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DINDB QUERY LISTING
12/28/1989

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*	7101003		L105	****	311N	3187	CAPE KEN	05/01/1967	07/01/1967	617	0
*			L105	****	311N	3187	BIMINI	04/01/1965	11/01/1970	3503	0
*			L105	****	311N	3187	JACKSVIL	07/01/1967	08/01/1967	625	0
*			L105	****	311N	3187	FOWEY RK	05/01/1965	06/01/1965	513	0
*			L105	****	311N	3187	HOPETOWN	07/01/1969	08/01/1969	979	0
*			L105	****	311N	3187	MARATHON	06/01/1966	07/01/1966	355	0
*			L105	****	311N	3187	F.PIERCE	07/01/1966	06/01/1967	451	0
*			L105	****	311N	3187	N. CAR.	06/01/1968	07/01/1968	623	0

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DØ1201

DNODC*File1.

APRIL 1970

ACCESSION NUMBER

71-1003

ACKNOWLEDGED BY POSTCARD 8/12/71

IN-
Nova University
Physical Oceanographic Lab.
Dania, Florida

DATA DOCUMENTATION FORM

NATIONAL OCEANOGRAPHIC DATA CENTER

WASHINGTON, D.C. 20390

INSTRUCTIONS

This form should accompany all data submissions to NODC. It requires the minimum information necessary for systematic data documentation (Section A) and subsequent reformating (Section C), with additional comments on scientific content (Section B). Section A, Originator Identification, must be completed when the data are submitted. It is highly desirable for NODC also to receive the remaining pertinent information at that time. If this inconveniences the donor, NODC personnel will establish contact at a later date, to obtain the remaining information necessary for completion of form.

Readable handwritten submissions, preferably in ink, are completely acceptable. All data shipments should be addressed to:

Records Control Section (Code 2121)
National Oceanographic Data Center
Bldg. 160 W.N.Y.
Washington, D. C. 20390.

SECTION A: ORIGINATOR IDENTIFICATION

The information in this section is used to credit the data to the proper originator and to allow archive indexing.

1. Write the complete name and address of the institution or laboratory with which the submitted data are associated. If several institutions are involved, indicate all.

2. Write name of the expedition, project, or program during which the data were collected.

3. Write the name and/or cruise number used internally or in publications to identify the data.

4. Enter the name, number, or other designator of the platform associated with the data. If more than one platform is used, explain proper data association.

5. Identify the type of platform, e.g., ship, aircraft.

6. Include nationality of platform registry.

7. If data should not be released for a specified time period, check "YES" box and complete item 8.

8. Specify date when data can be released for general distribution.

9. Give the name and address of the scientist to whom inquiries concerning data should be addressed.

10. If data should be included in World Data Center A for international exchange, please check "YES" for DNP; otherwise check "NO." If part of data should be treated as DNP, check "PART" and specify.

A. ORIGINATOR IDENTIFICATION

THIS SECTION MUST BE COMPLETED FOR ALL TRANSMITTALS

1. INSTITUTION/LABORATORY/ACTIVITY (NAME AND ADDRESS)
Nova Oceanographic Laboratory North Dante Bch. Blvd., Dania, Florida

2. EXPEDITION/PROJECT/PROGRAM
Transport Measurements of the Florida Current

3. CRUISE NUMBER

4. PLATFORM NAME
Gulfstream

5. PLATFORM TYPE
55 ft. cruiser

6. PLATFORM NATIONALITY
American

7. ARE DATA PROPRIETARY?
☒ NO ☐ YES COMPLETE 8 IF YES

8. RELEASE DATE

9. RESPONSIBLE SCIENTIST (WITH ADDRESS IF NOT THE SAME AS ITEM 1)
Dr. William S. Richardson

10. ARE DATA DECLARED NATIONAL PROGRAM (DNP)? ☒ YES ☐ NO ☐ PART (SPECIFY)

C. DATA FORMAT

COMPLETE THIS SECTION FOR PUNCHED CARDS OR TAPE, MAGNETIC TAPE OR DISC SUBMISSIONS.

