Australian Government
Bureau of Meteorology

Tropical Cyclone *Vince*

9 January – 16 January 2011

A. Summary

A tropical low pressure system developed in an active monsoon trough on 9 January and moved quickly west. The low was affected by strong easterly wind shear and had an exposed low level circulation. On 12 January the wind shear dropped and the low began to be steered back towards the east under the influence of monsoonal westerlies. The decrease in wind shear allowed the low to briefly organise into a tropical cyclone early on 13 January. *Vince* reached a 10-minute mean wind peak intensity of 40 knot (kn) (74 kilometres per hour (km/h)) at this time and then weakened below tropical cyclone strength late on 13 January. The remnant low pressure system drifted east and then back to the west over the next few days before finally dissipating over the ocean. *Vince* did not affect mainland Australia.

B. Meteorological Description

Intensity analysis

On 9 January satellite imagery showed low level spiral banding with some deep, curved convection located to the west of the low centre. Cooperative Institute for Meteorological Satellite Studies (CIMSS) shear analyses showed the low was subjected to 30-40 kn (55 – 74 km/h) of easterly wind shear. Satellite imagery from 9 to 11 January showed *Vince* remained sheared with an exposed low level circulation centre (LLCC) and associated deep convection at varying distances to the west.

The 0235 UTC (1035 WST) Advanced SCATterometer (ASCAT) satellite pass on 12 January (refer Figure 2) showed a well developed circulation with gales in the southwest quadrant. The subsequent 1446 UTC 12 January ASCAT pass (refer Figure 3) showed gales in the northern quadrants. The wind direction solutions in the southern quadrants appear incorrect but examination of the ambiguities showed that the actual wind speeds appeared reliable. During 12 January shear decreased to less than 20 kn (37 km/h) and *Vince* reached tropical cyclone strength by 0000 UTC 13 January. Microwave imagery showed *Vince* had become vertical and developed a ring of deep convection (refer Figure 4). *Vince* reached a 10-minute mean wind peak intensity of 40 kn (74 km/h) at this time. Despite the fact that shear remained around 10 to 20 kn (19 – 37 km/h) by 1200 UTC 13 January the deep, curved convection had become well separated from the LLCC again and it is likely, based on Dvorak analyses, that *Vince* had weakened to below tropical cyclone strength by this time. There were no ASCAT passes during this period that were close enough to show the complete structure of Vince through this period.

Deep convection briefly redeveloped around 1800 UTC 13 January and again around 1200 UTC 14 January but *Vince* never reached tropical cyclone strength again and eventually the remaining low dissipated over water.

Comparison of intensity analysis methods showed some disagreement (refer Figure 5). CIMMS Advanced Dvorak Technique (ADT) showed a decrease in intensity during 13 January when other methods showed intensification. Examination of the hourly analysis data showed the algorithm was going from a shear scene type to a curved band and despite initial raw Dvorak Data T-numbers (DT) being high the Final T-number (FT) was being constrained. In the later stages CIMMS ADT and Advanced Microwave Sounding Unit (AMSU) and Satellite Consensus (SATCON) were estimating wind speeds that were considered too high. This may have been due to the tropical cyclone being affected by shear. ADT was varying

between mainly curved band and Central Dense Overcast (CDO) scene types at this time when a shear pattern was being applied by subjective Dvorak methods.

Motion

Vince initially moved in a westward direction steered by a mid-level ridge. During 11 January the mid-level ridge was eroded by an approaching trough. On 12 January the mid-level ridge had eroded completely and Vince slowed and then began to move back towards the east-southeast under the steering influence of the mid-level trough. This westerly steering regime persisted until 15 January when a mid-level ridge re-established itself over mainland Australia. The tropical cyclone was then in a weak steering flow and *Vince* drifted back towards the west before dissipating.

Structure

For most of its lifetime *Vince* experienced moderate to strong shear. The low predominantly exhibited an exposed low level centre to the east of deep convection. It briefly became vertical on 12 and 13 January allowing the low to reach tropical cyclone strength. The tropical cyclone had an estimated radius to gales of 90 nautical miles (nm) (165 kilometres (km)) at its largest extent.

C. Impact

Vince had no impact on mainland Australia.

D. Observations

No direct observations of *TC Vince* were recorded.

E. Forecast Performance

Shipping gale warnings were issued from 11 January until 14 January. No Tropical Cyclone Advices were issued for *Vince*.

