NATIONAL HURRICANE CENTER
TROPICAL CYCLONE REPORT

TROPICAL STORM POLO

(EP212020)

17–19 November 2020

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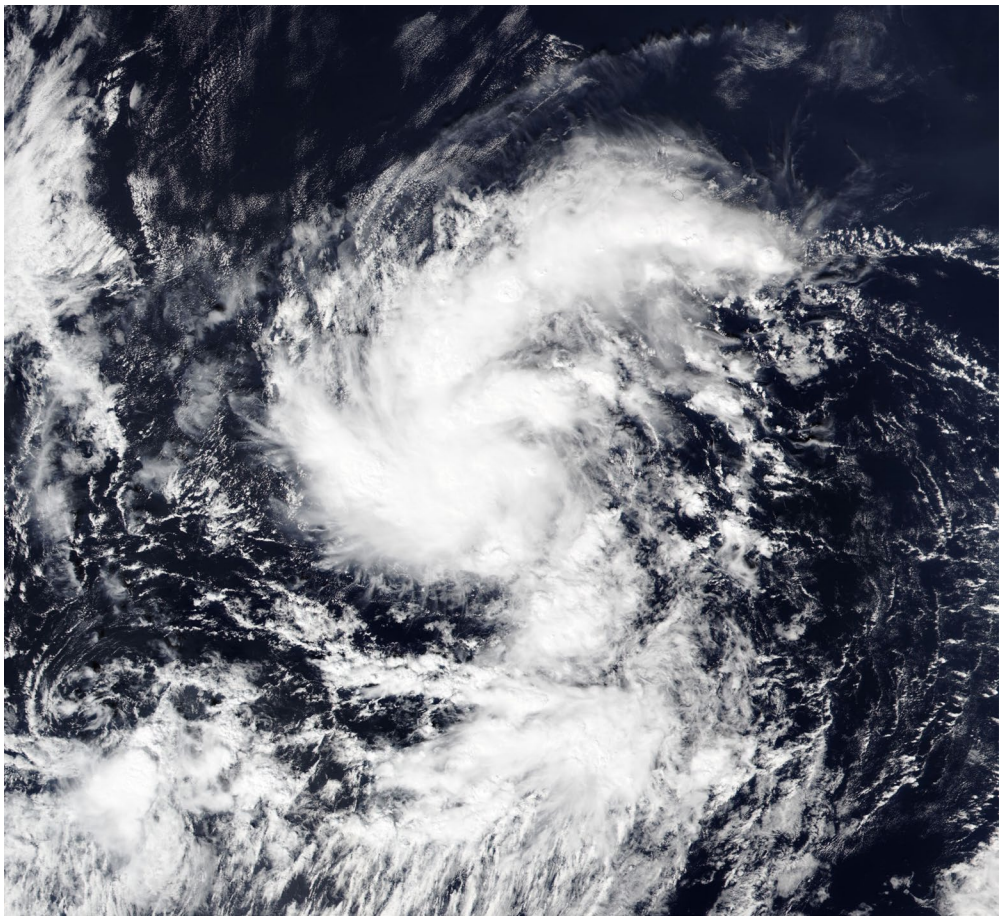

NOAA VIIRS TRUE COLOR IMAGE OF POLO AT 2054 UTC 17 NOVEMBER 2020. IMAGE COURTESY OF NASA EARTHVIEW.

Polo was a short-lived late-season tropical storm that remained over the open eastern North Pacific Ocean.

Tropical Storm Polo

17–19 NOVEMBER 2020

SYNOPTIC HISTORY

The origin of Polo was a convective cluster that developed in an active portion of the eastern Pacific monsoon trough southwest of Acapulco, Mexico, on 11 November, whose formation may have been aided by a Gulf of Tehuantepec gap wind event. Regardless of the origin, the subsequent development of the system was slow. A broad low-pressure area formed well southwest of Manzanillo, Mexico, on 14 November, and the system moved little during the next day or so while no development occurred. On 16 November, the convection associated with the low became better organized. Gradual development continued, and it is estimated that a tropical depression formed near 1800 UTC 17 November about 500 n mi south-southwest of the southern tip of the Baja California peninsula. The "best track" chart of the tropical cyclone's path is given in Fig. 1, with the wind and pressure histories shown in Figs. 2 and 3, respectively. The best track positions and intensities are listed in Table 1[1].