1. LIST RECORD TYPES CONTAINED IN THE TRANSMITTAL OF YOUR FILE. GIVE METHOD OF IDENTIFYING EACH RECORD TYPE.

undefined

2. PLEASE GIVE BRIEF DESCRIPTION OF FILE ORGANIZATION

sequential unblocked card images

using the format 20A4

3. ATTRIBUTES AS EXPRESSED IN ☐ PL-I ☐ ALGOL ☐ COBOL ☒ FORTRAN ☐ ________ LANGUAGE

4. RESPONSIBLE COMPUTER SPECIALIST:

NAME AND PHONE NUMBER Nancy Birnesser

ADDRESS No. Dania Beach Blvd., Dania, Florida

COMPLETE THIS SECTION IF DATA ARE ON MAGNETIC TAPE

5. RECORDING MODE: ☒ BCD ☐ BINARY ☐ ASCII ☐ EBCDIC ☐ ________

6. NUMBER OF TRACKS (CHANNELS): ☒ SEVEN ☐ NINE ☐ ________

7. PARITY: ☐ ODD ☒ EVEN

8. DENSITY: ☐ 200 CPI ☐ 1600 CPL ☒ 556 CPI ☐ 800 CPI ☐ ________

9. LENGTH OF IRG: ☒ 3/4 INCH ☐ ________

10. END OF FILE MARK: ☒ OCTAL 17 ☐ ________

11. PASTE-ON-PAPER LABEL DESCRIPTION (INCLUDE ORIGINATOR NAME AND SOME LAY SPECIFICATIONS OF DATA TYPE, VOLUME NUMBER)

NO1541

12. PHYSICAL BLOCK LENGTH IN BYTES

80

13. LENGTH OF BYTES IN BITS

8

Section A: 3. Cruise Number

There are eight sections of data:

I Marathon

II Fowey Rock

III Miami-Bimini

IV Fort Pierce

V Fort Pierce (the following year)

VI Jacksonville

VII North Carolina

VIII Hopetown

Each represents a cross-section of the Gulfstream (except Hopetown) and includes a number of stations where data is taken. The latitudes and longitudes of these transects and locations of the stations are included as part of the data.

B. SCIENTIFIC CONTENT - Operation

The boat is brought to the drop position on a preselected heading. At the start of a drop, the instrument is turned on and the receiver tone is energized by the transmitted signal; a button is pressed to prime the digital clock. The flow meter is zeroed and the ballast weight is attached to the release. The instrument is then dropped, a photograph is taken of the Hi-Fix position, and the clock begins to count when the radio signal is lost as the transmitting antenna goes under water. When the instrument returns to the surface, the nose cone drains and the transmitter comes back on the air. The receiver hears this signal and turns off the clock, which then displays the run time. The instrument is fixed again as quickly as possible and recovered. Following recovery, the instrument is turned off, the flow meter is read, and the release is rerigged for the next drop.

Since several simultaneous drops to different depths are often made and since each drop requires a back extrapolation from fix position to surfacing position using the surface drift, a float is used to measure the surface current after the last instrument is dropped. The float has nearly the same dimensions as the instrument, but it is made of polyvinyl-chloride pipe ballasted to float like the instrument on the surface.

B. SCIENTIFIC CONTENT - Instrumentation

The data is collected using the free fall method. An instrument falls freely to a preselected depth, where it releases its ballast weights and returns to the surface under its own buoyancy. The instrument records depth and is used with a navigational system capable of measuring the horizontal deflection of the instrument. The resulting data are vertically averaged velocity or average current measured over the depth.

The instrument used to collect data has been modified during the period when data was taken. The original instrument was used for the first six sections as described in A.-3. and the improved instrument was used for sections VII and VIII.

The original instrument consists of an aluminum pipe 15 cm (6 in.) diameter and 150 cm (5 ft.) long, fitted with flat end caps that are streamlined by addition of free-flooding fiberglass nose and tail cones. Within the pressure case is a 16-mm camera that takes time-lapse pictures of a pressure gauge, an electric wrist watch, and a mercury thermometer. When the instrument is used for transport measurements, the lower end of it carries a 2-m rope attached to a 4.5-kg weight that leads to another 2-m rope, where the release mechanism is attached. This weight provides vertical stability during the fall and ascent and is separated from the instrument case for ease of handling.

Two types of release mechanism are used. The first is a single lever arrangement that drops two 4.5 kg weights when the weights contact the bottom. The second is a mid-depth release consisting of a piston held at the end of its travel in a cylinder by a brass screw and eyenut. The brass screw is weakened as desired by reducing its diameter at one point so that it will break under tension generated by hydrostatic pressure on the piston. When the screw breaks, the eyenut and the attached 9 kg of weight fall off.