Table 1. Best track summary for Tropical Cyclone *Vince*.
Refer to the Australian Tropical Cyclone database for complete listing of parameters.

Year	Month	Day	Hour (UTC)	Position Latitude S	Position Longitude E	Position Accuracy nm	Max wind 10min knots	Max gust knots	Central Pressure hPa	Rad. of Gales # nm	Rad. of storm force winds	Radius Max. Wind ^ (RMW)
2011	1	9	06	15.1	112.8	30	25	45	996			
2011	1	9	12	15.1	112.9	30	25	45	996			
2011	1	9	18	15.2	113.0	30	25	45	996			
2011	1	10	00	15.2	112.3	20	25	45	996			
2011	1	10	06	15.2	111.7	30	25	45	995			
2011	1	10	12	15.1	110.7	30	25	45	995			
2011	1	10	18	15.2	109.5	30	30	45	994			
2011	1	11	00	15.0	108.6	30	30	45	993			
2011	1	11	06	15.0	108.1	25	30	45	990			
2011	1	11	12	14.9	107.7	20	30	45	990			
2011	1	11	18	15.0	107.0	15	35	50	990	90*		35
2011	1	12	00	15.0	107.3	15	35	50	990	90*		35
2011	1	12	06	15.0	107.5	15	35	50	990	90*		35
2011	1	12	12	15.4	108.0	30	35	50	990	90*		35
2011	1	12	18	15.8	107.8	30	35	50	990	90*		35
2011	1	13	00	15.8	108.0	30	40	55	986	67.5		30
2011	1	13	06	15.9	109.2	25	35	50	990	67.5		30
2011	1	13	12	15.8	110.4	20	30	50	991			
2011	1	13	18	16.1	111.6	10	30	45	995			
2011	1	14	00	16.3	112.5	15	30	45	995			
2011	1	14	06	16.3	113.5	10	30	45	995			
2011	1	14	12	16.1	114.4	15	30	45	995			
2011	1	14	18	15.8	114.7	15	30	45	995			
2011	1	15	00	15.6	114.5	20	30	45	995			
2011	1	15	06	15.6	114.2	20	30	45	995			
2011	1	15	12	15.9	114.1	15	30	45	995			
2011	1	15	18	15.7	113.4	20	30	45	995			
2011	1	16	00	16.0	113.2	20	25	45	995			
2011	1	16	06	16.2	112.5	30	25	45	995			
2011	1	16	12	15.9	112.2	20	20	45	998			

#Average of non-zero quadrants.
^Minimum distance to maximum mean wind in any quadrant.
*Gales do not extend more than half way around and hence it is not a tropical cyclone.

