

Tropical Cyclones IN THE SOUTHWEST PACIFIC

A SIMPLIFIED VIEW : David Sapiane, BSc. Version 1 18 Sept 2011

A Tropical Cyclone in the SW Pacific is a cyclonic warm core system with winds of 34 knots or greater, whereas a Hurricane or Typhoon has winds of 64 knots or greater. BoM rates tropical cyclones (TC) by a scale of 1 to 5. This scale was established for local conditions and is similar to the Saffir Simpson Scale used in much of the world.

THERE ARE SIX ESSENTIAL REQUIREMENTS FOR A TROPICAL CYCLONE:

1. Coriolis Parameter. The initial disturbance must be more than 3 degrees from the Equator otherwise the system will not spin.
2. Low Level Cyclonic Vorticity. The air flow into the disturbance must be cyclonic , that is, have a clockwise flow.
3. Ocean Thermal Energy. Warm ocean water is necessary to feed the disturbance. The temperature must be greater than 26C down to a depth of 60meters or about 200 feet.
4. Relative Humidity. Must be greater than 70% up to 500mb or about 18,000 feet altitude.
5. Equivalent Potential Temperature (Theta-e). Must be relatively consistent from the surface to 18,000 feet. This simply means the couplet of temperature and moisture that defines Theta-e must be nearly equal with altitude. For example because temperature normally drops with altitude, more moisture must be present, or if the air is relatively drier at altitude then the temperature at that altitude must be greater.
6. Low Vertical Wind Shear. There must be less than 25 knots difference between winds at low altitude and winds at upper altitude. If more than this the TC cannot form.

WHERE AND WHEN DO TROPICAL CYCLONES FORM IN THE SW PACIFIC?

1. Usually between 5 South and 20 South and from the Coral Sea to 175W.
2. Jan, Feb, and Mar are the busiest months. Season is Nov through Apr , but TC's have formed in every month of the year.
3. EL NINO expands birth zone closer to the equator and toward French Polynesia. This is because the Tropical warm pool of water in the Coral sea surges eastward.
4. LA NINA favors formation over the Coral Sea and Vanuatu areas. In the past one or two TCs have formed south of 20S near the southern Cooks.
5. TCs are linked to the MJO (Madden Julien Oscillation). This is an atmospheric wave disturbance, most active in the summer, that circles the globe every 30 to 60 days travelling eastward against the trade winds. It produces a moving area of convective cloud and rain which will assist in TC formation if the essential requirements are coincidental.

CAN TC FORMATION BE PREDICTED IN FUTURE?

1. There are a number of models being continually fine tuned to incorporate the six requirements and provide an 'estimate' for the season.

2. Once a TC has formed other models are being developed to estimate direction, but success has been limited.
3. In addition to the 6 fundamental requirements there are a myriad of other complicated atmospheric feedback events which can enhance or destroy TC development.
4. In actual practice each TC zone has Met Services where specialists are called upon for a season prediction.

ARE THERE MORE TROPICAL CYCLONES NOW THAN IN THE PAST?

1. This is a tricky question because many, many years ago TCs could have formed with no knowledge of their existence.
2. With the advent of Satellites the probability of TC detection in data sparse areas is high.
3. There are formal records of TC formation over the last 30 years in the SW Pacific. From 1978 to 1993 (15 years) there were 17 TC formations, while from 1994 to 2009 there were 14 TC formations.

ARE TROPICAL CYCLONES MORE INTENSE NOW THAN IN THE PAST?

NOAA has developed an index called ACE. This is an energy index that measures the combined strength and duration of TCs. It has been applied to the North West Pacific which is the most active location on the planet for Tropical Storms. Over 30 Typhoons develop on average every year in this area. NOAA used a 50 year period (1950 to 2000) to establish a mean and then compare actual storms to the mean in terms of 'above normal', 'normal', and 'below normal'. They then looked at every recorded storm from 1945 to 2008. To summarize, the first half of this period recorded a total of 799 storms of which 149 were considered 'above normal' (18.6%). The second half, the most recent half, totalled 760 storms of which 101 were considered 'above normal' (13.3%).

However when politics become the driving force behind descriptions of tropical cyclones we get a different picture! If dollar amounts become the basis of cyclone intensity then because of inflation current cyclones would appear to be more devastating than in the past. This sort of analysis has no place in science because it isn't science; its manipulation of financial data as part of political agenda.