

Preliminary Report  
Tropical Storm Bud  
13 - 17 June 2000

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a. Synoptic history

The origins of Bud can be traced to a tropical wave that emerged from the coast of Africa on 22 May. The wave generated little convection as it moved across the Atlantic and Caribbean. The wave moved into the eastern Pacific on 6 June, but showed few signs of organization until 11 June when a broad low pressure area formed a few hundred miles southwest of Acapulco, Mexico. The initial Dvorak intensity estimates were made that day. Further development was slow, as the low exhibited multiple centers for much of 11-12 June. As one center emerged as dominant, the system became a tropical depression near 0600 UTC 13 June about 370 n mi south-southwest of Manzanillo, Mexico (Table 1). The depression became Tropical Storm Bud six hours later as it moved northwestward.

Bud reached a peak intensity of 45 kt early on 14 June while turning north-northwestward. The peak intensity was maintained for 12 hr, followed by slow weakening due to a combination of increasing vertical shear and cooler sea surface temperatures. Bud passed just northeast of Socorro Island on 15 June as a 40 kt tropical storm. It weakened to a depression on 16 June as it slowed to an erratic drift about 70 n mi north of Socorro Island. Bud dissipated as a tropical cyclone on 17 June about 90 n mi north-northeast of Socorro Island; however, the remnant broad low persisted until 19 June.

b. Meteorological statistics

The “best track” of Bud is given in Table 1 and Figure 1. Figures 2 and 3 show the best track maximum sustained (1 min average) surface (10 m elevation) wind speed and minimum central pressure, as well as the associated observations. These include Dvorak satellite technique position and intensity estimates from the Tropical Analysis and Forecast Branch (TAFB), the NOAA/NESDIS Satellite Analysis Branch (SAB), and the Air Force Weather Agency (AFWA).

The NASA QuikScat satellite provided useful information during Bud. An overpass near 1256 UTC 13 June, although partly contaminated by rain, showed that the circulation had become well-defined and that winds were near or at tropical-storm strength (Fig. 4). Another overpass near 1256 UTC 17 June showed that winds had decreased to less than 25 kt. This helped determine when the cyclone dissipated.

The ship **Roger Revelle** (call sign KAOU) reported 40 kt winds and a 1001.0 mb pressure at 0000 UTC 14 June. While Socorro Island did not report tropical storm force winds, it reported a 997.3 mb pressure at 1500 UTC 15 June.

c. Casualty and Damage Statistics

Although Bud passed near Socorro Island, and large waves associated with the storm likely

affected portions of the Mexican coast, there are no reports of damage or casualties.

#### d. Forecast and Warning Critique

Since Bud was a tropical storm for less than 72 hr, no verification statistics are available for that time. The NHC official average track forecast errors were 44, 83, 133 and 194 n mi at 12 (10 cases), 24 (8 cases), 36 (6 cases) and 48 h (4 cases) respectively. These errors are considerably worse than the 1990-1999 average of 37, 69, 101 and 132 n mi. Most of these errors came early in Bud's life, when the official forecasts failed to catch the turn to the north-northwest. Several objective aids had lower forecast errors than the official forecast. This included the GFDL and the GFDN (U.S. Navy version of the GFDL), which were better than the official forecast at all times.

NHC intensity forecast errors were near the 1990-1999 average at 12 and 24 hr and worse than the average at 36 and 48 hr. There was a positive bias (winds overforecast) in all the 36 and 48 hr forecasts.

No watches or warnings were issued for Bud.