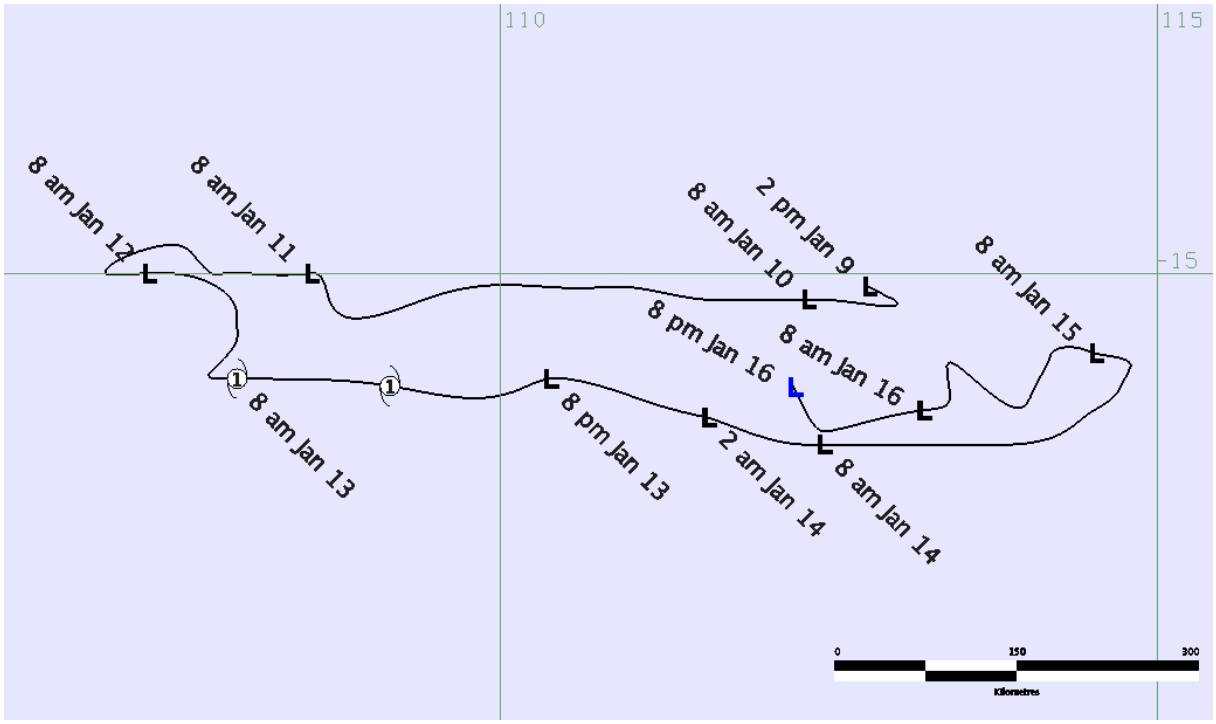

Figure 1. Best track of Tropical Cyclone *Vince* 9 – 16 January 2011 (WST).

