to be the case in 2003. Actual forecasts will be issued in April and updated in June.

References

Chan, J. C. L., 2000: Tropical cyclone activity over the western North Pacific associated with El Niño and La Niña Events. *J. Climate*, **13**, 2960-2972.

Wang, B. and J. C. L. Chan, 2002: How strong ENSO events affect tropical storm activity over the western North Pacific. *J. Climate*, **15**, 1643-1658.

Xu J. J. and J. C. L. Chan, 2001: The role of the Asian-Australian monsoon system in the onset time of El Niño events. *J. Climate*, **14**, 418 - 433.

Table 1. Forecasts of TC activity in 2002 using the CSL-4 and CSL-6 schemes.

2002	Forecast		Observed	Normal
	CSL-4	CSL-6		
Western North Pacific				
No. of TCs	30 ± 3	31 ± 3	33 (34)	31
No. of TCs with at least tropical storm intensity	27 ± 3	27 ± 3	26 (26)	27
No. of typhoons	17 ± 2	18 ± 2	17	17
South China Sea				
No. of TCs	11 ± 2	12 ± 2	9	13
No. of TCs with at least tropical storm intensity	9 ± 2	9 ± 2	6	10
No. of TCs making landfall along the South China coast	4 ± 1	4 ± 1	4	5

Notes:

- 13W and 18W were considered as having TS intensity by JTWC but no name was given by RSMC Tokyo.
- Kalmaegi was considered by RSMC Tokyo as having reached TS intensity but JTWC classified it as TD only.
- Changmi was considered by RSMC Tokyo as having reached TS intensity but no warning was issued by JTWC.

	JTWC	RSMC Tokyo
Kalmaegi	30 kt	40 kt
13W	35 kt	30 kt
18W	35 kt	30 kt
Changmi	No warning	45 kt

4. If Changmi is excluded (no warning is given by JTWC), the total number of TCs is 33.

5. If 13W and 18W are considered as TS and Kalmaegi as TD, the number of TCs with at least TS intensity is 26.

Table 2. 2002 summary of tropical cyclones over the western North Pacific.

Western North Pacific (including South China Sea)			
2002	Tropical cyclones	Tropical cyclones with at least tropical storm intensity	Tropical cyclones with typhoon intensity
	01. Tapah 02. Mitag 03. 03W 04. 04W 05. Hagibis 06. 06W 07. Noguri 08. Chataan 09. Rammasun 10. Halong 11. Nakri 12. Fengshen 13. 13W [#] 14. Fung-Wong 15. Kalmaegi [%] 16. Kammuri 17. 17W 18. 18W [#] 19. Phanfone 20. Vongfong 21. Rusa 22. Sinlaku 23. Ele 24. Hagupit 25. Changmi* 26. Mekkhala 27. Higos 28. Bavi 29. 27W 30. 28W 31. Maysak 32. Huko 33. Haishen 34. Pongsona	01. Tapah 02. Mitag 03. Hagibis 04. Noguri 05. Chataan 06. Rammasun 07. Halong 08. Nakri 09. Fengshen 10. 13W [#] 11. Fung-Wong 12. Kalmaegi [%] 13. Kammuri 14. 18W [#] 15. Phanfone 16. Vongfong 17. Rusa 18. Sinlaku 19. Ele 20. Hagupit 21. Changmi* 22. Mekkhala 23. Higos 24. Bavi 25. Maysak 26. Huko 27. Haishen 28. Pongsona	01. Mitag 02. Hagibis 03. Noguri 04. Chataan 05. Rammasun 06. Halong 07. Fengshen 08. Fung-Wong 09. Phanfone 10. Rusa 11. Sinlaku 12. Ele 13. Higos 14. Bavi 15. Huko 16. Haishen 17. Pongsona
<p># 13W and 18W were considered as having TS intensity by JTWC but no name was given by RSMC Tokyo. % Kalmaegi was considered by RSMC Tokyo as having reached TS intensity but JTWC classified it as TD only. * Changmi was considered by RSMC Tokyo as having reached TS intensity but no warning was issued by JTWC.</p>			
Total number	33 (34)	26 (26)	17
Predicted number (issued in April)	30 ± 3	27 ± 3	17 ± 2
Predicted number (issued in June)	31 ± 3	27 ± 3	18 ± 2

Note: Numbers in parentheses are the observed TC numbers if the RSMC-Tokyo data are used.

Table 3. 2002 summary of tropical cyclones over the South China Sea and making landfall along the South China coast.

