

NOAA Technical Memorandum NWS NHC 19

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ANNUAL DATA AND VERIFICATION TABULATION
ATLANTIC TROPICAL CYCLONES

Gilbert B. Clark and Staff,

National Hurricane Center
Miami, Florida
February 1983

UNITED STATES
DEPARTMENT OF COMMERCE
Malcolm Baldrige, Secretary

National Oceanic and
Atmospheric Administration
John V. Byrne, Administrator

National Weather
Service
Richard E. Hallgren, Director



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4. CLIPER (Neumann, 1972). Stepwise multiple screening regression using the predictors derived from climatology and persistence
5. NHC-72 (Neumann, Hope, Miller, 1972). A modified stepwise multiple screening regression system which combines the NHC-67 concept and the CLIPER system into a single model.
6. NHC-73 (Neumann and Lawrence, 1973). Similar in concept to the NHC-72 except it also uses the "perfect prog" and MOS (model output statistics) methods to introduce NMC (National Meteorological Center) numerical prognostic data into the prediction equations.
7. NMC MFM MODEL (Hovermale, 1975). A ten-level baroclinic model which uses a moving fine mesh (MFM) grid nested within the coarser NMC fixed grid primitive equation (PE) model.

In addition, operational forecasts of tropical cyclone intensity changes in knots at 12-hourly intervals out to 72 hours are generated by a program named SHIFOR (Statistical Hurricane Intensity FORcasts). Generation of the forecast equations was done by multiple screening regression techniques using historical tropical cyclone data as input. Results over the past several years have shown that SHIFOR and official intensity forecasts have comparable skill scores.

The National Hurricane Center uses the above models as guidance in the formulation of its forecasts. The hurricane forecaster also makes extensive use of analyses and prognoses produced by NMC and RCTM (Regional Center for Tropical Meteorology) in Miami.

VERIFICATION

Verification statistics for the 1982 season are shown in Table

The initial position error in Table 1 is the difference between the operational initial position and that determined during post analysis (best track position). The forecast displacement error is the vector difference between the forecast displacement and the actual displacement computed from best-track positions. Landfall prediction errors for the official forecasts are given in Tables 2a and 2b. These are defined as the distance from the predicted landfall point made 24 hours prior to actual landfall, to the actual landfall point. In cases where a storm either crossed an island or made landfall when predicted to remain offshore, the error was designated as the distance from the landfall point to the nearest point on the forecast track.

Tropical cyclone warning lead times for United States landfalling storms are given in Table 3a. A summary of warning lead times for the period 1970-1982 for hurricanes only and for both tropical storms and hurricanes is given in Table 3b. The length of time between the issuance of the warnings and the time that the center crossed the coast, as determined from the "best track," was taken as the warning lead time. A more complete discussion of the verification of tropical cyclone warning lead times, as well as verifications for individual storms from 1970-1977, can be found in the 1977 Annual Data and Verification Tabulation (Lawrence, Hebert, and Staff, 1979).

DATA SUMMARIES

A summary of 1982 North Atlantic tropical and subtropical cyclone statistics is given in Table 4. Tracks of 1982 named storms as well as the June subtropical cyclone are shown in Figure 1.

The best track, initial, and forecast positions for 1982 named storms are in Table 5, along with initial position and forecast errors, and storm average errors.

Table 6 lists all center fix positions and intensity evaluations used operationally at the National Hurricane Center during 1982. The center fixes are listed in chronological order, and include those obtained by aerial reconnaissance, satellite (Miami SFSS), and land-based radar. This section precedes the initial table.

Supplementary Vortex Data Messages which replaced Vortex Paths in the 1977 Annual Data Tabulation are given in Table 7. A diagram of the paths flown in obtaining these Data Messages is given in Figure 2. A new symbolic code for interpreting the Data Messages, revised this year, is given as Appendix A.

Table 8 is an aerial reconnaissance summary for the 1982 season.

Graphs of the lowest central pressure versus time for tropical cyclones and the subtropical cyclone are presented in Figure 3.

Daily GOES-5 satellite photographs of 1982 named tropical cyclones and the subtropical cyclone are shown in Figure 4.

