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DEPARTMENT OF INTERIOR-DEPARTMENT OF TRANSPORTATION

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Prepared by
THE BOMAP OFFICE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
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N71-32766

Introduction

Effective February 1, 1971, a temporary BOMEX archive will be operational to service requests for some 26 processed BOMEX data products. Not all BOMEX data have been assembled. The temporary archive represents data selected by BOMAP that were acquired from the fixed-ship, aircraft, and island-based acquisition systems under the operational control of the BOMEX Field Headquarters. Various BOMEX principal investigators (responsible for experiments other than the BOMEX Core Experiment) acquired data during BOMEX, but these data will not be placed in the temporary archive since most are still in the possession of the investigators for processing and analysis.

The temporary archive is defined as such since it contains preliminary, unvalidated data that are being made available at an early stage in the planned BOMAP processing activity. The temporary archive will be replaced by a permanent archive when the BOMAP data-processing cycle is finished (scheduled for mid-FY 1972). Validated data are defined by BOMAP as processed data for which the quality has been effectively demonstrated, and limitations as to space resolution, time resolution, and accuracy have been clearly documented. Such conclusive information is not available at this time due to the continuing BOMAP efforts in data-processing software development, scientific test computations, calibration studies, and intercomparison studies of data obtained from the various types of BOMEX acquisition platforms. Those requesting BOMEX data from the temporary archive should therefore be prepared to perform such quality and accuracy tests as required prior to use for scientific research. The BOMAP staff stands ready to assist in answering users' questions concerning the processing or quality of the temporary archive data products. (Phone Mr. DeVer Colson, (301) 496-8871.)

Description of the Temporary Archive Data Products

Table 1.0 lists the data products available through the temporary archive. This table defines the acquisition platform or location where the data were obtained, specifies the archive product as observed data or support documents for use in evaluating the observed data, and the form in which these data products can be obtained from the temporary archive. A description of each archive data type and associated data products follows. Examples of some of these data were shown in BOMEX Bulletins Nos. 7 and 8.

Fixed-Ship Rawinsonde Data. These data are the processed rawinsonde observations for all four BOMEX Observation Periods resulting from the "A_o" data reduction process accomplished by NASA's Mississippi Test Facility (NASA/MTF). These data are available only by ship observation period (i.e., all rawinsonde observations at 1½-to-3-hour intervals and processed for one fixed-ship for one BOMEX Observation Period) in the form of one magnetic tape or a single 100-ft reel of 35-mm microfilm. In either form the data represent a time series of 5-sec data points (averaged over 5 sec) from launch to termination of processing. The magnetic tape is written in BCD (binary coded decimal) and organized so that one rawinsonde observation comprises one file of all the processed 5-sec averages for that observation. The microfilm consists of two types of presentation: a tabulation of 5-sec data points for a rawinsonde observation and a graphic display (plot) of temperature, relative humidity, u-component (west-east) of the wind, and v-component (south-north) of the wind versus pressure in millibars.

Radiometersonde Data. These data represent the BOMEX radiometersonde observations processed from strip-chart records by Dr. P. Kuhn, Atmospheric Physics and Chemistry Laboratory, ERL, NOAA, Boulder, Colorado. The observations were made from the fixed ships Discoverer, Rainier, and Rockaway, and a location near Paragon House on the island of Barbados. The data are presented as punched-card images written on magnetic tape and are available either on magnetic tape or as computer tabulation, by observation, of the entire radiometersonde file recorded on archive magnetic tape. Each punched-card image (one magnetic tape record) contains the processed parameters of pressure, time, temperature, IR radiation (up, down, and net), radiative cooling (warming) rate, and relative humidity.

Boom Surface Meteorological Measurements. These data represent the processed boom surface meteorological data (acquired approximately 10 m above sea level) that were automatically recorded on SCARD (signal conditioning and recording device) from the boom surface pressure sensor and ship's gyro aboard the five fixed ships at 30-sec interaals. The NASA/MTF-produced data data contain the parameters of wind speed relative to ship, true wind direction, dry-bulb temperature, wet-bulb temperature, relative humidity, sea-surface temperature, IR radiation (incident, reflected, and net from the Discoverer, Rainier, and Rockaway only), ship's true heading, and sea-level pressure. The data are archived as 30-sec samples in time series on magnetic tape and tabulated by BOMEX Observation Day on 35-mm microfilm. One magnetic tape or reel of microfilm contains all processed boom data for one ship observation period. The BCD magnetic tape has multiple files, each one of which represents a day of boom observations, with each file containing a variable number of fixed length records. Also contained on 35-mm microfilm, and following the 30-sec time series data for a BOMEX Observation Period, are the 10-min and 30-min averages of the boom parameters.

BOMEX Marine Meteorological Observations. These data were visually obtained by shipboard observers on the five BOMEX fixed ships. The records are coded according to the coding techniques found in the Manual of Marine Meteorological Observations, Circular M. These observations were made approximately 10 m above sea surface at intervals of about 1½ to 3 hours to coincide with rawinsonde launches. The data are retrievable from the archive in the form of a BCD magnetic tape that contains a file of all fixed-ship BOMEX marine meteorological observations organized as punched-card image records or a computer tabulation of these observations from all ships for all BOMEX Observation Periods.

Surface Pressure - Marine Microbarograms. These are standard U.S. Department of Commerce, National Weather Service, microbarograms. The charts were maintained aboard the fixed ships *Oceanographer*, *Discoverer*, *Mt. Mitchell*, and *Rainier* with a maximum of 4 days of sea-level pressure data contained on each chart. The microbarograms from these ships for all four BOMEX Observation Periods are available on 35-mm microfilm.

Fixed-Ship Operations Data. These data pertain to ship operations: position, true heading, true speed, and indicated speed. They represent the only source presently available from which to derive ship motion corrections for wind observations (rawinsonde and surface wind) acquired during fixed-ship "drift and steam" periods. The data are available on 35-mm microfilm or magnetic tape.

BOMEX Fixed-Ship Event Log. The BOMEX Event Log is a plain-language record kept by the ship's personnel to document the chronology of a day's observation and operational activity. The sheets are a decided aid in evaluating data characteristics reflecting unusual activities or occurrences that are a function of the manner in which the fixed ships were operated or observations were taken. These sheets are available on 35-mm microfilm.

Discoverer Weather Radar Photographs. When the Selenia radar, Model Meteor 200, RMT-2S, was not used for tracking rawinsonde balloons, 35-mm photographs were taken routinely of the PPI (plan position indicator) on a VC-2 repeater displaying maximum ranges of up to 200-n-mi range. On the average, one photograph of weather activity was taken every 144 sec. The data are available as duplicate reels of the original data. One reel of 35-mm microfilm contains approximately 2 days of *Discoverer* radar photographs..

Discoverer Weather Radar Log. This log describes the daily weather radar operations. Each page is labeled with date, data ID code, and page number. A new page was usually begun at the start of each GMT day. Each entry is prefaced by GMT time, frame number, and film roll number. The entries are:

a. Camera on or off with indication of photograph frequency.

b. Start to finish of attenuation-elevation sequence.

c. Change of photograph frequency.

d. Winding and setting of data chamber clock.

e. Calibration sequences.

f. Magazine changes.

g. Start or stop of precipitation on station.

h. Hourly synopsis of activity observed.

i. Error or changes in normal operations procedure.

j. Any other item the operator felt was significant to the project.

This log is available in 35-mm microfilm form.

Salinity/Temperature/Depth Data (STD 8 sps). These data represent BOMAP-processed data from the Bissett-Berman, Model 9006, STD sensor. The data are recorded in time series at eight (8) samples per second, consisting of time, pressure, temperature, and salinity on magnetic tape, with one cast forming one file on tape. The data are available as duplicates of multiple reels of magnetic tape that contain all STD casts for the Discoverer, Period IV, and/or the Oceanographer, Period IV. A tabulation is available as a computer listing of all files from one or more magnetic tapes. Other BOMAP-processed STD 8 sps data are not yet available. Processed data for other ships and observation periods will be placed in the temporary archive when processing is completed. Availability will be announced through the BOMEX Bulletins.

STD Support Data. These data contain surface and Nansen comparison (temperature and salinity) information for use in verifying the STD data. They are available in 80-column punched-card form or as a computer listing of the punched cards, representing all STD support data for all STD casts taken by the five fixed ships during BOMEX.

Radio Transmission Log for Salinity, Temperature, Depth, and Sound Velocity. These data for four casts per day during all BOMEX Observation Periods from all fixed ships are being supplied in lieu of the missing BOMAP STD 8 sps data. The data represent temperature and salinity values for the standard depths (0, 10, 20, 30, 50, 75, 100, 125, 150, 200, 300, 400, 600, 800, and 1000 m) and at significant depth levels. The procedure for selecting the data points from strip charts or STD plots followed the standard NODC (National Oceanographic Data Center) instructions for this log. The data are available on 35-mm microfilm. While the name of this archive item suggests sound velocity measurements were made, none were made by the fixed ships.

Sea Surface Temperature. Routine bucket temperatures were taken at 2-hour intervals from the fixed ships. The data were recorded on the standard Naval Oceanographic Office CTEM form. They are available on 35-mm microfilm.

RFF Aircraft Meteorological and Renavigated Flight Track Data. These data represent meteorological and navigation parameters acquired aboard the RFF (Research Flight Facility) aircraft during BOMEX. The renavigation processing was performed by NHRL (National Hurricane Research Laboratory) with calibration information provided by RFF. The data are available on magnetic tape. A computer tabulation of the parameters is also available for individual missions by individual aircraft.

RFF Flight Folder. A folder consisting of several individual logs was prepared by the flight crew for each RFF mission and contains a description of the flight plan and complete history of aircraft and data acquisition system operations. The logs document equipment operation, time checks, and malfunctions that pertain to the data. It is important for any user to review these logs when evaluating data from a mission. They are available on 35-mm microfilm.

RFF Radar Photographs. Radar PPI and RHI (range height indicator) photographs are available for selected days in 35-mm black and white negative film with synchronized time reference appearing on each frame. Data consist of multiple 100-ft reels of 35-mm film. The following types or radar data are available:

a. APS-20E (10 cm) PPI on DC-6 (40C).

b. WP-101 (5.6 cm) PPI on DC-6 (39C) and DC-6 (40C).

c. RDR-1D (3.2 cm) RHI on DC-6 (39C) and DC-6 (40C).

d. APS-42 (3.2 cm) PPI on DC-4 (82E).

RFF Aircraft Cloud Photographs. Photographic records of the cloud systems appearing along the flight tracks of the DC-6 (39C) and DC-6 (40C) missions are available as duplicates of multiple 800-ft reels (black and white, side camera) and 400-ft reels (color, nose camera). Descriptions of the photographs are as follows.

a. A 16-mm forward-viewing camera was time lapsed to expose one frame every 2 sec. The record is Ektachrome color with time-synchronized data chamber appearing on each frame.

b. Two 35-mm side-viewing cameras viewing 90° each side of the heading of the aircraft were time lapsed to expose one frame every 5 sec. The lenses were wide angle and film was black and white positive.

RFF Photographic Quality Review Log. Following the field phase of BOMEX, RFF personnel reviewed all cloud, photopanel, and radar film acquired aboard the RFF aircraft. These log sheets indicate the quality of the processed film, any discrepancies found, and corrections of discrepancies for each mission flown during May and June. These support data are available on 35-mm microfilm.

Navy and Air Force Aircraft RECCO Observations. On all flights during BOMEX, the participating Navy and Air Force aircraft took routine RECCO (Aerial Meteorological Reconnaissance Reports) observations at 5- to 10-min intervals in flight. The observations were logged in punched-card form and later written on magnetic tape by BOMAP. The tape contains a separate file for each aircraft (Navy WC-121, AF WB-47, AF RB-57, AF WC-130) with records written in punched-card image. Each aircraft file contains all RECCO observations in chronological order acquired by the aircraft during BOMEX. These data are available as a duplicate magnetic tape of all RECCO observations from all Navy and Air Force aircraft or as a computer tabulation of all RECCO observations for any one aircraft type.

Navy WC-121 Radar Photographs. These records are 35-mm black and white negatives of the AN/APS-20E radar PPI. The 10-cm radar photographs were not taken at regular intervals but only during disturbed conditions or when unusually large weather systems were present. The data are available as duplicates of the original 100-ft reel of 35-mm microfilm.

Air Force WB-47 Photographs. AF WB-47 aircraft flew weather radar surveillance almost daily during BOMEX Observation Periods I, II, and III. Radar data were obtained during Period IV but did not cover the BOMEX array. During Periods I, II, and III, tracks flown by the aircraft gave radar photos time lapsed sufficiently to overlap successive photos and provide complete coverage of the entire BOMEX array. These data are available as duplicates of the original film, with a 100-ft reel of film corresponding to one WB-47 radar mapping mission.

Air Force WC-130 Dropsonde Data. Day and night reconnaissance missions were flown by the WC-130 aircraft during Periods I, II, and III. On each of these missions, eight dropsondes were released from 20,000 ft, four along each diagonal of the BOMEX array. Comparison missions were also flown, during which eight sondes were dropped over the Mt. Mitchell. The observations were evaluated according to standard Air Force tolerances and instructions. These evaluated data are available in the form of punched-card images as one of five files on a magnetic tape. Duplicates of the entire tape or a computer tabulation of all dropsonde data contained in the dropsonde file are available.

U.S. Army Island Radar Photographs. An AN/MPS-34 van-mounted weather radar was located at Hackleton's Cliff, Barbados. Routine 35-mm photos were taken of the PPI at intervals of 5 to 15 min during all four BOMEX Observation Periods These data are available in multiples of 100-ft reels of 35-mm negative film.

"Weather Radar Investigations on the BOMEX." This is the title of a publication that documents the contents of each reel of island radar film, contains a quality review of each reel, and describes operational and calibration procedures, results, and other significant information for film interpretation. Listed as Research and Development Technical Report ECOM-3329, "Weather Radar Investigations on the BOMEX," by Michael D. Hudlow, Sept. 1970, the document should be ordered by users from Federal Agencies from

Defense Documentation Center
Attn: UNC-TCA
Cameron Station (Bldg. 5)
Alexandria, Virginia 22314,

and by users from non-Government groups from

National Technical Information Service
Springfield, Virginia 22151.

Island Rawinsonde Data. At a location near the BOMEX Field Headquarters, Paragon House, on the island of Barbados, the U.S. Air Force Air Weather Service's 6th Mobile Weather Squadron obtained upper air soundings daily. Two or more rawinsondes were launched and the data evaluated. These data are available as duplicates of the adiabatic charts (DOD-WPC 9-31A, Adiabatic) and Winds Aloft Computation Sheets (WEBAN 20).

Hughes ATS-3 Data (Period IV). For BOMEX Observation Period IV, July 11 to 28, Hughes Aircraft Company, Aerospace Group, Space Systems Division, moved the ATS ground station from Mojave, California, to Barbados for the reception of ATS-3 satellite pictures. Duplicates of these negatives, acquired approximately every 20 min or so, are available in positive form.

As explained above, the temporary archive has been established for one purpose only: to distribute selected BOMEX data upon request in the form(s) in which the data are stored in the BOMAP Data Center. If the procedures outlined below are followed, the material required to satisfy a data request will usually be shipped within 2 weeks after receipt of the order.

Tables To Be Used In Preparing Data Request; Ordering Procedures; and Costs.

Various tables of information have been compiled to standardize requests for BOMEX data. These tables also provide the user with information concerning the approximate quantity of data available for each BOMEX Observation Day, the contents of the archive products, and cost of duplication to be borne by the user. A description of the tables and their use in preparing a data request follows.

Table 2-0.--Reference Information to Aid in Preparation of a Data Request. The Temporary BOMEX Data Archive consists of two types of data: Observed Data and the Support Data required to interpret or evaluate a particular observed-data product. Table 2-0 was compiled to insure that the user is aware of all support data for an observed-data type. The user should keep in mind that most of the temporary archive products are the results of initial processing steps that are being used by BOMAP to produce the final data-processing system design. Also shown in table 2-0 are the minimum quantities of an observed-data type and the corresponding support data that can be supplied by the archive. For each observed-data type and support-data type, the appropriate columns in table 2-0 refer to the other tables to be used by the requester in selecting desired observation periods or dates, and to specify the desired archive product(s) and the appropriate support data on the data request.

Tables 2-1 through 2-8.--These tables provide information on the availability of each observed-data type by BOMEX Observation Day. The tables are organized by acquisition platform or location. The information shown is a summary of the approximate observation frequency or quantity available. The tables are the source from which the user will define the observation period or dates for the data desired.

Tables 3-0 through 3-11.-- These tables provide the ordering specifications, inventory of each available archive product, and duplication cost.

If the user is not familiar with the BOMEX data, the first step is to request only the temporary archive documentation (see table 3-0). Reading this documentation is of particular importance to users contemplating ordering BOMEX data in magnetic-tape form. All magnetic tapes containing archive data products were placed in the archive in the most convenient format to BOMAP and the respective archive. This format may or may not be compatible with the user's computer system. All magnetic-tape formats are fully described in the archive documentation. All costs, shown in tables 3-0 through 3-11, for magnetic tapes (i.e., $60.00 per reel), are for a one-to-one duplication in the archive format. Any other desired format must first be cost-estimated prior to ordering data. Having reviewed the archive documentation and possibly consulted the BOMAP Staff with regard to questions posed by the documentation, the user should proceed as follows:

a. Using table 2-0, note the support data required for an observed-data type and the minimum quantity of the desired observed-data product(s) that can be supplied.

b. Define the desired observation period or dates for which data are required for the research need at hand. This can be done for each acquisition platform or location from the appropriate table in tables 2-1 through 2-8.

Having defined the desired data product(s) and time period from tables 2-1 through 2-8, select and list from tables 3-0 through 3-11 the order number or order designation found in the far left column of each table or specifications described in the footnotes in the appropriate table, along with the description of contents for the data products desired. To eliminate any possible confusion in processing of a data request, the list of requested items should be organized in the same order as they are found in tables 3-0 through 3-11, i.e., the data products selected from table 3-0 should be listed first, then items selected from table 3-1, and so forth. In some cases, a user may find that more data must be ordered than is necessary. Do not specify less than the stated minimum quantity (see table 2-0) since the retrieval cost and duplication cost will be that of the minimum quantity. A sample data request is shown in figure 1.

Tables 3-0 through 3-11 include the duplication cost of one copy for each selected data product. The cost to the user is the sum of the individual costs for one copy of each of the data products selected. For multiple copies of any data product, multiply the duplication cost for one copy by the number of desired copies.

Advance payment is required for all work done for non-Federal institutions or agencies, private firms, universities, or individuals. All work done for other Federal agencies will be on a reimbursable basis. Requests from other countries should be accompanied by a check drawn on a United States bank, if practicable, or a United States Branch of a foreign bank, and payable in United States currency.

The minimum charge per order is $3.00. Prices include shipping cost by usual "best way." Special shipping can be arranged upon request, at cost.

A few radar and microfilm reels contain less than 100 ft of film. This has been considered in establishing the overall cost of the copies and the full price is charged for each reel, regardless of its length.

Although the meteorological data are stored in the National Climatic Center (NCC), Environmental Data Service (EDS), and the oceanographic data in the National Oceanographic Data Center (NODC), EDS, a procedure has been developed within EDS that requires only a single request in response to which the user will receive information or data from both archives, if required.

Data requests or requests for information regarding data should be directed to Mr. Arthur I. Cooperman, Chief, Marine Branch, Office of Data Information, Environmental Data Service, NOAA, Silver Spring, Md., 20910. Make checks payable to "Department of Commerce, NOAA."

Mr. Arthur I. Cooperman, Chief
Marine Branch
Office of Data Information
Environmental Data Service, NOAA
Silver Spring, Maryland 20910

Dear Mr. Cooperman:

Please send me the following from the temporary BOMEX archive:

1. Reels B0752, B0753, B0760, and B0754 of Boom Surface Meteorological Measurements for the Discoverer for the period May 7 through July 28, on magnetic tape, 7-channel, BCD, 800 BPI, and DOC.-1, containing the following support data: Complete documentation for all data products in temporary archive; BOMEX Fixed-Ship Event Logs; and tabulation of all fixed-ship operations data.

2. Magnetic tape B3405, containing all RECCO Observations by the Navy and Air Force aircraft during the four BOMEX Observation Periods, and Listing of Dropsonde File from tape B9622 (computer printout) for Air Force WC-130. (Support data, consisting of archive documentation, ordered under 1. above.)

3. Reels 1 through 5, non-registered copy, of AN/MPS-34 Island Radar Data on microfilm for the period May 3 - May 15. (Per your instructions, will order the support data, "Weather Radar Investigations on the BOMEX" from the National Technical Information Service.)

Enclosed please find my check for $369.00 made out to "Department of Commerce, NOAA."

Thank you for your kind attention.

Sincerely,

Figure 1.--Sample Data Request

Table 1-0.--Contents of the Temporary BOMEX Data Archive

Name of BOMEX Data Archive Product	Name of BOMEX Acquisition Platform or Location From Which Data Were Acquired	Observed Data or Support Data for Evaluating observed Data	Available Form(s) of Archive Products: Magnetic Tape	Listing of Magnetic Tape Contents or File	Punched Cards	35-mm Microfilm	Remarks
Fixed-Ship Rawinsonde Data	All fixed ships	Observed	X			X	
Radiometersonde Data	Fixed ships (*Rainier*, *Discoverer*, & *Rockaway* only) and Island of Barbados (Paragon House)	Observed	X	X			
Boom Surface Meteorological Measurements	All fixed ships	Observed	X			X	
BOMEX Marine Meteorological Observations	All fixed ships	Observed	X	X			
Surface Pressure -- Marine Microbarograph	*Oceanographer*, *Discoverer*, *Rainier*, & *Mt. Mitchell*	Observed				X	
Fixed-Ship Operations Data	All fixed ships	Support	X			X	
BOMEX Fixed-Ship Event Log	All fixed ships	Support				X	
Discoverer Weather Radar Photographs	Fixed ship *Discoverer*	Observed				X	
Discoverer Weather Radar Log	Fixed ship *Discoverer*	Support				X	
Salinity/Temperature/Depth Data (STD 8 sps)	Fixed ship *Oceanographer* & *Discoverer*	Observed	X	X			
STD Support Data	All fixed ships	Support		X (Listing of punched cards)	X		

Table 1-0 (Continued)

Name of BOMEX Data Archive Product	Name of BOMEX Acquisition Platform or Location From Which Data Were Acquired	Observed Data or Support Data for Evaluating observed Data	Available Form(s) of Archive Products				Remarks
			Magnetic Tape	Listing of Magnetic Tape Contents or File	Punched Cards	35-mm Microfilm	
Radio Transmission Log for Salinity, Temperature, Depth & Sound Velocity	All fixed ships	Observed				X	
Sea Surface Temperature	All fixed ships	Observed				X	
RFF Aircraft Meteorological and Renavigated Flight Track Data	RFF DC-6 (39C), DC-6 (40C), and DC-4 (82E) aircraft	Observed	X	X			
RFF Flight Folder	RFF DC-6 (39C), DC-6 (40C), and DC-4 (82E) aircraft	Support				X	
RFF Radar Photographs	RFF DC-6 (39C), DC-6 (40C), and DC-4 (82E) aircraft	Observed				X	
RFF Aircraft Cloud Photographs	RFF DC-6 (39C) & RFF DC-6 (40C) aircraft	Observed					Data available as duplicates of multiple 400-ft reels of color film & 800-ft reels of black and white film
RFF Photographic Quality Review Log	RFF DC-6 (39C), DC-6 (40C), and DC-4 (82E) aircraft	Support				X	
Navy and Air Force Aircraft RECCO Observations	Navy WC-121, AF WB-47, AF RB-57, and AF WC-130 aircraft	Observed	X	X			
Navy WC-121 Radar Photographs	Navy WC-121 aircraft	Observed				X	
Air Force WB-47 Radar Photographs	Air Force WB-47	Observed				X	

Table 1-0 (Continued)

Name of BOMEX Data Archive Product	Name of BOMEX Acquisition Platform or Location From Which Data Were Acquired	Observed Data or Support Data for Evaluating observed Data	Available Form(s) of Archive Products				Remarks
			Magnetic Tape	Listing of Magnetic Tape Contents or File	Punched Cards	35-mm Microfilm	
Air Force WC-130 Dropsonde Data	Air Force WC-130	Observed	X	X			
U.S. Army Island Radar Photographs	Island of Barbados	Observed				X	
"Weather Radar Investigations on the BOMEX"	Island of Barbados	Support					Obtainable from Defense Documentation Center or National Technical Information Service
Island Rawinsonde	Paragon House, Island of Barbados	Observed					Available as hard copies of the Adiabatic Chart and Winds Aloft Computation Sheets for each sounding.
Hughes ATS-3 Data (Period IV)	Paragon House, Island of Barbados	Observed					Available as duplicates of original negatives in positive form.

Table 2-0.--Reference Information to Aid in Preparation of Data Request

Observed Data	Determine Availability of Observed Data from Table Number in This Column	Support Data Required to Use and/or Evaluate the Observed Data	Minimum Quantity of Observed Data Products Available	Specify Observed Data Type from Table Number in This Column	Minimum Quantity of Support Data Available	Specify Support Data from Table Number in This Column
Fixed-Ship Rawinsonde Data	Tables 2-1 through 2-5 for the appropriate fixed ship	1. Complete Archive Documentation 2. BOMEX Fixed-Ship Event Log 3. Fixed-Ship Operations Data	Magnetic tape: Duplicate of one magnetic tape containing rawinsonde observations for one ship observation period Microfilm: Duplicate of one reel of 35-mm film contain all rawinsondes for one ship observation period	Table 3-1	Microfilm: Duplicate of one reel of 35-mm film containing the 3 support data items listed in third column	Table 3-0
Radiometersonde Data	Tables 2-1 through 2-5 for the appropriate fixed ship	1. Complete Archive Documentation 2. BOMEX Fixed-Ship Event Log 3. Fixed-Ship Operations Data	Magnetic tape: Duplicate of one tape containing radiometersonde file Tabulated form: Complete listing of contents of radiometersonde file	Table 3-2	Microfilm: Duplicate of one reel of 35-mm film containing the 3 support data items listed in third column.	Table 3-0
Boom Surface Meteorological Observations	Tables 2-1 through 2-5 for the appropriate fixed ship.	1. Complete Archive Documentation 2. BOMEX Fixed-Ship Event Log 3. Fixed-Ship Operations Data	Magnetic tape: Duplicate of one magnetic tape containing all boom observations for one ship observation period. Microfilm: Duplicate of one reel of 35-mm film containing all boom observations for one ship observation period	Table 3-3	Microfilm: Duplicate of one reel of 35-mm film containing the 3 support items listed in third column.	Table 3-0

Ship observation period - All observations of the appropriate type from any one of the five fixed ships for one BOMEX Observation Period (14 to 18 days).