The navigational system used is the controlling factor in the accuracy of measurements of this type. The system employed is known as Hi-Fix (Decca Navigator System, Inc.) This is a radio location system in which the master station, located on the boat, alternately interrogates two slave stations to determine range from them. The system has a range of about 115 km and a precision of about 1 m. The readout is in the form of two- 5-digit counters showing range to the two stations.

The improved instrument is considerably lighter and easier to handle. It consists of an aluminum tube 2.5 m. long by 11.5 cm in diameter, closed at the top and bottom with flat o-ring sealed end caps. The wall thickness (6 mm) is sufficient for use to depths of 2000 m. The upper end cap is pierced for the leads to a flashing xenon light that is encased in a small plexiglass housing and for the lead to a radio antenna 20 cm. long. These parts are protected by a streamlined fiberglass nose cone that is perforated near the nose by four holes 1 cm. in diameter. The holes permit the nose cone to drain in less than 0.5 seconds when the instrument surfaces. The upper portion of the nose cone is painted brillant orange, but the lower 5 cm is left unpainted so that the light, when not directly visible through the bottom holes, is seen at somewhat reduced intensity through the translucent fiberglass. On the inside of the top end cap is a small electronic assembly consisting of a power supply, a very low-powered crystal-controlled radio transmitter, and a light-flashing circuit. All are solid state units.

The bottom end cap carries externally a solid polyvinyl-chloride hemisphere for streamlining. A magnet embedded in the hemisphere operates a reed switch inside the bottom end cap when the hemisphere is rotated one-third of a turn around its axial mounting pin. This reed switch turns on the batteries (12 volt), which are mounted inside on the bottom end cap.

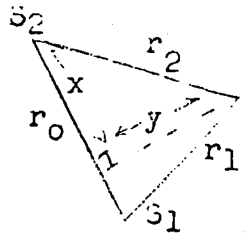
Hanging from this bottom hemisphere is a short bridle to which a flow meter (TSK model 30) is attached; the flow meter is modified so that it only records on the downward trip of the instrument. As soon as the release mechanism, which is carried on the end of a short lanyard below the flow meter, releases the ballast, the instrument starts up and a small detent engages and locks the reading of the flow meter. This reading measures the depth of the drop. Calibration is made by dropping to the bottom in known depths.

The instrument with these attachments has a net buoyance of 2.5 kg and requires about 5 kg of expended ballast to give approximately equal fall and rise velocities of about 1.0 m per sec.

On the vessel there is a crystal-controlled radio receiver (one for each instrument) tuned to the instrument's transmitter. Each receiver is coupled to a digital clock such that it starts on loss of signal and stops on return of signal. The circuits are arranged so that the clock can be "primed" or readied only when the instrument is transmitting. A latching circuit is incorporated to avoid restarting of the clock after the instrument has surfaced, even if the instrument is submerged by wave action and the signal is temporarily lost. Sensitivity and time constants are set in the receiver to eliminate false signals due to static and spurious radio signals. In addition, an audio tone is generated and coupled to the receiver's loudspeaker whenever the signal from the instrument is received. This provided a functional check on the electronics before launch and an audible indication when the instrument returns to the surface.

B. SCIENTIFIC CONTENT - Computational Proceedure.

Computation of the vertically averaged current are made primarily by on-line use of a PDP-8L computer. Once the depths have been calibrated, information is read from the photographs and ship records and typed into the teletype. The program uses a lane to meter conversion factor equal to the speed of propagation divided by twice the frequency and the two fixes in lanes read from the polaroids to calculate the distance east and north from the second slave station (a fixed shore position).



$$x = r_2 \cos(r_1)$$

$$y = \sqrt{r_2^2 - x^2}$$

then rotate through angle theto using

$$x = x \cos\theta + y \sin\theta$$

$$y = y \cos\theta - x \sin\theta$$

where theto is the angle through which the base line must be rotated counterclockwise to get the the desired y direction which can be due north or the direction of the Gulfstream.

These positions must then be corrected for variation in the ships' heading.

$$x = x + B \cos ang - A \sin ang$$
$$y = y + A \cos ang + B \sin ang \quad \text{where } A = 2 \text{ and } B = -6.$$

indicating the location on the boat from the radio position of the instrument release.