ACKNOWLEDGMENTS

Main contributors were: Frank Revitte and Andrew Stern, who listed the center fixes in chronological order and performed other miscellaneous tasks; Mr. Miles Lawrence, who computed the verification statistics; Ms. Mary Watson, who drafted the pressure/time graphs; Mr. Frank Marshall, who did all reduction work on the graphs and tables; and Mrs. Teresa Smith and Ms. Mary Ellen Dell, who typed the tables and manuscript.

REFERENCES

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INTRODUCTION

This is the ninth report of an annual series prepared by the National Hurricane Center (NHC) to provide a source of summarized data on Atlantic tropical cyclones. It will not duplicate the narrative overview of the hurricane season and the description of individual storms, which will continue to be published in the Monthly Weather Review.

In addition to data supplied by the National Weather Service, materials have been furnished by the NOAA National Earth Satellite Services (NESS) Miami Office, and the CARCAH (Chief Aerial Reconnaissance Coordination, all Hurricanes).

OBJECTIVE FORECAST TECHNIQUES

The following tropical cyclone prediction models were used at the National Hurricane Center for forecasting motion on an operational basis:

1. NHC-67 (Miller, Hill, Chase, 1968). A stepwise screening regression model using predictors derived from the current and 24-hour old 1000, 700, and 500 mb data, and includes persistence during the early forecast periods.
2. SANBAR (Sanders and Burpee, 1968). A filtered barotropic model using input data derived from the 1000 to 100 mb pressure weighted winds. The model requires use of "bogus" data in data-void areas. The system was modified by Pike (1972) so that the initial wind field near the storm would conform to the current storm motion.
3. HURRAN (Hope and Neumann, 1970). An analog system using as a data base the tracks of all Atlantic tropical storms and hurricanes dating back to 1886.

