

**Updated Prediction of Seasonal Tropical Cyclone Activity over
the Western North Pacific for 2010**

24 June 2010

1. Introduction

This is an update of the predictions of the annual number of tropical cyclones (TCs) in the western North Pacific (WNP) for 2010 that we issued on 26 April 2010. These updates are made based on new information for the months of April and May 2010.

2. ENSO conditions in 2010

The El Niño event developed in 2009 has dissipated and the oceanic and atmospheric conditions in the Pacific are now in neutral status. The Niño3.4 and Niño4 indices in May are -0.03 and 0.39 respectively. At the same time, cooling of the central and east equatorial Pacific Ocean is observed and may continue into the summer. A summary of the various ENSO model forecasts from different climate centres suggests that most of them predict a cool condition in 4 to 7 months time (Table 1). Out of the 7 forecasts, 6 suggest the possible development of a La Niña event. It therefore appears that for the rest of 2010, development of La Niña conditions is possible. In other words, 2010 will likely be a La Niña year.

Table 1. Summary of model forecasts extracted from the Australian Bureau of Meteorology homepage.

MODEL / GROUP	1-4 MONTHS (Jun-Sep)	4-7 MONTHS (Sep-Dec)
POAMA Australian Bureau of Meteorology	Neutral	Neutral / Cool
System 3 ECMWF (EU)	Neutral	Cool / Neutral
GloSea UK Met Office	Cool / Neutral	Cool
CFS NCEP (US)	Cool / Neutral	Cool
CGCMv1 NASA Goddard GMAO (US)	Cool / Neutral	Cool
JMA-CGCM02 Japan Met. Agency	Cool / Neutral	Cool
KMA-SNU Korean Met. Administration	Warm / Neutral	Neutral

3. The predictions for 2010

For the total number of TCs, the prediction from the index of the western extent of the subtropical high gives decrease in TC number (from 30 to 29) compared with the April forecast (cf. Tables 2a and 2b). No change occurs using the other predictors and the final predicted number therefore decreases from 28 to 27.

Table 2. Forecasts from various predictors and the weighted average of the forecasts issued in (a) April and (b) June.

(a) April Forecast

<i>Entire western North Pacific</i>							
All TC							
Prediction	HWNP	HIB	NINO4		Final forecast	Normal	
Weight	0.65	0.68	0.70		28	31	
Tropical storms and typhoons							
Prediction	HWNP	HIB	WP	NINO3.4	Final forecast	Normal	
Weight	0.68	0.64	0.49	0.68	24	27	
Typhoons							
Prediction	HWNP	HIB	WP	NINO3.4	ESOI	Final forecast	Normal
Weight	0.64	0.58	0.59	0.77	0.67	16	17

(b) June Forecast

<i>Entire western North Pacific</i>							
All TC							
Prediction	HWNP	HIB	NINO4		Final forecast	Normal	
Weight	0.74	0.68	0.70		27	31	
Tropical storms and typhoons							
Prediction	HWNP	HIB	WP	NINO3.4	Final forecast	Normal	
Weight	0.68	0.71	0.49	0.68	23	27	
Typhoons							
Prediction	HWNP	HIB	WP	NINO3.4	ESOI	Final forecast	Normal
Weight	0.64	0.58	0.62	0.75	0.67	15	17
HWNP	Index of the westward extent of the subtropical high over the western North Pacific						
HIB	Index of the strength of the India-Burma trough (15°-20°N, 80°-120°E)						
WP	Primary mode of low-frequency variability over the North Pacific						
NINO3.4	Sea surface temperature (SST) anomalies in the NINO3.4 region (5°S-5°N, 170°-120°W)						
NINO4	Sea surface temperature (SST) anomalies in the NINO4 region (5°S-5°N, 160°E-150°W)						
ESOI	Equatorial Southern Oscillation Index (Equatorial SOI) Equatorial Eastern Pacific SLP—Indonesia SLP (standardized anomalies)						

For the number of tropical storms and typhoons, the predictions from the index of the western extent of the subtropical high and the index of the strength of the India-Burma trough give decreases in TC number (from 24 to 22 for the former and from 26 to 24 for the latter). No change occurs using other predictors. The final predicted number therefore decreases from 24 to 23.

For the number of typhoons, the predictions from the ENSO predictors give decreases in TC number, which is probably related to the recent cooling of the equatorial North Pacific. The Niño3.4 predictor gives a predicted number of 16 compared with 17 in the April forecast. A greater decrease, from 18 to 16, occurs using the Equatorial SOI. No change occurs using other predictors and the final predicted number therefore decreases from 16 to 15.

