

NATIONAL INSTITUTE OF OCEANOGRAPHY
WORMLEY, GODALMING, SURREY

NEUTRALLY BUOYANT FLOATS

Serial Nos. 59 - 77

November - December 1959

TABLES AND DIAGRAMS

G. F. CASTON
and
J. C. SWALLOW

N.I.O. INTERNAL REPORT No. D. 5

October 1970

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Tables of times and positions.
Diagrams showing trajectories
and components of displacement.

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Introduction

This is the second volume of data from neutrally buoyant floats tracked in the deep water off Bermuda in the "Aries" project, continuing from those given in Ref.1.

Serial Nos 59,60,64,65,68,69,71,73 and 74 (all those originally prefixed "V") were floats built by G.H. Volkmann at Woods Hole and tracked by him and J. Crease from the R.V. "Aries". Nos 61-63, 66,67, 70 and 72 were done by J.C. Swallow, J.R. Barrett and other colleagues from Woods Hole on board the R.V. "Crawford", and the last three observations, 75-77, were made by J.C. Swallow and J.R. Barrett from the R.V. "Atlantis". All these measurements, and the last five of the previous volume, were made in relation to the "cold patch" - a clockwise rotating subsurface eddy associated with an unusually thick layer of 18°C water (Ref.2). The high speeds of floats Nos 60 and 64 were observed within the eddy at about 400m depth.

Loran-C was used for navigation in the "Aries" (Ref.3) supplemented by Loran A. The Loran-C receiver had been designed by R.G. Walden at Woods Hole and was installed and tested by him in August 1959. The equipment worked well, and greatly enhanced the accuracy of navigation in the "Aries". In the "Crawford" and "Atlantis", Loran-A was the primary navigational aid.

As in previous reports in this series, the float trajectories have been re-numbered in chronological order, but the original designations are given as well. Mean velocities have been derived in most cases by fitting straight lines to the components of displacement plotted against time, subdividing the fixes into two groups where it seemed necessary.

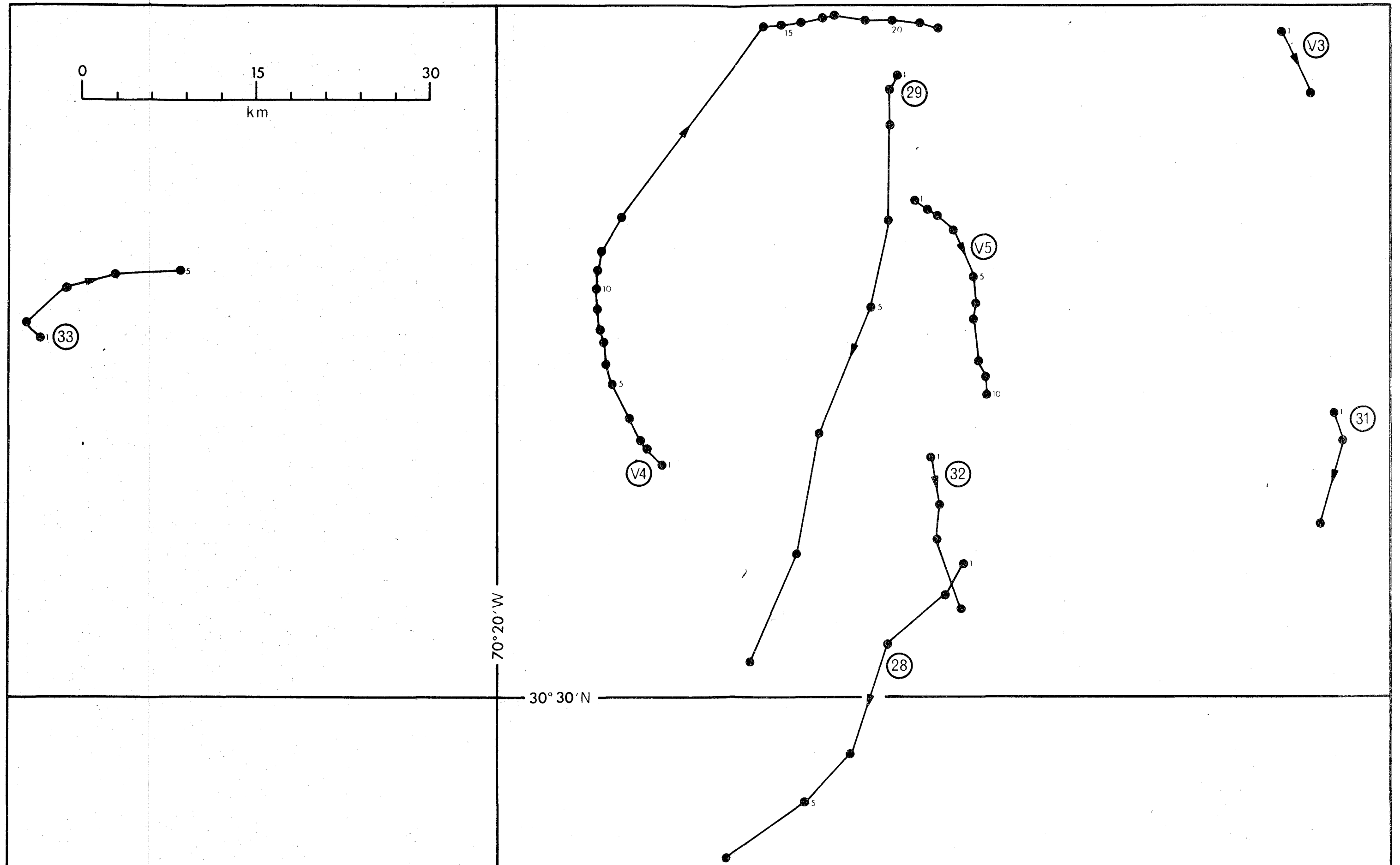
LIST OF FLOATS

Serial No	Original Designation	Date and time laid
59	V3	1145/8.XI.59
60	V4	0730/10.XI.59
61	29	0800/10.XI.59
62	28	1215/11.XI.59
63	33	1639/12.XI.59
64	V5	0735/13.XI.59
65	V6	0743/16.XI.59
66	32	1635/16.XI.59
67	31	1018/17.XI.59
68	V7	1000/25.XI.59
69	V8	1030/26.XI.59
70	25	1030/29.XI.59
71	V9	1535/30.XI.59
72	26	1233/30.XI.59
73	V10	0630/9.XII.59
74	V11	1020/9.XII.59
75	27	1300/16.XII.59
76	7	0945/17.XII.59
77	5	1457/17.XII.59

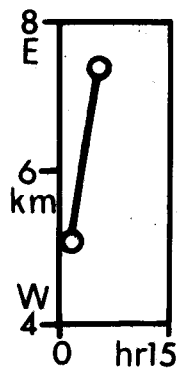
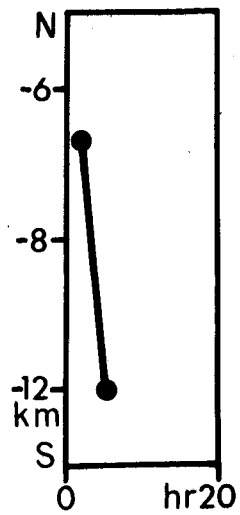
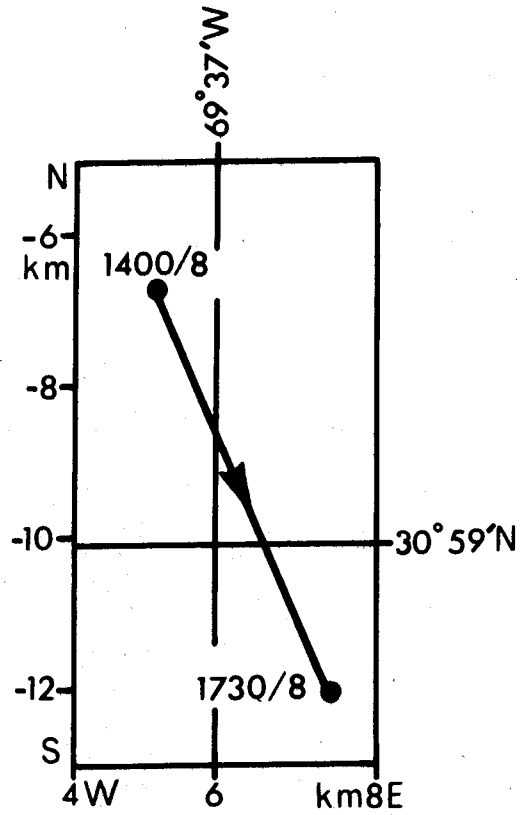
REFERENCES

1. Caston, G.F. and J.C. Swallow, 1970. Neutrally Buoyant Floats, Serial Nos 40-58, June-October 1959. Tables and Diagrams. NIO Internal Report No. D4.
2. Swallow, M. 1961. Deep Currents in the Open Ocean. Oceanus, Vol. VII. No.3, pp.2-8.
3. Walden, R.G. 1961. An Interim Loran-C Receiving System. W.H.O.I. Technical Report No. 61-22 (unpublished manuscript).

FLOAT DESIGNATIONS: V3(laid 1145/8.XI.59), V4(laid 0730/10.XI.59), 29(laid 0800/10.XI.59), 28(laid 1215/11.XI.59),
33(laid 1639/12.XI.59), V5(laid 0735/13.XI.59), 32(laid 1635/16.XI.59), 31(laid 1018/17.XI.59).



FLOAT DESIGNATION: V3 Date and time laid: 1145/8.XI.59.



FLOAT DESIGNATION: V3

Date and time laid: 1145/8.XI.59

Position laid: 31° 04'·47N
69° 40'·75W

Displacement origin: 31° 04'·47N
69° 40'·75W

Navigation based on: Loran C

Estimated accuracy of positions: ± 0.2 km (relative)

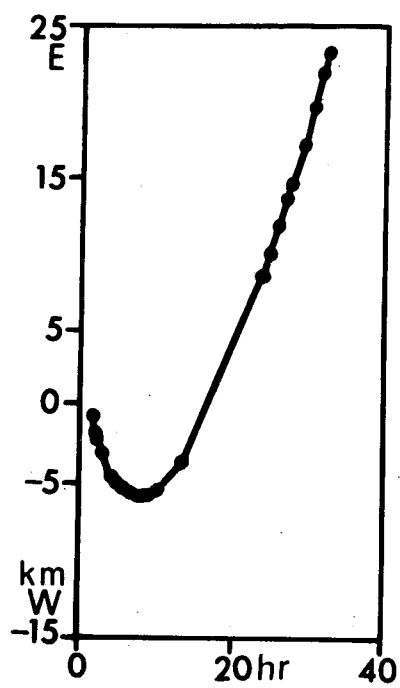
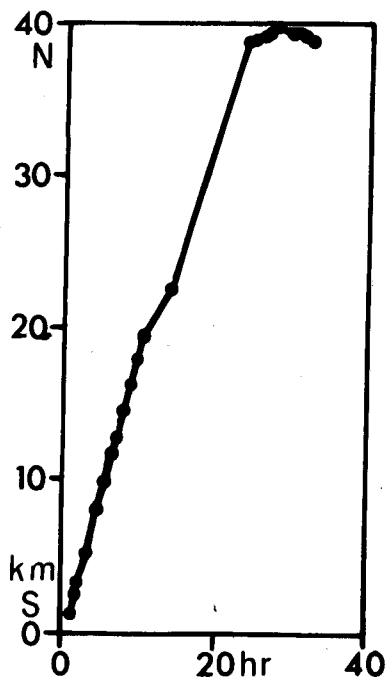
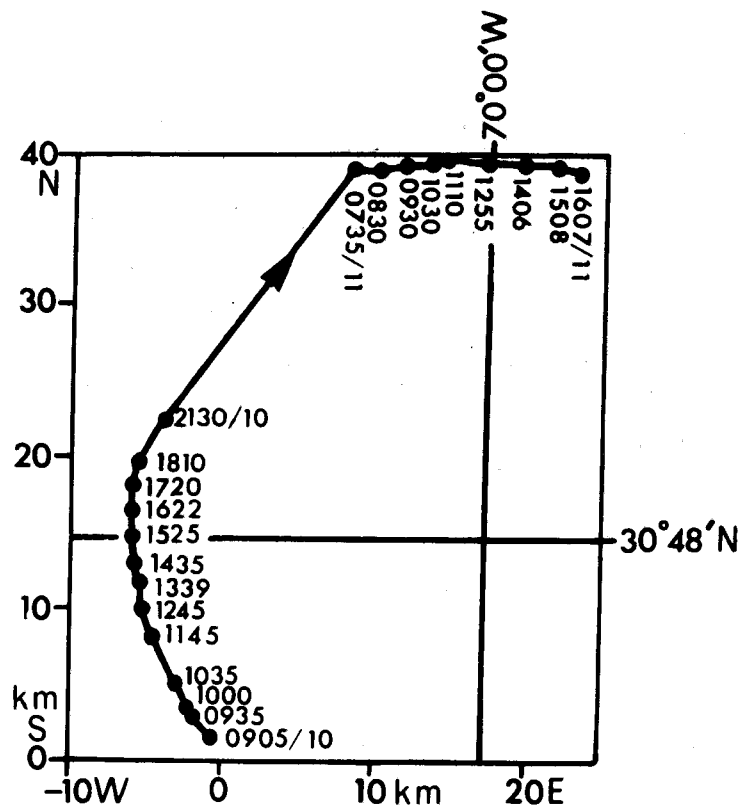
Depth(m): Nominal Observed S.D. S.D.(mean)
 400 1100 (single observation)

Fix No.	Date	Time GMT -4	Fix Position		Hours Since Laid (t)	Displacement(km)	
			Lat.N.	Long.W.		+E-W x	+N-S y
1	8.XI	1400	31°00'·82	69°37'·50	2·25	+5·1	-6·7
2	8.XI	1730	30°58'·00	69°36'·00	5·75	+7·4	-12·0

Mean velocity fixes 1 - 2 = 46·1 cm/sec, 157°T

The single observation of depth is uncertain; it seems likely that the depth was much nearer the nominal value.

FLOAT DESIGNATION: V4 Date and time laid: 0730/10.XI.59.



FLOAT DESIGNATION: V4

Date and time laid: 0730/10.XI.59

Position laid: 30° 40'·09N

Displacement origin: 30° 40'·09N

70° 10'·9W

70° 10'·9W

Navigation based on: Loran C

Estimated accuracy of positions: ± 0.2 km (relative)

Depth(m): Nominal Observed S.D.
 400 1220 ± 570

Possible systematic error in observed depth due to uncertainties in running fixes.

