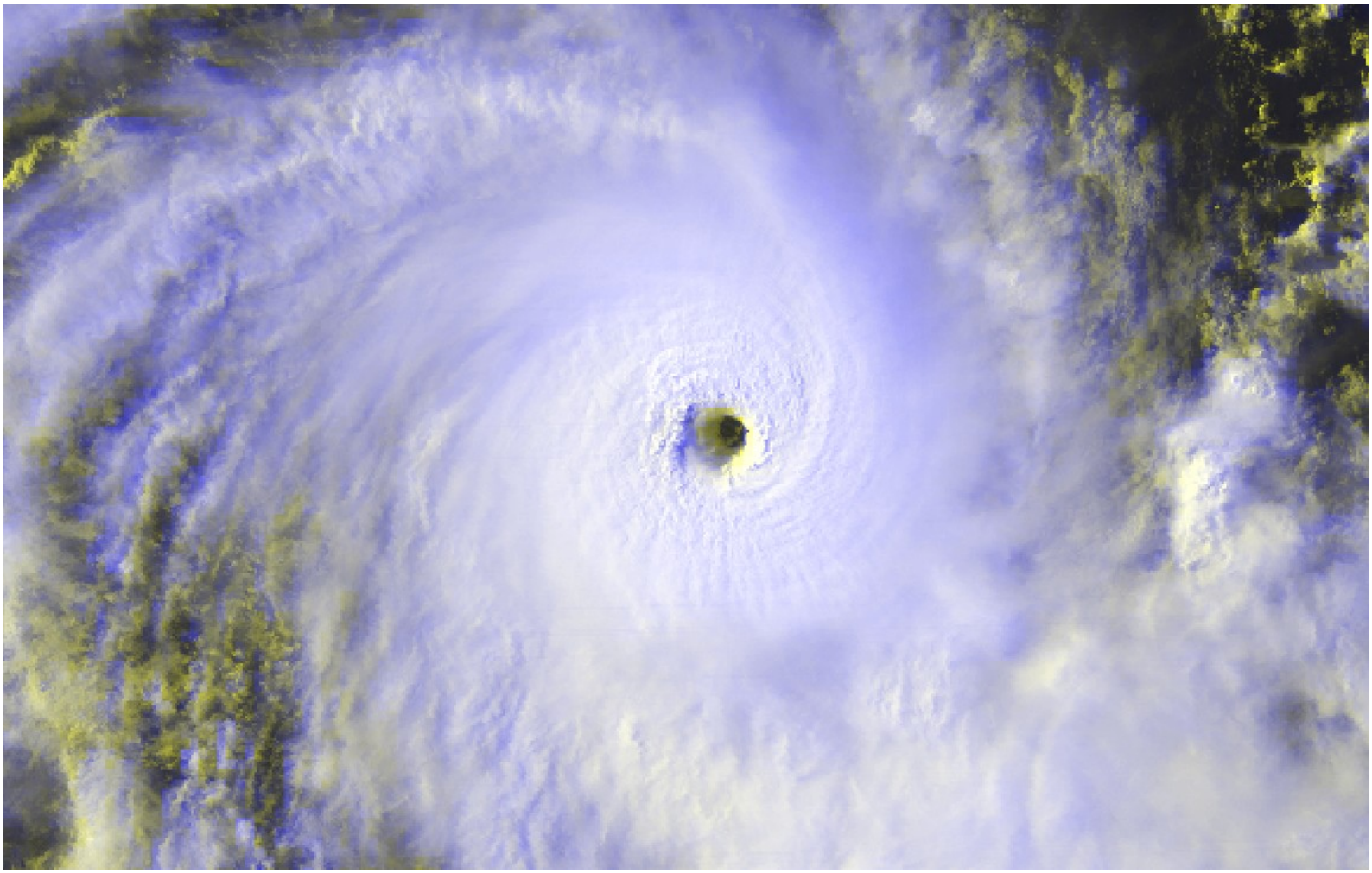
2017

Force Thirteen Cyclone Reports

Cyclone Ernie (201713)



Cyclone Ernie was a powerful but short-lived cyclone that existed in the southeastern Indian Ocean in early April 2017.

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Cover photo: NOAA Floater image of Cyclone Ernie, captured at some point on April 7th.

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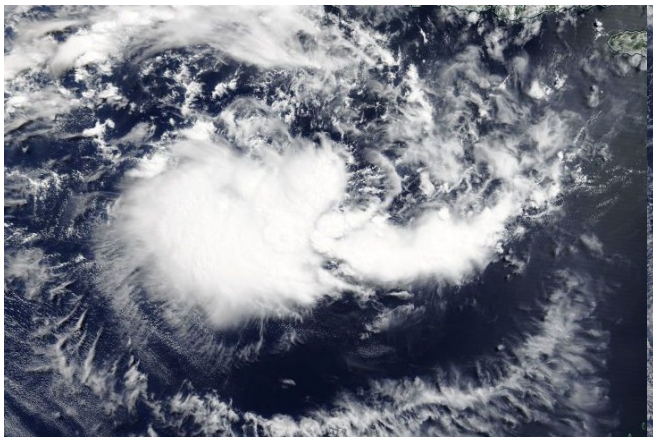
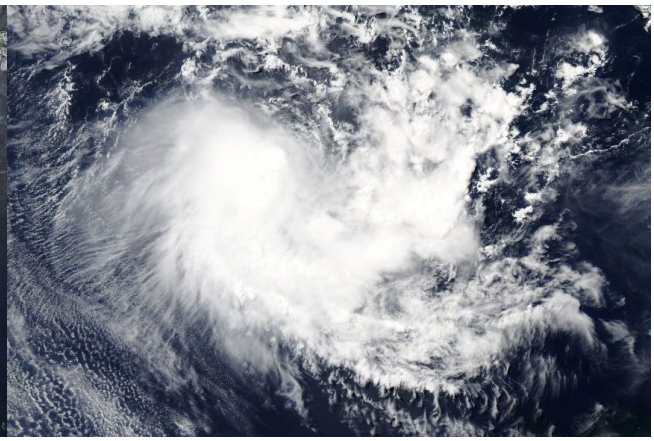
1.1. Synoptic History

