2017
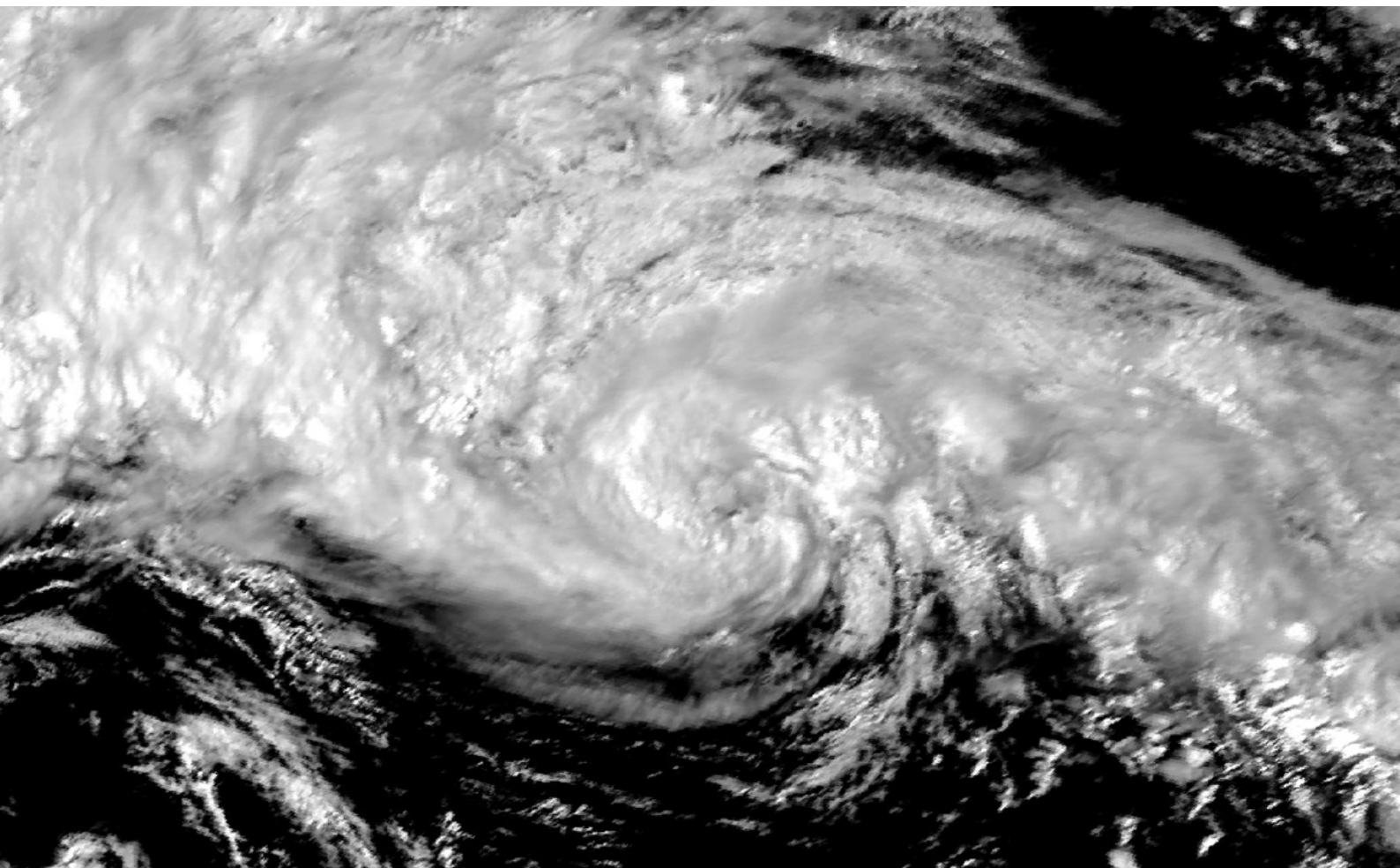# Force Thirteen Cyclone Reports

Tropical Storm Arlene (201716)

Tropical Storm Arlene was the first cyclone to form in the North Atlantic Ocean in 2017, and marked three successive years in which the first storm formed before the official start of the basin's season.