Table 2-0 (Continued)

Observed Data	Determine Availability of Observed Data from Table Number in This Column	Support Data Required to Use and/or Evaluate the Observed Data	Minimum Quantity of Observed Data Products Available	Specify Observed Data Type from Table Number in This Column	Minimum Quantity of Support Data Available	Specify Support Data from Table Number in This Column
BOMEX Marine Meteorological Observations	Tables 2-1 through 2-5 for the appropriate fixed ship	1. Complete Archive Documentation	Magnetic tape: Duplicate of a magnetic tape contains these data as one file Tabulated form: Complete listing of marine meteorological observations file from magnetic tape	Table 3-4	Microfilm: Duplicate of one reel of 35-mm film containing the support data item	Table 3-0
Surface Pressure-Marine Microbarograms	Tables 2-1 through 2-5 for the appropriate fixed ship	1. Marine Microbarograph Archive Documentation	Microfilm: Duplicate of one reel of 35-mm film containing all microbarograms from the four fixed ships	Table 3-4	Microfilm: Duplicate of one reel of 35-mm film containing the support data item	Table 3-0
Discoverer Weather Radar Photographs	Table 2-4	1. Complete Archive Documentation 2. BOMEX Fixed-Ship Event Log 3. Fixed-Ship Operations Data 4. Discoverer Weather Radar Log	Microfilm: Duplicate of one 35-mm reel containing approximately 2 days of radar photos	Table 3-7	Microfilm: Duplicates of two reels of 35-mm film; one reel contains the first three support data items and the second contains the radar log	Table 3-0
Salinity/Temperature/Depth Data (STD 8 SPS) (continued on next page)	Table 2-1 and 2-4	1. Complete Archive Documentation 2. BOMEX Fixed-Ship Event Log	Magnetic tape: Duplicate of one magnetic tape containing all casts from one ship for 3-6 BOMEX days	Table 3-5	Microfilm: Duplicate of one 35-mm reel containing first three support data items.	Table 3-0 for first three items

Ship observation period - All observations of the appropriate type from any one of the five fixed ships for one BOMEX Observation Period (14 to 18 days).

Table 2-0 (Continued)

Observed Data	Determine Availability of Observed Data from Table Number in This Column	Support Data Required to Use and/or Evaluate the Observed Data	Minimum Quantity of Observed Data Products Available	Specify Observed Data Type from Table Number in This Column	Minimum Quantity of Support Data Available	Specify Support Data from Table Number in This Column
Salinity/Temperature/Depth Data (STD 8 SPS) (Con't)	(see preceding page)	3. Fixed-Ship Operations Data 4. Complete Archive Documentation	Tabulated form: Complete listing of one magnetic tape	(see preceding page)	Punched cards: Duplicate punched card deck for all STD support data Tabulated form: Listing of complete STD support data punched card deck.	Table 3-5 for STD support data
Radio Transmission Log for Salinity, Temperature, Depth, and Sound Velocity (No sound velocity observed)	Tables 2-1 through 2-4 for the appropriate fixed ship	1. Radio Transmission Log Archive Documentation	Microfilm: Duplicate of one 35-mm reel containing all radio transmission logs from all fixed ships during BOMEX	Tables 3-0 and 3-5	Microfilm: Duplicate of one 35-mm reel containing archive documentation	Table 3-0
Sea Surface Temperature (Navoceano CTEM Log)	Tables 2-1 through 2-4 for the appropriate fixed ship	1. CTEM Log Archive Documentation	Microfilm: Duplicate of one 35-mm reel containing all CTEM logs from all fixed ships during BOMEX.	Tables 3-0 and 3-5	Microfilm: Duplicate of one 35-mm reel containing archive documentation	Table 3-0
RFF Meteorological and Renavigated Flight Track Data	Table 2-6	1. Complete Archive Documentation 2. RFF Flight Folders	Magnetic tape: Duplicate of one magnetic tape containing data for one or two missions flown by one aircraft. Tabulated form: Listing of one mission by one aircraft from magnetic tape	Table 3-6	Microfilm: Duplicates of two 35-mm reels; one contains archive documentation and the other contains the flight folders	Table 3-0

Ship observation period - All observations of the appropriate type from any one of the five fixed ships for one BOMEX Observation Period (14 to 18 days).

Table 2-0 (Continued)

Observed Data	Determine Availability of Observed Data from Table Number in This Column	Support Data Required to Use and/or Evaluate the Observed Data	Minimum Quantity of Observed Data Products Available	Specify Observed Data Type from Table Number in This Column	Minimum Quantity of Support Data Available	Specify Support Data from Table Number in This Column
RFF Radar Photographs	Table 2-6	1. Complete Archive Documentation 2. RFF Photographic Quality Review Log 3. RFF Flight Folders	Microfilm: Duplicate of one 35-mm reel containing one mission by one RFF aircraft.	Table 3-7	Microfilm: Duplicates of two 35-mm reels; one contains the archive documentation and the other contains quality log and flight folders	Table 3-0
RFF Aircraft Cloud Photographs	Table 2-6	1. Complete Archive Documentation 2. RFF Photographic Quality Log 3. RFF Flight Folder	35-mm b/w film: Duplicate of one 800-ft reel of either right side or left side film containing one or two missions flown by one aircraft 16-mm color film: Duplicate of one 400-ft reel containing one or more missions flown by one aircraft	Table 3-8	Microfilm: Duplicates of two 35-mm reels; one contains archive documentation and the other contains the quality logs and flight folders	Table 3-0
Navy and Air Force Aircraft Recco Observations	Table 2-7	1. Complete Archive Documentation	Magnetic tape: Duplicate of one magnetic tape containing all RECCO observations by all Navy and Air Force aircraft Tabulated form: Complete listing of all observations by one Navy or Air Force aircraft type (WC-130, WC-121, etc.)	Table 3-9	Microfilm: Duplicate of one 35-mm reel containing archive documentation.	Table 3-0

Ship observation period - All observations of the appropriate type from any one of the five fixed ships for one BOMEX Observation Period (14 to 18 days).

Table 2-0 (Continued)

Observed Data	Determine Availability of Observed Data from Table Number in This Column	Support Data Required to Use and/or Evaluate the Observed Data	Minimum Quantity of Observed Data Products Available	Specify Observed Data Type from Table Number in This Column	Minimum Quantity of Support Data Available	Specify Support Data from Table Number in This Column
Navy WC-121 Radar Photographs	Table 2-7	1. Complete Archive Documentation	Microfilm: Duplicate of one 35-mm reel containing one or more aircraft missions	Table 3-7	Microfilm: Duplicate of one 35-mm reel containing archive documentation	Table 3-0
Air Force WB-47 Radar Photographs	Table 2-7	1. Complete Archive Documentation	Microfilm: Duplicate of one 35-mm reel containing all radar photos from one WB-47 mission	Table 3-7	Microfilm: Duplicate of one 35-mm reel containing archive documentation.	Table 3-0
Air Force WC-130 Dropsonde Data	Table 2-7	1. Complete Archive Documentation	Magnetic tape: Duplicate of one magnetic tape containing all dropsonde observations as one of several files Tabulated form: Complete listing of dropsonde file from magnetic tape	Table 3-9	Microfilm: Duplicate of one 35-mm reel containing archive documentation	Table 3-0
U. S. Army Island Radar Photographs	Table 2-8	1. "Weather Radar Investigations on the BOMEX"	Microfilm: Duplicate of one 35-mm reel containing 1 to 3 days of radar photos	Table 3-7	A publication available from Defense Documentation Center or National Technical Information Service	(See text describing contents of temporary archive for address to request publication)

Ship observation period - All observations of the appropriate type from any one of the five fixed ships for one BOMEX Observation Period (14 to 18 days).

Table 2-0 (Continued)

Observed Data	Determine Availability of Observed Data from Table Number in This Column	Support Data Required to Use and/or Evaluate the Observed Data	Minimum Quantity of Observed Data Products Available	Specify Observed Data Type from Table Number in This Column	Minimum Quantity of Support Data Available	Specify Support Data from Table Number in This Column
Island Rawinsonde Observations	Table 2-8	1. Complete Archive Documentation	Manuscript: Hard-copy reproduction of adiabatic chart and upper air computation sheet for one observation	Table 3-10	Microfilm: Duplicate of one reel of 35-mm film containing archive documentation	Table 3-0
Hughes ATS-3 Data (Period IV)	Table 2-8	1. Complete Archive Documentation	Photograph (positive transparency): Duplicate of one ATS-3 "full earth" negative in positive form	Table 3-11	Microfilm: Duplicate of one 35-mm reel containing archive documentation	Table 3-0

Ship observation period - All observations of the appropriate type from any one of the five fixed ships for one BOMEX Observation Period (14 to 18 days).

Table 2-1.--Fixed-Ship Observed Data Availability
Ship: Oceanographer

Date CY 1969 Calendar Date	Date CY 1969 Julian Day	Fixed-Ship Rawinsonde Data. No. of Observations	Radiometersonde Data. No. of Observations	Boom Surface Meteorological Measurements. No. of Hrs.	BOMEX Marine Meteorological Observations. No. of Observations	Surface Pressure--Marine Microbarogram. No. of Charts	Discoverer Weather Radar Photographs. No. of Photos	Salinity/Temperature/Depth Data (STD 8 sps). No. of Casts	Radio Transmission Log for STD. No. of Casts	Sea Surface Temperature No. of Observations
May 1	121					1				
2	122					1				
3	123	12		20	16	1			5	11
4	124	14		19	15	1			4	14
5	125	8		20	11	1			4	13
6	126	3		20	14	1			4	12
7	127	6		22	10	1			4	12
8	128			2	1	1				
9	129	7		22	9	1			4	12
10	130	14		23	13	1			3	10
11	131	15		24	15	1			4	11
12	132	13		23	14	1			3	9
13	133	13		23	15	1			4	15
14	134	5		19	7	1			3	13
15	135	1			2	1			1	22
16	136					1				8
17	137									
18	138									
19	139									
20	140									
21	141									
22	142					1				6
23	143					1			2	24
24	144	2		23	4	1			1	17
25	145	10		22	13	1			4	12
26	146	8		23	15	1			4	13
27	147	7		20	14	1			3	11
28	148	11		20	14	1			5	13
29	149	1		2	1	1				
30	150	5		22	8	1			4	13
31	151	11		22	13	1			4	12

Table 2-1 (Continued)
Ship: Oceanographer

Date CY 1969		Fixed-Ship Rawinsonde Data. No. of Observations	Radiometersonde Data. No. of Observations	Boom Surface Meteorological Measurements. No. of Hrs.	BOMEX Marine Meteorological Observations. No. of Observations	Surface Pressure--Marine Microbarogram. No. of Charts	*Discoverer* Weather Radar Photographs. No. of Photos	Salinity/ Temperature/ Depth Data (STD 8 sps). No. of Casts	Radio Transmission Log for STD. No. of Casts	Sea Surface Temperature No. of Observations
Calendar Date	Julian Day									
June 1	152	14		23	15	1			4	12
2	153	10		22	15	1			4	12
3	154	13		22	15	1			3	12
4	155	12		22	13	1			4	12
5	156	1		1	1	1				
6	157	5		22	9	1			4	12
7	158	13		22	15	1			4	12
8	159	3		22	8	1			4	12
9	160	13		22	15	1			3	12
10	161	3		7	4	1			2	4
11	162					1				
12	163									
13	164									
14	165									
15	166									
16	167									
17	168									
18	169									
19	170					1				7
20	171	1			1	1			1	21
21	172	3		21	8	1			2	13
22	173	12		22	4	1			4	13
23	174	11		22	14	1			4	12
24	175	14		22	15	1			4	12
25	176	12		22	15	1			4	12
26	177	9		22	13	1			4	12
27	178	1		2	1	1				
28	179	9		22	12				4	12
29	130	13		22	15				4	12
30	131	5		11	5				2	5

Table 2-1 (Continued)
Ship: Oceanographer

Date CY 1969 Calendar Date	Date CY 1969 Julian Day	Fixed-Ship Rawinsonde Data. No. of Observations	Radiometer-sonde Data. No. of Observations	Boom Surface Meteorological Measurements. No. of Hrs.	BOMEX Marine Meteorological Observations. No. of Observations	Surface Pressure--Marine Microbarogram. No. of Charts	Discoverer Weather Radar Photographs. No. of Photos	Salinity/Temperature/Depth Data (STD 8 sps). No. of Casts	Radio Transmission Log for STD. No. of Casts	Sea Surface Temperature No. of Observations
July 1	182									
2	183									
3	184									
4	185									
5	186									
6	187									
7	188									
8	189									
9	190									
10	191					1				5
11	192					1		2	2	24
12	193	3		14	5	1		6	2	17
13	194	6		22	8	1		8	3	14
14	195	3		22	8	1		4	4	12
15	196	1		21	7	1		3	3	13
16	197	1		2	1	1				
17	198	3		23	8	1		7	4	6
18	199	8		22	8	1		7	4	20
19	200	7		23	8	1		9	4	14
20	201	8		22	8	1		8	4	14
21	202	6		22	8	1		9	4	14
22	203	6		22	8	1		8	4	14
23	204	7		22	8	1		9	4	14
24	205			14	4	1		2	2	7
25	206	8		20	8	1		7	2	6
26	207	4		22	8	1		9	4	22
27	208	4		16	7	1		8	3	17
28	209	6			7	1		7		24
29	210	2						2		15

Table 2-2.--Fixed-Ship Observed Data Availability
Ship: Rainier

Date CY 1969 Calendar Date	Date CY 1969 Julian Day	Fixed-Ship Rawinsonde Data. No. of Observations	Radiometersonde Data. No. of Observations	Boom Surface Meteorological Measurements. No. of Hrs.	BOMEX Marine Meteorological Observations. No. of Observations	Surface Pressure--Marine Microbarogram. No. of Charts	Discoverer Weather Radar Photographs. No. of Photos	Salinity/Temperature/Depth Data (STD 8 sps). No. of Casts	Radio Transmission Log for STD. No. of Casts	Sea Surface Temperature No. of Observations
May 1	121	2		7	9	1				
2	122	3		17	15	1				10
3	123	12	1	18	15	1				13
4	124	13	2	19	15	1				13
5	125	4	2	17	8	1				12
6	126	13	1	22	15	1				12
7	127	6	1	23	11	1				12
8	128					1				
9	129	7	1	23	10	1				12
10	130	14	1	21	15	1				12
11	131	12	1	21	15	1				12
12	132	13	1	22	15	1				12
13	133	13	1	22	15	1				12
14	134	4	2	18	8	1				14
15	135									
16	136									
17	137									
18	138									
19	139									
20	140									
21	141									
22	142					1				
23	143					1				
24	144	7	1	21	10	1			4	10
25	145	9	2	21	14	1			4	12
26	146	9	1	22	15	1			4	11
27	147			21	14	1			3	18
28	148	2		21	14	1			3	6
29	149			1		1				12
30	150	4	1	21	8	1			4	12
31	151	10	2	21	14	1			4	12

Table 2-2 (Continued)
Ship: Rainier

Date CY 1969 Calendar Date	Julian Day	Fixed-Ship Rawinsonde Data. No. of Observations	Radiometersonde Data. No. of Observations	Boom Surface Meteorological Measurements. No. of Hrs.	BOMEX Marine Meteorological Observations. No. of Observations	Surface Pressure--Marine Microbarogram. No. of Charts	Discoverer Weather Radar Photographs. No. of Photos	Salinity/ Temperature/ Depth Data (STD 8 sps). No. of Casts	Radio Transmission Log for STD. No. of Casts	Sea Surface Temperature No. of Observations
June 1	152	14	1	22	15	1			4	12
2	153	13	1	22	15	1			4	12
3	154	13	1	21	15	1			4	12
4	155	11		22	13	1			4	12
5	156			1		1				12
6	157	4	2	22	10	1			4	12
7	158	9	1	21	15	1			2	12
8	159	2	1	21	8	1			4	12
9	160	10	1	22	15	1			3	12
10	161			9	4	1			1	4
11	162									
12	163									
13	164									
14	165									
15	166									
16	167									
17	168									
18	169									
19	170					1				6
20	171	1	1		1	1				24
21	172	1	1	21	8	1			3	12
22	173	12		22	14	1			3	12
23	174	14	1	22	15	1			4	12
24	175	15	2	22	16	1			4	12
25	176	14	1	22	15	1			3	12
26	177	11		21	13	1			4	12
27	178			1		1				12
28	179	7	2	23	13	1			4	12
29	180	13	1	21	15	1			3	12
30	181	12	1	22	15	1			3	12

Table 2-2 (Continued)
Ship: Rainier

Date CY 1969		Fixed-Ship Rawinsonde Data. No. of Observations	Radiometersonde Data. No. of Observations	Boom Surface Meteorological Measurements. No. of Hrs.	BOMEX Marine Meteorological Observations. No. of Observations	Surface Pressure--Marine Microbarogram. No. of Charts	Discoverer Weather Radar Photographs. No. of Photos	Salinity/Temperature/Depth Data (STD 8 sps). No. of Casts	Radio Transmission Log for STD. No. of Casts	Sea Surface Temperature No. of Observations
Calendar Date	Julian Day									
July 1	182	11	1	22	14	1			4	12
2	183			13	4				3	6
3	184									
4	185									
5	186									
6	187									
7	188									
8	189									
9	190									8
10	191					1			2	24
11	192	3	1	12	6	1			1	15
12	193	4	1	20	8	1			4	12
13	194	7	1	21	8	1			4	12
14	195	5	1	21	8	1			3	12
15	196	2		21	7	1			2	16
16	197	1	1	2	1	1				4
17	198	4	2	22	8	1			4	11
18	199	6	2	21	8	1			4	12
19	200	6	2	21	8	1			4	12
20	201	7	2	22	8	1			4	12
21	202	3	1	22	7	1			4	12
22	203	5	2	21	9	1			3	12
23	204	7	2	22	8	1			4	12
24	205	1		13	3	1			2	12
25	206	5	1	19	8	1			3	12
26	207	4	1	22	8	1			4	12
27	208	5	1	21	8	1			4	12
28	209	6		22	7	1			4	12
29	210								2	24
30	211									10

Table 2-3.--Fixed-Ship Observed Data Availability
Ship: Mt. Mitchell

Date CY 1969		Fixed-Ship Rawinsonde Data. No. of Observations	Radiometersonde Data. No. of Observations	Boom Surface Meteorological Measurements. No. of Hrs.	BOMEX Marine Meteorological Observations. No. of Observations	Surface Pressure--Marine Microbarogram. No. of Charts	Discoverer Weather Radar Photographs. No. of Photos	Salinity/Temperature/Depth Data (STD 8 sps). No. of Casts	Radio Transmission Log for STD. No. of Casts	Sea Surface Temperature No. of Observations
Calendar Date	Julian Day									
May 1	121									
2	122	1		2	2	1				
3	123	13		19	15	1			2	12
4	124	7		12	9	1			3	6
5	125	3		14	7	1			3	11
6	126	11		19	14	1			3	12
7	127	6		23	12	1			4	12
8	128			1		1				
9	129	7		23	12	1			4	12
10	130	13		23	15	1			4	12
11	131	15		23	15	1			4	12
12	132	10		23	15	1			4	12
13	133	12		23	15	1			4	12
14	134	3		21	8	1			3	12
15	135			6						
16	136									
17	137									
18	138									
19	139									
20	140									
21	141									
22	142									
23	143					1			2	5
24	144	5		22	9	1			4	11
25	145	9		22	14	1			4	12
26	146	6		20	14	1			4	12
27	147	12		20	15	1			4	12
28	148	11		23	14	1			4	12
29	149			1						
30	150	5		20	9	1			4	12
31	151	10		19	12	1			4	12

Table 2-3 (Continued)
Ship: Mt. Mitchell

Date CY 1969 Calendar Date	Julian Day	Fixed-Ship Rawinsonde Data. No. of Observations	Radiometersonde Data. No. of Observations	Boom Surface Meteorological Measurements. No. of Hrs.	BOMEX Marine Meteorological Observations. No. of Observations	Surface Pressure--Marine Microbarogram. No. of Charts	Discoverer Weather Radar Photographs. No. of Photos	Salinity/Temperature/Depth Data (STD 8 sps). No. of Casts	Radio Transmission Log for STD. No. of Casts	Sea Surface Temperature No. of Observations
June 1	152	14		20	15	1			4	12
2	153	12		23	14	1			4	12
3	154	11		21	15	1			3	12
4	155	14		22	14	1			4	12
5	156			1		1				
6	157	6		19	10	1			4	12
7	158	10		22	15	1			3	12
8	159	4		23	7	1			4	12
9	160	15		22	16	1			4	12
10	161	3		7	3	1			2	3
11	162									
12	163									
13	164									
14	165									
15	166									
16	167									
17	168									
18	169									
19	170									1
20	171					1				11
21	172	4		4	8	1			4	12
22	173	10		21	15	1			4	12
23	174	12		22	16	1			4	12
24	175	11		23	14	1			4	12
25	176	14		23	15	1			4	12
26	177	11		23	13	1			4	12
27	178			1		1				
28	179	8		21	12	1			4	12
29	180	7		23	15	1			3	12
30	181	12		23	14	1			4	12

Table 2-3 (Continued)
Ship: Mt. Mitchell

Date CY 1969		Fixed-Ship Rawinsonde Data. No. of Observations	Radiometersonde Data. No. of Observations	Boom Surface Meteorological Measurements. No. of Hrs.	BOMEX Marine Meteorological Observations. No. of Observations	Surface Pressure--Marine Microbarogram. No. of Charts	*Discoverer* Weather Radar Photographs. No. of Photos	Salinity/Temperature/Depth Data (STD 8 sps). No. of Casts	Radio Transmission Log for STD. No. of Casts	Sea Surface Temperature No. of Observations
Calendar Date	Julian Day									
Jul 1	182	11		23	14	1				
2	183	1		14	5	1				
3	184									
4	185									
5	186									
6	187									
7	188									
8	189									
9	190									
10	191					1			4	11
11	192	1		2	1	1			1	1
12	193	1		9	3	1			1	5
13	194	8		21	8	1			4	12
14	195	5		21	7	1			4	12
15	196	6		23	7	1			4	12
16	197			1		1				
17	198	4		21	8	1			4	12
18	199	8		22	8	1			4	12
19	200	6		22	8	1			3	12
20	201	7		23	8	1			4	12
21	202	5		23	8	1			4	12
22	203	6		23	8	1			4	12
23	204	7		23	7	1			4	12
24	205	1		12	4	1			2	6
25	206	6		20	7	1			3	12
26	207	4		22	7	1			4	12
27	208	5		23	8	1			4	12
28	209	6		12	8	1			6	12
29	210	2				1			3	9

Table 2-4.--Fixed-Ship Observed Data Availability
Ship: Discoverer

Date CY 1969 Calendar Date	Date CY 1969 Julian Day	Fixed-Ship Rawinsonde Data. No. of Observations	Radiometersonde Data. No. of Observations	Boom Surface Meteorological Measurements. No. of Hrs.	BOMEX Marine Meteorological Observations. No. of Observations	Surface Pressure--Marine Microbarogram. No. of Charts	Discoverer Weather Radar Photographs. No. of Photos	Salinity/Temperature/Depth Data (STD 8 sps). No. of Casts	Radio Transmission Log for STD. No. of Casts	Sea Surface Temperature No. of Observations
May 1	121									
2	122									
3	123					1				
4	124					1				
5	125					1				
6	126					1				
7	127	6		21	11	1			4	12
8	128	1	1	1		1				
9	129	7	1	22	10	1			4	12
10	130	6		20	16	1			4	12
11	131	10	1	20	15	1			4	13
12	132	9	2	22	15	1			4	12
13	133	8	1	23	15	1			4	12
14	134	3	3	22	9	1			4	12
15	135				1	1				
16	136									
17	137									
18	138									
19	139									
20	140									
21	141									
22	142					1				
23	143					1				
24	144	8	1	5	10	1	890		3	10
25	145					1	354			11
26	146					1				4
27	147	7	1	15	13	1	335		3	10
28	148	8		22	13	1	519		3	11
29	149	1	1	1	1	1	685			
30	150	2	1	14	6	1	479		4	12
31	151	10	1	19	12	1	496		4	12

Table 2-4 (Continued)
Ship: Discoverer

Date CY 1969		Fixed-Ship Rawinsonde Data. No. of Observations	Radiometersonde Data. No. of Observations	Boom Surface Meteorological Measurements. No. of Hrs.	BOMEX Marine Meteorological Observations. No. of Observations	Surface Pressure--Marine Microbarogram. No. of Charts	Discoverer Weather Radar Photographs. No. of Photos	Salinity/Temperature/Depth Data (STD 8 sps). No. of Casts	Radio Transmission Log for STD. No. of Casts	Sea Surface Temperature No. of Observations
Calendar Date	Julian Day									
June 1	152	14	1	23	15	1	484		4	12
2	153	14	1	22	13	1	511		4	6
3	154	13	1	21	15	1	493		4	10
4	155	12		22	13	1	512		4	10
5	156	1	1	2	1	1	250			
6	157	6	1	22	8	1	464		4	12
7	158	13	1	23	15	1	26		4	12
8	159	6	1	22	8	1			4	12
9	160	15	2	23	15	1			4	12
10	161	4		7	5	1			4	10
11	162					1				6
12	163					1				
13	164					1				
14	165									
15	166									
16	167									
17	168									
18	169						258			
19	170					1				4
20	171	1				1	55			12
21	172	1	1	21	8	1	512		4	12
22	173	10	1	23	16	1	381		2	12
23	174	15	1	21	14	1	454		4	12
24	175	10	1	21	15	1	387		4	12
25	176	15	1	22	15	1	518		4	12
26	177	11		21	13	1	620		4	6
27	178	1	1	1	1	1	1115			
28	179	8		21	12	1	638		2	
29	180	14	1	19	15	1	449		4	12
30	181	14	1	20	14	1	465		4	6

Table 2-4 (Continued)
Ship: Discoverer

Date CY 1969 Calendar Date	Julian Day	Fixed-Ship Rawinsonde Data. No. of Observations	Radiometersonde Data. No. of Observations	Boom Surface Meteorological Measurements. No. of Hrs.	BOMEX Marine Meteorological Observations. No. of Observations	Surface Pressure--Marine Microbarogram. No. of Charts	Discoverer Weather Radar Photographs. No. of Photos	Salinity/Temperature/Depth Data (STD 8 sps). No. of Casts	Radio Transmission Log for STD. No. of Casts	Sea Surface Temperature No. of Observations
July 1	182	10	1	17	14	1	542		4	12
2	183	2		14	4	1	419		3	4
3	184					1				6
4	185					1				
5	186					1				
6	187									
7	188									
8	189									
9	190					1				3
10	191					1			2	12
11	192	5	2	9	5	1	477	6	3	10
12	193	4	1	22	8	1	615	9	4	12
13	194	8	1	21	8	1	572	8	4	12
14	195	4	1	21	8	1	429	8	4	12
15	196	6		22	7	1	529	6	3	10
16	197	1	1	1	1	1	1072			
17	198	4	2	21	8	1	762	8	4	12
18	199	6	1	22	8	1	534	8	4	12
19	200	8	2	22	4	1	414	8	4	12
20	201	7		22	8	1	459	8	4	10
21	202	10	2	22	8	1	482	8	4	12
22	203	6	2	22	8	1	609	8	4	12
23	204	10	2	21	4	1	515	8	4	12
24	205	3	1	13	8	1	843	1	1	
25	206	9	1	19	8	1	634	7	3	12
26	207	4	3	22	8	1	783	5	3	12
27	208	4	2	22	8	1	657	5	4	12
28	209	9		20	1	1	397		1	