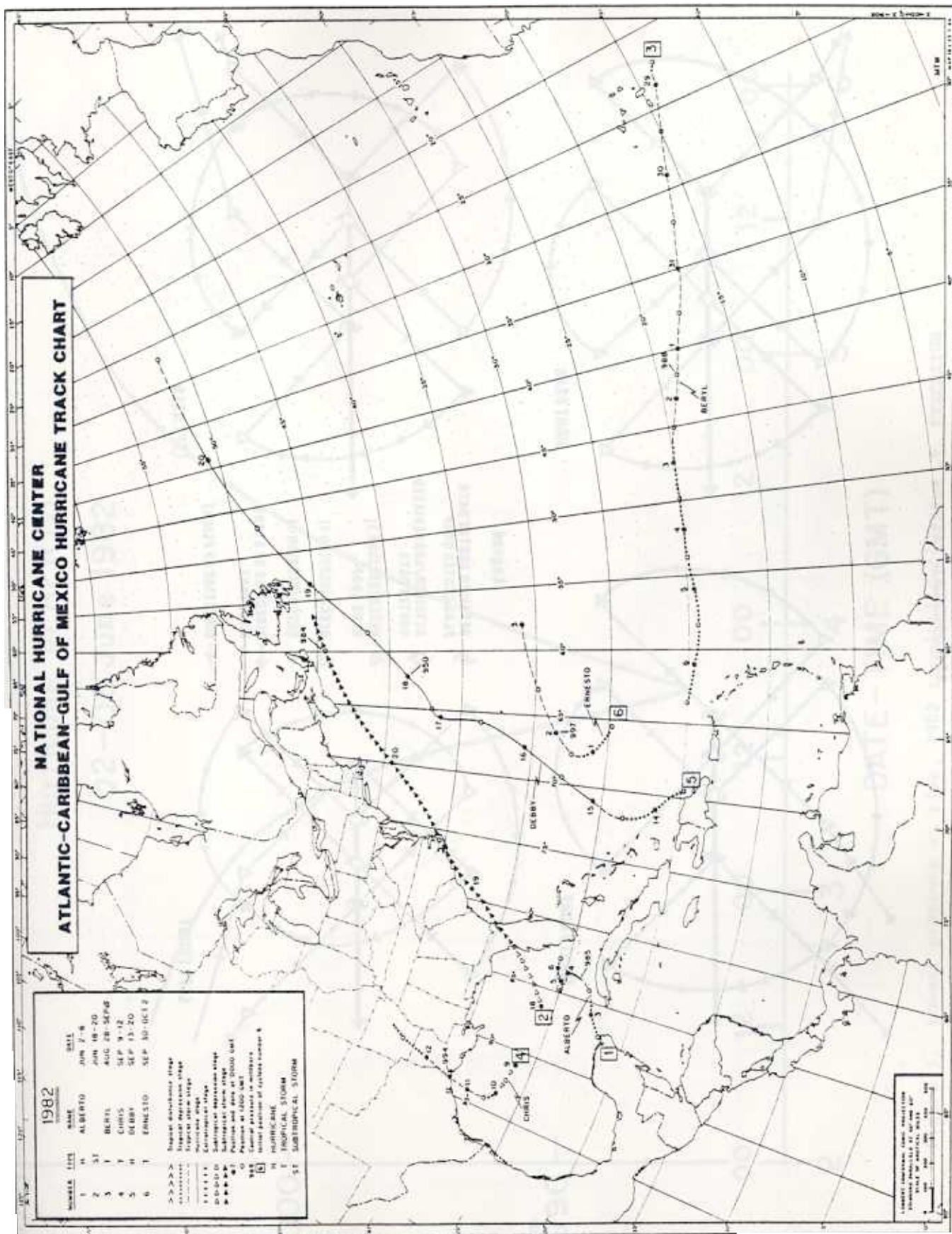
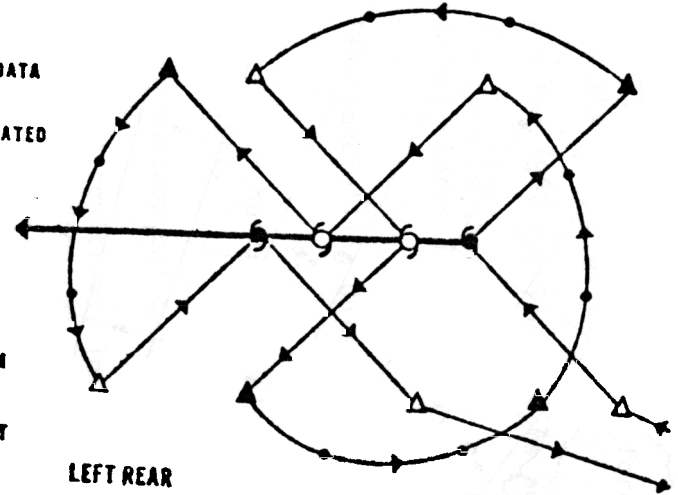
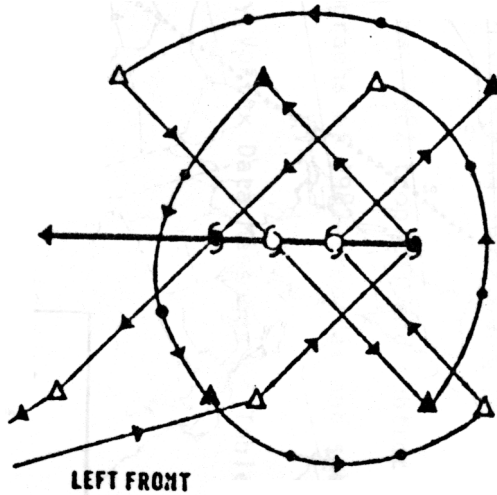