Fix No.	Date	Time GMT -4	Fix Position		Hours Since Laid (t)	Displacement(km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	10.XI	0905	30°40'·75	70°11'·2	1·6	-0·5	+1·2	+2·2	-1·3
2	10.XI	0935	30°41'·45	70°11'·95	2·1	-1·7	+2·5	+1·1	-0·9
3	10.XI	1000	30°41'·85	70°12'·3	2·5	-2·2	+3·2	+0·8	-0·9
4	10.XI	1035	30°42'·85	70°12'·9	3·1	-3·1	+5·1	0·0	0·0
5	10.XI	1145	30°44'·45	70°13'·75	4·3	-4·5	+8·1	-0·9	+0·8
6	10.XI	1245	30°45'·4	70°14'·1	5·3	-5·1	+9·8	-1·3	+0·8
7	10.XI	1339	30°46'·35	70°14'·2	6·1	-5·3	+11·6	-1·1	+0·9
8	10.XI	1435	30°47'·0	70°14'·5	7·1	-5·7	+12·8	-1·3	+0·4
9	10.XI	1525	30°48'·0	70°14'·6	7·9	-5·8	+14·6	-1·1	+0·8
10	10.XI	1622	30°48'·9	70°14'·6	8·9	-5·8	+16·3	-0·8	+0·8
11	10.XI	1720	30°49'·75	70°14'·55	9·8	-5·8	+17·9	-0·6	+0·6
12	10.XI	1810	30°50'·65	70°14'·35	10·7	-5·5	+19·5	0·0	+0·6
13	10.XI	2130	30°52'·2	70°13'·3	14·0	-3·8	+22·4	+2·8	-0·6
14	11.XI	0735	31°01'·1	70°05'·5	24·1	+8·6	+38·9	0·0	-0·4
15	11.XI	0830	31°01'·15	70°04'·5	25·0	+10·2	+39·0	+0·2	-0·2
16	11.XI	0930	31°01'·3	70°03'·45	26·0	+11·9	+39·3	0·0	0·0
17	11.XI	1030	31°01'·5	70°02'·3	27·0	+13·7	+39·6	0·0	+0·4
18	11.XI	1110	31°01'·55	70°01'·65	27·7	+14·7	+39·8	-0·2	+0·6
19	11.XI	1255	31°01'·4	70°00'·0	29·4	+17·3	+39·4	-0·6	+0·2
20	11.XI	1406	31°01'·4	69°58'·4	30·6	+19·8	+39·4	-0·2	+0·2
21	11.XI	1508	31°01'·25	69°57'·05	31·6	+22·0	+39·2	+0·4	0·0
22	11.XI	1607	31°01'·05	69°56'·05	32·6	+23·6	+38·8	+0·2	-0·4

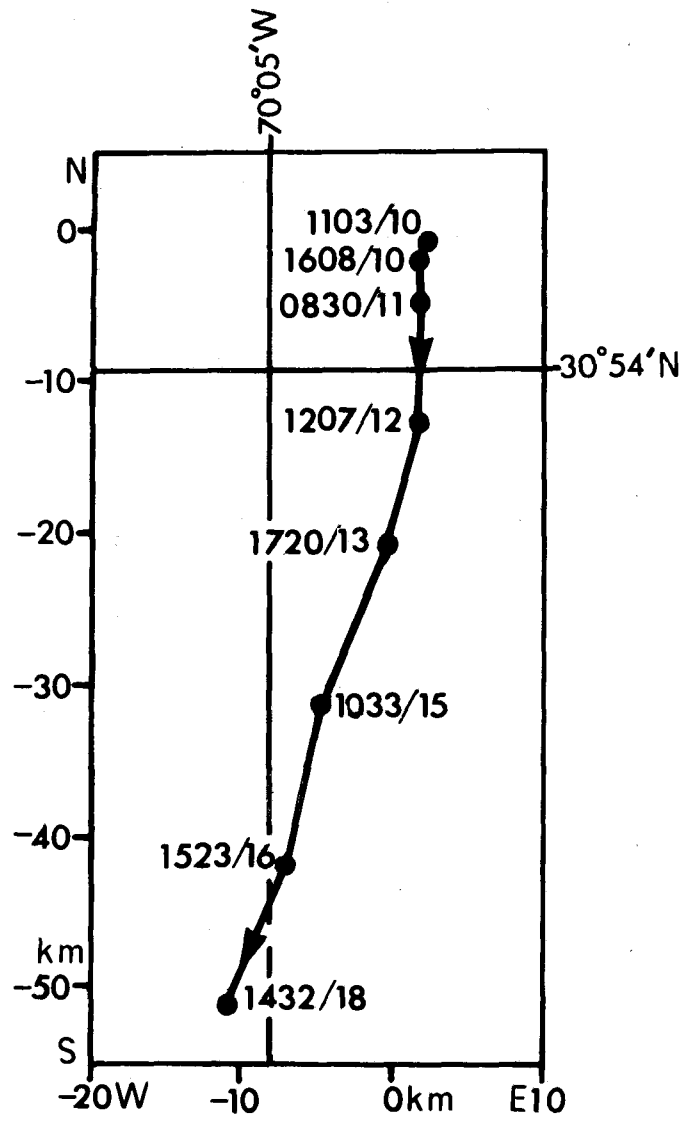
Fitted lines: $x = -0.314t - 2.2$) Fixes 1-13
 $y = +1.803t - 0.4$)

Mean velocity = $50.9(\pm 2.4)$ cm/sec, $350(\pm 3)^{\circ}T$

$x = +1.756t - 33.8$) Fixes 14-22
 $y = -0.003t + 39.3$)

Mean velocity = $48.8(\pm 0.8)$ cm/sec, $090(\pm 1.4)^{\circ}T$

FLOAT DESIGNATION: 29 Date and time laid: 0800/10.XI.59.



SERIAL No: 61

FLOAT DESIGNATION: 29

Date and time laid: 0800/10.XI.59

Position laid: 30°59'·1N
69° 59'·5W

Displacement origin: 30° 59'·1N
69° 59'·5W

Navigation based on: Loran A

Estimated accuracy of positions ± 1 km (relative)

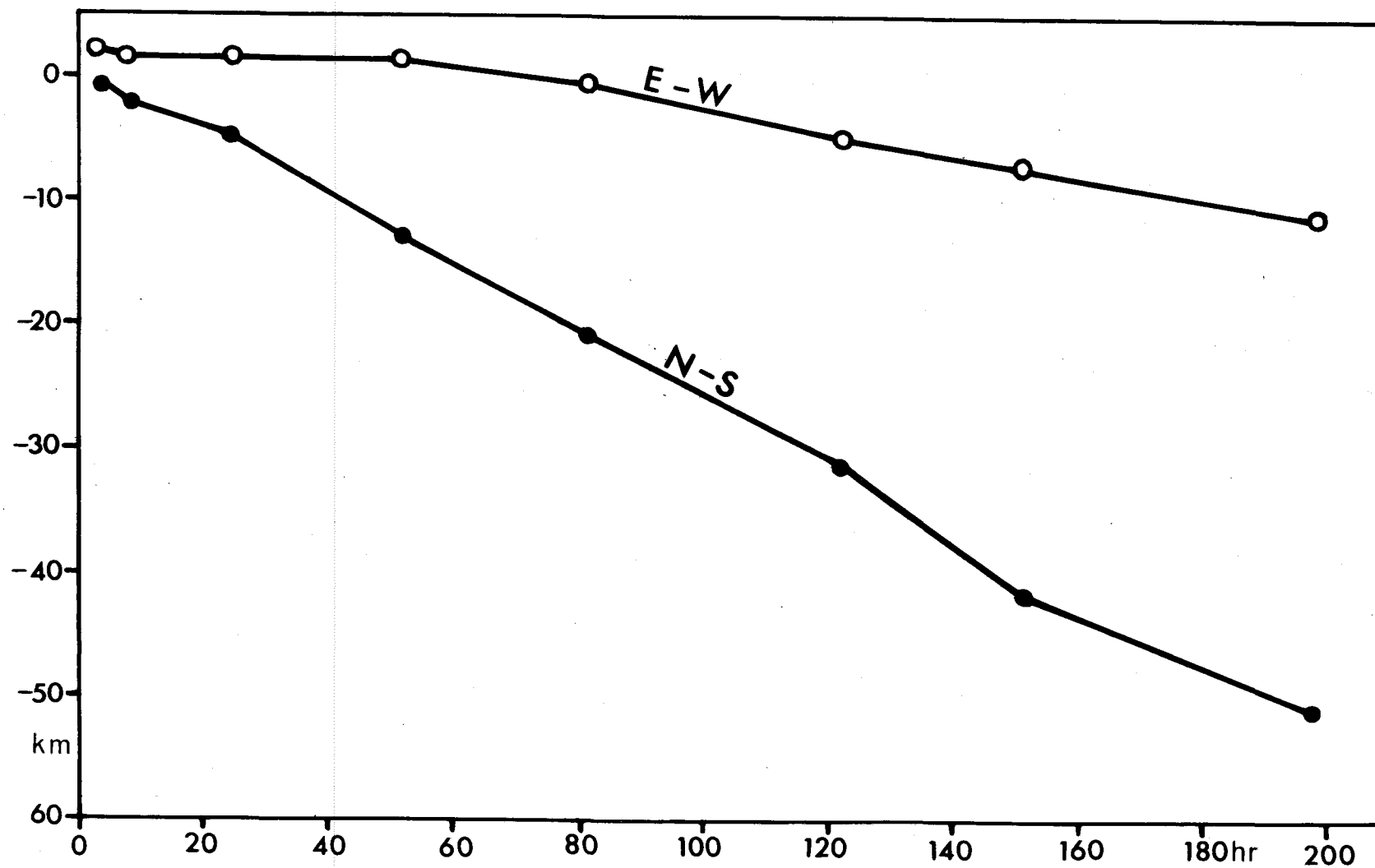
Depth(m):	Nominal	Observed	S.D.	S.D.(mean)
	2000	1962	± 380	± 90

Fix No.	Date	Time GMT -4	Fix Position		Hours Since Laid (t)	Displacement(km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	10.XI	1103	30°58'·8	69°58'·2	3·1	+2·2	-0·6	-0·9	-0·4
2	10.XI	1608	30°58'·1	69°58'·7	8·1	+1·5	-1·9	-1·3	-0·4
3	11.XI	0830	30°56'·5	69°58'·6	24·5	+1·7	-4·8	0·0	+1·1
4	12.XI	1207	30°52'·1	69°58'·7	52·1	+1·5	-13·0	+1·7	+0·2
5	13.XI	1720	30°47'·9	69°59'·8	81·3	-0·4	-20·8	+1·7	+0·2
6	15.XI	1033	30°42'·2	70°02'·6	122·6	-4·8	-31·3	0·0	+0·6
7	16.XI	1523	30°36'·6	70°03'·8	151·4	-7·0	-41·7	-0·2	-2·2
8	18.XI	1432	30°31'·6	70°06'·4	198·5	-10·9	-51·0	-0·9	+1·1

Fitted lines: $x = -0.067t + 3.4$

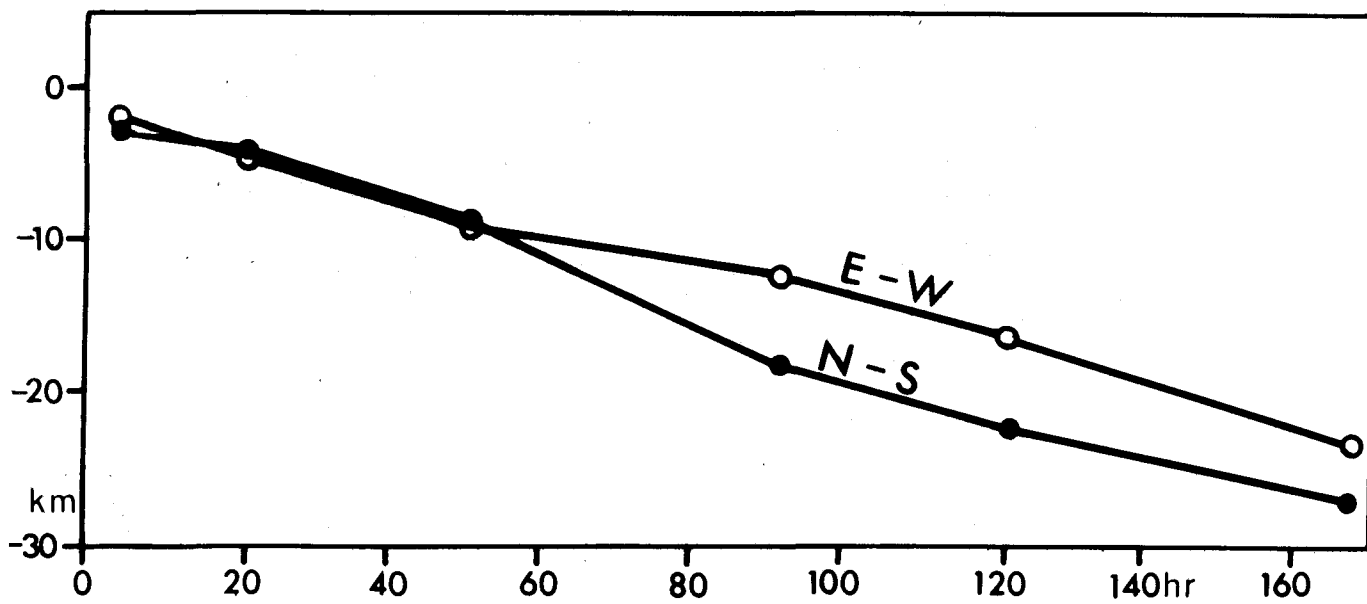
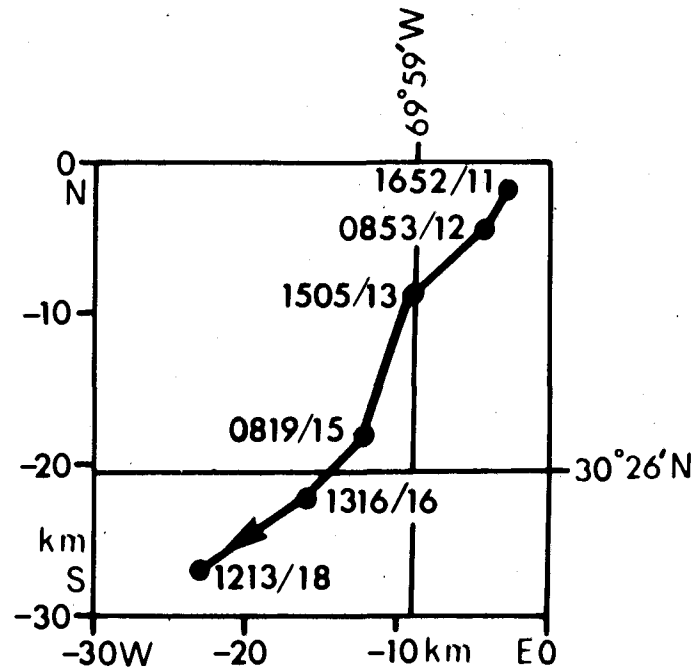
$y = -0.266t + 0.7$

Mean velocity = $7.6(\pm 0.2)$ cm/sec, $194(\pm 1.3)^\circ T$



FLOAT DESIGNATION: 29 Date and time laid: 0800/10.XI.59.

FLOAT DESIGNATION: 28 Date and time laid: 1215/11.XI.59.