Table 2-5.--Fixed-Ship Observed Data Availability
Ship: Rockaway

Date CY 1969 Calendar Date	Date CY 1969 Julian Day	Fixed-Ship Rawinsonde Data. No. of Observations	Radiometersonde Data. No. of Observations	Boom Surface Meteorological Measurements. No. of Hrs.	BOMEX Marine Meteorological Observations. No. of Observations	Surface Pressure--Marine Microbarogram. No. of Charts	*Discoverer* Weather Radar Photographs. No. of Photos	Salinity/Temperature/Depth Data (STD 8 sps). No. of Casts	Radio Transmission Log for STD. No. of Casts	Sea Surface Temperature No. of Observations
May 1	121	1			14					
2	122	7	1		15					
3	123	7	2		15				4	12
4	124	10	1		15				4	12
5	125	4	2		8				4	12
6	126	8	2		15				4	12
7	127	4		18	11				4	12
8	128	1	1	8	8					
9	129	6	1	18	10				4	12
10	130	6	1	16	15				4	12
11	131	8	1	7	15				4	12
12	132	7	2	21	11				2	12
13	133	6		21	8				4	12
14	134	4	2	17	7				4	12
15	135	1			2				1	
16	136				1					
17	137									
18	138									
19	139									
20	140									
21	141									
22	142									
23	143		1							
24	144	4	1		7				1	6
25	145	2	1	9	9				4	12
26	146	6	1	22	8				4	12
27	147	3	1	22	8				4	12
28	148	6		22	7				4	12
29	149	1	1	1	5					
30	150	5	1	22	7				4	12
31	151	6	1	22	7				4	12

Table 2-5 (Continued)
Ship: Rockaway

Date CY 1969 Calendar Date	Julian Day	Fixed-Ship Rawinsonde Data. No. of Observations	Radiometersonde Data. No. of Observations	Boom Surface Meteorological Measurements. No. of Hrs.	BOMEX Marine Meteorological Observations. No. of Observations	Surface Pressure--Marine Microbarogram. No. of Charts	*Discoverer* Weather Radar Photographs. No. of Photos	Salinity/ Temperature/ Depth Data (STD 8 sps). No. of Casts	Radio Transmission Log for STD. No. of Casts	Sea Surface Temperature No. of Observations
June 1	152	8	1	23	8				5	12
2	153	6	1	22	7				2	12
3	154			2					1	4
4	155	4		13	5				2	17
5	156	1	1	1	1					6
6	157	6	1	22	7				4	12
7	158	8	1	22	8				4	12
8	159	3		23	6				4	12
9	160	9	2	22	9				4	12
10	161	2		8	2				4	12
11	162								2	
12	163									
13	164									
14	165									
15	166									
16	167									
17	168									
18	169									
19	170									
20	171	1	1		1					12
21	172	2	1	11	4				3	12
22	173	8	1	20	9				4	12
23	174	6	1	21	8				4	12
24	175	7	1	22	8				4	12
25	176	8	1	20	8				4	12
26	177	6		20	6				4	12
27	178	1	1	1	1					6
28	179	6	1	21	6				4	12
29	180	6	1	19	8				4	12
30	181	2	1	11	5				2	12

Table 2-5 (Continued)
Ship: Rockaway

Date CY 1969		Fixed-Ship Rawinsonde Data. No. of Observations	Radiometersonde Data. No. of Observations	Boom Surface Meteorological Measurements. No. of Hrs.	BOMEX Marine Meteorological Observations. No. of Observations	Surface Pressure--Marine Microbarogram. No. of Charts	Discoverer Weather Radar Photographs. No. of Photos	Salinity/ Temperature/ Depth Data (STD 8 sps). No. of Casts	Radio Transmission Log for STD. No. of Casts	Sea Surface Temperature No. of Observations
Calendar Date	Julian Day									
July 1	182	7	1	22	7				4	12
2	183	2		11	2				3	6
3	184									
4	185									
5	186									
6	187									
7	188									
8	189									
9	190								1	
10	191								3	12
11	192	5	2	18	5				4	12
12	193	4		19	4				4	12
13	194	7	1	22	8				4	12
14	195	4	1	22	5				4	12
15	196	6		21	6				4	11
16	197	1	1		1					6
17	198	2	2	8	5				4	12
18	199	8	3	21	8				4	12
19	200	8	2	22	8				4	12
20	201	7	2	23	8				4	15
21	202	9	3	22	9				4	12
22	203	6	2	22	6				4	13
23	204	8	1	23	8				3	13
24	205	2		12	2				2	6
25	206	7	1	23	8				3	12
26	207	4	1	22					4	12
27	208	5	1	22					4	12
28	209	5		17					1	12

Table 2-6.--RFF Aircraft Observed Data Availability

Date CY 1969		RFF DC-6 (39C)					RFF DC-6 (40C)						RFF DC-4 (82E)	
Calendar Date	Julian Day	Aircraft Meteorological and Re-navigated Flight Track Data. No. of Flight Hrs.	Radar RDR-1	Radar WP-101	Cloud Photos Side	Cloud Photos Nose	Aircraft Meteorological and Re-navigated Flight Track Data. No. of Flight Hrs.	Radar RDR-1	Radar WP-101	Radar APS-20	Cloud Photos Side	Cloud Photos Nose	Aircraft Meteorological and Re-navigated Flight Track Data. No. of Flight Hrs.	Radar APS-42
May 1	121													
2	122													
3	123													
4	124	7.7			X	X	11.8	X			X	X	11.6	X
5	125	7.3			X	X								
6	126													
7	127													
8	128													
9	129						6.3	X	X	X	X	X	6.2	X
10	130	8.3			X	X								
11	131	7.2			X	X	11.3	X		X	X	X	11.3	X
12	132	10.1	X	X	X	X	10.3	X			X	X		
13	133													
14	134	7.8			X	X								
15	135													
16	136													
17	137	5.3			X	X								
18	138													
19	139													
20	140													
21	141													
22	142	6.1			X	X								
23	143													
24	144	7.5			X	X								
25	145													
26	146	8.0			X	X	10.7	X	X		X	X	10.6	X
27	147	10.1			X	X	10.9	X	X		X	X	10.9	X
28	148													
29	149	3.5			X									
30	150													
31	151													

X - Radar or cloud photos taken.

Table 2-6 (Continued)

Date CY 1969		RFF DC-6 (39C)					RFF DC-6 (40C)						RFF DC-4 (82E)	
Calendar Date	Julian Day	Aircraft Meteorological and Renavigated Flight Track Data. No. of Flight Hrs.	Radar		Cloud Photos		Aircraft Meteorological and Renavigated Flight Track Data. No. of Flight Hrs.	Radar			Cloud Photos		Aircraft Meteorological and Renavigated Flight Track Data. No. of Flight Hrs.	Radar
			RDR-1	WP-101	Side	Nose		RDR-1	WP-101	APS-20	Side	Nose		APS-42
June 1	152	8.7			X	X	11.2		X		X	X	11.2	
2	153						11.1		X		X	X	11.1	
3	154	6.5			X	X	10.8		X		X	X	11.0	X
4	155													
5	156													
6	157													
7	158	12.7			X	X	11.0		X	X	X	X	12.6	X
8	159													
9	160	12.1			X	X	11.0		X	X	X	X	12.2	X
10	161													
11	162													
12	163													
13	164													
14	165													
15	166													
16	167													
17	168													
18	169													
19	170													
20	171													
21	172	5.0			X	X								
22	173	12.3			X	X	11.3	X	X		X	X	11.6	X
23	174	11.4					11.9	X	X				10.7	
24	175													
25	176	11.4					11.6	X					11.7	X
26	177													
27	178													
28	179	7.4			X	X							7.6	X
29	180	6.9			X	X	11.5	X			X	X	11.5	X
30	181	8.6			X	X	11.6	X			X	X		X

X - Radar or cloud photos taken.

Table 2-6 (Continued)

Date CY 1969		RFF DC-6 (39C)					RFF DC-6 (40C)						RFF DC-4 (82E)	
		Aircraft Meteorological and Renavigated Flight Track Data. No. of Flight Hrs.	Radar		Cloud Photos		Aircraft Meteorological and Renavigated Flight Track Data. No. of Flight Hrs.	Radar			Cloud Photos		Aircraft Meteorological and Renavigated Flight Track Data. No. of Flight Hrs.	Radar
Calendar Date	Julian Day		RDR-1	WP-101	Side	Nose		RDR-1	WP-101	APS-20	Side	Nose		APS-42
July 1	182													
2	183	8.3			X	X							8.8	X
3	184													
4	185													
5	186													
6	187													
7	188													
8	189													
9	190													
10	191													
11	192						11.3							
12	193													
13	194	10.8					10.7						5.3	
14	195	11.1					11.0							
15	196												5.7	
16	197													
17	198													
18	199	9.4					10.7						10.7	
19	200													
20	201	7.1					7.5							
21	202												5.0	
22	203													
23	204	11.1					10.1						11.2	
24	205													
25	206	12.3												
26	207	11.6					10.3						11.2	
27	208						0.6						3.6	
28	209	9.8												

X - Radar or cloud photos taken.

Table 2-7.--Navy and Air Force Aircraft Observed Data Availability

Date CY 1969		Navy WC-121		AF WB-47			AF WC-130			AF RB-57	
		RECCO Observations	Radar	RECCO Observations		Radar	RECCO Observations		Dropsonde Data	RECCO Observations	
Calendar Date	Julian Day	No. of Flight Hrs.	No. of Hrs.	Total Flight Hrs.	No. of Flights	No. of Hrs. of Observations	Total Flight Hrs.	Number of Flights	No. of Observations	Total Flight Hrs.	Number of Flights
May 1	121										
2	122										
3	123	9.7		13	2	4	11	1	4	6	1
4	124	11.4		12	2	5	14	2	16	5	1
5	125			11	2	6	19	2	8	7	1
6	126			12	2	3	23	3	4	5	1
7	127			11	2	6	10	1		5	1
8	128									5	1
9	129	12.9		12	2	3	10	1		6	1
10	130	10.8		11	2	5	11	1		5	1
11	131	12.5		11	2	4	18	2		5	1
12	132	11.1		11	2	5	18	2	8	5	1
13	133			6	1	5	27	3	21	5	1
14	134			13	2	6	10	1		6	1
15	135									6	1
16	136										
17	137										
18	138										
19	139										
20	140										
21	141										
22	142										
23	143										
24	144			6	1	5				11	2
25	145	1.1		7	1	4	8	1	8	5	1
26	146	18.4					15	2	16	5	1
27	147	9.6		6	1	4	16	2	16	5	1
28	148			6	1	3	28	4	24	5	1
29	149										
30	150			6	1	6				6	1
31	151	10.2		6	1	5	8	1	8	11	2

Table 2-7 (Continued)

Date CY 1969		Navy WC-121		AF WB-47			AF WC-130			AF RB-57	
		RECCO Observations	Radar	RECCO Observations		Radar	RECCO Observations		Dropsonde Data	RECCO Observations	
Calendar Date	Julian Day	No. of Flight Hrs.	No. of Hrs.	Total Flight Hrs.	No. of Flights	No. of Hrs. of Observations	Total Flight Hrs.	Number of Flights	No. of Observations	Total Flight Hrs.	Number of Flights
June 1	152	10.0		6	1	4	15	2	4	5	1
2	153	10.3		6	1	5	16	2	15	4	1
3	154	10.0		6	1	5	16	2	13	5	1
4	155			6	1	6	20	3	14	5	1
5	156										
6	157			6	1	4				5	1
7	158	21.0		6	1	4	8	1	8	5	1
8	159			5	1		16	2	14	5	1
9	160	21.00		6	1	6	15	2	14	5	1
10	161			6	1		7	1	8	5	1
11	162									7	1
12	163										
13	164										
14	165										
15	166										
16	167										
17	168										
18	169										
19	170										
20	171										
21	172			12	2	3	10	1		10	2
22	173	23.6		11	2		11	1	16	6	1
23	174	11.6		12	2	4	14	3	6	6	1
24	175			11	2	5	29	3	16	5	1
25	176	11.6		12	2	6	19	2	16	5	1
26	177			11	2	5	22	3	15	5	1
27	178									6	1
28	179			11	2	6	11	1	8	6	1
29	180	21.6		11	2	4	20	2	15	5	1
30	181	21.1		9	2	5	19	2	15	6	1

Table 2-7 (Continued)

Date CY 1969		Navy WC-121		AF WB-47			AF WC-130			AF RB-57	
		RECCO Observations	Radar	RECCO Observations		Radar	RECCO Observations		Dropsonde Data	RECCO Observations	
Calendar Date	Julian Day	No. of Flight Hrs.	No. of Hrs.	Total Flight Hrs.	No. of Flights	No. of Hrs. of Observations	Total Flight Hrs.	Number of Flights	No. of Observations	Total Flight Hrs.	Number of Flights
July 1	182			11	2	6	28	3	16	5	1
2	183			11	2		4	1	1	11	2
3	184						7	1	4		
4	185						2	1			
5	186										
6	187										
7	188										
8	189										
9	190										
10	191										
11	192										
12	193										
13	194			6	1	4	8	1	7	7	1
14	195	10.8	7	5	1	3	8	1		5	1
15	196			6	1	3	2	1		4	1
16	197										
17	198	10.1		5	1		10	1	3	6	1
18	199									6	1
19	200	11.6	11	6	1	5	10	1	11	5	1
20	201			7	1	4				5	1
21	202	5.1	5							5	1
22	203	9.0	9	5	1		8	1	13	5	1
23	204			6	1	6	6	1			
24	205										
25	206										
26	207	10.8	10	5	1	4	7	1	3	5	1
27	208			5	1		7	1	2	3	1
28	209			4	1	3	3	1		5	1

Table 2-8.-- Island Observed Data Availability

Date CY 1969		Island Radar Data	Island Upper Air Observations		Hughes ATS-3 Data
Calendar Date	Julian Day	No. of Hrs. of Operation	Rawinsonde No. of Observations	Radiometersonde No. of Observations	No. of Photos
May 2	122		1	1	
3	123	13	1	1	
4	124	3	1	1	
5	125	10	1	1	
6	126	15	1	1	
7	127	18	1	1	
8	128	8	1	1	
9	129	7	1	1	
10	130	18	1	1	
11	131	12	1	1	
12	132	21	2	2	
13	133	19	2	2	
14	134	17	1	2	
15	135	21	3	1	
16	136		2	2	
17	137		2	2	
18	138		2	2	
19	139		2		
20	140	3	2	1	
21	141	23	2		
22	142	23	2		
23	143	15	2		
24	144	9	1		
25	145	11	2		
26	146	21	2		
27	147	19	3		
28	148	13	1		
29	149	16	2		
30	150	21	2		
31	151	22	2		

Table 2-8 (Continued)

Date CY 1969		Island Radar Data	Island Upper Air Observations		Hughes ATS-3 Data
Calendar Date	Julian Day	No. of Hrs. of Operation	Rawinsonde No. of Observations	Radiometersonde No. of Observations	No. of Photos
June 1	152	23	2	2	
2	153	17	2	2	
3	154	20	2	2	
4	155	16	2	2	
5	156	22	2	2	
6	157	21	2	2	
7	158	18	2	2	
8	159	17	2	2	
9	160	19	2	2	
10	161	9	2	2	
11	162		2	2	
12	163		2	2	
13	164		2	2	
14	165		2	2	
15	166	10	2	2	
16	167	23	3	2	
17	168	16	2	2	
18	169	22	2	2	
19	170	21	2	2	
20	171	19	2	2	
21	172	18	2	2	
22	173	15	2	2	
23	174	17	2	2	
24	175	23	2	2	
25	176	22	2	2	
26	177	15	2	2	
27	178	20	2	2	
28	179	18	2	2	
29	180	14	2	2	
30	181	22	2	2	

Table 2-8 (Continued)

Date CY 1969		Island Radar Data	Island Upper Air Observations		Hughes ATS-3 Data
Calendar Date	Julian Day	No. of Hrs. of Operation	Rawinsonde No. of Observations	Radiometersonde No. of Observations	No. of Photos
July 1	182	17	2	2	
2	183		2	2	
3	184		2	2	
4	185		2	2	
5	186		2	2	
6	187		2	2	
7	188		2	2	
8	189	13	2	2	
9	190	22	2	2	
10	191	19	2	2	3
11	192	12	2	2	11
12	193	21	2	2	13
13	194	21	2	2	16
14	195	9	2	2	6
15	196	14	2	2	15
16	197	17	2	2	
17	198	21	2	2	9
18	199	21	2	2	17
19	200	21	4	4	7
20	201	12	4	4	18
21	202	20	4	4	15
22	203	22	4	4	23
23	204	20	4	4	11
24	205	22	2	2	15
25	206	21	4	4	13
26	207	19	4	4	27
27	208	10	4	4	23
28	209		3	3	6

Table 3-0.--Temporary Archive Documentation Inventory

Reel Designation for Ordering	Contents of Reel	Duplication Cost	Availability Date for Distribution
DOC.-1	A. Complete documentation for all data products in temporary archive [1] B. BOMEX Fixed-Ship Event Logs C. Tabulation of all fixed-ship operations data [2]	$9.00	2/1/71
DOC.-2	A. RFF Photographic Quality Review Log B. RFF Flight Folders	$9.00	2/1/71
DOC.-3	A. Discoverer Weather Radar Log B. Surface Pressure - Marine Microbarograms C. Sea Surface Temperature Logs (NAVOCEANO CTEM Logs)	$9.00	2/1/71
DOC.-4	A. Radio Transmission Logs for Salinity, Temperature, Depth, and Sound Velocity	$9.00	2/1/71

[1] Copy of the complete documentation only is available on request in microfiche form. Cost is $1.30.

[2] Fixed-ship operations data are also available on magnetic tape B9622 as one of five data files on this tape. Specify tape B9622, and one of the following: (A) 7 Channel; BCD; 200, 556, or 800 BPI, or (B) 9 Channel; EBDIC; 800 BPI. Cost is $60.00 (includes cost of magnetic tape).

Table 3-1.--Fixed-Ship Rawinsonde Data Inventory

Order by Reel Number in This Column	Name of Ship	Archived Form of Data [1]	Recorded Format of Data	BOMEX Observation Period	Date and Time of First Observation, 1969		Date and Time of Last Observation, 1969		Duplication Cost	Availability Date for Distribution
					Date	Hr:Min	Date	Hr:Min		
B0723	Oceanographer	Magnetic Tape	Time series of processed rawinsonde 5-sec data points. Each rawinsonde observation is one tape file	I	May 3	0305	May 15	0256	$60.00 per magnetic tape (includes cost of reel)	2/1/71
B0724	"	"	"	II	May 24	1250	June 10	0600		"
B0725	"	"	"	III	June 21	2320	June 30	0901	"	"
B0726	"	"	"	IV	July 12	1129	July 29	0318	"	"
B0727	Rainier			I	May 1	1038	May 14	1754	"	"
B0728	"	"	"	II	May 24	0310	June 9	1644	"	"
B0729	"	"	"	III	June 21	2356	July 1	1920	"	"
B0730	"	"	"	IV	July 11	1141	July 28	2120	"	"
B0731	Mt. Mitchell			I	May 2	1907	May 14	1806	"	"
B0732	"	"	"	II	May 24	0306	June 10	0601	"	"
B0733	"	"	"	III	June 21	0114	July 2	0001	"	"
B0734	"	"	"	IV	July 11	0004	July 29	0627	"	"
B0735	Discoverer			I	May 7	0440	May 14	1759	"	"
B0736	"	"	"	II	May 24	0030	June 10	0742	"	"
B0737	"	"	"	III	June 20	2325	July 2	1123	"	"
B0738	"	"	"	IV	July 11	0129	July 28	2119	"	"
B0739	Rockaway			I	May 1	1159	May 15	0245	"	"
B0740	"	"	"	II	May 24	0259	June 10	0603	"	"
B0741	"	"	"	III	June 21	2323	July 2	1136	"	"
B0742	"	"	"	IV	July 11	0004	July 28	2029	"	"

[1] When ordering magnetic tape, specify (A) 7 Channel; BCD; 200, 556, or 800 BPI; or (B) 9 Channel; EBCDIC; 800 BPI.

Table 3-1 (Continued)

Order by Reel Number in This Column	Name of Ship	Archived Form of Data [1]	Recorded Format of Data	BOMEX Observation Period	Date and Time of First Observation, 1969		Date and Time of Last Observation, 1969		Duplication Cost	Availability Date for Distribution
					Date	Hr:Min	Date	Hr:Min		
LP400	Oceanographer	Microfilm	Listing that tabulates 5-sec data points for observation and plots of T, RH vs. P(mb) and U, V vs. P(mb).	I	May 3	0305	May 15	0256	$9.00 per reel	2/1/71
LP401	"	"	"	II	May 24	1250	June 10	0600	"	"
LP402	"	"	"	III	June 20	2320	June 30	0901	"	"
LP403	"	"	"	IV	July 12	1129	July 29	0318	"	"
LP404	Rainier			I	May 1	1038	May 14	1754	"	"
LP405	"	"	"	II	May 24	0310	June 9	1644	"	"
LP406	"	"	"	III	June 20	2356	July 1	1920	"	"
LP407	"	"	"	IV	July 11	1141	July 28	2120	"	"
LP408	Mt. Mitchell			I	May 2	1907	May 14	1806	"	"
LP409	"	"	"	II	May 24	0306	June 10	0601	"	"
LP410	"	"	"	III	June 21	0011	July 2	0001	"	"
LP411	"	"	"	IV	July 11	0004	July 27	0009	"	"
LP412	Discoverer			I	May 7	0440	May 14	1759	"	"
LP413	"	"	"	II	May 24	0030	June 10	0742	"	"
LP414	"	"	"	III	June 19	2325	July 2	1123	"	"
LP415	"	"	"	IV	July 11	0129	July 28	2119	"	"
LP416	Rockaway			I	May 1	1159	May 15	0245	"	"
LP417	"	"	"	II	May 24	0259	June 10	0603	"	"
LP418	"	"	"	III	June 20	2323	July 2	1136	"	"
LP419	"	"	"	IV	July 11	0428	July 28	1452	"	"

[1] When ordering magnetic tape, specify (A) 7 Channel; BCD; 200, 556, or 800 BPI; or (B) 9 Channel; EBCDIC; 800 BPI.

Table 3-2.-- Radiometersonde Data Inventory

Order by Designation in This Column	Contents	Duplication Cost	Availability Date for Distribution
B9622	Magnetic tape containing all observations from fixed ships _Discoverer_, _Rainier_, and _Rockaway_, and observations near Paragon House, Barbados[2]	$60.00 (includes cost of tape)	2/1/71
Printout of Radiometersonde File from tape B9622	Listing of entire Radiometersonde File from tape B9622	$15.00	2/1/71

[1] Radiometersonde data is only 1 of 5 files on this tape.

[2] When ordering magnetic tape, specify (A) 7 channel; BCD; 200, 556, or 800 BPI; or (B) 9 channel; EBCDIC; 800 BPI.

Table 3-3.--Boom Surface Meteorological Measurements Inventory

Order by Reel Number in This Column	Name of Ship	Archived Form of Data [1]	Recorded Format of Data	BOMEX Observation Period	Date and Time of First Observation, 1969		Date and Time of Last Observation, 1969		Duplication Cost	Availability Date for Distribution
					Date	Hr:Min	Date	Hr:Min		
B0743	Oceanographer	Magnetic Tape	Time series of 30-sec data points. One observation day is one tape file.	I	May 3	0003	May 15	0003	$60.00 per magnetic tape (includes cost of reel)	2/1/71
B0744	"	"	"	II	May 24	1236	June 10	2358	"	"
B0761	"	"	"	III	June 21	2322	June 30	2327	"	"
B0745	"	"	"	IV	July 11	1005	July 29	0000	"	"
B0746	Rainier	"	"	I	May 1	1004	May 14	2343	"	"
B0747	"	"	"	II	May 24	2332	June 10	2355	"	"
B0758	"	"	"	III	June 21	2356	July 1	2348	"	"
B0748	"	"	"	IV	July 11	0733	July 28	2315	"	"
B0749	Mt. Mitchell	"	"	I	May 3	0104	May 14	0003	"	"
B0750	"	"	"	II	May 24	2355	June 10	2359	"	"
B0759	"	"	"	III	June 21	2139	July 2	0000	"	"
B0751	"	"	"	IV	July 10	2340	July 28	2352	"	"
B0752	Discoverer	"	"	I	May 7	0104	May 15	2327	"	"
B0753	"	"	"	II	May 24	1700	June 10	2332	"	"
B0760	"	"	"	III	June 20	2349	July 2	2356	"	"
B0754	"	"	"	IV	July 11	1511	July 28	2320	"	"
B0755	Rockaway	"	"	I	May 2	0006	May 14	0750	"	"
B0756	"	"	"	II	May 24	2330	June 10	2328	"	"
B0762	"	"	"	III	June 21	2103	July 2	2317	"	"
B0757	"	"	"	IV	July 11	0517	July 28	2332	"	"

[1] When ordering magnetic tape, specify (A) 7 channel; BCD; 200, 556, or 800 BPI; or (B) 9 channel; EBCDIC; 800 BPI.

Table 3-3 (Continued)

Order by Reel Number in This Column	Name of Ship	Archived Form of Data [1]	Recorded Format of Data	BOMEX Observation Period	Date and Time of First Observation		Date and Time of Last Observation		Duplication Cost	Availability Date for Distribution
					Date	Hr:Min	Date	Hr:Min		
LB420	Oceanographer	35-mm Microfilm	Tabulation of 30-sec data points, 10-min averages, and 30-min averages by observation day.	I	May 3	0003	May 15	0430	$9.00 per reel	2/1/71
LB421	"	"	"	II	May 24	1236	June 10	1700	"	"
LB422	"	"	"	III	June 20	2322	June 30	1000	"	"
LB423	"	"	"	IV	July 11	1005	July 29	0430	"	"
LB424	Rainier	"	"	I	May 1	1004	May 14	2000	"	"
LB425	"	"	"	II	May 23	2332	June 10	0830	"	"
LB526	"	"	"	III	June 21	2356	July 1	2230	"	"
LB427	"	"	"	IV	July 11	0733	July 28	2300	"	"
LB428	Mt. Mitchell	"	"	I	May 3	0104	May 14	2330	"	"
LB429	"	"	"	II	May 23	2355	June 10	0630	"	"
LB430	"	"	"	III	June 22	2139	July 2	1330	"	"
LB431	"	"	"	IV	July 11	2340	July 28	1130	"	"
LB432	Discoverer	"	"	I	May 7	0104	May 15	0330	"	"
LB433	"	"	"	II	May 24	1700	June 10	0730	"	"
LB434	"	"	"	III	June 19	2349	July 2	1330	"	"
LB435	"	"	"	IV	July 11	1511	July 28	2200	"	"
LB436	Rockaway	"	"	I	May 2	0006	May 14	1730	"	"
LB437	"	"	"	II	May 23	2330	June 10	0730	"	"
LB438	"	"	"	III	June 20	2103	July 2	1230	"	"
LB439	"	"	"	IV	July 11	0517	July 28	1700	"	"

[1] When ordering magnetic tape, specify (A) 7 channel; BCD; 200, 556, or 800 BPI; or (B) 9 channel; EBCDIC; 800 BPI.