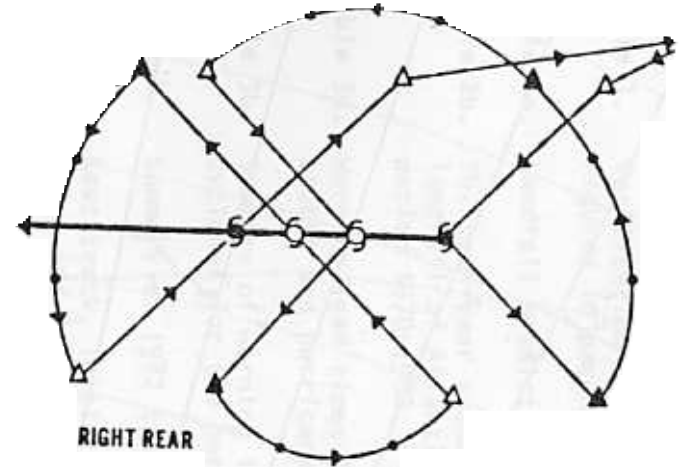
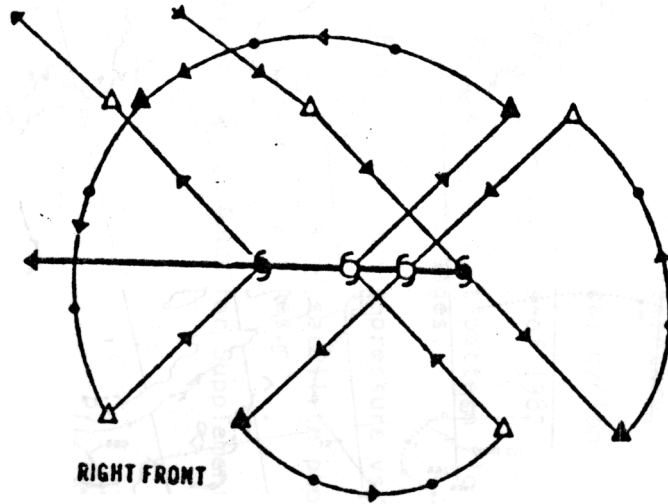