SERIAL No: 62

FLOAT DESIGNATION: 28

Date and time laid: 1215/11.XI.59

Position laid: 30° 37'.1N
69° 53'.3W

Displacement origin: 30° 37'.1N
69° 53'.3W

Navigation based on: Loran A

Estimated accuracy of positions: ± 1 km(relative)

Depth(m):	Nominal	Observed	S.D.	S.D.(mean)
	2000	1855	± 320	± 81

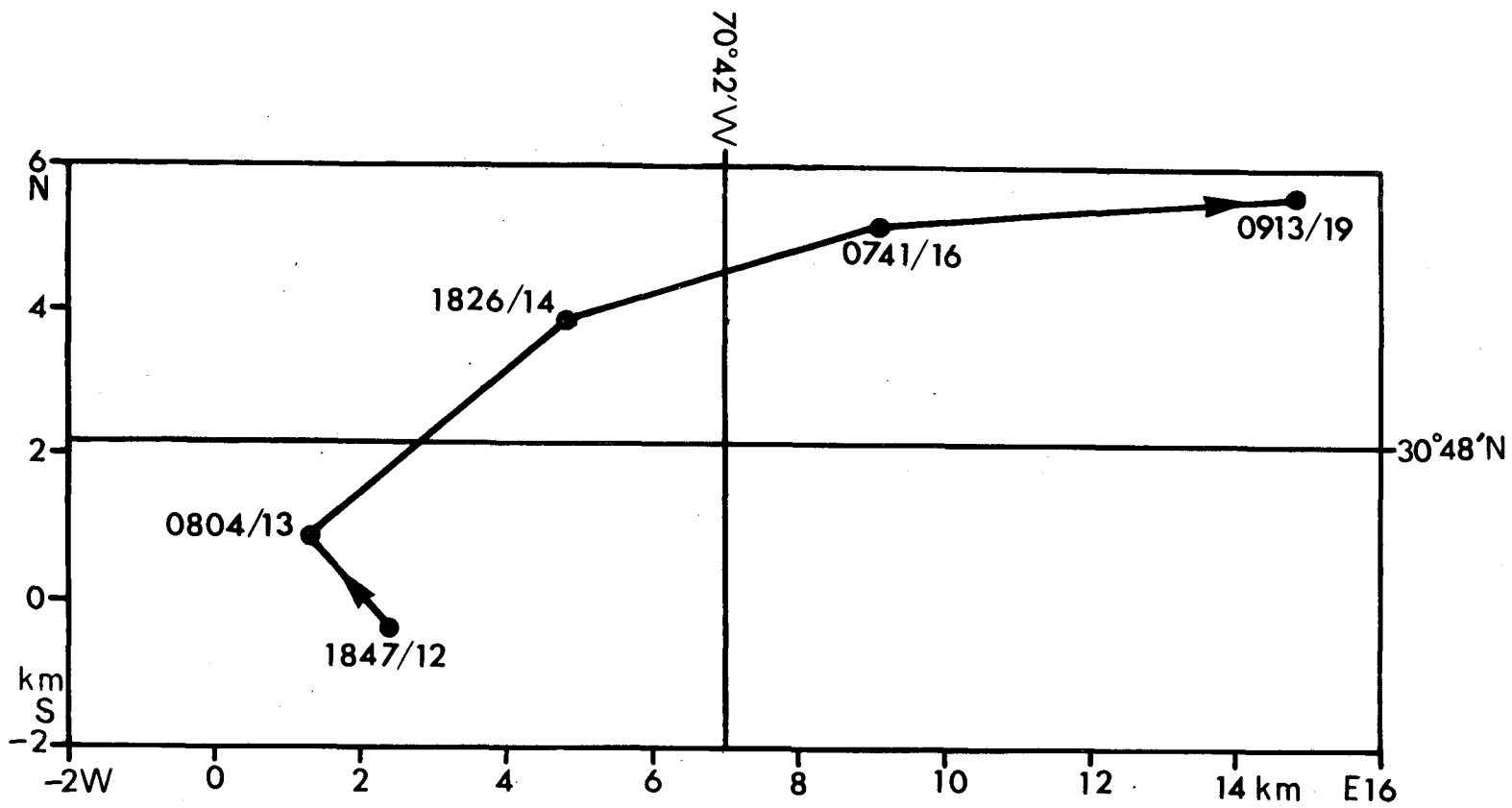
Fix No.	Date	Time GMT -4	Fix Position		Hours Since Laid (t)	Displacement(km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	11.XI	1652	30°36'.2	69°54'.9	4.6	-2.6	-1.7	-0.2	+0.4
2	12.XI	0853	30°34'.7	69°55'.8	20.6	-4.1	-4.4	+0.2	+0.2
3	13.XI	1505	30°32'.4	69°59'.0	50.8	-8.9	-8.7	-0.9	+0.9
4	15.XI	0819	30°27'.3	70°00'.9	92.0	-12.2	-18.2	+0.9	-1.9
5	16.XI	1316	30°25'.1	70°03'.4	121.0	-16.1	-22.2	+0.6	-1.3
6	18.XI	1213	30°22'.5	70°07'.7	167.9	-23.2	-27.0	-0.7	+1.7

Fitted lines: $x = -0.123t - 1.8$

$y = -0.163t - 1.3$

Mean velocity = $5.7(\pm 0.3)$ cm/sec, $217(\pm 1.3)^\circ T$

FLOAT DESIGNATION: 33 Date and time laid: 1639/12.XI.59.



SERIAL No: 63

FLOAT DESIGNATION: 33

Date and time laid: 1639/12.XI.59

Position laid: $30^{\circ} 46'.8N$
 $70^{\circ} 46'.3W$

Displacement origin: $30^{\circ} 46'.8N$
 $70^{\circ} 46'.3W$

Navigation based on: Loran A

Estimated accuracy of positions: $\pm 1km$ (relative)

Depth(m): Nominal Observed S.D. S.D.(mean)
 2000 2013 ± 700 ± 220

Fix No.	Date	Time GMT -4	Fix Position		Hours Since Laid (t)	Displacement(km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	12.XI	1847	$30^{\circ}46'.6$	$70^{\circ}44'.7$	2.1	+2.4	-0.4	+1.1	-1.1
2	13.XI	0804	$30^{\circ}47'.3$	$70^{\circ}45'.5$	15.4	+1.3	+0.9	-1.1	-0.4
3	14.XI	1826	$30^{\circ}48'.9$	$70^{\circ}43'.3$	49.7	+4.8	+3.9	-0.6	+1.3
4	16.XI	0741	$30^{\circ}49'.6$	$70^{\circ}40'.7$	87.0	+9.1	+5.2	+0.6	+1.3
5	19.XI	0913	$30^{\circ}49'.8$	$70^{\circ}37'.1$	160.5	+14.8	+5.6	0.0	-1.1

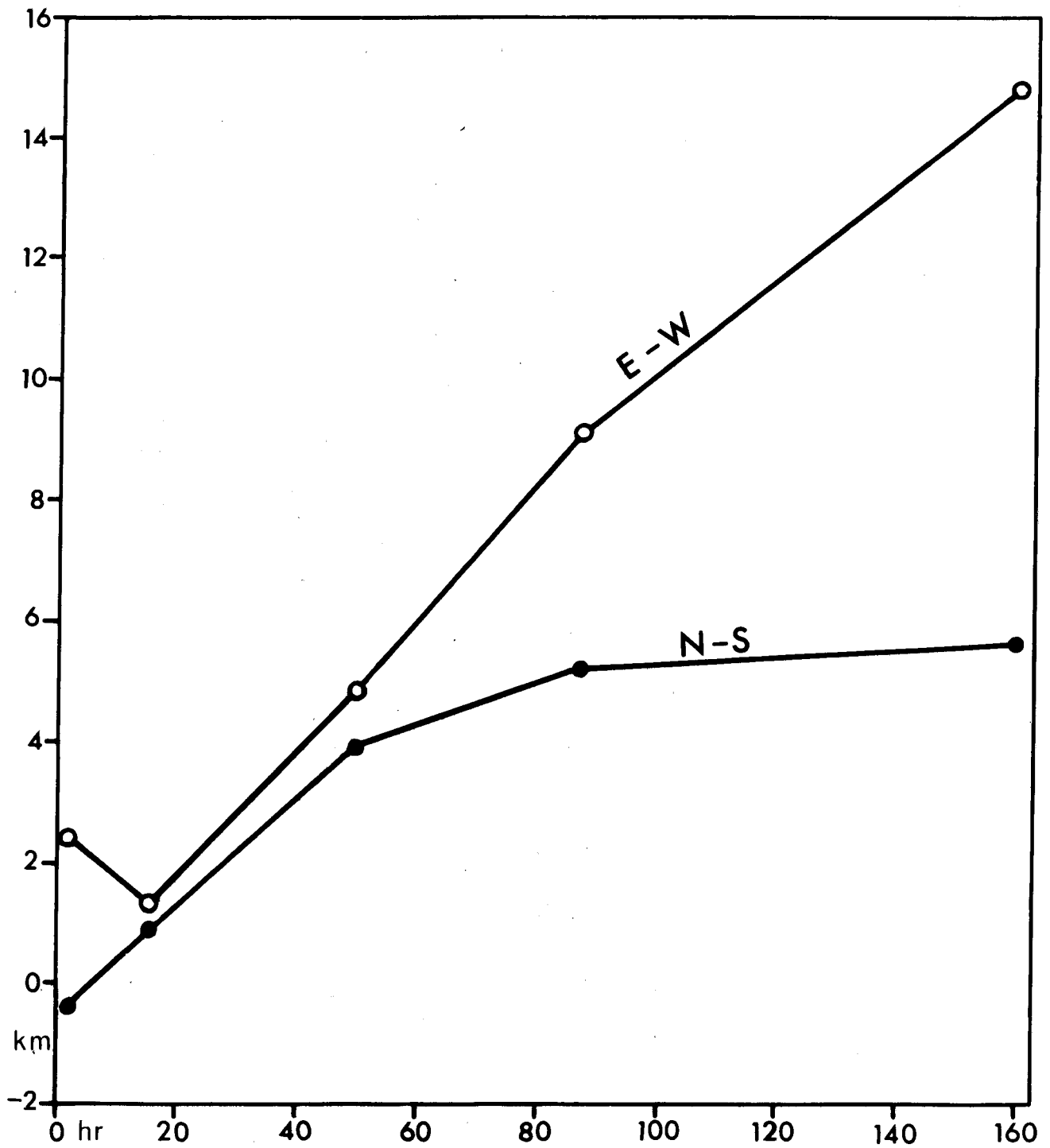
Fitted lines: $x = + 0.086t + 1.1$
 $y = + 0.037t + 0.7$ } Fixes 1-5

Mean velocity = $2.6(\pm 0.2) \text{ cm/sec, } 067(\pm 6)^{\circ}T$

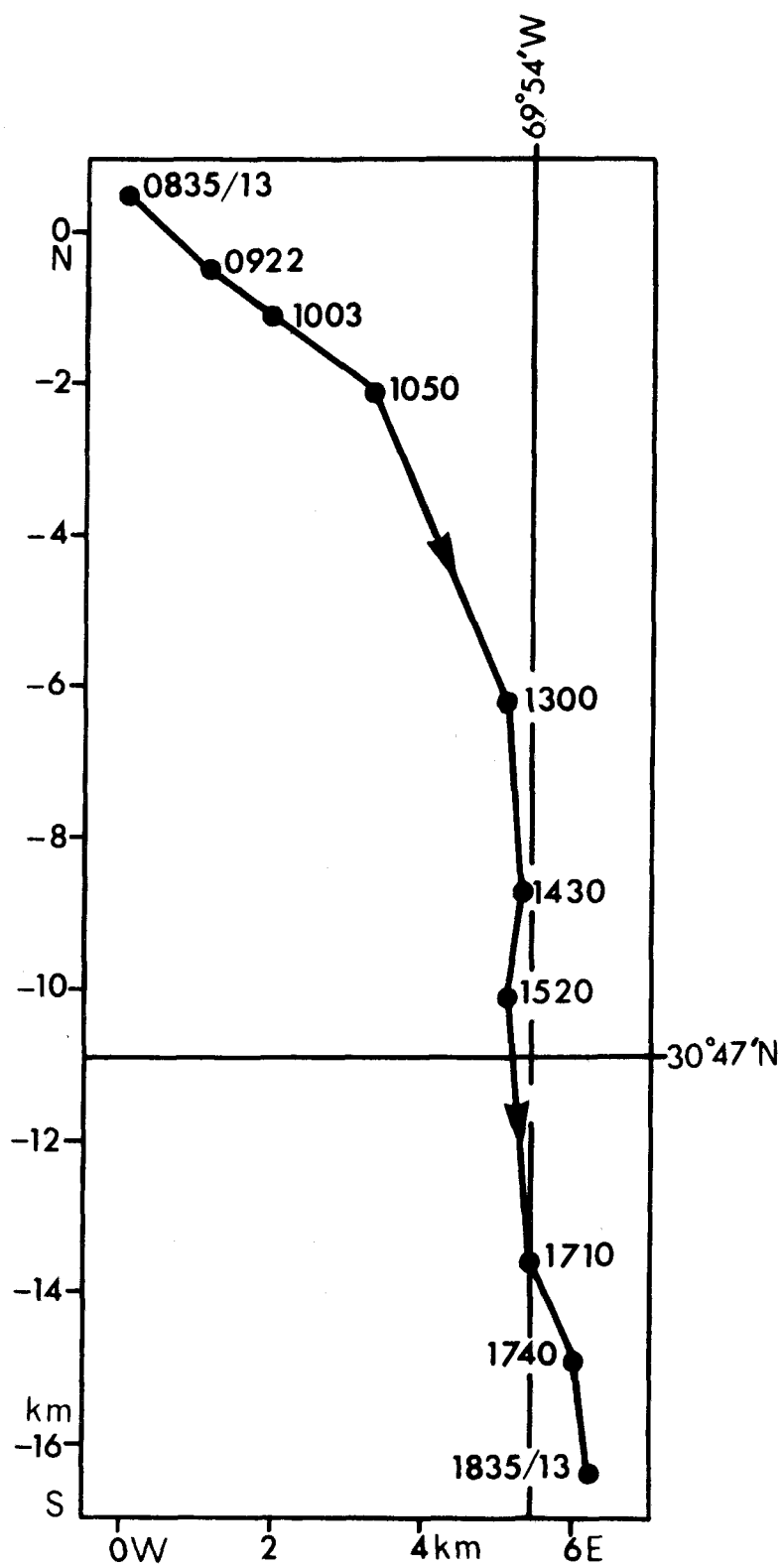
$x = + 0.093t + 0.2$
 $y = + 0.029t + 1.6$ } Fixes 2-5

Mean velocity = $2.7(\pm 0.2) \text{ cm/sec, } 073(\pm 6.9)^{\circ}T$

FLOAT DESIGNATION: 33 Date and time laid: 1639/12.XI.59.



FLOAT DESIGNATION: V5 Date and time laid: 0735/13.XI.59.



SERIAL No: 64

FLOAT DESIGNATION: V5

Date and time laid: 0735/13.XI.59

Position laid: 30° 52'.86N
69° 57'.93W

Displacement origin: 30° 52'.86N
69° 57'.93W

Navigation based on: Loran C

Estimated accuracy of positions: ± 0.2 km (relative)

Depth(m): Nominal Observed S.D.
 400 640 ± 300
(2 observations only)

Fix No.	Date	Time GMT -4	Fix Position		Hours Since Laid (t)	Displacement(km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	13.XI	0835	30°53'.1	69°57'.4	1.0	0.0	+0.5	0.0	0.0
2	13.XI	0922	30°52'.6	69°56'.7	1.8	+1.1	-0.5	0.0	0.0
3	13.XI	1003	30°52'.3	69°56'.2	2.5	+1.9	-1.1	-0.2	0.0
4	13.XI	1050	30°51'.7	69°55'.3	3.3	+3.3	-2.1	+0.2 -0.6	0.0 0.0
5	13.XI	1300	30°49'.5	69°54'.2	5.4	+5.1	-6.2	+0.6	-0.2
6	13.XI	1430	30°48'.2	69°54'.1	6.9	+5.3	-8.7	+0.4	0.0
7	13.XI	1520	30°47'.4	69°54'.2	7.7	+5.1	-10.1	-0.2	+0.2
8	13.XI	1710	30°45'.5	69°54'.0	9.6	+5.4	-13.6	-0.4	+0.2
9	13.XI	1740	30°44'.8	69°53'.6	10.1	+6.0	-14.9	0.0	-0.2
10	13.XI	1835	30°44'.0	69°53'.5	11.0	+6.2	-16.4	0.0	0.0