The cyclone was moving west-northwestward on the south side of a low- to mid-level ridge at the time of genesis, and this motion would continue for the next 36 h or so. Gradual strengthening caused the cyclone to become a tropical storm 6 h after genesis and reach a peak intensity of 40 kt near 1200 UTC 18 November. After that time, increasing westerly vertical wind shear, decreasing sea-surface temperatures under the storm, and dry air entrainment caused Polo to weaken as the associated convection waned and eventually dissipated. The cyclone weakened to a tropical depression around 1200 UTC 19 November and turned westward as the shallow system was steered by low-level easterly flow. The system degenerated to a remnant low later that day about 710 n mi west-southwest of the southern tip of the Baja California peninsula. The remnant low moved west-southwestward until it degenerated to a trough on 21 November.

METEOROLOGICAL STATISTICS

Observations in Polo (Figs. 2 and 3) include subjective satellite-based Dvorak technique intensity estimates from the Tropical Analysis and Forecast Branch (TAFB) and the Satellite Analysis Branch (SAB), objective Advanced Dvorak Technique (ADT) estimates and Satellite Consensus (SATCON) estimates from the Cooperative Institute for Meteorological Satellite Studies/University of Wisconsin-Madison. Data and imagery from NOAA polar-orbiting satellites including the Advanced Microwave Sounding Unit (AMSU), the NASA Global Precipitation

[1] A digital record of the complete best track, including wind radii, can be found on line at ftp://ftp.nhc.noaa.gov/atcf. Data for the current year's storms are located in the *btk* directory, while previous years' data are located in the *archive* directory.

Mission (GPM), the European Space Agency's Advanced Scatterometer (ASCAT), and Defense Meteorological Satellite Program (DMSP) satellites, among others, were also useful in constructing the best track of Polo.

There were no surface observations from land stations or ships of tropical-storm-force winds from Polo. The estimated peak intensity of 40 kt is based on a blend of objective and subjective satellite intensity estimates. The estimated minimum pressure of 1004 mb is based on the Knaff-Zehr-Courtney pressure-wind relationship.

CASUALTY AND DAMAGE STATISTICS

There were no reports of damage or casualties associated with Polo.

FORECAST AND WARNING CRITIQUE

The genesis of Polo was well forecast at longer lead times, but poorly forecast at shorter lead times (Table 2). On the longer side, the pre-Polo disturbance was introduced into the 5-day Tropical Weather Outlook (TWO) with a low chance (<40%) of development 162 h before genesis, was given a medium chance (40-60%) 126 h before genesis, and a high chance (>60%) 96 h before genesis. The system was introduced into the 2-day TWO with a low chance 114 h before development and was given a medium chance 90 h before development. However, on the shorter side the genesis probabilities in both the 5 and 2-day TWO decreased as the time of genesis approached, and 30 h before genesis the probabilities were in the low category. The probabilities were again increased thereafter, but did not reach the high category until the best track genesis time. These probability trends can be attributed to forecasters recognizing there was only a small timeframe during which genesis could occur before the system reached an unfavorable environment. Once development was slower than forecast it appeared that genesis was unlikely before the window for development closed. This was followed by a rapid ramp-up of the probabilities when development started in earnest.

A verification of NHC official track forecasts for Polo is given in Table 3. Official forecast track errors were lower than the mean official errors for the previous 5-yr period. Since Polo was a tropical cyclone for less than 48 h, no meaningful discussion of the track forecast errors is possible. However, the official forecasts well captured the actual motion of the cyclone.

A verification of NHC official intensity forecasts for Polo is given in Table 4. Official forecast intensity errors were lower than the mean official errors for the previous 5-yr period. As with the track forecasts, no meaningful discussion of the intensity forecast errors is possible given the small sample. However, the official forecasts correctly anticipated that little or no strengthening would occur, followed by a quick demise in the unfavorable environment that the cyclone would be traversing.

No coastal watches or warnings were issued for Polo.

Table 1. Best track for Tropical Storm Polo, 17–19 November 2020.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
17 / 1200	14.7	111.9	1008	25	low
17 / 1800	15.0	112.9	1007	30	tropical depression
18 / 0000	15.4	113.8	1006	35	tropical storm
18 / 0600	15.7	114.7	1005	35	"
18 / 1200	16.0	115.6	1004	40	"
18 / 1800	16.4	116.7	1004	40	"
19 / 0000	16.8	117.8	1004	40	"
19 / 0600	17.0	118.8	1005	35	"
19 / 1200	17.0	119.8	1007	30	tropical depression
19 / 1800	16.9	120.8	1007	30	low
20 / 0000	16.8	121.7	1008	30	“
20 / 0600	16.7	122.6	1008	30	“
20 / 1200	16.7	123.7	1009	30	“
20 / 1800	16.6	124.8	1010	25	“
21 / 0000	16.4	126.0	1010	25	“
21 / 0600					dissipated
18 / 1200	16.0	115.6	1004	40	minimum pressure and maximum winds

Table 2. Number of hours in advance of formation for Polo associated with the first NHC Tropical Weather Outlook forecast in the indicated likelihood category. Note that the timings for the “Low” category do not include forecasts of a 0% chance of genesis. Numbers in parentheses are the times for the second time the probabilities were raised to the medium category.

