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Division of Fisheries and Oceanography

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Satellite-tracked Buoy Data Report V.
Bureau of Meteorology Buoys Tracked in
The Southern, Indian and Pacific Oceans
January to March 1979

M. A. Greig

1980

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SATELLITE-TRACKED BUOY DATA REPORT V.
BUREAU OF METEOROLOGY BUOYS TRACKED IN
THE SOUTHERN, INDIAN AND PACIFIC OCEANS
JANUARY TO MARCH 1979

M.A. Greig

CSIRO Division of Fisheries and Oceanography
P.O. Box 21, Cronulla, NSW 2230

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Abstract

The track, speed, and sea surface temperature data from 38 buoys released in the oceans around Australia are presented for the period January to March 1979. Interesting features of these tracks are: the number of eddies located by the buoys in all current systems and the initial northward movement of buoys released south of latitude 50°S near longitude 90°E.

INTRODUCTION

This report on oceanographic data gathered by free drifting buoys released by the Australian Bureau of Meteorology covers data received during the period January to March 1979 as part of the Global Weather Experiment. A further report on the period from March to June 1979 is at present being prepared in this Division and we hope to receive more data for the remainder of the year.

We present plots of the buoy tracks, buoy speed, and sea surface temperature in five sections (Appendix).

- (i) The zone between the Antarctic Divergence and the Antarctic Convergence.
- (ii) The zone between the Antarctic Convergence and the Sub-tropical Convergence.
- (iii) The Southeast Indian Ocean north of the Sub-tropical Convergence.
- (iv) The Coral and Tasman Seas north of the Sub-tropical Convergence.
- (v) The Great Australian Bight.

Within each section the tracks followed by the buoys are broadly along the lines of the flow as indicated by the ocean current diagrams in Neumann and Pierson (1966) even to the extent of the occurrence of eddies along convergence and divergence lines.

THE BUOYS

The free drifting buoys, constructed by the Australian Bureau of Meteorology with a drogue at 20 m, are vertical PVC/fibreglass "spar" buoys 5 m in length similar to those developed by CSIRO (Cresswell 1976). The design, manufacture and testing of all other parts, sensors, and test equipment was done by the Bureau of Meteorology as was the logistical planning for the development of the 50 buoys in three oceans; the Antarctic, the Indian and the Pacific Oceans. (Project Plan for Australian Drifting Buoy Program for F.G.G.E., Bureau of Meteorology Australia).

The buoys are located and their data transmitted through a French "ARGOS" System on the U.S. TIROS-N satellite. The data are received and processed in France where they are available immediately through Telex distribution.

In all 300 buoys were released by various countries as part of the Global Weather Experiment. This report is concerned only with the Australian buoys.

DATA PRESENTATION

The buoy track charts, on a quasi mercator projection, are for 9° of latitude and 15° of longitude as in previous reports of this nature. Where the 15° of longitude is insufficient to cover the movement of buoys in the polar region a second chart has been drawn. With each track diagram we have provided a plot of sea surface temperature and daily buoy speed. Where interesting features of the track can be clarified we have also provided a plot of the buoy track from the launch date in 1978 to the beginning of 1979.

Figure 1 is an orthographic projection of the globe showing all buoy tracks from their launch date until March 1979.

DATA HANDLING

Data on Australian buoys were extracted from buoy data files of the Australian Numerical Meteorology Research Centre. The files of the Australian data were edited to remove fixes obtained before the launching date of the buoys and these files were then used to plot the diagrams.

THE BUOY TRACKS

(a) *South-east Indian Ocean*

Nine of the buoys were launched in an area in the South-east Indian Ocean which may be the northern limit of the Sub-tropical Convergence (Schott 1933) or a weak current system between the sub-tropical and tropical waters (Neumann and Pierson 1966).

Each of these buoys, 1103, 1108, 1120, 1128, 1136, 1140, 1144, 1150 has drifted along a path markedly different from the paths followed by buoys released south of the Sub-tropical Convergence in that some of them drift to the west and that there is usually a strong northerly component in their mostly circuitous tracks. A comparable set of tracks is found in the Tasman Sea at the latitudes where buoys released near the Tasman Front have followed similar devious paths.

Buoy number 1130 released at 23°S , 110°E travelled northward along a track similar to that initially followed by CSIRO buoy number 1104 in December 1977 and reported in Cresswell and Golding (1979).

(b) *Antarctic Circumpolar Current*

(i) *Zone between the Antarctic Convergence and the Sub-tropical Convergence*

Eleven buoys were released in this zone. Nearly all of them travelled east at fairly high speeds. Two exceptions were buoys 1132 and 1137 both of which were released near the Sub-tropical Convergence and both of which moved northward into the area of the Great Australian Bight.

One buoy, number 1105, appears to be aground or about to go aground on the South Island of New Zealand.

(ii) *Zone between the Antarctic Convergence and the Antarctic Divergence*

Nine buoys were released in this zone, all of which travelled eastward with the West Wind Drift. However, three buoys, numbers 1112, 1123, and 1125, initially drifted to the north before settling down to a steady eastward drift. This northerly motion near the polar ice cap at longitude 90°E has been noted by Tchernia and Jeannin (1980) in their study of the movement of Antarctic icebergs.

Another buoy, number 1139, described a remarkable series of anticlockwise circles in an area 1° x 1° before setting out on its drift to the east. This buoy was released close to the Antarctic Convergence.

(c) *Tasman and Coral Seas*

The six tracks shown in this area are all of a circuitous nature, even that of buoy number 1133 which eventually drifted west to ground on the Australian coast at latitude 24°S.

Buoy number 1110 drifted south and east after its release in 1978 to latitude 25°S, longitude 181°E where it described a series of clockwise loops for about 45 days before drifting off to the south-west again.

(d) *Great Australian Bight*

Two buoys 1107 and 1111 were released in this area and two others 1132 and 1137 appear to be making their way into the Bight.

Buoy number 1111 is performing a series of anticlockwise loops while the others are following roundabout paths, generally towards the north and into the Bight.

ACKNOWLEDGMENTS

The writing of this report is due to the continued interest of Dr George Cresswell in satellite-tracked buoys released in the Ocean. We acknowledge the help of Dr Bill Bourke and Dr Noel Davidson of the Australian Numerical Meteorology Research Centre in providing us with their files of buoy data and thank Mr Neville Ridgway of this Division for his programming help.

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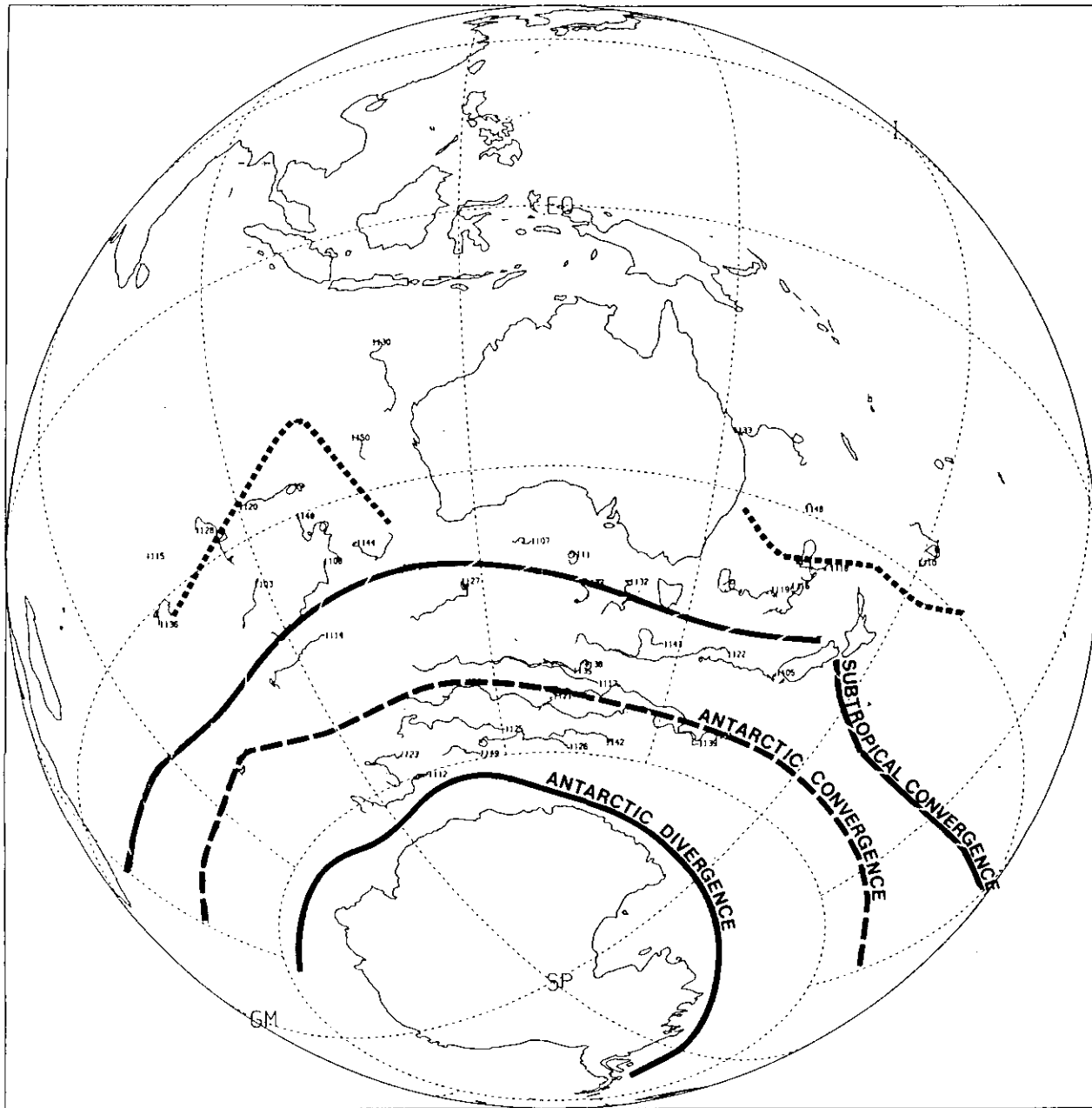


Figure 1. Orthographic projection of the eastern hemisphere showing all buoy tracks for the period December 1978 to March 1979.

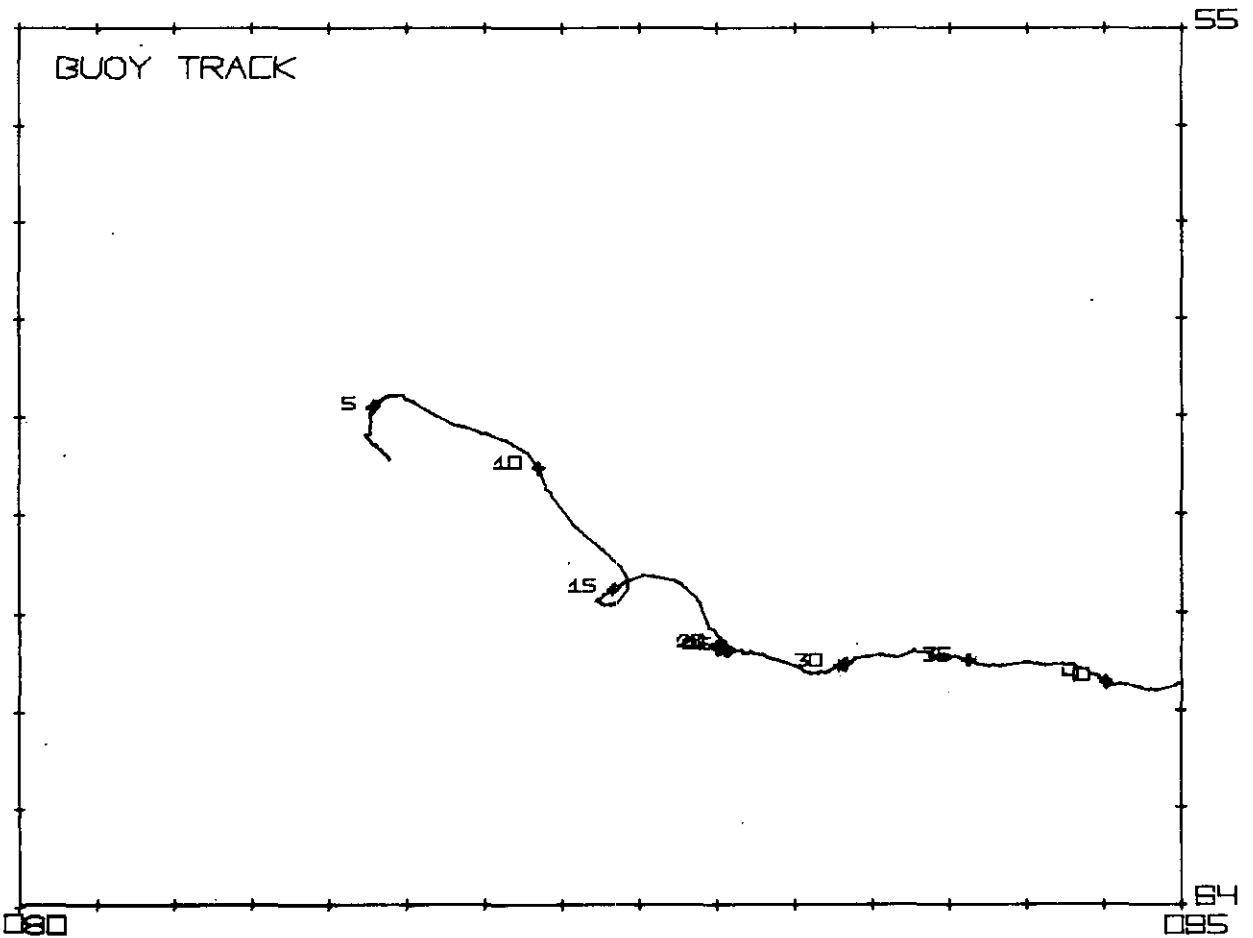
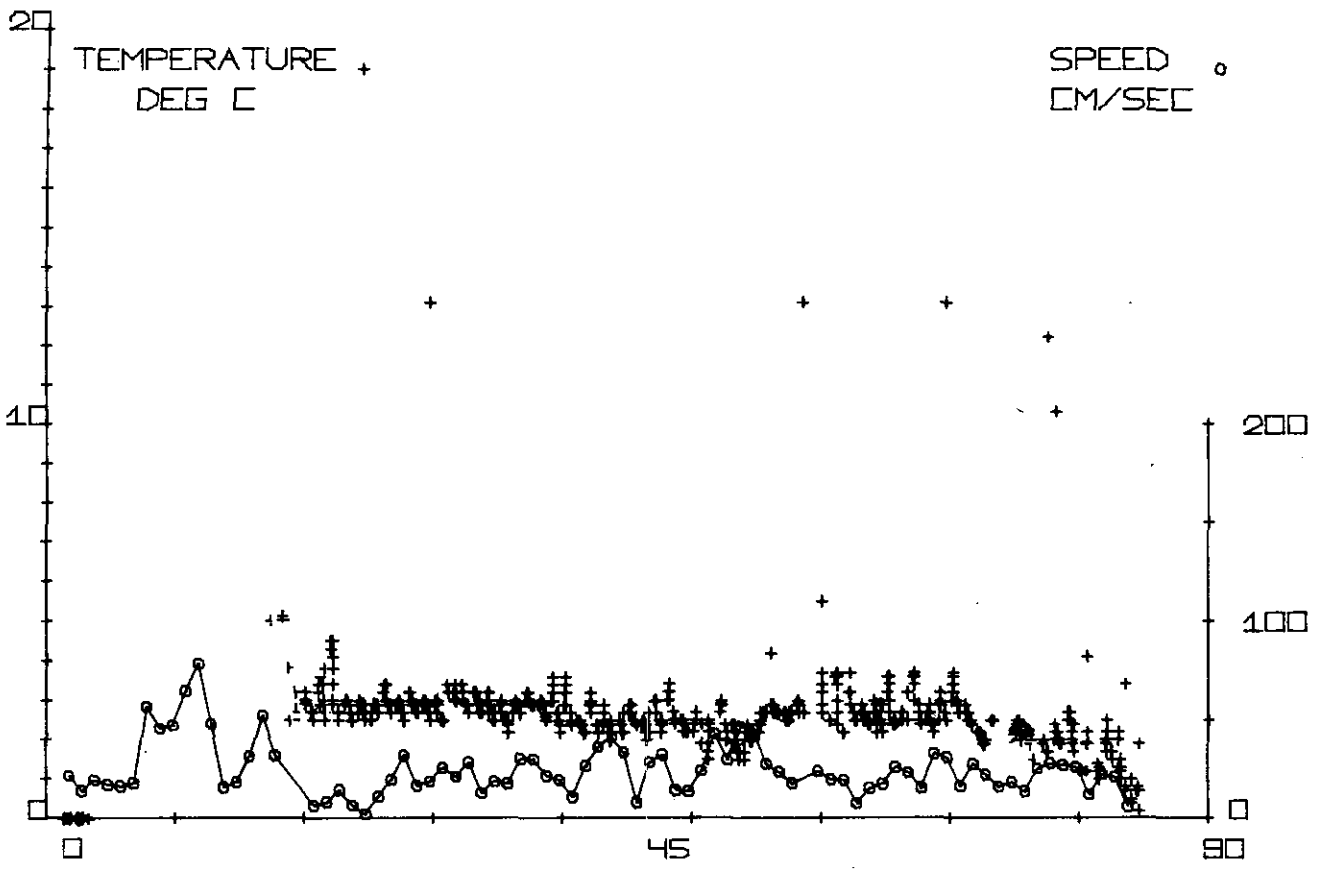
APPENDIX : Buoy tracks, buoy speed and sea surface sections.

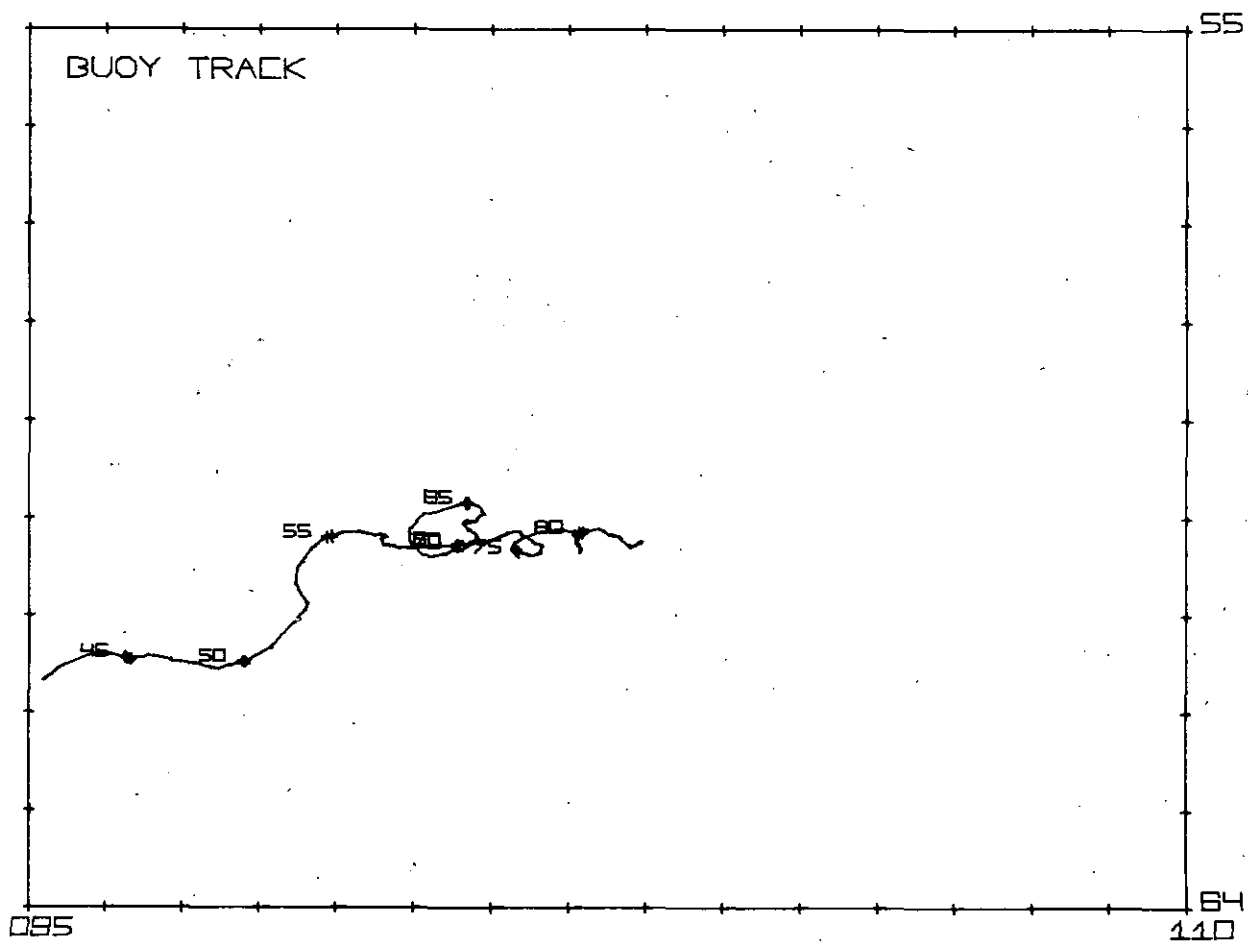
- (i) Buoys tracked between Antarctic Divergence and the Antarctic Convergence.
- (ii) Buoys tracked between Antarctic Convergence and the Subtropical Convergence.
- (iii) Buoys tracked in the South-East Indian Ocean north of the Subtropical Convergence.
- (iv) Buoys tracked in the Coral and Tasman Seas north of the Subtropical Convergence.
- (v) Buoys tracked in the Great Australian Bight.

BUOY 1112

DAYS

0- 80 78

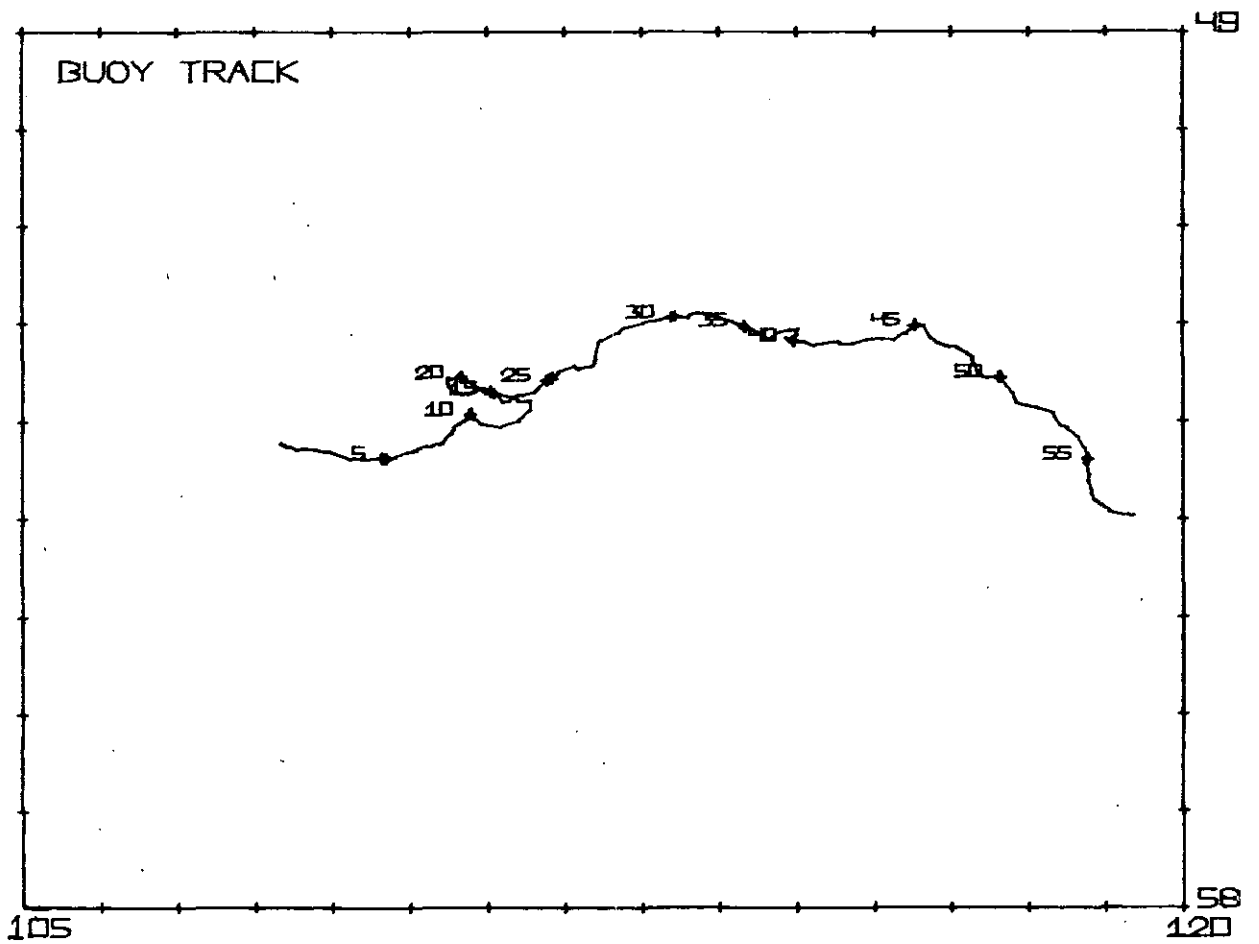
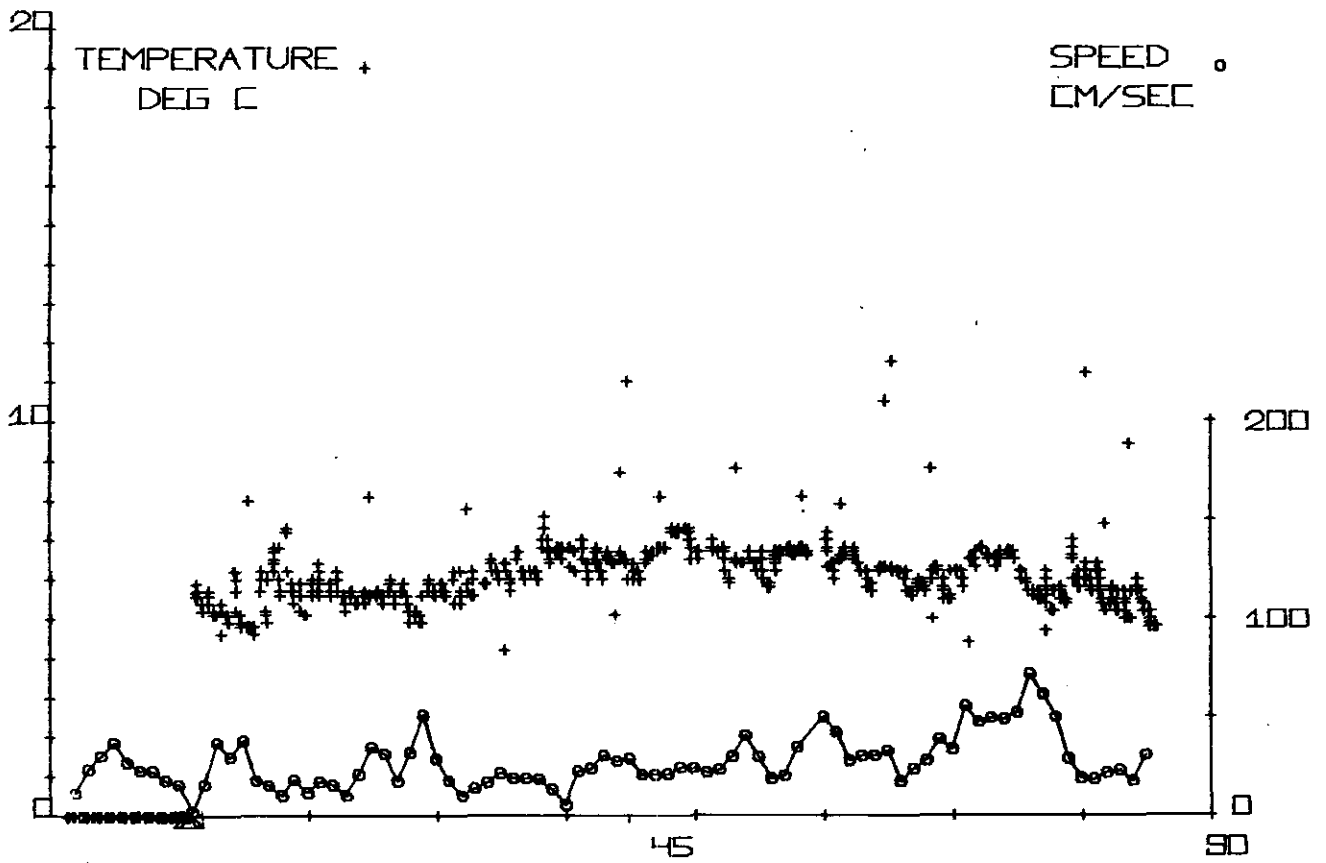