Table 1. Best track, Tropical Storm Bud, 13-17 June 2000.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
13 / 0600	13.1	105.9	1002	30	tropical depression
13 / 1200	13.9	106.6	1000	35	tropical storm
13 / 1800	14.4	107.4	999	40	"
14 / 0000	14.9	108.3	997	45	"
14 / 0600	15.5	109.1	994	45	"
14 / 1200	16.3	109.4	994	45	"
14 / 1800	17.1	109.7	994	45	"
15 / 0000	17.8	110.1	995	40	"
15 / 0600	18.3	110.4	995	40	"
15 / 1200	18.9	110.7	995	40	"
15 / 1800	19.4	110.9	996	40	"
16 / 0000	19.7	111.1	998	35	"
16 / 0600	19.9	111.3	998	35	"
16 / 1200	19.9	111.2	998	30	tropical depression
16 / 1800	19.8	111.0	998	30	"
17 / 0000	19.8	110.8	998	30	"
17 / 0600	19.8	110.6	1000	25	"
17 / 1200	20.2	110.5	1002	25	"
14 / 0600	15.5	109.1	994	45	minimum pressure

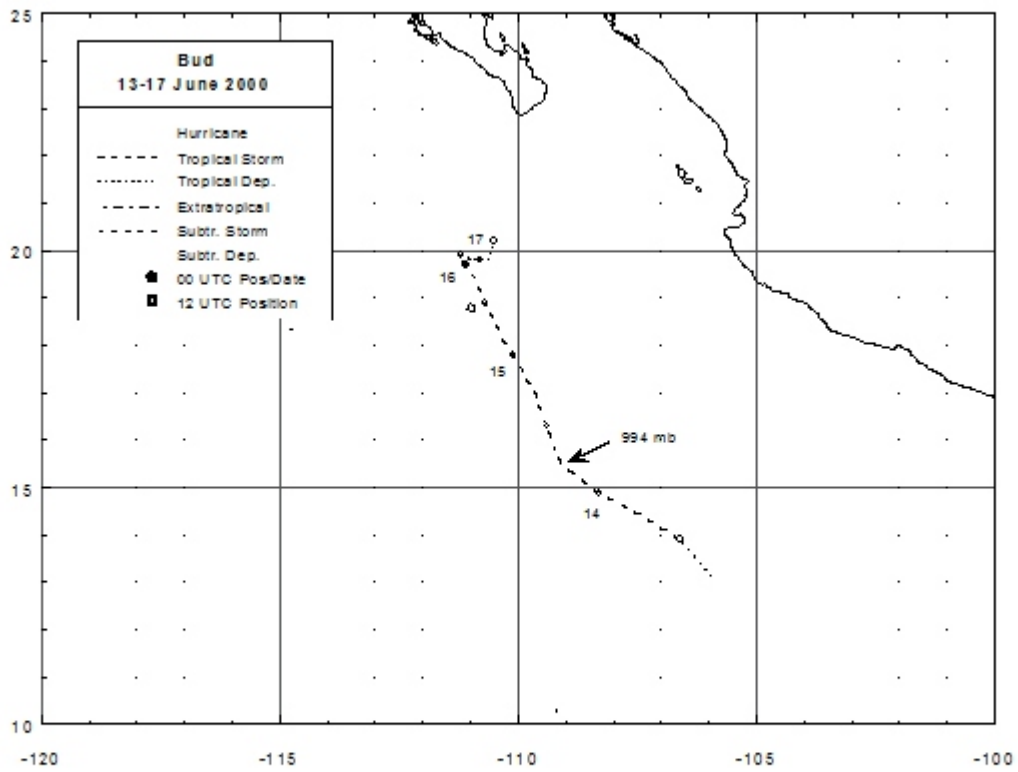


Figure 1. Best track for Tropical Storm Bud, 13-17 June 2000.

