The 2008 Hurricane Season in Bermuda

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Summary

Two tropical systems were cause for concern in Bermuda during the 2008 Atlantic Hurricane Season – Tropical Storm Bertha and Tropical Storm Kyle. Both systems came close enough to the island and marine area to warrant the posting of Tropical Strom Warnings, and both produced tropical storm force winds locally.

Tropical Storm Bertha

Tropical Storm Bertha impacted Bermuda on Monday 14 July 2008, after a weekend of very slow movement to the southeast of the island, remaining between 29ºN and 30ºN for nearly 48 hours as a marginal Category 1 Hurricane. The effect on our sea state was to create Small Craft Warning conditions right through the preceding weekend, even though the subsidence ahead of the storm maintained mainly settled weather conditions locally. An outer band from Bertha moved over the island on the 12th providing 0.65” of rainfall. There was a high east and north of Bertha, providing a block to the north and northeast movement of the tropical system. There was also little upper level flow to give Bertha the steering it needed to continue to move. Thus Bertha slowly moved towards Bermuda. The positive effect of this was to increase upwelling *in situ* and decrease the ocean heat content. This is probably what caused Bertha to weaken to a tropical storm before approaching Bermuda on the 13th. On the 14th winds began to increase from the northeast reaching tropical storm force, lasting approximately 12 hours. The closest point of approach, estimated using Doppler Radar data, was approximately 1700 UTC, the center being around 50 km to the east of the island.

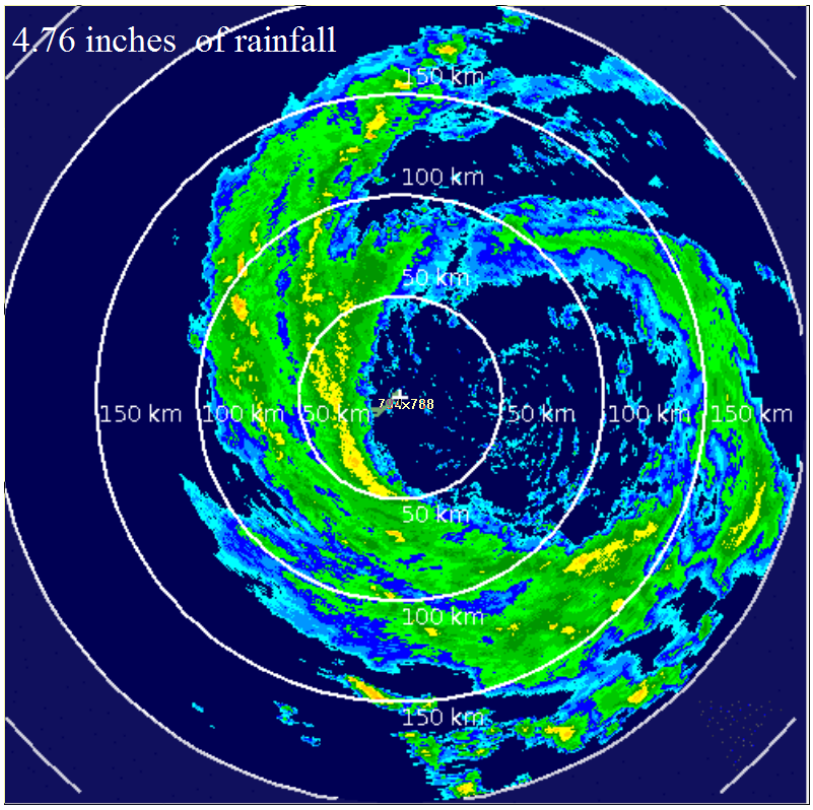


Figure 1: Bertha's Closest Point of Approach approximately 1700 UTC 14 July 2008

Interestingly, winds at LF Wade International Airport, on the east end of the island, decreased to around 15 knots while at the same time winds at Dockyard, Somerset, (a distance of 9 miles to the west) still blew tropical storm force. At 1910 UTC a sensor at Commissioner's Point, Dockyard reported sustained northerly winds of 54 knots and a gust to 79 knots. The western portion of the eye moved over the east end of the island, whilst the central and western parts of Bermuda remained in the eyewall, where stronger winds and heavier convection thus showers were experienced.