In the first days of April, a tropical disturbance moved southwestwards from the coast of Indonesia, near the island of Sumba. The system displayed impressive thunderstorm activity into April 5th, though initially winds remained low. Thereafter, a remarkable period of intensification occurred from late on April 5th until the morning of April 7th, when a well defined eye appeared with eye temperatures entering the +10s Celsius, and surrounded by cloud tops no higher than –72 degrees Celsius, typically a benchmark for designating a Category 5 storm on the Saffir-Simpson Hurricane Wind Scale.
Indeed, an area of –80 Celsius cloud tops appeared on the western half of the storm for a brief period, and estimated wind speeds reached 165mph according to satellite presentation estimates.
Hereafter, Ernie rapidly weakened but continued to show an energetic display of very cold cloud tops wrapping around a reforming eye which ultimately never reached its potential, and a secondary peak with winds of 110mph occurred on April 8th.
By the next day, the storm completely capitulated and by the end of April 9th, Ernie was barely a tropical storm. It would lose this status on April 10th and lose its residual circulation two days later.

Ernie's intensification rate over a 24 hour period tied with Hurricane Patricia of 2015, with both storms increasing wind speed by 120mph over that time. Ernie even eclipsed Patricia over the course of 12 hours, when its winds increased by 85mph as opposed to 70mph from Patricia and 70mph from Hurricane Matthew in 2016, both record setters for their respective years.

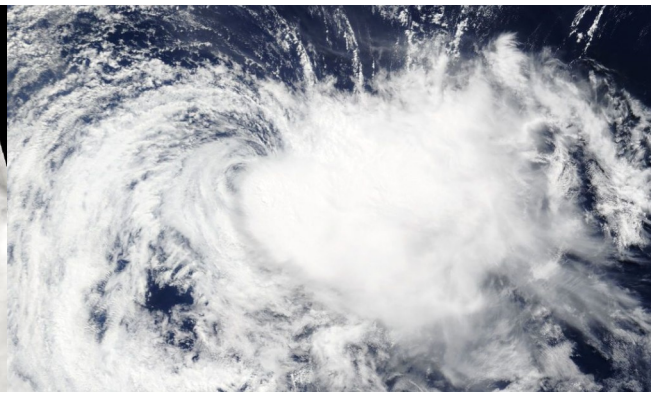


April 5th



April 6th

April 7th



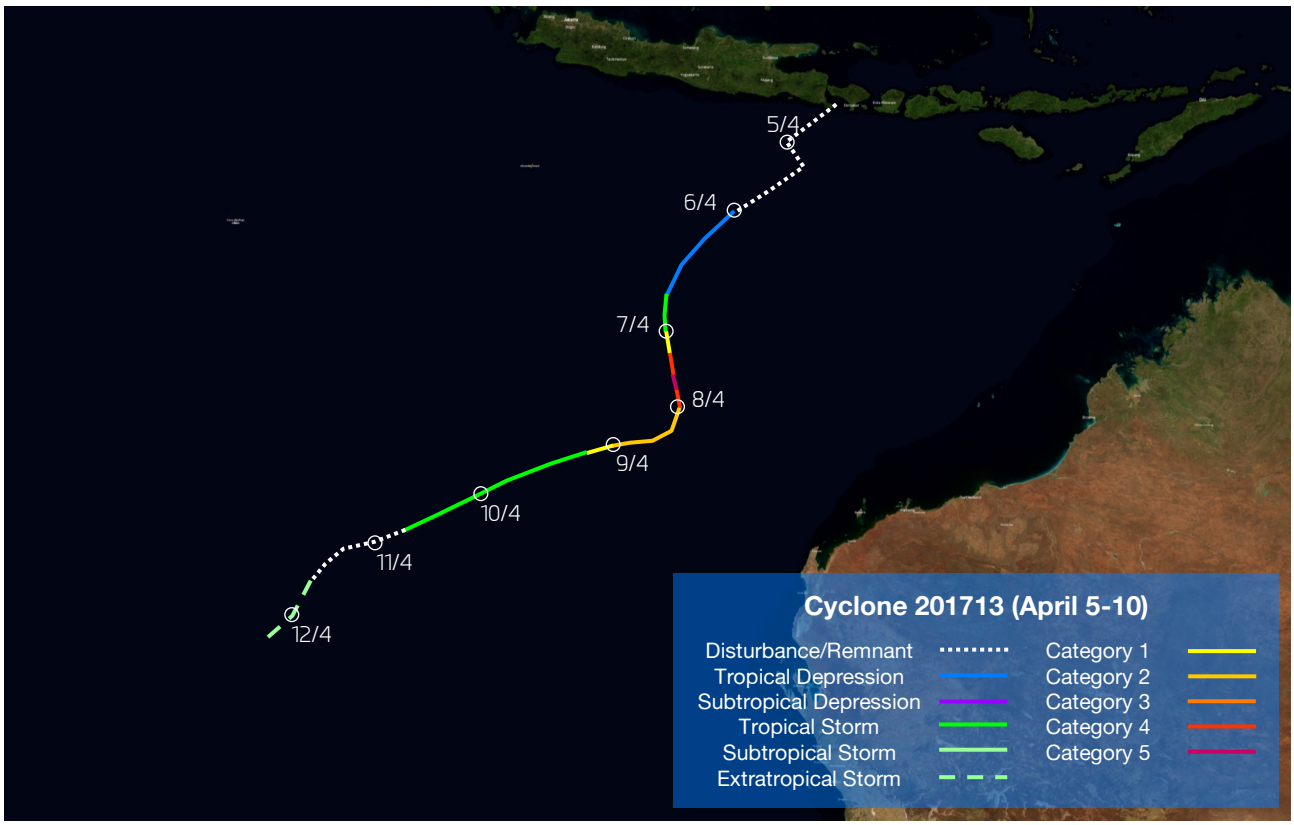
April 10th

1.2. Best Track

Below is the best track analysis from Force Thirteen, using Force Thirteen's SATOPS—a tool which uses infrared satellite imagery and cloud temperatures to estimate a storm's wind speed and air pressure. SATOPS does not take precedence over surface observations.