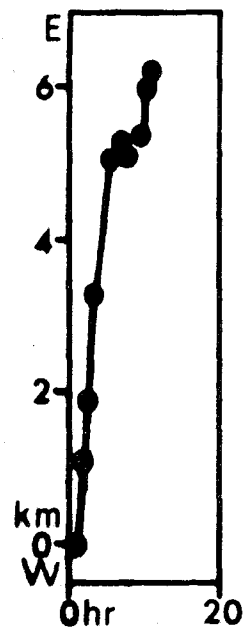
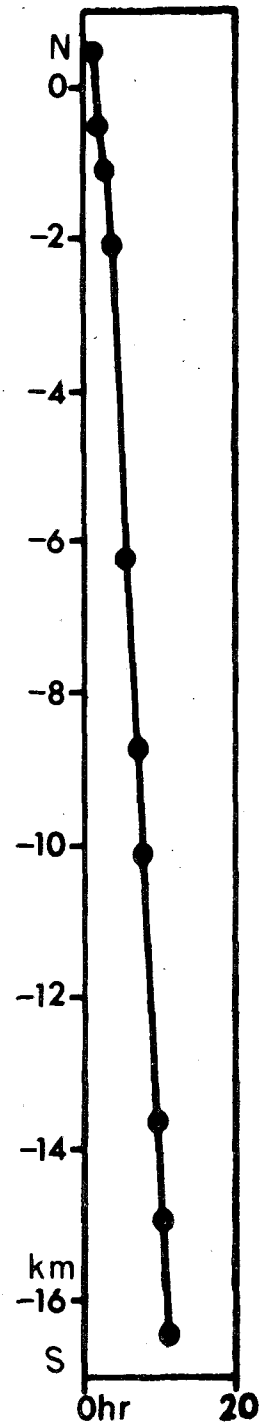
Fitted lines: $x = +1.410t - 1.5$
 $y = -1.107t + 1.6$ } Fixes 1-4

Mean velocity = 49.8(± 2.1)cm/sec, 128(± 1)°T

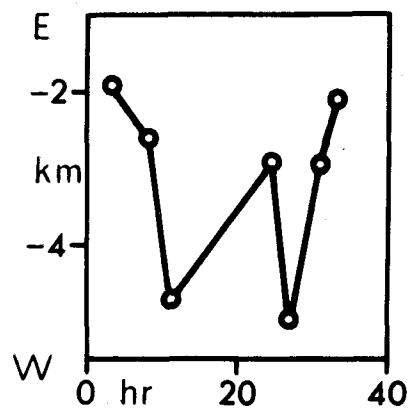
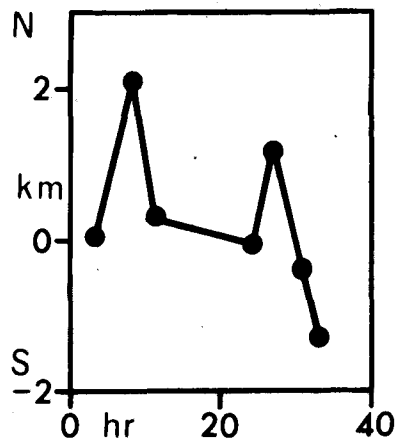
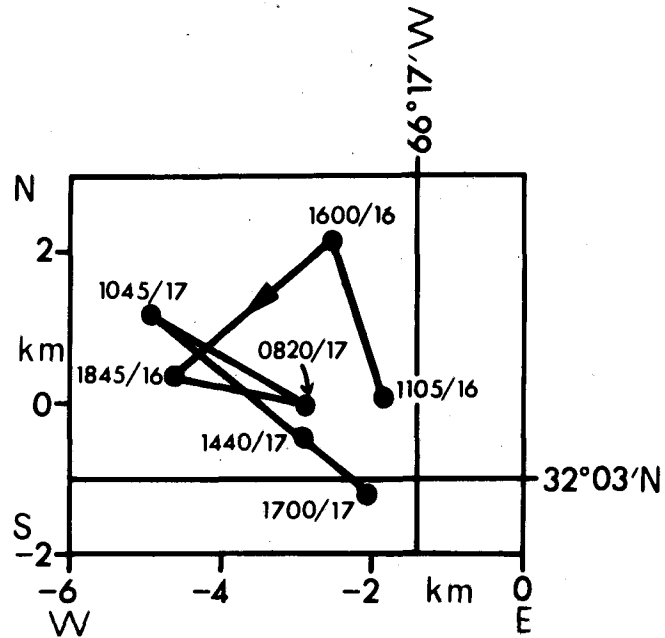
$x = +0.310t + 2.8$
 $y = -1.849t + 4.0$ } Fixes 4-10

Mean velocity = 52.1(± 0.8)cm/sec, 171(± 2)°T

FLOAT DESIGNATION: V5 Date and time laid: 0735/13.XI.59.



FLOAT DESIGNATION: V6 Date and time laid: 0743/16.XI.59.



SERIAL No: 65

FLOAT DESIGNATION: V6

Date and time laid: 0743/16.XI.59

Position laid: 32° 03'.6N
66° 16'.05W

Displacement origin: 32° 03'.6N
66° 16'.05W

Navigation based on: Loran C

Estimated accuracy of positions: ± 1 km (relative)

Depth(m):	Nominal	Observed	S.D.	S.D.(mean)
	2000	2296	± 520	± 130

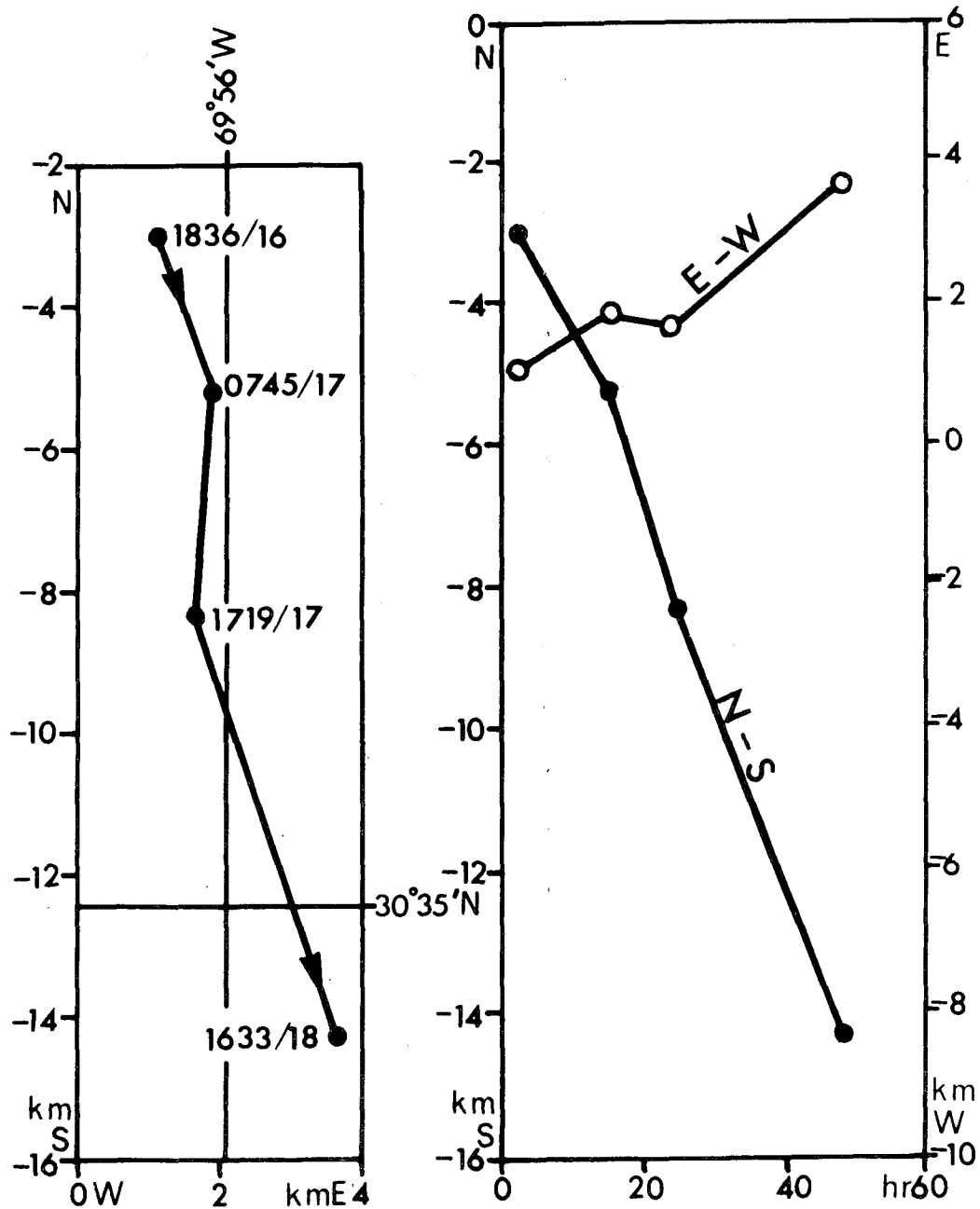
Fix No.	Date	Time GMT -4	Fix Position		Hours Since Laid (t)	Displacement(km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	16.XI	1105	32°03'.7	66°17'.3	3.35	-1.9	+0.1	+1.1	-0.9
2	16.XI	1600	32°04'.8	66°17'.7	8.3	-2.6	+2.15	+0.4	+1.3
3	16.XI	1845	32°03'.8	66°19'.2	11.05	-4.7	+0.35	-1.7	-0.4
4	17.XI	0820	32°03'.6	66°18'.0	24.6	-2.95	0.0	+0.2	0.0
5	17.XI	1045	32°04'.3	66°19'.3	27.05	-5.0	+1.2	-1.7	+1.3
6	17.XI	1440	32°03'.4	66°18'.0	30.95	-2.95	-0.4	+0.4	-0.2
7	17.XI	1700	32°02'.9	66°17'.5	33.3	-2.1	-1.2	+1.3	-0.9

Fitted lines: $x = -0.011t - 3.0$

$y = -0.048t + 1.3$

Mean velocity = $1.4(\pm 1)$ cm/sec, $193(\pm 50)^{\circ}T$

FLOAT DESIGNATION: 32 Date and time laid: 1635/16.XI.59.



SERIAL No: 66

FLOAT DESIGNATION: 32

Date and time laid: 1635/16.XI.59

Position laid: $30^{\circ} 41'.7N$
 $69^{\circ} 57'.3W$

Displacement origin: $30^{\circ} 41'.7N$
 $69^{\circ} 57'.3W$

Navigation based on: Loran A

Estimated accuracy of positions: $\pm 1\text{km}$ (relative)

Depth(m):	Nominal	Observed	S.D.	S.D.(mean)
	4000	4350	± 1650	± 620

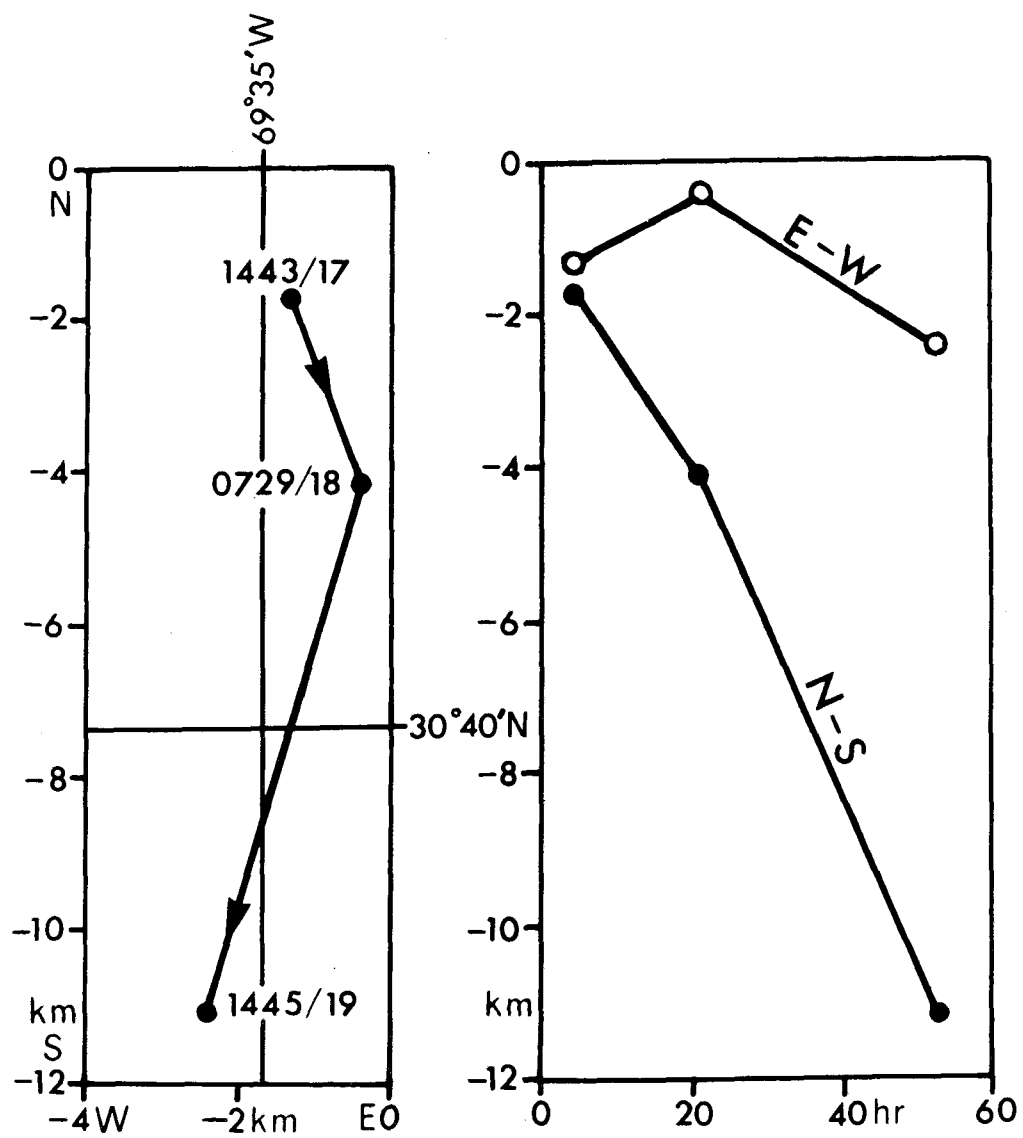
Fix No.	Date	Time GMT -4	Fix Position		Hours Since Laid (t)	Displacement(km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	16.XI	1836	$30^{\circ}40'.1$	$69^{\circ}56'.6$	2.0	+1.1	-3.0	+0.2	-0.4
2	17.XI	0745	$30^{\circ}38'.9$	$69^{\circ}56'.1$	15.2	+1.9	-5.2	+0.2	+0.7
3	17.XI	1719	$30^{\circ}37'.2$	$69^{\circ}56'.3$	24.7	+1.7	-8.3	-0.6	-0.0
4	18.XI	1633	$30^{\circ}34'.0$	$69^{\circ}54'.9$	48.0	+3.7	-14.3	+0.2	-0.2

Fitted lines: $x = + 0.055t + 0.9$

$y = - 0.252t - 2.0$

Mean velocity = $7.2(\pm 0.5)\text{cm/sec}$, $168(\pm 3)^{\circ}T$

FLOAT DESIGNATION: 31 Date and time laid: 1018/17.XI.59.