As the system moved northeast the eyewall then moved back over the whole island and strongest winds recorded at LF Wade International Airport (located in the eastern end of the island) were northwest 43 knots with gusts to 59 knots at 2247 UTC. The Bermuda Maritime Operations Centre (also located in the east end of the island) reported 59 knots and gusts to 72 knots at 2335 UTC.

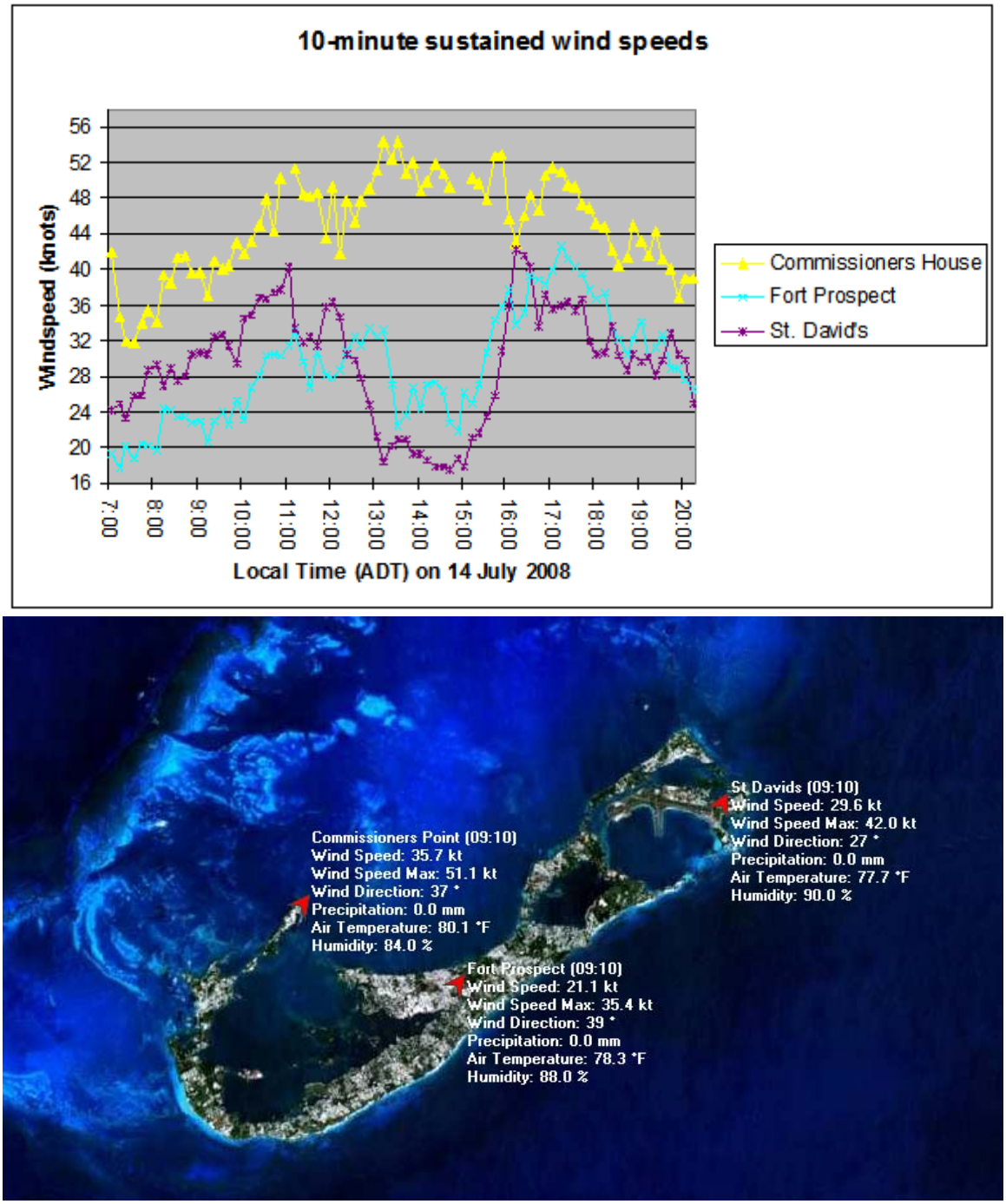
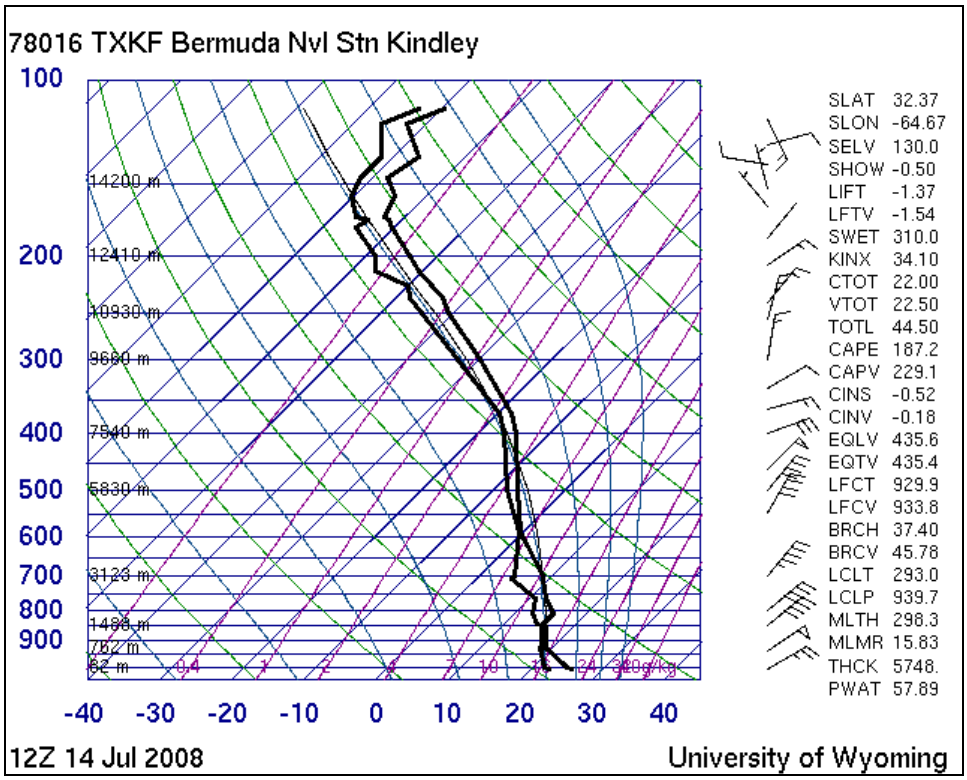