Table 3-4.--BOMEX Marine Meteorological Observations and Surface Pressure - Marine Microbarogram Data Inventory

Order by Designation in This Column	Archived Form of Data [1]	Observed Data Type	Description of Contents	Duplication Cost	Availability Date for Distribution
B9622	Magnetic tape.	BOMEX Marine Meteorological Observations	BOMEX Marine Meteorological Observations from all fixed ships for all Observation Periods as one file on tape	$60.00 (includes cost of tape)	2/1/71
Listing of Surface Observations File from tape B9622	Computer listing of magnetic tape file	BOMEX Marine Meteorological Observations	Printout of complete contents of BOMEX Marine Meteorological File from tape B9622	$15.00	2/1/71
DOC.-3 (see also table 3-1)	35-mm microfilm	Surface Pressure-Marine Microbarograms	This reel contains all Marine Microbarograms from the <u>Oceanographer</u>, <u>Rainier</u>, <u>Mt. Mitchell</u>, and <u>Discoverer</u> for all Observation Periods	$9.00	2/1/71

[1] When ordering magnetic tape, specify (A) 7 channel; BCD; 200, 556, or 800 BPI; or (B) 9 channel;EBCDIC; 800 BPI.

Table 3-5.--Fixed-Ship Salinity/Temperature/Depth and Sea Surface Temperature Observed Data Inventory

Order by Designation in This Column	Name of Ship	Archived Form of Data [1,2]	Contents	Date and Time of First Observation, 1969		Date and Time of Last Observation, 1969		Duplication Cost	Availability Date for Distribution
				Date	Hr:Min	Date	Hr:Min		
B9005	<u>Discoverer</u>	Magnetic tape	STD 8 sps Data for BOMEX Period IV	July 11	0558	July 17	2100	$60.00 per magnetic tape (includes cost of reel)	2/1/71
B9006	"	"	"	18	0000	23	2100		
B9007	"	"	"	24	0000	27	1520		
B9008	<u>Oceanographer</u>	"	"	11	1011	17	2111		
B9009	"	"	"	18	0056	21	2223		
B9010	"	"	"	22	0057	25	2123		
B9011	"	"	"	26	0056	29	0316		
DOC.-4 (see table 3-0)	<u>Oceanographer</u>, <u>Rainier</u>, <u>Mt. Mitchell</u>, <u>Discoverer</u>, and <u>Rockaway</u>	35-mm microfilm	This reel of microfilm contains all Radio Transmission Logs for Salinity/Temperature/Depth (one sheet per cast; four casts per ship per day in chronological order by ship)	May 1		July 28		$9.00	2/1/71
DOC.-3 (see table 3-0)	<u>Oceanographer</u>, <u>Rainier</u>, <u>Mt. Mitchell</u>, <u>Disooverer</u>, and <u>Rockaway</u>	35-mm microfilm	This reel of microfilm contains all CTEM Log sheets (two sheets per ship per day)	May 1		July 28		$9.00	2/1/71

[1] When ordering magnetic tape, specify (A) 7 channel; BCD; 556 or 800 BPI; or (B) 9 channel; EBCDIC; 800 BPI. (On special request, a 7 channel, BCD, 200 BPI magnetic tape copy is available at a cost of $180.00 per order number in the far left column.)

[2] A computer tabulation of all 8 sps data on one of the magnetic tapes (B9005 to B9011) is also available. When ordering a printout, specify magnetic tape number, ship's name, date and time of first observation and date and time of last observation. Example: "Listing of B9005, <u>Discoverer</u>, July 11/0558, July 17/2100." Cost is $30.00 per magnetic tape printout.

Table 3-5 (Continued)

Order by Designation in This Column	Name of Ship	Archived Form of Data [1,2]	Contents	Date and Time of First Observation, 1969		Date and Time of Last Observation, 1969		Duplication Cost	Availability Date for Distribution
				Date	Hr:Min	Date	Hr:Min		
STD Support Data in punched card form	Oceanographer, Rainier, Mt. Mitchell, Discoverer, and Rockaway	Punched cards	These cards contain all STD Support Data for all STD casts taken during BOMEX by all fixed ships (one punched card per STD cast)	May 1		July 28		$15.00	2/1/71
Listing of STD Support Data	Oceanographer, Rainier, Mt. Mitchell, Discoverer, and Rockaway	Computer printout	This is a computer tabulation of the STD data from punched cards for all STD casts taken during BOMEX by all fixed ships (one line per STD cast)	May 1		July 28		$5.00	2/1/71

[1] When ordering magnetic tape, specify (A) 7 channel; BCD; 556 or 800 BPI; or (B) 9 channel; EBCDIC; 800 BPI. (On special request, a 7 channel, BCD, 200 BPI magnetic tape copy is available at a cost of $180.00 per order number in the far left column.)

[2] A computer tabulation of all 8 sps data on one of the magnetic tapes (B9005 to B9011) is also available. When ordering a printout, specify magnetic tape number, ship's name, date and time of first observation and date and time of last observation. Example: "Listing of B9005, Discoverer, July 11/0558, July 17/2100." Cost is $30.00 per magnetic tape printout.

Table 3-6.--Magnetic Tape Inventory of RFF Meteorological and Renavigated Flight Tracks
Part 1: RFF DC-6 39C

Order by Reel Number in This Column[1,2]	Archived Form of Data	Mission Number	Type and Name of Aircraft	Date and Time of Start of Mission		Date and Time of End of Mission		Mission Name[3]	Duplication Cost	Availability Date for Distribution
				Calendar Date	Hr: Min. (GMT)	Calendar Date	Hr:Min. (GMT)			
B2830	Magnetic tape	690504A	DC-6 39C	May 4	1450	May 4	2143	Water vapor flux	$60.00 per magnetic tape (includes cost of reel)	3/8/71
B2830		690505A	"	5	1457	5	2051			"
B2831		690510A	"	10	0949	10	1743	"		"
B2831		690511A	"	11	1511	11	2127	"		"
B2832		690512A	"	12	1137	12	2125	LID-B		"
B2832		690514A	"	14	1216	14	1941	Water vapor flux	"	"
B2833		690517A	"	17	1409	17	1903		"	"
B2833		690522A	"	22	1743	22	2315		"	"
B2834		690524A	"	24	1842	25	0147	"	"	3/22/71
B2834		690526A	"	26	1452	26	2226	"	"	"
B2835		690527A	"	27	1321	27	2211	"	"	"
B2835		690529A	"	29	1946	29	2248	"	"	"
B2836		690601A	"	June 1	1312	June 1	1603	"	"	3/8/71
B2836		690601A	"	1	1705	1	2214	"	"	"
B2837		690603A	"	3	1314	3	1926	"	"	"
B2837		690607A	"	7	1005	7	2212	LID-C	"	"
B2838		690609A	"	9	1007	9	2147	"	"	"
B2838		690621A	"	21	1712	21	2147	Water vapor flux	"	"

1. Two separate RFF missions are written on one magnetic tape, except for those missions having only one reel number. A computer tabulation of the processed data for one mission flown by one RFF aircraft is also available. When ordering a tabulation, specify the reel number in the far left column and the mission number in the third column from the left. Example: "Listing of reel number, B2830, flight number, 690504A,". Cost of tabulation is $45.00 per mission.

2. When ordering magnetic tape, specify one of the following, along with reel number in far left column: (A) 7 Channel; BCD; 200, 556, or 800 BPI; or (B) 9 Channel; EBCDIC; 800 BPI.

3. No gust probe data are contained on the magnetic tapes for water vapor flux missions flown by RFF DC-6 39C. The data shown for these missions represent only the standard aircraft meteorological and navigation parameters. The gust probe data are being evaluated and will be placed in the temporary archive when available.

Table 3-6 (Continued)
Part 1: RFF DC-6 39C

Order by Reel Number in This Column[1,2]	Archived Form of Data	Mission Number	Type and Name of Aircraft	Date and Time of Start of Mission		Date and Time of End of Mission		Mission Name[3]	Duplication Cost	Availability Date for Distribution
				Calendar Date	Hr: Min. (GMT)	Calendar Date	Hr:Min. (GMT)			
B2839	Magnetic tape	690622A	DC-6 39C	June 22	1012	June 22	2207	LID-C	$60.00 per magnetic tape (includes cost of reel)	2/25/71
B2839		690623A	"	23	2212	24	0910	LIN-C		"
B2840		690625A	"	25	2245	26	0941	"		"
B2840		690628A	"	28	1327	28	2026	Radiation		"
B2841		690629A	"	29	1337	29	2005	Water vapor flux		"
B2841		690630A	"	30	1405	30	2215	WVF-LID-D	"	"
B2842		690702A	"	July 2	1234	July 2	2022	Radiation	"	"
B2842		690713A	"	13	1238	13	2221	ITCZ	"	"
B2843		690714A	"	14	1324	14	2354	Synoptic	"	"
B2843		690718A	"	18	1116	18	2013	Radiation	"	"
B2844		690720A	"	20	1520	20	2144	Cloud streets	"	"
B2844		690723A	"	23	1240	23	2319	ITCZ-Rad.	"	"
B2845		690725A	"	25	1011	25	2205	ITCZ-Recife	"	"
B2845		690726A	"	26	1310	27	0023	ITCZ-Return	"	"
B2846		690728A	"	28	1431	28	2400	Synoptic disturb.	"	"

1. Two separate RFF missions are written on one magnetic tape, except for those missions having only one reel number. A computer tabulation of the processed data for one mission flown by one RFF aircraft is also available. When ordering a tabulation, specify the reel number in the far left column and the mission number in the third column from the left. Example: "Listing of reel number, B2830, flight number, 690504A,". Cost of tabulation is $45.00 per mission.

2. When ordering magnetic tape, specify one of the following, along with reel number in far left column: (A) 7 Channel: BCD; 200, 556, or 800 BPI; or (B) 9 Channel; EBCDIC;-800 BPI.

3. No gust probe data are contained on the magnetic tapes for water vapor flux missions flown by RFF DC-6 39C. The data shown for these missions represent only the standard aircraft meteorological and navigation parameters. The gust probe data are being evaluated and will be placed in the temporary archive when available.

Table 3-6.--Magnetic Tape Inventory of RFF Meteorological and Renavigated Flight Tracks
Part 2: RFF DC-6 40C

Order by Reel Number in This Column[1,2]	Archived Form of Data	Mission Number	Type and Name of Aircraft	Date and Time of Start of Mission		Date and Time of End of Mission		Mission Name[3]	Duplication Cost	Availability Date for Distribution
				Calendar Date	Hr: Min. (GMT)	Calendar Date	Hr:Min. (GMT)			
B2847	Magnetic tape	690504B	DC-6 40C	May 4	1045	May 4	2156	MOD. LID	$60.00	3/8/71
B2847		690509B	"	9	1421	9	1955	Doppler comparison	per magnetic	"
B2848		690511B	"	11	1030	11	2010	LID-A	tape	"
B2848		690512B	"	12	1136	12	2125	"	(includes	"
B2849		690526B	"	26	1104	26	2113	"	cost of	"
B2849		690527B	"	27	1102	27	2120	"	reel)	"
B2850		690601B	"	June 1	1108	June 1	2150	"	"	"
B2850		690602B	"	2	1112	2	2139	"	"	"
B2851		690603B	"	3	1100	3	2127	"	"	"
B2851		690607B	"	7	1030	7	2106	LID-G	"	"
B2852		690609B	"	9	1034	9	2101	"	"	2/25/71
B2852		690622B	"	22	1034	22	2122	"	"	"
B2853		690623B	"	23	2213	24	0910	LIN-D	"	"
B2853		690625B	"	25	2246	26	0941	"	"	"
B2854		690629B	"	29	1014	29	2113	LID-C	"	"
B2854		690630B	"	30	1110	30	2215	"	"	"
B2855		690711B	"	July 11	1343	July 11	2126	ITCZ-crossing	"	3/22/71
B2855		690713B	"	13	1304	13	2236	ITCZ	"	"
B2856		690714B	"	14	1326	14	2358	Synoptic	"	2/25/71

1. Two separate RFF missions are written on one magnetic tape, except for those missions having only one reel number. A computer tabulation of the processed data for one mission flown by one RFF aircraft is also available. When ordering a tabulation, specify the reel number in the far left column and the mission number in the third column from the left. Example: "Listing of reel number, B2830, flight number, 690504A,". Cost of tabulation is $45.00 per mission.

2. When ordering magnetic tape, specify one of the following, along with reel number in far left column: (A) 7 Channel; BCD; 200, 556, or 800 BPI; or (B) 9 Channel; EBCDIC; 800 BPI.

3. No gust probe data are contained on the magnetic tapes for water vapor flux missions flown by RFF DC-6 39C. The data shown for these missions represent only the standard aircraft meteorological and navigation parameters. The gust probe data are being evaluated and will be placed in the temporary archive when available.

Table 3-6 (Continued)
Part 2: RFF DC-6 40C

Order by Reel Number in This Column[1,2]	Archived Form of Data	Mission Number	Type and Name of Aircraft	Date and Time of Start of Mission: Calendar Date	Date and Time of Start of Mission: Hr: Min. (GMT)	Date and Time of End of Mission: Calendar Date	Date and Time of End of Mission: Hr:Min. (GMT)	Mission Name[3]	Duplication Cost	Availability Date for Distribution
B2856	Magnetic tape	690718B	DC-6 40C	July 18	1118	July 18	2134	Radiation	$60.00 per magnetic tape (includes cost of reel)	2/25/71
B2857		690720B	"	20	1521	20	2228	Cloud-streets		"
B2857		690723B	"	23	1240	23	2227	ITCZ-Rad.		"
B2858		690726B	"	26	1011	26	2006	Synoptic disturb.		"

1. Two separate RFF missions are written on one magnetic tape, except for those missions having only one reel number. A computer tabulation of the processed data for one mission flown by one RFF aircraft is also available. When ordering a tabulation, specify the reel number in the far left column and the mission number in the third column from the left. Example: "Listing of reel number, B2830, flight number, 690504A,". Cost of tabulation is $45.00 per mission.

2. When ordering magnetic tape, specify one of the following, along with reel number in far left column: (A) 7 Channel; BCD; 200, 556, or 800 BPI; or (B) 9 Channel; EBCDIC; 800 BPI.

3. No gust probe data are contained on the magnetic tapes for water vapor flux missions flown by RFF DC-6 39C. The data shown for these missions represent only the standard aircraft meteorological and navigation parameters. The gust probe data are being evaluated and will be placed in the temporary archive when available.

Table 3-6.--Magnetic Tape Inventory of RFF Meteorological and Renavigated Flight Tracks
Part 3: RFF DC-4 82E

Order by Reel Number in This Column[1,2]	Archived Form of Data	Mission Number	Type and Name of Aircraft	Date and Time of Start of Mission		Date and Time of End of Mission		Mission Name[3]	Duplication Cost	Availability Date for Distribution
				Calendar Date	Hr: Min. (GMT)	Calendar Date	Hr:Min. (GMT)			
B2859	Magnetic tape	690504E	DC-4 82E	May 4	1045	May 4	2145	MOD. LID Doppler-compar.	$60.00 prt magnetic tape (includes cost of reel)	3/8/71
B2859		690509E	"	9	1421	9	1939			"
B2860		690511E	"	11	1029	11	2118	LID-B		"
B2860		690526E	"	26	1102	26	2112	"		"
B2861		690527E	"	27	1101	27	2119	"		"
B2861		690601E	"	June 1	1108	June 1	2146	"		"
B2862		690602E	"	2	1111	2	2139	"	"	"
B2862		690603E	"	3	1059	3	2127	"	"	"
B2863		690607E	"	7	1004	7	2112	LID-D	"	"
B2863		690609E	"	9	1007	9	2147	"	"	"
B2864		690622E	"	22	1012	22	2121	"	"	2/25/71
B2864		690623E	"	23	2253	24	0652	LIN-E	"	"
B2865		690625E	"	25	2234	26	0949	LIN-F	"	"
B2865		690628E	"	28	1327	28	2026	Radiation	"	"
B2866		690629E	"	29	1013	29	2112	LID-D	"	3/22/71
B2866		690702E	"	July 2	1233	July 2	2059	Radiation	"	"
B2867		690713E	"	13	1237	13	1658	ITCZ	"	2/25/71
B2867		690715E	"	15	0947	15	1502	Synoptic	"	"
B2868		690718E	"	18	1115	18	2126	Radiation	"	"

1. Two separate RFF missions are written on one magnetic tape, except for those missions having only one reel number. A computer tabulation of the processed data for one mission flown by one RFF aircraft is also available. When ordering a tabulation, specify the reel number in the far left column and the mission number in the third column from the left. Example: "Listing of reel number, B2830, flight number, 690504A,". Cost of tabulation is $45.00 per mission.

2. When ordering magnetic tape, specify one of the following, along with reel number in far left column: (A) 7 Channel; BCD; 200, 556, or 800 BPI; or (B) 9 Channel; EBCDIC; 800 BPI.

3. No gust probe data are contained on the magnetic tapes for water vapor flux missions flown by RFF DC-6 39C. The data shown for these missions represent only the standard aircraft meteorological and navigation parameters. The gust probe data are being evaluated and will be placed in the temporary archive when available.

Table 3-6 (Continued)
Part 3: RFF DC-4 82E

Order by Reel Number in This Column[1,2]	Archived Form of Data	Mission Number	Type and Name of Aircraft	Date and Time of Start of Mission		Date and Time of End of Mission		Mission Name[3]	Duplication Cost	Availability Date for Distribution
				Calendar Date	Hr: Min. (GMT)	Calendar Date	Hr:Min. (GMT)			
B2868	Magnetic tape	690721E	DC-4 82E	July 21	1312	July 21	1723	Subcloud layer	$60.00 per magnetic tape (includes cost of reel)	2/25/71
B2869		690723E	"	23	1239	23	2318	ITCZ-Rad.		"
B2869		690726E	"	26	0916	26	1959	Synoptic-disturb.		"
B2870		690727E	"	27	1339	27	1651	"		"

1. Two separate RFF missions are written on one magnetic tape, except for those missions having only one reel number. A computer tabulation of the processed data for one mission flown by one RFF aircraft is also available. When ordering a tabulation, specify the reel number in the far left column and the mission number in the third column from the left. Example: "Listing of reel number, B2830, flight number, 690504A,". Cost of tabulation is $45.00 per mission.

2. When ordering magnetic tape, specify one of the following, along with reel number in far left column: (A) 7 Channel; BCD; 200, 556, or 800 BPI; or (B) 9 Channel; EBCDIC; 800 BPI.

3. No gust probe data are contained on the magnetic tapes for water vapor flux missions flown by RFF DC-6 39C. The data shown for these missions represent only the standard aircraft meteorological and navigation parameters. The gust probe data are being evaluated and will be placed in the temporary archive when available.

Table 3-7.--Island, Discoverer, Air Force WB-47, Navy WC-121, RFF DC-6 39C, RFF DC-6 40C, and RFF DC-4 82E Radar Data Inventory

Order by Reel Number in This Column[1]	Type of Radar	Data Acquisition Unit	Date and Time of First Frame		Date and Time of Last Frame		Duplication Cost[2]		Availability Date for Distribution
			Calendar Date, 1969	Hr:Min (GMT)	Calendar Date, 1969	Hr: Min (GMT)	Registered	Non-Registered	
1	AN/MPS-34	Island radar	May 3	0100	May 6	1825	$20.00 per reel	$9.00 per reel	2/8/71
2	"	"	6	1825	9	2330	"	"	"
3	"	"	9	2330	12	2400	"	"	"
4	"	"	12	2400	13	2145	"	"	"
5	"	"	13	2145	15	1945	"	"	"
6	"	"	15	2000	23	0100	"	"	"
7	"	"	23	0245	23	2130	"	"	"
8	"	"	24	0730	24	2300	"	"	"
9	"	"	24	2300	26	0230	"	"	"
10	"	"	26	0230	26	2300	"	"	"
11	"	"	26	2300	28	1615	"	"	"
12	"	"	28	1700	30	1430	"	"	"
13	"	"	30	1420	31	1200	"	"	"
14	"	"	31	1145	June 1	1520	"	"	"
15	"	"	June 1	1520	2	0300	"	"	"
16	"	"	2	0305	2	1750	"	"	"
17	"	"	2	1750	3	0600	"	"	"
18	"	"	3	0615	3	1715	"	"	"
19	"	"	3	1730	4	2450	"	"	"
20	"	"	4	0450	4	2100	"	"	"
21	"	"	4	2100	6	1045	"	"	"
22	"	"	6	1045	7	0122	"	"	"
23	"	"	7	0122	7	1635	"	"	"
24	"	"	7	1725	8	1107	"	"	"
25	"	"	8	1107	9	0755	"	"	"

1 Radar film will be sent as a negative copy

2 When ordering radar film, specify registered or non-registered copy. Allow 3 weeks for delivery of registered and 2 weeks for delivery of non-registered film after receipt of request.

Table 3-7 (Continued)

Order by Reel Number in This Column [1]	Type of Radar	Data Acquisition Unit	Date and Time of First Frame: Calendar Date, 1969	Date and Time of First Frame: Hr:Min (GMT)	Date and Time of Last Frame: Calendar Date, 1969	Date and Time of Last Frame: Hr: Min (GMT)	Duplication Cost [2]: Registered	Duplication Cost [2]: Non-Registered	Availability Date for Distribution
26	AN/MPS-34	Island Radar	June 9	0830	June 10	0515	$20.00 per reel	$9.00 per reel	2/8/71
27	"	"	10	0515	10	1530	"	"	"
28	"	"	10	2340	19	1245	"	"	"
29	"	"	19	0650	20	1415	"	"	"
30	"	"	20	1415	21	0600	"	"	"
31	"	"	21	0600	21	2240	"	"	"
32	"	"	21	2340	23	1245	"	"	"
33	"	"	23	1245	25	0830	"	"	"
34	"	"	25	0830	26	0925	"	"	"
35	"	"	26	0925	27	1425	"	"	"
36	"	"	27	1435	28	0900	"	"	"
37	"	""	28	0915	29	0805	"	"	"
38	"	"	29	0815	29	2138	"	"	"
39	"	"	29	2138	30	2400	"	"	"
40	"	"	July 7	0115	July 1	2030	"	"	"
41	"	"	7	0930	9	1700	"	"	"
42	"	"	9	1700	10	1145	"	"	"
43	"	"	10	1145	11	1440	"	"	"
44	"	"	11	1450	12	2305	"	"	"
45	"	"	12	2315	13	2220	"	"	"
46	"	"	13	2235	15	0050	"	"	"
47	"	"	15	0050	16	0730	"	""	"
48	"	"	16	0720	17	1808	"	"	"
49	"	"	17	1808	18	1305	"	"	"
50	"	"	18	1305	19	0745	"	"	"

1 Radar film will be sent as a negative copy

2 When ordering radar film, specify registered or non-registered copy. Allow 3 weeks for delivery of registered and 2 weeks for delivery of non-registered film after receipt of request.

Table 3-7 (Continued)

Order by Reel Number in This Column [1]	Type of Radar	Data Acquisition Unit	Date and Time of First Frame		Date and Time of Last Frame		Duplication Cost [2]		Availability Date for Distribution
			Calendar Date, 1969	Hr:Min (GMT)	Calendar Date, 1969	Hr: Min (GMT)	Registered	Non-Registered	
51	AN/MPS-34	Island radar	July 19	0645	July 20	1805	$20.00 per reel	$9.00 per reel	2/8/71
52	"	"	20	1820	21	2230	"	"	"
53	"	"	21	2235	22	2200	"	"	"
54	"	"	22	2200	24	0900	"	"	"
55	"	"	24	0900	25	1520	"	"	"
56	"	"	25	1520	26	0705	"	"	"
57	"	"	26	0730	26	2330	"	"	"
58	"	"	26	2330	27	1200	"	"	"
59	Selenia	Discoverer	May 24	0230	May 27	2150	"	"	"
60	"	"	27	2200	29	1101	"	"	"
61	"	"	29	1945	June 1	1625	"	"	"
62	"	"	June 1	1645	4	2300	"	"	"
63	"	"	5	2309	7	2310	"	"	"
64	"	"	20	2320	24	0523	"	"	"
65	"	"	25	2130	27	1531	"	"	"
66	"	"	27	1531	29	0357	"	"	"
67	"	"	29	0406	July 2	0357	"	"	"
68	"	"	July 2	0439	13	0250	"	"	"
69	"	"	13	0303	16	0110	"	"	"
70	"	"	16	0115	17	1415	"	"	"
71	"	"	17	1416	20	1625	"	"	"
72	"	"	20	1725	23	1459	"	"	"
73	"	"	23	1440	25	1455	"	"	"

1 Radar film will be sent as a negative copy

2 When ordering radar film, specify registered or non-registered copy. Allow 3 weeks for delivery of registered and 2 weeks for delivery of non-registered film after receipt of request.

Table 3-7 (Continued)

Order by Reel Number in This Column [1]	Type of Radar	Data Acquisition Unit	Date and Time of First Frame: Calendar Date, 1969	Date and Time of First Frame: Hr:Min (GMT)	Date and Time of Last Frame: Calendar Date, 1969	Date and Time of Last Frame: Hr: Min (GMT)	Duplication Cost [2]: Registered	Duplication Cost [2]: Non-Registered	Availability Date for Distribution
74	Selenia	Discoverer	July 25	1618	July 27	1704	$20.00 per reel	$9.00 per reel	2/8/71
75	"	"	27	1720	28	2037			
	"	"							"
84	AN/APS-64	AF WB-47	May 3	1411	May 3	1813	"	"	"
76	"	"	4	1146	4	1637	"	"	"
77	"	"	5	1149	5	1726	"	"	"
78	"	"	6	1105	6	1359	"	"	"
79	"	"	7	1205	7	1741	"	"	"
80	"	"	9	1320	9	1620	"	"	"
81	"	"	11	1159	11	1623	"	"	"
82	"	"	13	1600	13	2103	"	"	"
83	"	"	14	1155	14	1730	"	"	"
85	"	"	24	0250	24	0940	"	"	"
86	"	"	25	1212	25	1620	"	"	"
87	"	"	27	1240	27	1635	"	"	"
88	"	"	28	1315	28	1620	"	"	"
89	"	"	30	1025	30	1735	"	"	"
90	"	"	31	1220	31	1731	"	"	"
91	"	"	June 1	1230	June 11	1640	"	"	"
92	"	"	2	1150	2	1625	"	"	"
93	"	"	3	1135	3	1625	"	"	"
94	"	"	4	1150	4	1725	"	"	"
95	"	"	6	1239	6	1630	"	"	"

1 Radar film will be sent as a negative copy

2 When ordering radar film, specify registered or non-registered copy. Allow 3 weeks for delivery of registered and 2 weeks for delivery of non-registered film after receipt of request.

Table 3-7 (Continued)

Order by Reel Number in This Column [1]	Type of Radar	Data Acquisition Unit	Date and Time of First Frame: Calendar Date, 1969	Date and Time of First Frame: Hr:Min (GMT)	Date and Time of Last Frame: Calendar Date, 1969	Date and Time of Last Frame: Hr: Min (GMT)	Duplication Cost [2]: Registered	Duplication Cost [2]: Non-Registered	Availability Date for Distribution
96	AN/APS-64	AF WB-47	June 7	1200	June 7	1530	$20.00 per reel	$9.00 per reel	2/8/71
97	"	"	9	1140	9	1740	"	"	"
98	"	"	21	1425	21	1720	"	"	"
99	"	"	22	1220	22	1612	"	"	"
100	"	"	23	1305	23	1635	"	"	"
102	"	"	24	2305	24	0340	"	"	"
101	"	"	25	1200	25	1755	"	"	"
103	"	"	26	1255	26	1820	"	"	"
104	"	"	28	1210	28	1740	"	"	"
105	"	"	29	1240	29	1630	"	"	"
106	"	"	30	1045	30	1720	"	"	"
107	"	"	July 1	1135	July 1	1735	"	"	"
109	"	"	13	1313	13	1708	"	"	"
110	"	"	14	1406	14	1724	"	"	"
111	"	"	15	1358	15	1710	"	"	"
108	"	"	26	1306	July 26	1724	"	"	"
117	AN/APS-20E	Navy VW-4 121	14	1354	July 14	1900	"	"	"
116	"	"	19	1450	26	2035	"	"	"
118	RDR-1	RFF DC-6 40C	May 4	1102	May 4	1705	"	"	"
119	"	"	4	1705	4	2150	"	"	"

[1] Radar film will be sent as a negative copy

[2] When ordering radar film, specify registered or non-registered copy. Allow 3 weeks for delivery of registered and 2 weeks for delivery of non-registered film after receipt of request.