SERIAL No: 67

FLOAT DESIGNATION: 31

Date and time laid: 1018/17.XI.59

Position laid: $30^{\circ} 44' \cdot 0N$
 $69^{\circ} 34' \cdot 0W$

Displacement origin: $30^{\circ} 44' \cdot 0N$
 $69^{\circ} 34' \cdot 0W$

Navigation based on: Loran A

Estimated accuracy of positions: $\pm 1km$ (relative)

Depth(m):	Nominal	Observed	S.D.	S.D.(mean)
	2000	1890	± 360	± 120

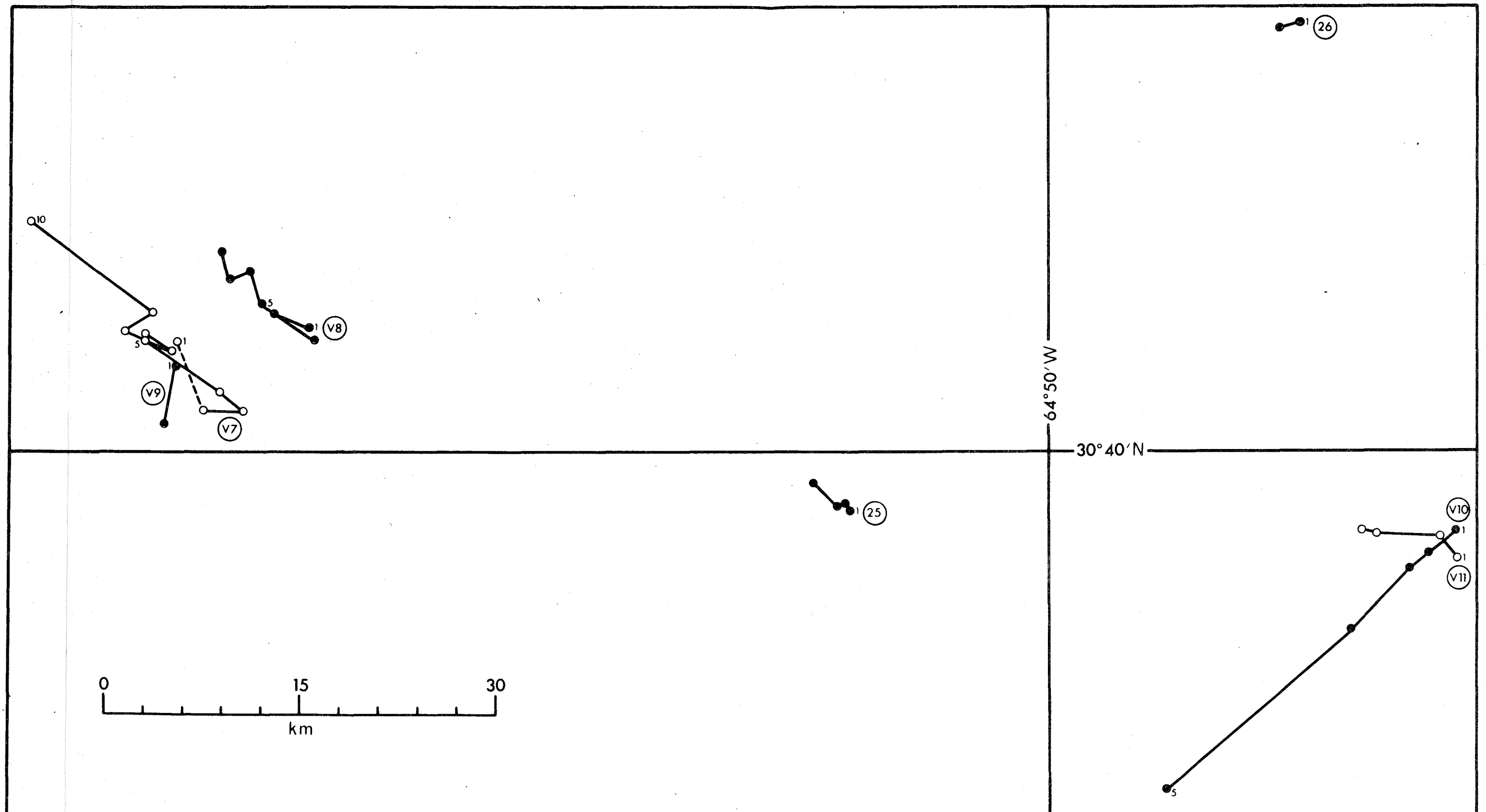
Fix No.	Date	Time GMT -4	Fix Position		Hours Since Laid (t)	Displacement(km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	17.XI	1443	$30^{\circ}43' \cdot 1$	$69^{\circ}34' \cdot 7$	4.4	-1.3	-1.7	-0.6	-0.4
2	18.XI	0729	$30^{\circ}41' \cdot 8$	$69^{\circ}34' \cdot 2$	21.2	-0.4	-4.1	+0.7	+0.6
3	19.XI	1445	$30^{\circ}38' \cdot 0$	$69^{\circ}35' \cdot 5$	52.5	-2.4	-11.1	-0.4	-0.2

Fitted lines: $x = -0.028t - 0.6$

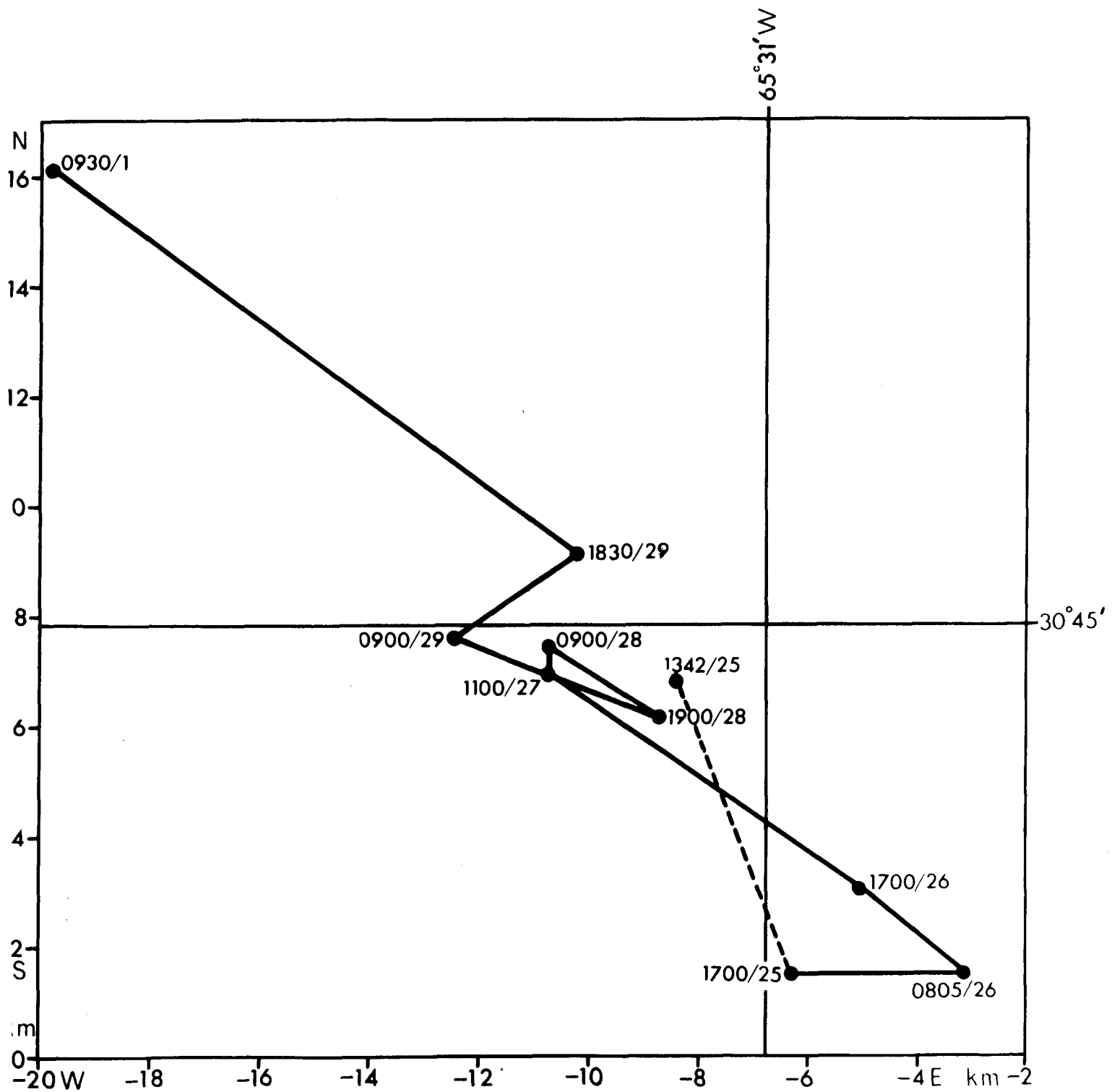
$y = -0.199t - 0.5$

Mean velocity = $5.6(\pm 0.6)cm/sec$, $188(\pm 8)^{\circ}T$

FLOAT DESIGNATIONS: V7(laid 1000/25.XI.59), V8(laid 1030/26.XI.59), 25(laid 1030/29.XI.59), V9(laid 1535/30.XI.59),
26(laid 1233/30.XI.59), V10(laid 0630/9.XII.59), VII(laid 1020/9.XII.59).



FLOAT DESIGNATION: V7 Date and time laid: 1000/25.XI.59.



FLOAT DESIGNATION: V7

Date and time laid: 1000/25.XI.59

Position laid: 30° 40'.8N
65° 26'.7W

Displacement origin: 30° 40'.8N
65° 26'.7W

Navigation based on: Loran C (Fix 1 Loran A)

Estimated accuracy of positions: ± 1km (Relative), except Fix 1 (more uncertain)

Depth(m):	Nominal	Observed	S.D.	S.D.(mean)
	2000	2290	±520	±170

Fix No.	Date	Time GMT -4	Fix Position		Hours Since Laid (t)	Displacement(km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	25.XI	1342	30°44'.5	65°32'.0	3.7	-8.4	+6.8	omitted	
2	25.XI	1700	30°41'.6	65°30'.7	7.0	-6.3	+1.5	-2.4	+0.7
3	26.XI	0805	30°41'.6	65°28'.7	22.1	-3.1	+1.5	+2.2	-0.7
4	26.XI	1700	30°42'.4	65°29'.9	31.0	-5.0	+3.0	+1.1	0.0
5	27.XI	1100	30°44'.5	65°33'.5	49.0	-10.7	+6.9	-2.8	+2.0
6	28.XI	0900	30°44'.8	65°33'.5	71.0	-10.7	+7.4	-0.7	+0.4
7	28.XI	1900	30°44'.1	65°32'.2	81.0	-8.7	+6.1	+2.2	-1.9
8	29.XI	0900	30°44'.9	65°34'.5	95.0	-12.4	+7.6	0.0	-1.7
9	29.XI	1830	30°45'.7	65°33'.1	104.5	-10.2	+9.1	+3.2	-1.1
10	1.XII	0930	30°49'.5	65°39'.1	143.5	-19.8	+16.1	-2.8	+2.0

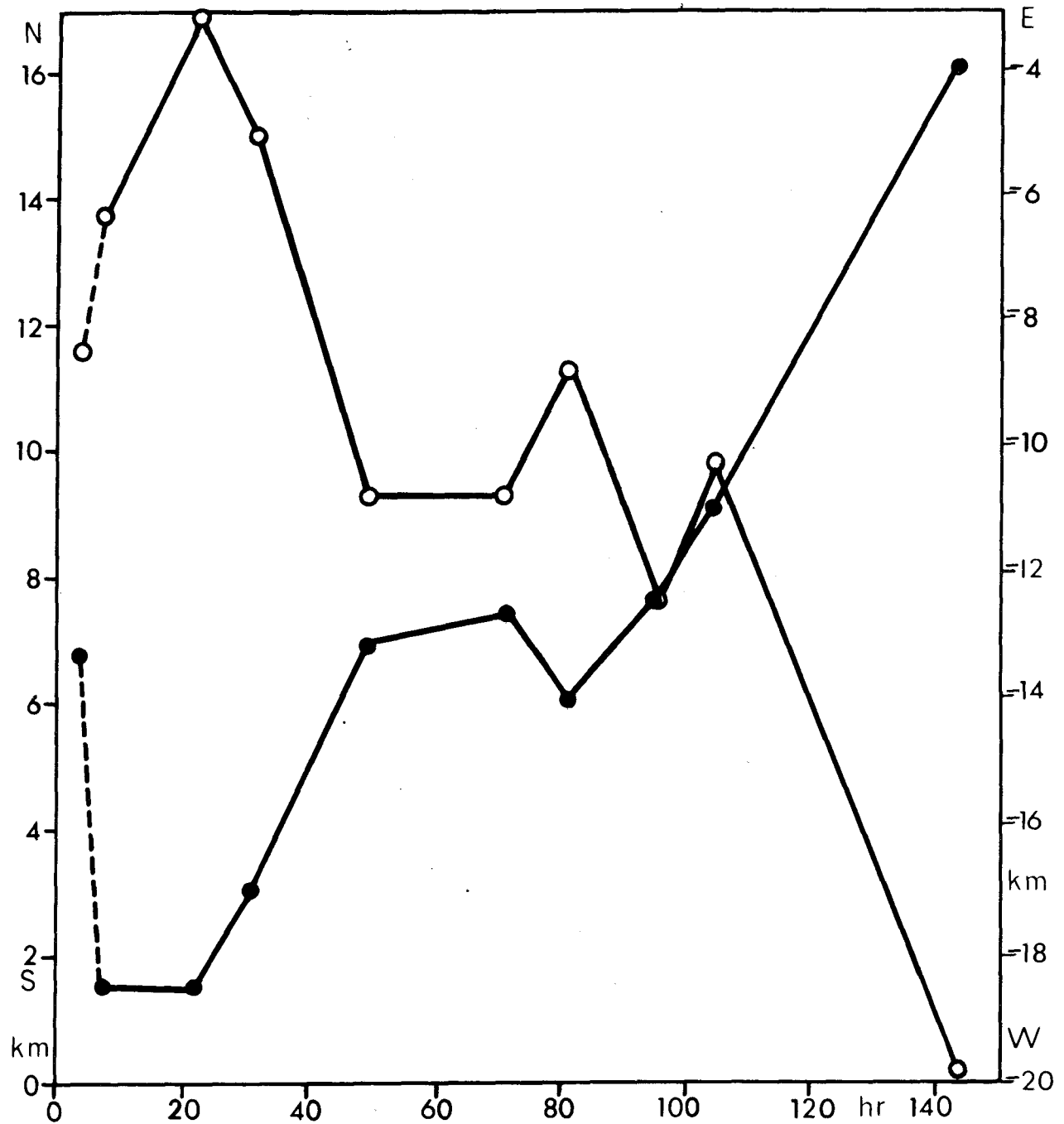
Fitted lines: $x = -0.097t - 3.1$
 $y = +0.097t + 0.1$ } Fixes 2-10

Mean velocity = 3.8(±0.5)cm/sec, 315(±4.5)°T
 $x = -0.107t - 2.2$
 $y = +0.076t + 1.0$ } Fixes 3-8