Figure 2: winds recorded at automated observing sites around the island (location highlighted on the map – elevation provided on the post-storm country report attached).

The total accumulated rainfall for this system overall was 4.76 inches or 121mm. The passage of the eye over the eastern parishes allowed the Bermuda Weather Service to make an 1800 UTC balloon launch in the eye.

It should be noted here that the track of Bertha was predicted by the global models as early as 10 days in advance of the Tropical Storm's approach. However, the timing of closest point of approach was held back by the blocking patterns mentioned above. This caused problems with the forecast confidence, but allowed a chance for early preparedness of the population and more planning time emergency management officials. Despite the early appearance of such a system (most tropical season activity for Bermuda has been confined to the mid- to late-Hurricane Season in recent years), the island was prepared, and no loss of life or damage to infrastructure was recorded.

For more information on Bertha, along with photos and radar images please refer to the Bertha link on http://www.weather.bm/TropicalArchive.asp.



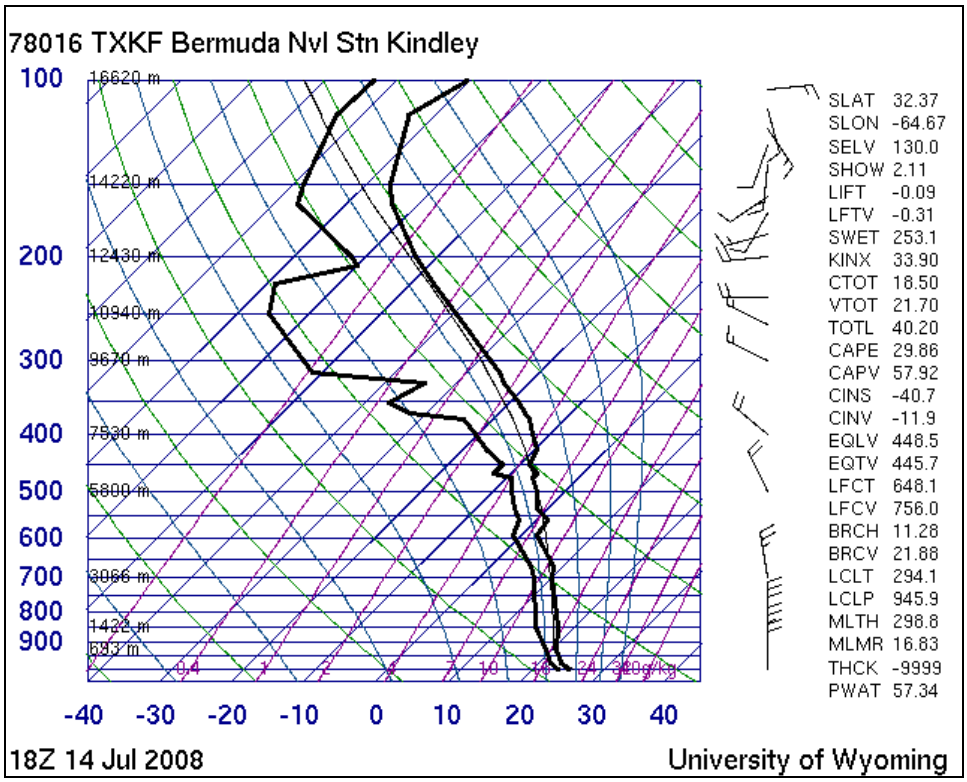


Figure 3: Skew-T Log-p diagram from the 12 and 18 UTC 14 July 2008 Radiosonde ascents.

POST STORM COUNTRY REPORT
Country: Bermuda
Tropical Cyclone: Tropical Storm Bertha
Date of data: June 14, 2008 Date of issue: June 21, 2008

Station	Maximum Sustained Wind			Maximum Wind Gust			Calm	Total Rainfall	Minimum Sea Level Pressure
	Direction	Velocity Knots	UTC Time	Direction	Velocity Knots	UTC Time			
Bermuda Airport TXKF (10 min avg)	300º	43	2011	300º	59	1947		4.76 inches	998 hPa
Bermuda Maritime Operations Centre[1] (formerly Harbour Radio)	321º	59	2035	321º	72	2035			
Fort Prospect[2]	292º	43	2010	312º	63	1850			
St. David's[3]	316º	42	1910	293º	67	2020			
Commisioner's Point[4]	350º	54	1610	323º	79	1850			

1 32° 22' 49.5582"N, 64° 40' 56.769"W Elevation 255ft AMSL – 1- minute average
2 32° 17' 57.6882"N, 64° 45' 53.4774"W Elevation 230ft AMSL - 10-minute average
3 32°21.825' N 64°39.368'W, Elevation 159ft AMSL - 10-minute average
4 32° 19' 44.5584"N, 64° 49' 55.9596"W Elevation 262ft AMSL - 10-minute average

Tropical Storm Kyle

Despite the distant passage of Kyle 250 nm to the west, Bermuda still experienced winds of greater than 34 knots. There is some ambiguity to this system in that its wind field was not symmetric, and frontogenesis appears to have been occurring during Kyle's northward progression. This is supported by satellite and QuikSCAT imagery. This ambiguity led to debate between BWS personnel regarding the merits of issuing a Tropical Storm Warning on the morning of the 26th. It was decided by BWS to issue one to cover the likelihood of 34-knot winds affecting the marine area. Tropical storm force winds were indeed observed at the most exposed, elevated AWOS site (also the westernmost site) on the island throughout the daylight hours of 27th of September (See Figure 6), accompanied by 1.53 inches (39 mm) of rainfall, associate mainly with the 'frontal' system associated with Kyle. No loss of life or damage to infrastructure was recorded.