	Hours Before Genesis	
	48-Hour Outlook	120-Hour Outlook
Low (<40%)	114	162
Medium (40%-60%)	90 (30)	126 (30)
High (>60%)	0	96

Table 3. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Tropical Storm Polo, 17–19 November 2020. Mean errors for the previous 5-yr period are shown for comparison. Official errors that are smaller than the 5-yr means are shown in boldface type.

	Forecast Period (h)							
	12	24	36	48	60	72	96	120
OFCL	**16.4**	**23.6**	**18.9**					
OCD5	23.9	49.2	50.8					
Forecasts	4	4	2					
OFCL (2015-19)	21.8	34.0	44.9					
OCD5 (2015-19)	34.3	69.9	108.7					

Table 4. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Tropical Storm Polo, 17–19 November 2020. Mean errors for the previous 5-yr period are shown for comparison. Official errors that are smaller than the 5-yr means are shown in boldface type.

	Forecast Period (h)							
	12	24	36	48	60	72	96	120
OFCL	**3.3**	**3.8**	**2.5**					
OCD5	6.2	8.2	1.5					
Forecasts	4	4	2					
OFCL (2015-19)	6.0	9.9	12.1					
OCD5 (2015-19)	7.8	13.0	16.6					

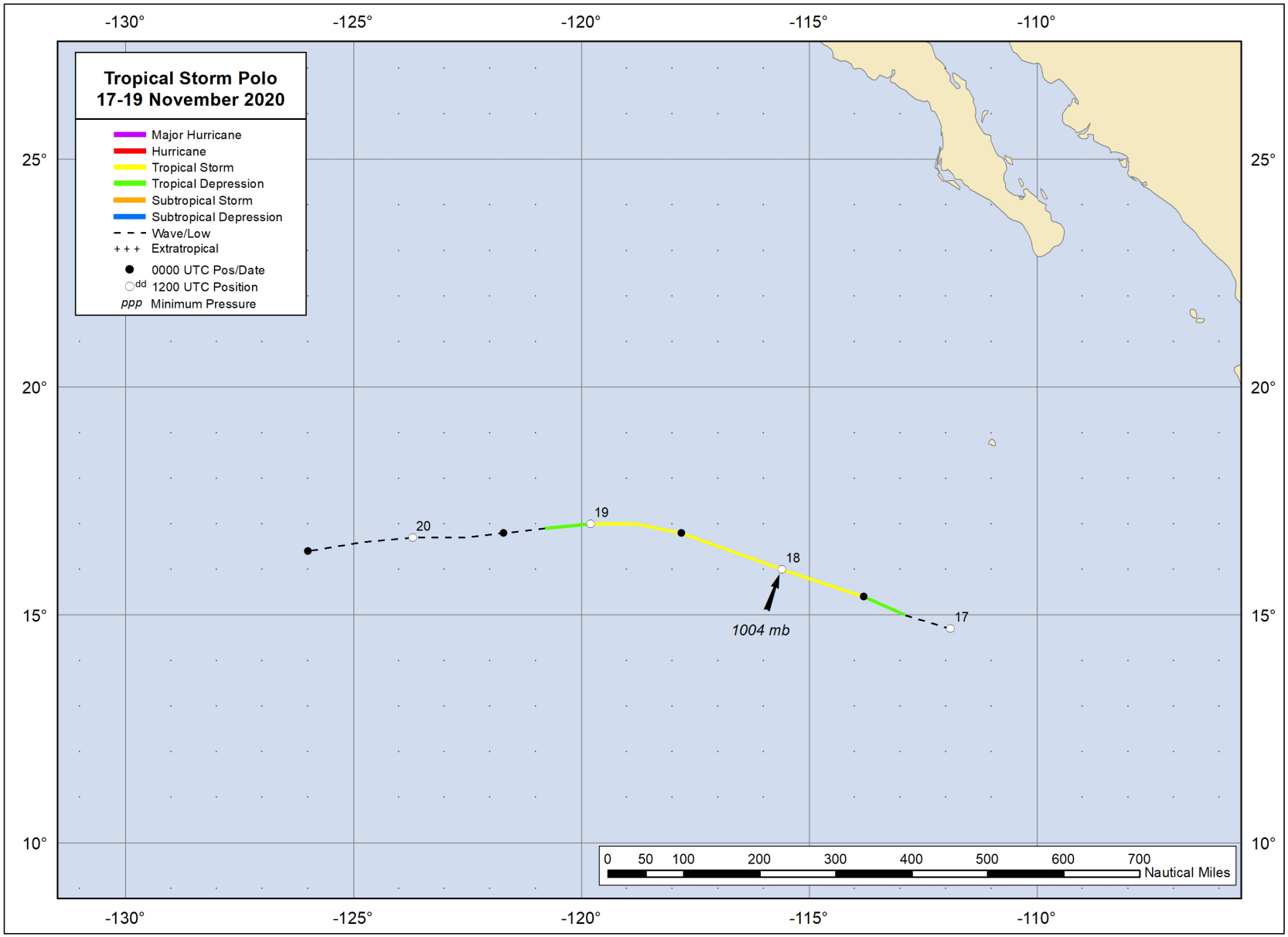

Figure 1. Best track positions for Tropical Storm Polo, 17–19 November.

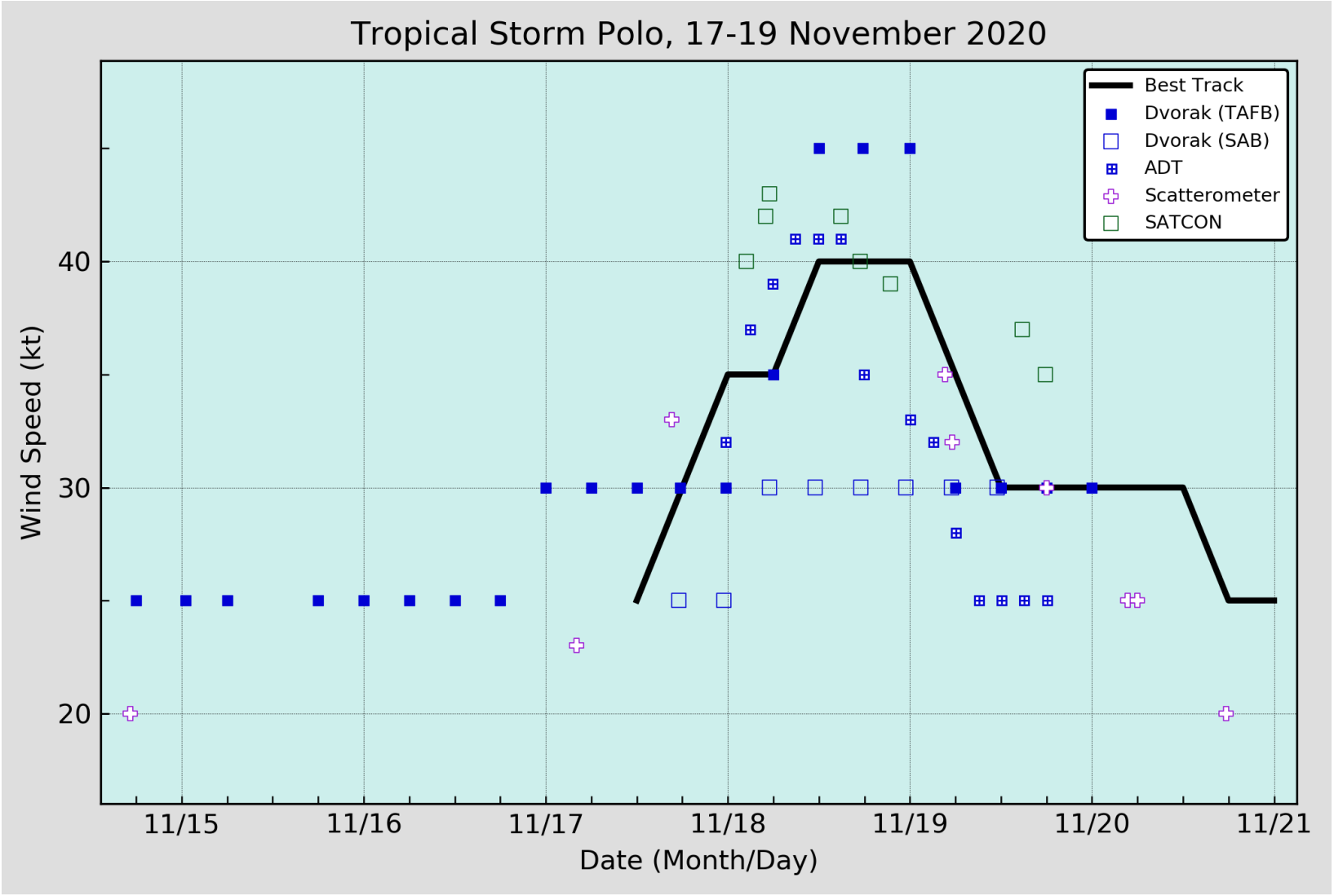

Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Polo, 17–19 November 2020. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies. Dashed vertical lines correspond to 0000 UTC.