Table 3-7 (Continued)

Order by Reel Number in This Column [1]	Type of Radar	Data Acquisition Unit	Date and Time of First Frame: Calendar Date, 1969	Date and Time of First Frame: Hr:Min (GMT)	Date and Time of Last Frame: Calendar Date, 1969	Date and Time of Last Frame: Hr: Min (GMT)	Duplication Cost [2]: Registered	Duplication Cost [2]: Non-Registered	Availability Date for Distribution
120	APS-42	RFF DC-4 82E	May 4	1043	May 4	1403	$20.00 per reel	$9.00 per reel	2/8/71
121	"	"	4	1403	4	1701	"	"	"
122	"	"	4	1701	4	2017	"	"	"
123	"	"	4	2017	4	2147	"	"	"
124	WP-101	RFF DC-6 40C	May 9	1418	9	1943	"	"	"
125	RDR-1	"	9	1418	9	1943	"	"	"
126	APS-20	"	9	1500	09	1752	"	"	"
127	APS-42	RFF DC-4 82E	9	1415	9	1942	"	"	"
128	APS-20	RFF DC-6 40C	11	1729	11	2004	"	"	"
129	RDR-1	"	11	1030	11	1743	"	"	"
130	"	"	11	1743	11	2113	"	"	"
131	APS-42	RFF DC-4 82E	11	1030	11	2015	"	"	"
132	"	"	11	2015	11	2115	"	"	"
133	WP-101	RFF DC-6 39C	12	1154	12	1805	"	"	"
134	"	"	12	1805	12	2125	"	"	"
135	RDR-1	"	12	1154	12	1805	"	"	"
136	"	"	12	1805	12	2125	"	"	"

1 Radar film will be sent as a negative copy

2 When ordering radar film, specify registered or non-registered copy. Allow 3 weeks for delivery of registered and 2 weeks for delivery of non-registered film after receipt of request.

Table 3-7 (Continued)

Order by Reel Number in This Column [1]	Type of Radar	Data Acquisition Unit	Date and Time of First Frame		Date and Time of Last Frame		Duplication Cost [2]		Availability Date for Distribution
			Calendar Date, 1969	Hr:Min (GMT)	Calendar Date, 1969	Hr: Min (GMT)	Registered	Non-Registered	
137	RDR-1	RFF DC-6 40C	May 12	1141	May 12	1839	$20.00 per reel	$9.00 per reel	2/8/71
138	"	"	12	1839	12	2037	"	"	"
139	WP-101	"	26	1109	26	1156	"	"	"
140	"	"	26	1156	26	1722	"	"	"
141	"	"	26	1722	26	2114	"	"	"
142	RDR-1	"	26	1109	26	1843	"	"	"
143	"	"	26	1843	26	2114	"	"	"
144	APS-42	RFF DC-4 82E	26	1101	26	2036	"	"	"
145	"	"	26	2036	26	2118	"	"	"
146	WP-101	RFF DC-6 40C	27	1337	27	2121	"	"	"
147	RDR-1	"	27	1108	27	1844	"	"	"
148	"	"	27	1844	27	2121	"	"	"
149	APS-42	RFF DC-4 82E	27	1103	27	1315	"	"	"
150	WP-101	RFF DC-6 40C	June 1	1109	June 1	1805	"	"	"
151	"	"	1	1805	1	2147	"	"	"
152	"	"	2	1132	2	1840	"	"	"
153	"	"	2	1840	2	2143	"	"	"
154	"	"	3	1106	3	1841	"	"	"
155	"	"	3	1841	3	2128	"	"	"

1 Radar film will be sent as a negative copy

2 When ordering radar film, specify registered or non-registered copy. Allow 3 weeks for delivery of registered and 2 weeks for delivery of non-registered film after receipt of request.

Table 3-7 (Continued)

Order by Reel Number in This Column [1]	Type of Radar	Data Acquisition Unit	Date and Time of First Frame		Date and Time of Last Frame		Duplication Cost [2]		Availability Date for Distribution
			Calendar Date, 1969	Hr:Min (GMT)	Calendar Date, 1969	Hr: Min (GMT)	Registered	Non-Registered	
156	APS-42	RFF DC-4 82E	June 3	1422	June 3	2131	$20.00 per reel	$9.00 per reel	2/8/71
157	WP-101	RFF DC-6 40C	7	1031	7	1752	"	"	"
158	"	"	7	1752	7	2107	"	"	"
159	APS-20	"	7	1519	7	2106	"	"	"
160	APS-42	RFF DC-4 82E	7	1017	7	2217	"	"	"
161	WP-101	RFF DC-6 40C	9	1029	9	1728	"	"	"
162	"	"	9	1728	9	2102	"	"	"
163	APS-20	"	9	1445	9	2048	"	"	"
164	APS-42	RFF DC-4 82E	9	1126	9	2151	"	"	"
165	WP-101	RFF DC-6 40C	22	1047	22	1749	"	"	"
166	"	"	22	1749	22	2123	"	"	"
167	RDR-1	"	22	1100	22	1749	"	"	"
168	"	"	22	1749	22	2123	"	"	"
169	APS-42	RFF DC-4 82E	22	1018	22	1930	"	"	"

[1] Radar film will be sent as a negative copy

[2] When ordering radar film, specify registered or non-registered copy. Allow 3 weeks for delivery of registered and 2 weeks for delivery of non-registered film after receipt of request.

Table 3-7 (Continued)

Order by Reel Number in This Column [1]	Type of Radar	Data Acquisition Unit	Date and Time of First Frame: Calendar Date, 1969	Date and Time of First Frame: Hr:Min (GMT)	Date and Time of Last Frame: Calendar Date, 1969	Date and Time of Last Frame: Hr: Min (GMT)	Duplication Cost [2]: Registered	Duplication Cost [2]: Non-Registered	Availability Date for Distribution
170	WP-101	RFF-DC-6 40C	June 23	2216	June 24	0540	$20.00 per reel	$9.00 per reel	2/8/71
171	"	"	24	0540	24	0911	"	"	"
172	RDR-1	"	23	2215	24	0530	"	"	"
173	"	"	24	0530	24	0911	"	"	"
174	APS-42	RBB DC-4 82E	23	2240	24	0705	"	"	"
175	RDR-1	RFF DC-6 40C	25	2246	26	0409	"	"	"
176	"	"	26	0409	26	0942	"	"	"
177	APS-42	RFF DC-4 82E	25	2233	26	0950	"	"	"
178	"	"	28	1326	28	2026	"	"	"
179	RDR-1	RFF DC-6 40C	29	1012	29	1736	"	"	"
180	"	"	29	1736	29	2114	"	"	"
182	APS-42	RFF DC-4 82E	29	1011	29	2114	"	"	"
183	RDR-1	RFF DC-6 40C	30	1110	30	1838	"	"	"
184	"	"	30	1838	30	2216	"	"	"
185	APS-42	RFF DC-4 82E	30	1108	30	1304	"	"	"
186	"	"	July 2	1235	July 2 2	2058			

[1] Radar film will be sent as a negative copy

[2] When ordering radar film, specify registered or non-registered copy. Allow 3 weeks for delivery of registered and 2 weeks for delivery of non-registered film after receipt of request.

Table 3-8.--RFF Aircraft Cloud Photograph Data Inventory

Order by Designation in This Column [1]	Film Type	Aircraft	Type of Camera	Contents of Reel: Date and Time of First Frame: Calendar Date, 1969	Contents of Reel: Date and Time of First Frame: Hr:Min. (GMT)	Contents of Reel: Date and Time of Last Frame: Calendar Date, 1969	Contents of Reel: Date and Time of Last Frame: Hr:Min. (GMT)	Contents of Reel: RFF Flight Number	Distribution Costs	Availability Date For Distribution
504 AF	16-mm 400-ft reel, color	RFF DC-6 39C	Nose camera	May 4	1440	May 4	2154	690504	$108.00 per 400-ft reel	1/24/71
505 AF	"	"	"	5	1446	5	2100	690505	"	"
510 AF	"	"	"	10	0941	10	1751	690510	"	"
511 AF	"	"	"	11	1346	11	2134	690511	"	"
512 AF	"	"	"	12	1129	12	1141	690512	"	"
514 AF	"	"	"	14	1200	14	1950	690514	"	"
517 AF	"	"	"	17	1400	17	1910	690517	"	"
522 AF	"	"	"	22	1730	22	2335	690522	"	"
524 AF	"	"	"	24	1830	24	2205	690524	"	"
526 AF	"	"	"	26	1437	26	2205	690526	"	"
527 AF	"	"	"	27	1310	27	2200	690527	"	"
601 AF	"	"	"	June 1	1255	June 1	2220	690601	"	"
603 AF	"	"	"	3	1300	3	1931	690603	"	"
607 AF	"	"	"	7	1130	7	2000	690607	"	"
609 AF	"	"	"	9	1130	9	2030	690609	"	"
621 AF	"	"	"	21	1701	21	2153	690621	"	"
622 AF	"	"	"	22	1130	22	2040	690622	"	"
628 AF	"	"	"	28	1316	28	2034	690628	"	"
629 AF	"	"	"	29	1320	29	2013	690629	"	"
630 AF	"	"	"	30	1358	30	2220	690630	"	"
702 AF	"	"	"	July 2	1222	July 2	2029	690702	"	"

[1] Allow 4 to 6 weeks for delivery after receipt of request.

Table 3-8 (Continued)

Order by Designation in This Column [1]	Film Type	Aircraft	Type of Camera	Contents of Reel: Date and Time of First Frame: Calendar Date, 1969	Hr:Min. (GMT)	Date and Time of Last Frame: Calendar Date, 1969	Hr:Min. (GMT)	RFF Flight Number	Distribution Costs	Availability Date For Distribution
504 AR	35-mm 800-ft reel, black & white	RFF DC-6 39C	Right side camera	May 4	1440	May 10	1751	690504 690505 690510	$88.00 per 800-ft reel "	1/24/71
511 AR	"	"	"	11	1346	12	1141	690511 690512	" "	"
514 AR	"	"	"	14	1200	17	1910	690514 690517	" "	"
522 AR	"	"	"	22	1730	26	2205	690522 690524 690526	" " "	" "
527 AR	"	"	"	27	1310	June 1	2220	690527 690529 690601	" " "	"
603 AR	"	"	"	June 3	1300	7	2220	690603 690607	" "	"
609 AR	"	"	"	9	0955	9	2153	690609	"	"
621 AR	"	"	"	21	1701	22	2211	690621 690622	" "	"
628 AR	"	"	"	28	1316	30	2204	690628 690629 690630	" " "	"
702 AR	"	"	"	July 2	1222	July 2	2029	690702	"	"

[1] Allow 4 to 6 weeks for delivery after receipt of request.

Table 3-8 (Continued)

Order by Designation in This Column [1]	Film Type	Aircraft	Type of Camera	Contents of Reel: Date and Time of First Frame: Calendar Date, 1969	Hr:Min. (GMT)	Date and Time of Last Frame: Calendar Date, 1969	Hr:Min. (GMT)	RFF Flight Number	Distribution Costs	Availability Date For Distribution
504 AL	35-mm 800-ft reel, black & white	RFF DC-6 39C	Left side camera	May 4	1440	May 10	1751	690504 690505 690510	$88.00 per 800-ft reel "	1/24/71
511 AL	"	"	"	11	1346	12	1141	690511 690512	" "	"
514 AL	"	"	"	14	1200	17	1910	690514 690517	" "	"
522 AL	"	"	"	22	1730	26	2205	690522 690524 690526	" " "	"
527 AL	"	"	"	27	1310	June 1	2220	690527 690527 690601	" " "	"
603 AL	"	"	"	June 3	1300	7	2220	690603 690607	" "	"
609 AL	"	"	"	9	0955	9	2153	690609	"	"
621 AL	"	"	"	21	1701	22	2211	690621 690622	" "	"
628 AL	"	"	"	28	1316	30	2206	690628 690629 690630	" " "	"
702 AL	"	"	"	July 2	1222	July 2	2029	690702	"	"

[1] Allow 4 to 6 weeks for delivery after receipt of request.

Table 3-8 (Continued)

Order by Designation in This Column [1]	Film Type	Aircraft	Type of Camera	Contents of Reel					Distribution Costs	Availability Date For Distribution
				Date and Time of First Frame		Date and Time of Last Frame		RFF Flight Number		
				Calendar Date, 1969	Hr:Min. (GMT)	Calendar Date, 1969	Hr:Min. (GMT)			
504 BF	16-mm 400-ft reel, color	RFF DC-6 40C	Nose camera	May 4	1024	May 4	2152	690504	$108.00 per 400-ft reel	1/24/71
509 BF	"	"	"	9	1357	9	2001	690509	"	"
511 BF	"	"	"	11	1020	11	1730	690511	"	"
512 BF	"	"	"	12	1124	12	2025	690512	"	"
526 BF	"	"	"	26	1055	26	2110	690526	"	"
527 BF	"	"	"	27	1050	27	2100	690527	"	"
601 BF	"	"	"	June 1	1045	June 1	2001	690601	"	"
602 BF	"	"	"	2	1050	2	2020	690602	"	"
603 BF	"	"	"	3	1055	3	2035	690603	"	"
607 BF	"	"	"	7	1020	7	2001	690607	"	"
609 BF	"	"	"	9	1020	9	2000	690609	"	"
622 BF	"	"	"	22	1026	22	2001	690622	"	"
629 BF	"	"	"	29	1000	29	1935	690629	"	"
630 BF	"	"	"	30	1100	30	2030	690630	"	"
504 BR	35-mm 800-ft reel, black & white	"	Right side camera	May 4	1024	May 9	1959	690504 690509	$88.00 per 800-ft reel	"

[1] Allow 4 to 6 weeks for delivery after receipt of request.

Table 3-8 (Continued)

Order by Designation in This Column [1]	Film Type	Aircraft	Type of Camera	Contents of Reel: Date and Time of First Frame: Calendar Date, 1969	Hr:Min. (GMT)	Date and Time of Last Frame: Calendar Date, 1969	Hr:Min. (GMT)	RFF Flight Number	Distribution Costs	Availability Date For Distribution
511 BR	35-mm 800-ft reel, black & white	RFF DC-6 40C	Right side camera	May 11	1020	May 12	2125	690511 690512	$88.00 per 800-ft reel	1/24/71
526 BR	"	"	"	26	1055	27	2133	690526 690527	" "	"
601 BR	"	"	"	June 1	1045	June 2	2148	690601 690602	" "	"
603 BR	"	"	"	3	1055	7	2113	690603 690607	" "	" "
609 BR	"	"	"	9	1015	9	2110	690609	"	"
622 BR	"	"	"	22	1025	29	2111	690622 690629		
630 BR	"	"	"	30	1100	30	2125	690630		
504 BL	35-mm 800-ft reel, black & white	"	Left side camera	May 4	1024	May 9	1959	690504 690509	" "	"
511 BL	"	"	"	11	1020	12	2125	690511 690512	" "	"
526 BL	"	"	"	26	1055	27	2133	690526 690527	" "	"

[1] Allow 4 to 6 weeks for delivery after receipt of request.

Table 3-8 (Continued)

Order by Designation in This Column [1]	Film Type	Aircraft	Type of Camera	Contents of Reel: Date and Time of First Frame: Calendar Date, 1969	Hr:Min. (GMT)	Date and Time of Last Frame: Calendar Date, 1969	Hr:Min. (GMT)	RFF Flight Number	Distribution Costs	Availability Date For Distribution
601 BL	35-mm 800-ft reel, black & white	RFF DC-6 40C	Left side camera	June 1	1045	June 2	2148	690601 690602	$88.00 per 800-ft reel	1/24/71
603 BL	"	"	"	3	1055	7	2113	690603 690607		"
609 BL	"	"	"	9	1015	9	2110	690609		"
622 BL	"	"	"	22	1025	29	2111	690622 690629		"
630 BL	"	"	"	30	1100	30	2125	690630		"

[1] Allow 4 to 6 weeks for delivery after receipt of request.

Table 3-9.--Navy and Air Force RECCO Data Inventory and Air Force WC-130 Dropsonde Data Inventory

Order by Designation in This Column	Archived Form of Data [1]	Name of Aircraft	Description of Contents	Duplication Cost	Availability Date for Distribution
B3405	Magnetic tape	Navy WC-121, AF WB-47, AF RB-57, and AF WC-130	This magnetic tape contains all RECCO Observations by the Navy and Air Force Aircraft during the four BOMEX Observation Periods. There is one file for each aircraft on tape, with all RECCO Observations for that aircraft in chronological order.	$60.00 (includes cost of tape)	2/1/71
Listing of WC-121 File from tape B3405	Computer printout	Navy WC-121	Tabulation of all RECCO Observations by the WC-121 during BOMEX	$30.00	2/1/71
Listing of WB-47 File from tape B3405	Computer printout	Air Force WB-47	Tabulation of all RECCO Observations by the WB-47 during BOMEX	$30.00	2/1/71
Listing of RB-57 File from tape B3405	Computer printout	Air Force RB-57	Tabulation of all RECCO Observations by the RB-57 during BOMEX	$ 30.00	2/1/71

[1] When ordering magnetic tape, specify (A) 7 Channel; BCD; 200, 556, or 800 BPI; or (B) 9 Channel; EBCDIC; 800 BPI.

[2] Tape B9622 contains 5 other files in addition to the dropsonde data.

Table 3-9 (Continued)

Order by Designation in This Column	Archived Form of Data [1]	Name of Aircraft	Description of Contents	Duplication Cost	Availability Date for Distribution
Listing of WC-130 File from tape B3405	Computer printout	Air Force WC-130	Tabulation of all RECCO Observations by the WC-130 during BOMFX	$30.00	2/1/71
B9622	Magnetic tape [2]	Air Force WC-130	This magnetic tape contains all dropsonde observations by the WC-130 during BOMEX dropsonde missions flown during Periods I, II, III, and IV	$60.00 (includes cost of tape)	2/1/71
Listing of Dropsonde File from tape B9622	Computer printout	Air Force WC-130	Tabulation of Dropsonde File from magnetic tape B9622	$15.00	2/1/71

[1] When ordering magnetic tape, specify (A) 7 Channel; BCD; 200, 556, or 800 BPI; or (B) 9 Channel; EBCDIC; 800 BPI.

[2] Tape B9622 contains 5 other files in addition to the dropsonde data.

Table 3-10.--Island Rawinsonde Data Inventory

Order by Designation in This Column	Date		BOMEX Observation Period	Launch Time (GMT)	Duplication Cost[2]	Availability Date for Distribution
	Calendar Date	Julian Day				
IR #1	May 2	122	Period I	1100	$2.50 per observation	2/1/71
2	3	123	"	1100		"
3	4	124	"	1100		"
4	5	125	"	1102		"
5	6	126	"	0900	"	"
6	7	127	"	0925	"	"
7	8	128	"	1100	"	"
8	9	129	"	1129	"	"
9	10	130	"	1100	"	"
10	11	131	"	1100	"	"
11	12	132	"	0140	"	"
12	12	133	"	1930	"	"
13	13	133	"	0125	"	"
14	13	134	"	1935	"	"
15	14	134	"	0145	"	"
16	14	135	"	1935	"	"
17 (Missing)			"		"	"
18	15	135	"	1925	"	"
19	16	136	"	0115	"	"
20	16	136	"	1759	"	"
21	17	137	"	0115	"	"
22	17	137	"	1940	"	"
23	18	138	"	0130	"	"
28[1]	20	140	"	1940	"	"
50[1]	June 1	152	Period II	0125	"	"
51	1	152	"	1347	"	"
52	2	153	"	0155	"	"
53	2	153	"	1325	"	"
54	3	154	"	0150	"	"
55	3	154	"	1319	"	"
56	4	155	"	0150	"	"
57	4	155	"	1326	"	"
58	5	156	"	0147	"	"
59	5	156	"	1323	"	"
60	6	157	"	0130	"	"
61	6	157	"	1317	"	"
62	7	158	"	0145	"	"
63	7	158	"	1315	"	"
64	8	159	"	0115	"	"
65	8	159	"	1319	"	"
66	9	160	"	0120	"	"
67	9	160	"	1317	"	"
68	10	161	"	0120	"	"

[1] Observations were taken during the period May 21, 1969, to May 31, 1969, but have not yet been evaluated. When these particular observations have been processed, they will be placed in the temporary archive.

[2] Cost of duplication of all island rawinsonde observations is $400.00

Table 3-10 (Continued)

Order by Designation in This Column	Date		BOMEX Observation Period	Launch Time (GMT)	Duplication Cost [2]	Availability Date for Distribution
	Calendar Date	Julian Day				
IR #69	June 10	161	Period II	1343	$2.50 per observation	2/1/71
70	11	162	"	0145		"
71	11	162	"	1317		"
72	12	163	"	0229		"
73	12	163	"	1335	"	"
74	13	164	"	0240	"	"
75	14	165	"	1325	"	"
76	14	165	"	0147	"	"
77	15	166	"	1315	"	"
78	15	166	"	0140	"	"
79	16	167	"	0320	"	"
80	16	167	"	0120	"	"
81	16	167	"	1420	"	"
82	17	168	"	0123	"	"
83	17	168	"	1320	"	"
84	18	169	"	0115	"	"
85	18	169	"	1318	"	"
86	19	170	Period III	0117	"	"
87	19	170	"	1330	"	"
88	20	171	"	0135	"	"
89	20	171	"	1317	"	"
90	21	172	"	1235	"	"
91	21	172	"	1315	"	"
92	22	173	"	0115	"	"
93	22	173	"	1315	"	"
94	23	174	"	0121	"	"
95	23	174	"	1715	"	"
96	24	175	"	0528	"	"
97	24	175	"	1315	"	"
98	25	176	"	0138	"	"
99	25	176	"	1324	"	"
100	26	177	"	0125	"	"
101	26	177	"	1330	"	"
102	27	178	"	0115	"	"
103	27	178	"	1315	"	"
104	28	179	"	0115	"	"
105	28	179	"	1315	"	"
106	29	180	"	0115	"	"
107	29	180	"	1315	"	"
108	30	181	"	0120	"	"
109	30	181	"	0115	"	"

1 Observations were taken during the period May 21, 1969, to May 31, 1969, but have not yet been evaluated. When these particular observations have been processed, they will be placed in the temporary archive.

2 Cost of duplication of all island rawinsonde observations is $400.00

Table 3-10 (Continued)

Order by Designation in This Column	Date		BOMEX Observation Period	Launch Time (GMT)	Duplication Cost [2]	Availability Date for Distribution
	Calendar Date	Julian Day				
IR #110	July 1	182	Period III	0115	$2.50 per observation	2/1/71
111	1	182	"	1315		"
112	2	183	"	0124		"
113	2	183	"	1315		"
114	3	184	"	0145	"	"
115	3	184	"	1315	"	"
116	4	185	"	0115	"	"
117	4	185	"	1315	"	"
118	5	186	"	0115	"	"
119	5	186	"	1315	"	"
120	6	187	"	0120	"	"
121	6	187	"	1305	"	"
122	7	188	"	0120	"	"
123	7	188	"	1318	"	"
124	8	189	"	0235	"	"
125	8	189	"	1315	"	"
126	9	190	"	0115	"	"
127	9	190	"	1317	"	"
128	10	191	"	0115	"	"
129	10	191	"	1320	"	"
130	11	192	"	0120	"	"
131	11	192	"	1317	"	"
132	12	193	"	0127	"	"
133	12	193	"	1317	"	"
134	13	194	"	0140	"	"
135	13	194	"	1315	"	"
136	14	195	"	0118	"	"
137	14	195	"	1315	"	"
138	15	196		0130	"	"
139	15	196	"	1328	"	"
140	16	197	"	0135	"	"
141	16	197	"	1320	"	"
142	17	198	"	0115	"	"
143	17	198	"	1320	"	"
144	18	199	"	0115	"	"
145	18	199	"	1320	"	"
146	19	200	"	0135	"	"
147	19	200	"	1015	"	"
148	19	200	"	1315	"	"
149	19	200	"	1615	"	"
150	20	201	"	0135	"	"

1 Observations were taken during the period May 21, 1969, to May 31, 1969, but have not yet been evaluated. When these particular observations have been processed, they will be placed in the temporary archive.

2 Cost of duplication of all island rawinsonde observations is $400.00

Table 3-10 (Continued)

Order by Designation in This Column	Date		BOMEX Observation Period	Launch Time (GMT)	Duplication Cost [2]	Availability Date for Distribution
	Calendar Date	Julian Day				
IR #151	July 20	201	Period III	1015	$2.50 per observation	2/1/71
152	20	201	"	1316		"
153	20	201	"	1615		"
154	21	202	"	0115		"
155	21	202	"	1100	"	"
156	21	202	"	1345	"	"
157	21	202	"	1615	"	"
158	22	203	"	0115	"	"
159	22	203	"	1016	"	"
160	22	203	"	1321	"	"
161	22	203	"	1615	"	"
162	23	204	"	0115	"	"
163	23	204	"	1015	"	"
164	23	204	"	1315	"	"
165	23	204	"	1615	"	"
166	24	205	"	0125	"	"
167	24	205	"	1320	"	"
168	25	206	"	0116	"	"
169	25	206	"	1016	"	"
170	25	206	"	1315	"	"
171	25	206	"	1615	"	"
172	26	207	"	0115	"	"
173	26	207	"	1015	"	"
174	26	207	"	1315	"	"
175	26	207	"	1615	"	"
176	27	208	"	0135	"	"
177	27	208	"	1015	"	"
178	27	208	"	1315	"	"
179	27	208	"	1620	"	"
180	28	209	"	0121	"	"
181	28	209	"	1022	"	"
182	28	209	"	1405	"	"

[1] Observations were taken during the period May 21, 1969, to May 31, 1969, but have not yet been evaluated. When these particular observations have been processed, they will be placed in the temporary archive.