Once all three surface current locations are computed, the surface currents are calculated pairwise and averaged.

$$u_i = \frac{x_{i+1} - x_i}{t_{i+1} - t_i} \qquad v_i = \frac{y_{i+1} - y_i}{t_{i+1} - t_i}$$

where u,v represent the east,north surface current components and t represents time in seconds of the positions.
The surface current vector is also computed:

$$r = \sqrt{x^2 + y^2} \qquad \theta = \arctan y/x$$

To calculate the average currents, the instrument drop and pick-up positions are calculated as above from Hi-fix data.

$\alpha = dt - t$, where dt is the time difference between

drop and pick-up and t is the travel time.

Then $\delta = dx - \alpha u_s$, where dx represents difference in x location of drop and pick-up and u_s is the x component of the surface current.

And $\gamma = dy - t \cdot v_s$, where dy represents difference in y location of drop and pick-up and v_s is the y component of the surface current. $(u, v) =$

$$\left(\frac{100\beta}{t} , \frac{100\gamma}{t} \right)$$

, the average current components in centimeters per second.

A transport is also calculated using D for depth:

$$U_t = \frac{u \cdot D}{100} \qquad V_t = \frac{v \cdot D}{100}$$

, the transport components in meters sq. per second.

The average current data thus calculated can be used for various other calculations. They are averaged, fitted by various curves, integrated to find transports over the depth and across the section of water. The transports are differentiated to calculate velocities, and the velocities may be averaged or fitted by various curves and these values used for other scientific calculations.

Data:

Header information includes the section of data, whether the data is the cross-stream or downstream components of data, the station, and the location of the station, usually in kilometers distance from the shore point across the gulfstream.

Three cards give the data: The first gives the number of data, the station, and the date in month, day, and year. A fortran format used would be 2I3,3I2.
A second card gives the depths of the data and the third card gives the data, both using format 6F8.1.

Bryden

P. P. NIILER AND W. S. RICHARDSON

Seasonal Variability of the Florida Current

REPRINT FROM
SEARS FOUNDATION: JOURNAL OF MARINE RESEARCH
Volume 31, Number 3, September 15, 1973. Pp. 144–167

Seasonal Variability of the Florida Current[1]

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ABSTRACT

The seasonal variability of the directly measured transport and horizontal currents in th Florida Strait has been determined from 90 transects of the Florida Current at the latitud of Miami, Florida. It is estimated that the seasonal variability accounts for 45% of the tot variability in the total transport; the early summertime maximum value of the transport 33.6 $\times 10^6$m^3/sec, and the early winter low is 25.4 $\times 10^6$m^3/sec. The details of the temperatur distribution with depth at the season of maximum and minimum flow also have been deter mined. The seasonal change in the sea level across the Florida Strait is computed from th geostrophically balanced surface velocity and is found to have an amplitude of 6.5 cm. much smaller (1.3 cm) corresponding seasonal amplitude in the steric level with respect t the ocean bottom has been observed, and the seasonal changes in the sea level are directl related to the seasonal changes in the dynamically induced pressure on the ocean floor Th seasonal changes of the transport in the Florida Strait penetrate to the ocean botton annual cycle of heat transport also is discussed.

I. *Introduction.* Tidal records, ship-drift reports, and electric potential difference measurements offer the most extensive data on the variability of th current that flows through the Florida Strait. An excellent review of th efforts to relate these data to the variable flow conditions of the Florida Cur rent has recently been provided by Wunsch et al. (1969). They suggest, alon with many previous investigators, that the long-term differences in the sea lev at various tide stations are related to the seasonal changes in the surface curre in this area; they conclude, simply, that the seasonal variability of the surfac Florida Current across the Strait is 10% of the average value. Their analys incorporates hourly tidal readings that span many years, and the statistical sig nificance of their conclusions on the nature of the sea-level variations is ce tainly reliable. Sea-level differences, however, are an indirect measure of t flow conditions; no detailed direct measurements of the seasonal cycle in th currents have been reported.

Two other types of surveys have been instrumental in the effort to unrav the magnitude of seasonal fluctuations of the Florida Current. The first of the

1. Accepted for publication and submitted to press 1 May 1973.

is the experiment carried out in 1962–1964 by the University of Miami in an effort to determine the seasonal variability of the hydrographic structure within the Florida Strait. Thirteen consecutive monthly cruises were undertaken and hydrographic stations were made at six equally spaced points across the Strait at the Miami latitude. Broida's (1962–1964) review of these data reveals that as much variability in the hydrographic conditions occurred from one monthly cruise to the next as was apparent in cruises separated by two seasons. The study helped to establish the seasonal cycle of the temperature of near-surface waters, but it did not provide a large enough sample to ascertain this variability in the deeper water.

