3927

Department of Commerce and Labor
COAST AND GEODETIC SURVEY

Superintendent.

State: S.C

DESCRIPTIVE REPORT.

Hydrographic *Sheet No.* 3927

LOCALITY:

Charleston S.C
to Martin Industry
Light Vessel

1906

CHIEF OF PARTY:

G.T. Rude

B

3927

D E S C R I P T I V E R E P O R T

to accompany

OFFSHORE DEAD REKONING HYDROGRAPHIC SHEET 3927

COAST OF SOUTH CAROLINA
Charleston to Martins Industry Light Vessel

December 1, 1915 to May 25, 1916

U S C & G S Steamer ISIS GILBERT T. RUDE, Commanding.

---oOo---

Instructions:

Instructions for this work were issued to Capt. R.F.Luce, on November 10, 1915 and orders were issued to me on November 23, 1915 to relieve him of the command of the ISIS.

Area:

The area of hydrography covered on this sheet is included within a line from Survey buoy B, about eleven miles off the coast of South Carolina opposite Charleston, in a southeast direction to the hundred-fathom curve, about 55 miles off shore and down the coast to a line from Survey buoy L, about ten miles northeast of Martins Industry Light Vessel to the hundred-fathom curve. The area embraced within these lines covers about 2000 square miles.

Signals:

A line of buoys, the type of which is explained in my season report dated July 31, 1916, were planted by the Lighthouse Tender CYPRESS and located by sextant cuts from the ISIS anchored inshore, her position fixed by angles from the tall signals built along the coast by Mr. O.B.French and Mr. Arthur Joachims. A list of these signals are given in my Season Report.

The angles for the location of these buoys are recorded in an Angle Record volume and forwarded with the inshore sheet of this locality. The positions of these signals were determined on the inshore sheet and transferred to this

sheet by D.M. and D.Ps, scaled from that sheet.

Class of Work:

No fixed position work was done on this sheet. The entire work consisted of the accurate class of dead reckoning work recently developed for offshore hydrography.

Currents:

The vessel was anchored for current observations every two hours inside the 25-fathom curve, at the 100-fathom curve and on two lines at the 40-fathom curve.

The method of making these observations is explained in detail in my Season Report, July 31, 1916, on pages 12 to 17 inclusive.

Tide Gauge:

The record of the Army Engineers Tide Gauge at Fort Sumter, Charleston, was used for the reduction of soundings over the entire area.

Scale:

The scale of the projection is one to one hundred and eighty thousand and the reference plane mean low water.

The soundings were plotted on the sheet by the field party and are in feet.

Spacing of Lines:

The lines are spaced four miles apart, except at the 100-fathom curve. Here it was thought advisable to run the line to a point and obtain only one sounding at the curve in order to remain in the strength of the Gulf Stream as short a time as possible. In this way the 100-fathom soundings are spaced about eight miles apart, decreasing to four miles at about the 40-fathom anchorage.

Spacing of Soundings:

Sounding was done with trolley, using either a 25 or a 40-pound lead

from the line of buoys off to the 25-fathom anchorage. From the 25-fathom anchorage to the 100-fathom curve strand sounding wire with registering dial was used and the engines reversed till all headway was off the ship and vertical casts obtained.

When using the dial and stopping the ship the soundings were spaced from five to six-tenths of a mile apart; when using the trolley they were spaced, at a speed of 4½ knots, every one, one and a half and two minutes apart, depending upon the depth.

Method:

In order to increase the accuracy of these lines and also shorten the time on these long lines on account of the uncertainty of the weather conditions and not being equipped with wireless, after the first two lines a departure was made from an offshore buoy and a full speed run made to an anchorage at the outer edge of the inshore sheet, the sounding line for the offshore work was then run at slow speed to the hundred-fathom curve and return to an anchorage at the edge of the inshore sheet, from which a full speed run was again made to a connection with one of the buoys.

Astronomical observations were made at every opportunity but on account of rough sea and poor horizon few were made. Some checked very closely with the adjusted dead reckoning positions while at other times they differed by as much as five miles.

Bottom specimens were obtained at intervals on these lines whenever bottom was such that it could be taken with Stellwagen cups. They were bottled, labeled and are forwarded as a part of the records of this sheet. Coquina was brought up at one place only.

The ISIS was not equipped with an anemometer, so the velocity of wind and amount of leeway applied are estimated.

Tests were made over a two-mile course twice during the season to standardize the logs used on the dead reckoning work. For these tests three barrel buoys, one at each end and one in the middle of the course, were located by sextant angles to shore stations and their positions plotted on a projection on a scale of one to twenty thousand. The vessel was run over this course each way several times at different speeds and log corrections computed for the different speeds. The record of these tests are forwarded with the other records.