[2] Cost of duplication of all island rawinsonde observations is $400.00

Table 3-11.--ATS-3 Data Inventory

Order by Designation in This Column [1]	Date CY 1969		Time of Picture (GMT)	Duplication Cost	Availability Date for Distribution
	Calendar Date	Julian Day			
ATS 1	July 10	191	1530	Positive transparency $2.00 each	2/1/71
" 2	"	"	2013		"
" 3	"	"	2038		"
					"
ATS 4	July 11	192	1021	Print $1.50 each	"
" 5	"	"	1041		"
" 6	"	"	1240	"	"
" 7	"	"	1300	"	"
" 8	"	"	1610	"	"
" 9	"	"	1634	"	"
" 10	"	"	1700	"	"
" 11	"	"	1723	"	"
" 12	"	"	1850	"	"
" 13	"	"	1916	"	"
" 14	"	"	2230	"	"
ATS 15	July 12	193	0910	"	"
" 16	"	"	1009	"	"
" 17	"	"	1022	"	"
" 18	"	"	1040	"	"
" 19	"	"	1050	"	"
" 20	"	"	1125	"	"
" 21	"	"	1213	"	"
" 22	"	"	1239	"	"
" 23	"	"	1305	"	"
" 24	"	"	1330	"	"
" 25	"	"	1614	"	"
" 26	"	"	1639	"	"
" 27	"	"	1900	"	"
ATS 28	July 13	194	1007	"	"
" 29	"	"	1034	"	"
" 30	"	"	1100	"	"
" 31	"	"	1142	"	"
" 32	"	"	1210	"	"
" 33	"	"	1247	"	"
" 34	"	"	1314	"	"
" 35	"	"	1344	"	"
" 36	"	"	1415	"	"
" 37	"	"	1440	"	"
" 38	"	"	1515	"	"
" 39	"	"	1534	"	"
" 40	"	"	1550	"	"
" 41	"	"	1755	"	"
" 42	"	"	1919	"	"
" 43	"	"	1944	"	"

[1] ATS-3 pictures will be sent in positive transparency or print form. Specify either transparency or print.

Table 3-11 (Continued)

Order by Designation in This Column [1]	Date CY 1969		Time of Picture (GMT)	Duplication Cost	Availability Date for Distribution
	Calendar Date	Julian Day			
ATS 44	July 14	195	1300	Positive transparency $2.00 each	2/1/71
" 45	"	"	1435		"
" 46	"	"	1534		"
" 47	"	"	1610		"
" 48	"	"	1625	Print #1.50 each	"
" 49	"	'	2040		"
ATS 50	July 15	196	1014	"	"
" 51	"	"	1037	"	"
" 52	"	"	1103	"	"
" 53	"	"	1153	"	"
" 54	"	"	1202	"	"
" 55	"	"	1223	"	"
" 56	"	"	1313	"	"
" 57	"	"	1331	"	"
" 58	"	"	1354	"	"
" 59	"	"	1422	"	"
" 60	"	"	1446	"	"
" 61	"	"	1551	"	"
" 62	"	"	1626	"	"
" 63	"	"	1700	"	"
" 64	"	"	1815	"	"
ATS 65	July 17	198	1425	"	"
" 66	"	"	1756	"	"
" 67	"	"	1834	"	"
" 68	"	"	1902	"	"
" 69	"	"	1925	"	"
" 70	"	"	1929	"	"
" 71	"	"	1951	"	"
" 72	"	"	2015	"	"
" 73	"	"	2040	"	"
ATS 74	July 18	199	1023	"	"
" 75	"	"	1100	"	"
" 76	"	"	1135	"	"
" 77	"	"	1210	"	"
" 78	"	"	1240	"	"
" 79	"	"	1312	"	"
" 80	"	"	1340	"	"
" 81	"	"	1402	"	"
" 82	"	"	1425	"	"
" 83	"	"	1428	"	"
" 84	"	"	1453	"	"
" 85	"	"	1519	"	"
" 86	"	"	1729	"	"

[1] ATS-3 pictures will be sent in positive transparency or print form. Specify either transparency or print.

Table 3-11 (Continued)

Order by Designation in This Column [1]	Date CY 1969		Time of Picture (GMT)	Duplication Cost	Availability Date for Distribution
	Calendar Date	Julian Day			
ATS 87	July 18	199	1751	Positive transparency $2.00 each	2/1/71
" 88	"	"	1900		"
" 89	"	"	1923		"
" 90	"	"	1948		"
ATS 91	July 19	200	1015	Print $1.50 each	"
" 92	"	"	1035	"	"
" 93	"	"	1628	"	"
" 94	"	"	1643	"	"
" 95	"	"	1812	"	"
" 96	"	"	1842	"	"
" 97	"	"	2022	"	"
ATS 98	July 20	201	1050	"	"
" 99	"	"	1218	"	"
" 100	"	"	1242	"	"
" 101	"	"	1306	"	"
" 102	"	"	1332	"	"
" 103	"	"	1358	"	"
" 104	"	"	1423	"	"
" 105	"	"	1450	"	"
" 106	"	"	1529	"	"
" 107	"	"	1608	"	"
" 108	"	"	1634	"	"
" 109	"	"	1701	"	"
" 110	"	"	1722	"	"
" 111	"	"	1748	"	"
" 112	"	"	1814	"	"
" 113	"	"	1840	"	"
" 114	"	"	1913	"	"
" 115	"	"	1940	"	"
ATS 116	July 21	202	1035	"	"
" 117	"	"	1105	"	"
" 118	"	"	1137	"	"
" 119	"	"	1200	"	"
" 120	"	"	1225	"	"
" 121	"	"	1250	"	"
" 122	"	"	1320	"	"
" 123	"	"	1354	"	"
" 124	"	"	1422	"	"
" 125	"	"	1512	"	"
" 126	"	"	1537	"	"
" 127	"	"	1614	"	"
" 128	"	"	1643	"	"
" 129	"	"	1905	"	"
" 130	"	"	2020	"	"

1 ATS-3 pictures will be sent in positive transparency or print form. Specify either transparency or print.

Table 3-11 (Continued)

Order by Designation in This Column [1]	Date CY 1969		Time of Picture (GMT)	Duplication Cost	Availability Date for Distribution
	Calendar Date	Julian Day			
ATS 131	July 22	203	1040	Positive transparency $2.00 each	2/1/71
" 132	"	"	1100		"
" 133	"	"	1135		"
" 134	"	"	1154		"
" 135	"	"	1228	Print $1.50 each	"
" 136	"	"	1246		"
" 137	"	"	1255	"	"
" 138	"	"	1315	"	"
" 139	"	"	1330	"	"
" 140	"	"	1337	"	"
" 141	"	"	1410	"	"
" 142	"	"	1417	"	"
" 143	"	"	1459	"	"
" 144	"	"	1518	"	"
" 145	"	"	1530	"	"
" 146	"	"	1542	"	"
" 147	"	"	1600	"	"
" 148	"	"	1649	"	"
" 149	"	"	1654	"	"
" 150	"	"	1810	"	"
" 151	"	"	1815	"	"
" 152	"	"	1835	"	"
" 153	"	"	1907	"	"
ATS 154	July 23	204	1006	"	"
" 155	"	"	1031	"	"
" 156	"	"	1055	"	"
" 157	"	"	1130	"	"
" 158	"	"	1407	"	"
" 159	"	"	1434	"	"
" 160	"	"	1505	"	"
" 161	"	"	1528	"	"
" 162	"	"	1627	"	"
" 163	"	"	1658	"	"
" 164	"	"	2030	"	"
ATS 165	July 24	205	1058	"	"
" 166	"	"	1116	"	"
" 167	"	"	1142	"	"
" 168	"	"	1158	"	"
" 169	"	"	1225	"	"
" 170	"	"	1250	"	"
" 171	"	"	1315	"	"
" 172	"	"	1536	"	"
" 173	"	"	1717	"	"
" 174	"	"	1812	"	"

[1] ATS-3 pictures will be sent in positive transparency or print form. Specify either transparency or print.

Table 3-11 (Continued)

Order by Designation in This Column[1]	Date CY 1969		Time of Picture (GMT)	Duplication Cost	Availability Date for Distribution
	Calendar Date	Julian Day			
ATS 175	July 24	205	1845	Positive transparency $2.00 each	2/1/71
" 176	"	"	1906		
" 177	"	"	1930		"
" 178	"	"	2000		"
" 179	"	"	2030	Print $1.50 each	"
ATS 180	July 25	206	1121	"	"
" 181	"	"	1330	"	"
" 182	"	"	1415	"	"
" 183	"	"	1456	"	"
" 184	"	"	1532	"	"
" 185	"	"	1603	"	"
" 186	"	"	1626	"	"
" 187	"	"	1649	"	"
" 188	"	"	1717	"	"
" 189	"	"	1803	"	"
" 190	"	"	1827	"	"
" 191	"	"	1924	"	"
" 192	"	"	2020	"	"
ATS 193	July 26	207	1016	"	"
" 194	"	"	1042	"	"
" 195	"	"	1105	"	"
" 196	"	"	1130	"	"
" 197	"	"	1154	"	"
" 198	"	"	1221	"	"
" 199	"	"	1247	"	"
" 200	"	"	1315	"	"
" 201	"	"	1340	"	"
" 202	"	"	1405	"	"
" 203	"	"	1435	"	"
" 204	"	"	1500	"	"
" 205	"	"	1530	"	"
" 206	"	"	1605	"	"
" 207	"	"	1635	"	"
" 208	"	"	1657	"	"
" 209	"	"	1727	"	"
" 210	"	"	1800	"	"
" 211	"	"	1828	"	"
" 212	"	"	1854	"	"
" 213	"	"	1920	"	"
" 214	"	"	1945	"	"
" 215	"	"	2010	"	"
" 216	"	"	2032	"	"
" 217	"	"	2101	"	"
" 218	"	"	2114	"	"
" 219	"	"	2140	"	"

[1] ATS-3 pictures will be sent in positive transparency or print form. Specify either transparency or print.

Table 3-11 (Continued)

Order by Designation in This Column [1]		Date CY 1969		Time of Picture (GMT)	Duplication Cost	Availability Date for Distribution
		Calendar Date	Julian Day			
ATS	220	July 27	208	1002	Positive transparency $2.00 each	2/1/71
"	221	"	"	1028		"
"	222	"	"	1055		"
"	223	"	"	1120		"
"	224	"	"	1145	Print $1.50 each	"
"	225	"	"	1210		"
"	226	"	"	1235	"	"
"	227	"	"	1303	"	"
"	228	"	"	1328	"	"
"	229	"	"	1400	"	"
"	230	"	"	1421	"	"
"	231	"	"	1458	"	"
"	232	"	"	1518	"	"
"	233	"	"	1553	"	"
"	234	"	"	1620	"	"
"	235	"	"	1648	"	"
"	236	"	"	1719	"	"
"	237	"	"	1744	"	"
"	238	"	"	1818	"	"
"	239	"	"	1843	"	"
"	240	"	"	1932	"	"
"	241	"	"	1957	"	"
"	242	"	"	2023	"	"
ATS	243	July 28	209	0950	"	"
"	244	"	"	1018	"	"
"	245	"	"	1042	"	"
"	246	"	"	1107	"	"
"	247	"	"	1131	"	"
"	248	"	"	1156	"	"

[1] ATS-3 pictures will be sent in positive transparency or print form. Specify either transparency or print.

N71-32767

II. BOMEX PAPERS AND PUBLICATIONS

Listed below are papers presented by BOMEX participants at scientific meetings, internal BOMEX publications, and journal articles dealing exclusively with the various experiments. Also included are miscellaneous BOMEX-related papers. The scientific journals containing the abstracts of papers presented at meetings are cited wherever possible. Abstracts of BOMEX papers given at the IEEE Second International Geoscience Electronics Symposium in Washington, D.C., April 14-17, 1970, the American Geophysical Union/American Meteorological Society meeting in Washington, D.C., April 20-24, 1970, and the Symposium on Tropical Meteorology in Honolulu, Hawaii, June 2-11, 1970, appear in BOMEX Bulletin No. 7.

The BOMEX experiment number and title as listed in BOMEX Bulletin No. 8 precedes each citation. Anyone desiring more information or copies of documents should write directly to the authors.

1. <u>Energy Exchange (Surface-Air Interaction)</u>

Alexander, R., and R. Pease, "Mapping Terrestrial Emission With the RS-14 Scanner," To be submitted for publication.

3. <u>Spectra of Horizontal Motions as a Function of Space and Time to Determine Horizontal Current Scales</u>

Banchero, L.A., "Long-Term, Deep-Ocean Moorings of Current-Measuring Arrays," Paper presented at the Second Offshore Technology Conference, Dallas, Texas. Preprint in BOMAP Office.

5. <u>Cloud Physics Experiment</u>

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7. <u>Lamont Radon Experiment</u>

Broecker, W., and T.-H. Peng, "Vertical Distribution of Radon in the BOMEX Area," Submitted to <u>Earth and Planetary Science Letters</u>. Copy at BOMAP Office.

8. <u>Field Testing of a Balloon-Borne Optical Dew-Point Hygrometer</u>

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11. Theory of Large-Scale Atmospheric and Oceanic Processes

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12. Microwave Radiometer Measurement of Rain Cells

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13. Air-Sea Interaction: (1) Air Flow Over Wind Waves and Swell; (2) Horizontal Temperature Fluctuation in the Surface Layers of the Ocean

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14. High-Frequency Sea Scatter Experiment

Watts, J.M., "Instrumentation for Observing HF Sea Scatter," ESSA Technical Memorandum ERLTM-ITS 223.

18. Spectral Albedo Measurement Program

Drummond, A.J., "The BOMEX Solar Radiation Experiment: Some Preliminary Results," Paper presented at Symposium on Early Results From BOMEX, Seattle, Washington, November 20-21, 1969.

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24- Radiation Balance, All-Sky Photography, and Rainfall on FLIP
25. Diurnal Variation of Momentum Flux

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30. Energy Budget of Barbados

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47- Tropical Cloud Streets
48 Giant Convective Cells in the Tropical Atmosphere

Kuettner, J.P., "Cloud Streets Over the Tropical Oceans," Abstract in Bulletin of the American Meteorological Society, Vol. 51, No. 3, March 1970.

56- Nimbus 3 Study of Various Environmental Parameters
57 Nimbus 3 Study of Aerosol Distribution

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III. FLORIDA STATE UNIVERSITY'S PARTICIPATION IN BOMEX

The BOMEX Core Experiment was an implementation of the area study called for in the National Academy of Sciences' report on "Interaction Between the Atmosphere and the Oceans," NAS-NRC Publication 983, 1962. The specific area chosen and further rationale for the experiment were discussed in reports written jointly in 1967 by the Florida State University (FSU) group headed by Dr. M. Garstang, and the Sea-Air Interaction Laboratory, then part of the Environmental Science Services Administration and headed by Mr. F. Ostapoff.

FSU conducted a field program on and near Barbados during 1968, which was continued in 1969 and played an important role in the BOMEX field operations. In view of this, it seems appropriate to reprint, in slightly modified and abbreviated form, an article written by Dr. Garstang, the principal investigator, and coauthors, for the American Scientist, September/October, 1970, that documents the FSU investigations in 1968 and 1969. Permission granted by the editor of American Scientist to reprint the article is gratefully acknowledged.

ATMOSPHERIC-OCEANIC OBSERVATIONS IN THE TROPICS

Direct Observation of Interacting Scales of Motion In the Tropical Ocean-Atmosphere System Provides The Basis for Viewing the Atmosphere As a Heat-Driven System

M. Garstang, N. E. LaSeur, K. L. Warsh, R. Hadlock, and J. R. Petersen

The field programs that form the basis for this paper were conceived in an attempt to remove aspects of observational deficiencies. The fundamental philosophy underlying the experiments was to attempt a multiscale observational program in which simultaneous measurements in the atmospheric boundary layer, the region of dry convection between the boundary and cloud bases, and in and above the cloud layer would be made. Such a scheme not only would permit quantitative description of scales of motion in each of these atmospheric layers, but would lead to insight into their interaction and role in atmospheric energy transfer.

The experimental design must therefore provide for the sampling of a hierarchy of scales of motion, commencing at the air-sea boundary and terminating in motions of a planetary scale. A possible approach lies in the intensive observation of the small-scale processes over the entire range of variation in the synoptic and larger scales. Such observations might permit the establishment of parametric relationships between the small and large-scale systems, allowing the implicit inclusion in atmospheric models of the small-scale effects upon the larger-scale processes.

Field Experiments

To execute the plan based upon these concepts, a specific tropical ocean area was selected. This area had to be one in which the range of atmospheric systems noted above occurred with some predictable regularity yet be free of complicating effects such as might be induced by the presence of large land masses. The sea area immediately to the east of Barbados (fig. 1) was chosen as the most practical location. The time selected was the period July through August, when a variety of meso- and synoptic-scale systems develop and move through the Barbados region, but when there is less danger of hurricanes, which typically occur later in the season.

Barbados, which has moderate relief, provided a base for the measurements which were taken in July-August 1968 and repeated in May-August 1969 as part of the Barbados Oceanographic and Meteorological Experiment (BOMEX) (Garstang and LaSeur 1968; Davidson 1968; Kuettner and Holland 1969). The island served as a base of operations and also formed part of the experiment. For example, because of the difference in absorption (radiation) characteristics of land and sea, the island represents a heat source by day and a heat sink by night. It is also an obstacle to atmospheric flow. The measurement of the perturbations of the temperature and velocity field produced by these island effects was one important objective of the observational program.

Sensing systems were designed to make measurements at the air-sea and air-land interface, in the region of dry convection below cloud base, in the cloud layer, and up to approximately 100,000 ft. The experiment was designed to coincide with the presence of the ATS-3 satellite positioned at synchronous altitude over the Amazon mouth. Additional satellite observations were available in 1969.

The spatial deployment of these sensing systems in 1968 is illustrated in figure 1. In 1969 the stable buoy Triton was positioned in the center of the BOMEX array to the northeast of the island (Kuettner and Holland 1969). The field experiments were concluded in August 1969; it will be at least two years from that date before the most fundamental scientific results of these efforts will emerge. The measuring systems, measurements, and results described below illustrate what has been achieved and provide experience useful in the design and execution of the even larger-scale programs now under consideration.

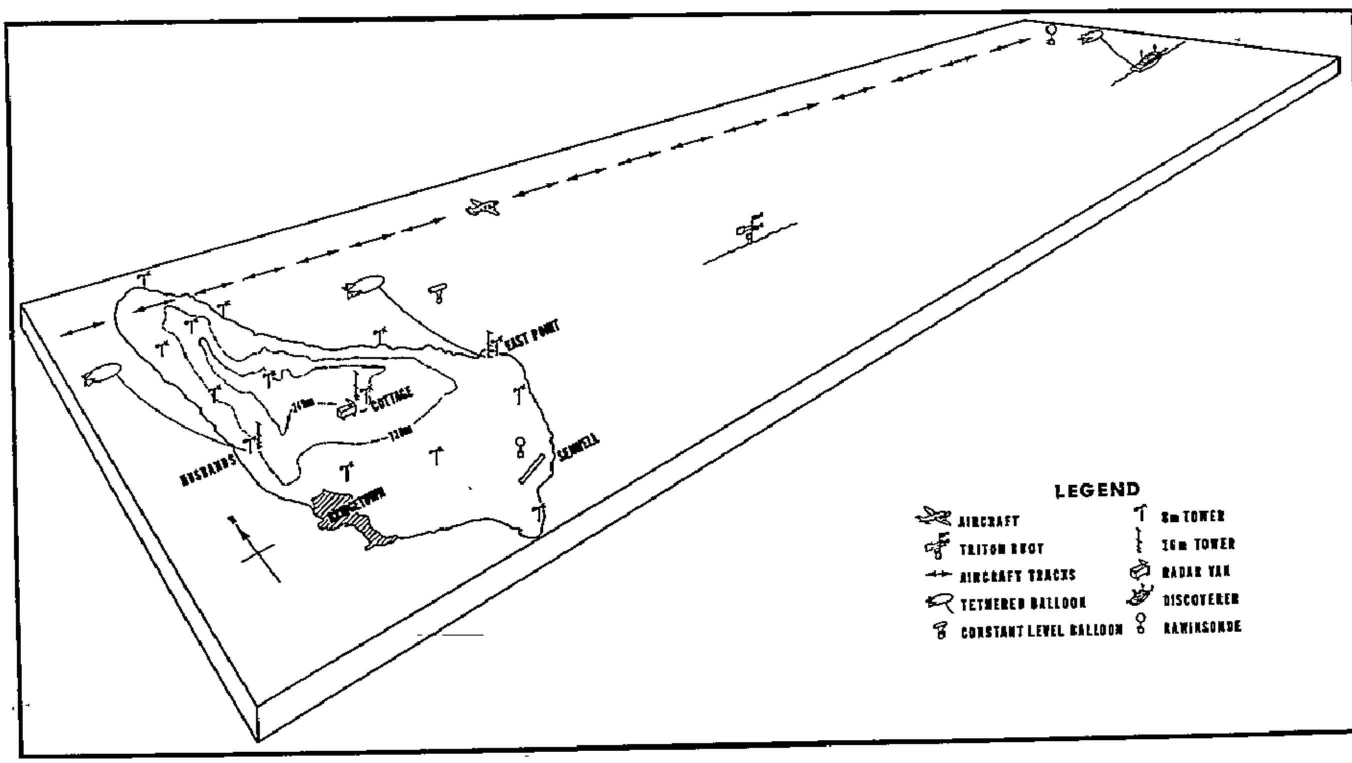


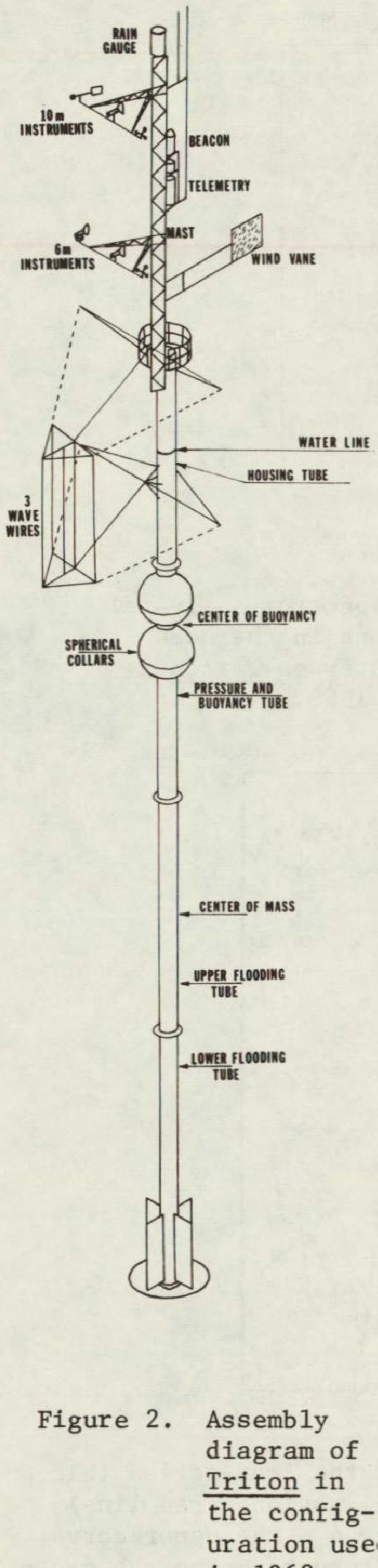
Figure 1. Schematic representation of the observational network east of and on Barbados (13 N, 59.5 W). The island, the easternmost of the Lesser Antilles, is 20 by 15 miles, with maximum elevation just over 1,100 ft. The E-W line of towers, buoy, and ship is traced by the aircraft track. The single-level towers are on a grid of about 4 by 4 miles.

The stable spar buoy Triton, illustrated in figures 2 and 3 and described in some detail by Warsh, Garstang, and Grose (1970), was designed at the Florida State University as a platform from which a variety of critical measurements could be made in the deep ocean and under both fair and foul conditions. A digital recording current meter attached at a depth of 25 m below mean sea level measured a time series of current speed and direction for a period of 60 days in 1968 (Warsh, Echternacht, and Garstang 1970a, 1970b).

An analysis of the kinetic energy of the current variations shows (fig. 4) large values at three periods: 12 hours, about 52 hours, and the longest periods (lowest frequencies) of 30-60 days. The first two maxima have clear physical explanations in terms of the semidiurnal tidal oscillations and inertial oscillations, respectively. The long-period oscillations may be associated with effects on the scale of the ocean basin itself; a longer period of record will be required to answer that question. The inertial oscillations arise from interactions between accelerations of the current and the deflecting influence of the earth's rotation. To test the qualitative impression that variations in the magnitude of these inertial motions is related to atmospheric disturbances, the current variations were divided into two portions: the shorter periods equal to or less than the inertial period, and the longer periods. Variations in the magnitude of these two parts during the period are shown by the lower curves in figure 5. The long-period oscillations exhibit two maxima separated by about 30-35 days; the shorter periods (dominated by inertial motion) show many more maxima with an average period of 3-5 days. The magnitude of the shorter-period variations is generally greater during the period of least amplitude in the longer-period motions.

Associated with such atmospheric systems are variations from the prevailing steady trade winds; such variations could produce the current accelerations necessary to induce the inertial oscillations. Minima in this curve occur with about the same period as maxima in the shorter-period oscillations of the ocean current, with a tendency for the maxima in the latter to coincide with or slightly lag minima in the former. We suggest that this is evidence for coupling between atmosphere and ocean of the kind postulated by Malkus (1962) and identified by Webster (1968) at higher latitudes. Extensive previous work (Palmer 1951; Riehl 1954; Yanai, et al. 1968; and Chang 1970) has documented the tendency for atmospheric disturbances in the tropics to occur with an average period of about four days.

As is seen in figure 3, Triton carried a multiple (3 to 5) resistance-wire wave system. Horizontal and vertical accelerometers were used to monitor the relatively small buoy motions (10 cm, heave; 35 cm, surge; and less than 1^{o} pitch in seas ranging from one to two meters in height). Simultaneous meteorological data were recorded from thirteen sensors located at two levels (6 m and 10 m in 1968, 2 m and 10 m in 1969 above mean sea level). This system therefore permits three-dimensional computations of the wave fields with a concurrent display of meteorological data.