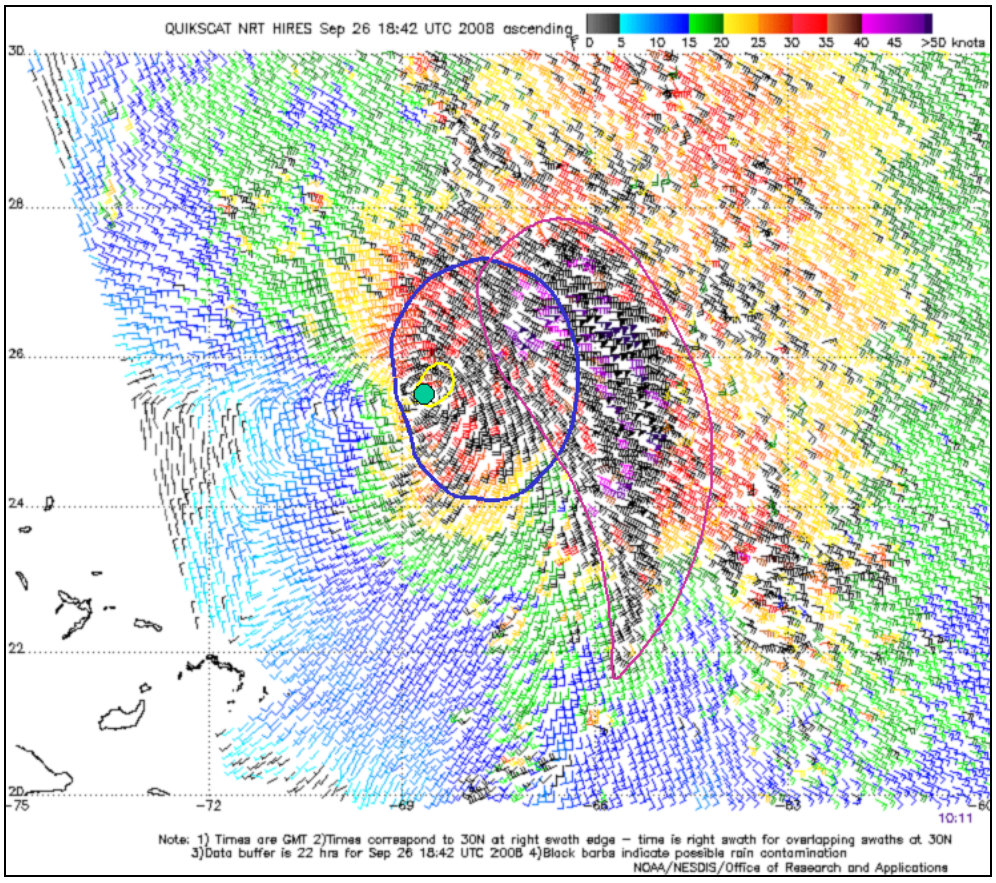


Figure 4: 1011 UTC QuikSCAT Imagery from Blue and yellow contours isolate Kyle's 34 knot and 50 knot wind field, respectively, from NHC Advisories. The purple contour outlines the shape of the frontogenetic region. Note the unambiguous 50-knot wind barbs included in that region. (source: NOAA website http://manati.orbit.nesdis.noaa.gov/quikscat/).