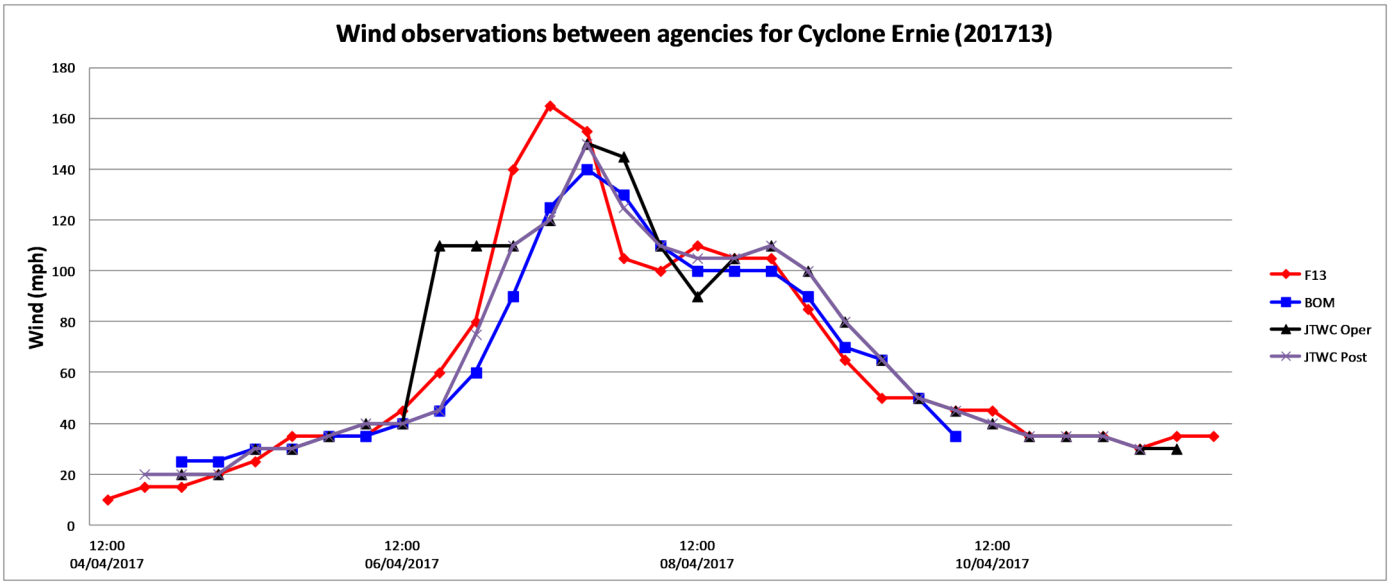
Date (dd/mm/yyyy)	Time	Latitude	Longitude	Wind	Press	Stage
04/04/2017	12:00			10	1012	Tropical Disturbance
04/04/2017	18:00	-11.4	114.7	15	1011	Tropical Disturbance
05/04/2017	00:00	-11.6	113.4	15	1010	Tropical Disturbance
05/04/2017	06:00	-11.9	112.3	20	1008	Tropical Disturbance
05/04/2017	12:00	-12.2	111.6	25	1007	Tropical Disturbance
05/04/2017	18:00	-12.5	111.2	35	1004	Tropical Depression
06/04/2017	00:00	-12.9	111	35	1002	Tropical Depression
06/04/2017	06:00	-13.3	110.8	35	1002	Tropical Depression
06/04/2017	12:00	-13.8	110.7	45	999	Tropical Storm
06/04/2017	18:00	-14.5	110.5	60	993	Tropical Storm
07/04/2017	00:00	-14.9	110.4	80	986	Category 1
07/04/2017	06:00	-15.4	110.3	140	956	Category 4
07/04/2017	12:00	-15.8	110.4	165	934	Category 5
07/04/2017	18:00	-15.9	110.4	155	929	Category 4
08/04/2017	00:00	-16.2	110.3	105	938	Category 2
08/04/2017	06:00	-16.6	110	100	953	Category 2
08/04/2017	12:00	-16.7	109.5	110	950	Category 2
08/04/2017	18:00	-16.8	108.9	105	953	Category 2
09/04/2017	00:00	-17	108.3	105	952	Category 2
09/04/2017	06:00	-17.4	107.6	85	961	Category 1
09/04/2017	12:00	-17.8	106.5	65	978	Tropical Storm
09/04/2017	18:00	-18	105.3	50	989	Tropical Storm
10/04/2017	00:00	-18.2	104.2	50	992	Tropical Storm
10/04/2017	06:00	-18.7	103	45	994	Tropical Storm
10/04/2017	12:00	-19.2	101.8	45	995	Tropical Storm
10/04/2017	18:00	-19.7	100.8	35	1000	Remnant Low
11/04/2017	00:00	-20	100.1	35	1001	Remnant Low
11/04/2017	06:00	-20.8	99.4	35	1002	Remnant Low
11/04/2017	12:00	-21.4	98.8	30	1004	Remnant Low
11/04/2017	18:00	-21.8	98.6	35	1003	Extratropical
12/04/2017	00:00	-21.8	98.3	35	1004	Extratropical