Records on the electric potential difference between two electrodes represent the second type of study; these records have been maintained since early 1969 at two locations in the Florida Strait. The electric potential difference is a measure of the total transport of seawater flowing over the cable, and the cable-electrode configuration must be calibrated by direct measurements of the transport in order that the data can be related quantitatively to the flow conditions. The University of Miami (de Ferrari, personal communication) has maintained a calibrated electrode pair in the western portion of the Strait, with an eight-mile electrode separation; Sanford (personal communication) of the Woods Hole Oceanographic Institution has maintained a record of the potential difference between Palm Beach, Florida, and Grand Bahama Island. These studies are not yet complete, but they should handsomely complement the three-year record that was obtained by Wertheim (1954) on the telegraph cable between Key West, Florida, and Havana, Cuba. Unfortunately, the present Miami cable does not span the entire channel, and the Palm Beach and Key West cables have not been calibrated.

A twofold problem has persisted in determining the seasonal variability of the Florida Current. When an adequate record length of a variable at a few locations can be obtained (such as tidal heights or cable potential readings), the interpretation in terms of the flow conditions is difficult and usually yields only qualitative information about the three-dimensional structure of the current; the shorter records of more direct measurements, while containing a wealth of information, are so contaminated with short-period fluctuations that they do not shed light on the annual cycle. Though unknown when the University of Miami's thirteen-month survey was started in 1962, it is now a well-established fact that the short-period (less than two weeks) modulation in both the velocity and the hydrographic structure of the Florida Current is as large as the seasonal changes.

This is a report on an experiment to determine the seasonal variabilities in the Florida Current by direct means. Over the years 1964–1971, numerous samples of the horizontal velocity were gathered at a number of depths at identical locations at the Miami latitude; the temperature structure was measured concurrently with the velocity. The seasonal changes determined from these data give an adequate picture of the variability of the two-dimensional cross-stream structure. The aliasing problem is dealt with in the following pragmatic manner.

A seasonal average of a measurement is determined from an appropriately calculated average of a number of random samples that were gathered during a two- or three-month period (in a number of different years). It has been possible to show that when more than ten samples of, for example, the transport of the Florida Current are used to form such an average, no significantly different average (no change in an r.m.s. fit or in the error of the mean) is obtained from ten different samples that belong to the same period or to the same period in a different year. Effectively, a low-pass filter is applied to the data, without determining the phase or amplitude of the short-period fluctuations explicitly. The standard error of the mean for a particular season is estimated on the basis that the shorter-period fluctuations are white noise. This method is analogous to that devised by Thompson (1971) to analyze the long-period fluctuations in gappy current-meter records at Site D in the North Atlantic, and statistical credence, if not certitude, is obtained for the variability that is interpreted as seasonal changes. It is clear that a more definitive study, one that could increase the statistical reliability of the data by a factor of two, would require a fourfold effort compared with that already expended.

II. *The Experimental Method and the Scope of the Data.* The data on the density and velocity structure of the Florida Current that are presented and discussed here have been gathered by the free-drop method. The method for obtaining measurements of the vertically averaged horizontal velocity and the accuracy of the data-acquisition system have been discussed by Richardson and Schmitz (1965). The temperature structure was obtained from a freely falling STD. The temperature sensor of the STD (Bissett-Berman Corp., Model 9060) has proved to be reliable, but the reliability of the conductivity system used to determine the salinity is questionable. With no apparent change in the calibration of the conductivity cell, values of salinity below 400 m were occasionally lower than the historical salinity data for this region by as much as 0.6‰. Because of this difficulty, the seasonal picture of the density structure has been based on the local seasonally averaged historical temperature-density correlation rather than on direct measurements. The specific method used to form a seasonal average, together with estimates of its statistical reliability, is outlined during the subsequent presentation of the variabilities in the transport, the horizontal-velocity distribution, and the temperature and density structure.