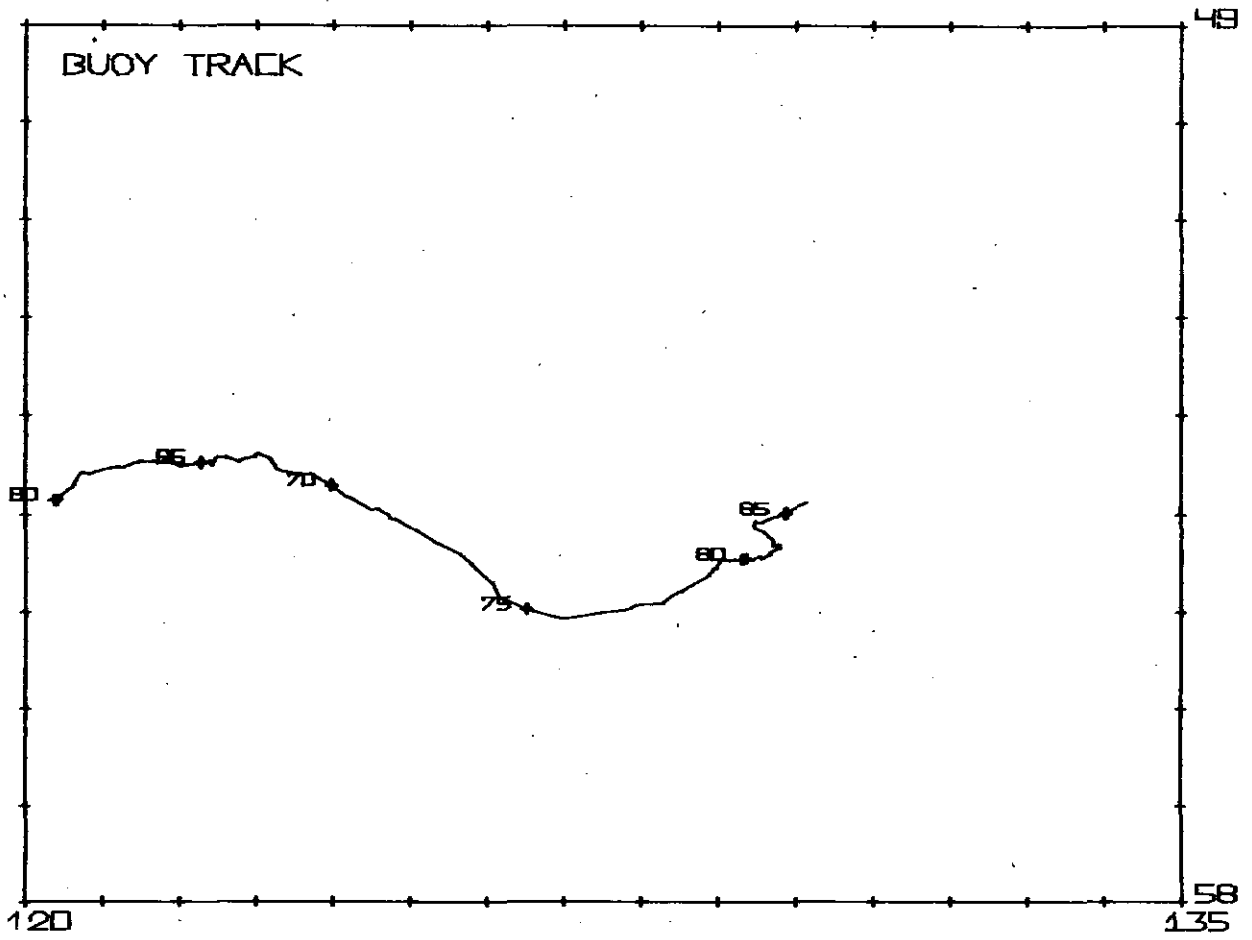
BUOY 1121

DAYS

0- 90 79



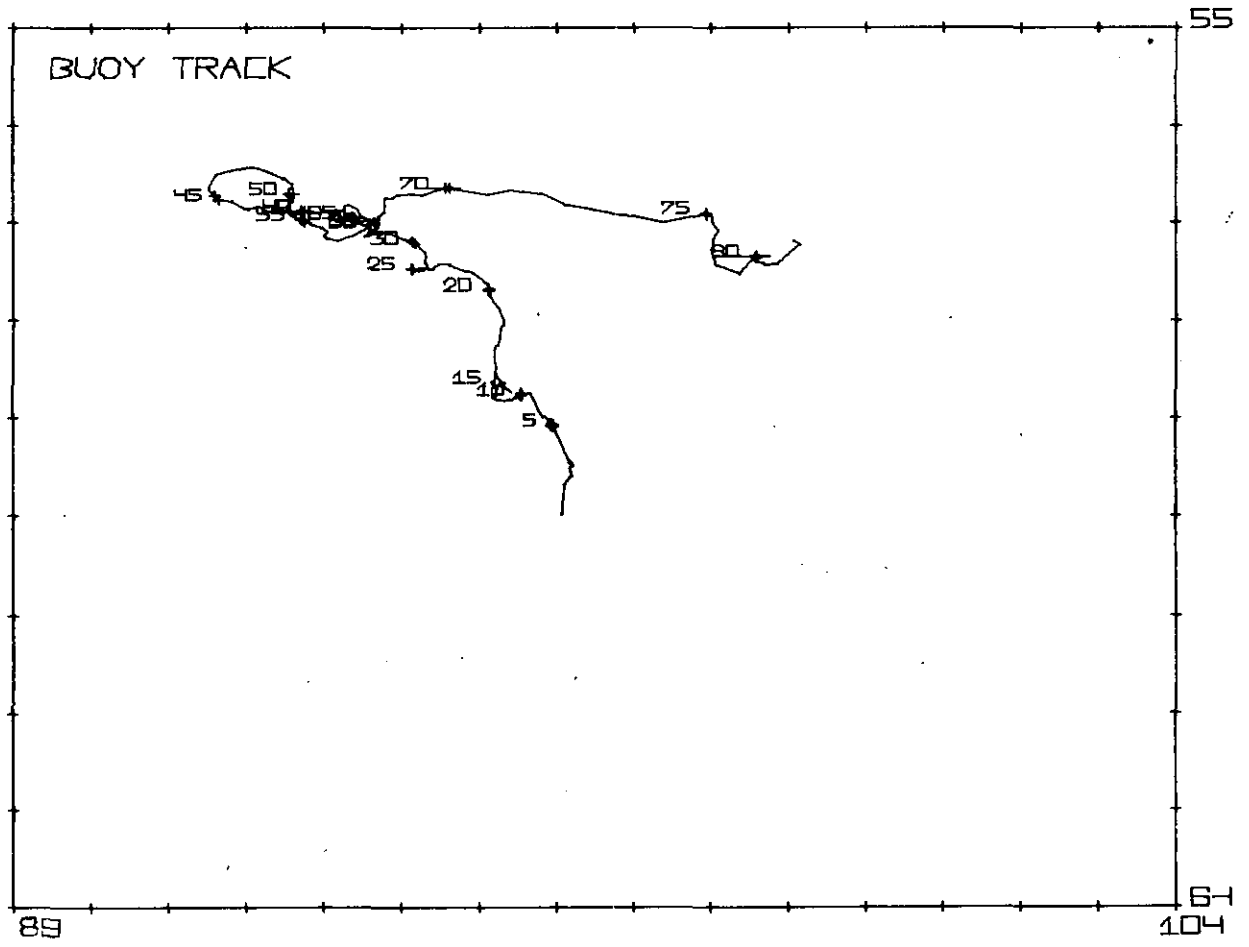
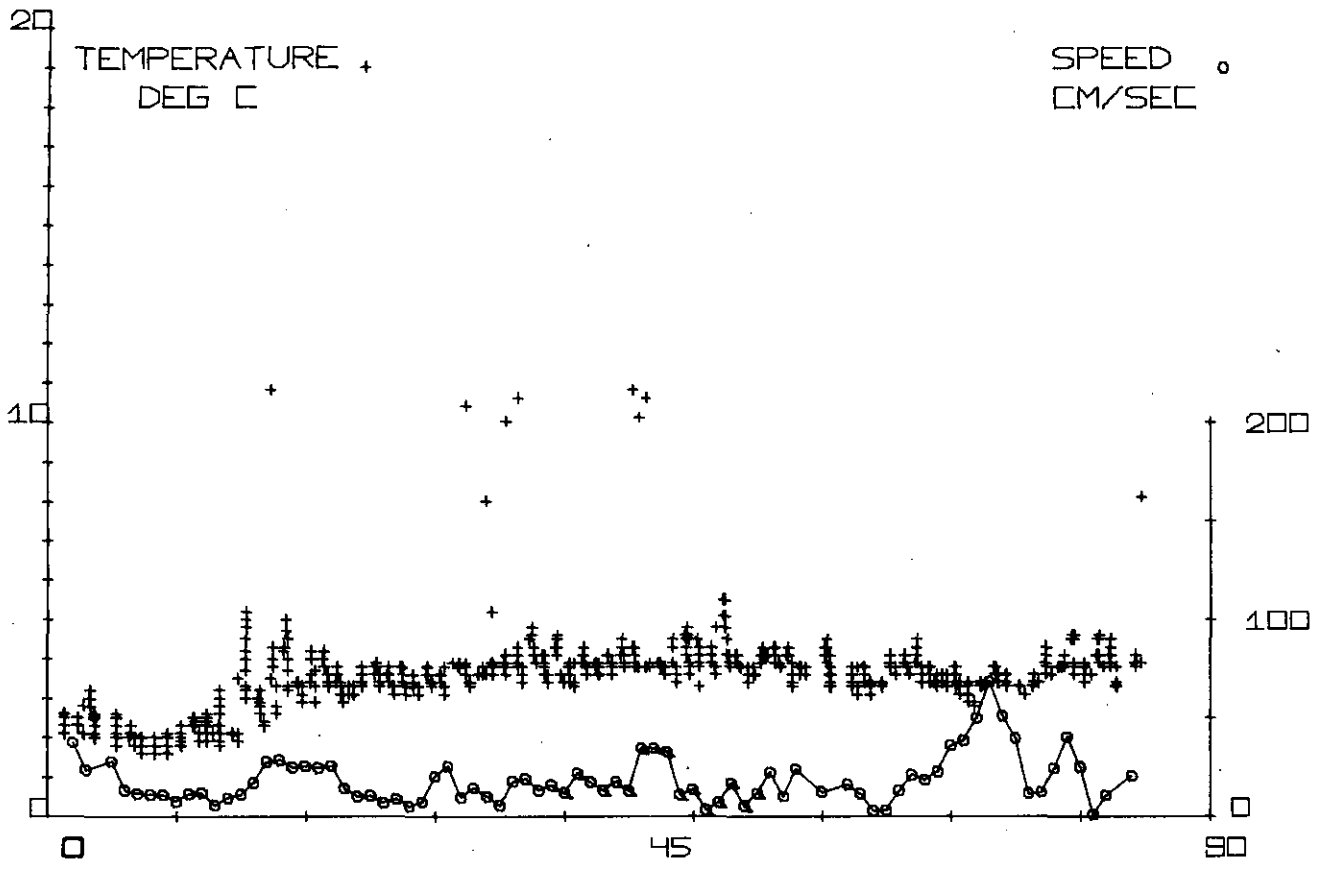
BUOY TRACK



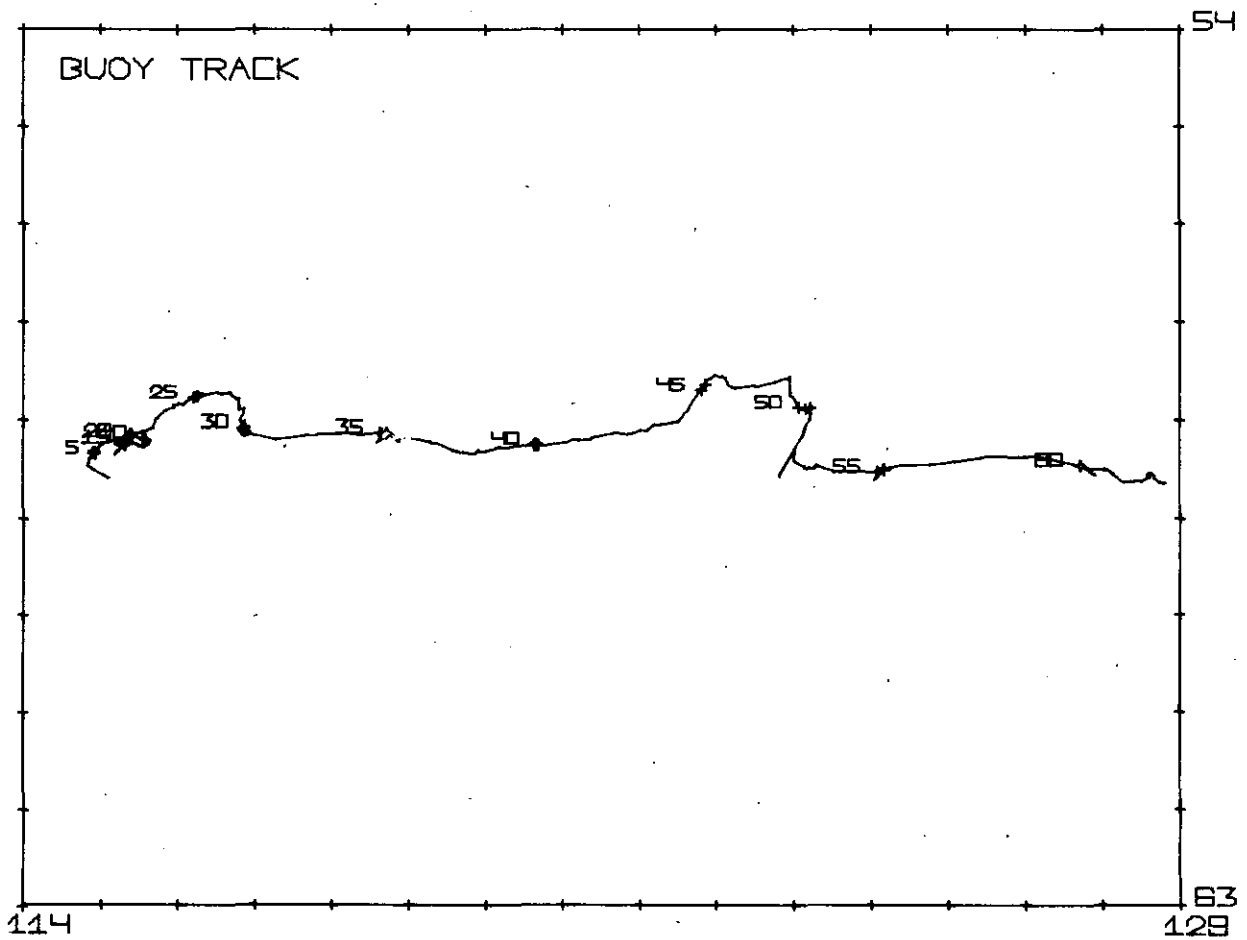
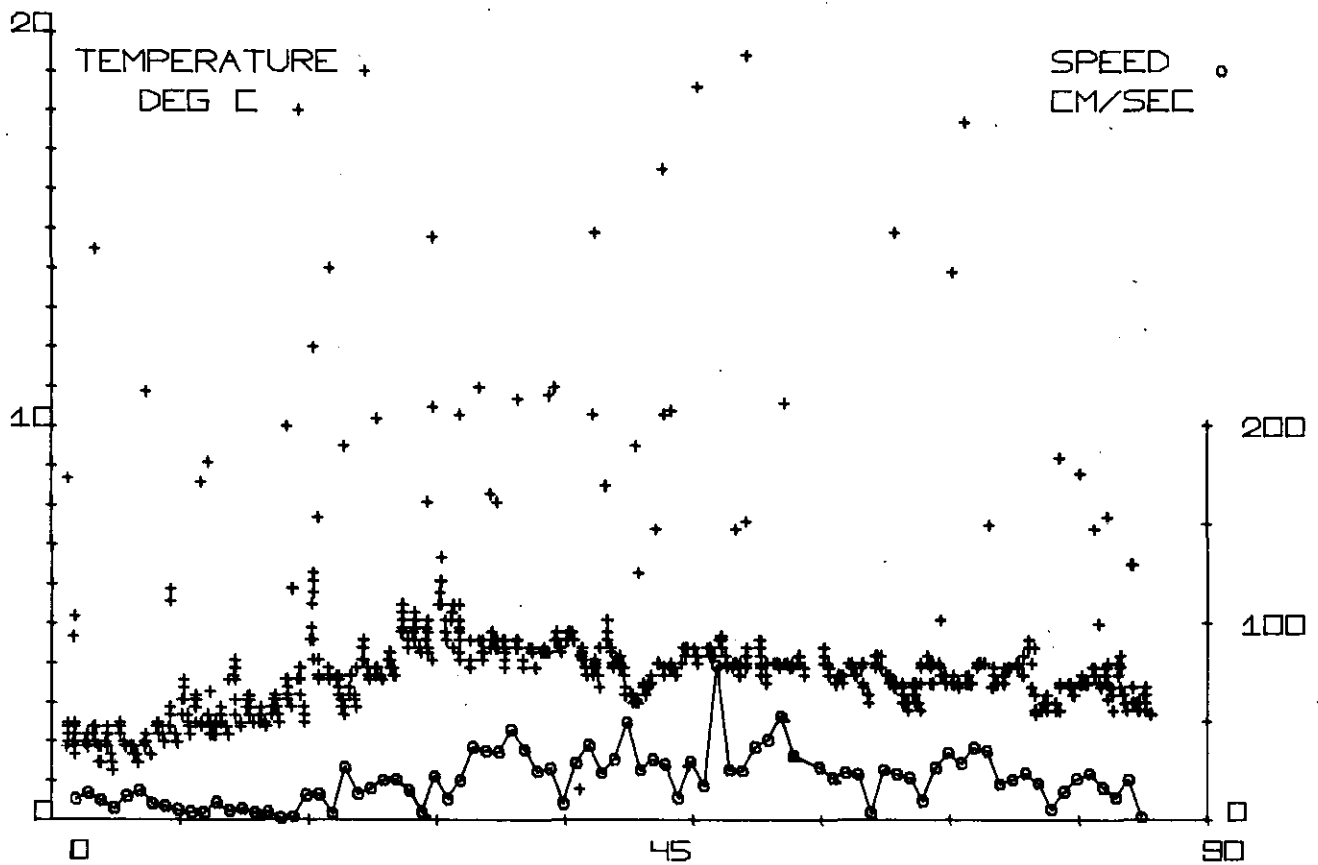
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DAYS

0 - 90 78



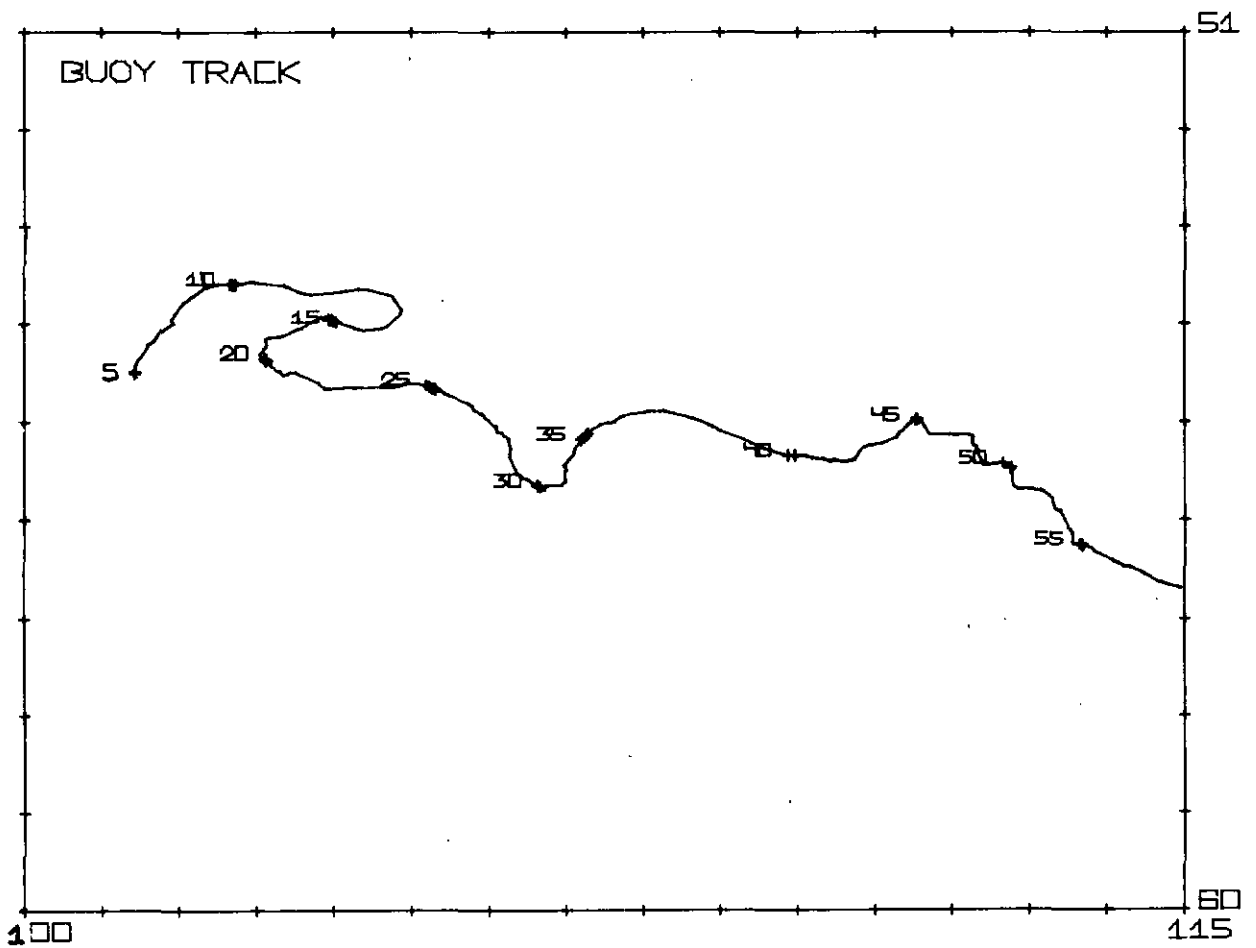
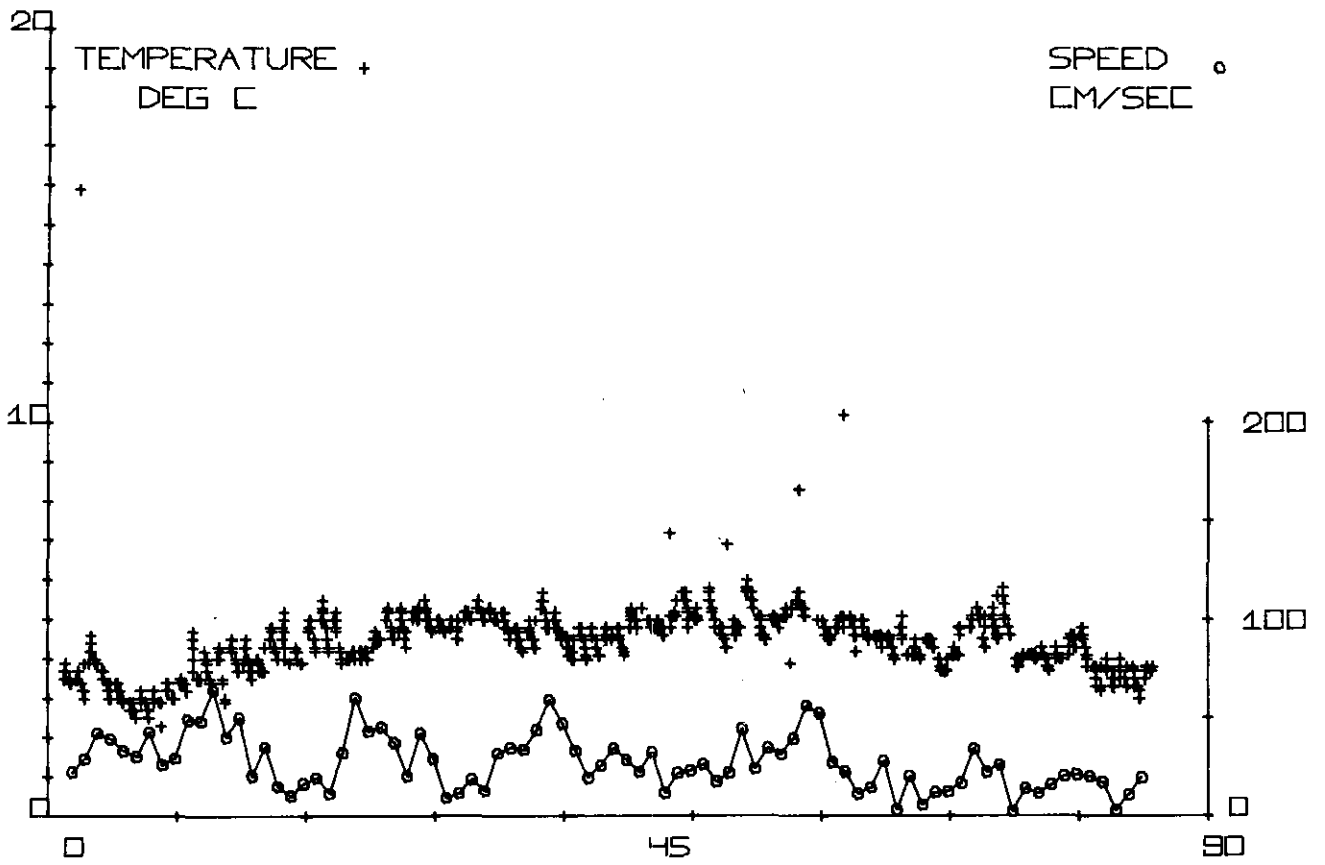
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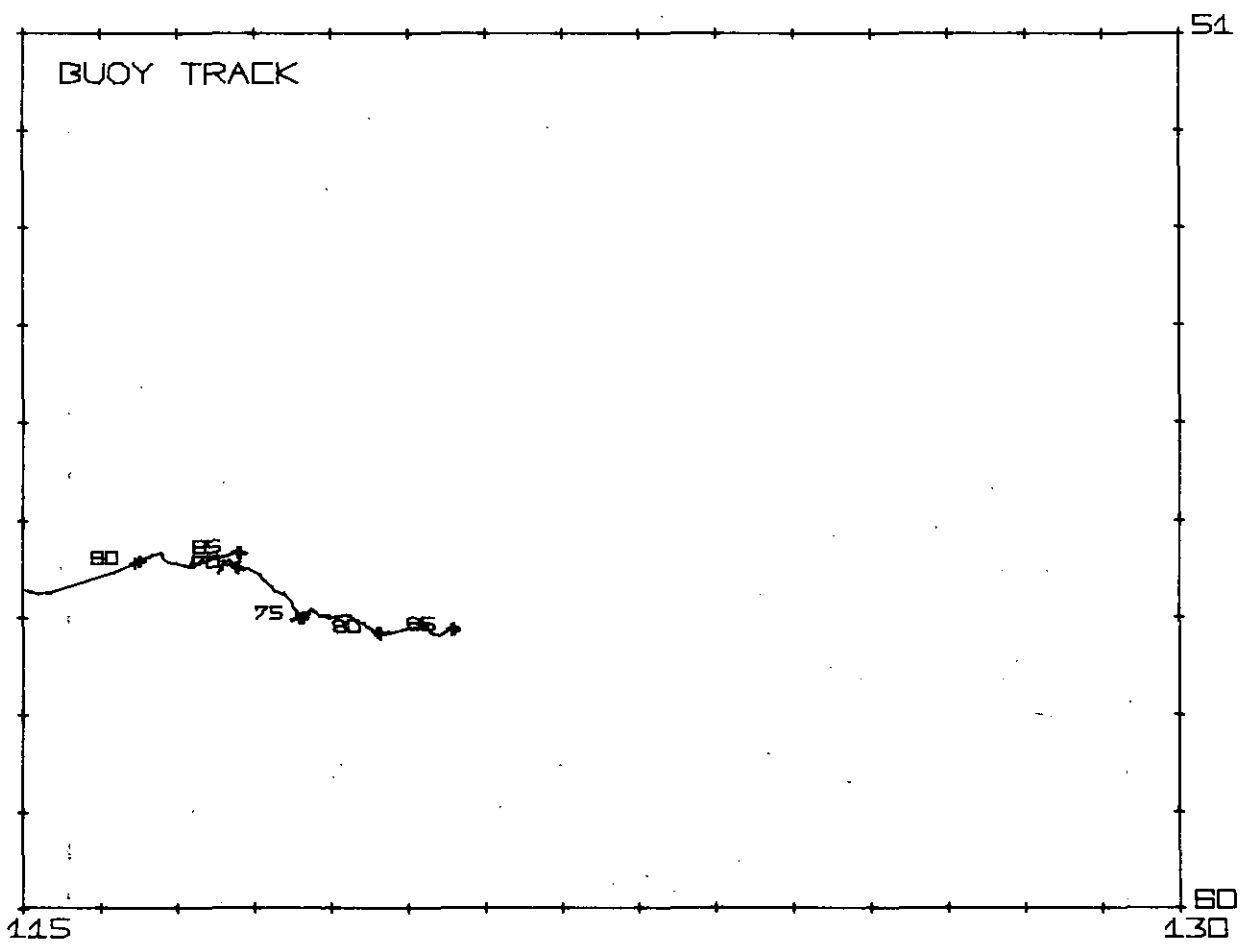


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DAYS

0- 90 79

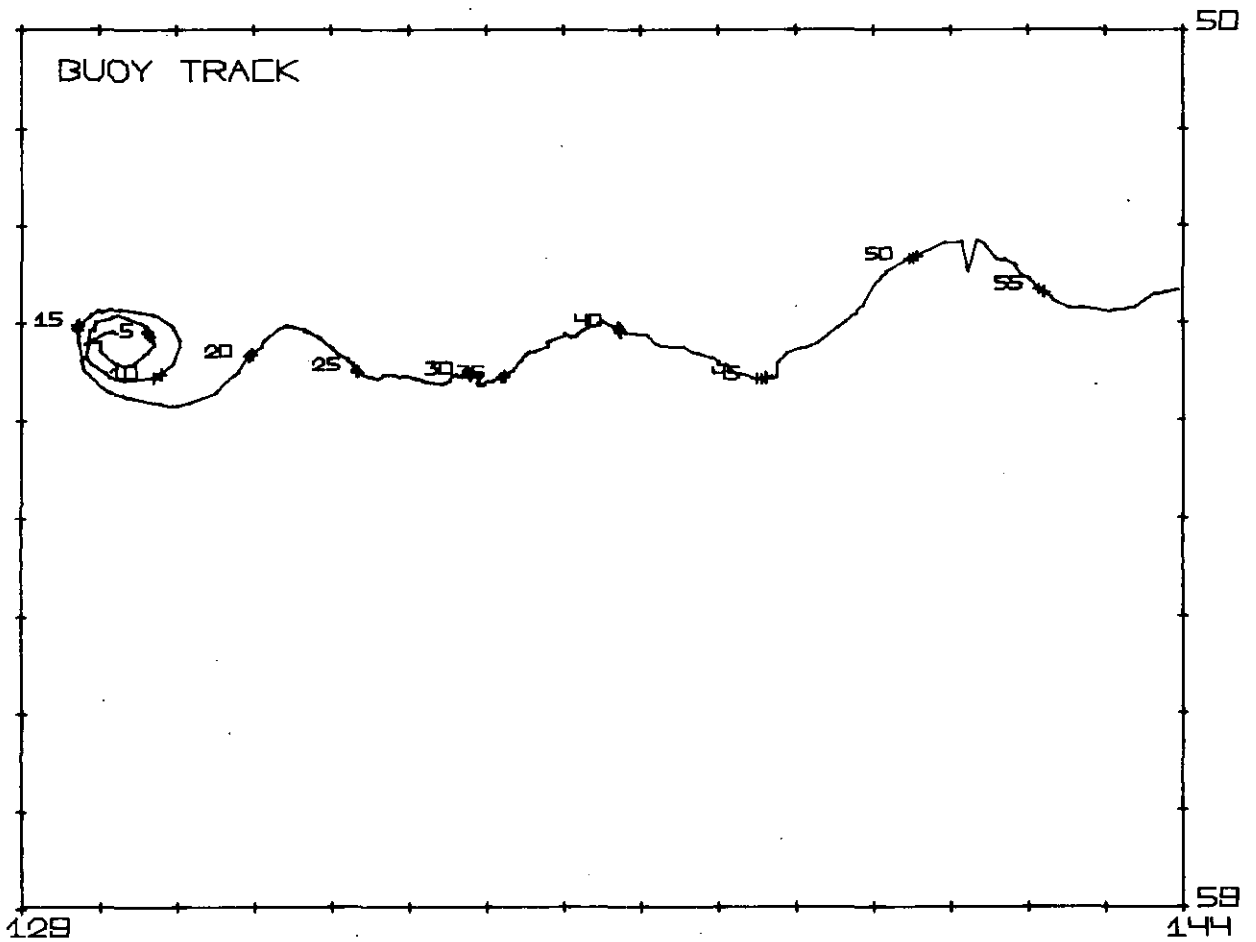
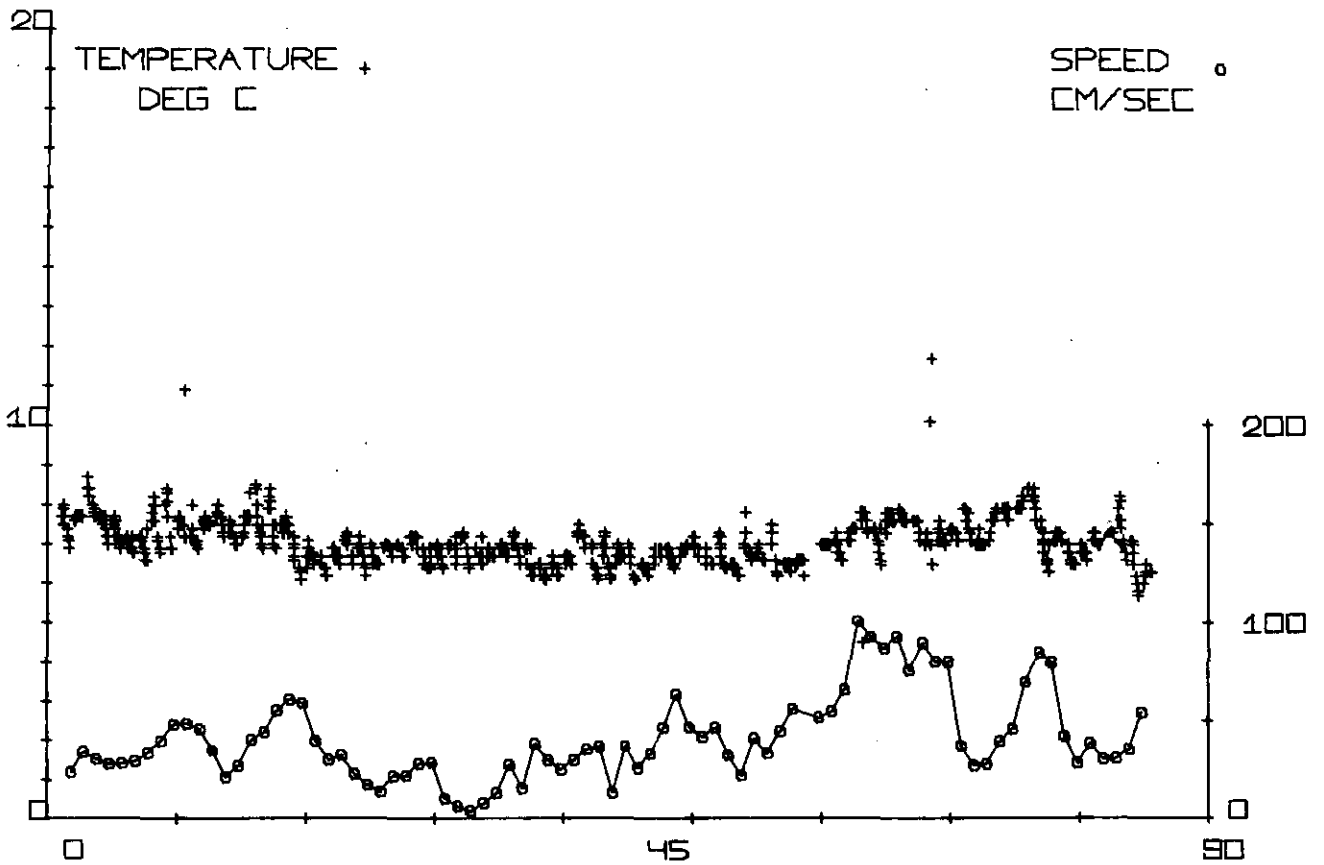