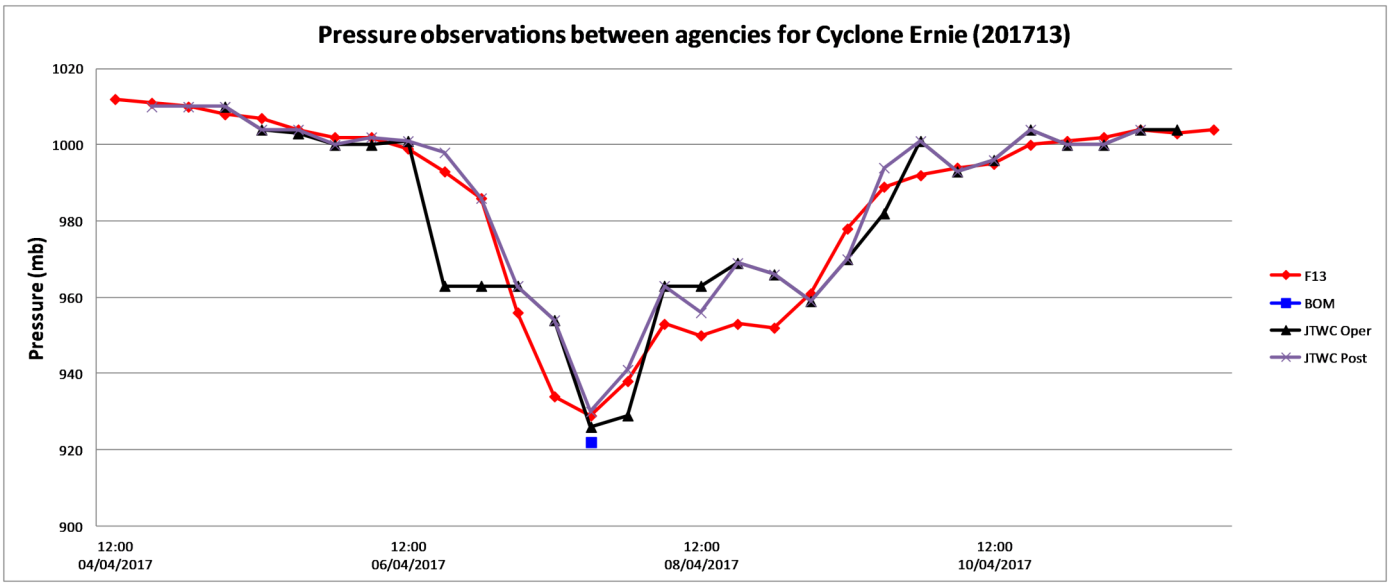
1.3. Track Chart



1.4. Comparison with other agencies

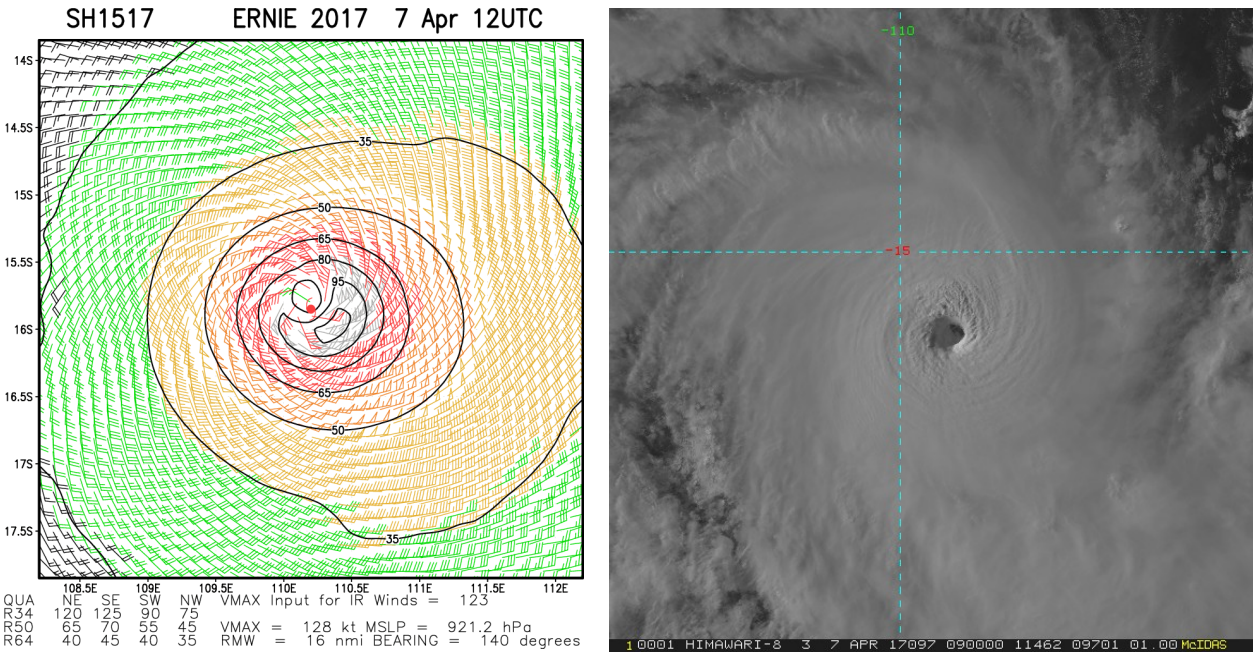
Ernie was monitored by the Regional Specialized Meteorological Centre, in this instance the Australian Bureau of Meteorology, and by the U.S. Joint Typhoon Warning Center (JTWC). The charts below show comparisons between Force Thirteen's best track and the other agencies' observations.