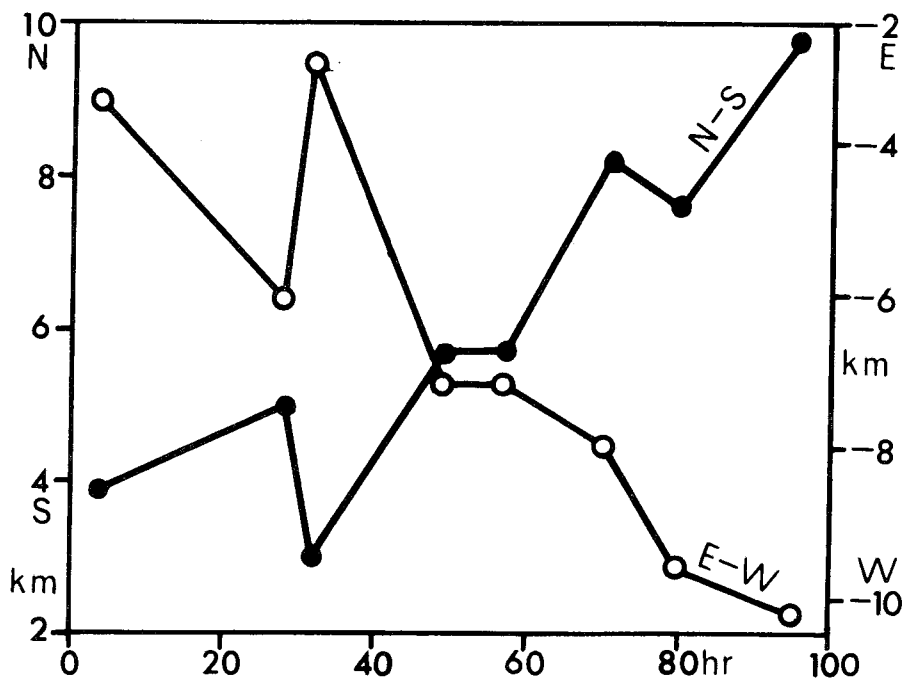
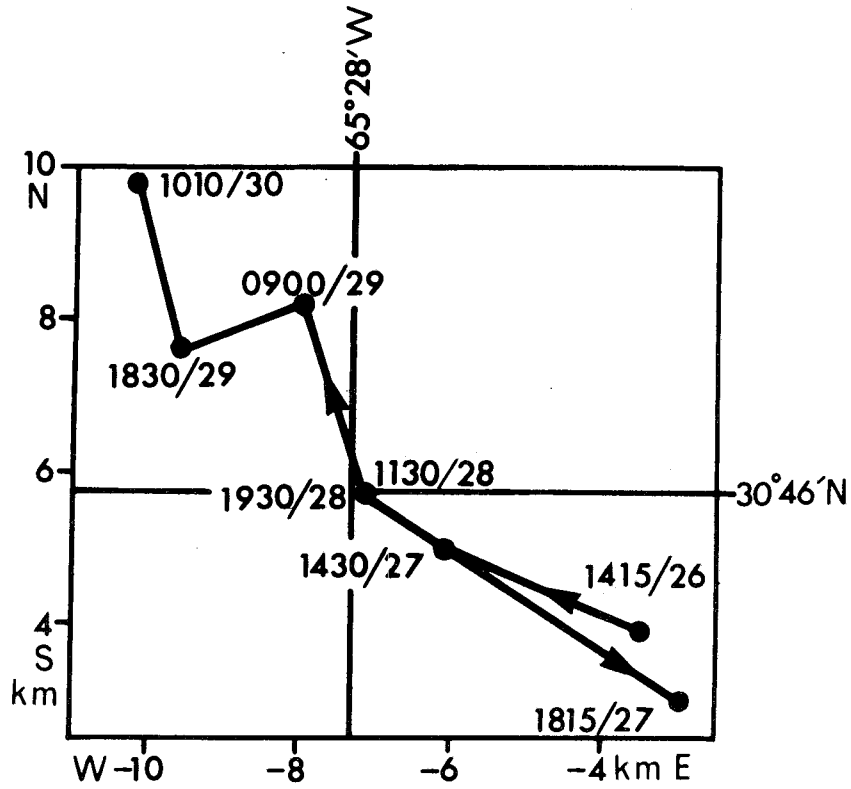
Mean velocity = 3.6(±0.8)cm/sec, 305(±1.9)°T

Mean velocity fixes 9-10 = 8.5cm/sec, 306°T

FLOAT DESIGNATION: V7 Date and time laid: 1000/25.XI.59.



FLOAT DESIGNATION: V8 Date and time laid: 1030/26.XI.59.



FLOAT DESIGNATION: V8

Date and time laid: 1030/26.XI.59

Position laid: 30° 42'.9N
65° 23'.4W

Displacement origin: 30° 42'.9N
65° 23'.4W

Navigation based on: Loran C

Estimated accuracy of positions: ± 1 km (relative)

Depth(m):	Nominal	Observed	S.D.	S.D.(mean)
	2000	2757	± 760	± 230

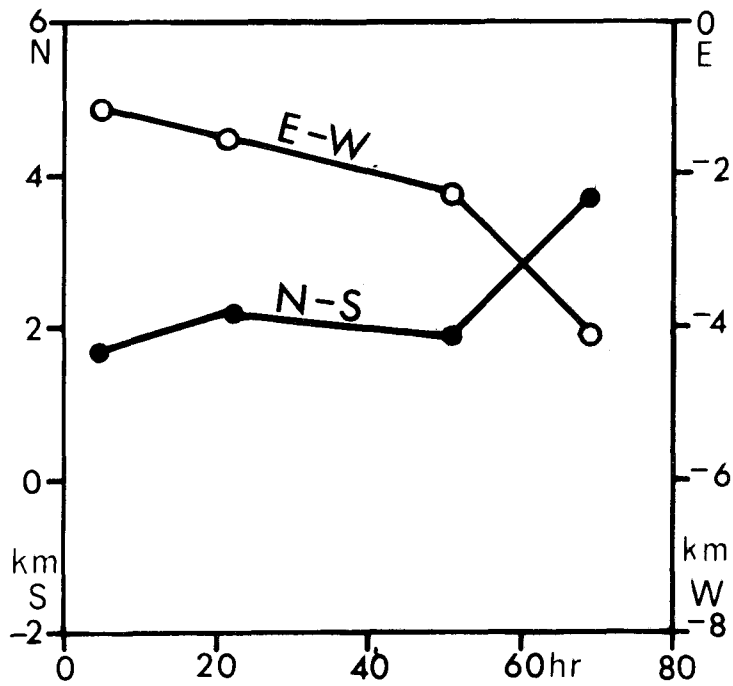
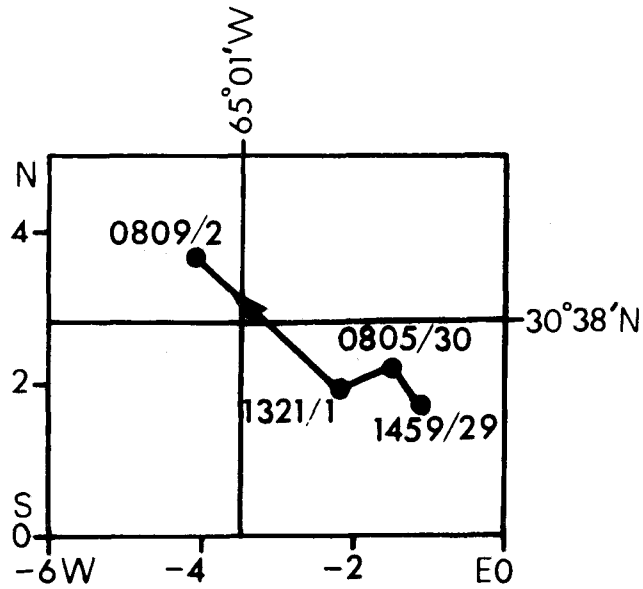
Fix No.	Date	Time GMT -4	Fix Position		Hours Since Laid (t)	Displacement(km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	26.XI	1415	30°45'.0	65°25'.6	3.7	-3.5	+3.9	-0.4	+1.1
2	27.XI	1430	30°45'.6	65°27'.3	28.0	-6.1	+5.0	-1.1	+0.6
3	27.XI	1815	30°44'.5	65°25'.3	31.7	-3.0	+3.0	+2.2	-1.7
4	28.XI	1130	30°46'.0	65°27'.9	49.0	-7.2	+5.7	-0.6	-0.2
5	28.XI	1930	30°46'.0	65°27'.9	57.0	-7.2	+5.7	0.0	-0.7
6	29.XI	0900	30°47'.3	65°28'.4	70.5	-8.0	+8.2	+0.4	+0.7
7	29.XI	1830	30°47'.0	65°29'.5	80.0	-9.6	+7.6	-0.6	-0.4
8	30.XI	1010	30°48'.2	65°29'.8	95.7	-10.2	+9.8	+0.2	+0.7

Fitted lines: $x = - 0.079t - 2.8$

$y = + 0.068t + 2.6$

Mean velocity = $2.9(\pm 0.4)$ cm/sec, $311(\pm 2)^\circ T$

FLOAT DESIGNATION: 25 Date and time laid: 1030/29.XI.59.



SERIAL No: 70

FLOAT DESIGNATION: 25

Date and time laid: 1030/29.XI.59

Position laid: 30° 36'.5N
64° 58'.8W

Displacement origin: 30° 36'.5N
64° 58'.8W

Navigation based on: Loran A

Estimated accuracy of positions: $\pm 2\text{km}$ (relative)

Depth(m): Nominal Observed

2000

-

Loran A too poor to be useful for depths.

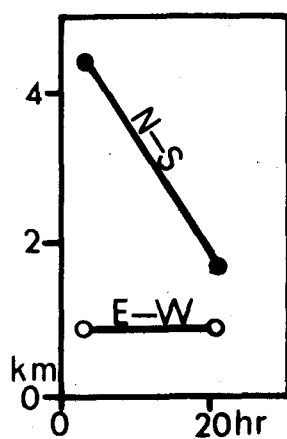
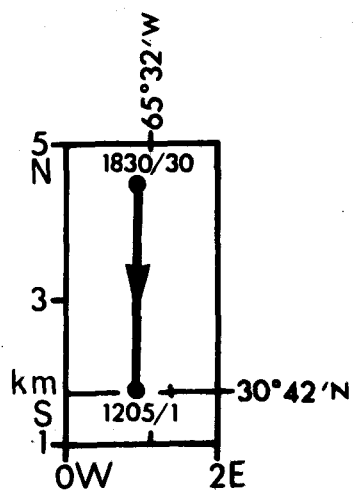
Fix No.	Date	Time GMT -4	Fix Position		Hours Since Laid (t)	Displacement(km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	29.XI	1459	30°37'.4	64°59'.6	4.5	-1.1	+1.7	-0.2	+0.2
2	30.XI	0805	30°37'.7	64°59'.8	21.6	-1.5	+2.2	0.0	+0.2
3	1.XII	1321	30°37'.5	65°00'.2	50.9	-2.2	+1.9	+0.6	-0.7
4	2.XII	0809	30°38'.5	65°01'.4	69.7	-4.1	+3.7	-0.6	+0.6

Fitted lines: $x = -0.043t - 0.7$

$y = +0.024t + 1.5$

Mean velocity = $1.4(\pm 0.3)\text{cm/sec}$, $299(\pm 13)^\circ\text{T}$

FLOAT DESIGNATION: V9 Date and time laid: 1535/30.XI.59.



SERIAL No: 71

FLOAT DESIGNATION: V9

Date and time laid: 1535/30.XI.59

Position laid: 30° 41'.1N
65° 32'.6W

Displacement origin: 30° 41'.1N
65° 32'.6W

Navigation based on: Loran C

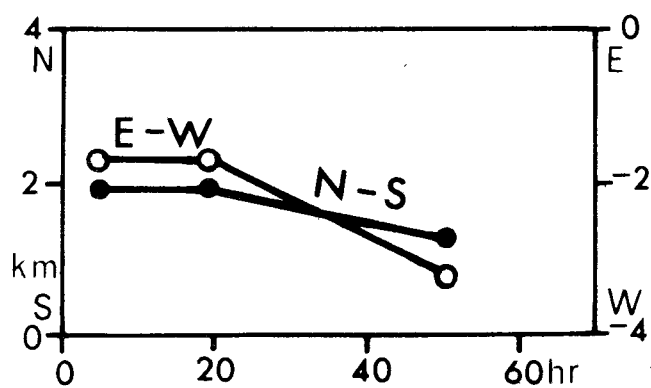
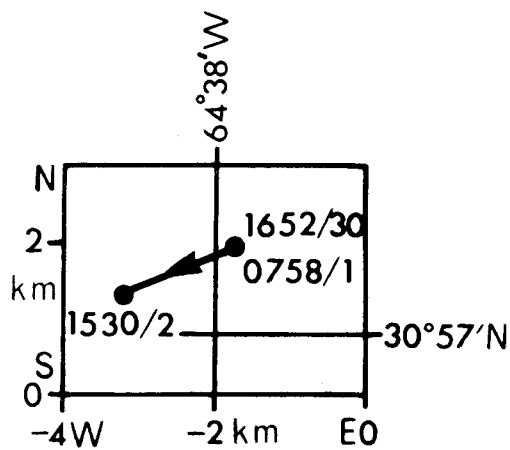
Estimated accuracy of positions: ± 0.5 km(relative)

Depth(m):	Nominal	Observed	S.D.	S.D.(mean)
	2000	2510	± 1100	± 450

Fix No.	Date	Time GMT -4	Fix Position		Hours Since Laid (t)	Displacement(km)	
			Lat.N.	Long.W.		+E-W x	+N-S y
1	30.XI	1830	30°43'.5	65°32'.1	2.9	+0.9	+4.4
2	1.XII	1205	30°42'.0	65°32'.1	20.5	+0.9	+1.7

Mean velocity fixes 1-2 = 4.3 cm/sec, 180°T

FLOAT DESIGNATION: 26 Date and time laid: 1233/30.XI.59.



FLOAT DESIGNATION: 26

Date and time laid: 1233/30.XI.59

Position laid: 30° 56'·6N
64° 36'·9W

Displacement origin: 30° 56'·6N
64° 36'·9W

Navigation based on: Loran A

Estimated accuracy of positions: ± 1 km (Fix 3 ± 2 km approx.) (relative)

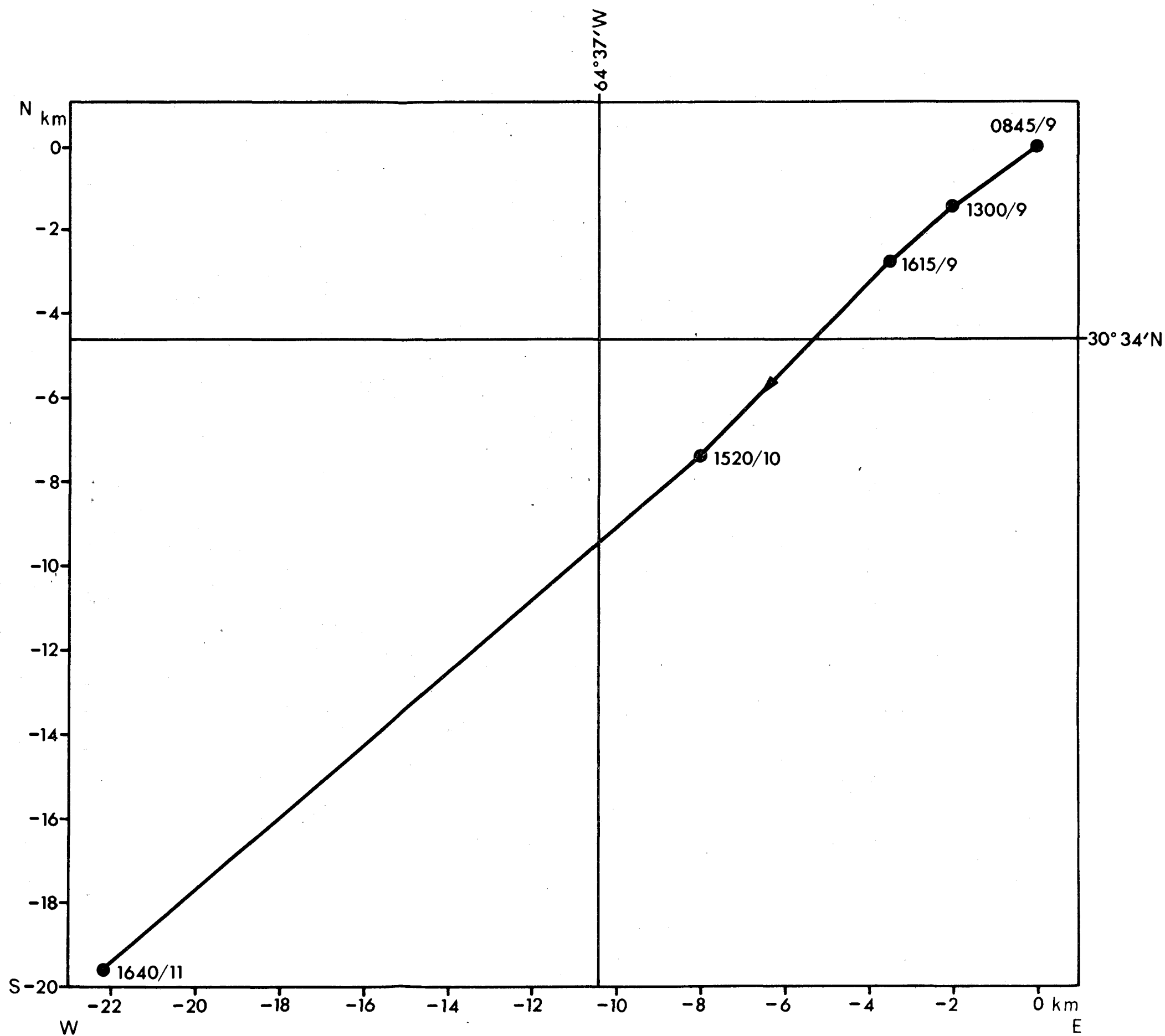
Depth(m): Nominal Observed
2000

Loran A too poor to be useful for depths

Fix No.	Date	Time GMT -4	Fix Position		Hours Since Laid (t)	Displacement(km)	
			Lat.N.	Long.W.		+E-W x	+N-S y
1	30.XI	1652	30°57'·6	64°37'·8	4·3	-1·7	+1·9
2	1.XII	0758	30°57'·6	64°37'·8	19·4	-1·7	+1·9
3	2.XII	1530	30°57'·3	64°38'·8	50·9	-3·2	+1·3

Mean velocity (Fix 1 - Fix 3) = 1·0 cm/sec, 248°T.