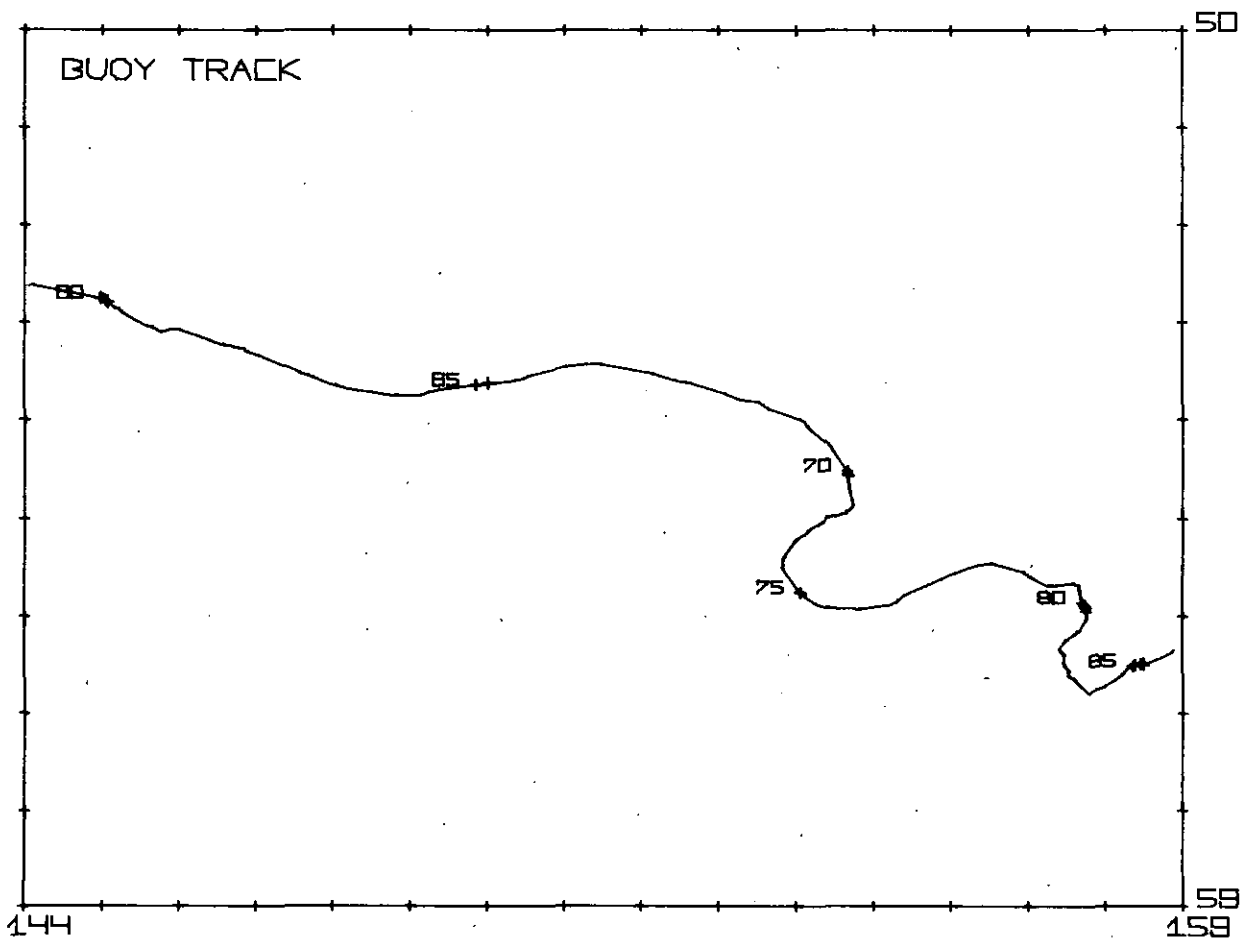


BUOY 1138

DAYS

0- 90 79

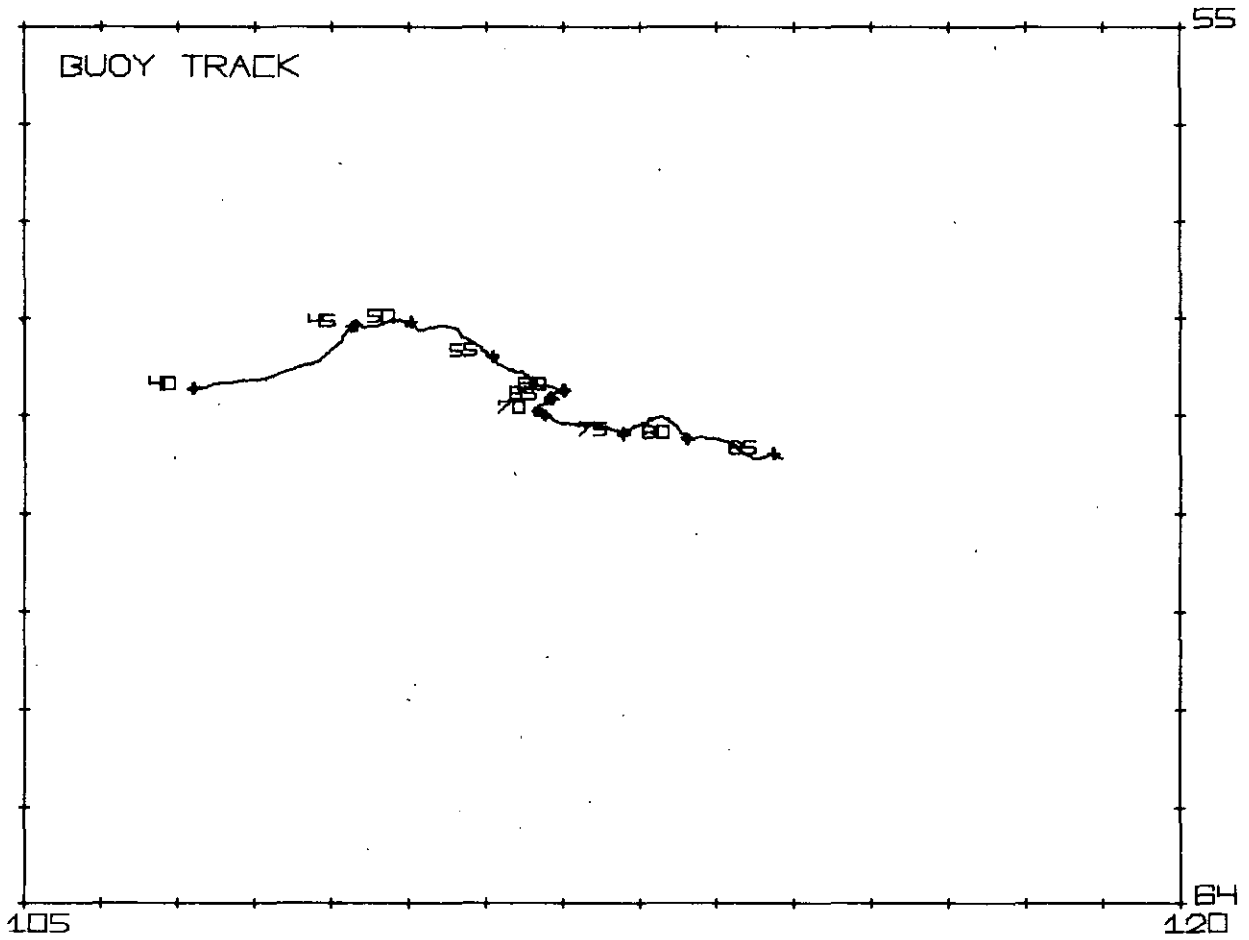
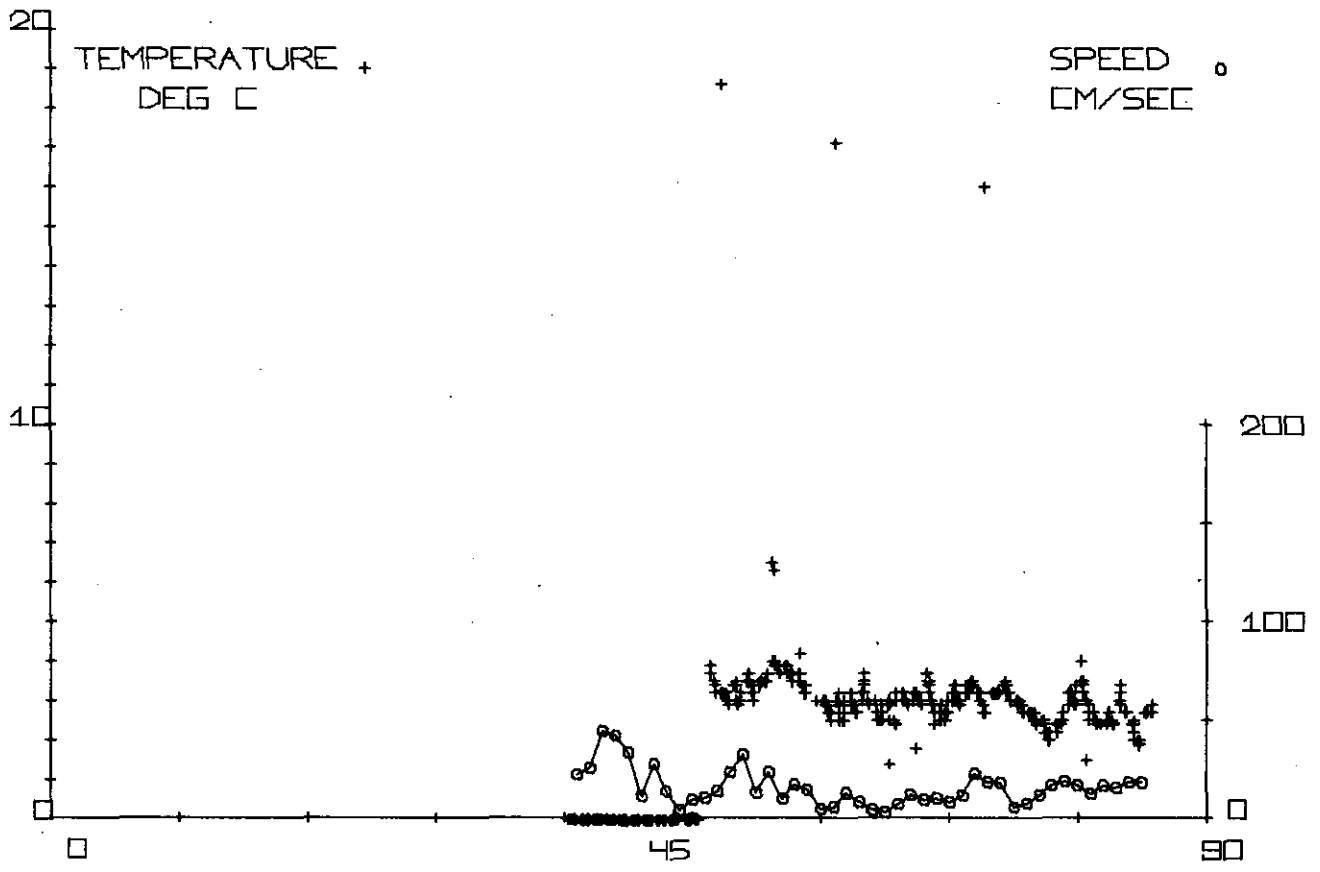




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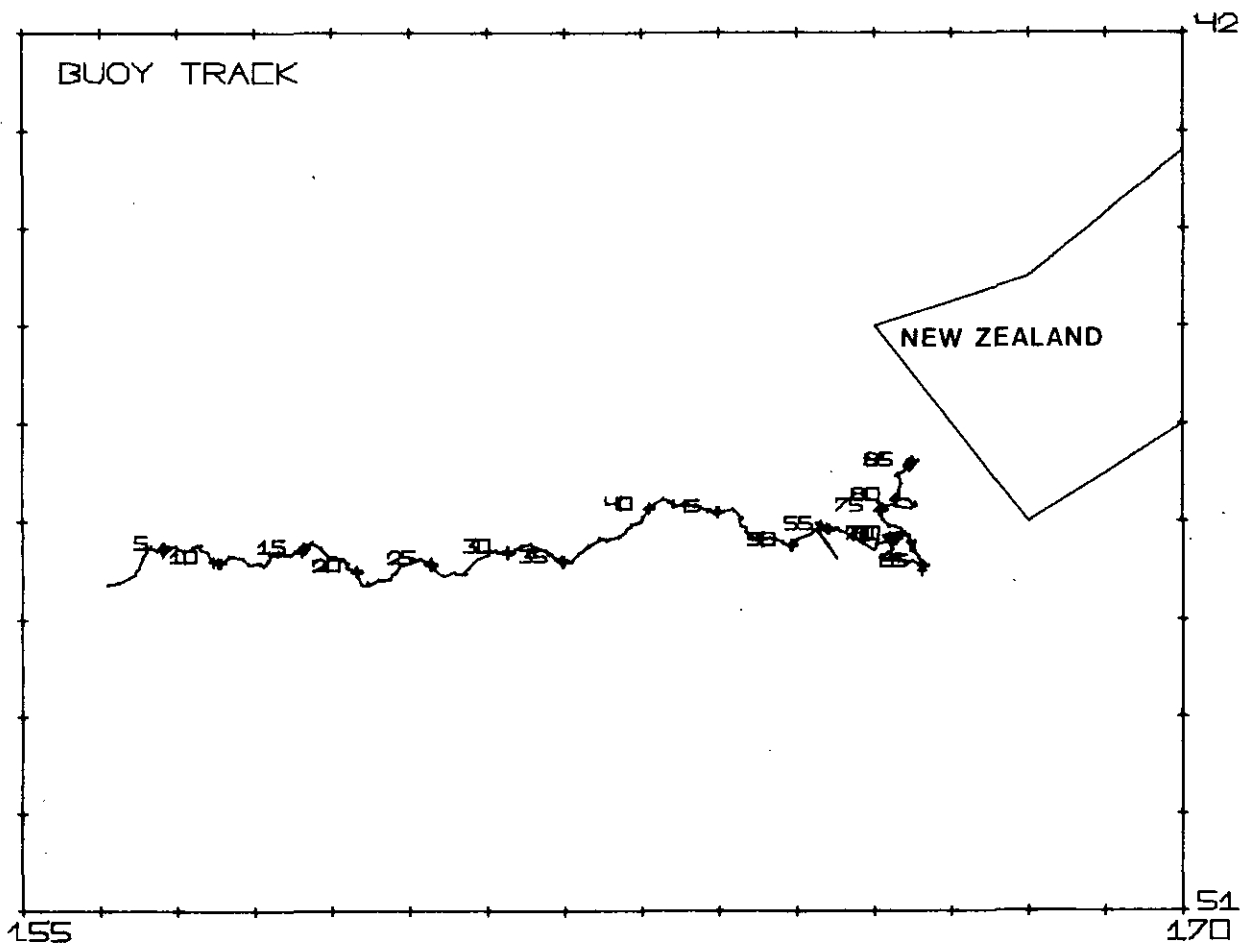
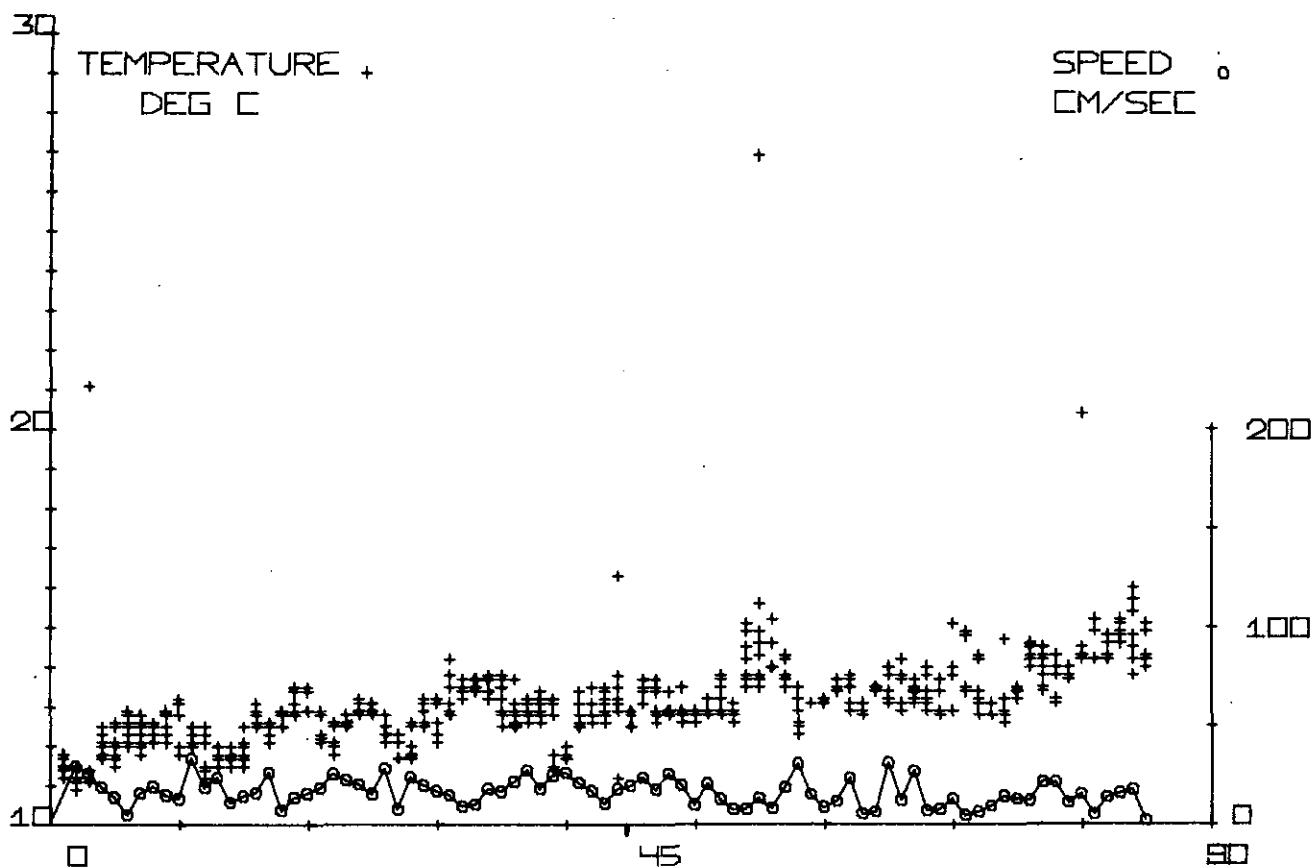
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0 - 90 79



(ii) Buoys tracked between Antarctic Convergence
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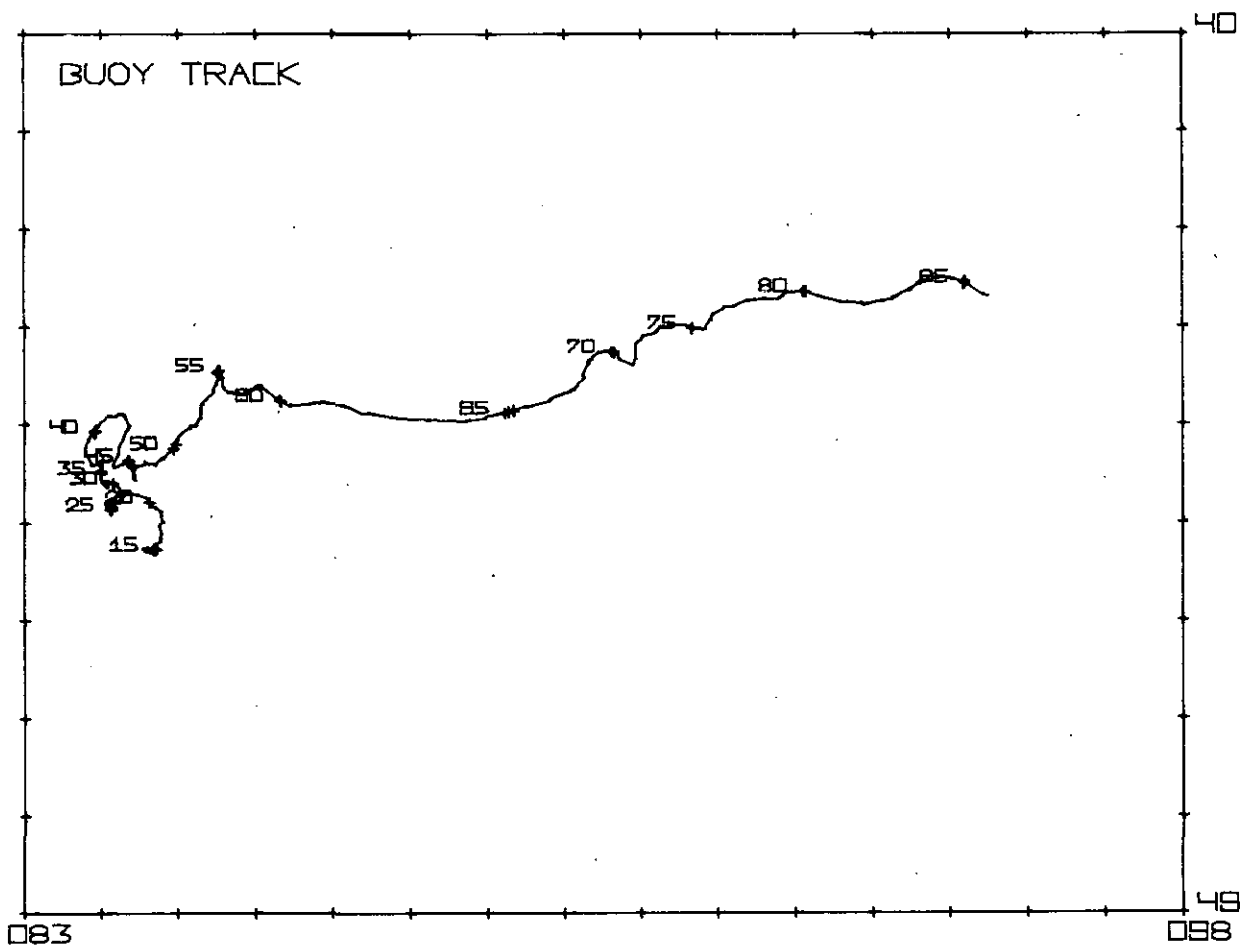
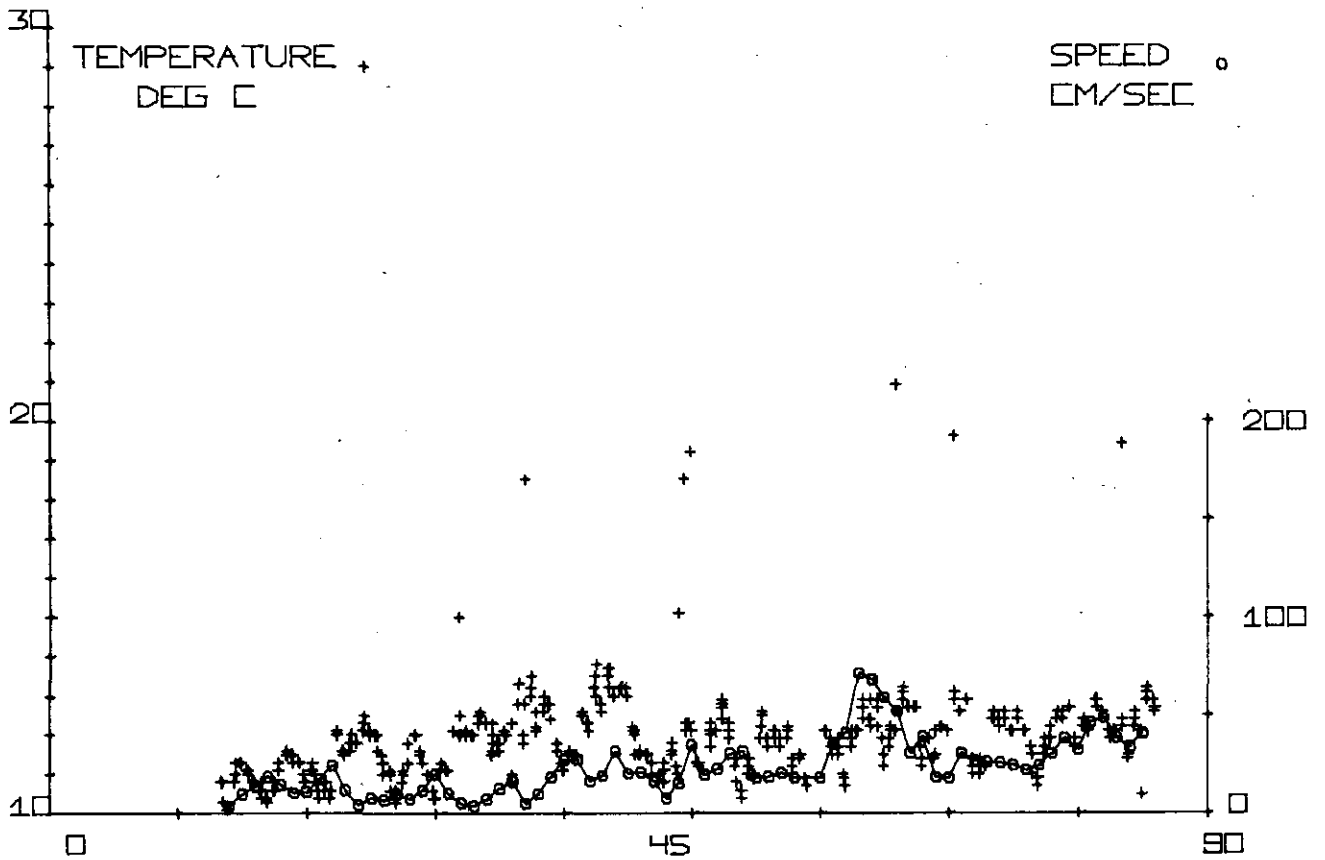
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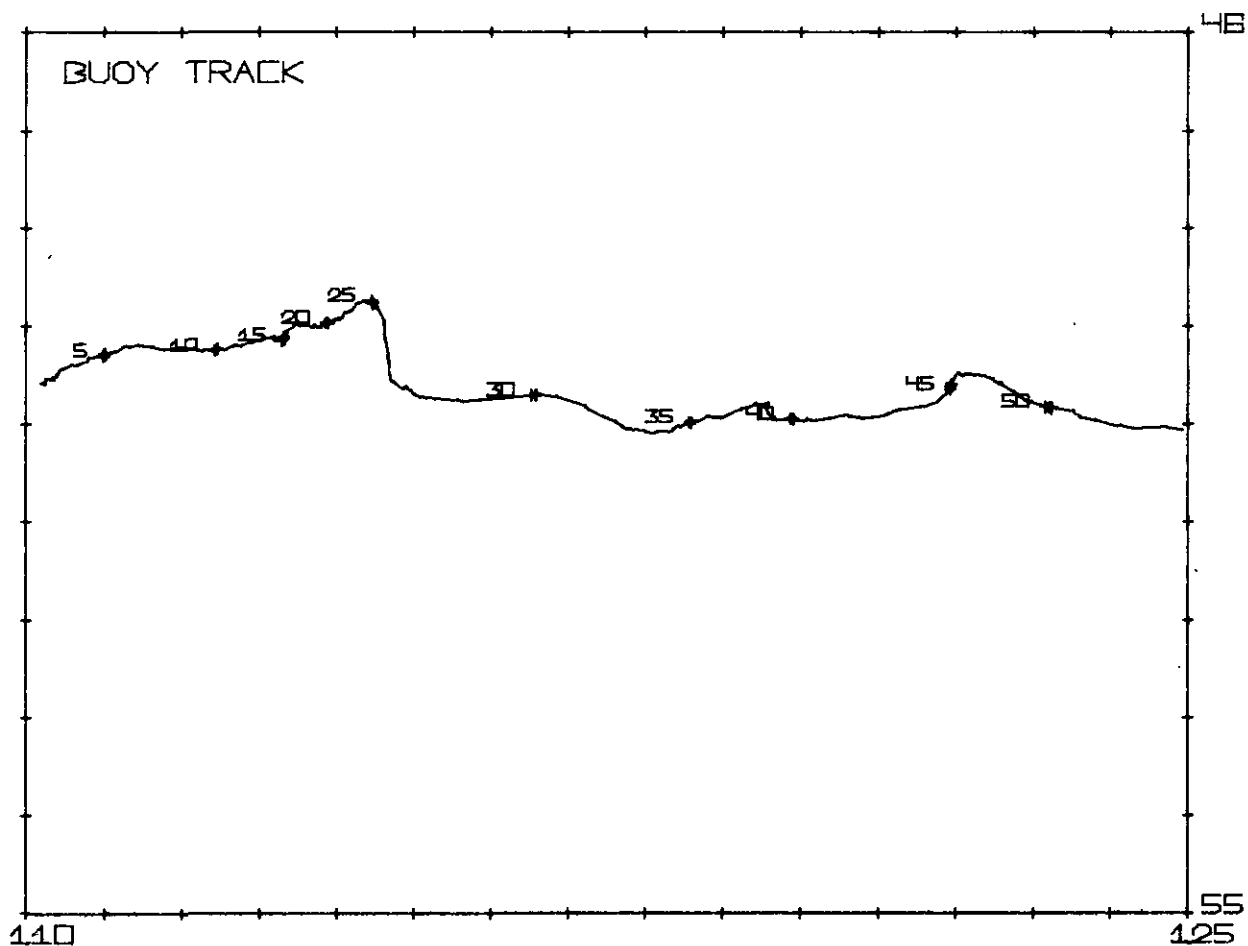
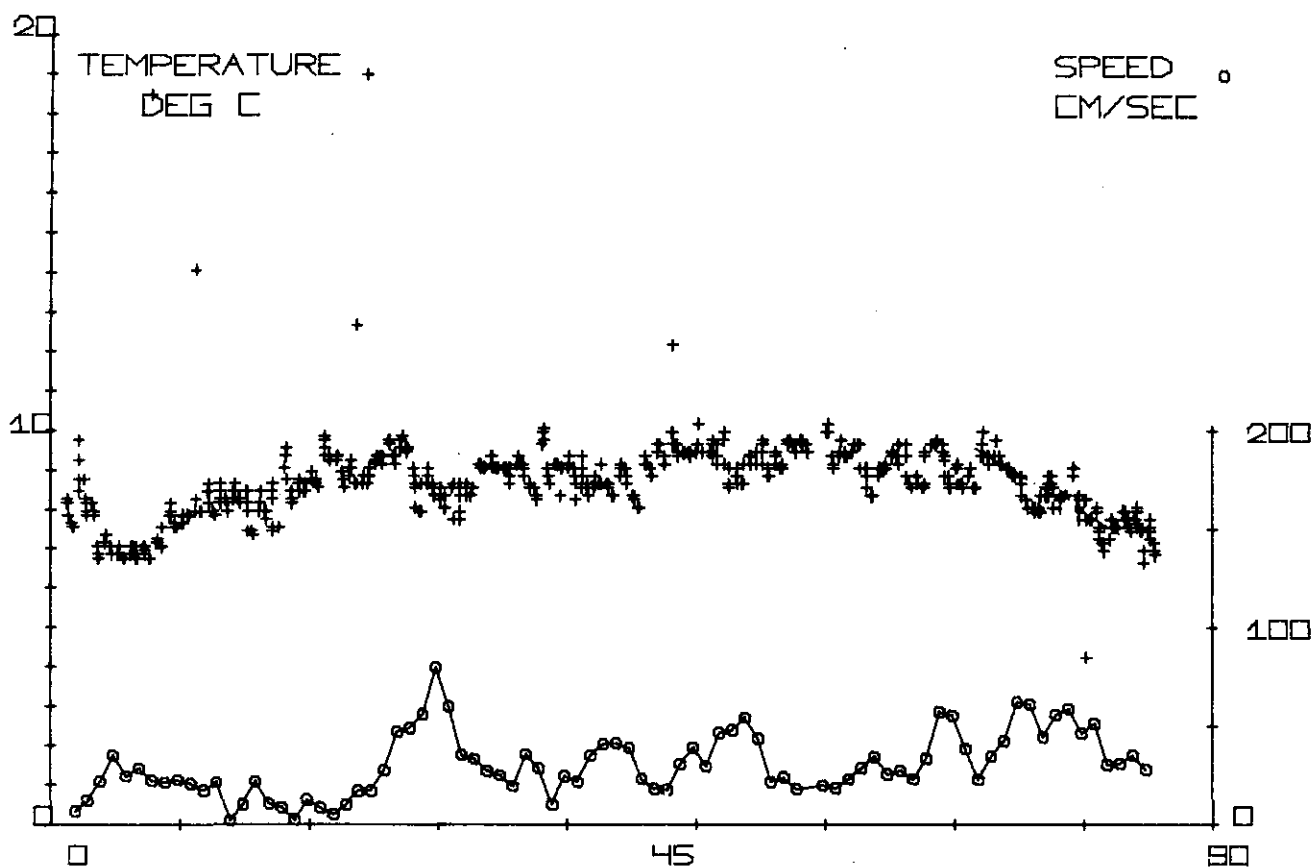
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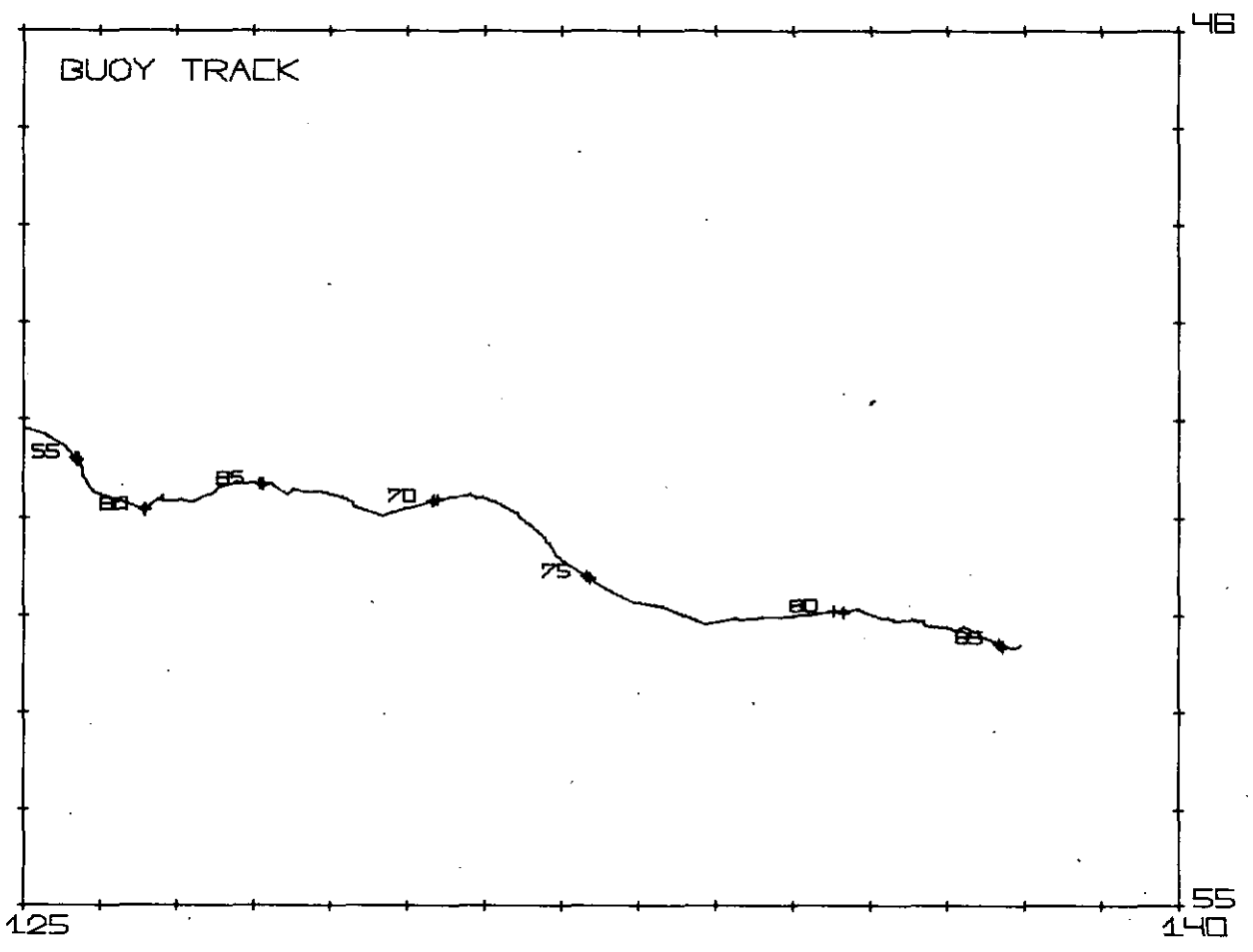
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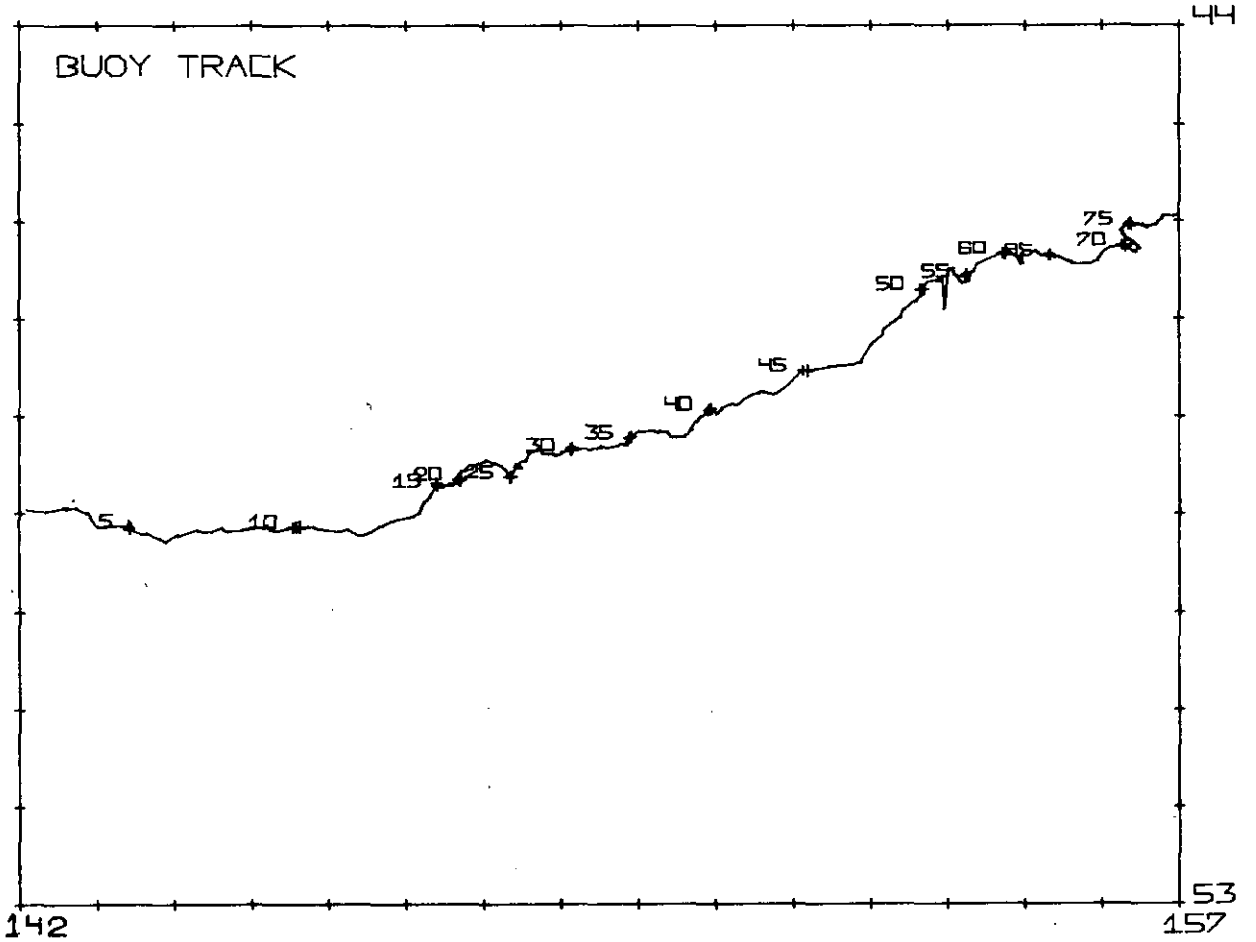
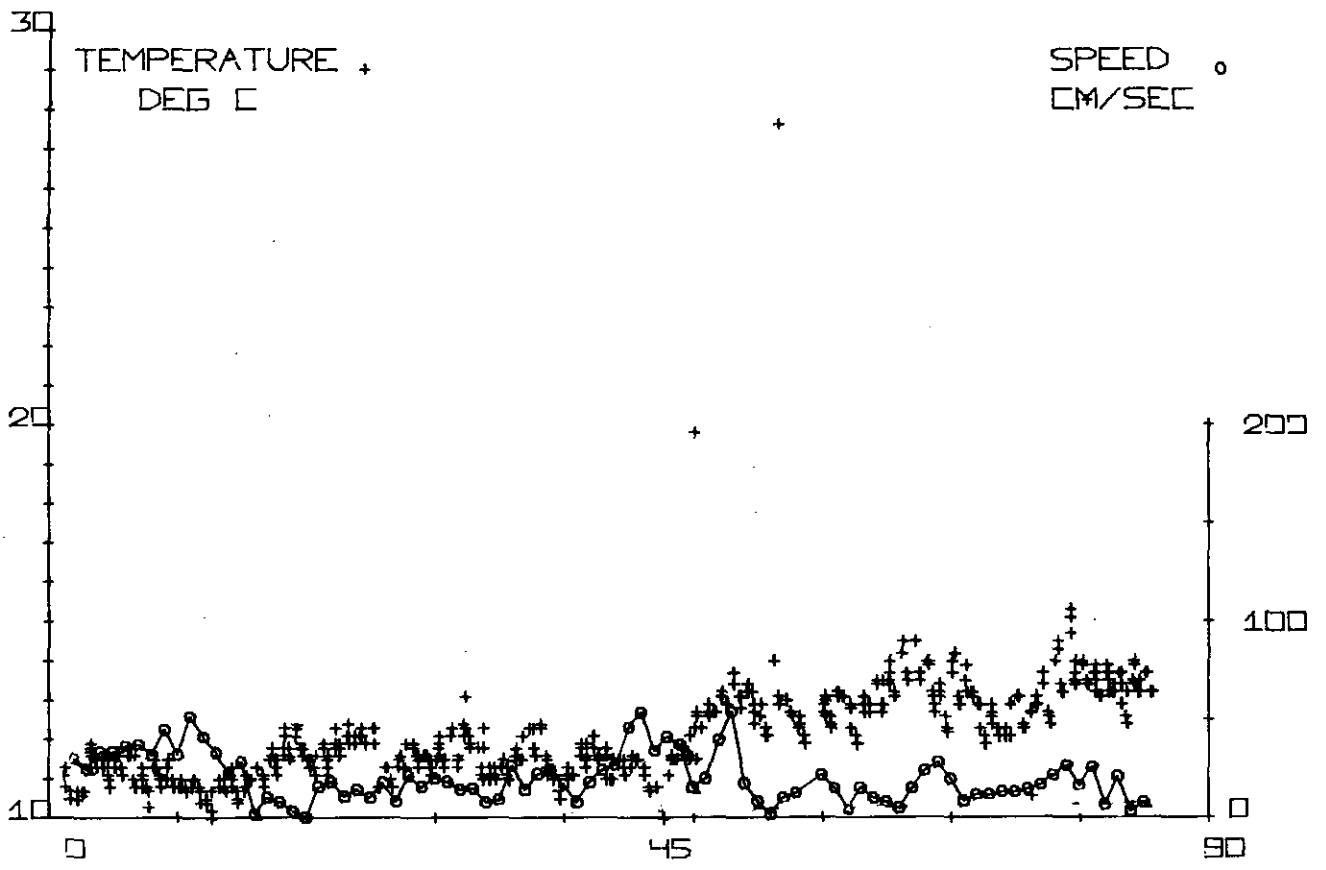
BUOY TRACK