2. Effects on Land

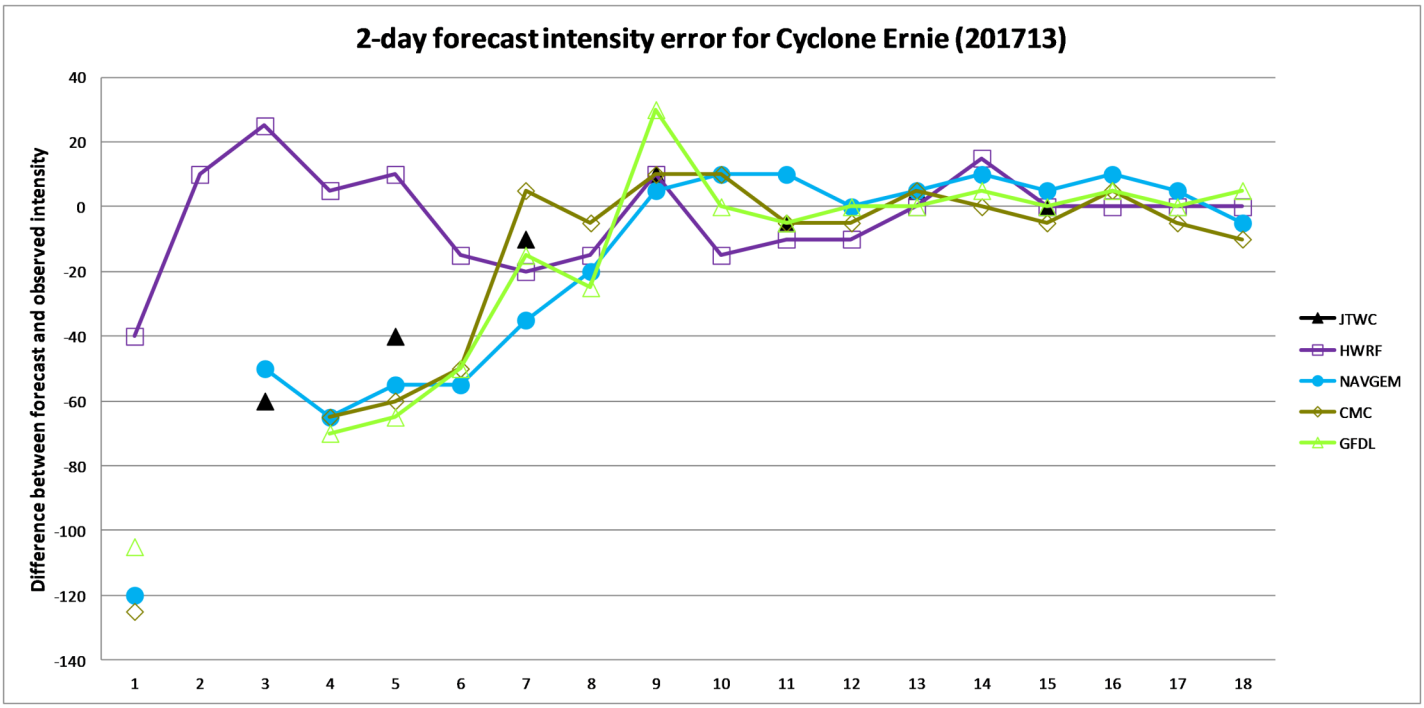
Cyclone Ernie is somewhat rare for a storm of its intensity, in that no land areas were effected even by the storm's peripheries. Satellite estimated rainfall totals at sea reached around 250mm.