With these changes, it is expected that the overall TC activity and the number of tropical storms and typhoons are likely to be below-normal and the number of typhoons is likely to be slightly below-normal.

As a La Niña event could occur in 2010 as suggested in section 2, it is useful to discuss the TC activity during La Niña years. During the past five decades, the TC activity exhibited a significant interdecadal variation, with the active periods of 1960–76 and 1989–97 and the inactive periods of 1977–1988 and 1998–2009 (Fig. 1). The variations of the TC activity during La Niña years are quite different in the active and inactive periods (Table 3). In the active periods, the variations are quite large, with very active as well as very inactive TC seasons. Normally, the active TC seasons generally have the above-normal activity during the early season (Chan 2008). Indeed, the TC numbers between January

and June for the three active seasons (1964, 1971 and 1974) are all above normal (with the numbers being 5, 11 and 8 respectively). However, the 2010 season has only two TCs occurring between January and June and therefore not likely to be an active season. Moreover, the La Niña years with moderate or strong El Niño events in the preceding years (1973, 1988, 1995, 1998 and 2007) are associated with normal or below-normal TC activity, which also suggests that the 2010 season (with a moderate El Niño event in 2009) is not likely to be an active season. On the other hand, the inactive TC period 1998–2009 will likely to continue into 2010, it is therefore more appropriate to discuss the TC activity during La Niña years occurring in the inactive periods. Of the 6 La Niña years, 3 are associated with below-normal number of tropical storms and typhoons and 3 are associated with normal number. Similar results are found for the number of typhoons. Therefore, the 2010 TC season will likely to be below-normal or slightly below-normal, which is consistent with our forecast.

Table 3. Number of tropical storms and typhoons and number of typhoons in a La Niña year. Green and blue shadings indicate the above-normal and below-normal TC activity respectively.

	La Niña Year	Number of tropical storms and typhoons	Number of typhoons
Active period	1964	39	26
	1970	24	12
	1971	35	24
	1973	21	12
	1974	32	15
	1975	20	14
	1995	26	15
Inactive period	1984	27	16
	1988	26	14
	1998	17	9
	1999	24	12
	2000	25	15
	2007	23	15