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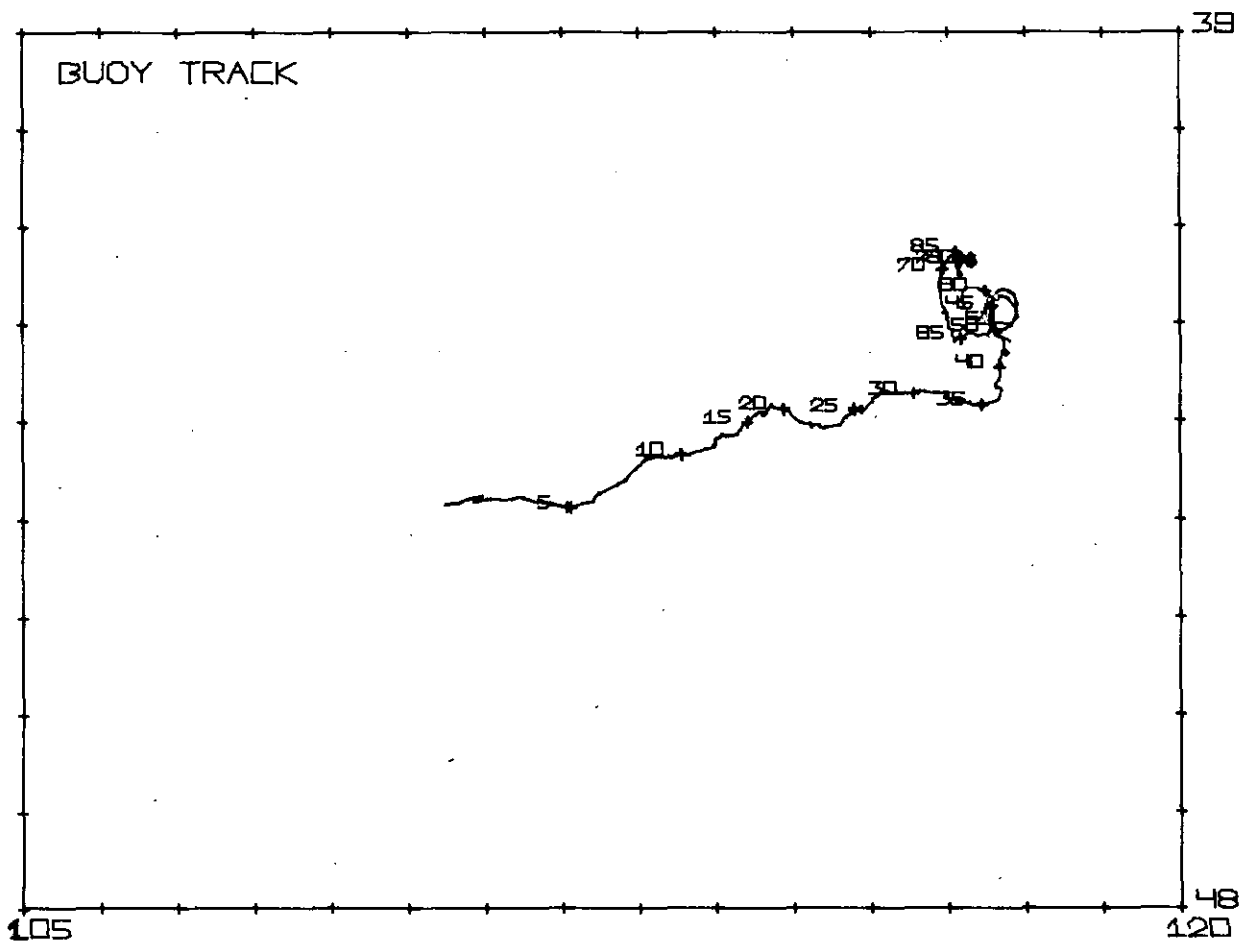
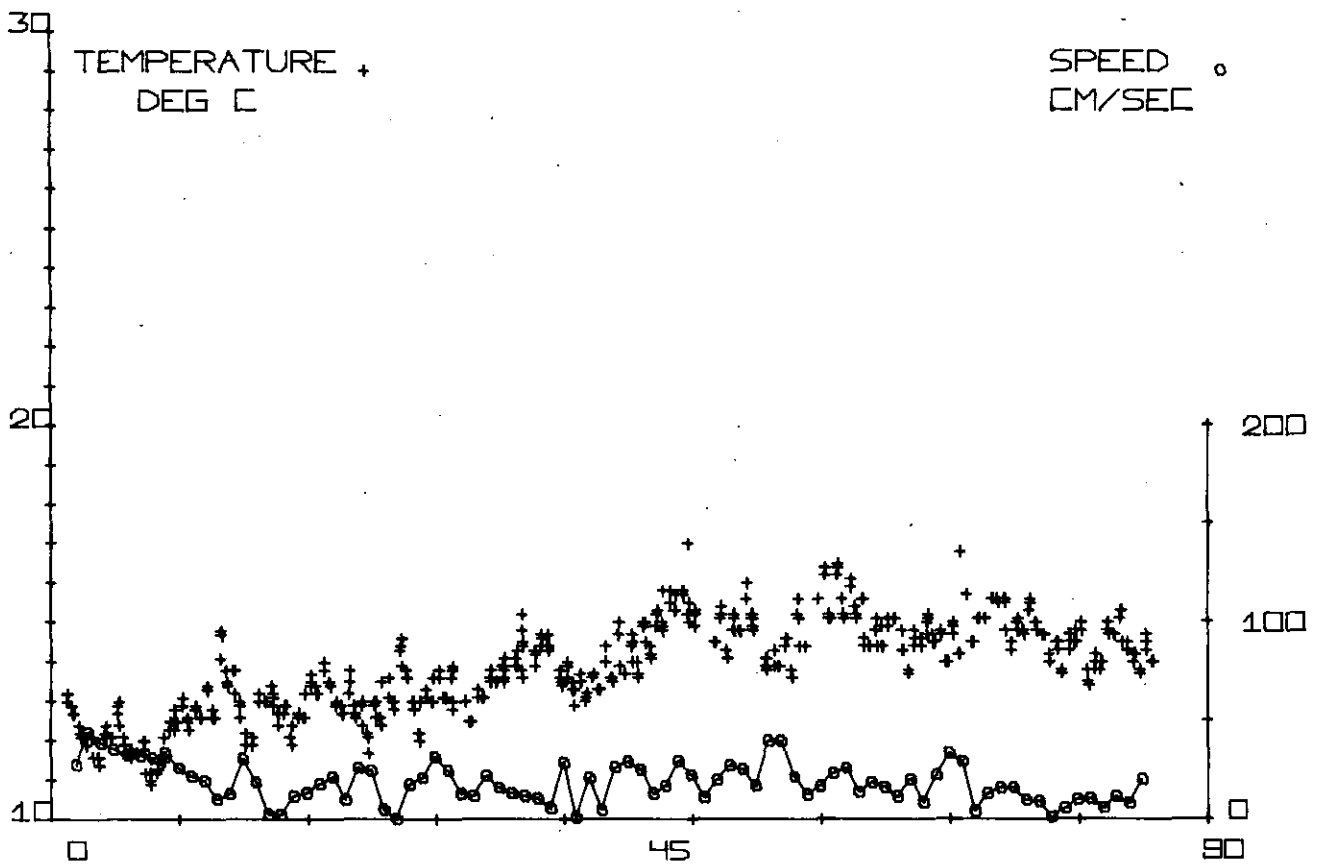
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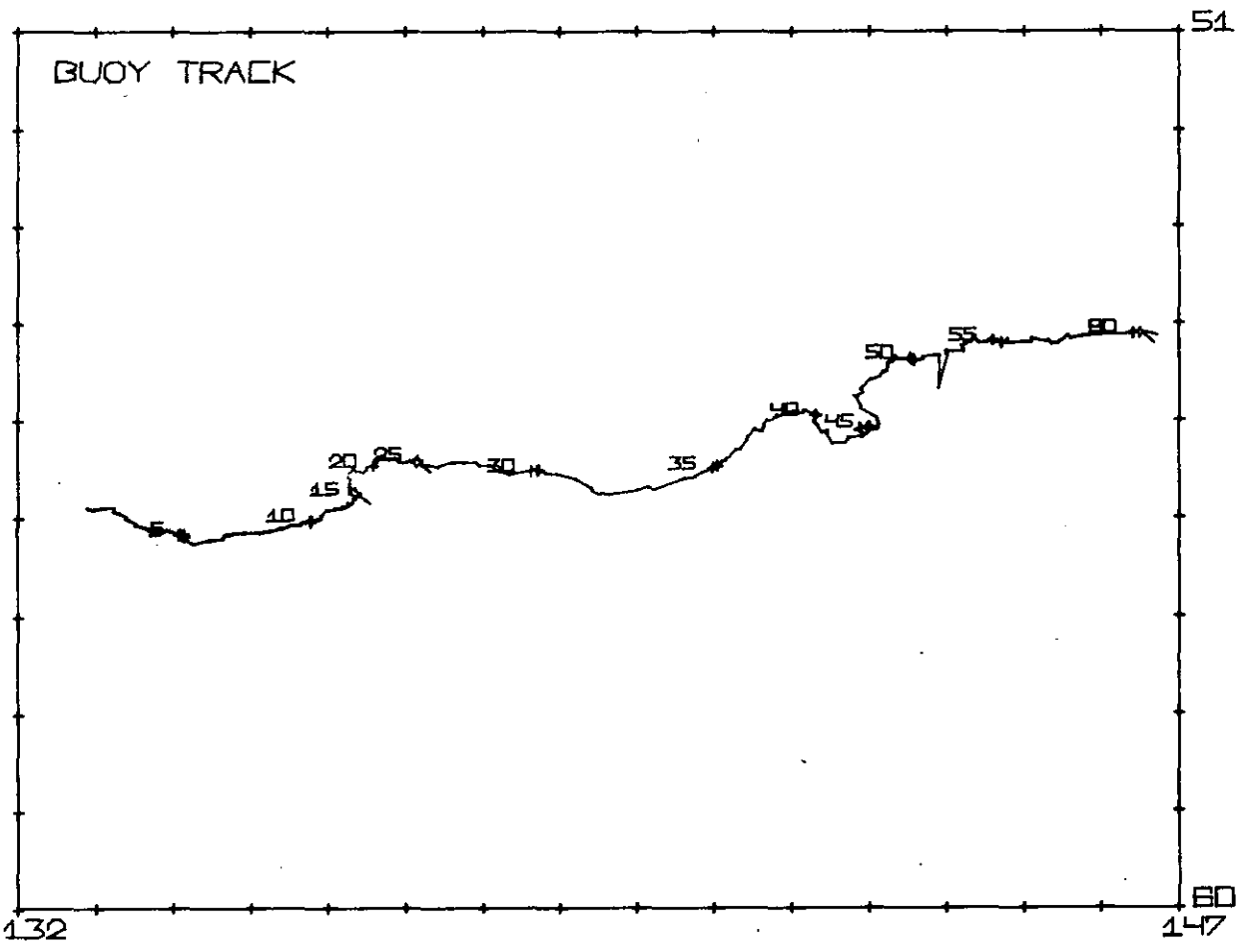
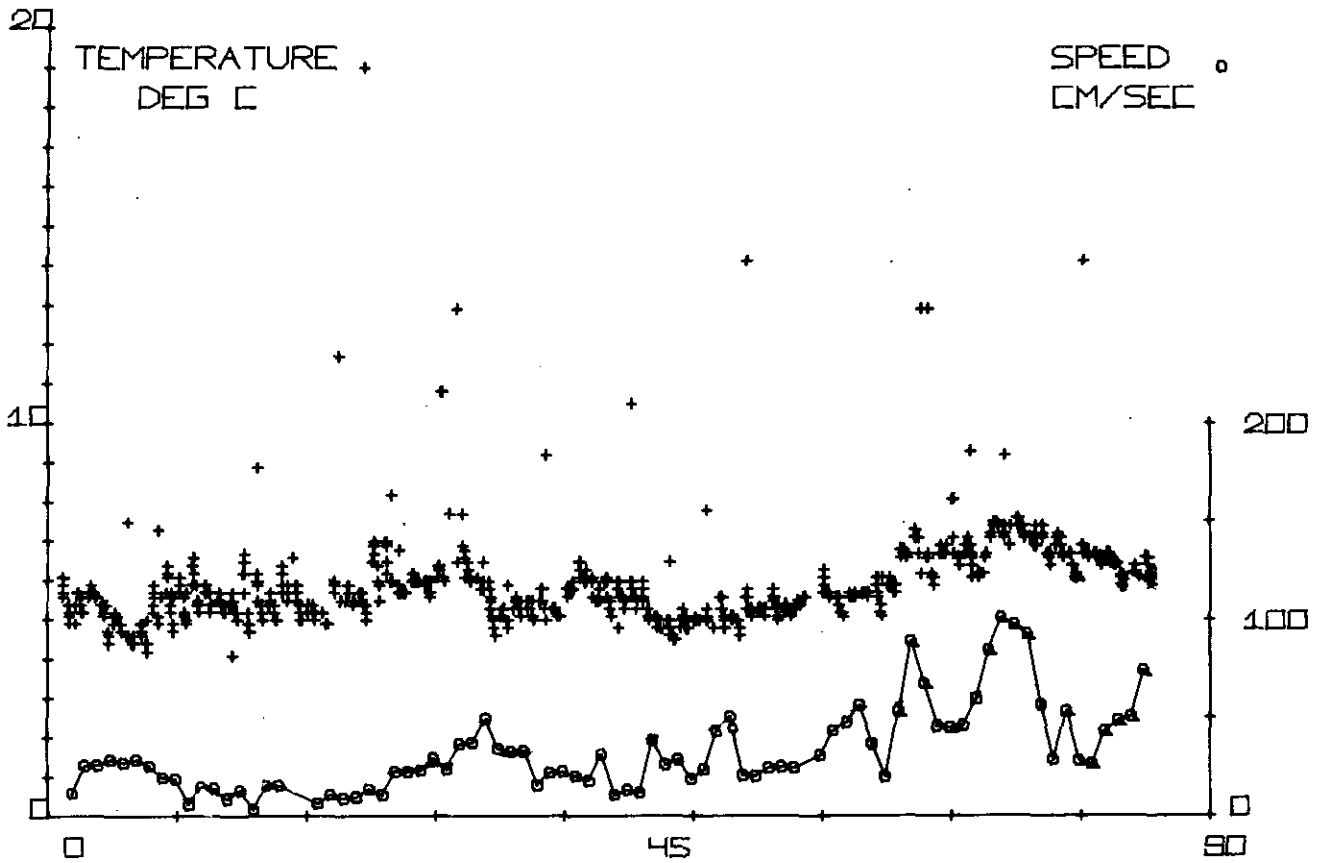
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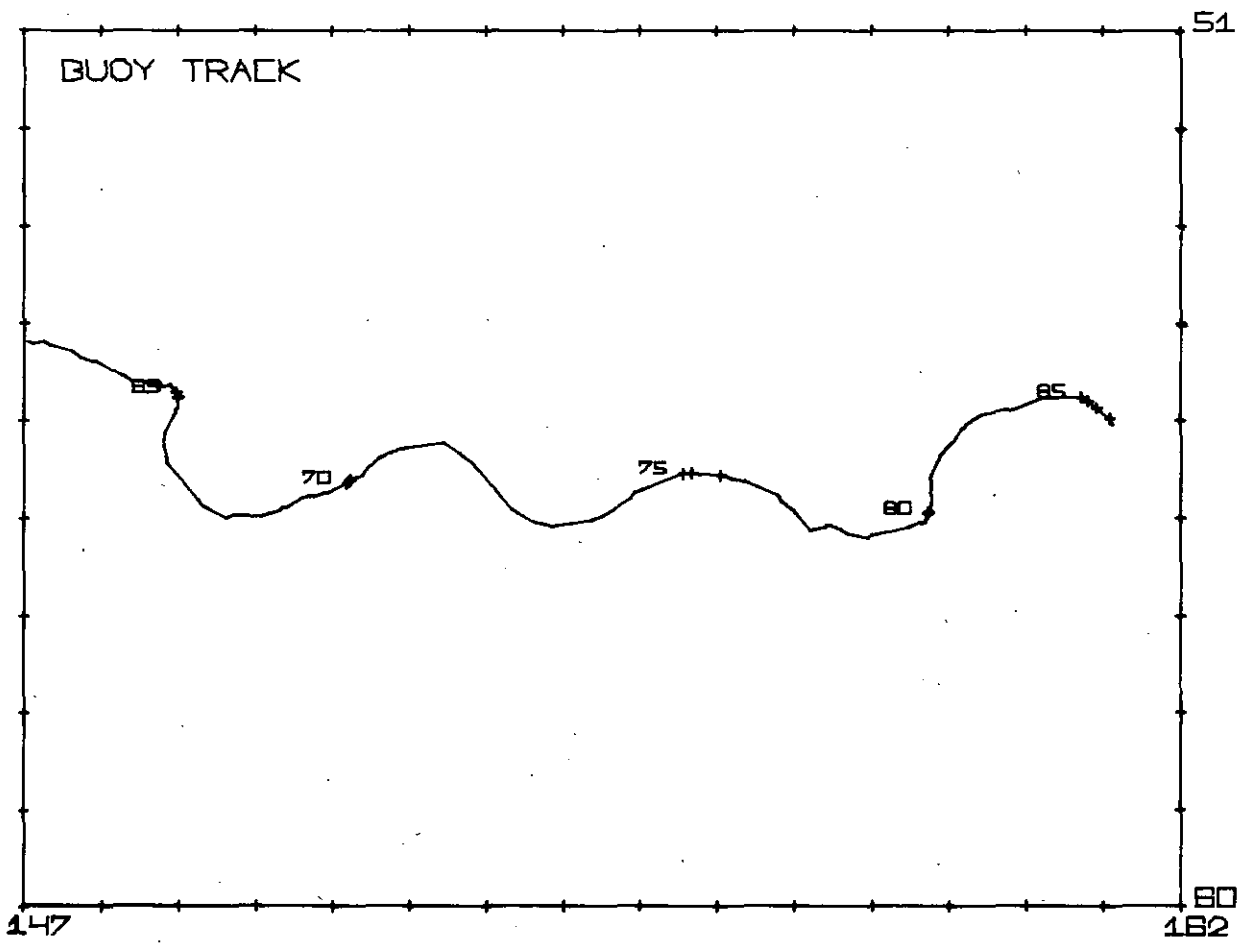
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DAYS