The ship was swung for deviation four times during the season.

Surface, air and bottom temperatures were obtained at intervals on these lines; also observations with whirling psychrometer. These are all recorded in the sounding record at the positions where obtained. Barometer readings were obtained every hour and are recorded in the ship's log.

Plotting:

The positions and soundings on the fair sheet were plotted by Mr. T.J. Shack, Aid.

From current observations made at the 40-fathom curve it was determined that this curve was about the inshore edge of the Gulf Stream. When plotting the fair sheet, the following plan, which is considered the nearest to the true conditions, was followed:

Line on which no currents observed at 40-fathoms.

Bound off shore

The position at 25-fathom anchorage plotted with the resultant of the current observed at that and the preceding anchorage.

The position at 40-fathom curve anchorage plotted with the current obtained at the 25-fathom anchorage. (No Anchorage See line 3 p 5) Ropplup

The position at the 100-fathom curve plotted with the resultant of the

current observed at the 100-fathom anchorage and a zero current.

Bound inshore from 100-fathom anchorage

The position at the 40-fathom curve plotted with the resultant of a zero current and the current observed at the 100-fathom anchorage.

The position at the 25-fathom anchorage plotted with the current observed at that anchorage.

Line on which currents were observed at the 40-fathom curve on the return trip from the 100-fathom anchorage:

Out bound

Position at 25-fathom anchorage plotted with the resultant of current observed at that and the preceding anchorage.

Position at 40-fathom curve plotted with the current observed at the 25-fathom anchorage.

Position at 100-fathom curve plotted with the resultant of the current observed at the 100-fathom curve and a zero current.

Bound inshore, current observed at 40-fathom curve

Position at 40-fathom anchorage plotted with the resultant of the currents observed at the 100-fathom curve and the 40-fathom anchorage.

Position at 25-fathom anchorage plotted with the current observed at that anchorage.

It will be noted that, altho currents were observed at the 40-fathom anchorage, when bound inshore, the resultant of this and the current observed at the 25-fathom anchorage was not used for plotting the 25-fathom anchorage. The position at the 25-fathom anchorage was plotted with the current observed at that anchorage. This was done because it is thought that soon after leaving the 40-fathom anchorage the vessel ran out of the effect of the Gulf Stream and entered the tidal current which was observed at the 25-fathom anchorage.

Five minutes after leaving the 40-fathom anchorage, bound inshore, the vessel passed thru a yellow streak of fine drift material, about 20 meters wide and extending in a northeast and southwest direction. This streak was clearly defined and extended in the same direction as the axis of the Gulf Stream. It is thought that this was the edge of the Stream and that the vessel passed into the effect of the tidal currents after passing thru this edge.

A record of the above will be found in Vol.18, page 20, position K".

On the last line to the 100-fathom curve no Gulf Stream was encountered, so all positions on that line, including the 100-fathom anchorage, were plotted with the resultants of adjacent current stations.

Respectfully submitted,

Gilbert D. Rude

Assistant, C.& G.Survey,
Commanding U.S.S. ISIS.

D E S C R I P T I V E R E P O R T

to accompany

OFFSHORE DEAD RECKONING HYDROGRAPHIC SHEET

COAST OF SOUTH CAROLINA
Charleston to Martins Industry Light Vessel

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Line on which currents were observed at the 40-fathom curve on the return trip from the 100-fathom anchorage:

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Respectfully submitted,

Gilbert D. Rude.

Assistant, C.& G.Survey,
Commanding U.S.S. ISIS.

Form 167 11—683

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

Washington, 3/31, 191 7

Respectfully referred to HYDROGRAPHY, ETC., (HFR)

This determination of drift incident to the occupation of anchorage current stations is an interesting and important contribution to precise dead-reckoning methods.

That it should be adopted is evident, and it should be utilized as far as possible to improve the dead-reckoning positions on sheets now in hand in the Office.

J Tee

Form 167 11—683

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

Washington, 3/31, 191 7

Respectfully referred to

In regard to the sheets now in the Office, unless the method followed in taking the anchors on board is described in the records the subject matter of this paper can not be utilized in plotting the sheets.

Some Chiefs of Party endeavor to keep the ship over the anchor until it is off bottom in which ~~method the~~ case this method of calculating drift would not be applicable. GPS.

Copy to Whitney 4/3/17 RMA

POST-OFFICE ADDRESS: JACKSONVILLE FLA.

TELEGRAPH ADDRESS:

EXPRESS OFFICE:

DEPARTMENT OF COMMERCE

U. S. COAST AND GEODETIC SURVEY

U.S.S. ISIS

Jacksonville, Fla.,
March 23, 1917.