For convenience, each excursion of the ship from port is termed a "cruise." During a normal cruise of eight hours, the surface current, the average horizontal velocity to a number of depths, and a record of the temperature versus depth were obtained at 13 closely spaced stations along the transect from Miami to Bimini. The location of the stations and the transect in the Florida Strait

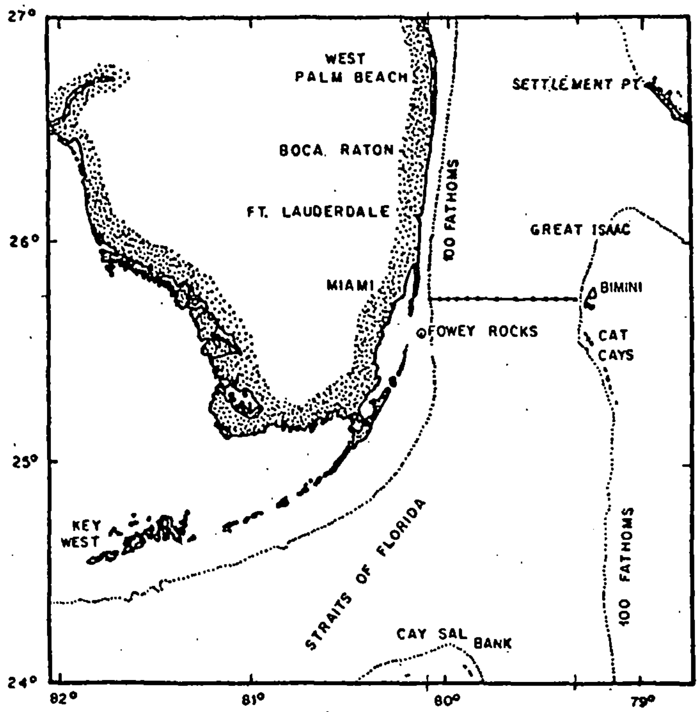

Figure 1. Station locations.

are shown in Fig. 1. The record of this experiment is tabulated in Table I. A total of 3682 dropsonde records and 336 STD records make up the bulk of the data.

Some of these data have been used by various investigators in describing and discussing the average dynamic and kinematic structure of the Florida Current (Richardson and Schmitz 1968, Richardson et al. 1969, Schmitz 1969, Schmitz and Niiler 1969, Broida 1969, Wunsch et al. 1969, Stubbs 1971, Duing and Johnson 1972, de Ferrari, personal communication). This is the first presentation of a comprehensive study of the entire archive in terms of the seasonal patterns. The National Oceanographic Data Center maintains a file of the dropsonde data, and Nova University has a file of the STD temperature records.

III. *The Seasonal Variability.* A. THE TRANSPORT. The transport of the Florida Current, tabulated in Table I, was computed by a cross-channel numerical integration of the observations of the northward component of transport per unit width during each individual cruise. The maximum value of the 75 samples is $38.2 \times 10^6 m^3 sec^{-1}$, in the summer of 1965; the minimum value is $19.0 \times 10^6 m^3 sec^{-1}$, in the winter of 1970. Not all of this variability

Table I. List of Miami-Bimini Cruises with total transport and geostrophically balanced sea-level difference.