FLOAT DESIGNATIONS: V10 Date and time laid: 0630/9.XII.59.



SERIAL No: 73

FLOAT DESIGNATION: V10

Date and time laid: 0630/9.XII.59

Position laid: -

Displacement origin: $30^{\circ} 36' \cdot 5N$
 $64^{\circ} 30' \cdot 45W$

Navigation based on: Loran C

Estimated accuracy of positions: $\pm 1\text{km}$ (relative)

Depth(m): Nominal Observed S.D.
 400 1065 ± 350

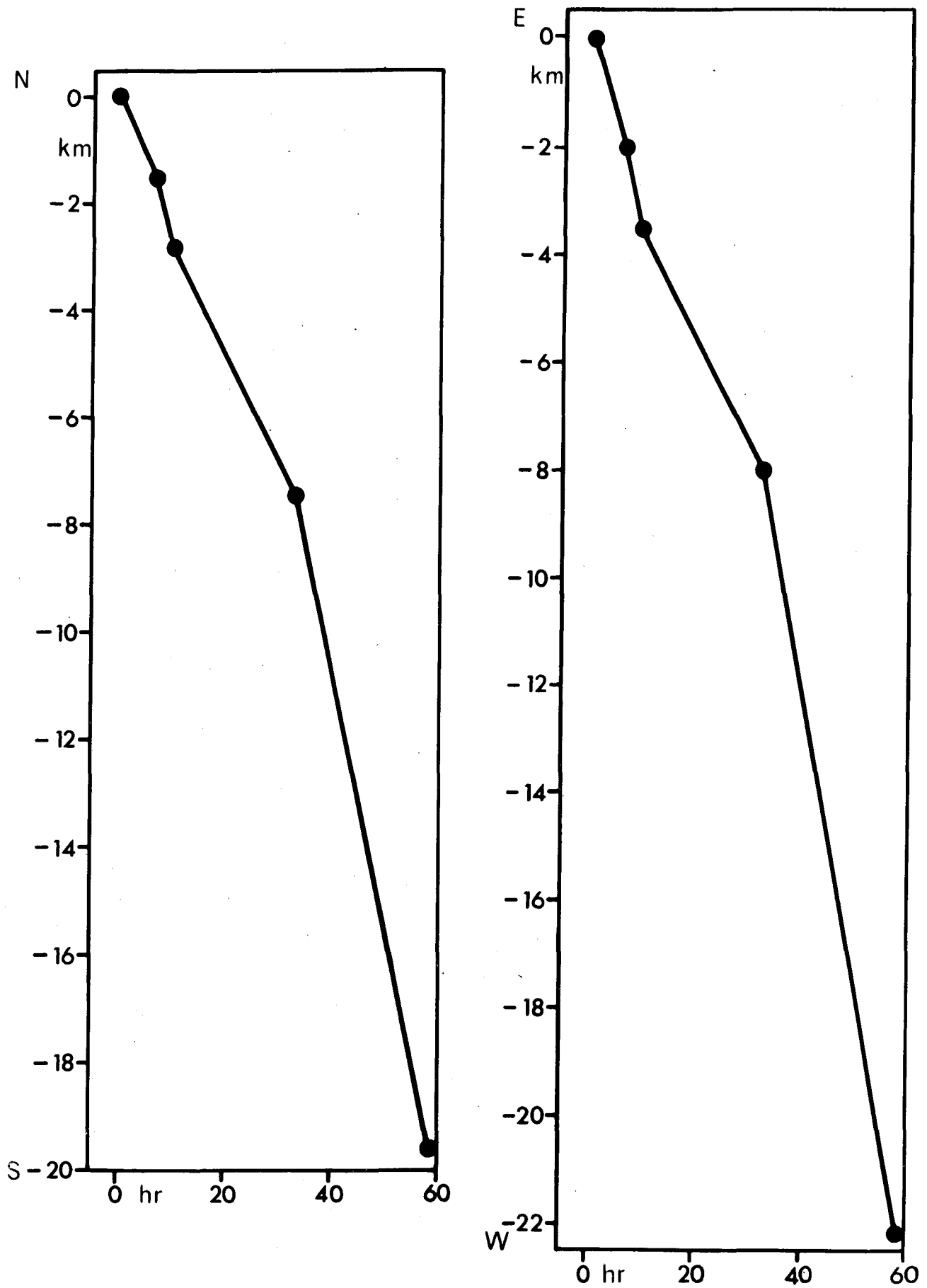
Fix No.	Date	Time GMT -4	Fix Position		Hours Since Laid (t)	Displacement(km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	9.XII	0845	$30^{\circ} 36' \cdot 5$	$64^{\circ} 30' \cdot 5$	2.3	0.0	0.0	-0.2	-0.2
2	9.XII	1300	$30^{\circ} 35' \cdot 7$	$64^{\circ} 31' \cdot 8$	6.5	-2.0	-1.5	-0.6	-0.4
3	9.XII	1615	$30^{\circ} 35' \cdot 0$	$64^{\circ} 32' \cdot 7$	9.7	-3.5	-2.8	-0.9	-0.6
4	10.XII	1520	$30^{\circ} 32' \cdot 5$	$64^{\circ} 35' \cdot 5$	32.8	-8.0	-7.4	+3.2	+2.4
5	11.XII	1640	$30^{\circ} 25' \cdot 9$	$64^{\circ} 44' \cdot 4$	58.2	-22.2	-19.6	-1.7	-1.3

Fitted lines: $x = -0.371t + 1.0$

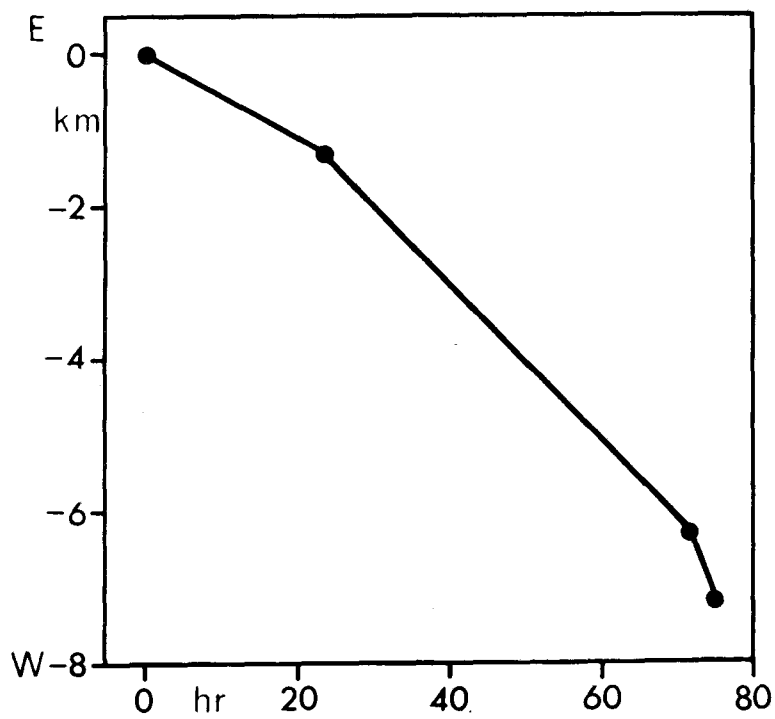
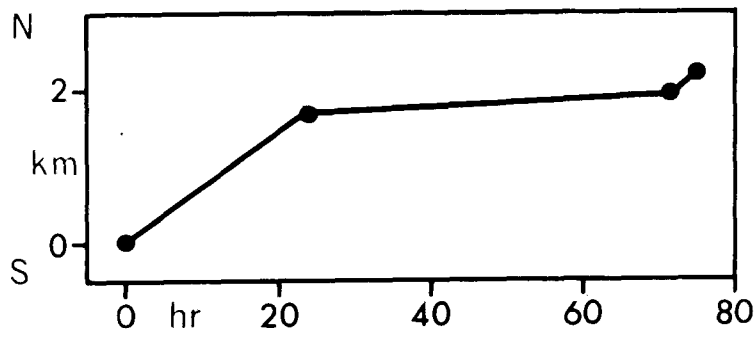
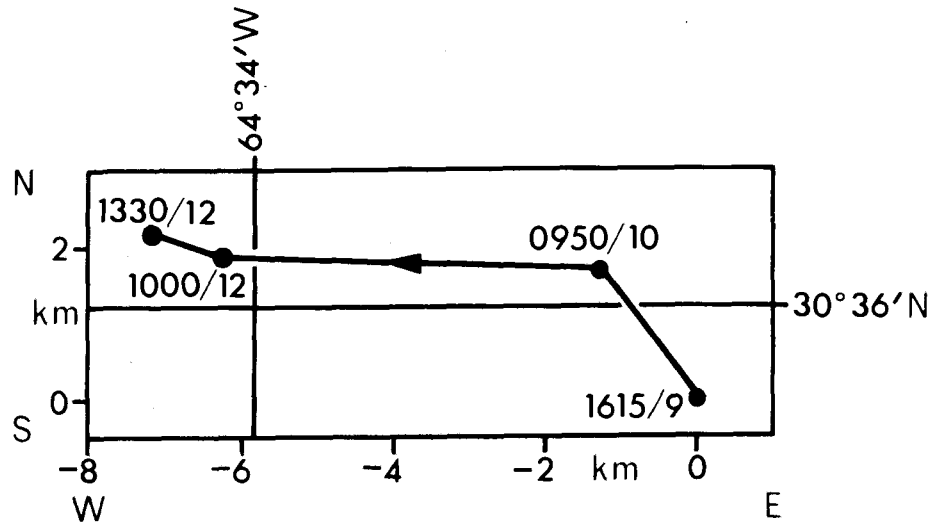
$y = -0.333t + 1.0$

Mean velocity = $13.9(\pm 1.1)\text{cm/sec}$, $228(\pm 1.7)^{\circ}T$

FLOAT DESIGNATIONS: V10 Date and time laid: 0630/9.XII.59.



FLOAT DESIGNATION: VII Date and time laid: 1020/9.XII.59.



SERIAL No: 74

FLOAT DESIGNATION: V11

Date and time laid: 1020/9.XII.59

Position laid: $30^{\circ} 35'.9N$
 $64^{\circ} 31'.5W$

Displacement origin: $30^{\circ} 35'.4N$
 $64^{\circ} 30'.4W$

Navigation based on: Loran C

Estimated accuracy of positions: $\pm 1km$ (relative)

Depth(m):	Nominal	Observed	S.D.	S.D.(mean)
	4000	4738	± 1110	± 450

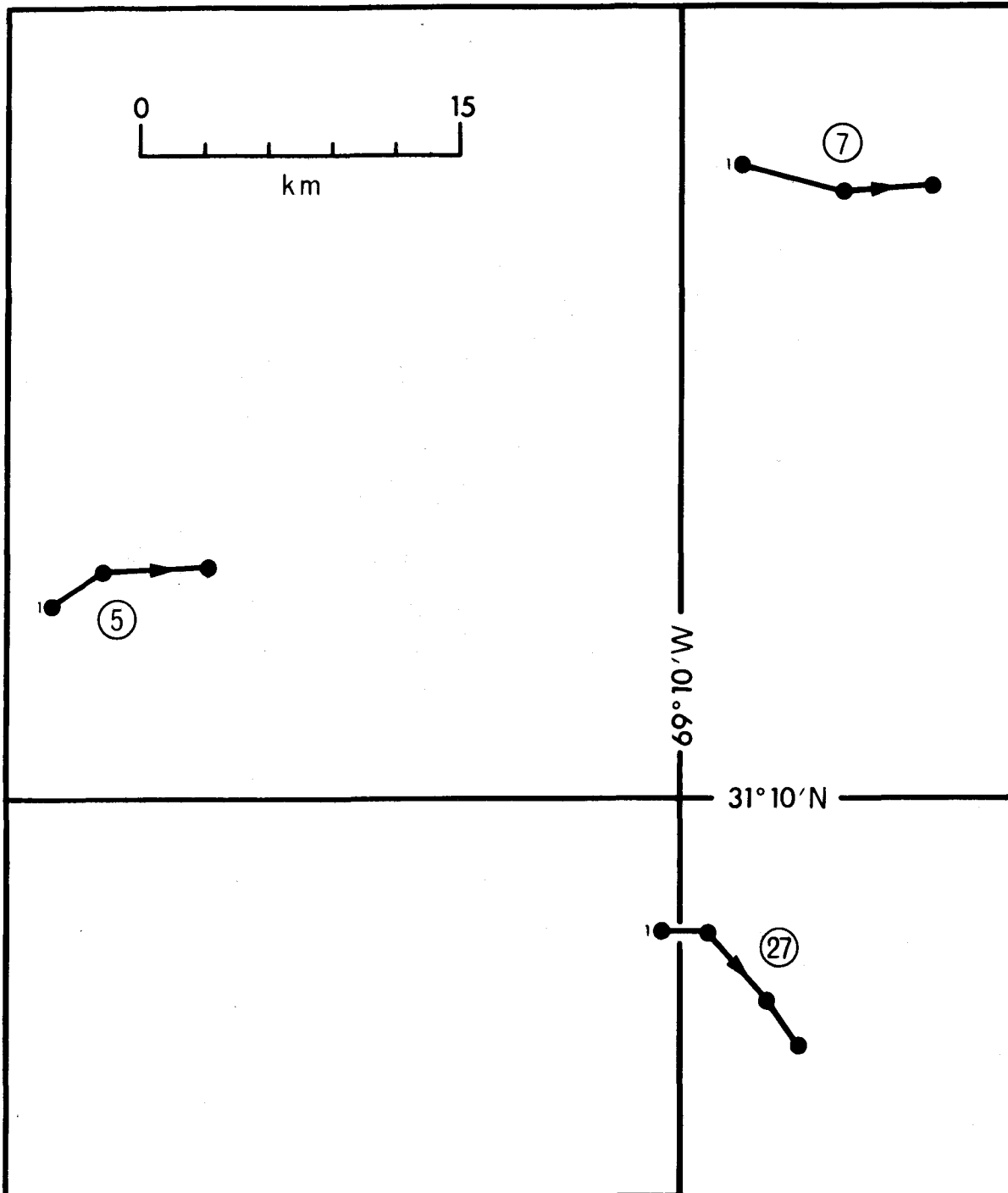
Fix No.	Date	Time GMT -4	Fix Position		Hours Since Laid (t)	Displacement(km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	9.XII	1615	$30^{\circ} 35'.4$	$64^{\circ} 30'.4$	5.9	0.0	0.0	-0.2	-0.6
2	10.XII	0950	$30^{\circ} 36'.3$	$64^{\circ} 31'.2$	23.5	-1.3	+1.7	+0.4	+0.7
3	12.XII	1000	$30^{\circ} 36'.4$	$64^{\circ} 34'.3$	71.7	-6.3	+1.9	+0.2	-0.2
4	12.XII	1330	$30^{\circ} 36'.6$	$64^{\circ} 34'.9$	75.2	-7.2	+2.2	-0.2	0.0