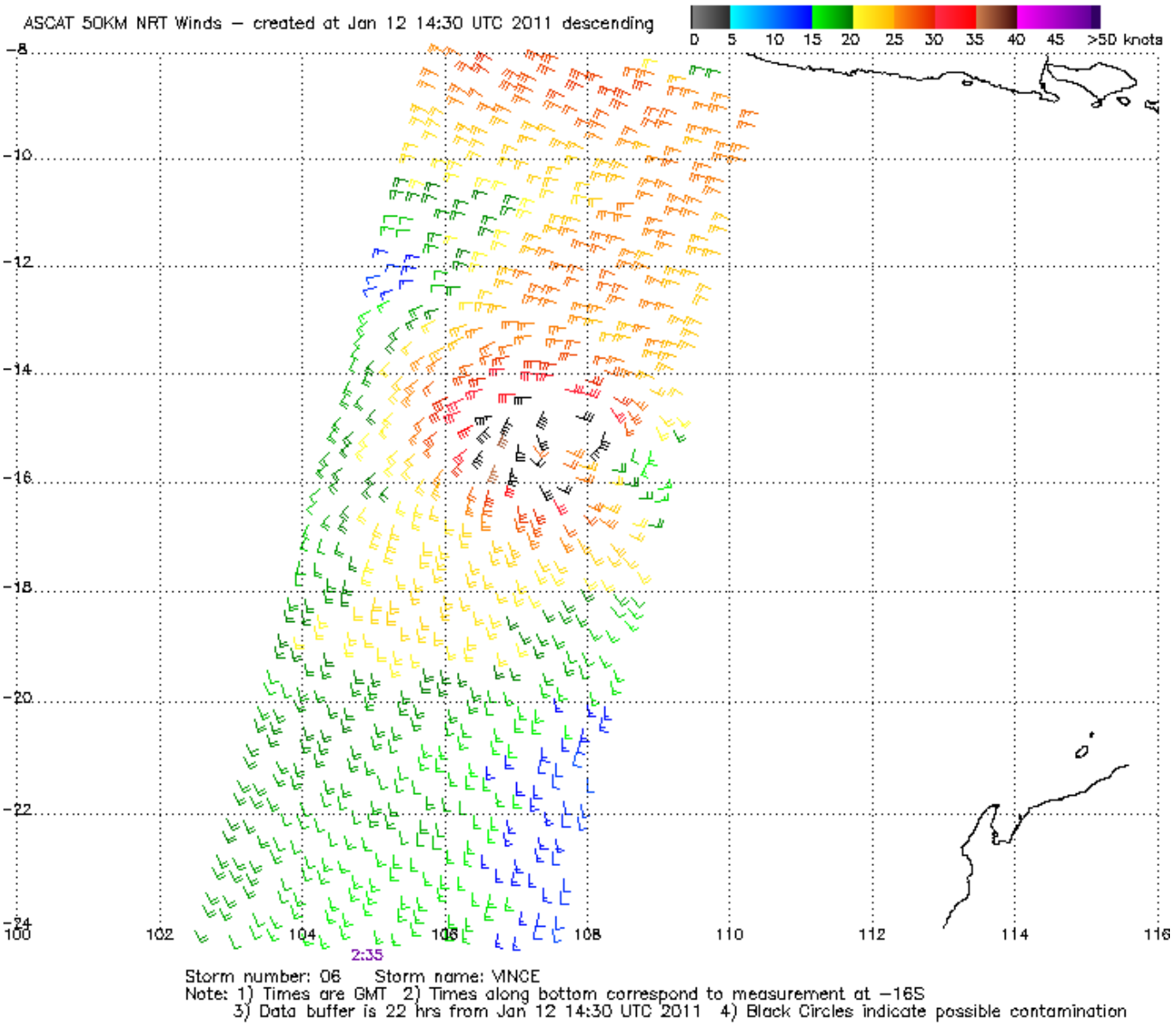

Figure 2. ASCAT image at 0235 UTC 12 January.
(image courtesy of US NRL: http://www.nrlmry.navy.mil/)