Sequential* cruise number	Date	Stations completed	Stations omitted	Transport (m^3/sec) × 10^6	Geostrophically balanced sea-level difference (cm)
1	8/16/64	1,2,4,6–10,13	3,5,12	36.0	– –
2	8/17/64	12,9–5,3–1	13,11,4	36.8	– –
3	10/20/64	1,2,5,7–9,11,13	3,4,6,10,12	33.0	– –
4	10/22/64	1,2,4,6–8,12,13	3,5,9,10,11	27.2	– –
5	12/14/64	4,6,7,10,11	1–3,5,8,9,12,13	32.4	– –
6	4/5/65	1–8,10,11,13	9,12	36.3	68.5
7	5/24/65	1–13	– –	31.2	80.8
8	5/26/65	1–13	– –	34.1	76.3
9	5/28/65	1–13	– –	38.2	86.7
10	5/30/65	1–13	– –	34.9	72.1
11	6/4/65	1–13	– –	29.2	56.0
12	6/6/65	1,3,4,7–9,11–13	2,5,6,10	26.9	65.8
13	6/8/65	1–3,5–7,11,12	4,8,9,10,13	31.7	68.0
14	6/12/65	1,3,4–13	2	35.0	83.6
15	6/16/65	1–13	– –	37.9	72.3
16	6/18/65	1–13	– –	31.4	69.5
17	6/21/65	1–13	– –	29.2	65.9
18	6/23/65	1–13	– –	33.0	70.7
19	3/24/66	1,3,6–8,10,13	2,4,5,9,11,12	32.4	– –
20	5/28/66	1,3,5–8,13	2,4,12	30.1	– –
21	12/4/66	1,7–13	2–6	32.8	– –
22	11/15/67	1–13	– –	28.5	42.1
23	11/16/67	13–8,6	9,5–1	N.G.	– –
24	12/7/67	1–13	– –	22.0	58.7
25	12/8/67	13–1	– –	26.5	63.3
26	1/3/68	1–13	– –	24.4	63.1
27	1/4/68	13–1	– –	26.5	68.2
28	2/10/68	1–13	– –	24.3	45.0
29	2/12/68	13–1	– –	26.5	58.5
30	3/30/68	1–13	– –	35.3	67.8
31	3/31/68	13–1	– –	35.2	81.3
32	4/4/68	1–13	– –	33.2	82.8
33	4/5/68	13–1	– –	33.8	86.2
34	4/10/68	1–13	– –	32.4	86.2
35	4/11/68	13–1	– –	31.7	76.8
36	4/17/68	1–13	– –	33.2	74.0
37	4/23/68	1–13	– –	28.2	68.5
38	4/24/68	13–1	– –	25.6	62.3
39	4/26/68	1–13	– –	32.5	61.4
40	4/27/68	12,10,8,6,4,2	13,11,9,7,5,3,1	34.0	71.5

* Cruises missing in the sequential list were carried out, but no usable data were obtained.

Table I – continued.

Sequential* cruise number	Date	Stations completed	Stations omitted	Transport (m^3/sec) x 10^6	Geostrophically balanced sea-level difference (cm)
41	4/30/68	1–13	– –	32.3	64.5
42	5/1/68	13–1	– –	31.4	60.7
43	4/29/69	2–10	1, 11, 12, 13	28.9	61.5
44	5/1/69	1–13	– –	35.5	71.3
45	5/27/69	1–8, 10, 11	9, 12, 13	31.8	70.5
46	5/28/69	13–9, 7, 6, 5, 3, 2	1, 4, 8	29.5	76.7
47	5/29/69	1–8, 10–13	9	34.1	70.2
48	5/30/69	12–1	13	33.2	66.6
49	5/31/69	1–13	– –	35.8	73.3
50	6/1/69	12–5, 3–1	4, 13	29.2	64.4
52	6/3/69	13–9, 7–1	8	33.5	70.3
55	11/2/69	1–13	– –	25.4	37.4
56	11/13/69	13–3	2, 1	27.0	46.3
57	11/4/69	1–13	– –	26.8	42.9
58	11/5/69	13–1	– –	23.9	34.5
59	11/8/69	1–11	12, 13	23.4	32.5
61	11/12/69	1–13	– –	20.1	42.1
62	11/13/69	13–1	– –	24.1	48.8
63	12/1/69	1–4	5–13	– –	– –
65	12/15/69	1–13	– –	28.0	50.8
66	12/16/69	13–1	– –	29.8	52.1
67	12/18/69	1–13	– –	28.4	59.9
68	12/19/69	13–9, 6–1	8, 7	N.G.	– –
69	1/13/70	1–10	11–13	26.1	52.3
70	1/14/70	13–1	– –	24.9	52.9
73	1/22/70	1–13	– –	19.0	44.6
74	1/23/70	13–1	– –	19.7	45.2
75	1/27/70	1–13	– –	27.4	59.7
77	2/12/70	1–13	– –	27.4	52.6
78	2/13/70	13–1	– –	26.9	57.0
79	9/9/70	1–13	– –	32.8	72.0
81	9/16/70	1–13	– –	27.4	67.4
82	9/17/70	13–7	6–1	– –	– –
83	9/23/70	1–13	– –	32.6	70.5
84	9/24/70	13–9	8–1	– –	– –
85	10/2/70	1–13	– –	22.2	48.5
86	1/4/70	13–10, 7–1	9, 8	N.G.	– –
87	10/15/70	1–6, 8–13	7	21.4	47.7
88	10/16/70	13–6	5–1	23.3	50.3
89	11/2/70	1–13	– –	20.5	49.0
90	11/3/70	13–1	– –	23.4	56.8

* Cruises missing in the sequential list were carried out, but no usable data were obtained.