figure Tracks of 982 ropica and subtropical cyclones.

RECOMMENDED PATTERN "A" EXECUTION



Legend

- DETAILED VORTEX DATA PLUS CENTER DROP
- DETAILED/ABBREVIATED VORTEX DATA
- ▲ RECCO (SECTION 1) PLUS DROP
- △ RECCO (SECTION 1)
- RECCO (SECTION 3)
- ← DIRECTION OF STORM MOVEMENT
- ↔ DIRECTION OF FLIGHT

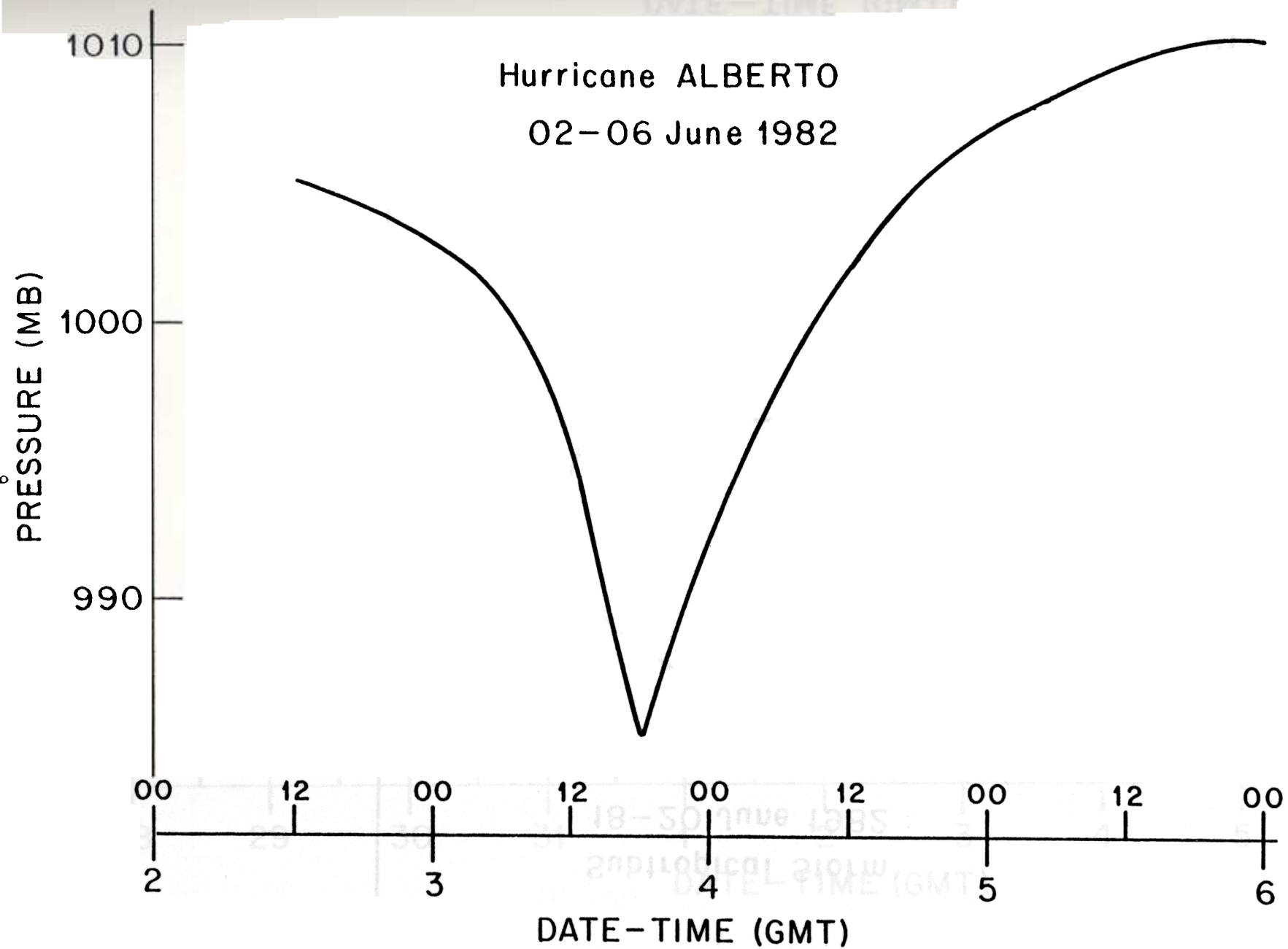
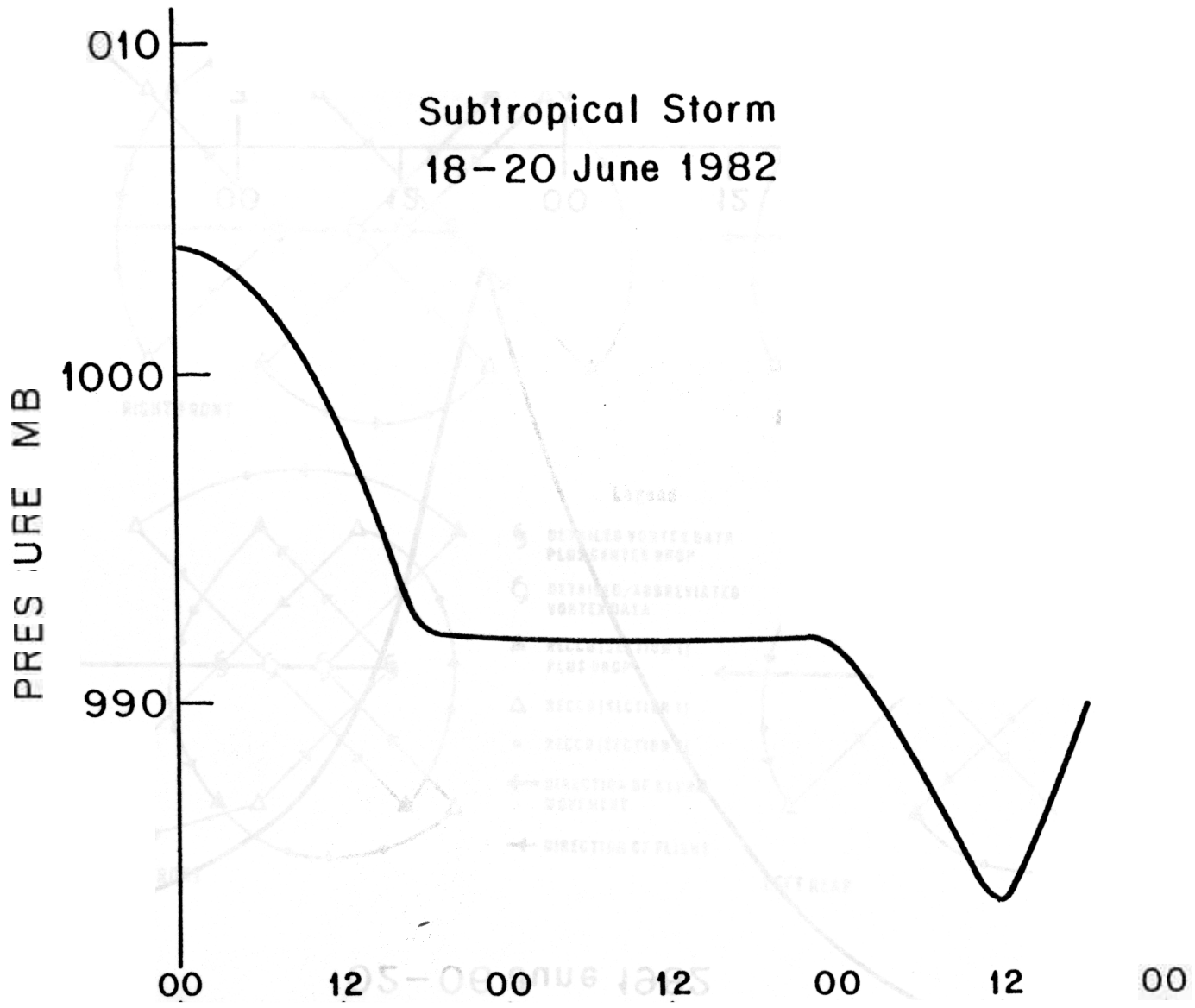
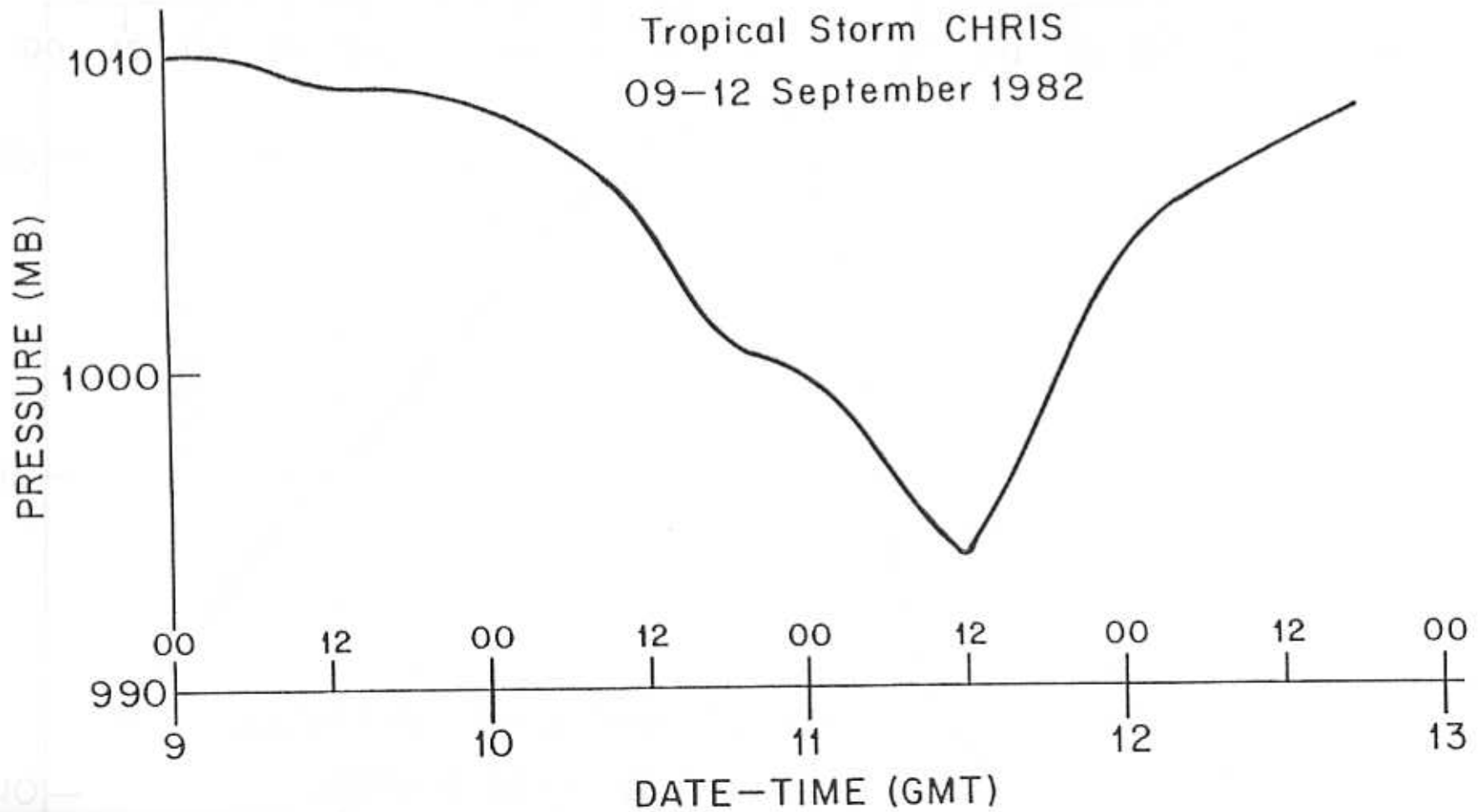