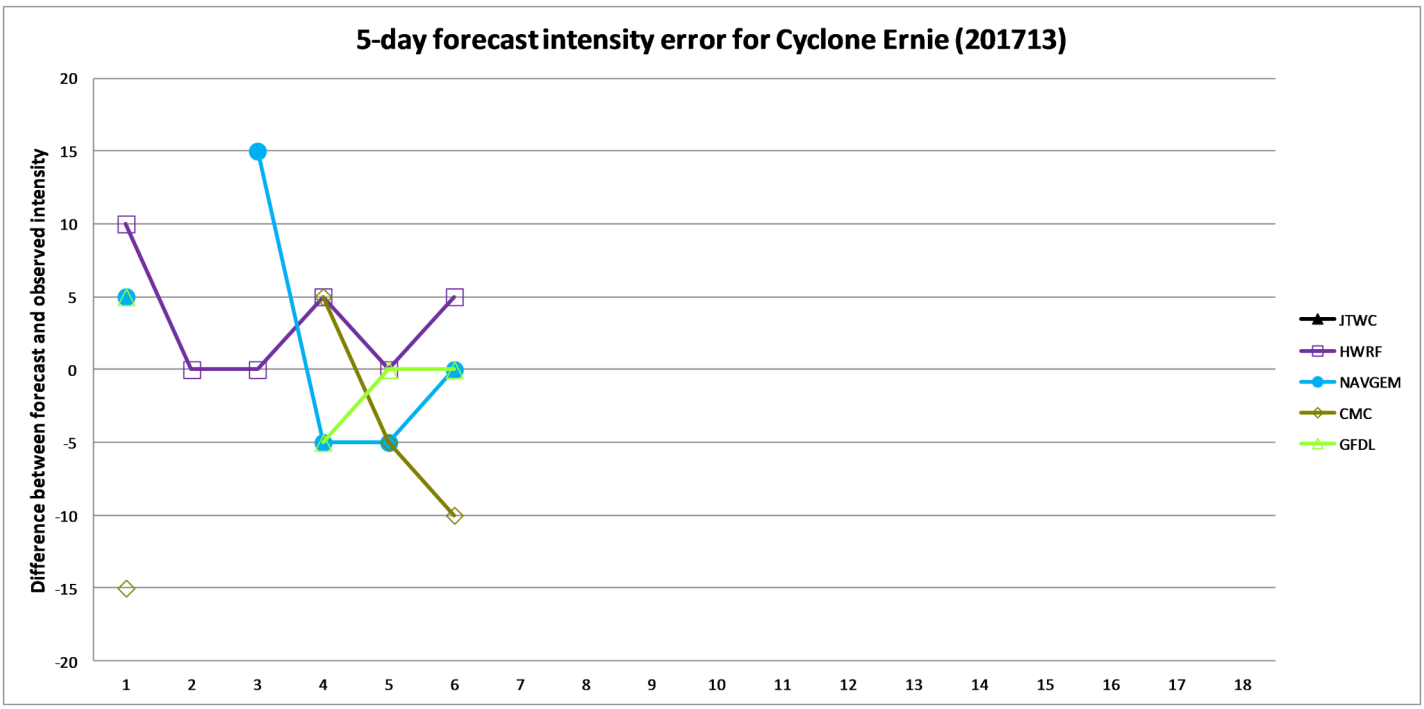


Satellite estimated winds and visible satellite image of Cyclone Ernie near peak intensity.

3. Forecasting Critique

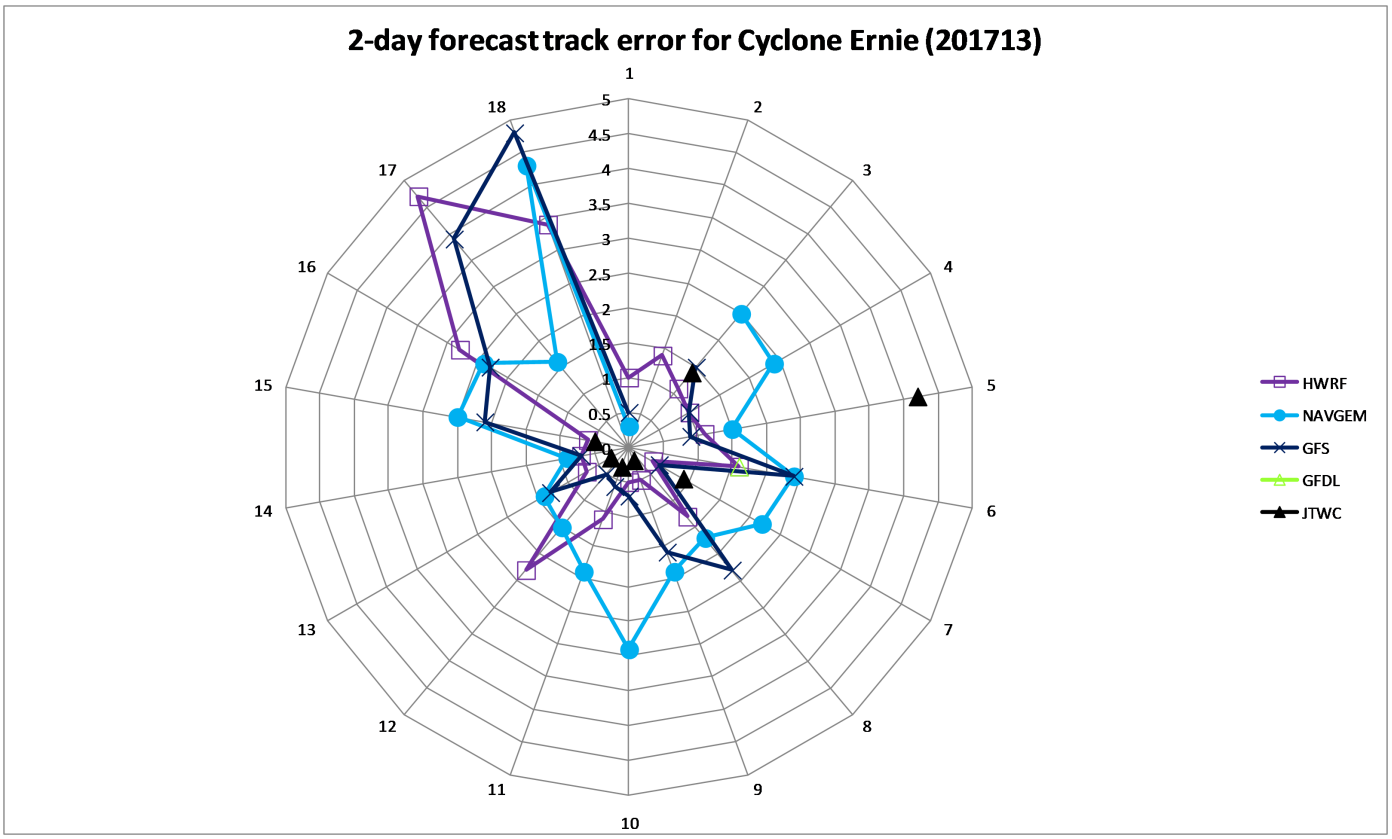
The next two pages show the track and intensity forecast error from the computer models and the JTWC during Cyclone Ernie.
The intensity error charts show how many miles per hour the model predictions were from the observed intensity two and five days later. A value of 0 denotes a perfectly accurate prediction. Negative values correspond to predictions lower than the observation, and positive values show predictions higher than the observation.