South China Sea			
	Tropical cyclones	Tropical cyclones with at least tropical storm intensity	Tropical cyclones making landfall along the South China coast
	01. 03W 02. 06W 03. Noguri 04. Nakri 05. 13W 06. Kammuri 07. Vongfong 08. Hagupit 09. Mekkhala	01. Noguri 02. Nakri 03. Kammuri 04. Vongfong 05. Hagupit 06. Mekkhala	01. Kammuri 02. Vongfong 03. Hagupit 04. Mekkhala
Total number	9	6	4
Predicted number (issued in April)	11 ± 2	9 ± 2	4 ± 1
Predicted number (issued in June)	12 ± 2	9 ± 2	4 ± 1

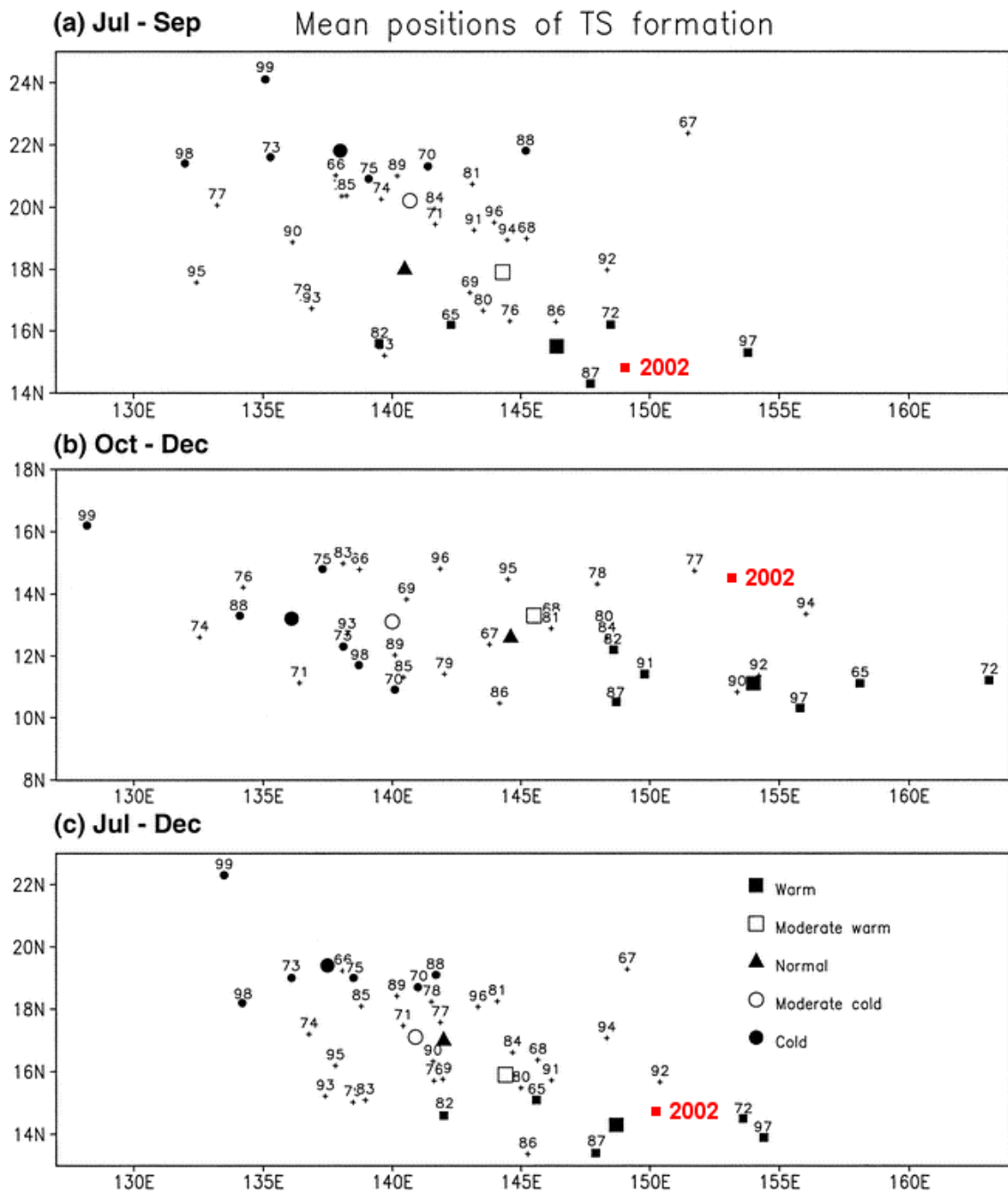


Fig. 1. Averaged locations of tropical storm formation during (a) JAS, (b) OND, and (c) Jul-Dec of each year from 1965 to 1999. Heavy squares and solids denote strong warm and strong cold years, respectively. The mean locations of TS formation for each of the five categories of SST anomalies are marked by large-size symbols as shown in (c). The averaged location of TS formation for 2002 is indicated in red (adapted from Wang and Chan 2002).