Technical Report

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Cover photo: GOES-16 Image of Arlene near peak intensity on April 20, 2017
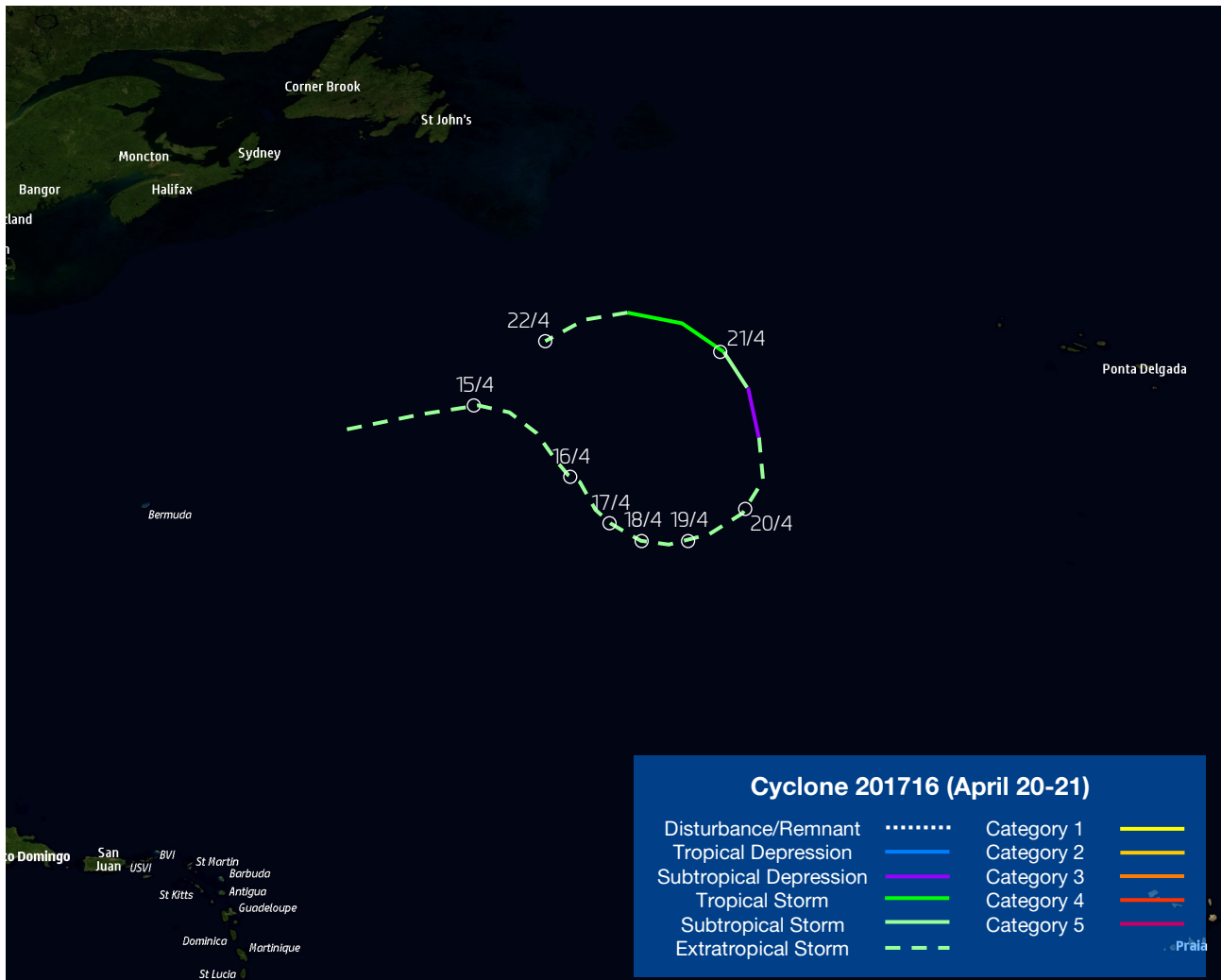
FORCE THIRTEEN