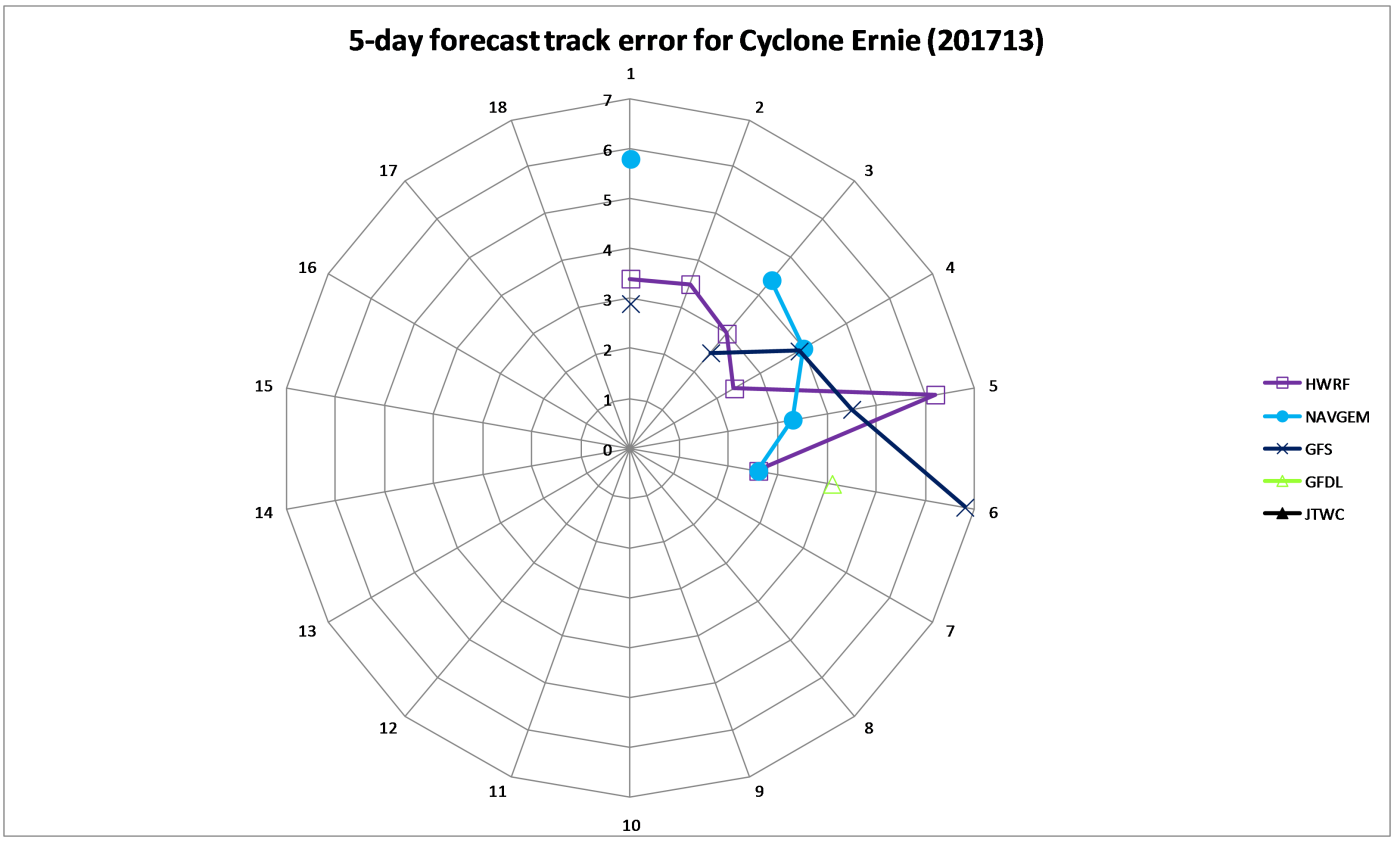




3. Forecasting Critique

The track error graphics show how far away from a perfectly accurate positional prediction the computer models and the JTWC predicted two and five days before the fact. Values are expressed in angular degrees, and a value closer to 0 (the center of the graphic) indicates a more accurate prediction.





3. Forecasting Critique

Data from the charts are published below.

2-day forecast intensity error								
Run	JTWC	BOM	HWRF	GFS	NAVGEM	GFDN	CMC	GFDL
2017040518			-40		-120		-125	-105
2017040600			10					
2017040606	-60		25		-50			
2017040612			5		-65		-65	-70
2017040618	-40		10		-55		-60	-65
2017040700			-15		-55		-50	-50
2017040706	-10		-20		-35		5	-15
2017040712			-15		-20		-5	-25
2017040718	10		10		5		10	30
2017040800			-15		10		10	0
2017040806	-5		-10		10		-5	-5
2017040812			-10		0		-5	0
2017040818	5		0		5		5	0
2017040900			15		10		0	5
2017040906	0		0		5		-5	0
2017040912			0		10		5	5
2017040918			0		5		-5	0
2017041000			0		-5		-10	5

5-day forecast intensity error								
Run	JTWC	BOM	HWRF	GFS	NAVGEM	GFDN	CMC	GFDL
2017040518			10		5		-15	5
2017040600			0					
2017040606			0		15			
2017040612			5		-5		5	-5
2017040618			0		-5		-5	0
2017040700			5		0		-10	0

Model	**Average**	**Predictions**
JTWC	-14.2	7
BOM	0	0
HWRF	-1.3	24
GFS	0	0
NAVGEM	-15.2	22
GFDN	0	0
CMC	-16.3	20
GFDL	-14.5	20

Therefore, the best model for intensity was the HWRF

3. Forecasting Critique

Data from the charts are published below.