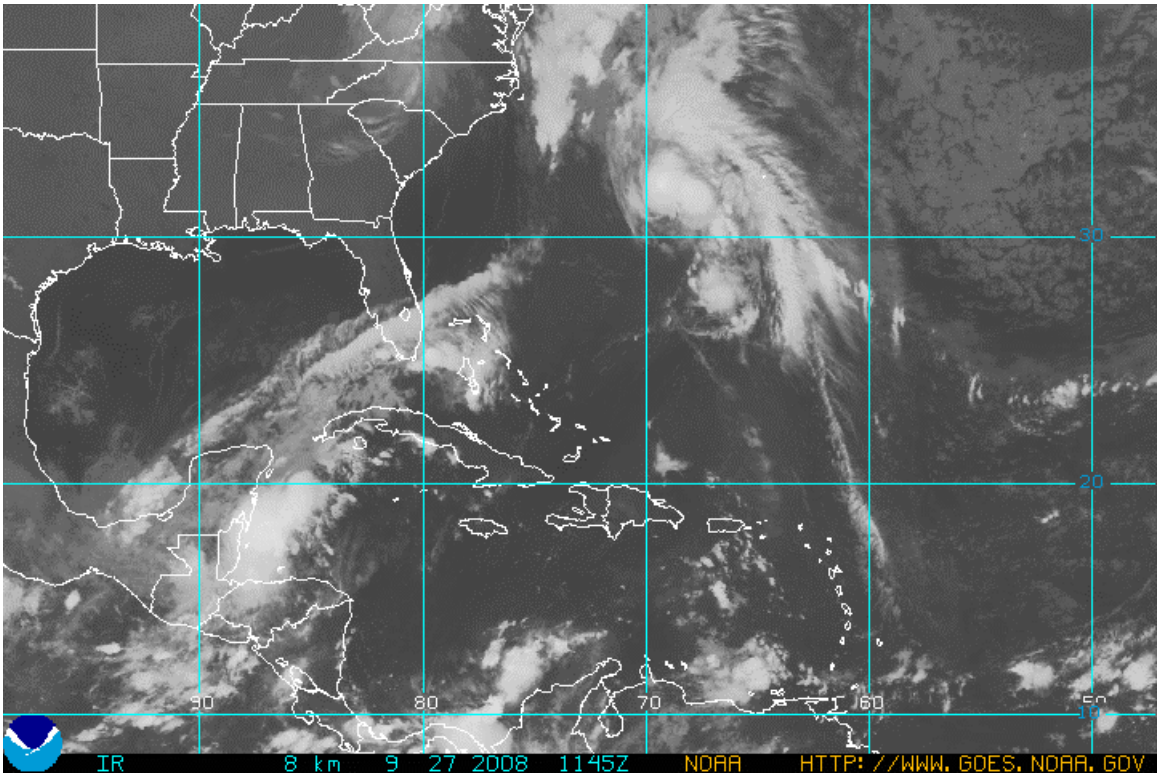


Figure 5: IR Satellite imagery of TS Kyle as it passed Bermuda 11455 UTC 27 Sept 2008.

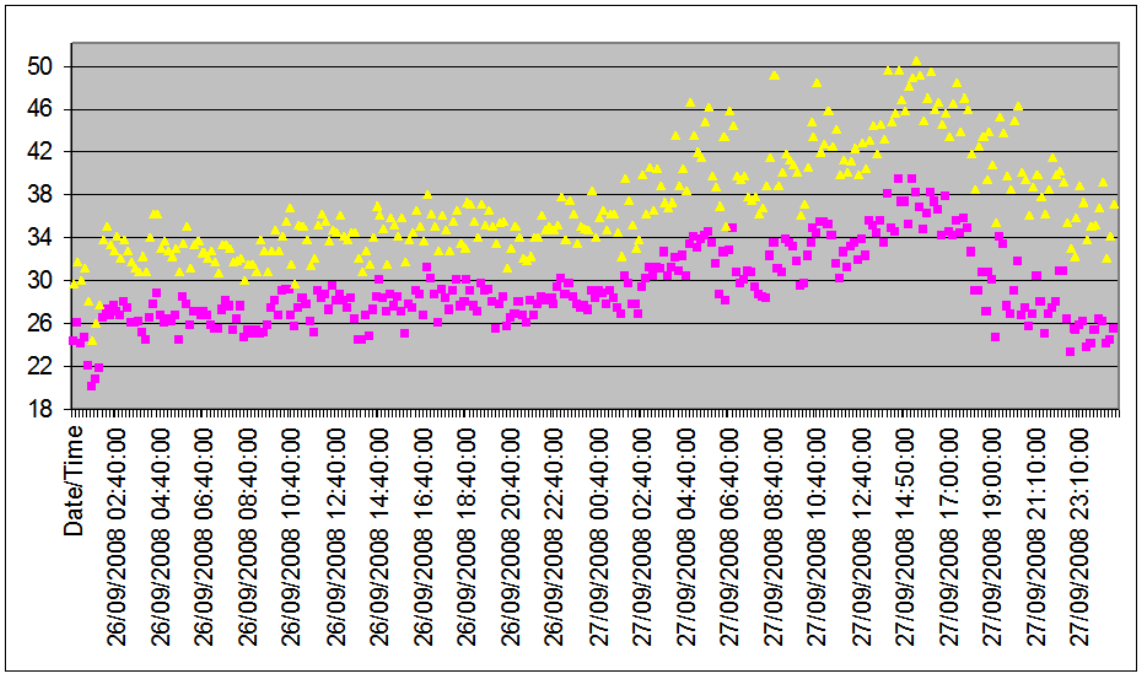


Figure 6: Commissioner's Point 10-minute wind speeds 26-27 Sept 2008.