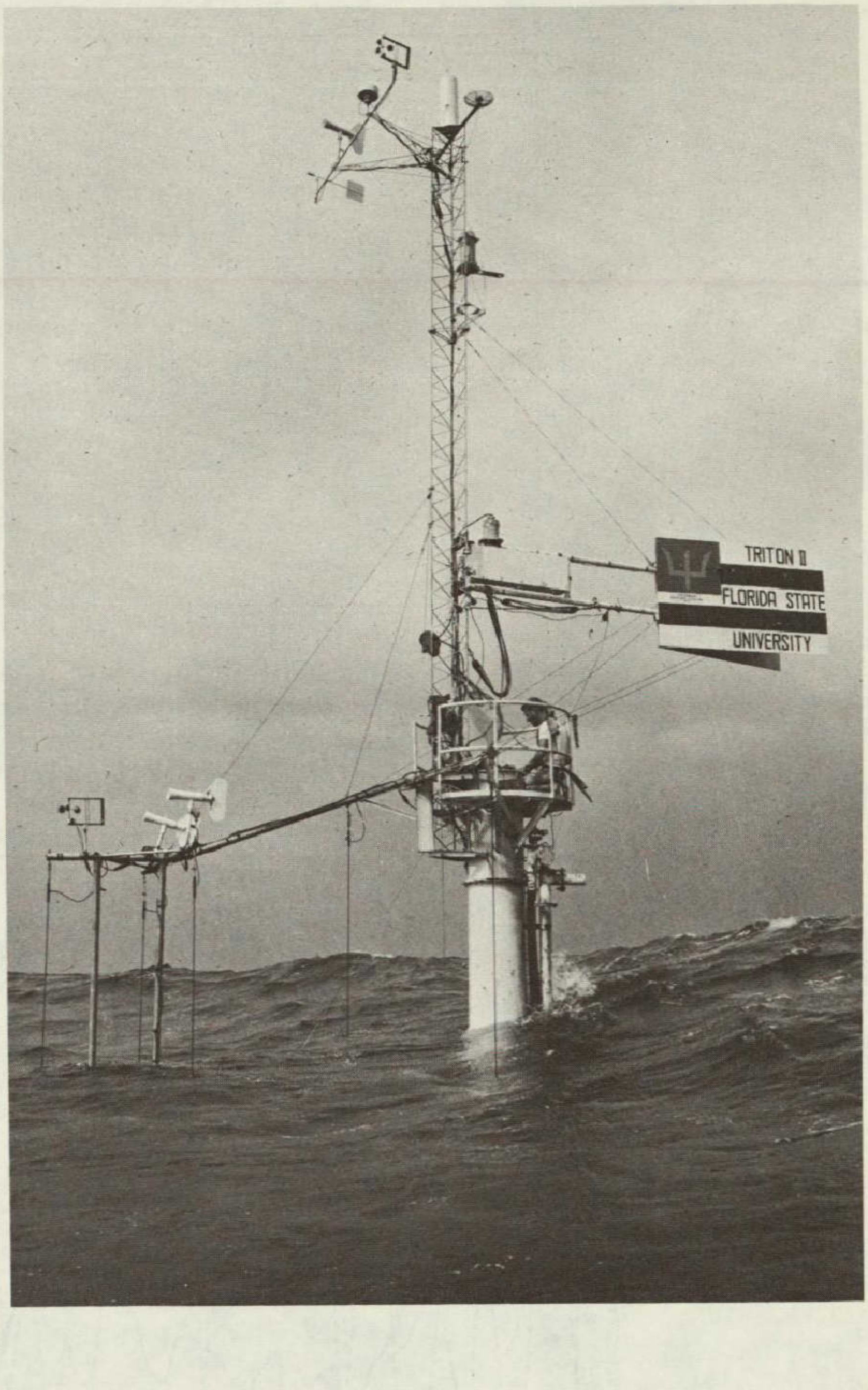


Figure 2. Assembly diagram of <u>Triton</u> in the configuration used in 1968.

Figure 3. <u>Triton</u> on station in 1969 in water over 5,000 m deep. Instruments in the atmosphere are at 2 and 10 m above mean sea level. Instrumentation at 6 m is not complete in this illustration. The large vane (emblazoned with symbol and name) serves to wind-orientate the buoy.

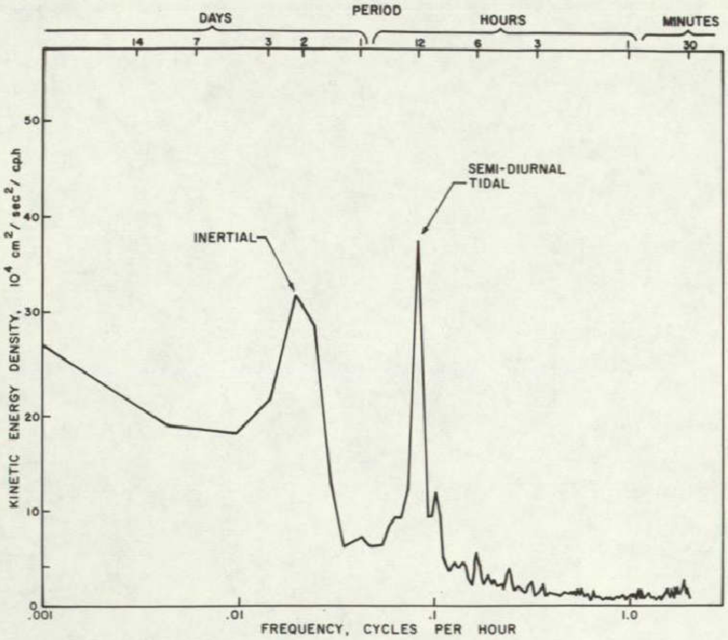


Figure 4. The relative distribution (variance spectrum analysis) of the kinetic energy of the variations in the ocean current as measured by the current meter on Triton during the period 2 July - 13 August 1968.

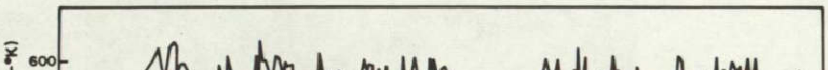


Figure 5. The variation of the relative magnitudes of the long-period (black line) and shorter-period (primarily inertial motions; red line) variations in the ocean current data in fig. 4. The upper curve is a measure of the degree of atmospheric disturbance on the organized convective mesoscale and synoptic scale calculated in such a manner that minima represent a greater degree of such disturbance.

Such a display is presented in figure 6 (Grose, Garstang, and Warsh 1970) for a five-day period in 1968. On 18 August 1968, starting at 14:00 LST, wave data were collected continuously. Prior to this time, wave data were collected over an 11 min period every two hours. The contoured portion of figure 6 depicts the smoothed variance density per band for the first twenty-three of one hundred bands (each .02 Hz wide) into which the total variance was partitioned. Directly above the contours of variance density is shown the net wave direction, which was obtained by multiplying the principal wave direction by the variance density for each band and then finding the vectorial average of all the one hundred frequency bands. The principal directions were calculated from cross-spectral analysis of the sea surface slopes from the three wave staffs. The net directions are shown every six hours for the two-hour data, unless major deviations occurred, and every hour for the continuous-wave data. The total variance is shown in units of centimeters squared on the lower graph of figure 6, which was constructed using the average of the total variance measured by each of the three wave staffs.

From this short record a series of interactions between the ocean and the atmosphere can be detected. On 14 August the variance density shows the greatest energy to be concentrated in swells with periods near 8 sec (frequency of 0.14 Hz). Commencing early on the afternoon of 14 August the total variance drops rapidly by 50 percent. Wave and wind directions are congruent. Wind speed shows an initial drop coincident with the pronounced drop in total variance. An increase from 8 to 10 m sec^{-1} in wind speed is accompanied by a 25 percent increase in total variance, but variance continues to decline while wind speed remains high until midday on 15 August. As long as the wind does not have to reorient the wave direction, similar linear relationships between wind speed and wave variance can be found. When reorientation is necessary, redistribution in the wave spectrum occurs. This phenomenon is most evident on 18 August in the continuous data where an increase in wind speed shows no accompanying increase in total variance. There is, however, a redistribution of the variance spectrum resulting first in a smoothing of the spectrum when the wind is nearly opposite to that of the waves and then in an increase in peakedness as the wind and wave directions become more nearly congruent.

Such interaction is equally evident on 17 August, when a well-organized atmospheric system passed over the buoy location. With the arrival of the initial squalls (also documented by island-based radar), there is a 33 percent increase in total wave variance strongly concentrated at 0.16 Hz. As the center of the disturbance passes, wind speeds drop below 4 meters per second, and the sea surface responds with a rapid decrease in total variance and a leveling out of the spectral peaks.

Three mechanisms contribute to this decrease and redistribution of variance. First, the decrease in wind speed leads to a decrease in the driving force. Second, energy is dissipated in reorienting wave directions. Third, the effect of nearly one inch of rainfall cannot be neglected, both in terms of oceanic and atmospheric surface stability and in terms of actual impact.

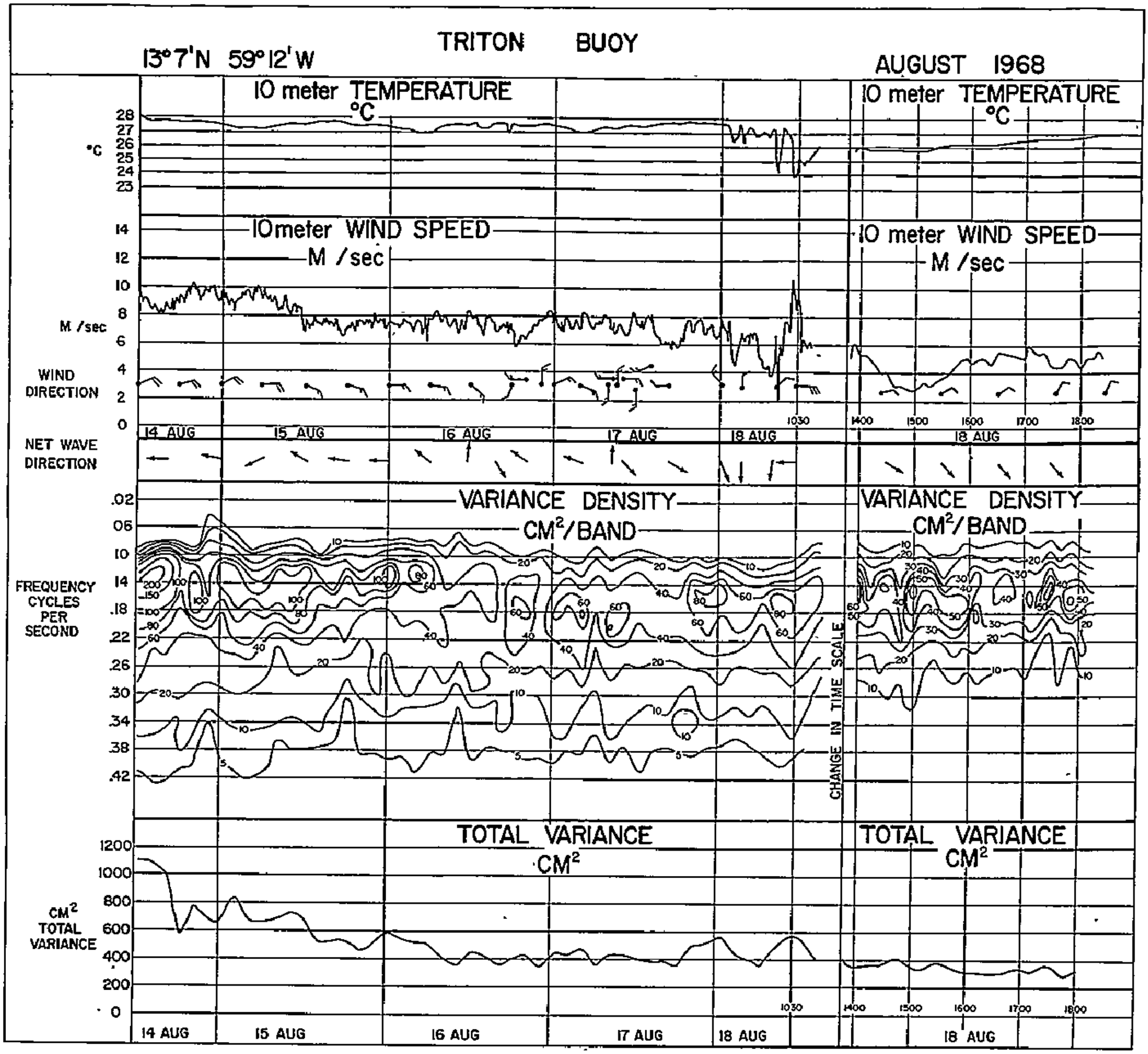


Figure 6. Meteorological data and characteristics of ocean waves as measured on Triton, 14-18 August 1968. The lower curve is a measure of the total kinetic energy of wave motion the distribution of this kinetic energy in waves of different frequency is shown in the contoured section immediately above.

These data permit the examination of the coupling between the atmosphere and the ocean, in particular the effect of the nonsteady atmospheric scales of motion. The meteorological sensors carried on Triton and on the U.S.C.G.S.S. Discoverer permitted the estimation of momentum, sensible heat, and latent heat flux between the ocean and the atmosphere. While Triton represents a nearly ideal platform from which to make this type of measurement, the 300-ft Discoverer generates problems of interference and contamination of the measurements. Careful comparisons between the buoy and the ship measurements are not yet complete. Figure 7 (Garstang and Warsh 1970), however, presents four days of data from Triton during August 1968. The flux computations were made using the bulk aerodynamic equations adjusted for departure from neutral stratification. The use of these equations is justified on the grounds that the stratification varied between -0.001 and -0.01 as computed from the Richardson bulk number (Garstang and Warsh 1970).

Except for a brief period at the start of the sequence, when sea and air temperatures appear to be unusually high, all variables are consistent with expected values. The early discrepancy may be the result of buoy servicing on the afternoon of 19 August. Both sea and air temperatures exhibit a weak diurnal oscillation. Air temperature is affected strongly by rain and related to cold downdrafts associated with the precipitation cycle of convective clouds. That this effect is real is confirmed by the fact that it is observed at night, when a reduction in insolation caused by increased cloudiness cannot be called upon to explain the drop in temperature; the fact that the cooling commences before the start of the rain and ends some time after rain has ceased to fall adds credence to the data. Surface wind speeds also exhibit a fairly pronounced diurnal oscillation. A complete explanation of the diurnal variation in surface wind fields over the open ocean is not yet available (see for example Shibata 1964). Additional insight into this question should emerge from a detailed analysis of the time series of surface wind speed and direction now available from Triton.

Relative humidity, in agreement with previous results (Garstang 1967), does not show any obvious diurnal changes. No clear explanation is offered for the increase in relative humidity after midday of the second day. This increase has an obvious impact upon the latent heat flux, which decreases to low values after this time. Tests are being made to ascertain that the indicated high values of relative humidity are not a spurious result caused by either drying or contamination (sea salt deposition) of the wet-bulb wick.

Momentum flux proves to be fairly stable, ranging between 0.37 and 2.16 dynes cm^{-2}. Highest values coincide with the highest average surface-wind speeds some 44 hours after the start of the data train shown in figure 7. Lowest values occur 27 hours after the start, coincident with the second-to-lowest average wind-speed period. The low values of stress at this point, rather than during the lowest wind-speed period, are related to small differences in stability prevailing during each period.

Despite some of the observational difficulties, significant inferences can be drawn from the computed values of latent and sensible heat flux shown in figure 7. Petterssen, Bradbury, and Pedersen (1962), Garstang (1967), and others have all recognized the fact that organized systems of a meso- or synoptic-scale in the atmosphere may significantly amplify the flux of latent and sensible heat between the ocean and the atmosphere. It has been further pointed out that only in regions of organized atmospheric systems do clouds grow to significant heights (Holle 1968).

Figure 7 indicates a period of rain in the first hour of 21 August. Other data (satellite pictures, conventional meteorological data) indicate that a poorly organized but extended east-west line of cloudiness was present over

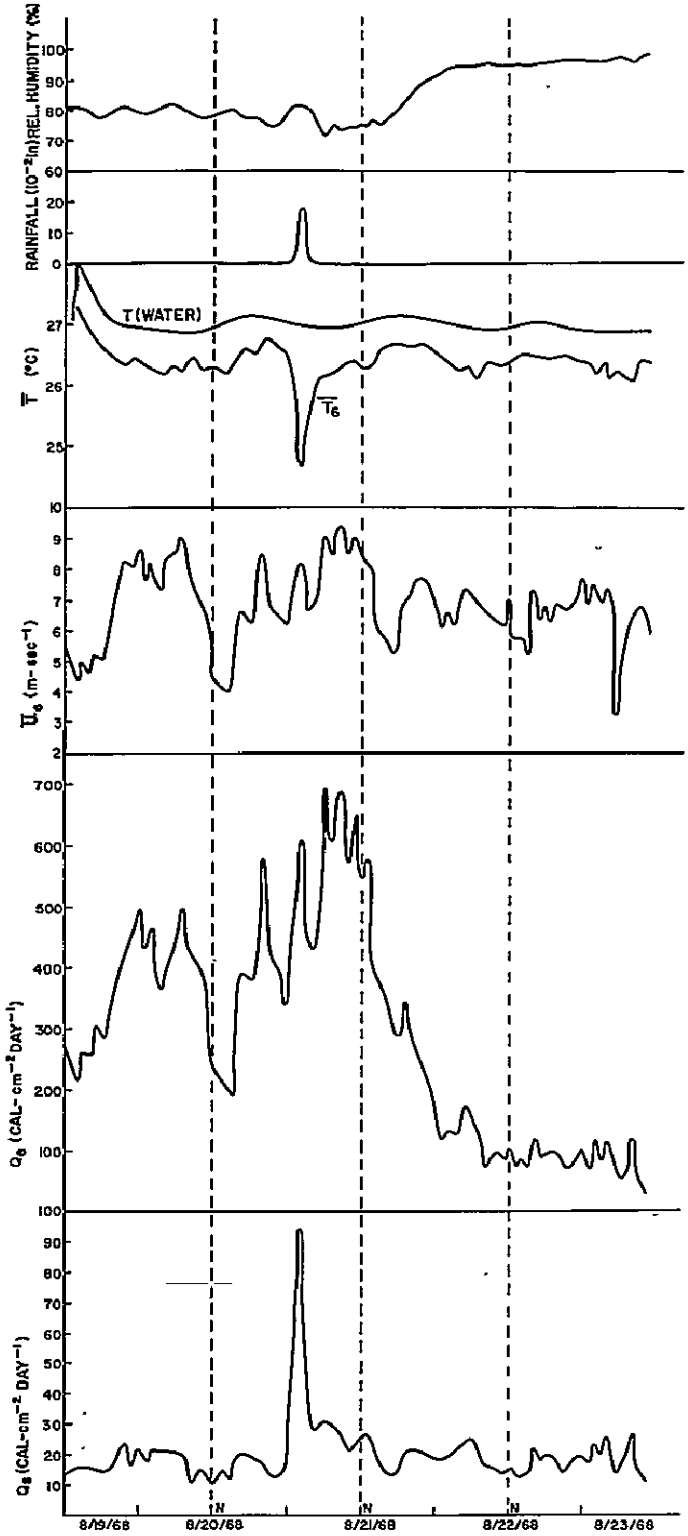


Figure 7. Curves of relative humidity, rainfall amount, surface temperature of the ocean, air tempertture at a height of 6 m above the ocean, wind speed at a height of 6 m, and the vertical fluxes of latent heat (Q_e) and sensible heat (Q_s) by turbulent eddies, at a site 25 km east of Barbados.

Barbados and Triton during the daylight hours of 21 August. Immediately prior to, during, and subsequent to this rain, latent heat flux increased by 100 percent while sensible heat flux increased by nearly one order of magnitude when compared to the average fluxes prior to the rain. These observations made from Triton confirm the ship measurements made by Garstang (1967) and the speculation of other authors. It is, therefore, expected that a complete analysis of the Triton data will provide a reliable measure of the interdiurnal fluctuations of energy flux over an open tropical ocean site. This information is of vital importance to the understanding of individual synoptic-scale systems and may provide an essential link in the energy-exchange chain.

The Boundary Layer and Subcloud Layer

Three multilevel towers (see fig. 8) and 14 single-level towers, together with one special purpose tower, were erected on the island. The single-level towers, located on approximately a 4 x 4 mile grid, as shown in figure 1, provided near-surface velocity fields and permitted the computation of near-

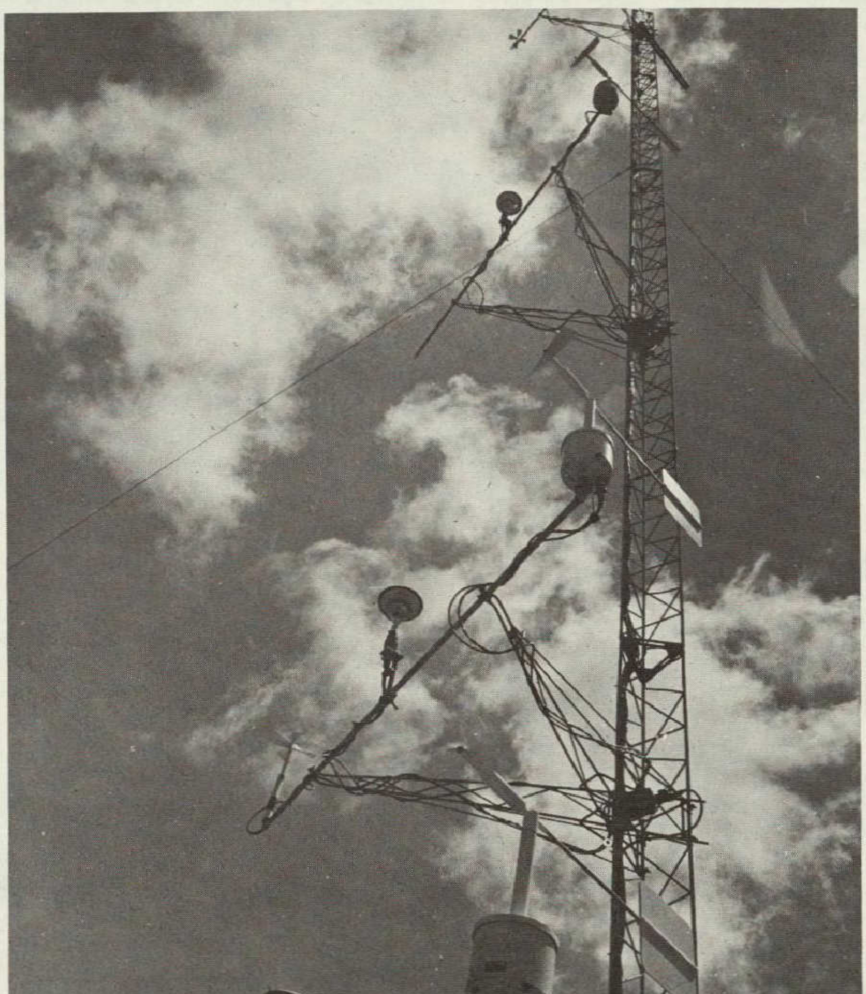


Figure 8. Sixteen-meter towers with sensors for temperature, humidity, horizontal wind speed and direction, and vertical wind speed, at 4 m and 16 m. At 2 m and 8 m, the vertical wind speed is omitted.

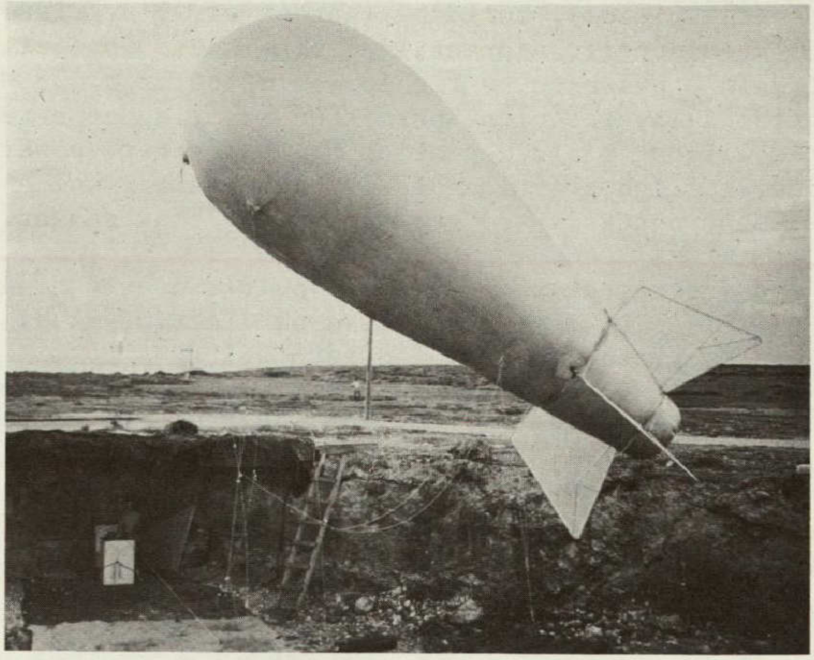
surface velocity divergence as a function of time. Such information is important to the study of the island effect upon the atmospheric circulation. Computations from these data reveal that there is a consistent diurnal and interdiurnal near-surface divergence.

The results, together with others described below, suggest that a heated island does not function in a simple, direct thermal sense. That is, at times of maximum heating, air does not simply rise over the island, leading to inflow from the sea at the boundaries. Instead, what happens over the heated island is critically dependent on the vertical structure of the wind field. If, as is usually the case in the tropics, the wind speed increases to a maximum near 600 m above the surface, heating will result in increased buoyant mixing over the island. The stronger winds will be mixed downward to the surface at times of maximum heating. The ocean surrounding the island warms only slightly during the day, and no additional mixing occurs.

The result is stronger near-surface velocities over the island compared to those over the ocean. More low-level air leaves the island than can be replaced by the horizontal wind field, and net downward motion must set in to compensate for this divergence. Thus, at times of maximum heating there are actually descending currents over the island instead of the classical picture of rising of hot air. The measurements obtained from the single-level towers confirm this hypothesis. The island-induced circulation therefore not only becomes a diurnal phenomenon but is strongly tied to interdiurnal changes in the structure of the larger-scale wind field, reflecting once again the interaction between various scales of motion.

The multiple-level towers provide time series of temperature, humidity, and three components of the wind field at three locations on an east-west line across the island. The time series are expected to yield information on the diurnal and interdiurnal turbulent structure of the boundary layer. At the central site, Cottage, detailed solar and terrestrial radiation measurements were made, which will be combined with the tower measurements to establish heating-rate models for the atmospheric boundary layer. The tower observations will also permit the computation of momentum, water vapor, and heat flux through the boundary layer at each location. Since vertical motion of the atmosphere was measured explicitly at each tower, more direct techniques of computation of momentum and heat can be employed. In addition, a fourth mobile tower carrying complex instrumentation was used as a check on the fixed tower. By moving this tower with respect to the fixed tower, a measure of terrain effects was obtained.

Three techniques were employed to sample the region of dry convection between the surface and the base of the convective clouds near 600 m. Tethered balloons (see fig. 9) were flown at altitudes up to 600 m from East Point and Husbands, stations on the extremities of the east and west coasts respectively. The balloons were tethered by 1,000-lb breaking-strain nylon line and controlled by a specially designed winch. The sensor-modulator-transmitter package was suspended from the tethering line in an adjustable but semirigid frame. A drogue chute damped high-frequency oscillations of the package, while a horizontally mounted vane maintained the package in a near-horizontal position offsetting variations caused by wind pressure on the package.



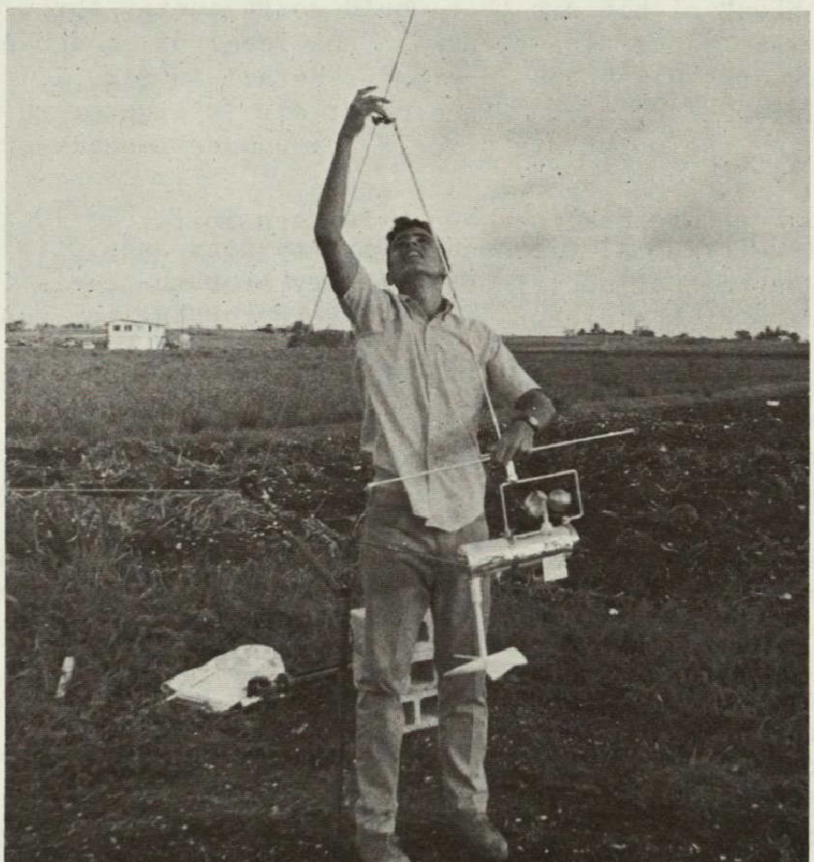


Figure 9. Fifteen-hundred-cubic-foot helium-filled balloon (top) ascending from storage pit. The balloon is 26 ft long, with a maximum diameter of 10 ft. A sensor-modulator-transmitter package (bottom) is suspended from the tethering line.