2-day forecast track error								
Run	JTWC	BOM	HWRF	GFS	NAVGEM	GFDN	CMC	GFDL
2017040518			1	0.5	0.3			
2017040600			1.4					
2017040606	1.4		1.1	1.5	2.5			
2017040612			1	1	2.4			
2017040618	4.2		1.1	0.9	1.5			
2017040700			1.6	2.4	2.4			1.6
2017040706	0.9		0.4	0.5	2.2			
2017040712			1.3	2.3	1.7			
2017040718	0.2		0.5	1.6	1.9			
2017040800			0.5	0.7	2.9			
2017040806	0.3		1.1	0.6	1.9			
2017040812			2.3	0.5	1.5			
2017040818	0.3		0.7	1.3	1.4			
2017040900			0.7	0.7	0.9			
2017040906	0.5		0.6	2.1	2.5			
2017040912			2.8	2.3	2.4			
2017040918			4.7	3.9	1.6			
2017041000			3.4	4.8	4.3			

5-day forecast track error								
Run	JTWC	BOM	HWRF	GFS	NAVGEM	GFDN	CMC	GFDL
2017040518			3.4	2.9	5.8			
2017040600			3.5					
2017040606			3	2.5	4.4			
2017040612			2.4	3.9	4			
2017040618			6.2	4.5	3.3			
2017040700			2.6	6.8	2.6			4.1

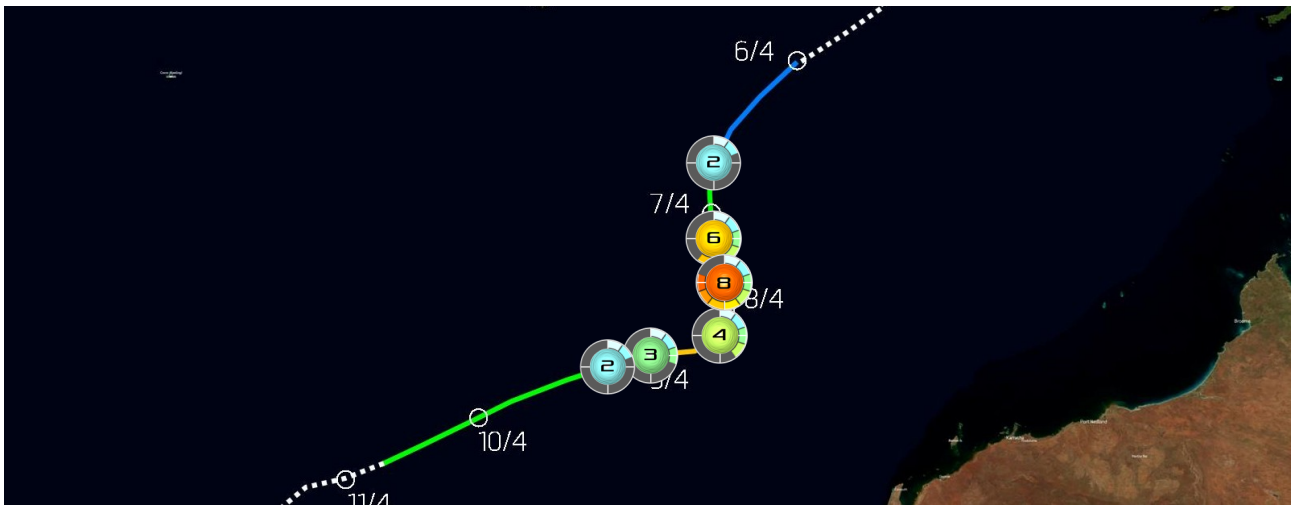
Model	**Average**	**Predictions**
JTWC	1.1	7
BOM	0	0
HWRF	2.0	24
GFS	2.2	22
NAVGEM	2.5	22
GFDN	0	0
CMC	0	0
GFDL	2.9	2

Therefore, the best model for track predictions was the HWRF, though no model bested the JTWC's advisories. However, it is also worth noting that no five-day forecasts from the JTWC were included in the data. The two-day average track error from the HWRF was 1.4, and 1.6 from the GFS.

4. Cyclone Destruction Potential Scale

The Cyclone Destruction Potential Scale (CDPS) is a new way of measuring cyclone impacts in a more meaningful way. For the past 45 years, storms worldwide have been measured using the Saffir-Simpson Hurricane Wind Scale, split into five categories. However, this scale measures wind alone, and does not correlate well with actual impacts on land, measured by monetary damage.
The CDPS measures other factors, such as storm size and forward speed as well as intensity to create a ten tiered scale that encompasses tropical storms as well as hurricanes.

Stage 1—Small or weak storms that are unlikely to cause a significant impact.
Stage 2—Generally disorganised storms that can cause significant damage.
Stage 3—Further organised systems that are likely to cause significant damage.
Stage 4—Somewhat powerful storms that are likely to cause extensive damage.
Stage 5—Powerful storms that are likely to cause devastating damages.
Stage 6—Very powerful storms that are likely to cause catastrophic damage.
Stage 7—Extremely powerful storms that are likely to cause catastrophic damage.
Stage 8—Super storms that are likely to cause incredible damage.
Stage 9—Super storms that may cause total damage.
Stage 10—Super storms that are likely to cause total damage.



Cyclone Ernie was the eleventh storm to be observed by Force Thirteen using the CDPS—a method which was adopted in January 2017.

Ernie was a Stage 8 cyclone at peak, only a couple of points away from the Stage 9 threshold.

The Cyclone Destruction Potential Scale was created by Devon Williams in 2016. More information can be found at: https://drive.google.com/file/d/0B7pEWk6yHKggSE1STHg2UFJmbHM/view

5. Force Thirteen's Coverage on Ernie

Force Thirteen's primary operations had taken a scheduled vacation during the life of Cyclone Ernie, and Force Thirteen Australia took charge of providing video updates during the storm. There were five updates issued on Ernie in its formative and mature stages. Due to opposition to the Force Thirteen Australia operation by Texas and Mexico-based insurgents, the approval rating of the videos were skewed downwards, but were otherwise well received.

Comments, suggestions and inquiries should be directed to force-13@hotmail.co.uk, or any of Force Thirteen's online platforms.