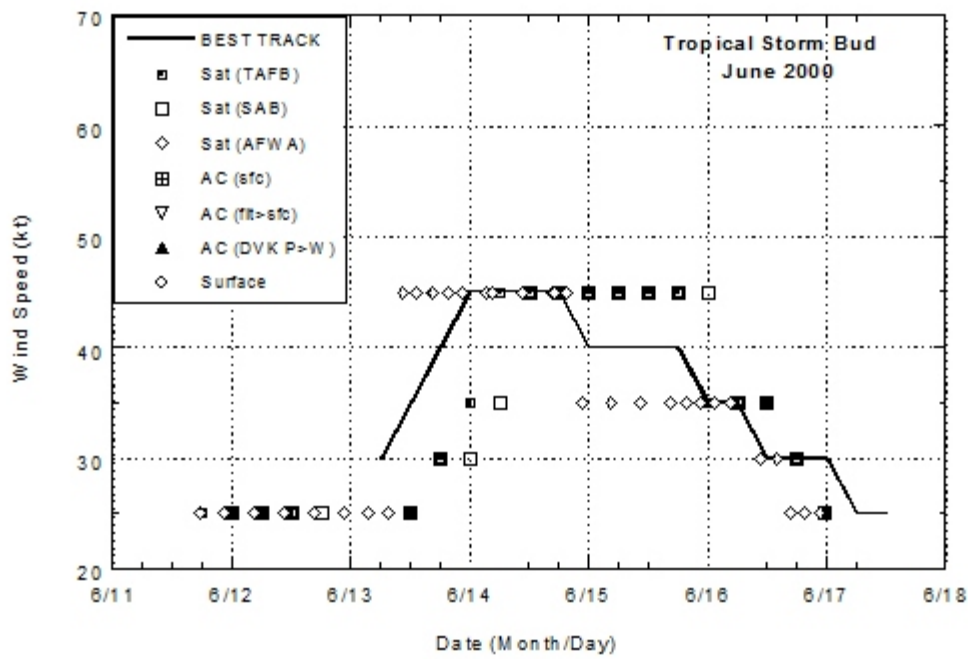


Figure 2. Best track maximum sustained 1-minute 10 meter wind speed curve for Tropical Storm Bud, 13-17 June 2000.