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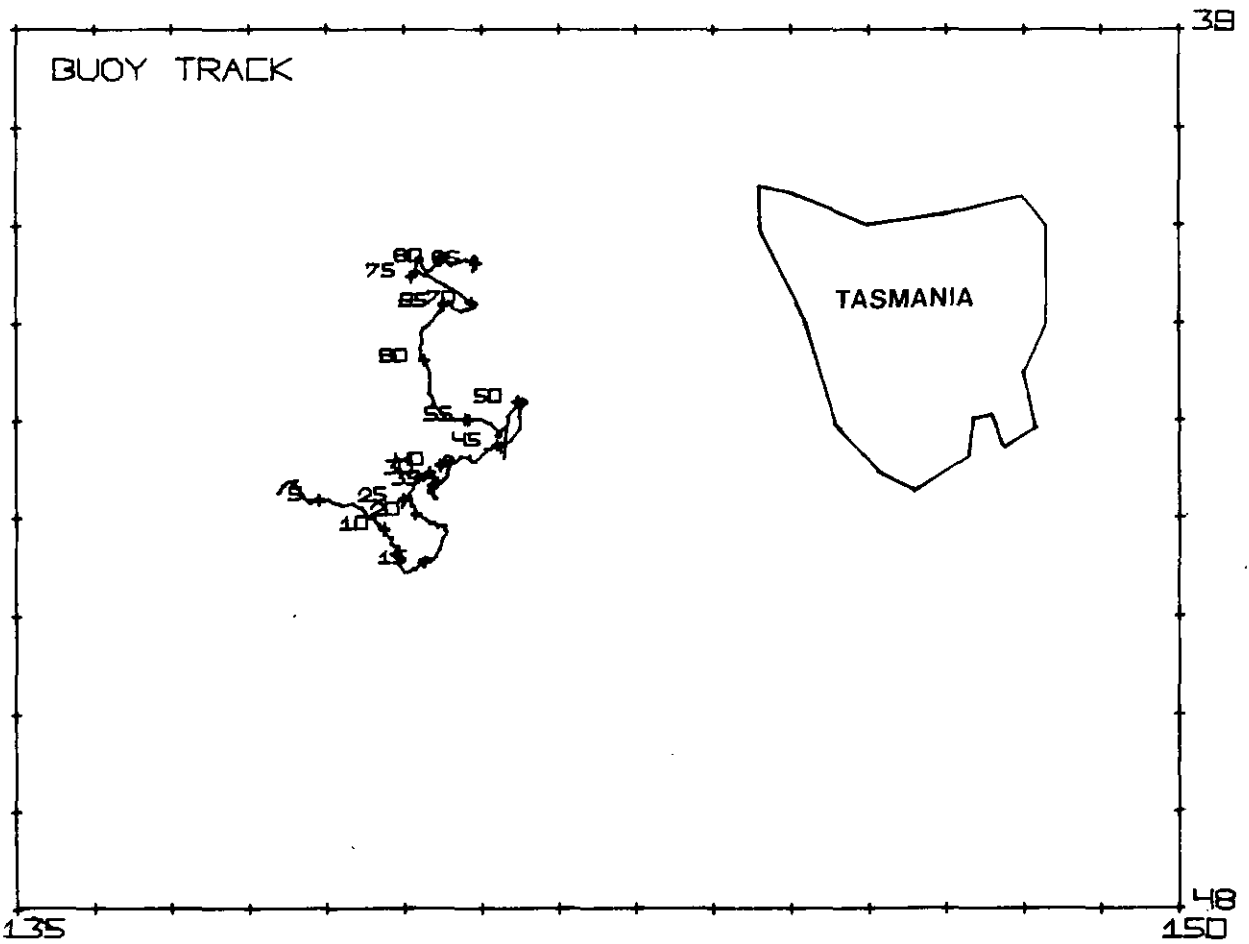
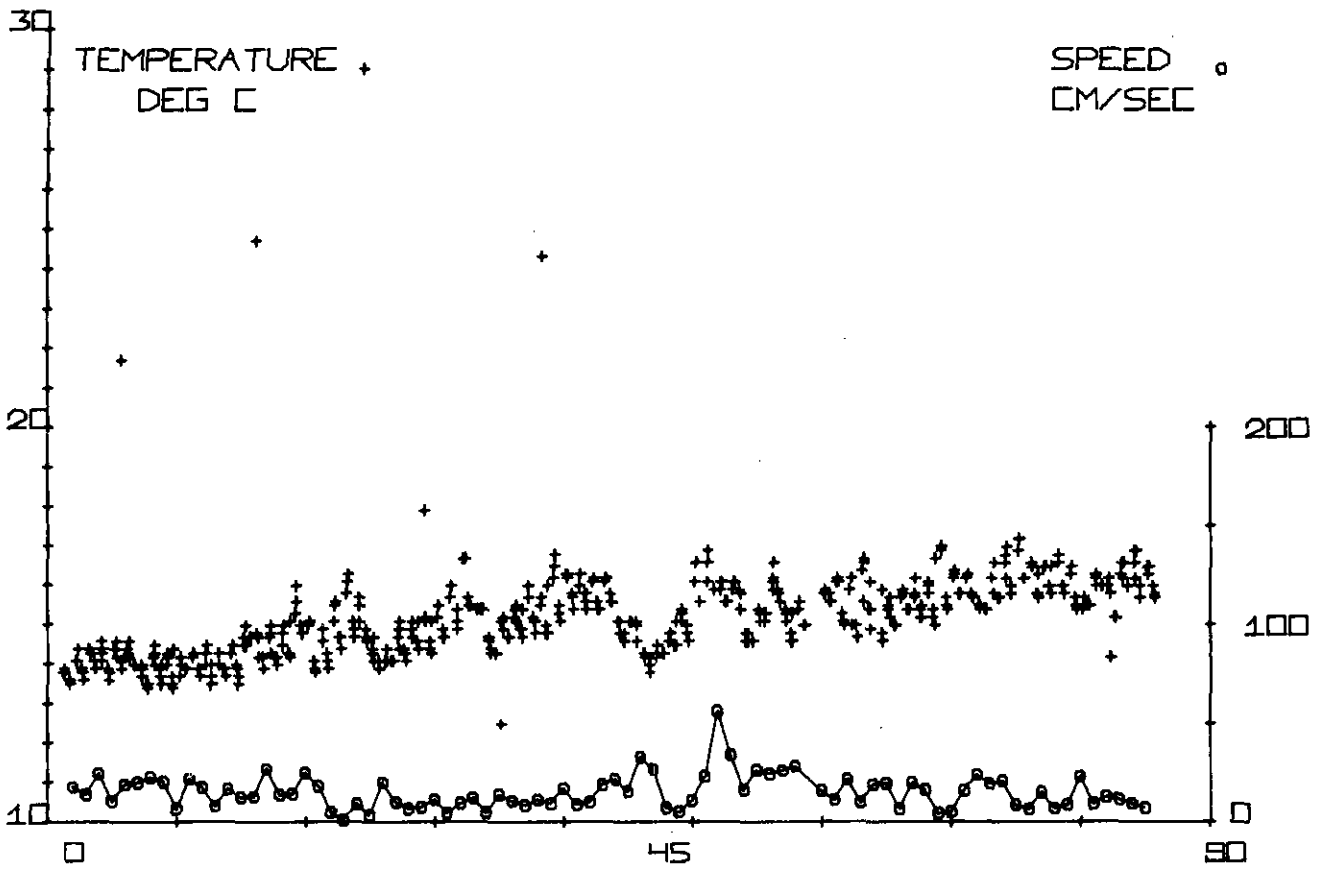
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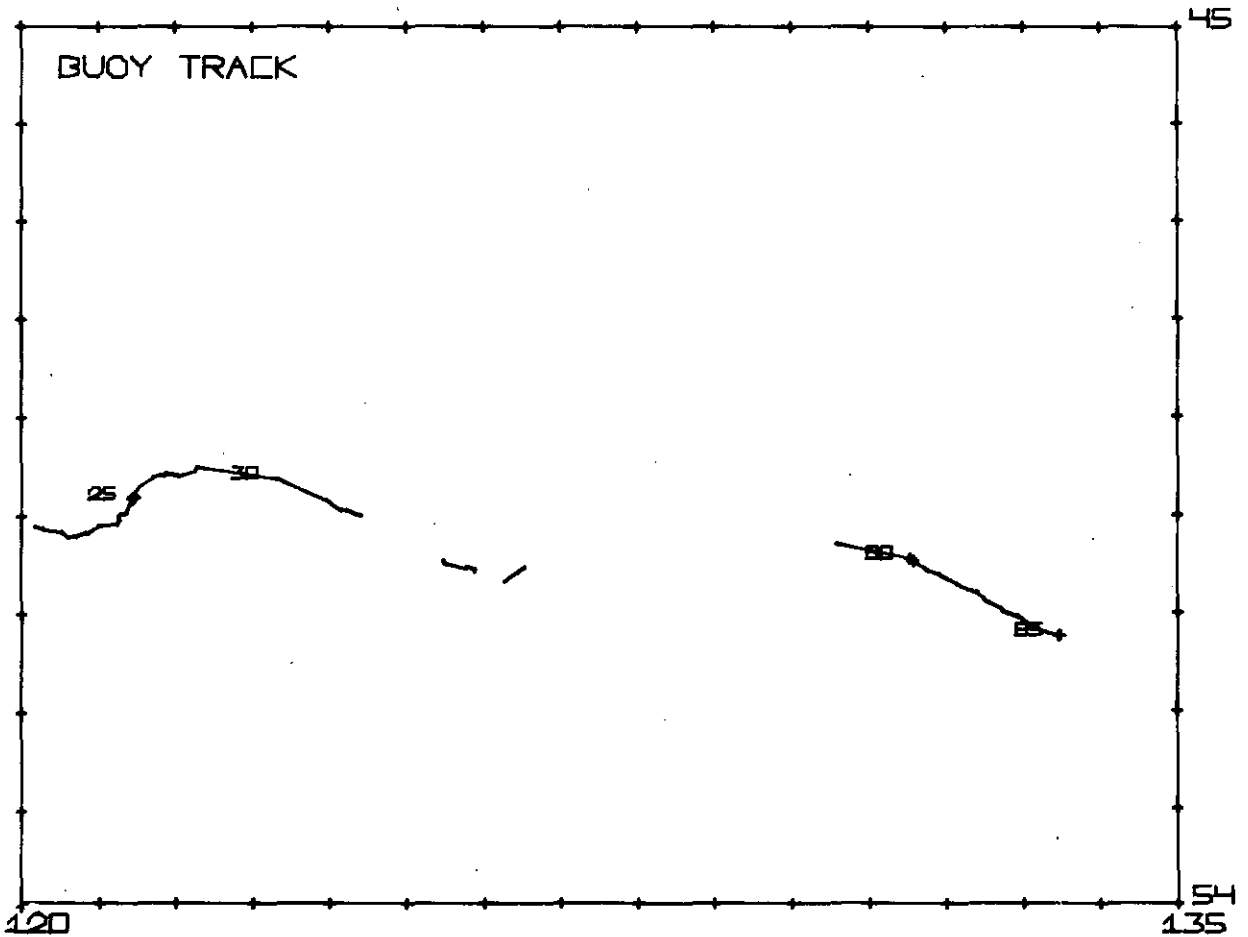
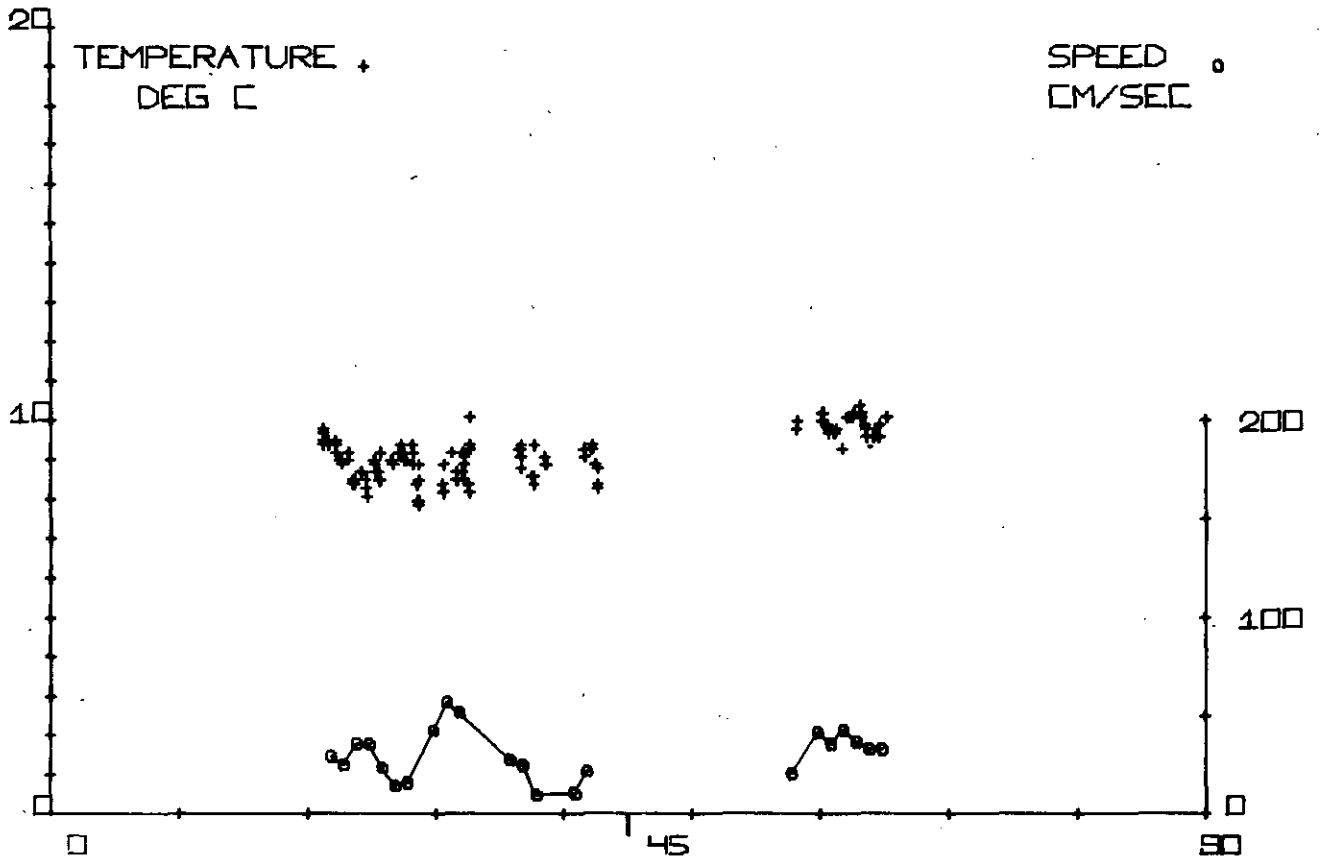
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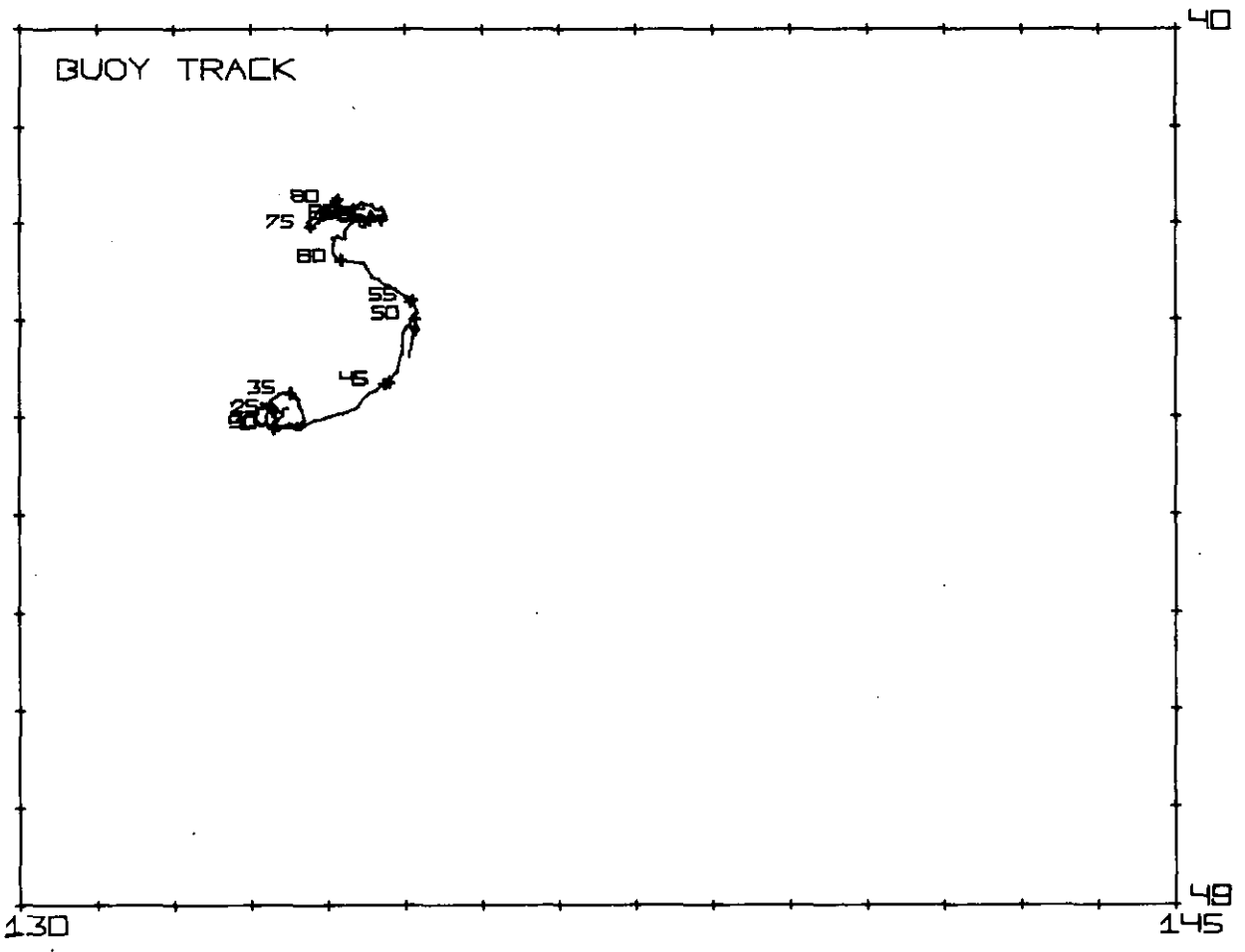
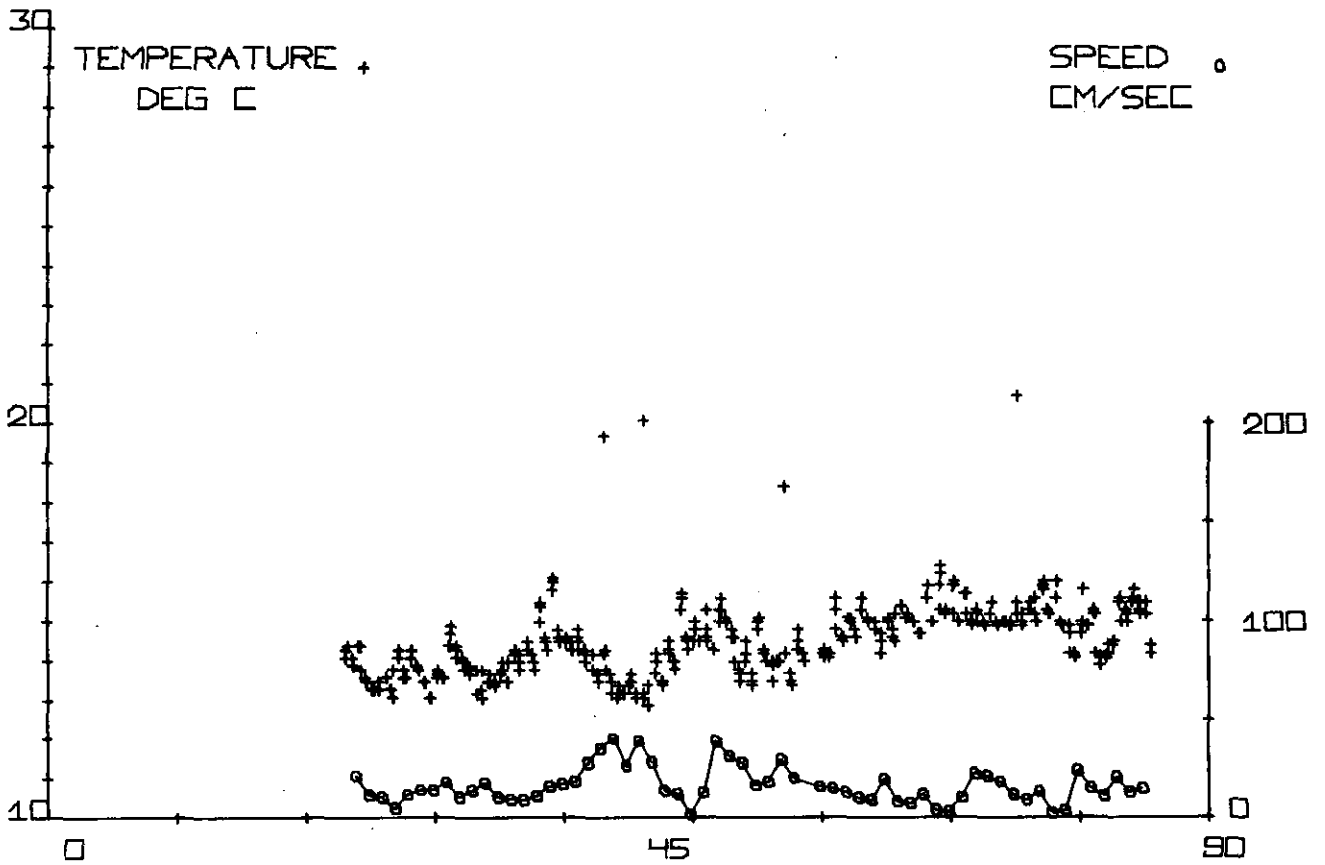
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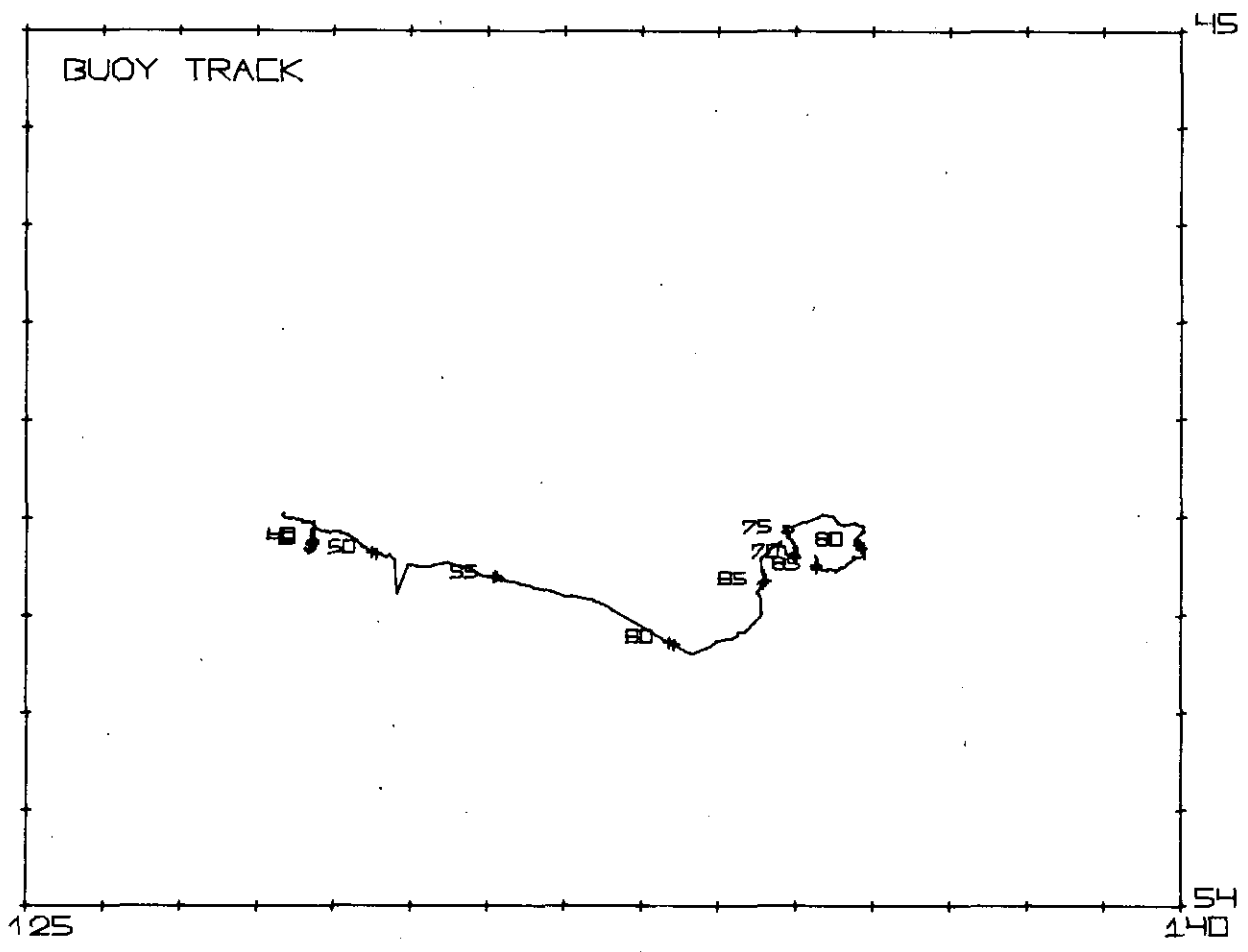
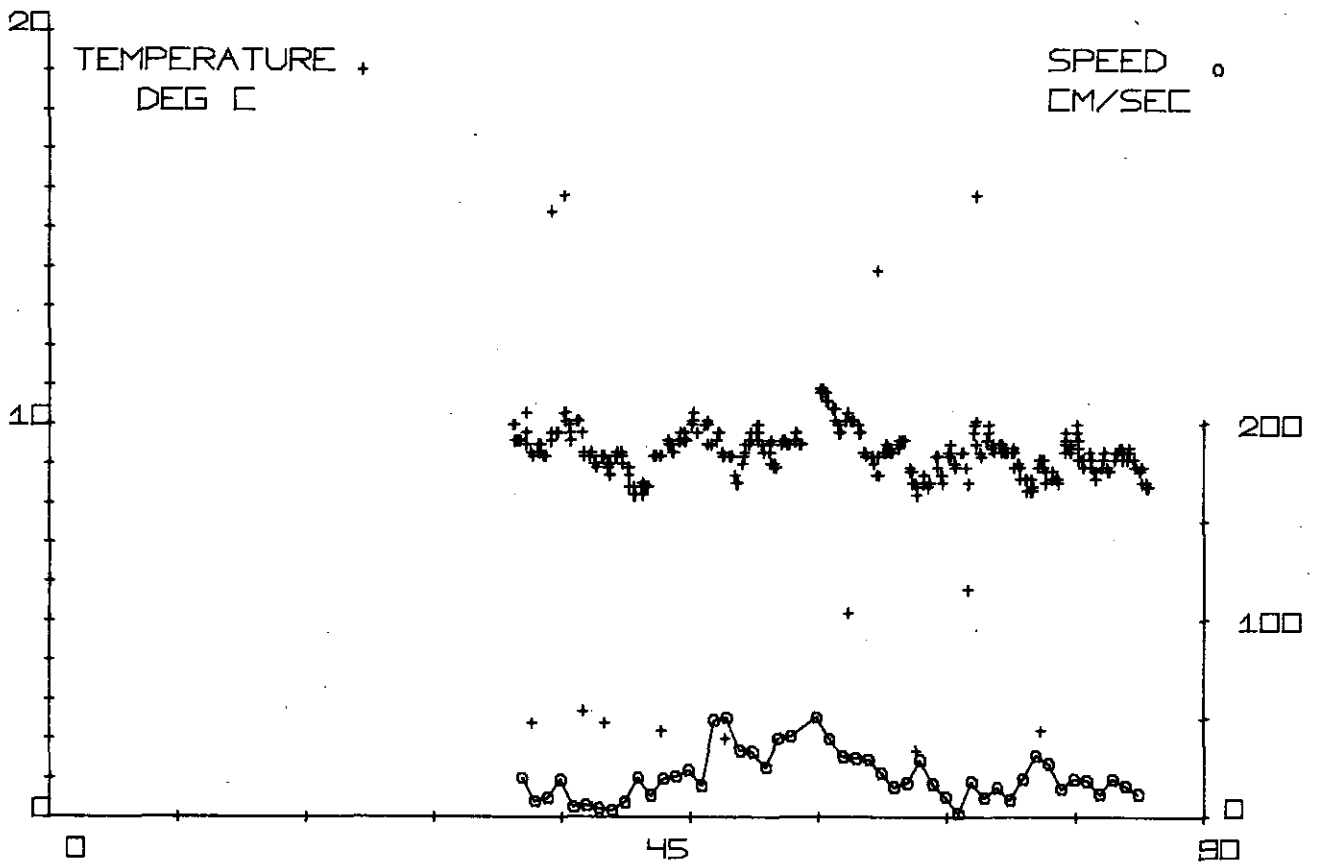
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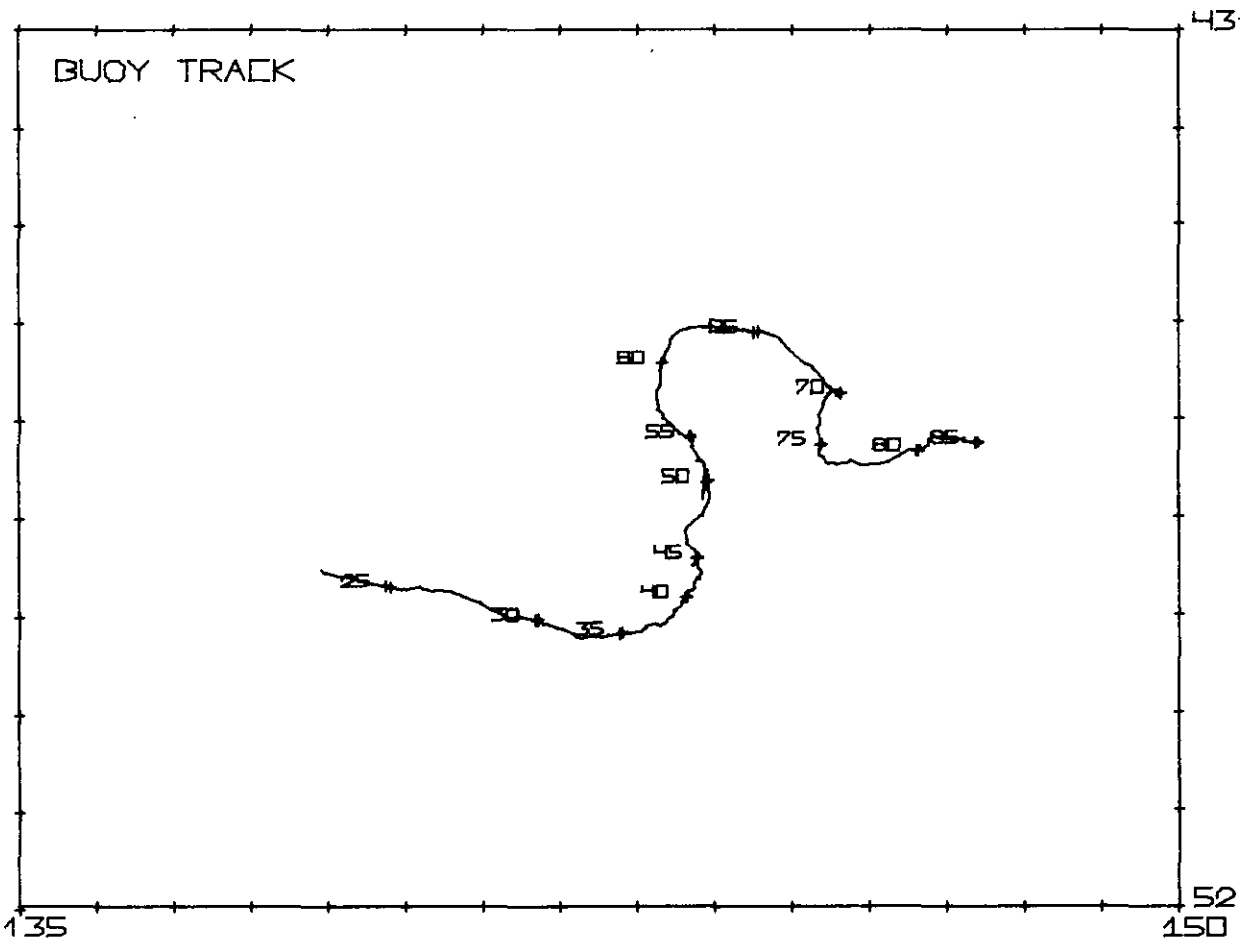
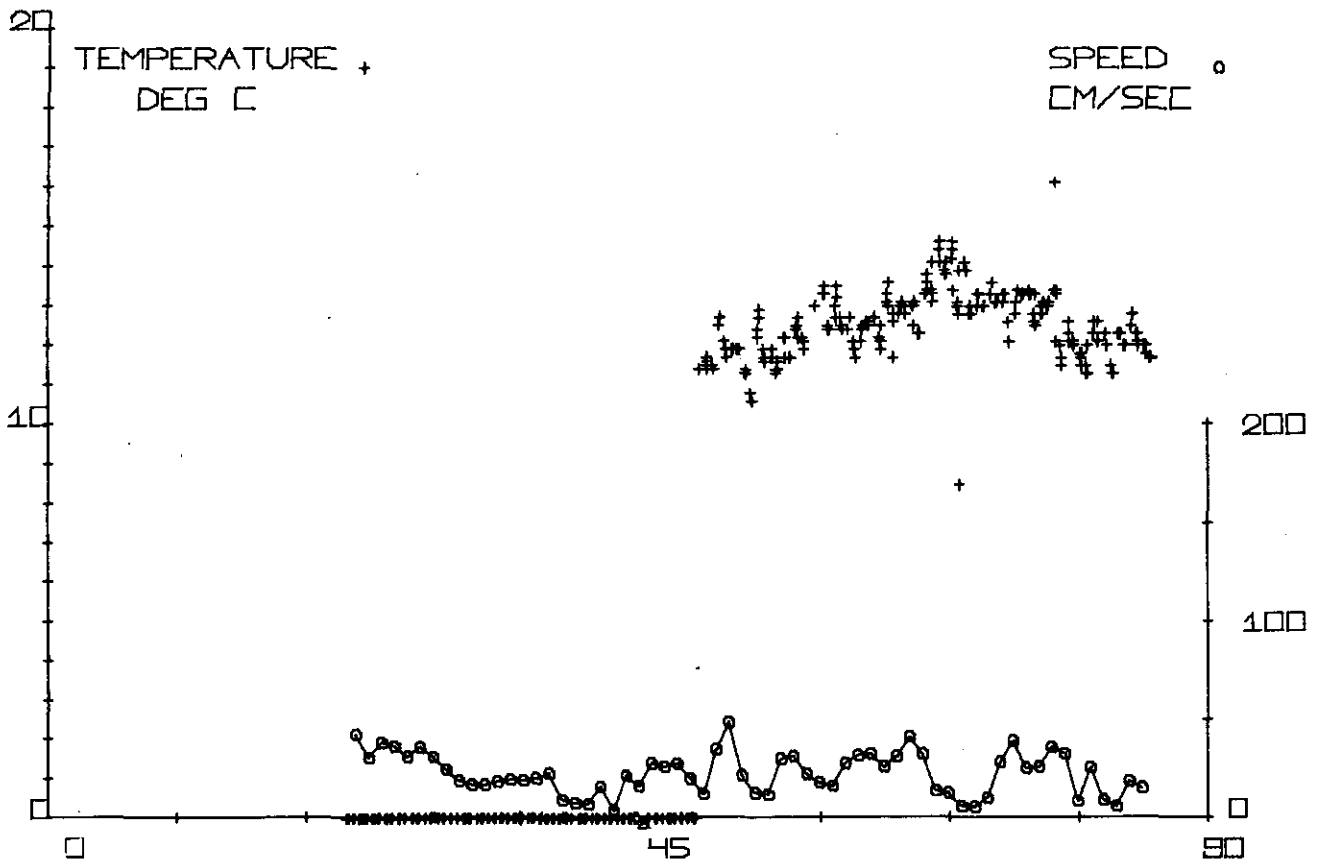
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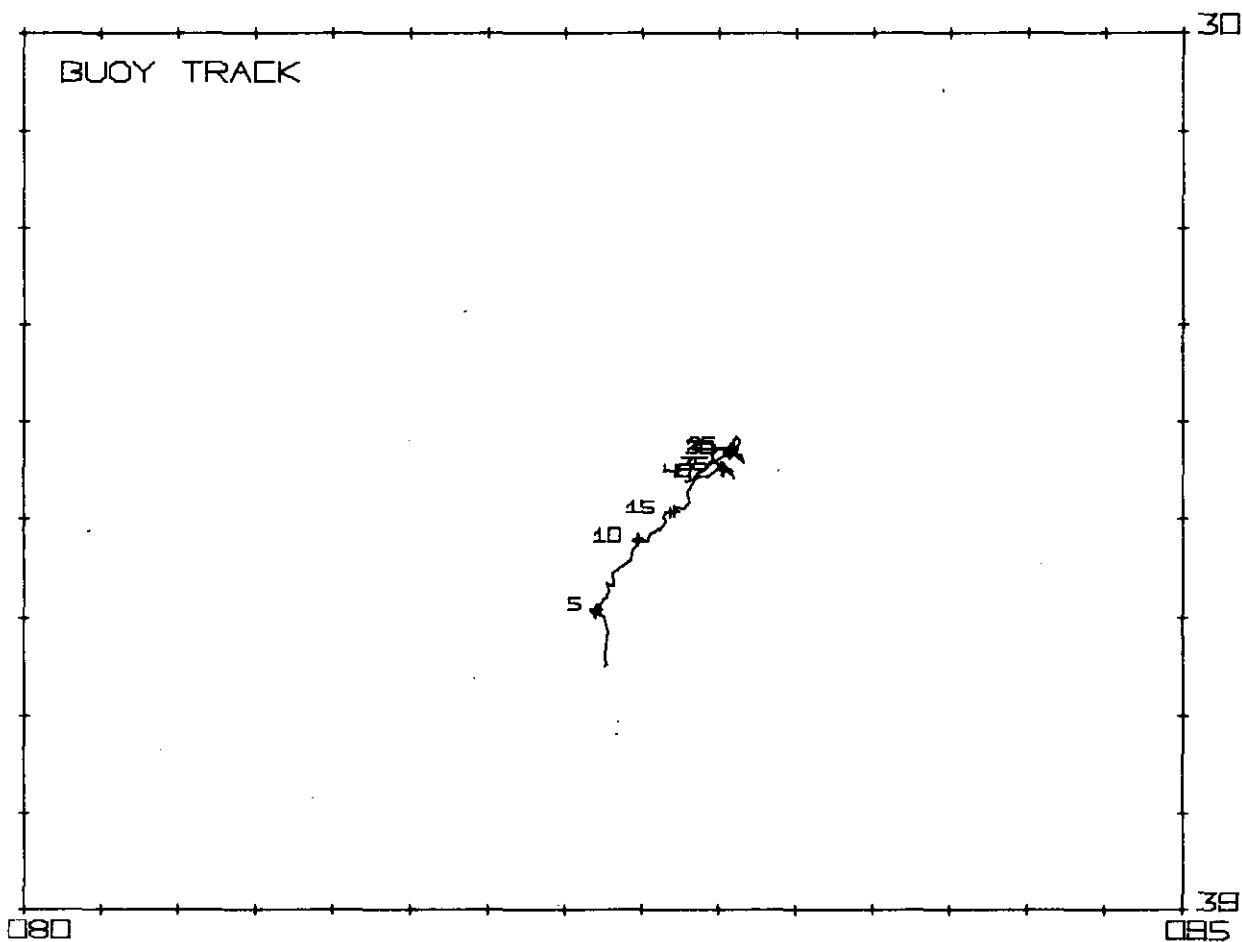
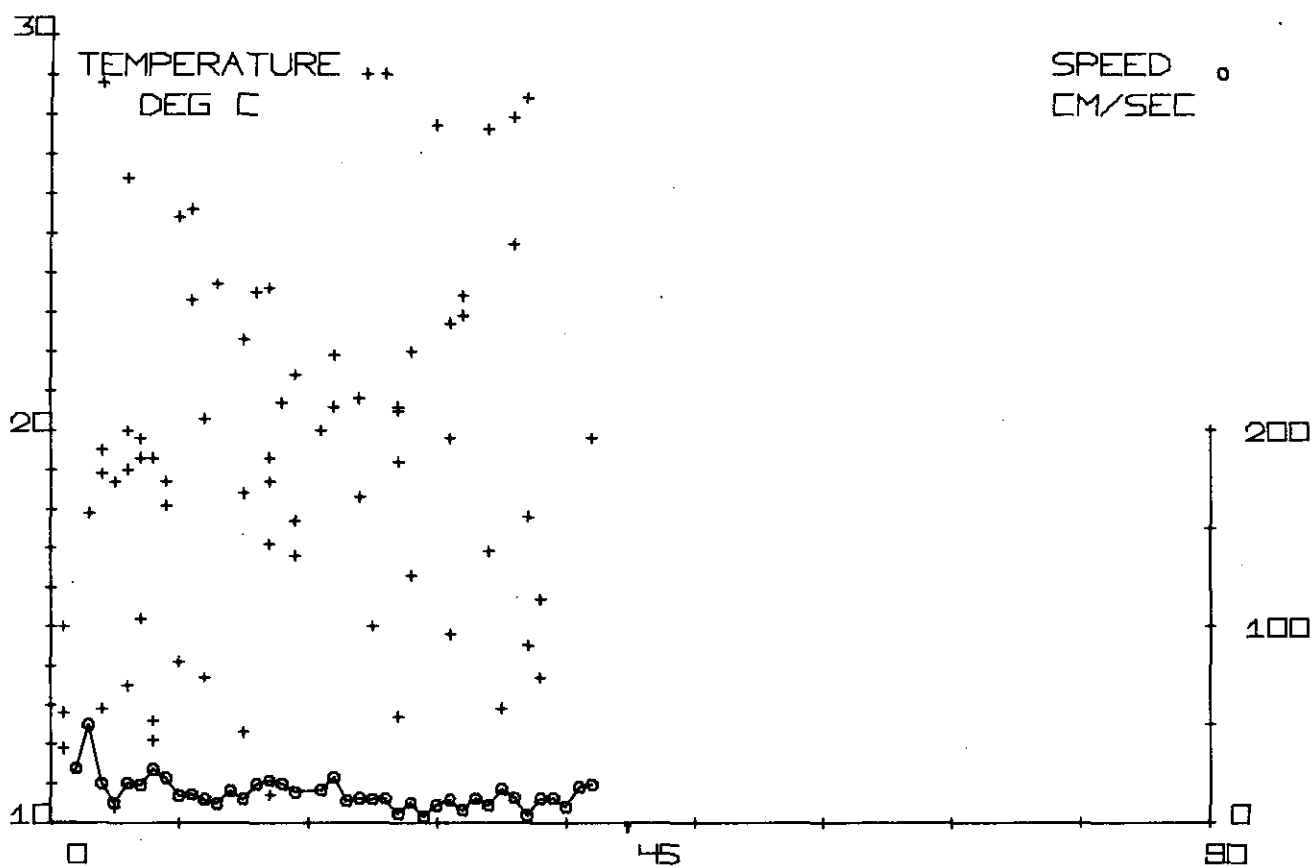
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(iii) Buoys tracked in the South-East Indian Ocean