Fitted lines: $x = -0.103t + 0.8$

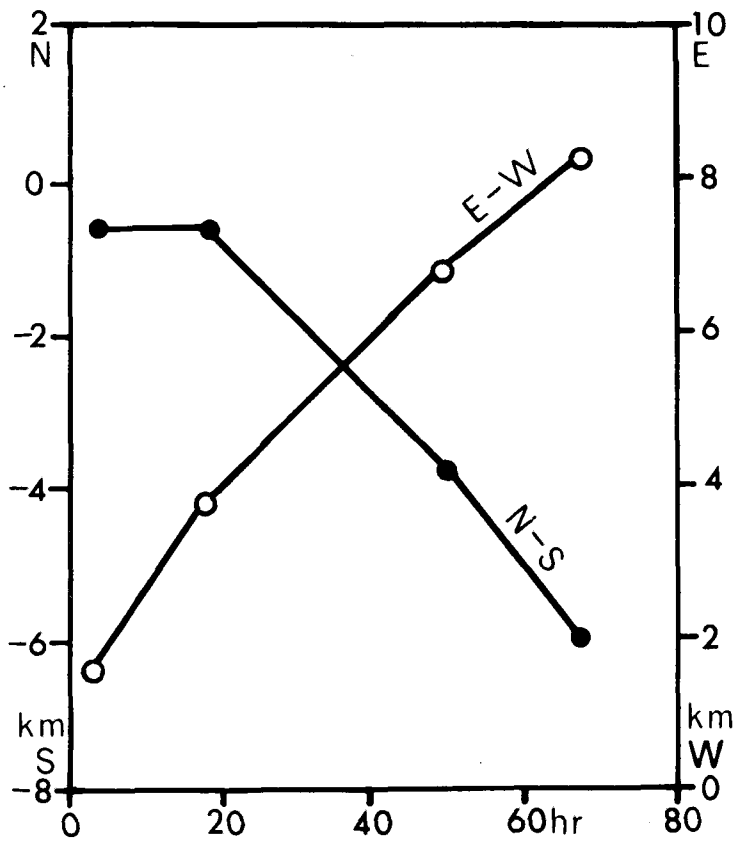
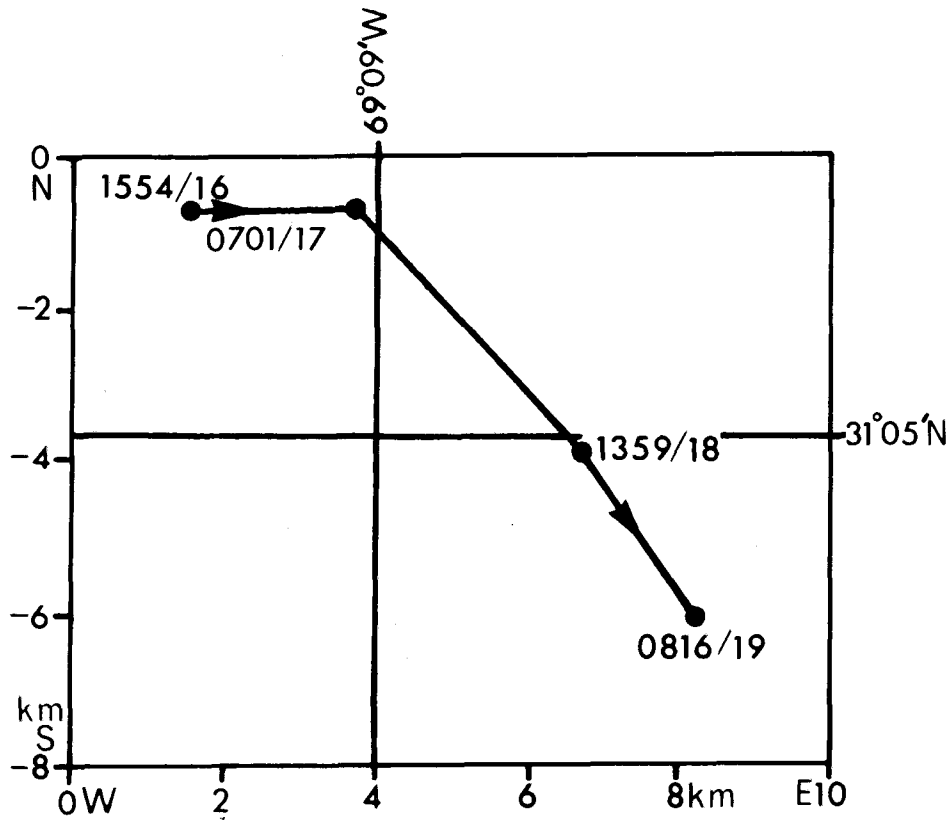
$y = +0.024t + 0.4$

Mean velocity = $2.9(\pm 0.2)cm/sec$, $283(\pm 6)^{\circ}T$

FLOAT DESIGNATIONS: 27 27(laid 1300/16.XII.59), 7(laid 0945/
17.XII.59), 5(laid 1457/17.XII.59).



FLOAT DESIGNATION: 27 Date and time laid: 1300/16.XII.59.



SERIAL No: 75

FLOAT DESIGNATION: 27

Date and time laid: 1300/16.XII.59

Position laid: $31^{\circ} 07'.0N$
 $69^{\circ} 11'.5W$

Displacement origin: $31^{\circ} 07'.0N$
 $69^{\circ} 11'.5W$

Navigation based on: Loran A

Estimated accuracy of positions: + 1km (relative)

Depth (m):	Nominal	Observed	S.D.	S.D.(mean)
	2000	1920	± 420	± 140

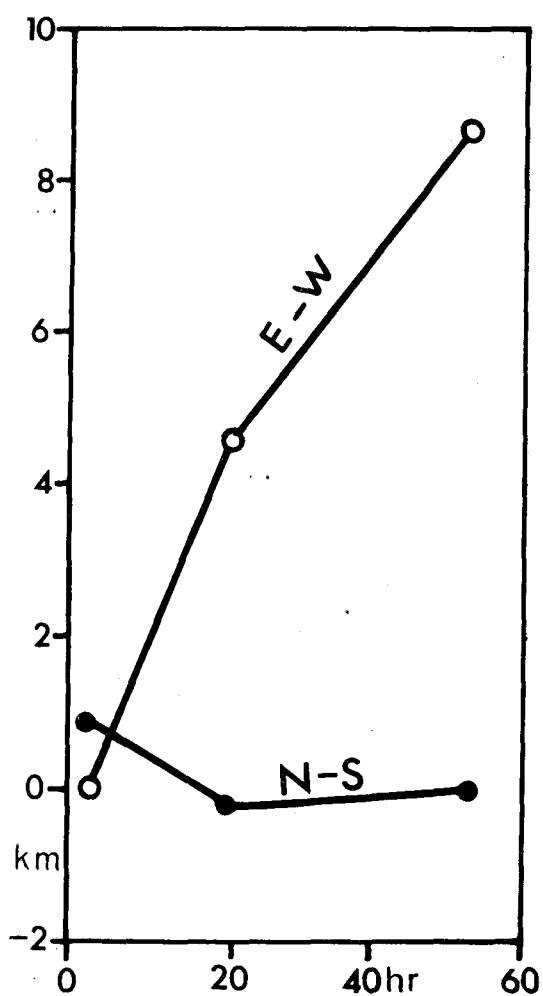
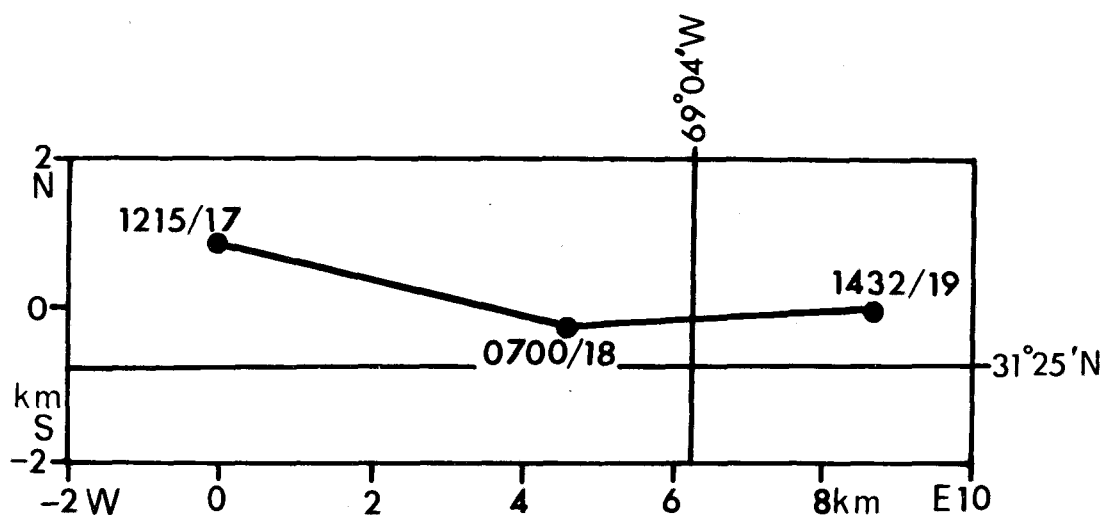
Fix No.	Date	Time GMT -4	Fix Position		Hours Since Laid (t)	Displacement(km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	16.XII	1554	$31^{\circ}06'.6$	$69^{\circ}10'.6$	2.9	+1.5	-0.7	-0.4	-0.6
2	17.XII	0701	$31^{\circ}06'.6$	$69^{\circ}09'.2$	18.0	+3.7	-0.7	+0.4	+0.7
3	18.XII	1359	$31^{\circ}04'.9$	$69^{\circ}07'.3$	49.0	+6.7	-3.9	+0.2	+0.2
4	19.XII	0816	$31^{\circ}03'.7$	$69^{\circ}06'.3$	67.3	+8.2	-6.1	-0.2	-0.4

Fitted lines: $x = + 0.102t + 1.5$

$y = - 0.088t + 0.2$

Mean velocity = $3.8(\pm 0.3)$ cm/sec, $131(\pm 4)^{\circ}T$

FLOAT DESIGNATION: 7 Date and time laid: 0945/17.XII.59.



FLOAT DESIGNATION: 7

Date and time laid: 0945/17.XII.59

Position laid: $31^{\circ} 25'.4N$
 $69^{\circ} 08'.2W$

Displacement origin: $31^{\circ} 25'.4N$
 $69^{\circ} 08'.2W$

Navigation based on: Loran A

Estimated accuracy of positions: $\pm 1km$ (relative)

Depth(m): Nominal Observed S.D. S.D.(mean)
 2000 1960 ± 760 ± 340

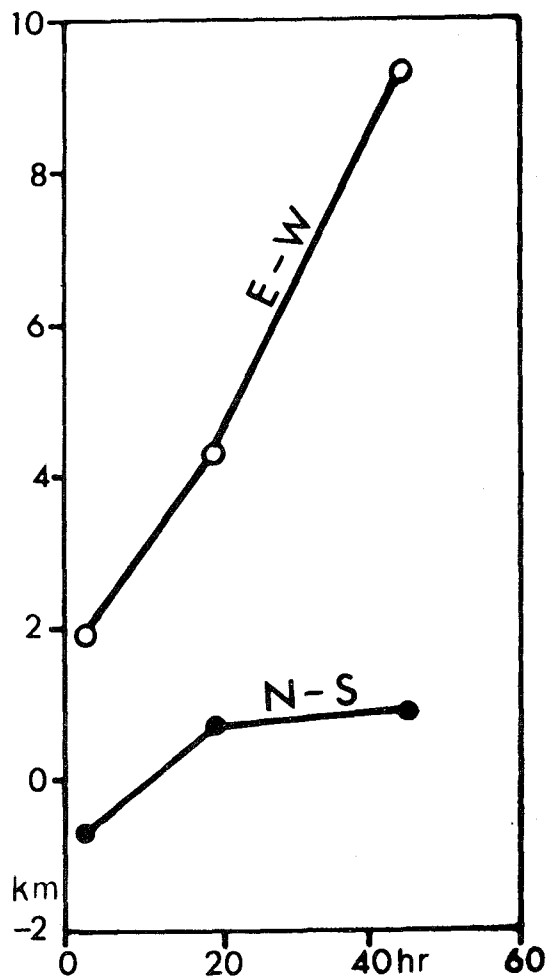
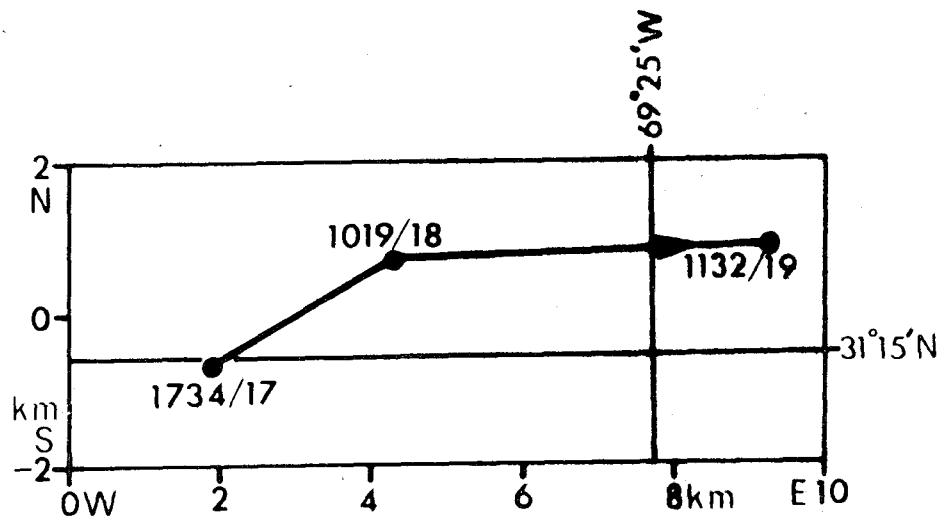
Fix No.	Date	Time GMT -4	Fix Position		Hours Since Laid (t)	Displacement(km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	17.XII	1215	$31^{\circ} 25'.9$	$69^{\circ} 08'.2$	2.5	0.0	+0.9	-0.6	+0.4
2	18.XII	0700	$31^{\circ} 25'.3$	$69^{\circ} 05'.1$	21.2	+4.6	-0.2	+0.9	-0.6
3	19.XII	1432	$31^{\circ} 25'.4$	$69^{\circ} 02'.6$	52.7	+8.7	0.0	-0.4	+0.2

Fitted lines: $x = + 0.169t + 0.1$

$y = - 0.015t + 0.6$

Mean velocity = $4.7(\pm 0.8)cm/sec, 095(\pm 6)^{\circ}T$

FLOAT DESIGNATION: 5 Date and time laid: 1457/17.XII.59.



SERIAL No: 77

FLOAT DESIGNATION: 5

Date and time laid: 1457/17.XII.59

Position laid: 31° 15'.3N
69° 29'.8W

Displacement origin: 31° 15'.3N
69° 29'.8W

Navigation based on: Loran A

Estimated accuracy of positions: $\pm 1\text{km}$ (relative)

Depth(m):	Nominal	Observed	S.D.	S.D.(mean)
	2000	1720	± 160	± 72

Fix No.	Date	Time GMT -4	Fix Position		Hours Since Laid (t)	Displacement(km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	17.XII	1734	31°14'.9	69°28'.7	2.6	+1.9	-0.7	+0.2	-0.4
2	18.XII	1019	31°15'.7	69°27'.1	19.4	+4.3	+0.7	-0.4	+0.6
3	19.XII	1132	31°15'.8	69°24'.0	44.6	+9.3	+0.9	+0.2	-0.2

Fitted lines: $x = + 0.178t + 1.2$

$y = + 0.036t - 0.5$

Mean velocity = $5.1(\pm 0.4)\text{cm/sec}$, $079(\pm 6)^\circ\text{T}$