Temperature (thermistor), humidity (carbon strip hygristor), horizontal wind speed (cup anemometer), and vertical wind speed (propeller anemometer) were transmitted in a pulse-delay fashion by means of a 403 MHz carrier frequency. The pulse delay technique permitted sampling at a rate of about three times per second without rapid depletion of the battery power supply, making possible continuous flights as long as 12 hours, after which deterioration of the humidity element necessitated replacement of that sensor.

More than one instrument package could be flown at a time if the carrier frequency was offset so that signals could be discriminated. The signals were received at the ground, translated into voltages by a demodulator, and recorded on a digital magnetic tape recorder. Figure 10 shows a short section of record with two instruments at 125 and 250 m respectively. The balloon height, which was not monitored continuously, is also shown on this record. Long-period oscillations of the balloon must be removed from the record to obtain true values for a given height, but in many applications of these data the balloon oscillations are relatively unimportant compared to the shorter-period turbulent fluctuations.

Examination of the temperature records for the east-coast station show short-period random fluctuations. There is little evidence in the temperature record of "bubbles" of hot air that would carry energy through the subcloud layer and initiate convective clouds at the level of condensation. However, the humidity record (displayed in greater detail in fig. 11) shows distinct parcels of moist and dry air. Since moist air is lighter than dry air of the same temperature, the moist air parcels are unquestionably buoyant and rising.

Clear evidence for this phenomenon is seen in figure 10 in the major balloon oscillation marked A. Although humidity decreases with height, it can be seen that, as the balloon rises, humidity at both levels increases, the increase commencing at the sensor levels before the balloon responds. These observations suggest that we are dealing with a rising parcel of moist air; parcel sizes are estimated from these data to be in the order of 100-300 m. The results strongly imply that energy transport through the subcloud layer over the opern ocean is closely allied to water-vapor concentrations, in agreement with findings of Woodcock (1960).

Further analysis may lead to a better understanding of the mechanisms for initial concentration and the subsequent relationship between the moist parcels and individual convective clouds.

Further information on the structure of the subcloud layer is being derived from trajectories of constant-volume balloons (CV-balloon). Cylindrical balloons, which have a volume of 0.3 m^3 and are constructed from 1-mil mylar plastic (see fig. 12), were inflated with helium and ballasted so that the balloon displaced exactly its own weight plus that of its payload at a predetermined altitude above ground. The CV-balloon was filled to an overpressure (well in excess of atmospheric pressure) at the ground, ensuring that no further changes in volume could take place with changes in pressure or temperature. The CV-balloon was then launched by aircraft or towed to the predetermined altitude by a conventional weather balloon, which was then cut loose by a fuse. At the altitude where the CV-balloon exactly displaces its own weight it is neutrally buoyant and is assumed to behave as an air parcel.

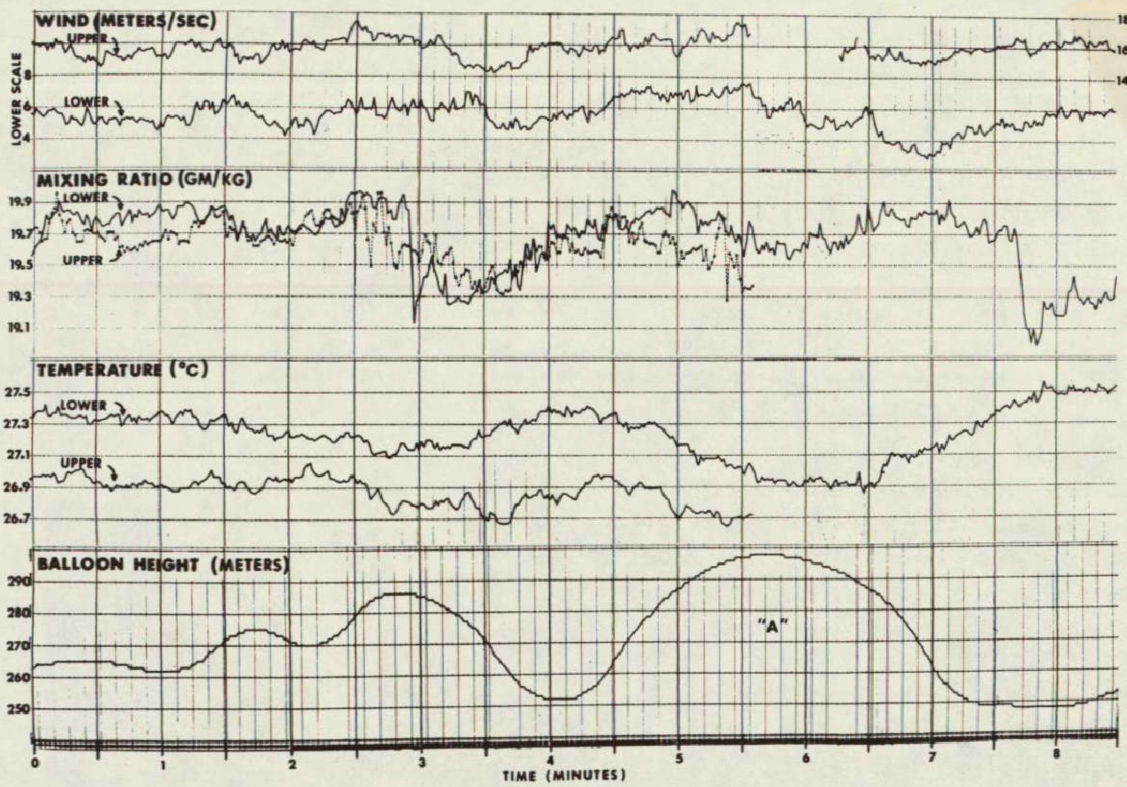


Figure 10. Computer-generated plots of the output from two instrument packages at 125 m (lower) and 250 m (upper) respectively. The vertical oscillations of the balloon are shown on the lower graph. ("Mixing ratio" is grams of water vapor per kilogram of air.)

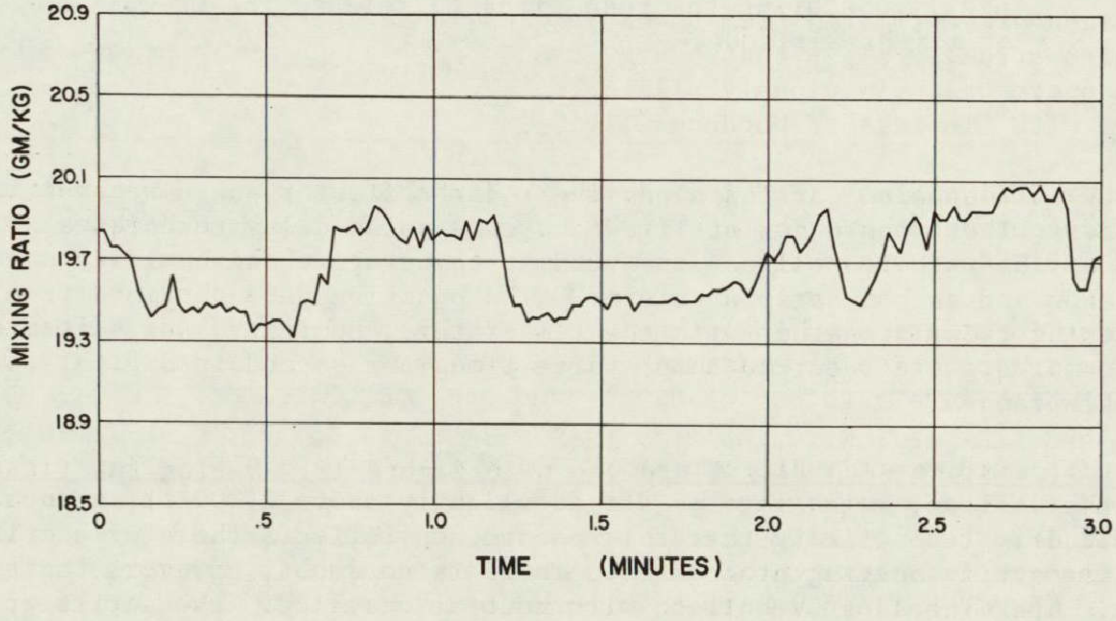


Figure 11. Expanded humidity record (mixing ratio) at 125 m, showing the discrete increases in water vapor.

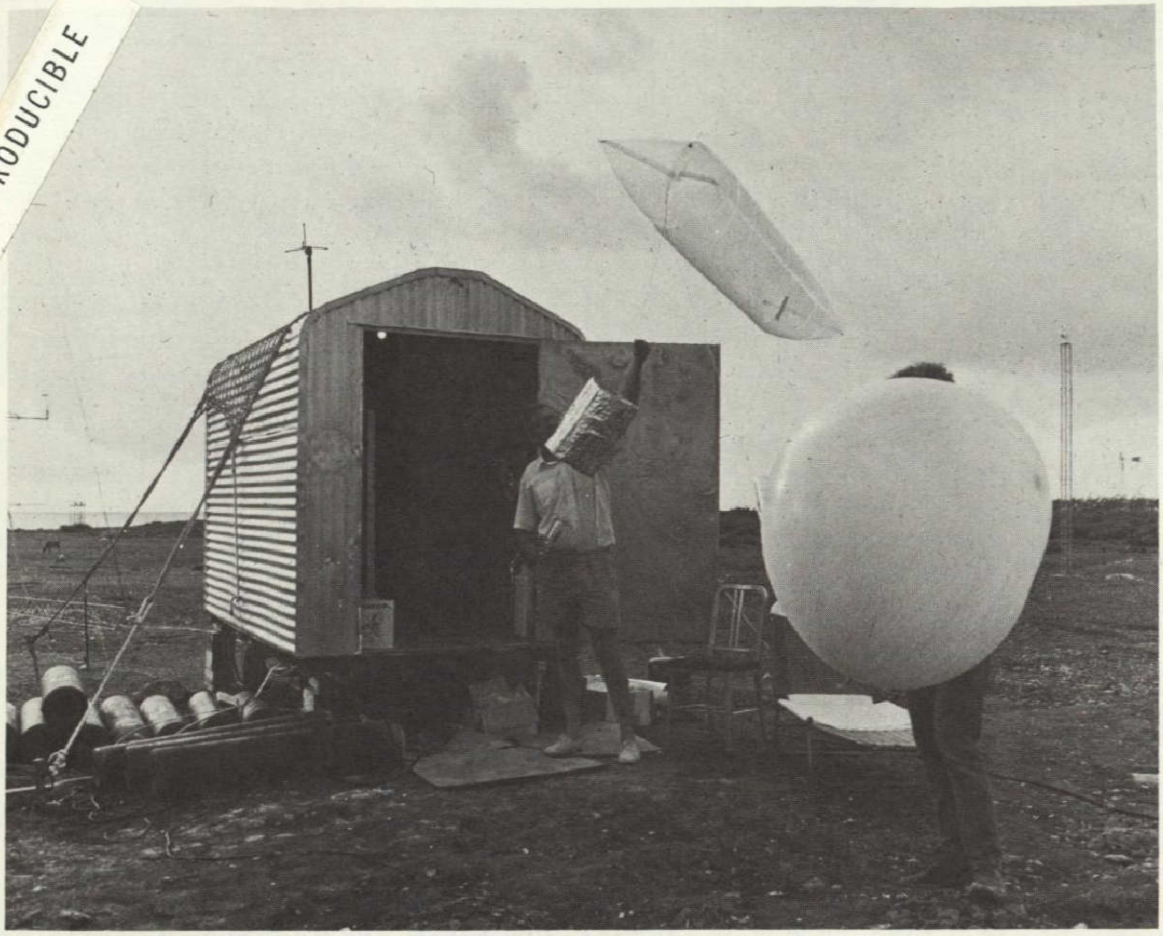


Figure 12. Constant-volume balloon of clear mylar plastic carrying a cylindrical aluminum-foil radar target and an instrumented (temperature and humidity) transponder, seen in the right hand of the scientist. The tow balloon is in the foreground, nearly obscuring the fuse timed to release the CV-balloon at flight altitude.

The CV-balloon also carried a passive radar reflector and a radar-triggered transponder. The transponder utilized the same pulse-delay techniques as were employed on the tethered balloon to transmit temperature and humidity sensed by a thermistor and carbon-strip hygristor. The position data obtained from the 3 cm tracking radar, together with the temperature, humidity, and suitable date/time marks, were recorded about three times per second in digital form on magnetic tape.

Results from one such flight are shown in figure 13. During the first 100 minutes the balloon, which leveled off at slightly above 2,000 ft, gradually lost altitude. It is likely that this phenomenon reflects the decrease in air density as daytime heating progresses. There is no doubt, however, that the balloon is behaving as a CV-balloon with neutral buoyancy. The series of displacements ranging between 200 and 500 ft are reflections of the eddy turbulence in the subcloud layer. Vertical velocities associated with these displacements approach 1.5 m sec^{-1}. If mean values of the velocity components are calculated over intervals of 10 to 100 seconds along the trajectory, departures from the mean velocity can be obtained, and from these the momentum flux can be computed. Values range from 1 to 5 dynes cm^{-2}. In cases where the balloon crossed the coastline from land to sea, momentum flux drops dramatically -- at least 50 percent.

In the flight presented in figure 13, the CV-balloon is entrained into the circulation of a cumulus congestus and swept from less than 400 ft above the terrain to 9,600 ft in 26 minutes. When corrections for negative buoyancy and liquid water on the surface of the CV-balloon are applied, calculated vertical motion in the cloud exceeds 10 m sec^{-1}. The vertical distribution of the velocity field in the cloud agrees remarkably well with an adiabatic steady-state jet model for convection. The horizontal trajectory of the balloon, which is not shown, reveals that the balloon underwent a complete spiral as it rose in the cloud.

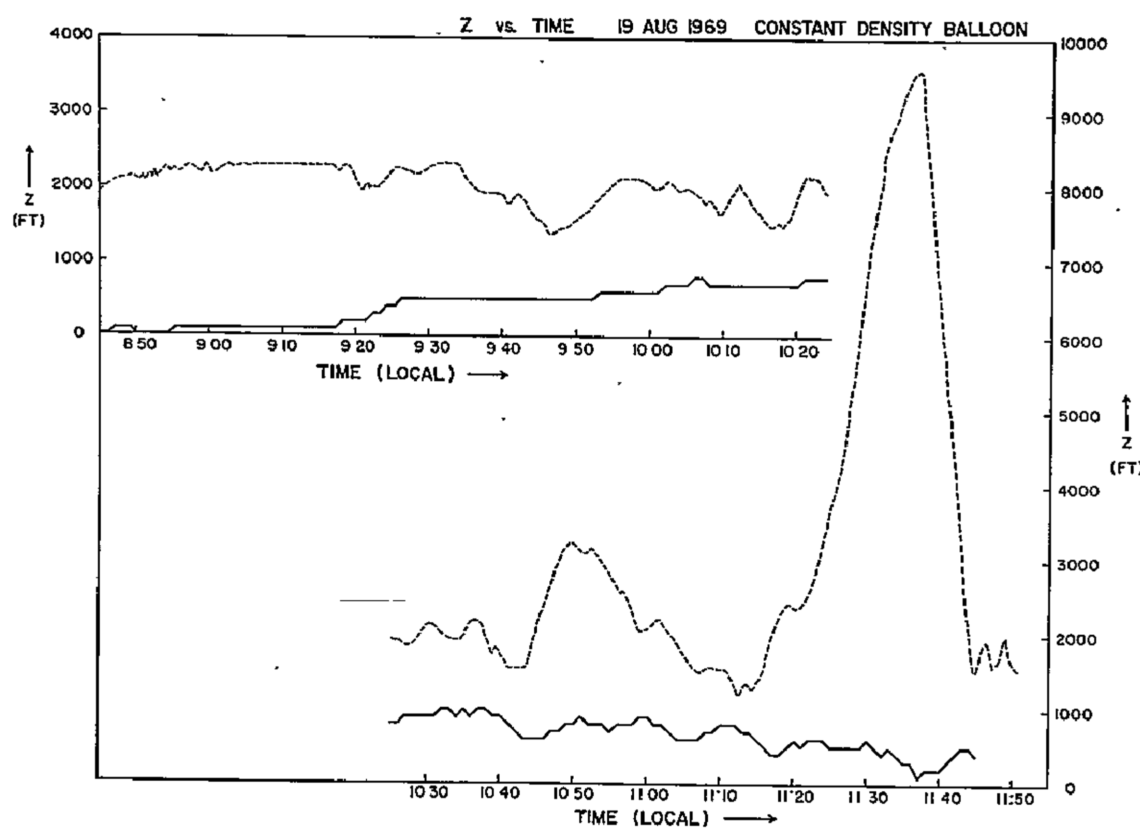


Figure 13. The height (Z) of the island (black curve) and of the constant-volume balloon (red curve) along its trajectory over Barbados. 19 August 1969. The balloon was launched at East Point at 8:30 local time and fell to the ground in a rain shower over 2 hours later. The continuous flight is shown in two parts here for convenience.

The final method used to sample the subcloud layer was by means of an instrumented aircraft -- a twin-engined Queen Air outfitted and operated by the National Center for Atmospheric Research, in Boulder, Colorado. The aircraft made flight-level measurements of horizontal wind speed, temperature, and humidity. An infrared radiometer was used to measure the surface radiative temperature, and motion-picture cameras were used to photograph the cloud fields. With the exception of the cloud pictures, all this information, together with relevant data on aircraft heading, speed, time, and the like, were recorded on magnetic tape. The reduction of these data has only just commenced.

The combination of these three methods of monitoring the behavior of the atmosphere in the layer between the surface and the convective cloud base will produce far more information than has ever been available for this layer at any other time or place in the tropics. From these data the links between the surface and the clouds will be sought.

<u>The Cloud Layer and Middle and Upper Troposphere</u>

Measurements in this region were carried out in a most intensive fashion during BOMEX in 1969 (Kuettner and Holland 1969), by the largest fleet of scientific aircraft and surface vessels ever assembled for a single meteorological experiment. The reduction of the enormous amount of data collected is still in progress. The results presented below on scales of motion in and above the cloud layer are drawn primarily from the observations made during the 1968 experiment.

Intensive use was made of conventional sounding techniques, using balloon-borne radio transmitters carrying temperature, humidity, and pressure sensors whose signals were modulated and transmitted to ground. Soundings made in 1968, together with other measurements, were made in two modes. Days of intensive experiments were separated by days of routine observations. A five-day cycle consisted of 72 hours of intensive observations followed by 48 hours of routine observations. During intensive periods soundings were made at 3-hour intervals from the island and from the <u>Discoverer</u> 60 miles east of Barbados. On routine days soundings were made every 6 hours.

The tropical troposphere is, on the average, in a state of convective and conditional unstable equilibruim. This instability, however, is not released at random but rather through organized systems in the tropical atmosphere. Such organized systems are of the meso to synoptic scale and are most frequently centers of intense convection, under which large quantities of sensible and latent heat (which is released in condensation-precipitation) are conveyed to high altitudes, creating in these very regions of activity a more stable atmosphere.

An effective measure of the total process -- and hence the existence of an organized tropical atmospheric system -- is the vertical distribution of equivalent potential temperature, θ_e, obtained from a radiosonde. Such vertical distributions of θ_e are shown in figure 14. In this figure soundings have been classified according to the vertical distribution of θ_e, yielding mean curves for low, moderate, and high values of θ_e in the column.

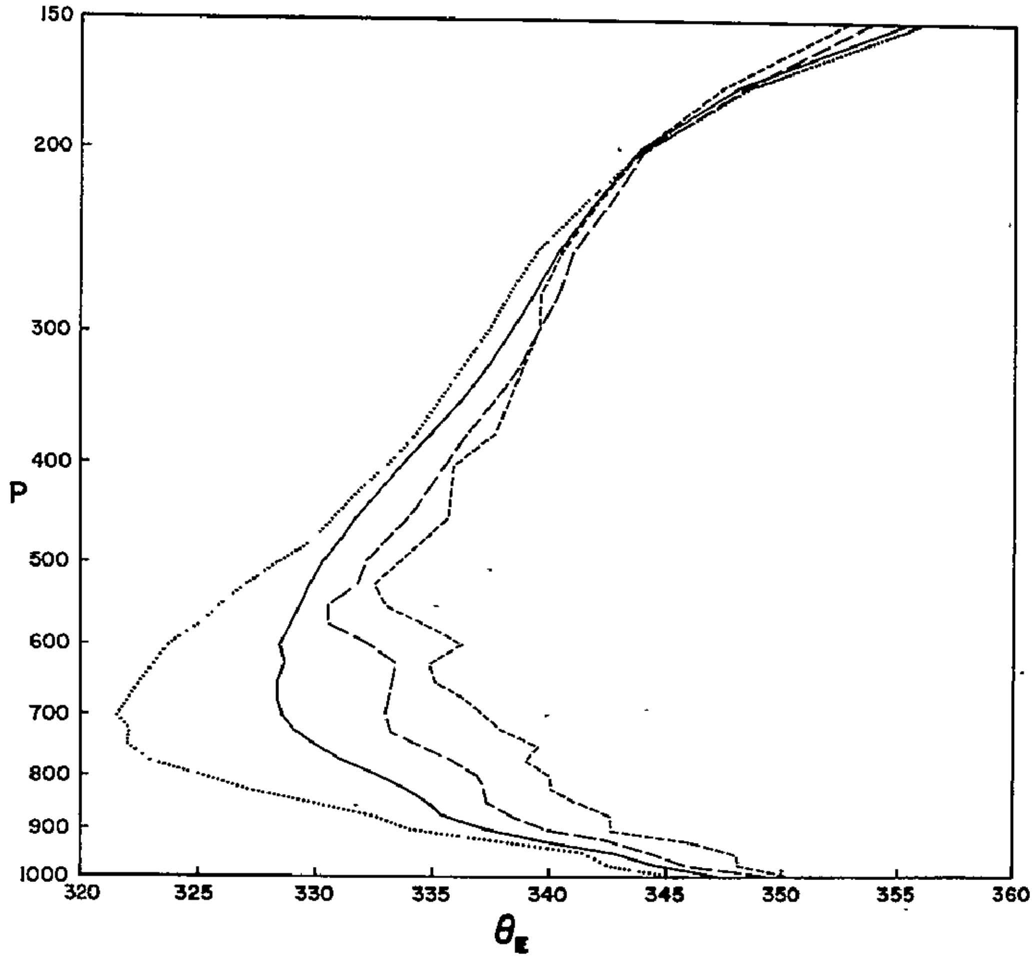


Figure 14. The distribution of θ_e as a function of pressure (P) in millibars or height (Z) in kilometers for days with four characteristic weather types: average (solid); suppressed convection (dotted); moderately enhanced convection (long dashes); and strongly enhanced convection (short dashes). The differences in the distributions result primarily from the vertical transport of water vapor by the convective clouds.

Similarly, these curves correspond to organized states of weather that can be classified as undisturbed, average, moderately disturbed, and disturbed. When days for which any of these soundings might be typical are compared with such measures of the weather as rainfall and cloudiness (from island observations and satellite pictures), good agreement is obtained.

Particularly good results are obtained if an integrated value of θ_e is derived from individual soundings by summing up the area below the curve to the left of a line arbitrarily located at $\theta_e > 350^oK$ in figure 14. (Such results are also presented in the upper part of fig. 5.) While this method is diagnostic rather than prognostic, it is a valuable means of quantitative classification of the tropical atmosphere and forms a basis for linking the surface, subcloud layer, and cloud layer to the synoptic-scale processes.

The Future

The above discussion gives some indication of the magnitude and complexity of the problem even when it is viewed only from the standpoint of a single experiment. We have made no reference to the cost in terms of human effort and money. Two and one half years were spent on preparatory work by the authors and a nucleus of some ten graduate students and technicians before the execution of the 1968 experiment. When major facilities -- such as aircraft, buoys, ships, and radar -- must be assembled, together with the necessary people and expendable supplies, logistics alone dictates that dates and times must be fixed well in advance.

Once such a timetable is established, system development and testing must proceed on schedule. Schedules and delivery times which appeared entirely reasonable during the planning stages could not be adhered to. As a result, the final phase of testing and evaluation prior to deployment could not be adequately accomplished. More than forty scientists, students, and technicians were in the field in 1968.

About $750,000 in direct funding was expended on this experiment over a period of four years. If the services provided at nominal or no charge by the Air National Guard, Environmental Science Services Administration, National Center for Atmospheric Research, Caribbean Meteorological Institute, and the Barbados Meteorological Service had had to be paid for, the cost would have been more than double.

In 1969, for BOMEX the total experiment was at least one order of magnitude greater in complexity and cost.

For each scale of motion, links with other scales in the atmosphere were indicated. Thus the regular periodicities noted in the ocean-current measurements were tied to organized synoptic-scale disturbances in the atmosphere, whose existence was summarized by variations of a particular parameter. Similarly, the behavior of the surface wave fields and the fluxes of sensible and latent heat could be linked to synoptic systems in the atmosphere. In the case of the heat fluxes, a fundamental link in the energy transport of the system was identified. In the subcloud layer the vertical transport of heat and water vapor was tied to eddies, measuring hundreds of meters across, which received their buoyancy not from temperature differences but from moisture differences. The task of unifying the components into a whole remains to be done, but many of the parts have been identified and their roles clarified in this first major attempt at an integrated field program. Many more pieces will be identified as analysis proceeds.

At this stage we may summarize the experience gained from the 1968 program and participation in the BOMEX, 1969, in the following conclusions: This type of field program is essential to better understanding of the atmosphere and its interactions with land and ocean. Specialized measuring systems must be developed and tested if the required data are to be obtained. In spite of attempts to formulate objectives of the program in advance, unanticipated problems arise in the execution or are revealed by analysis of the data; conversely, serendipity typically provides unexpected results.

Much more extensive field programs are now in the planning stages as part of the Global Atmospheric Research Program. Considerable effort has been expended in formulating the scientific objectives of the first GARP tropical experiment, now tentatively scheduled for the tropical Atlantic region in 1974. Much additional effort will be needed to develop and select the technological tools and experimental design to fulfill these objectives. In addition, an administrative and scientific management structure must be established to provide the framework for cooperative efforts of many university and government groups on both the national and international level. Given optimum success, this field program is not likely to answer all questions; rather, succeeding experiments will have to be built upon its results. The potential benefits fully justify the effort needed.

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