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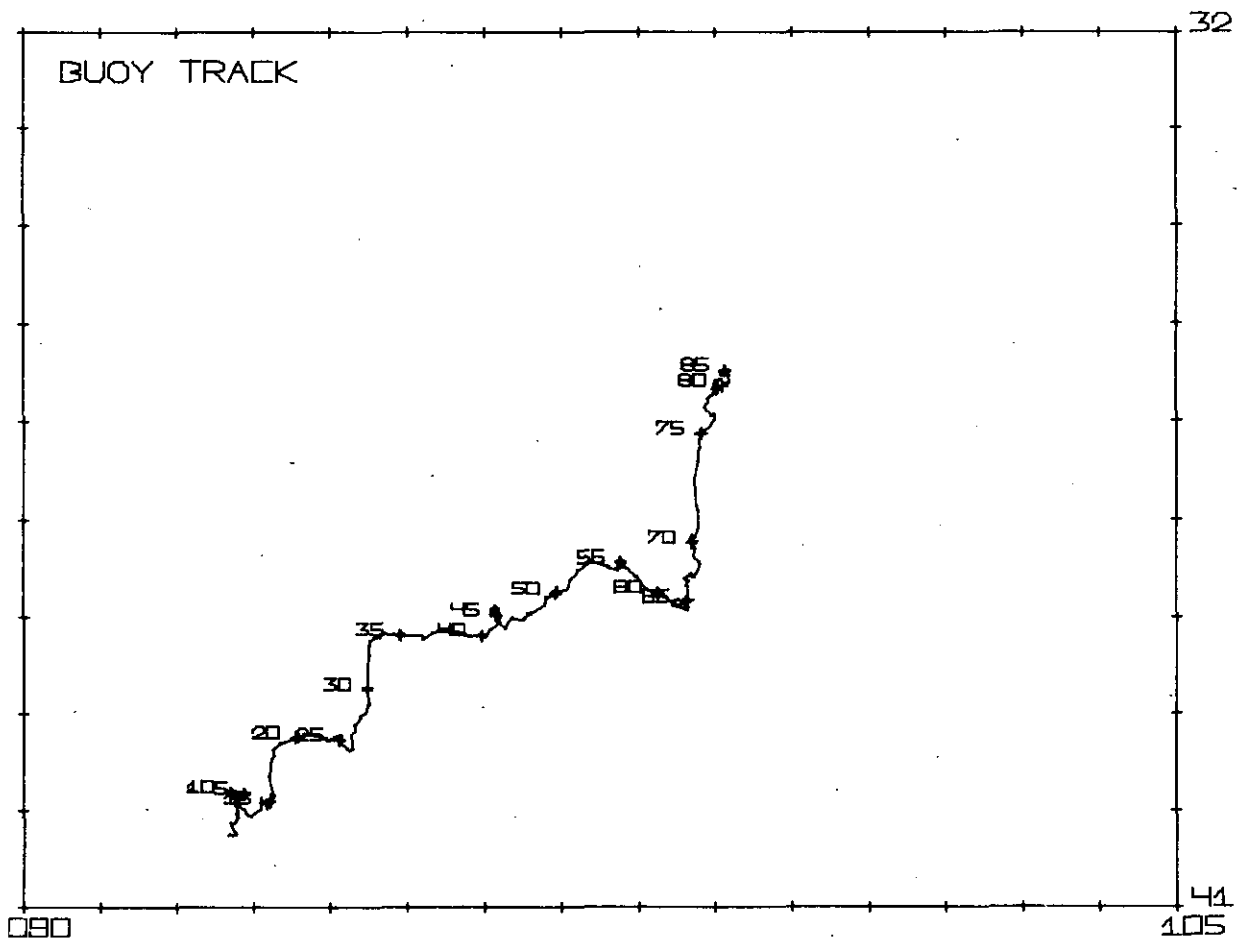
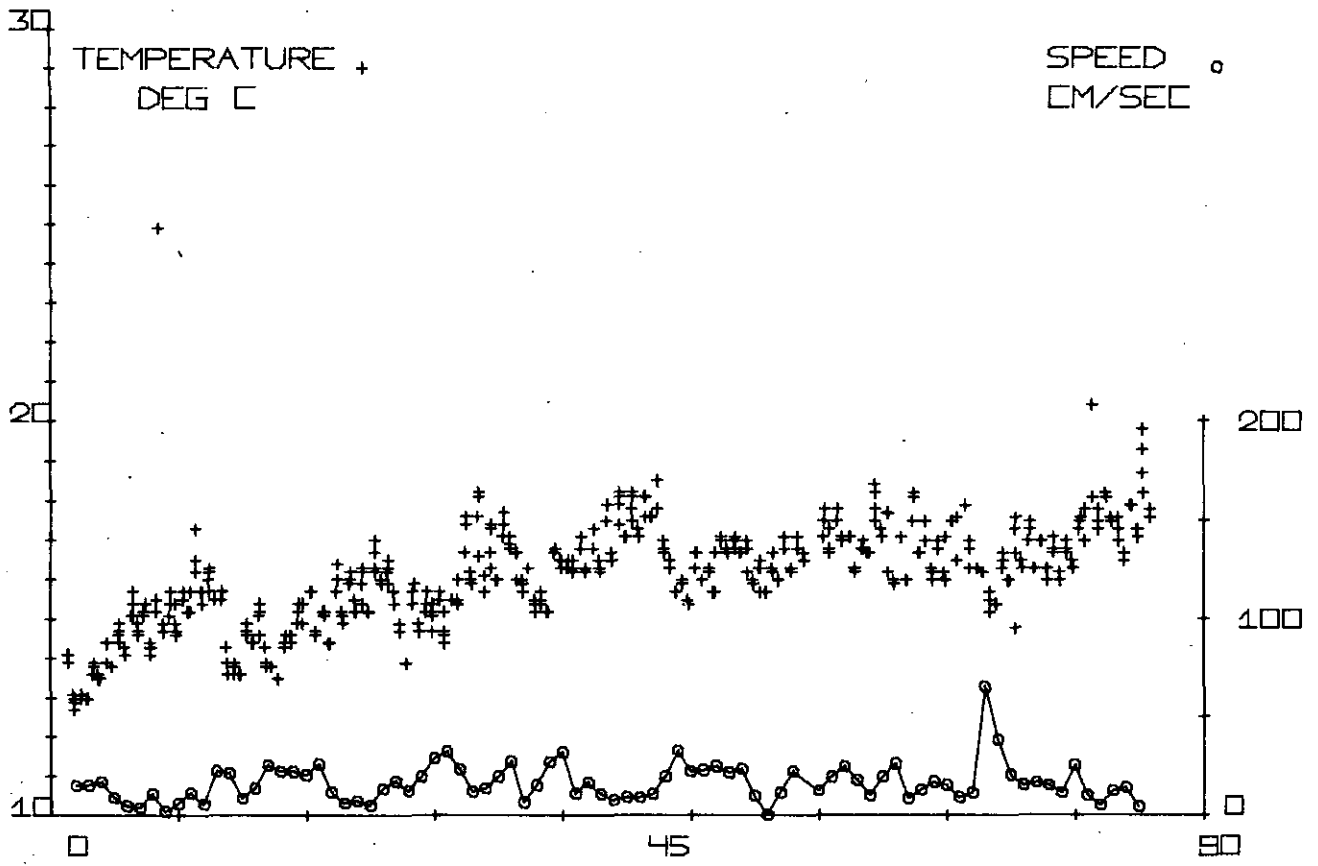
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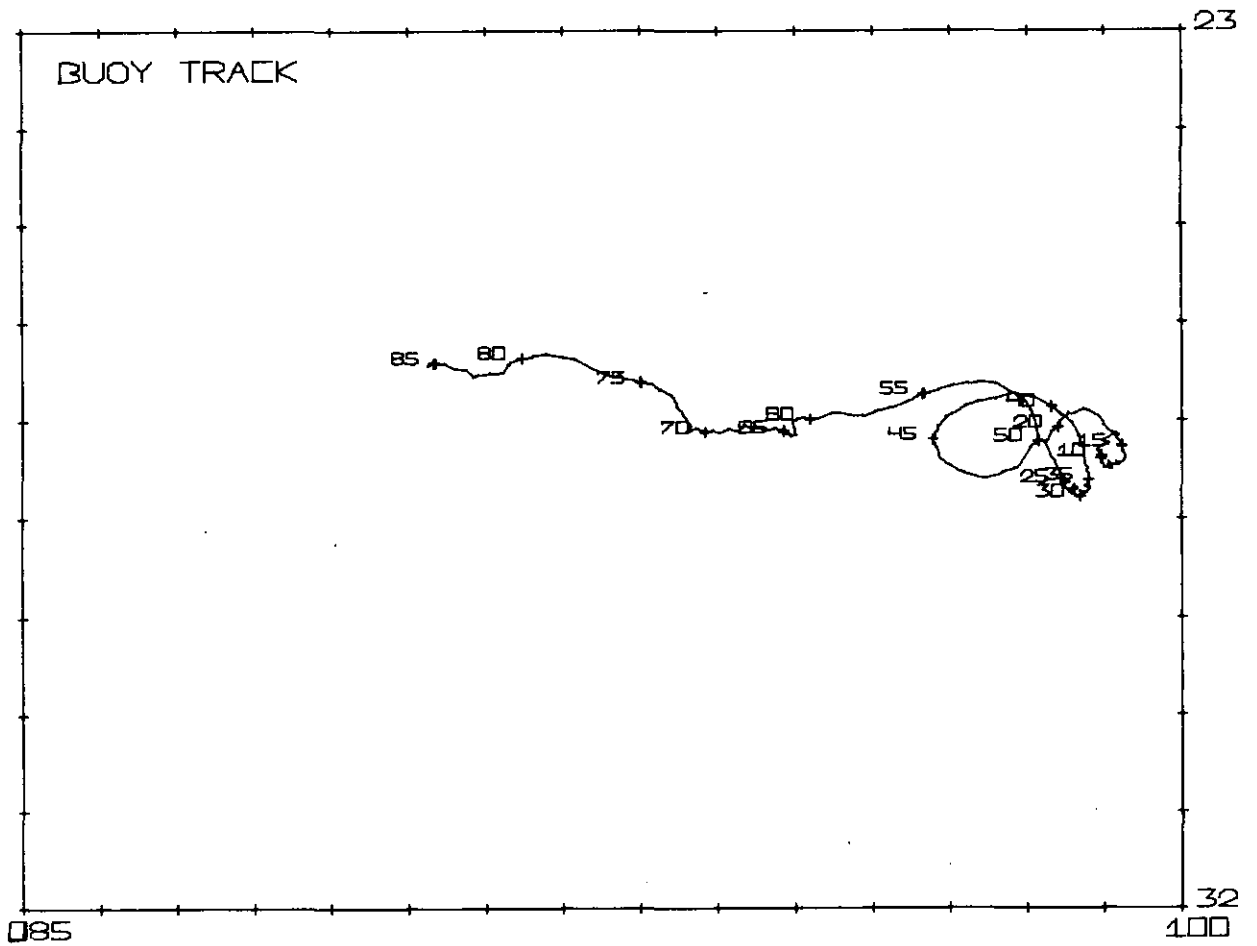
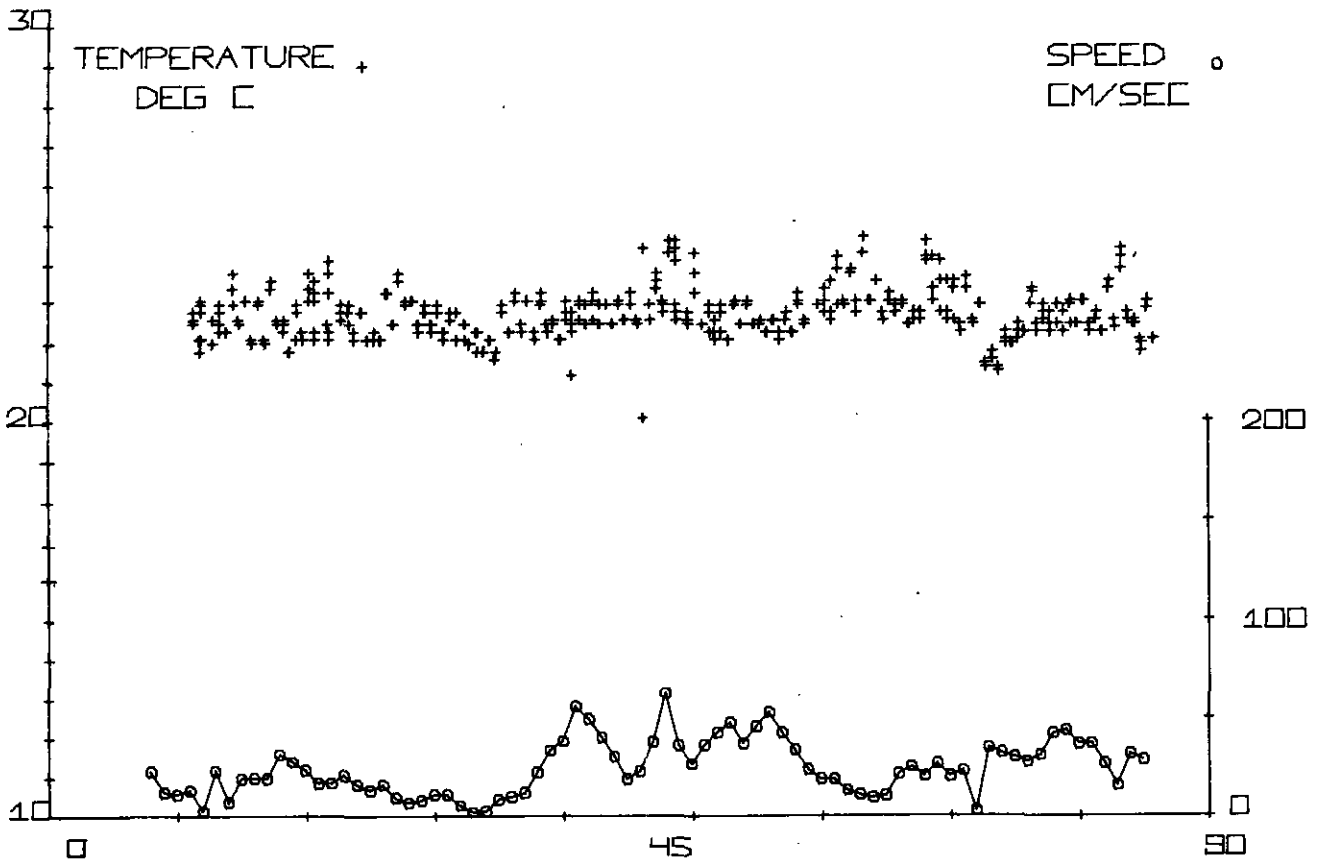
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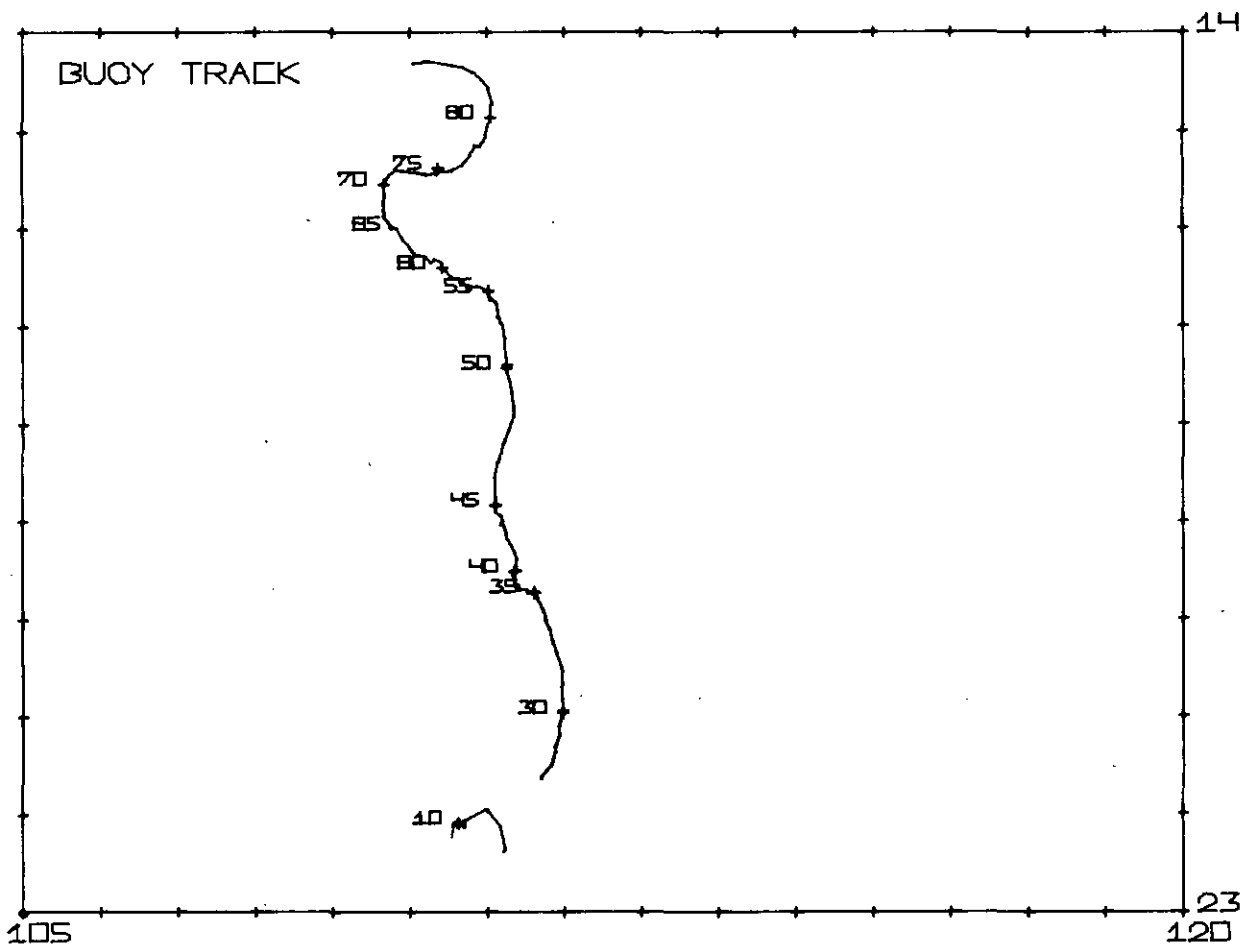
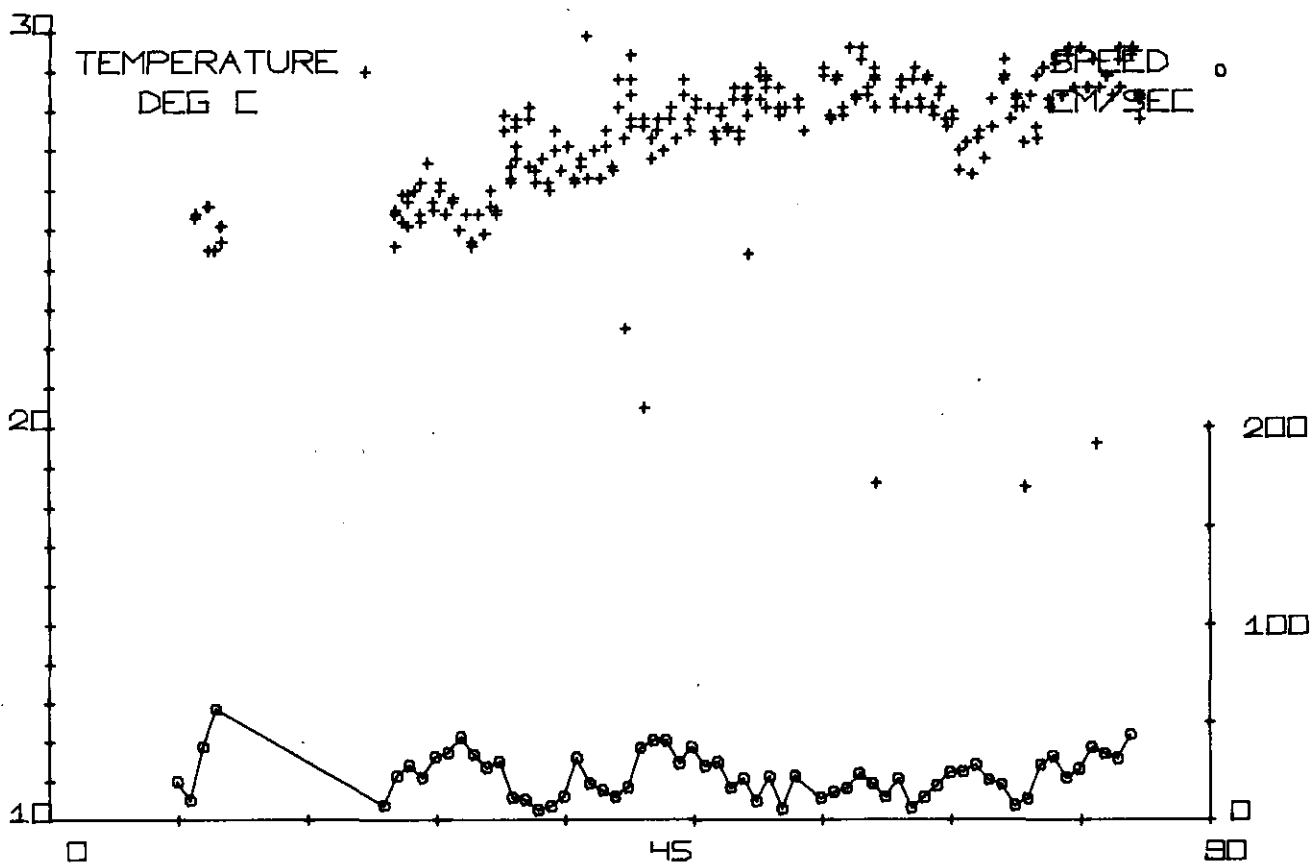
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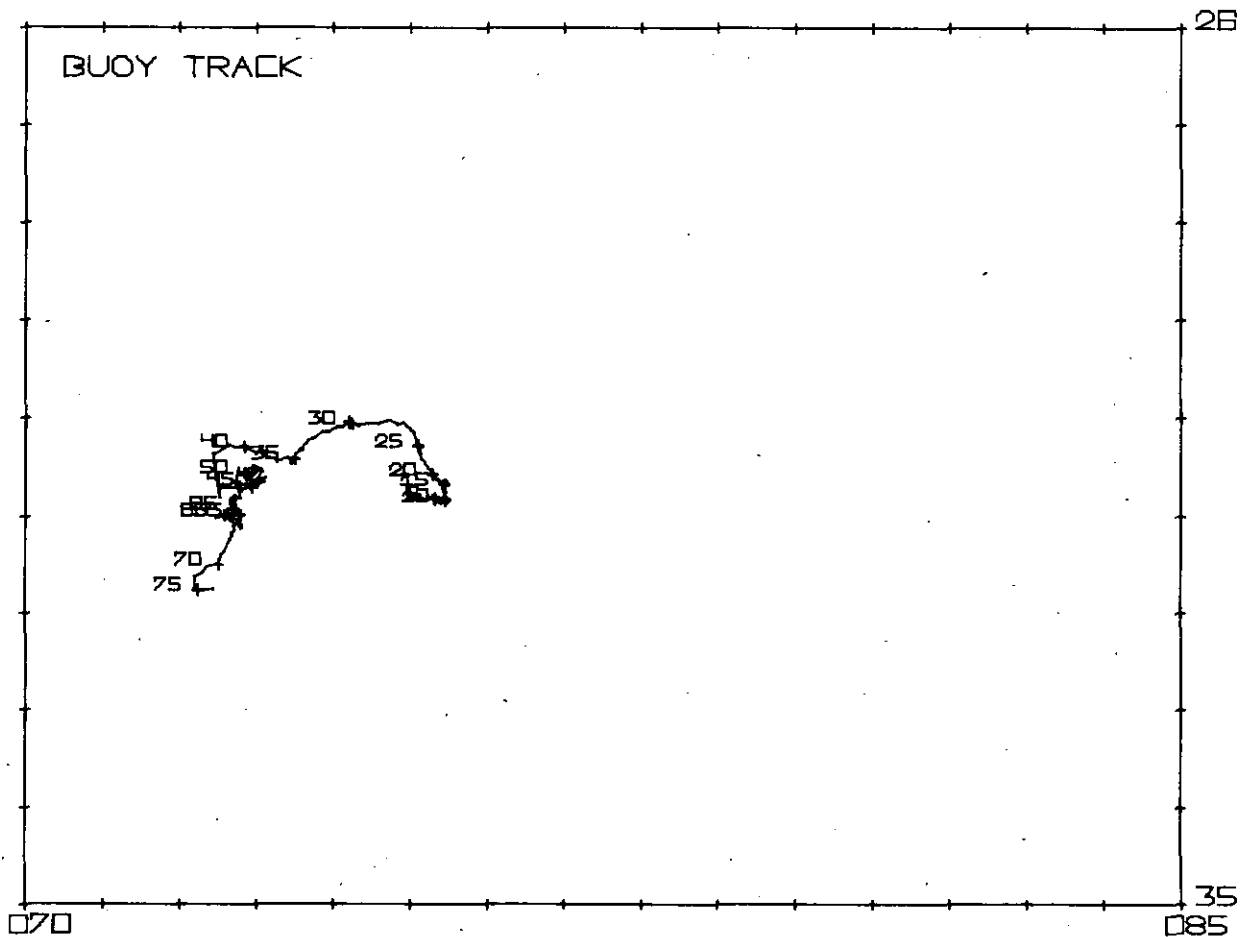
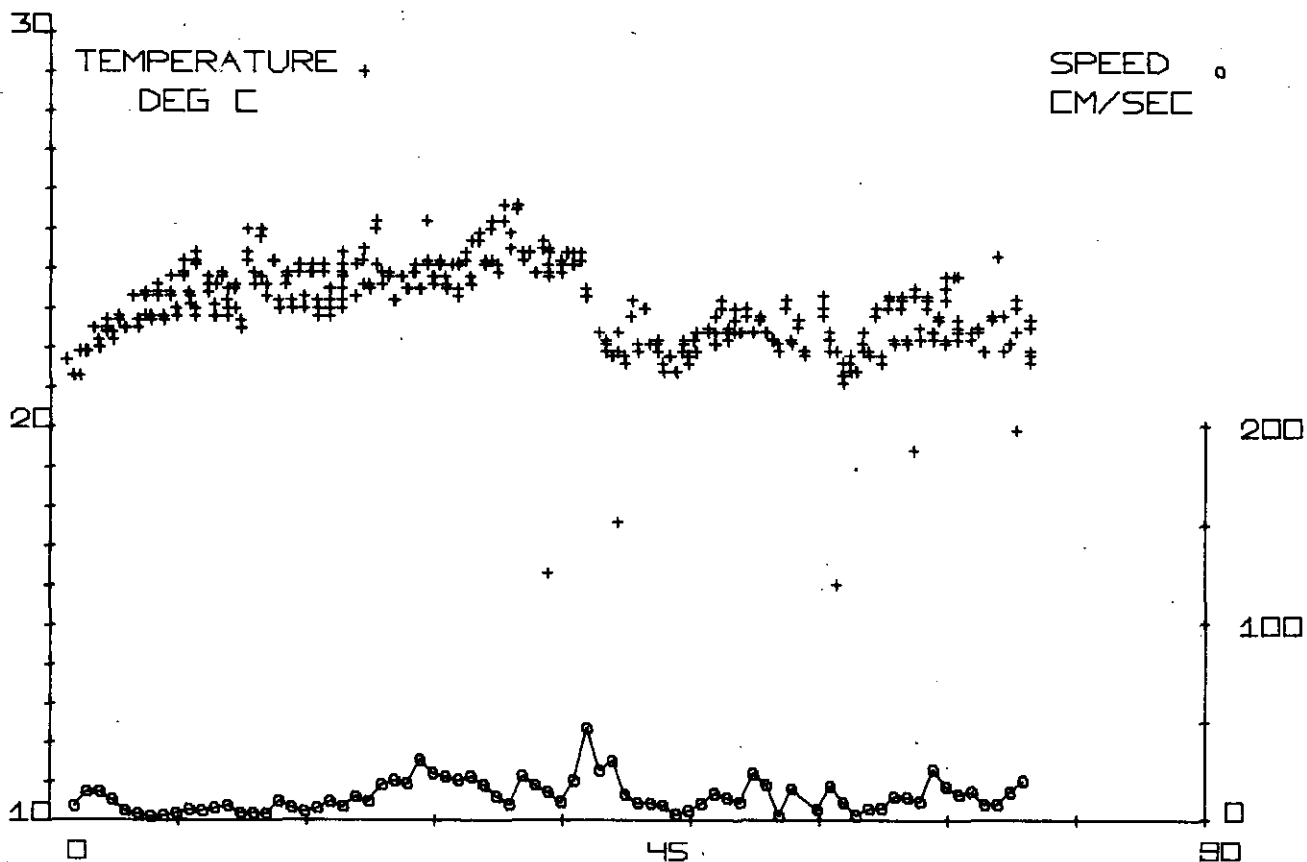
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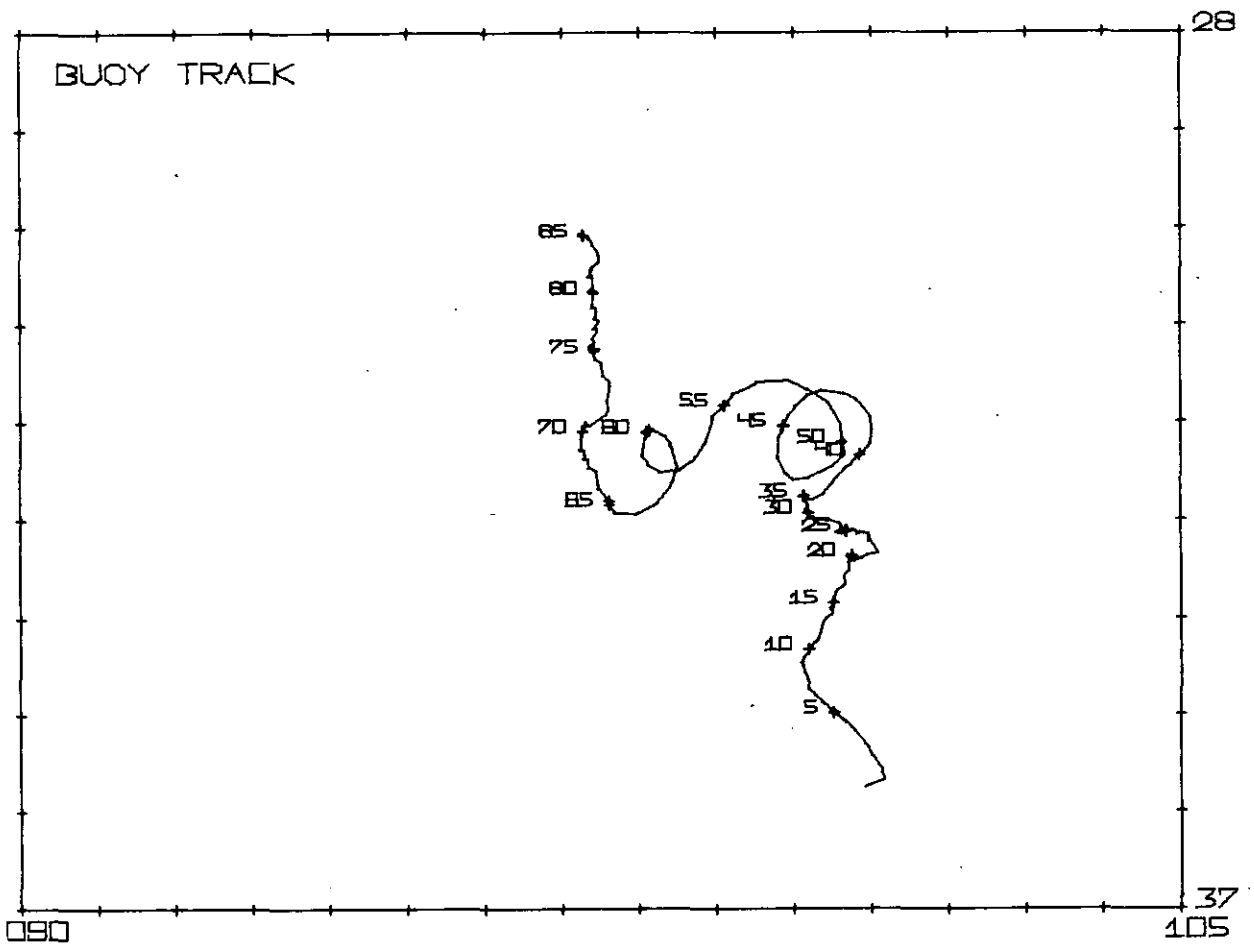
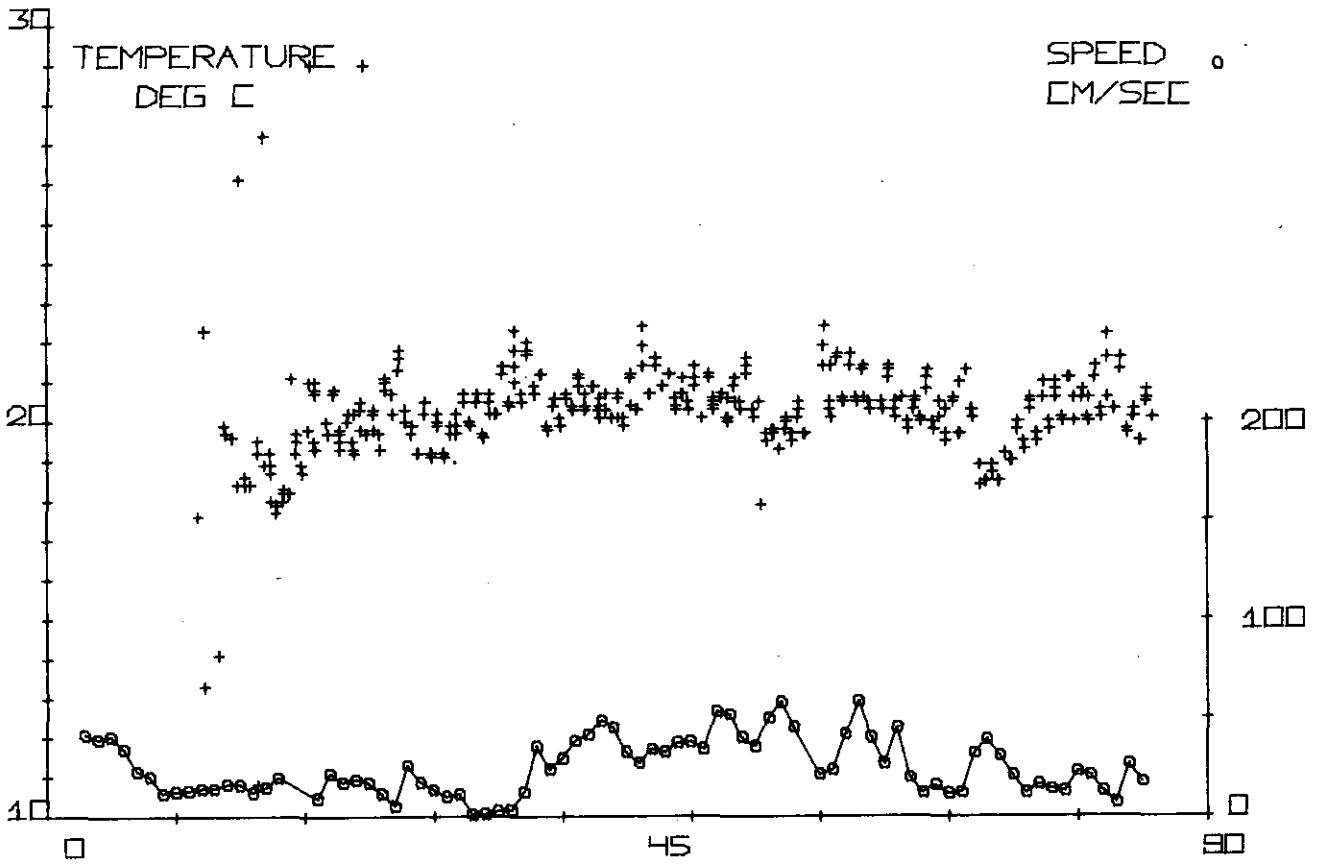
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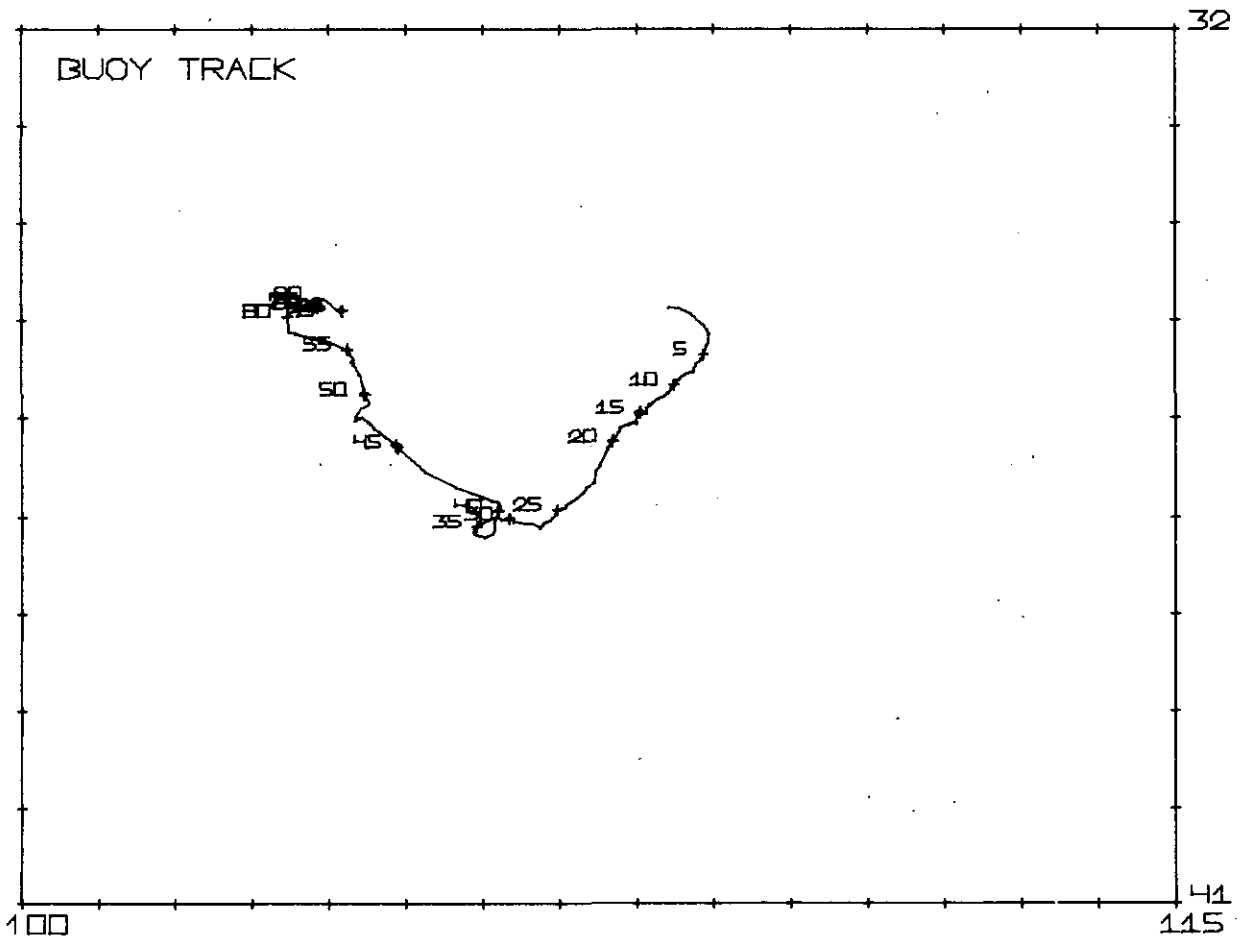
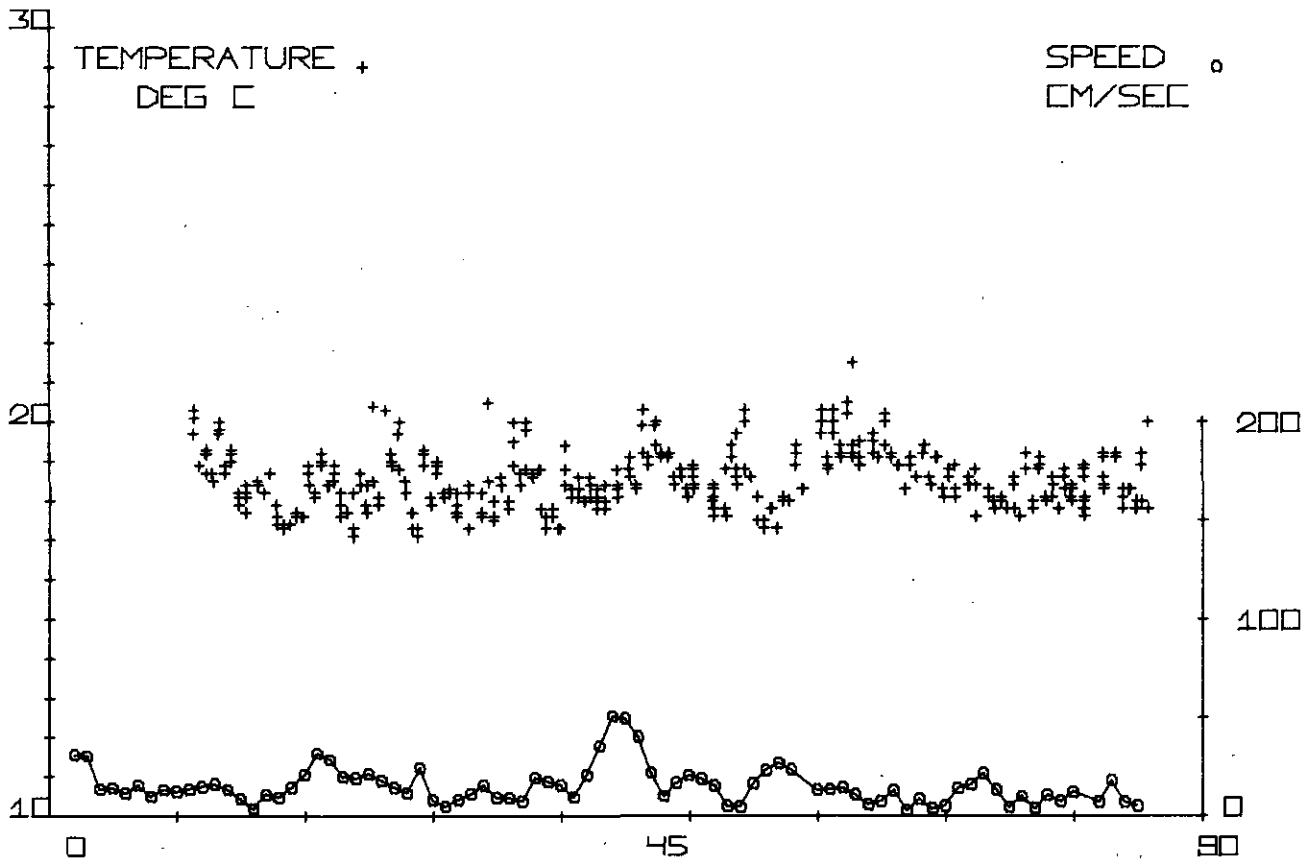
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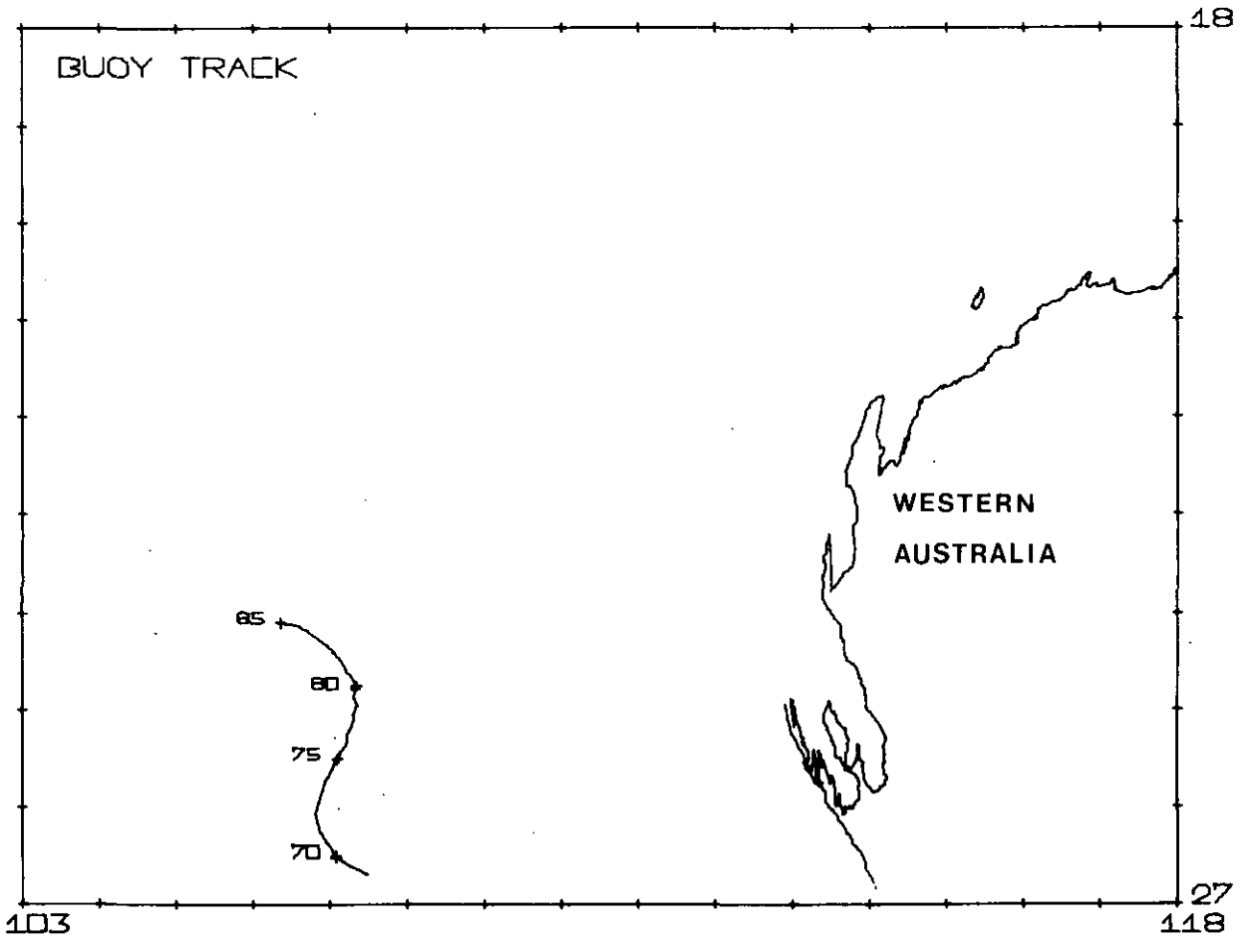
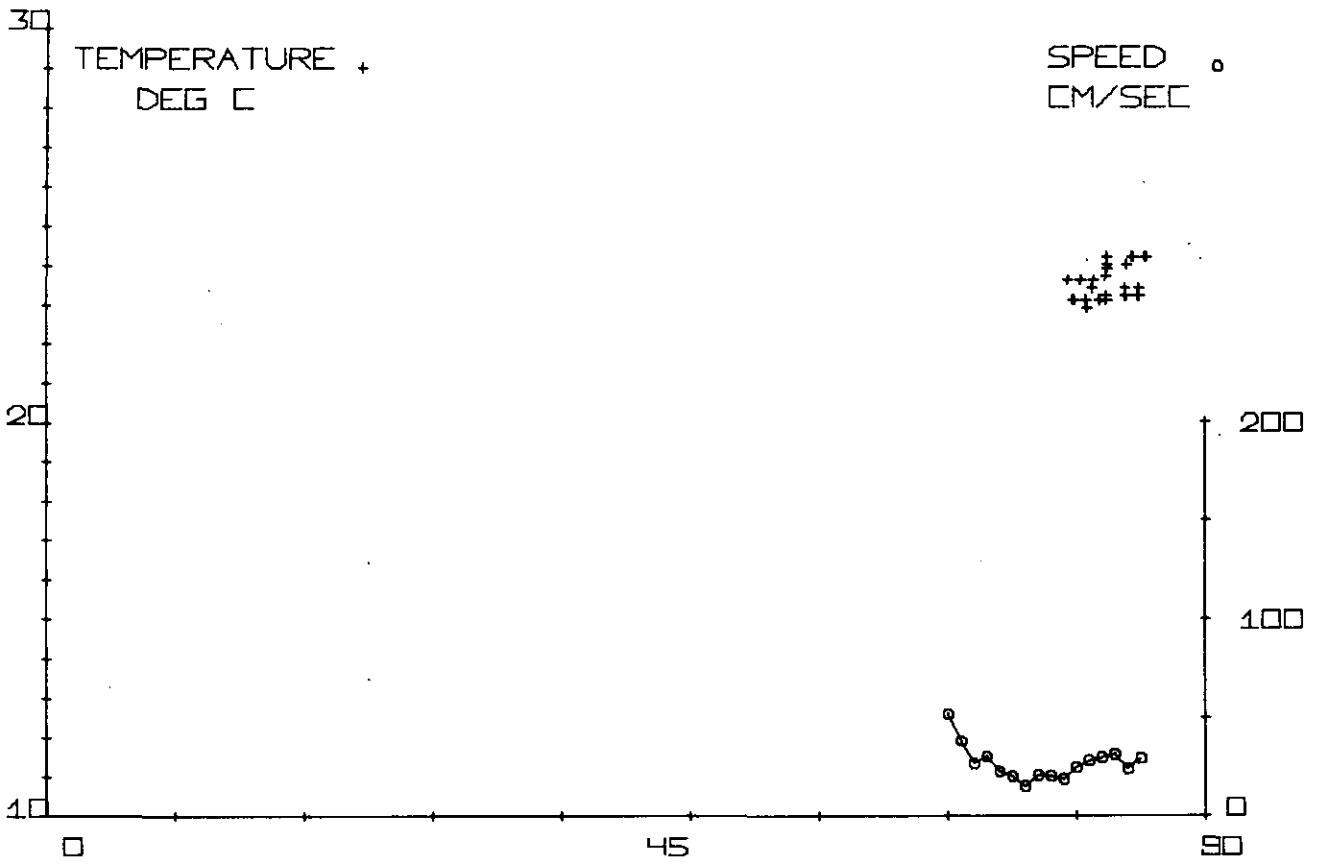
0- 30 78