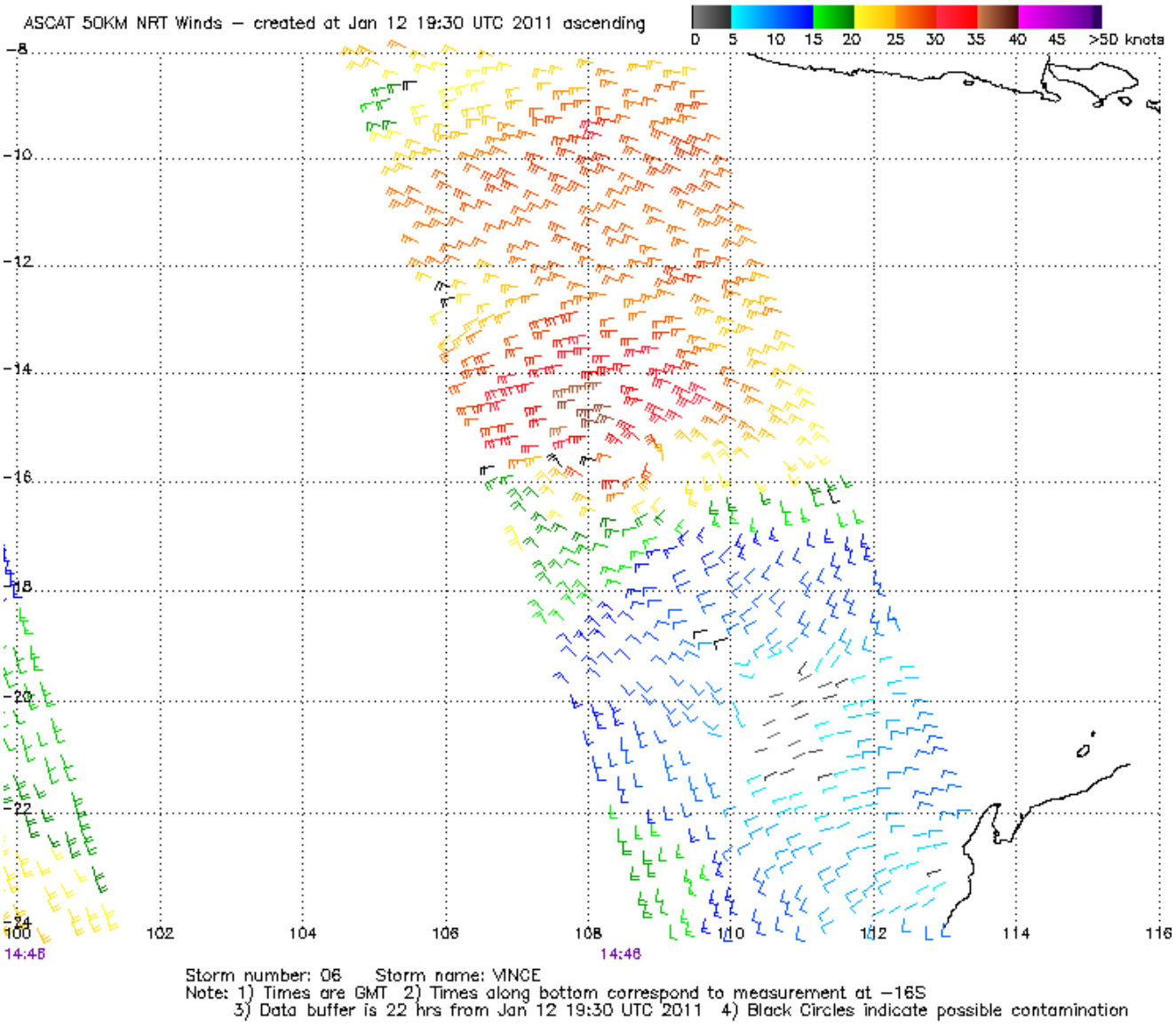

Figure 3. ASCAT image at 1446 UTC 12 January.
(image courtesy of US NRL: http://www.nrlmry.navy.mil/)

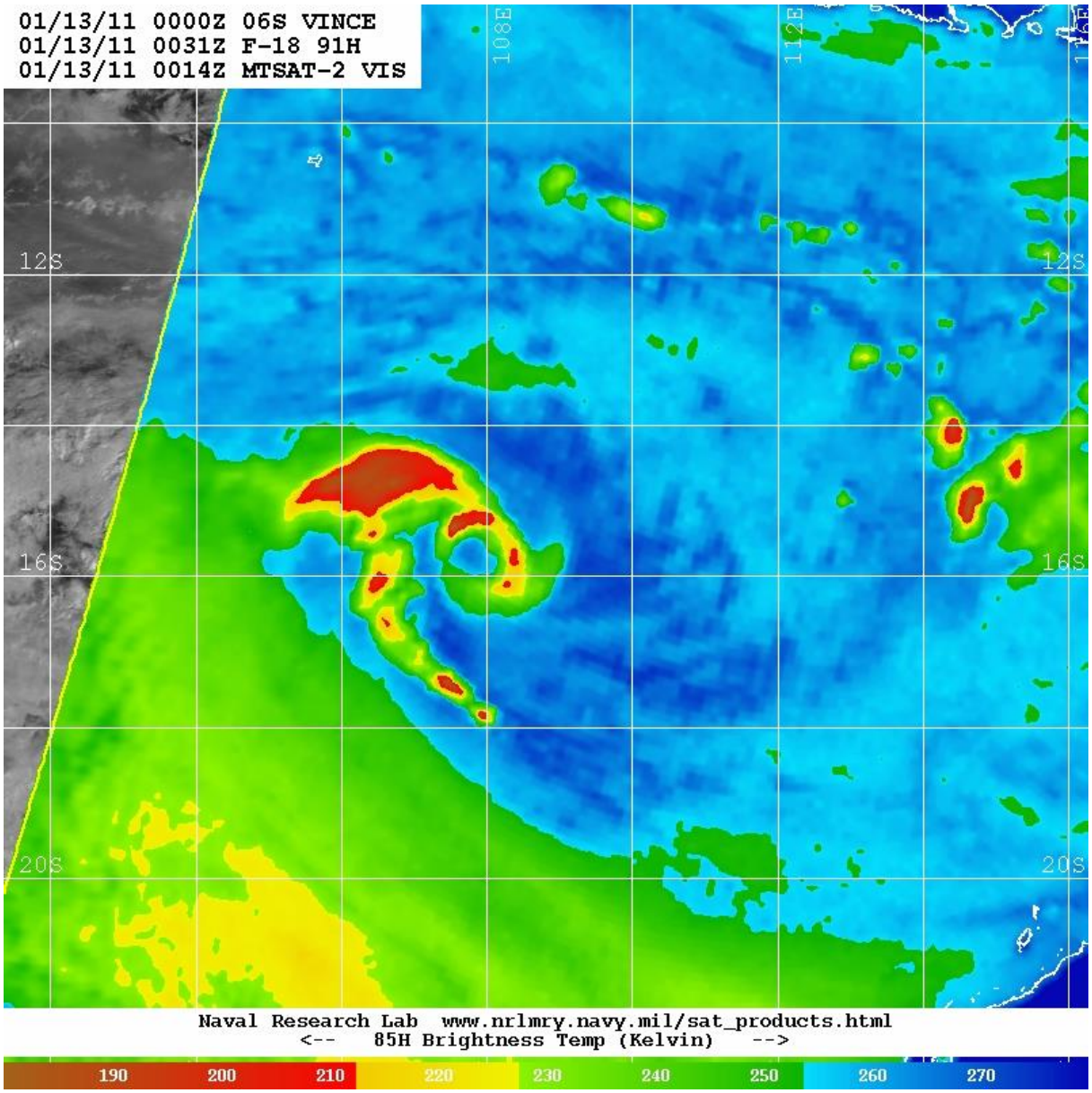

Figure 4. Microwave (TC SSMIS 91GHz) image at 0031 UTC 13 January.
(image courtesy of US NRL: http://www.nrlmry.navy.mil/)