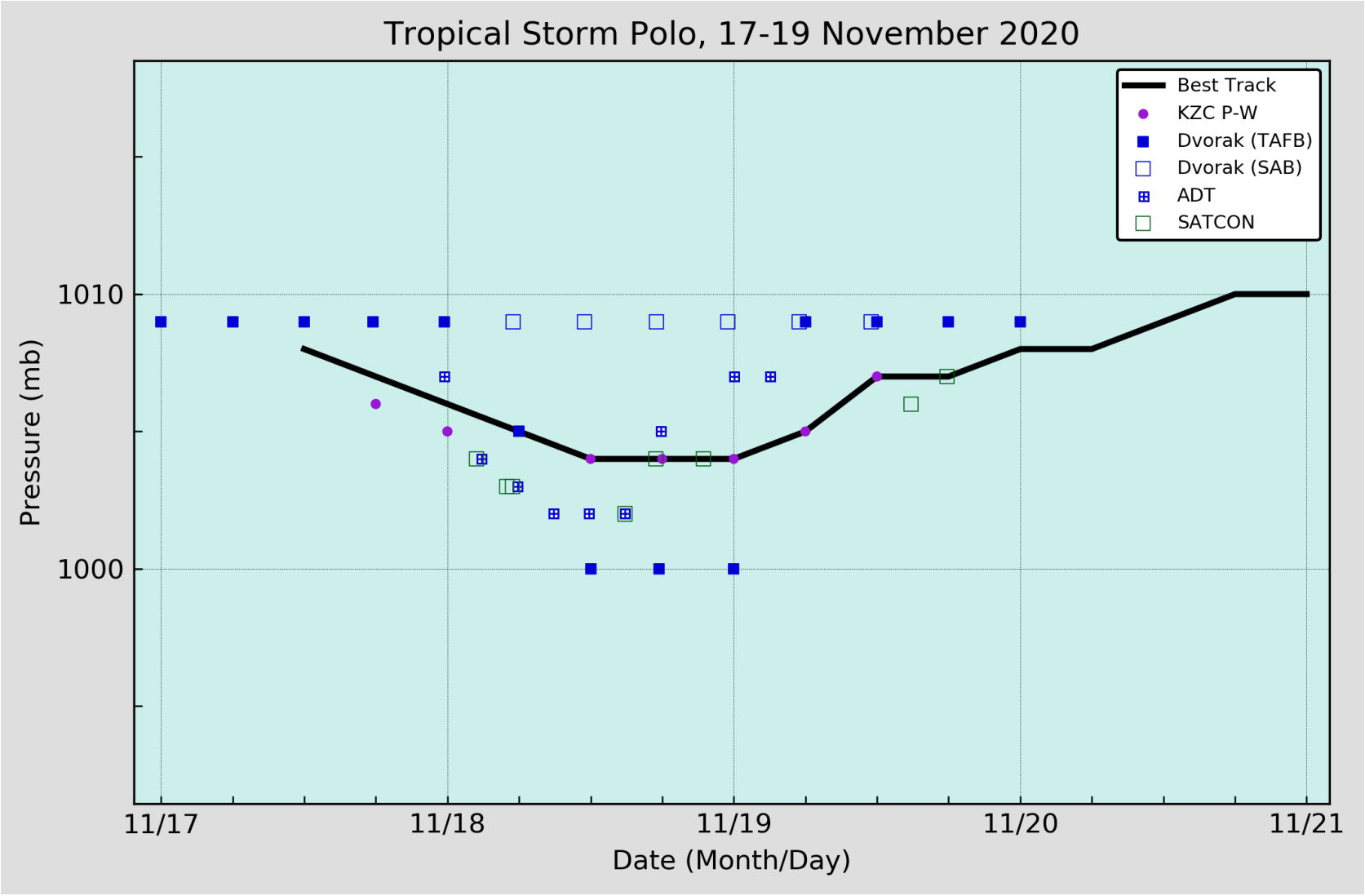

Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Storm Polo, 17–19 November 2020. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies. KZC P-W refers to pressure estimates derived using the Knaff-Zehr-Courtney pressure-wind relationship. Dashed vertical lines correspond to 0000 UTC.