To the Superintendent,
U.S.Coast and Geodetic Survey,
Washington, D.C.

Sir:

As a matter of interest to you and possible assistance to others engaged in offshore dead reckoning hydrography, I have the honor to make the following report on experiments made at anchorages in the Gulf Stream and to submit a diagram from which may be obtained graphically the amount of drift of the vessel while heaving in the current anchor at a station in the Gulf Stream.

The ISIS anchors a barrel buoy at the 40-fathom curve with a 300-pound concrete block and 120 fathoms of 1/8" Siemens Martin strand wire; at the 100-fathom curve with a 400-pound block and 300 fathoms of wire. When the current has been obtained from small boat the barrel is taken on board and the wire run through snatch block on the anchor davit to the fleeting barrel of the anchor windlass, and wound in as fast as the windlass will take it.

From current observations made on the vessel while anchor was being hove in the drift of the vessel is considerably retarded within the full drift of the current by the anchor's holding her somewhat while she has the full lead of the 300 fathoms, the retardation decreasing gradually as the scope of the anchor wire decreases.

At the last anchorage in the Gulf Stream this was accurately determined for each three minutes from the time power was put on the wire till anchor left bottom by the following plan:

A base (101.3 feet), equal to two knots on a 30-second current line, was measured along the rail of the ISIS. (A current pole and current line may be used and the line allowed to run out two knots and the time noted instead of measuring base if desired). As soon as a strain was put on the anchor wire a chip was thrown over the side forward and the time noted when it passed the forward end of base and again when it passed the other end. In three minutes time this was repeated and the mean of the times required for the chip to pass over this base was taken for that three minutes. This was done every three minutes till anchor left bottom.

It will be noted that if the ship is in a three-knot current and the anchor holds her so that the current past the vessel is at the rate of two knots per hour she drifts only at the rate of one knot per hour. From this the actual drift of the ship was computed for each three minutes in a one, two, three, four and five knot current, decreased by the amount the anchor held the ship as shown by the length of time required for the chip log to run out two knots, and a current curve and diagram made, from which the actual drift may be scaled for these and intermediate currents.

The left hand column of figures is the time interval in seconds required for the 30-second current line to run out two knots; the curves are drawn for one, two, three, four and five knot currents; the figures at bottom of diagram is the ship's drift in knots per hour for three minutes and the figures at top of page the ship's rate of drift in knots. The latter is not necessary and is not used in obtaining the drift, but added here to prove the diagram. For example, if it required 30 seconds for a 30-second current line to run out two knots in a three-knot current, the current would be passing the ship at the rate of two knots while the ship would be drifting the other knot. On the diagram from 30 in the time interval column to the right to the intersection with the three-knot current curve and up to figure 1 at top of page, etc. Instead of up to the top column run down to the .05 miles in the figures at the bottom, the ship drifts .05 of a mile in three minutes in a one-knot current, etc.

As an example of the use of the diagram the following is a record of the amount of drift made by this vessel at the 100-fathom curve during 29 minutes, 18 of which the anchor was at the bottom, retarding the drift of ship, and 11 minutes from bottom to rail:

Strength of current 3.7 knots.