BUOY 1150

DAYS

0- 90 79

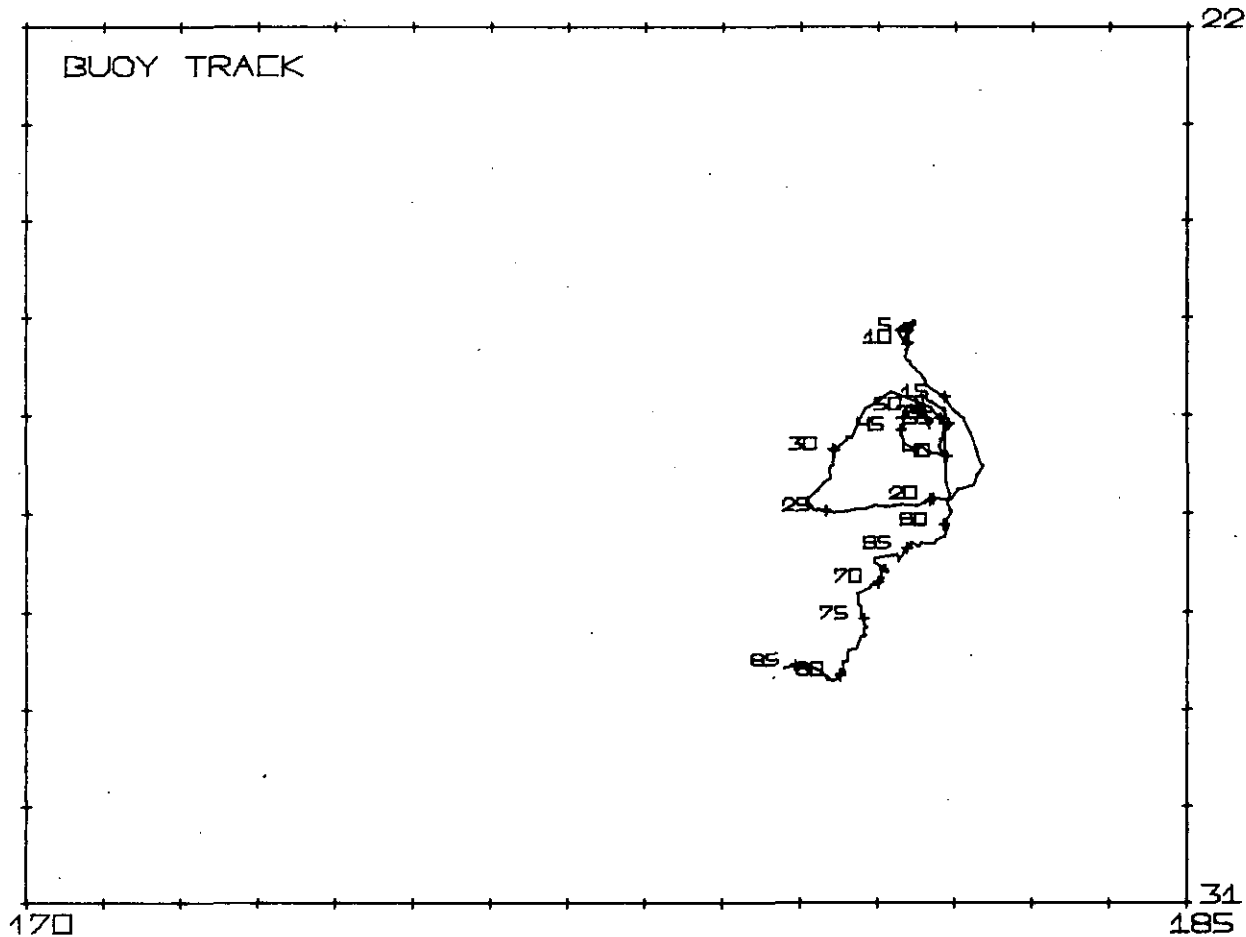
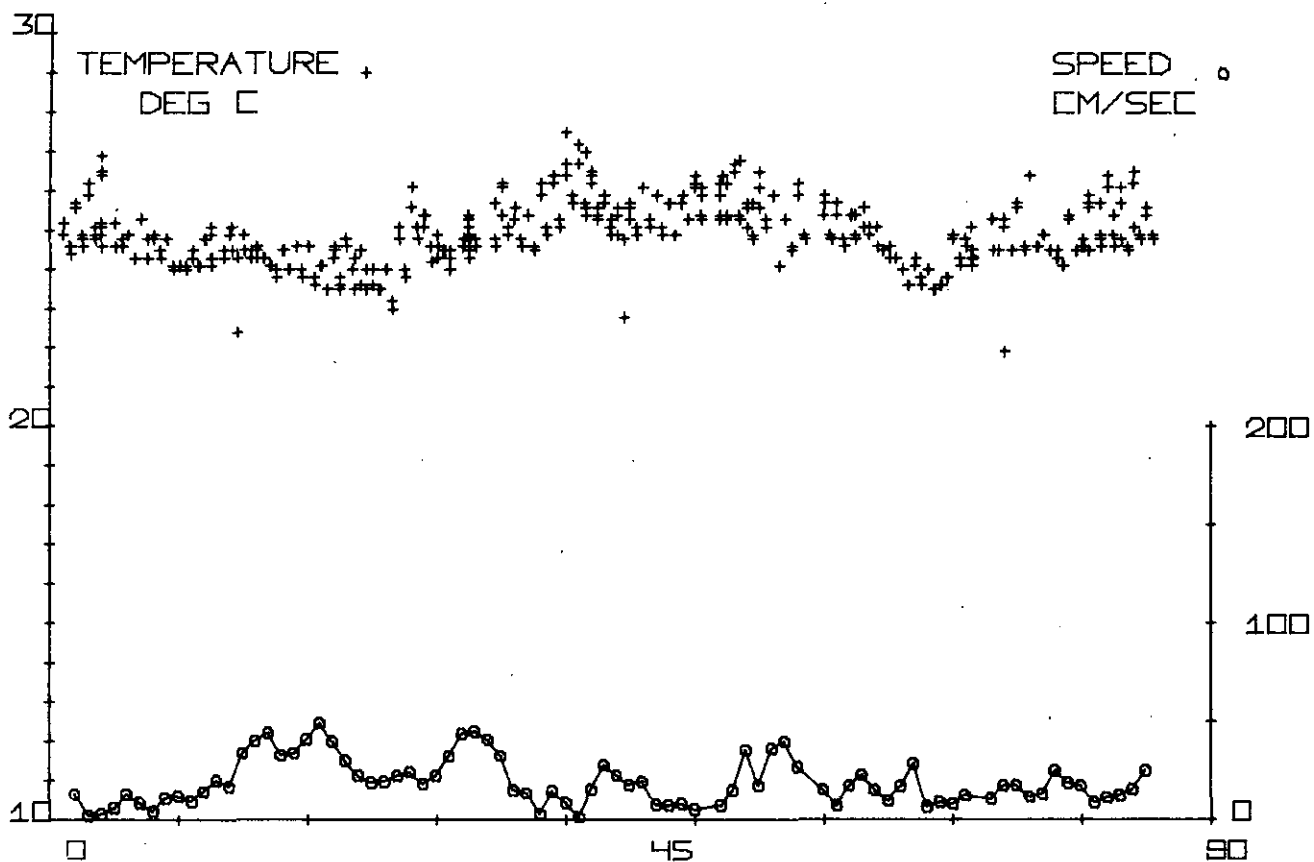


(iv) Buoys tracked in the Coral and Tasman Seas
north of the Subtropical Convergence.