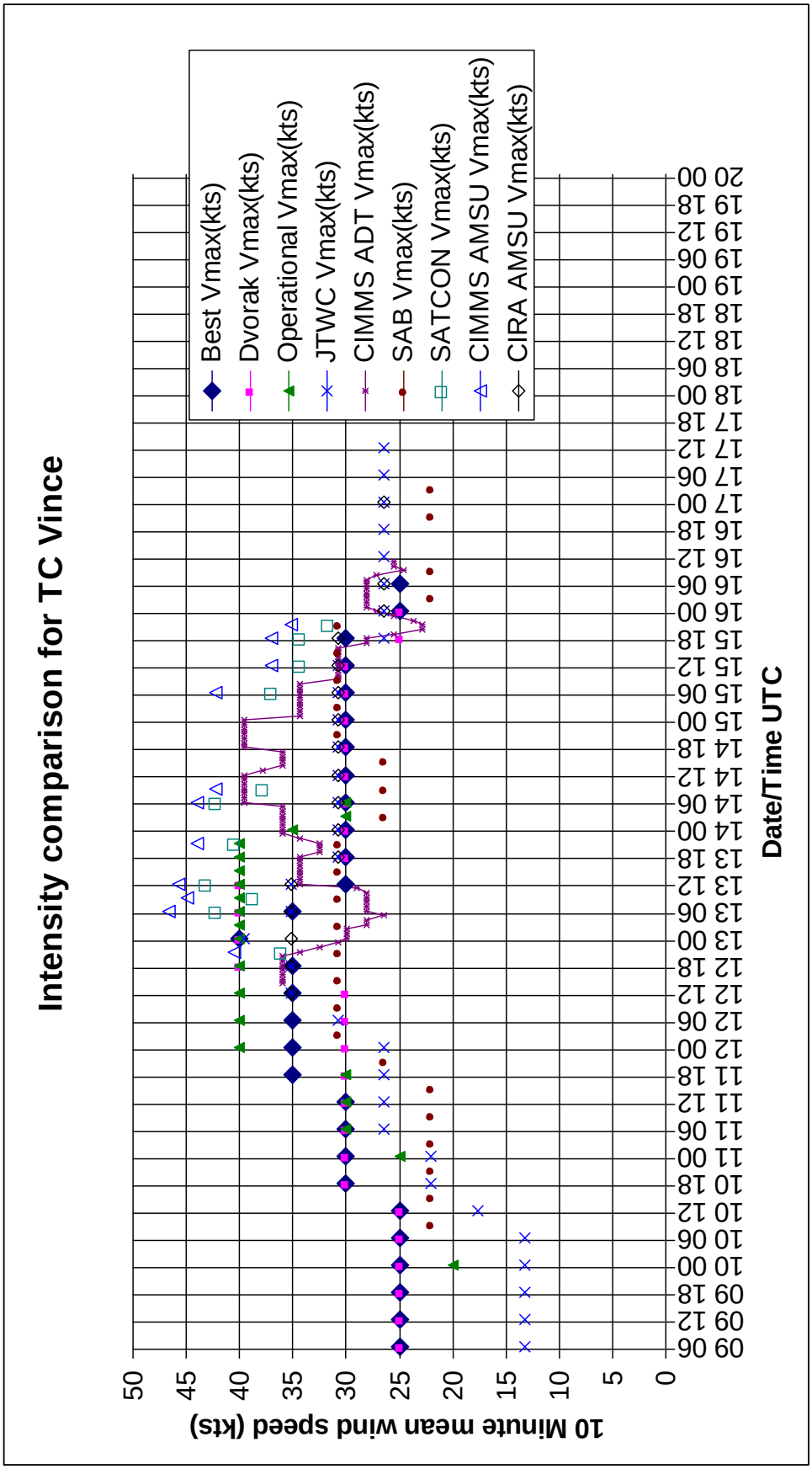

Figure 5. Comparison of objective and subjective intensity analysis techniques.