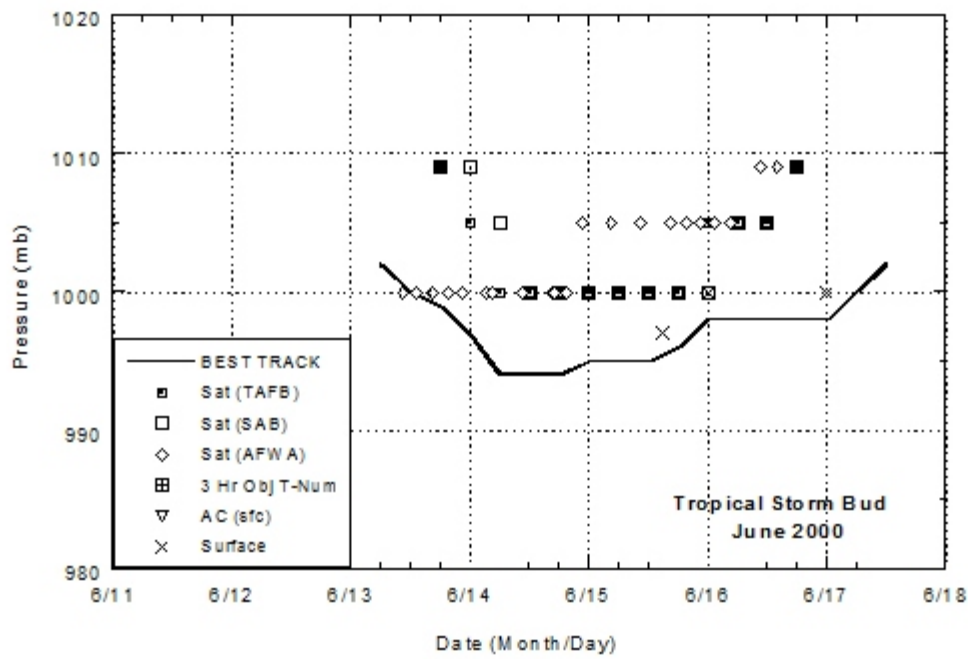
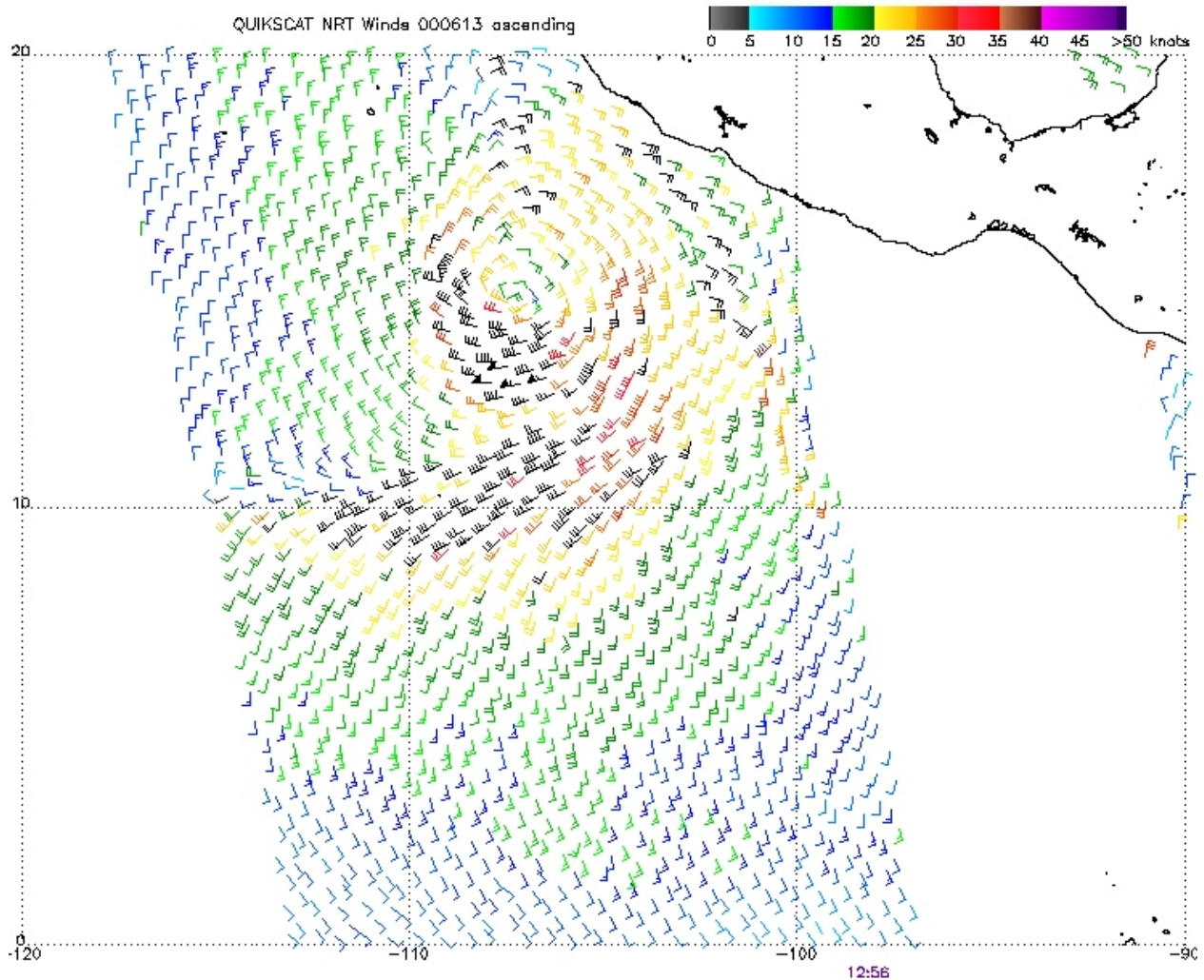


Figure 3. Best track minimum central pressure curve for Tropical Storm Bud, 13-17 June 2000.



Note: 1) Times are GMT 2) Times correspond to 10N at right swath edge - time is right swath for overlapping swaths at 10N  
 3) Data buffer is 24 hrs for 000613 4) Black barbs indicate possible rain contamination  
 NOAA/NESDIS/Office of Research and Applications

Figure 4. NASA QuikScat overpass of Tropical Storm Bud near 1256 UTC 13 June 2000. Image courtesy of NOAA/NESDIS Marine Observing Systems Team. Black wind barbs indicate unreliable wind speeds due to rain contamination.