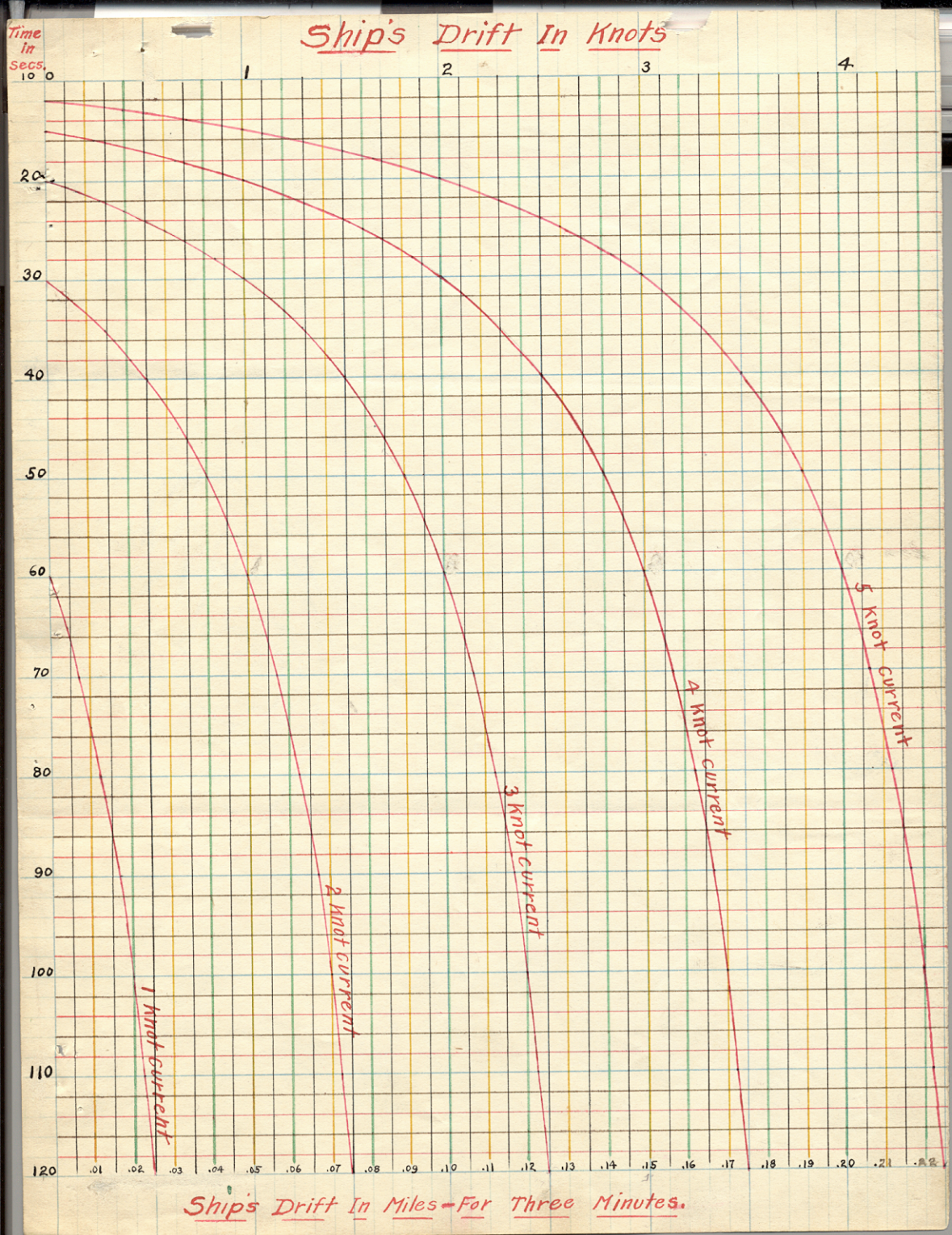
	Time interval	Mean	Drift from diagram.
First 3 min.	(20 sec. (30 sec.	25 sec.	.065
Second 3 min.	(30 sec. (50 sec.	40 sec.	.110
Third 3 min.	(50 sec. (65 sec.	58 sec.	.135
Fourth 3 min.	(65 sec. (80 sec.	72 sec.	.145
Fifth 3 min.	(80 sec. (100 sec.	90 sec.	.152
Sixth 3 min.	(100 sec. (115 sec.	108 sec.	.157

Total drift till anchor left bottom ---------- .764
Drift of ship in 11 min. in full strengh of current ---------- .64
Total drift of ship at anchorage ----------1.404 miles.

Respectfully submitted,

Gilbert D. Rude.

Commanding.


Ship's Drift In Knots
Time In Secs.
10
20
30
40
50
60
70
80
90
100
110
120
0
1
2
3
4
1 knot current
2 knot current
3 knot current
4 knot current
5 knot current
.01
.02
.03
.04
.05
.06
.07
.08
.09
.10
.11
.12
.13
.14
.15
.16
.17
.18
.19
.20
.21
.22
Ship's Drift In Miles - For Three Minutes.

VEC
Mar.23,1917

C.S.
1892
H.C.

HYDROGRAPHIC SHEET 3927.

Coast of South Carolina, by party of Assistant G. T. Rude in 1915 - 1916.

TIDES.

	Fort Sumter. Feet.
Mean low water, or plane of reference on staff	3.1
Mean range of tide	5.0

Allowance was made for difference in tide off shore.

Hydrographic Sheet 3927.

Plotted by Field Party. Verified and inked by H.S. Rafferge and S.L. Rosenberg.

This survey was run entirely by dead reckoning and all of the plotting was carefully verified. Starting from a sextant angle fix or a departure from a buoy, the compass course, corrected for variation and deviation, was plotted; the corrected log distance laid off; and the corrections for wind and current applied. This method was repeated at every anchorage for current observations, to the end of the line and back again until a fixed point was reached, when the closure was made and the error distributed proportionally.

Those lines of soundings from this survey which fell on sheet 3926 were plotted on that sheet and the 60 foot curve is based upon the edge of both 3926 and this sheet.

Samuel L. Rosenberg.
March 4, 1918.