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.
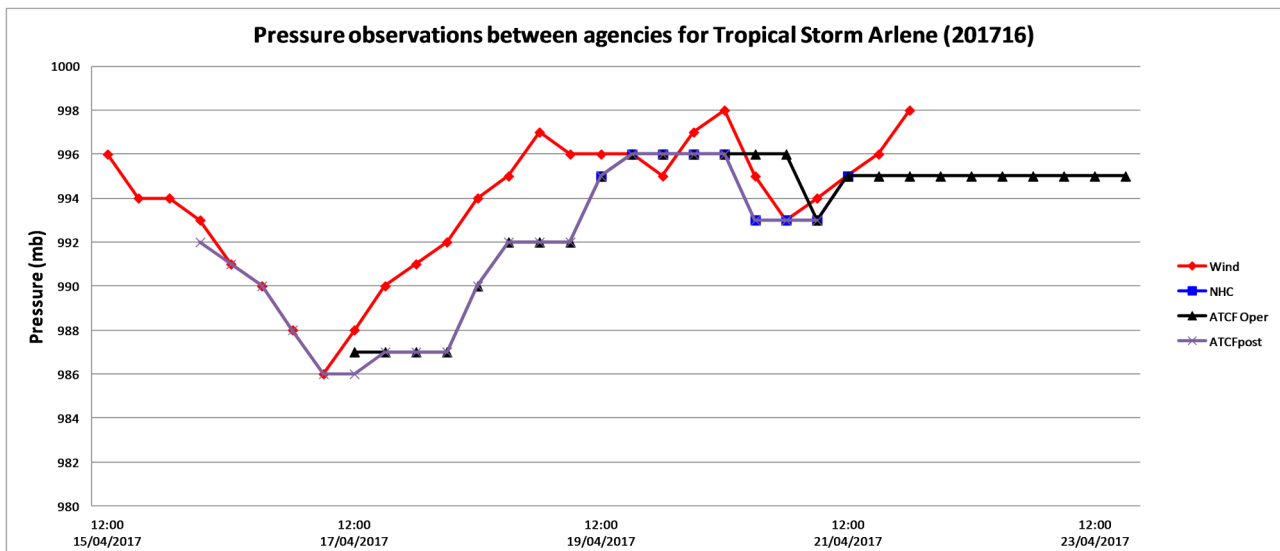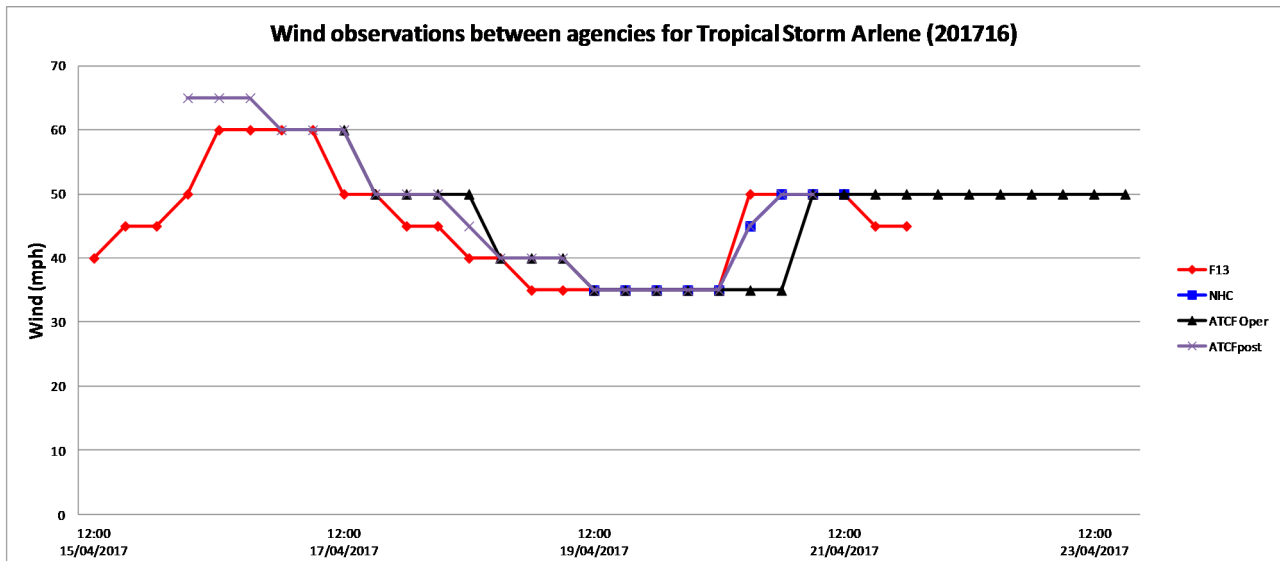
Date (dd/mm/yyyy)	Time	Latitude	Longitude	Wind	Press	Stage
15/04/2017	12:00	35.9	-56	40	996	Extratropical
15/04/2017	18:00	36.5	-53.5	45	994	Extratropical
16/04/2017	00:00	36.6	-51.8	45	994	Extratropical
16/04/2017	06:00	36.5	-50	50	993	Extratropical
16/04/2017	12:00	35.3	-49.3	60	991	Extratropical
16/04/2017	18:00	34.2	-48.7	60	990	Extratropical
17/04/2017	00:00	33.8	-47.6	60	988	Extratropical
17/04/2017	06:00	33.3	-47.1	60	986	Extratropical
17/04/2017	12:00	32.7	-46.1	50	988	Extratropical
17/04/2017	18:00	32.3	-45.2	50	990	Extratropical
18/04/2017	00:00	32.1	-44.7	45	991	Extratropical
18/04/2017	06:00	31.9	-44.4	45	992	Extratropical
18/04/2017	12:00	31.6	-44.1	40	994	Extratropical
18/04/2017	18:00	31.1	-43.5	40	995	Extratropical
19/04/2017	00:00	31.1	-42.4	35	997	Extratropical
19/04/2017	06:00	31.3	-41.8	35	996	Extratropical
19/04/2017	12:00	31.6	-41.1	35	996	Extratropical
19/04/2017	18:00	32.2	-40.5	35	996	Extratropical
20/04/2017	00:00	32.8	-39.5	35	995	Extratropical
20/04/2017	06:00	33.8	-39.2	35	997	Extratropical
20/04/2017	12:00	35.5	-39.6	35	998	Subtropical Depression
20/04/2017	18:00	37.3	-40.7	50	995	Subtropical Storm
21/04/2017	00:00	39	-43	50	993	Tropical Storm
21/04/2017	06:00	40	-46.3	50	994	Tropical Storm
21/04/2017	12:00	40.1	-47.4	50	995	Extratropical
21/04/2017	18:00	40	-48.5	45	996	Extratropical
22/04/2017	00:00	39.8	-49.6	45	998	Extratropical