Figure 3. Lowest pressure vs time 1982 tropical cyclones.



Tropical Storm CHRIS
09-12 September 1982



Hurricane DEBBY
13-20 September 1982

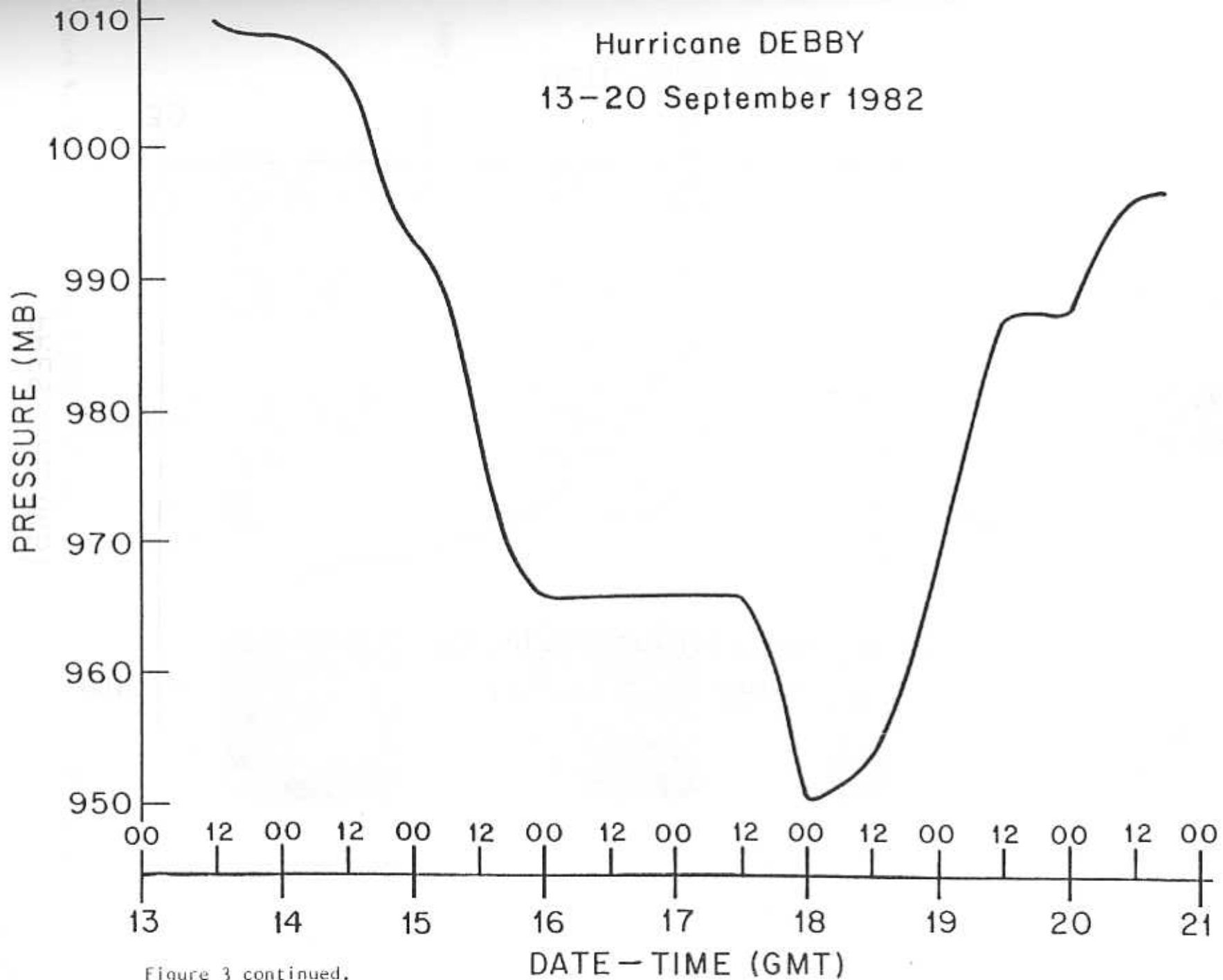


Figure 3 continued.