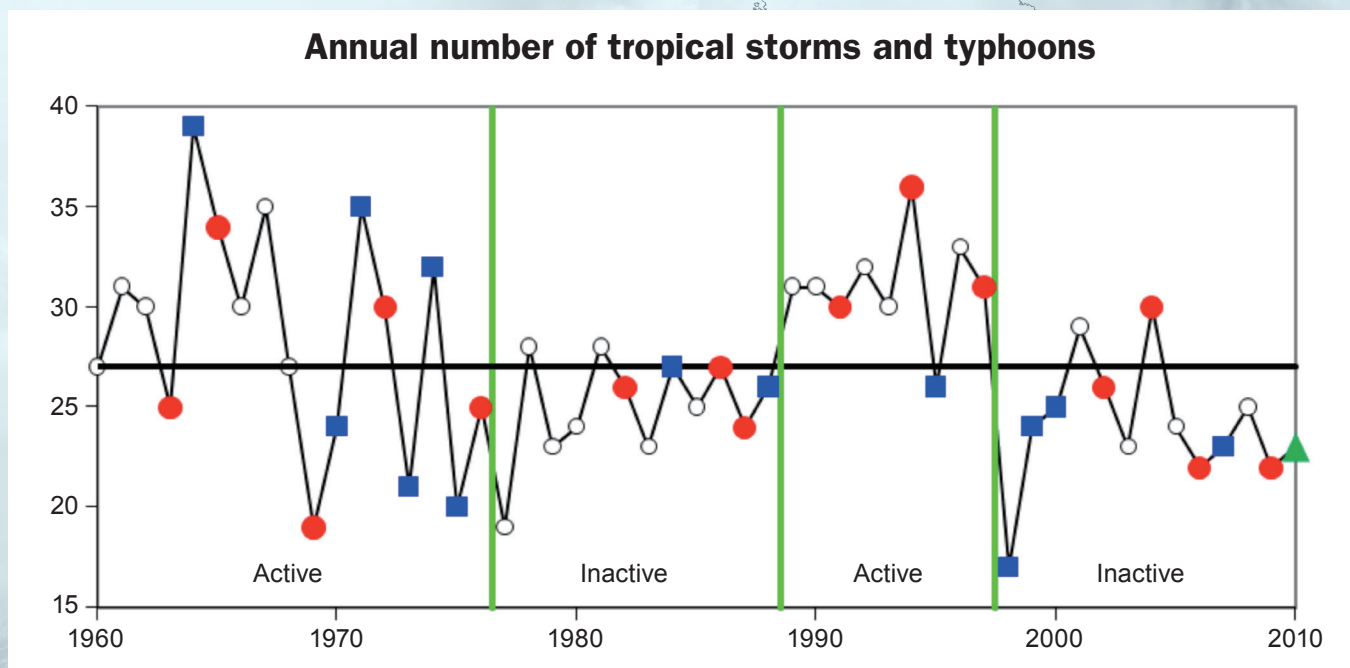


Fig. 1. Time series of the annual number of tropical storms and typhoons. Red circle and blue squares indicate the El Niño and La Niña years respectively. The green triangle indicated the predicted number in 2010. The thick horizontal line indicates the normal number of tropical storms and typhoons. The green vertical lines divide the years 1960–2009 into the active and inactive periods.

500-hPa geopotential height anomalies Apr–May 2010

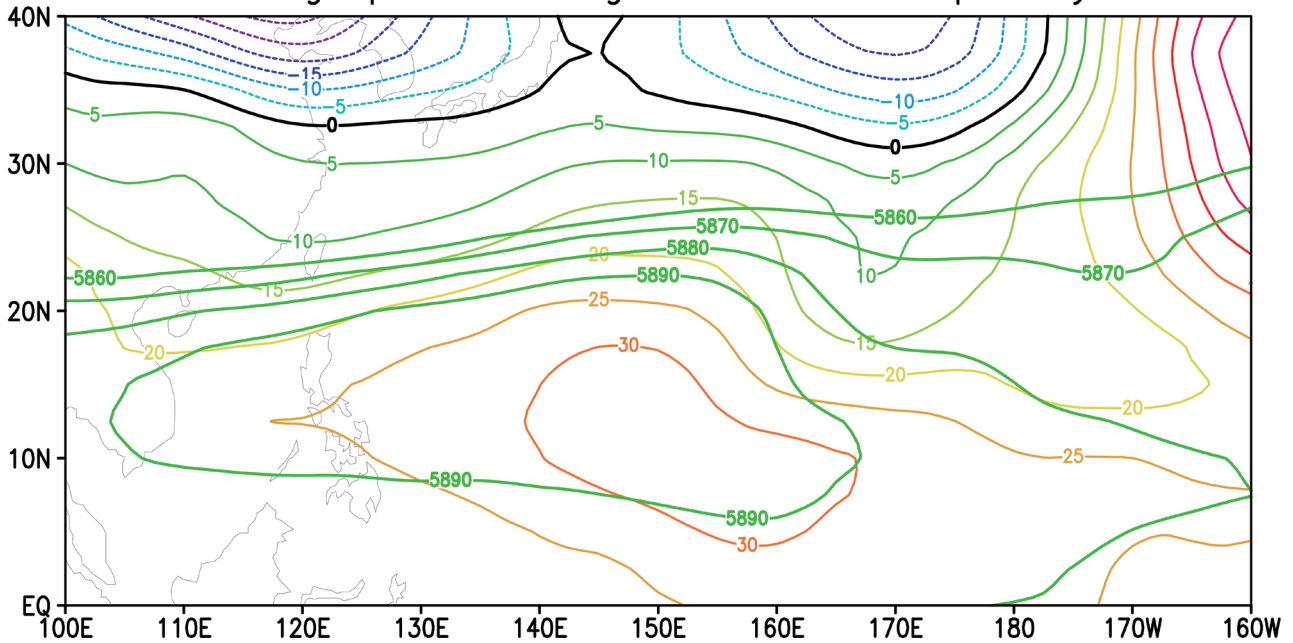


Fig. 2. 500-hPa geopotential height anomalies between April and May in 2010. Thick contour indicates the geopotential height (contour interval = 10m) \geq 5860m.

The predictor related to the subtropical high (HWNP) continues to suggest a below-normal TC activity. The subtropical high over the WNP is stronger than normal in the months of April and May (Fig. 2). On the other hand, no tropical cyclone formed in the WNP during the months of April and May, which is probably related to the current atmospheric conditions.

References

Chan, J. C. L., 2008: A Simple Seasonal Forecast Update of Tropical Cyclone Activity. *Weather Forecasting*, **23**, 1016-1021.

Summary of predictions

Entire western North Pacific	Forecast	Normal
All TC	27 (below-normal)	31
Tropical storms and typhoons	23 (below-normal)	27
Typhoons	15 (slightly below-normal)	17