Track Chart

Cyclone 201716 (April 20-21)

|			
Disturbance/Remnant	·········	Category 1	———
Tropical Depression	———	Category 2	———
Subtropical Depression	———	Category 3	———
Tropical Storm	———	Category 4	———
Subtropical Storm	———	Category 5	———
Extratropical Storm	– – –		

Comparison with other agencies

Arlene was monitored by the Regional Specialized Meteorological Centre, in this instance the National Hurricane Center in Miami, Florida. Also included are the Navy's automated observations (ATCF). The charts below show comparisons between Force Thirteen's best track and the other agencies' observations.

Wind observations between agencies for Tropical Storm Arlene (201716)

Pressure observations between agencies for Tropical Storm Arlene (201716)
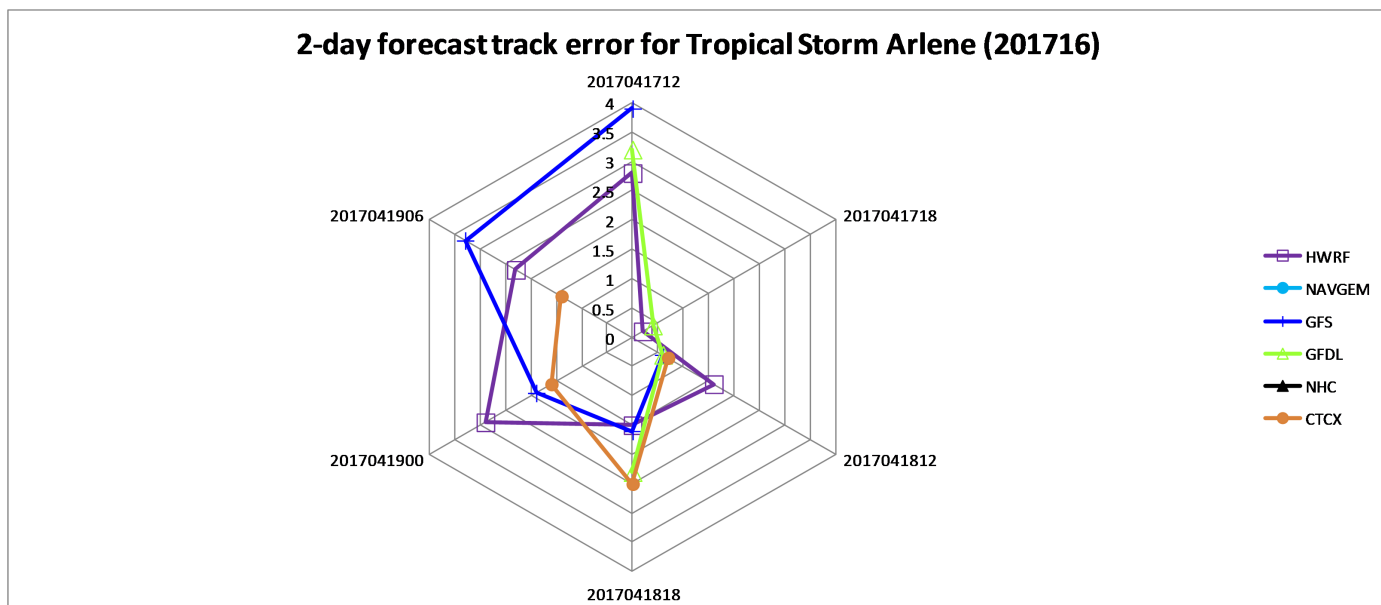
Forecasting Critique

The next pages show the track and intensity forecast error from the computer models and the NHC during Tropical Storm Arlene. Since the storm dissipated within five days of the first model runs, five day error data is not available.

The intensity error chart shows 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.

2-day forecast intensity error for Tropical Storm Arlene (201716)
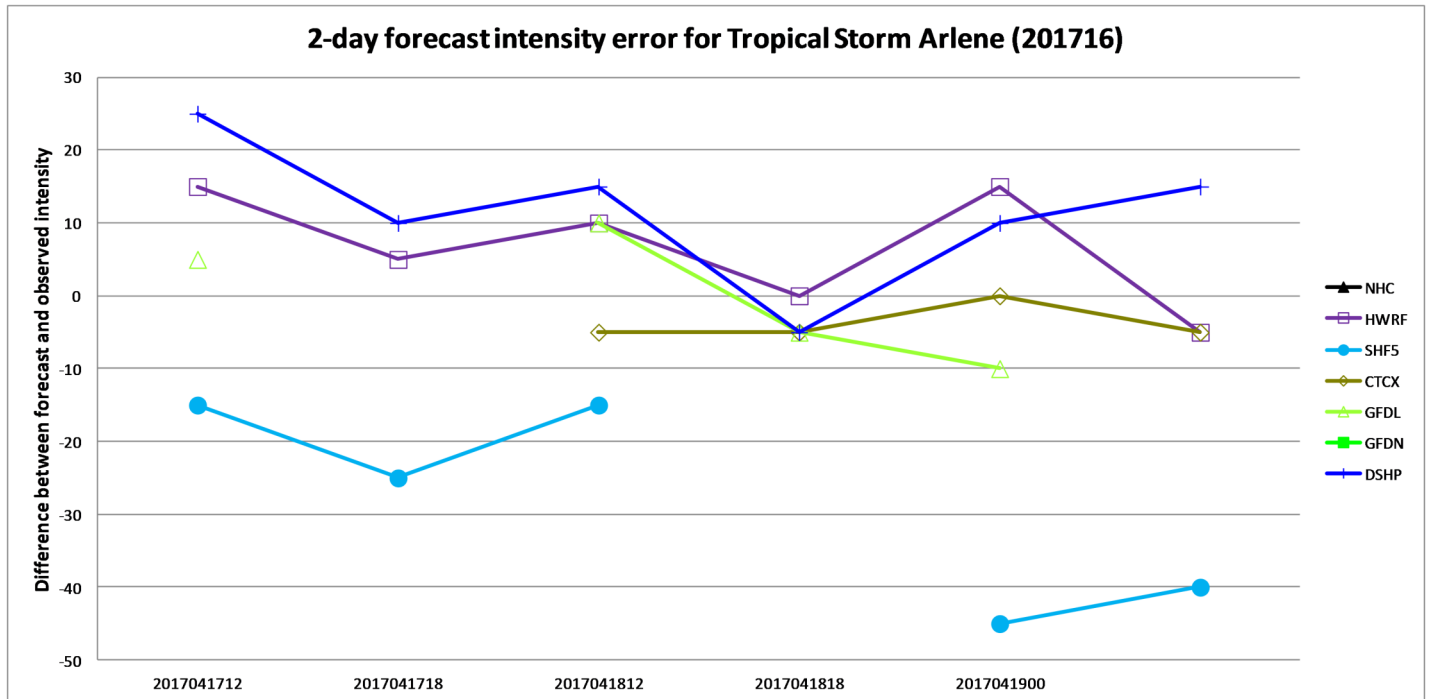
Forecasting Critique

The track error graphics show how far away from a perfectly accurate positional prediction the computer models and the NHC 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.

2-day forecast track error for Tropical Storm Arlene (201716)

Forecasting Critique

Data from the charts are published below.

2-day forecast intensity error								
Run	NHC	NHC	HWRF	DSHP	SHF5	GFDN	CTCX	GFDL
2017041712			15	25	15			5
2017041718			5	10	25			
2017041812			10	15	15		5	10
2017041818			0	5			5	5
2017041900			15	10	45		0	10
2017041906			5	15	40		5	

Model	Average	Predictions
NHC	0	0
NHC	0	0
HWRF	8.3	6
DSHP	13.3	6
SHF5	28	5
GFDN	0	0
CTCX	3.8	4
GFDL	7.5	4

Therefore, the best model for intensity was the CTCX

Forecasting Critique

Data from the charts are published below.

2-day forecast track error								
Run	NHC	NHC	HWRF	GFS	NAVGEM	GFDN	CTCX	GFDL
2017041712			2.8	3.9				3.2
2017041718			0.2					0.4
2017041812			1.6	0.6			0.7	0.6
2017041818			1.5	1.6			2.5	2.3
2017041900			2.9	1.9			1.6	
2017041906			2.3	3.3			1.4	

Model	Average	Predictions
NHC	0	0
NHC	0	0
HWRF	1.8	6
GFS	2.3	5
NAVGEM	0	0
GFDN	0	0
CTCX	1.55	4
GFDL	1.63	4

Therefore, the best model for track predictions was the CTCX.

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.

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

Arlene was a weak Stage 2 cyclone at peak.

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