BUOY 1110

DAYS

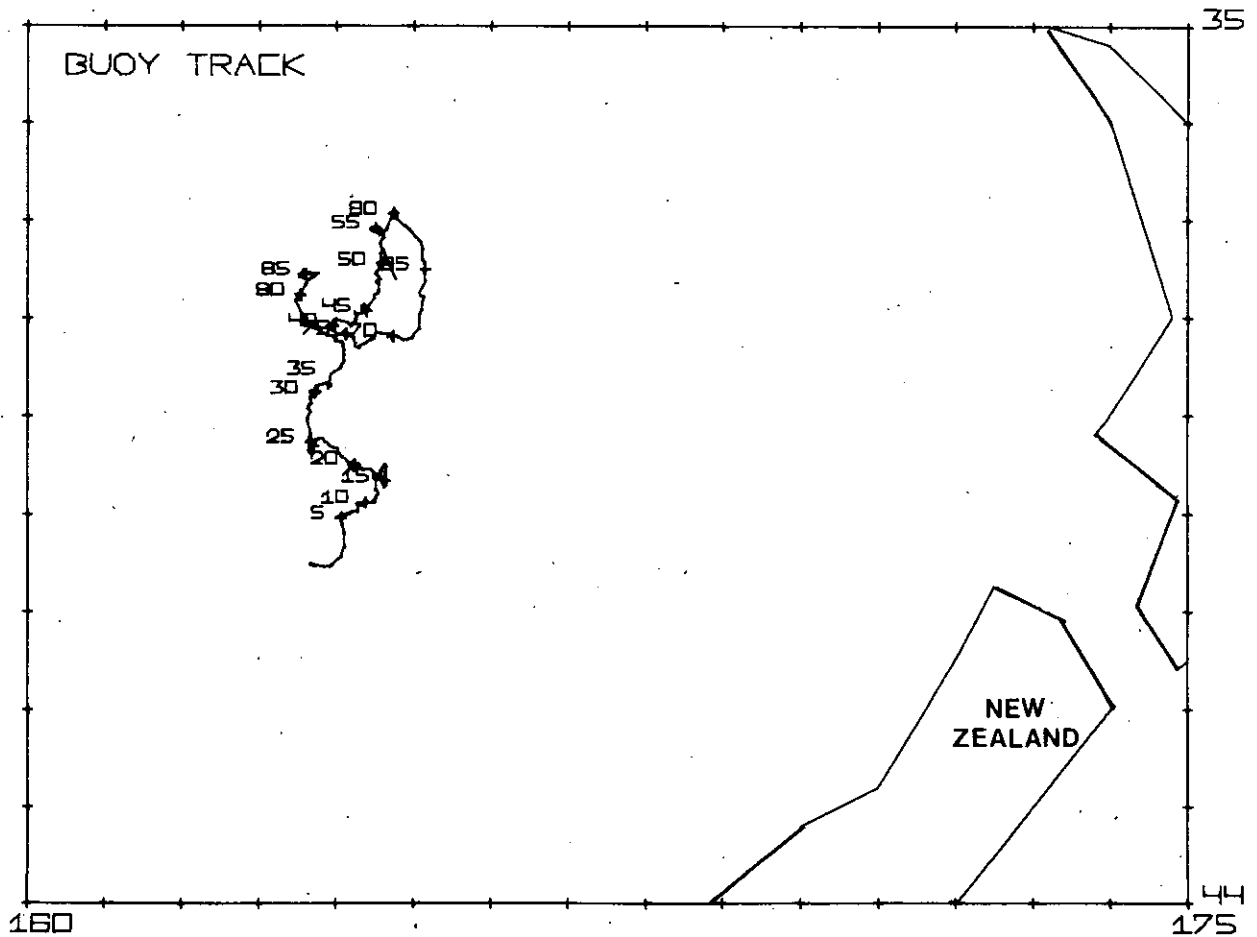
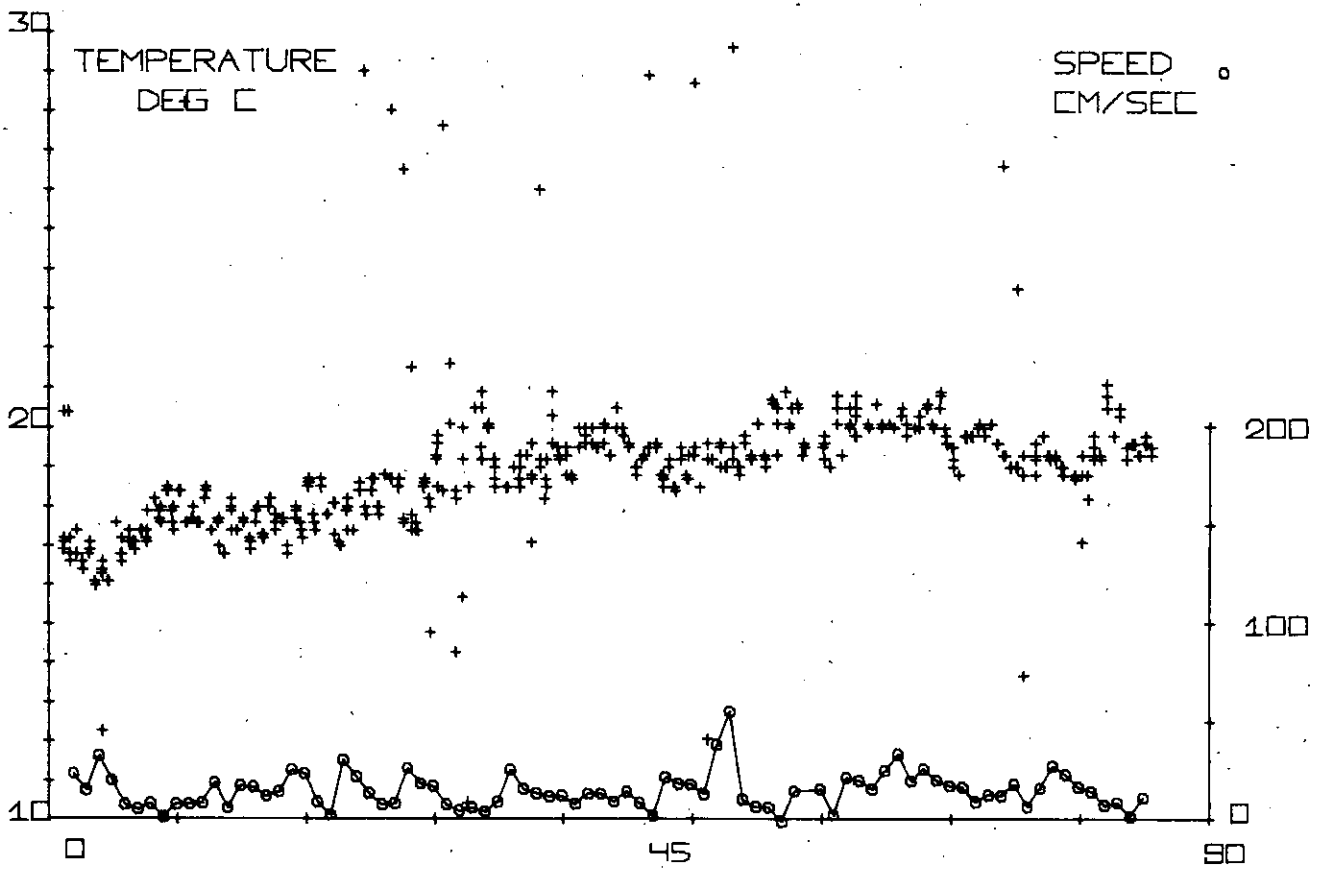
0 - 80 78



BUOY 1116

DAYS

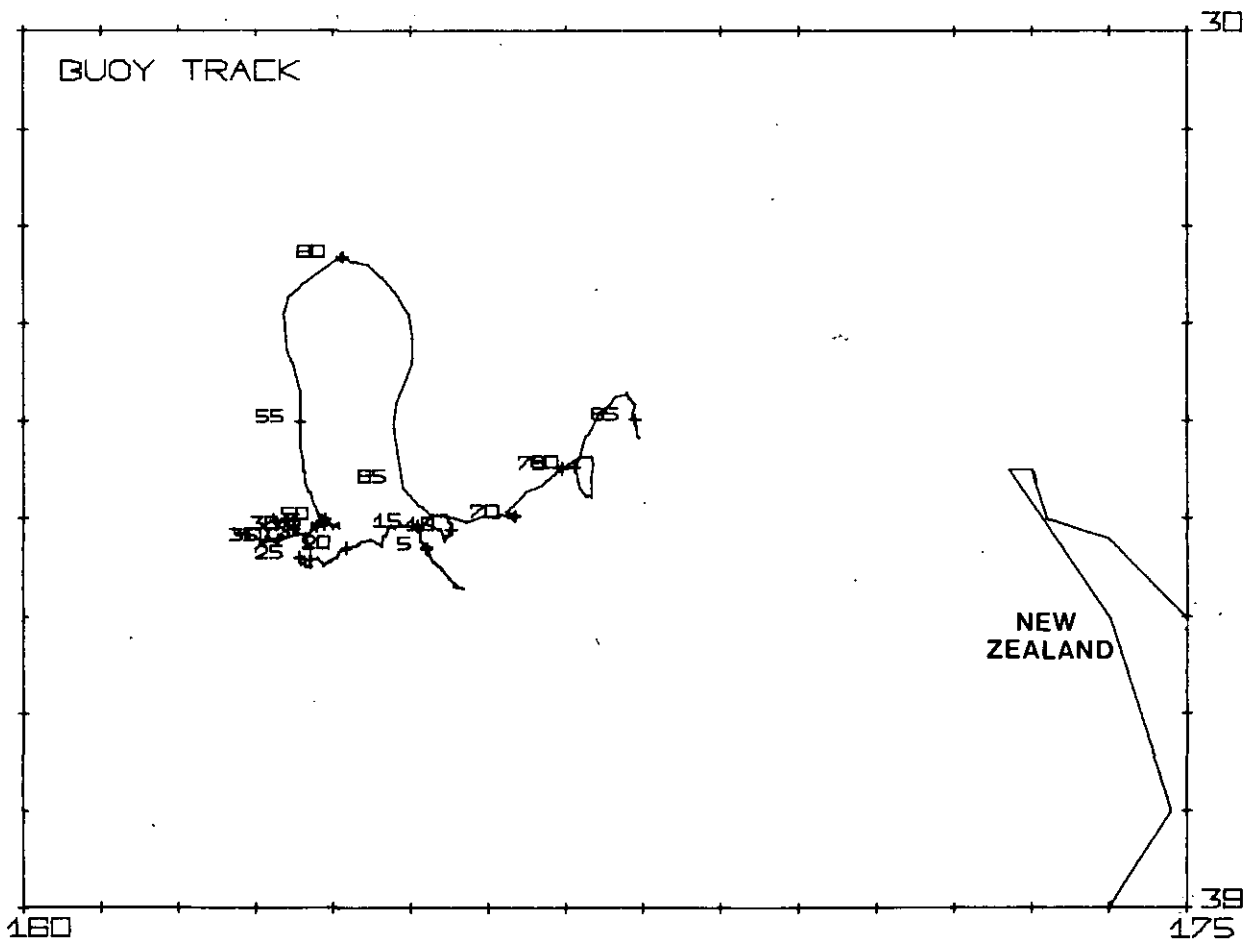
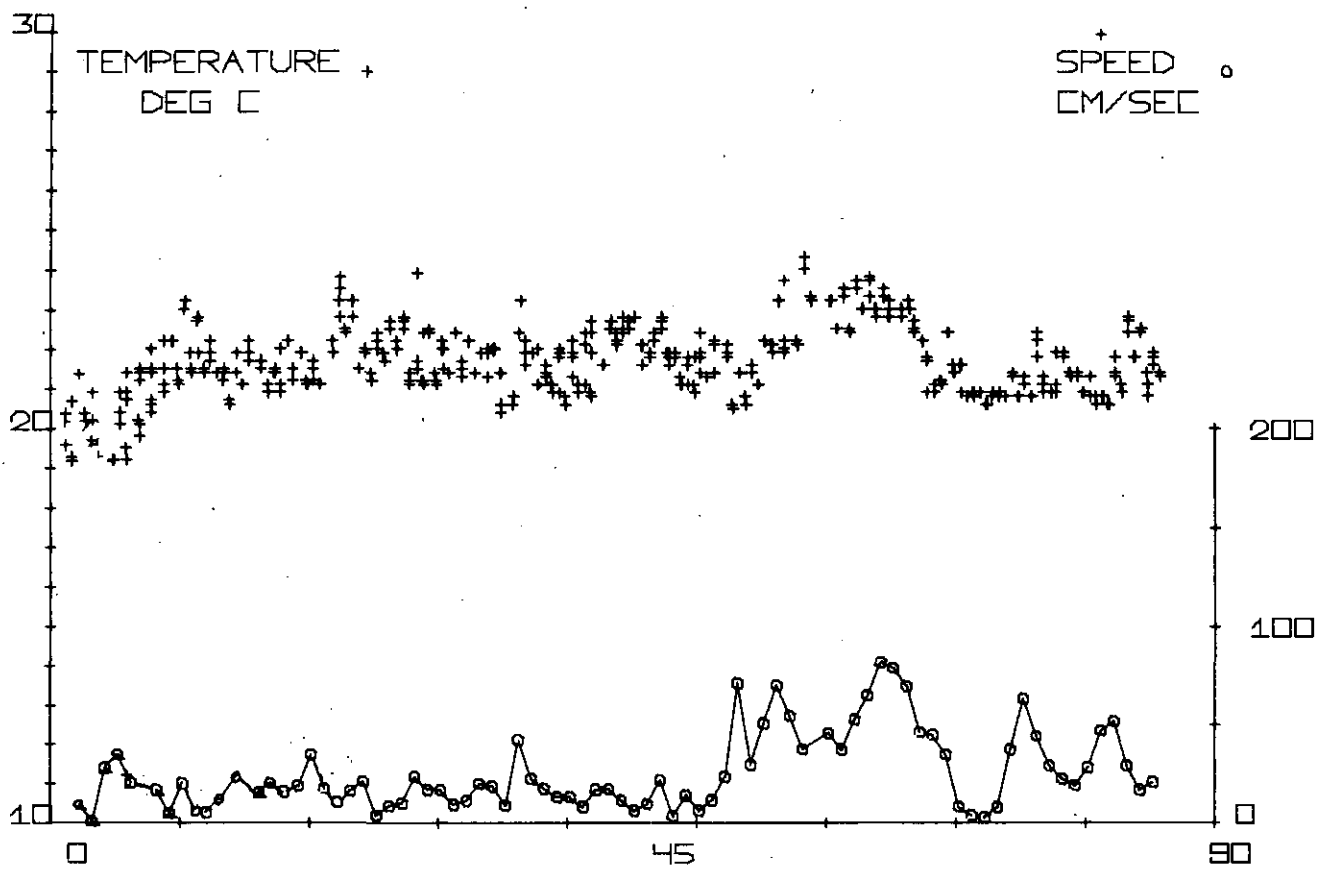
0 - 90 79



BUOY 1118

DAYS

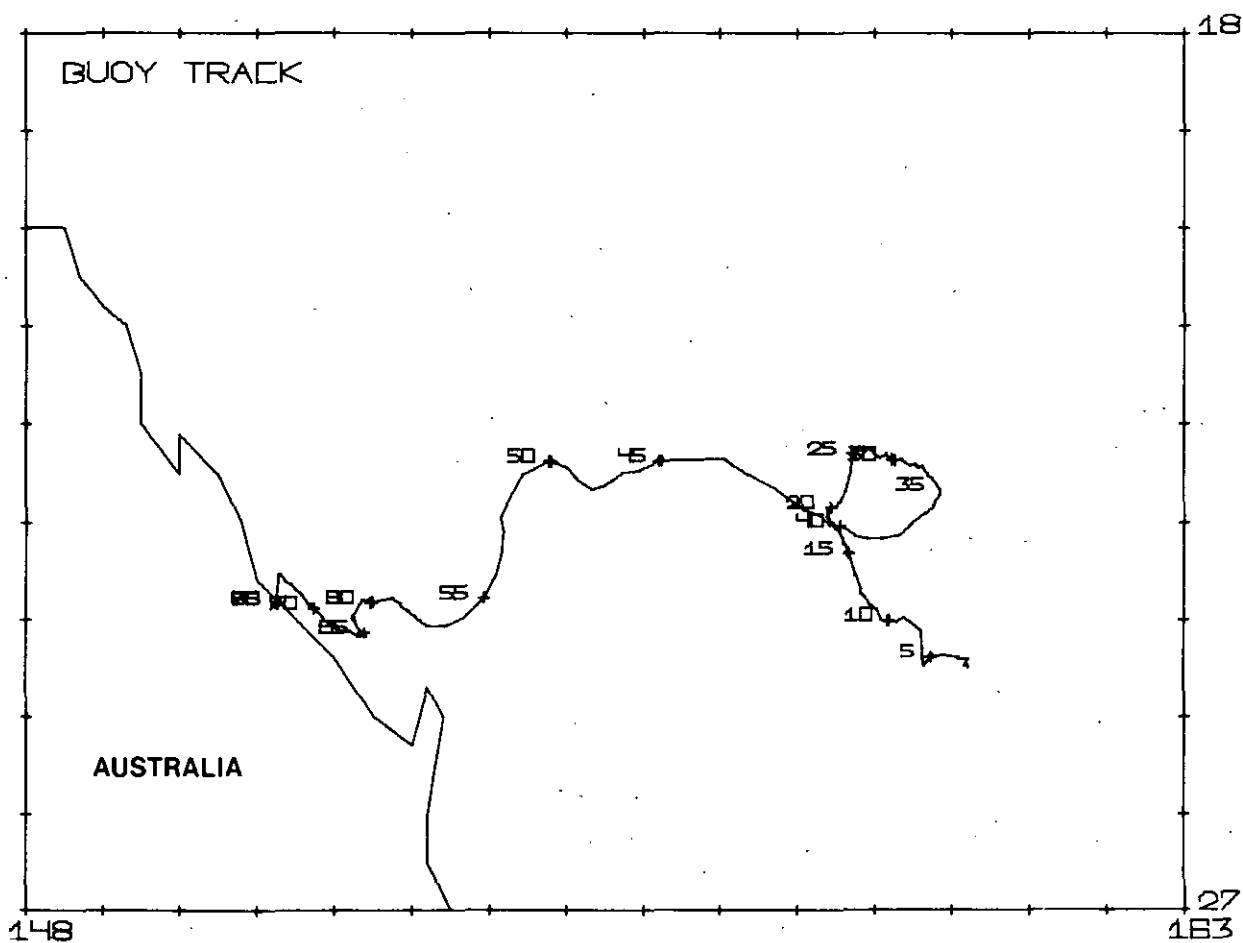
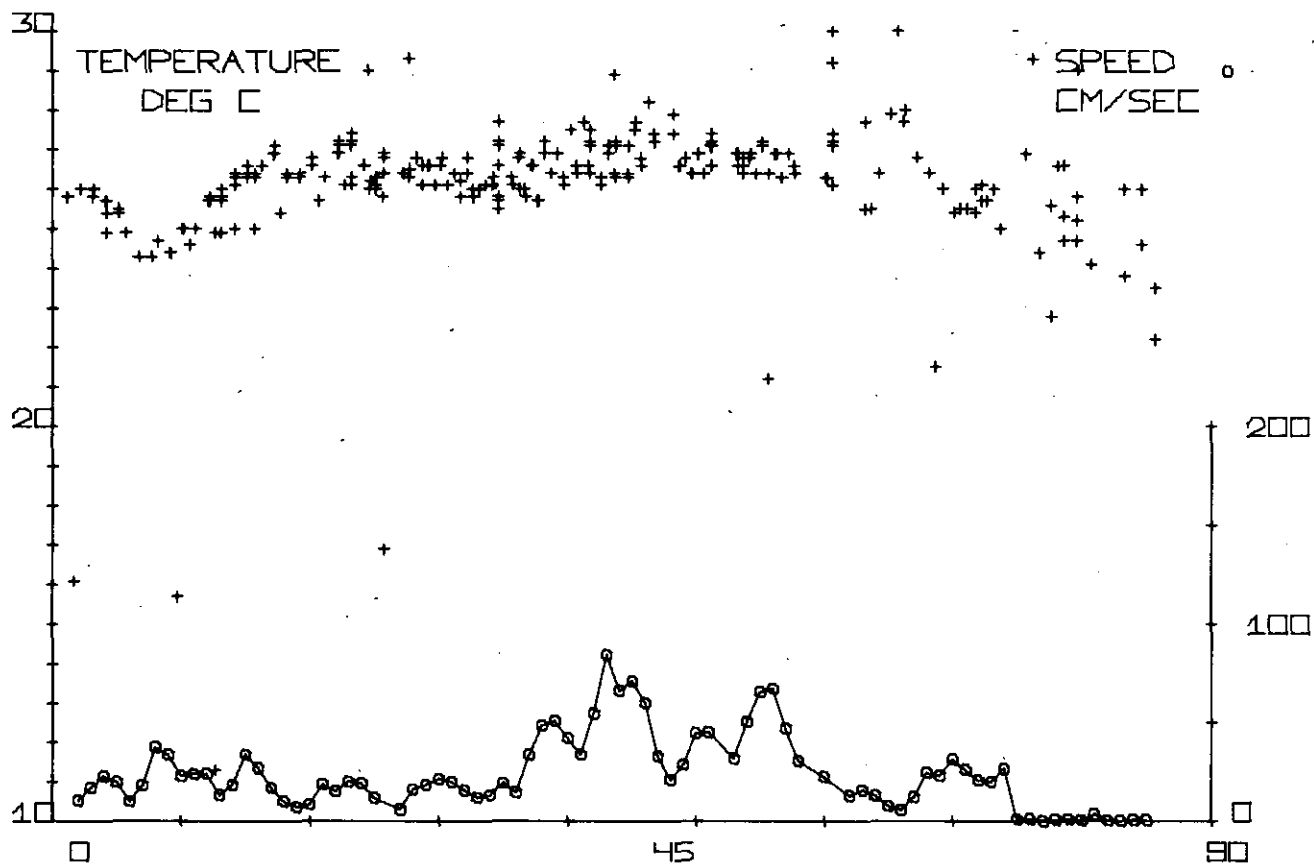
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BUOY 1133

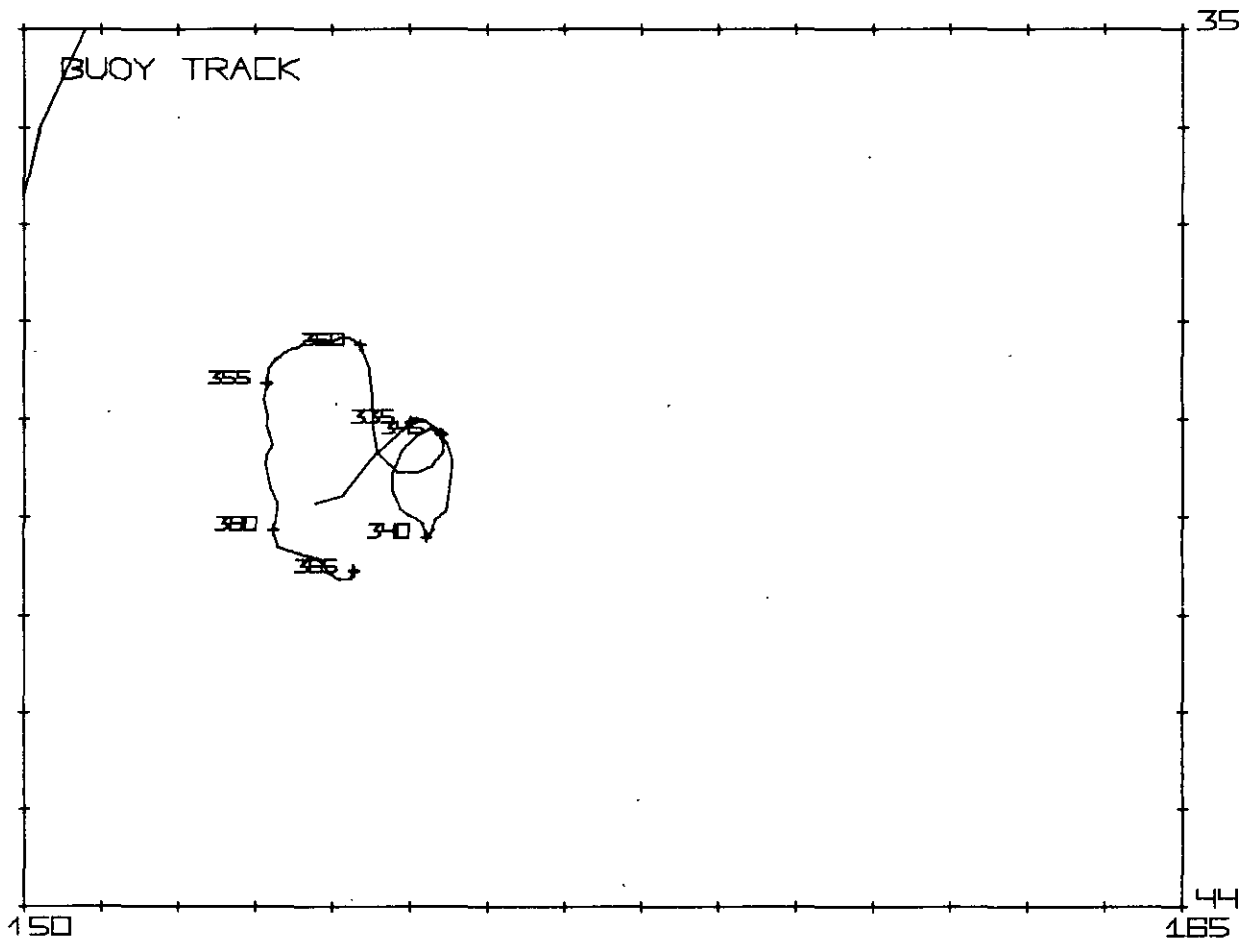
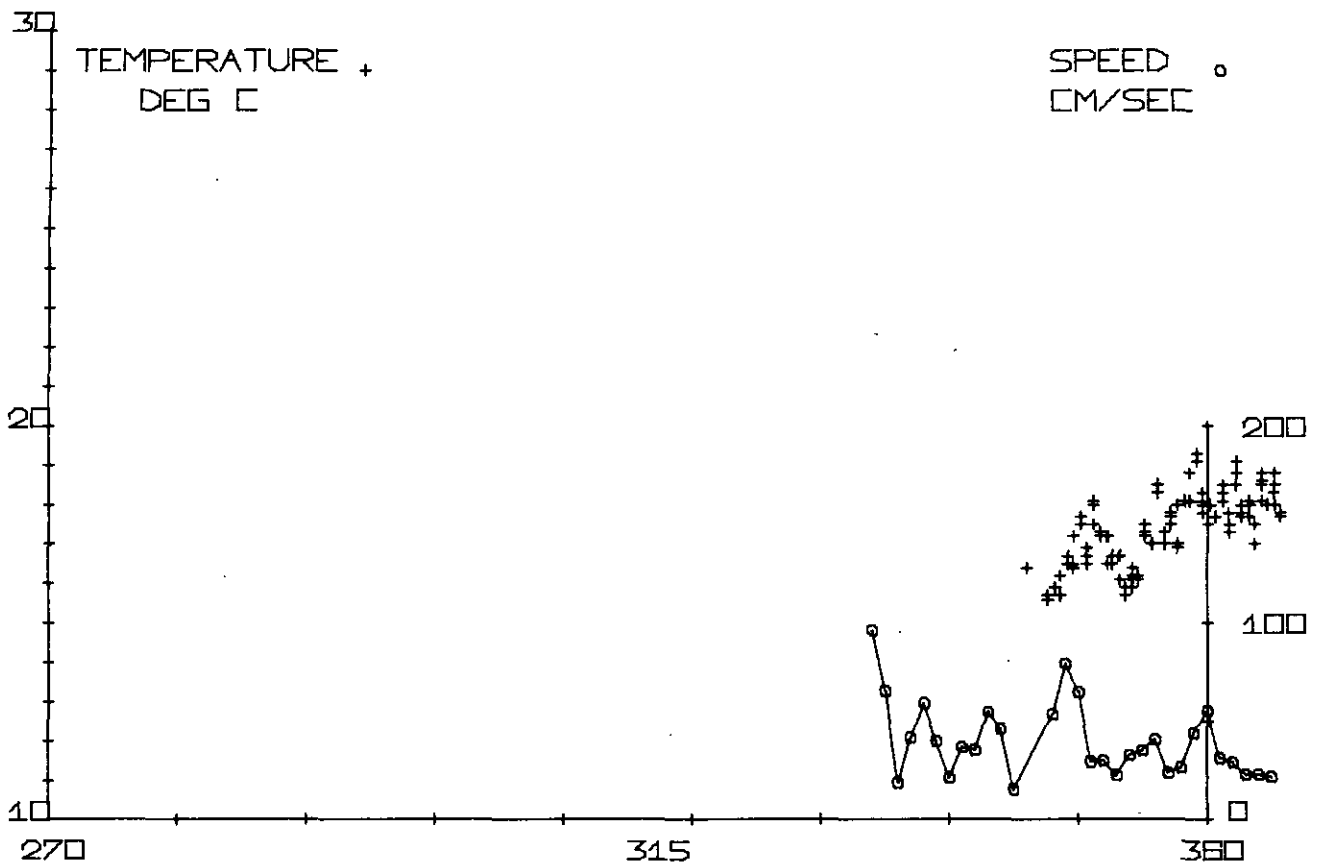
DAYS

0 - 90 78



BUOY 1118

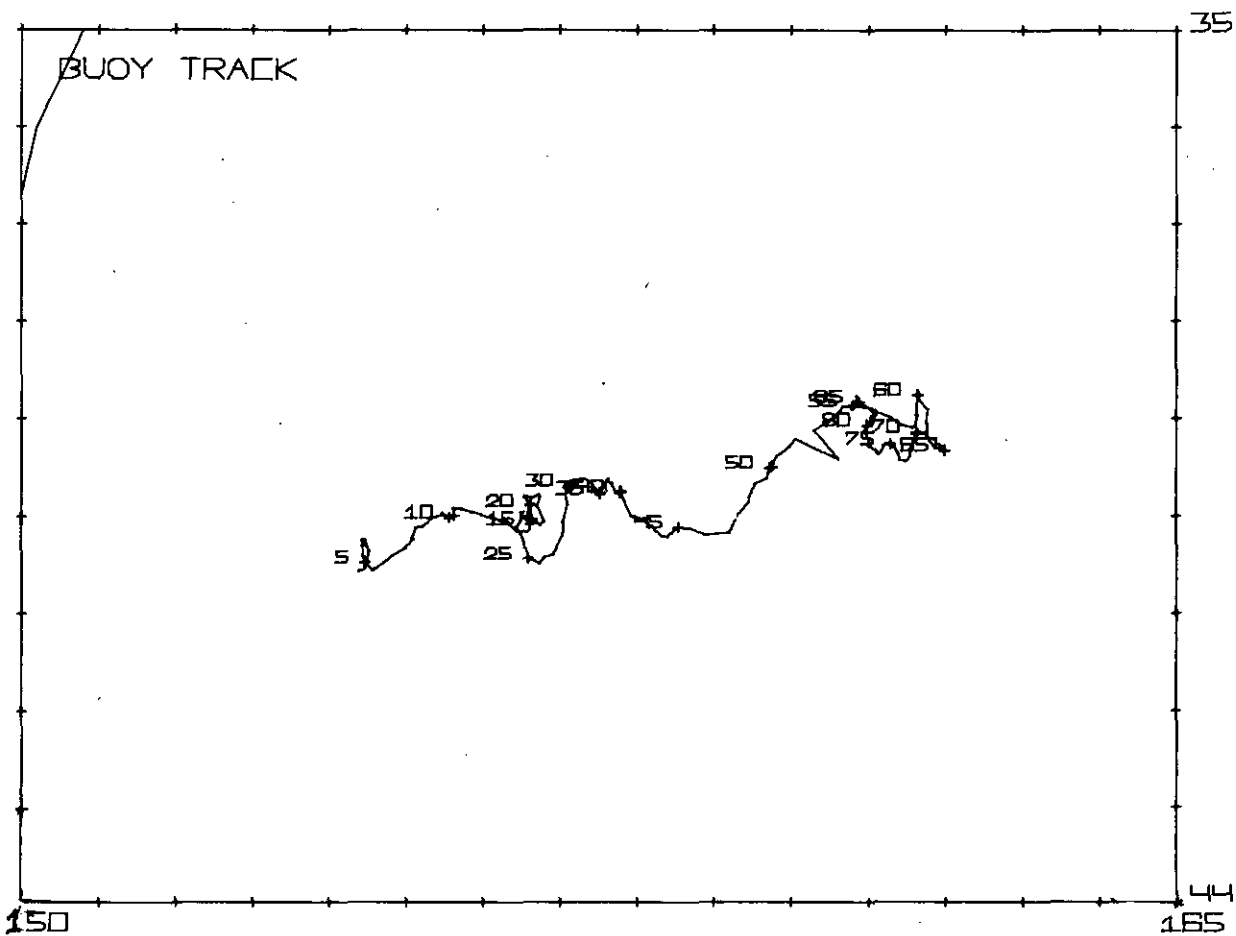
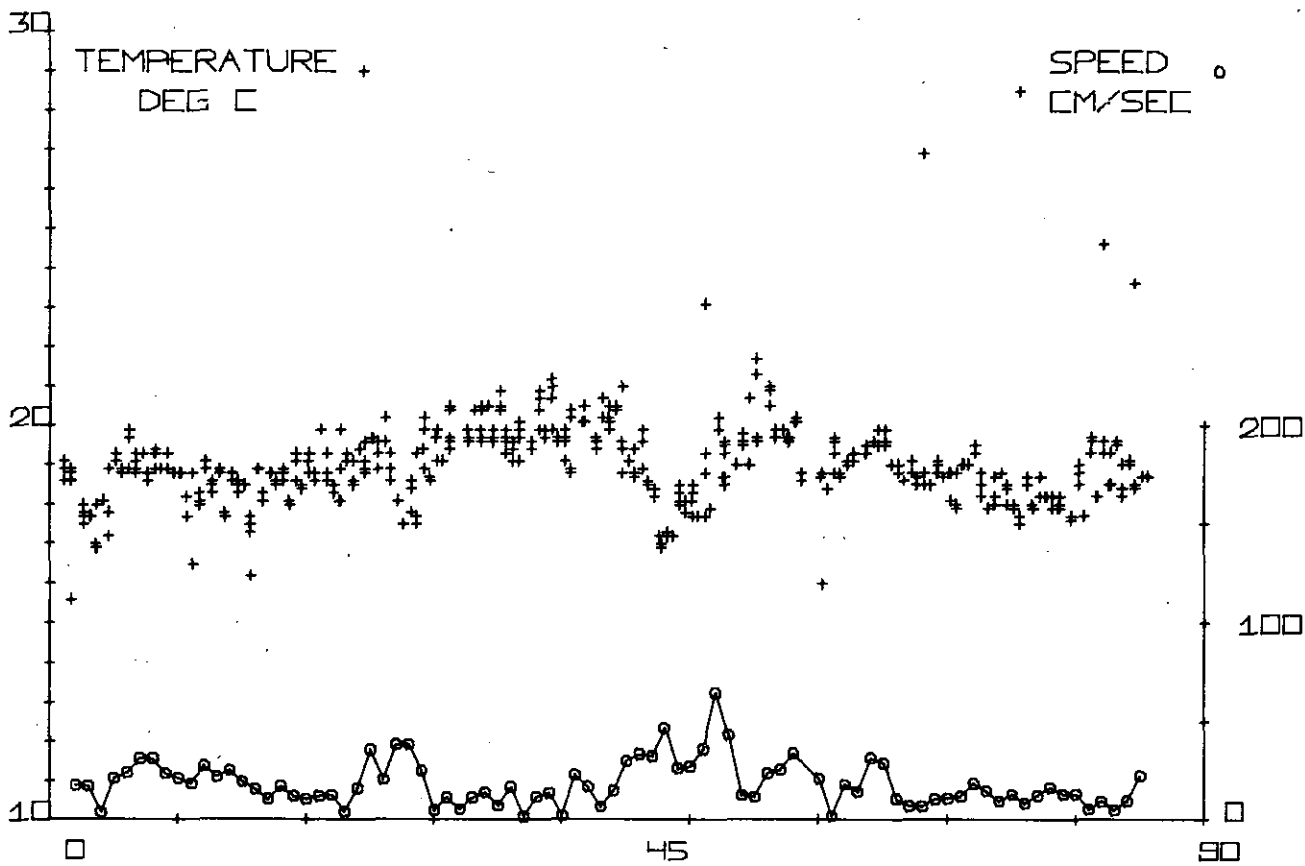
DAYS 270-380 78



BUOY 1119

DAYS

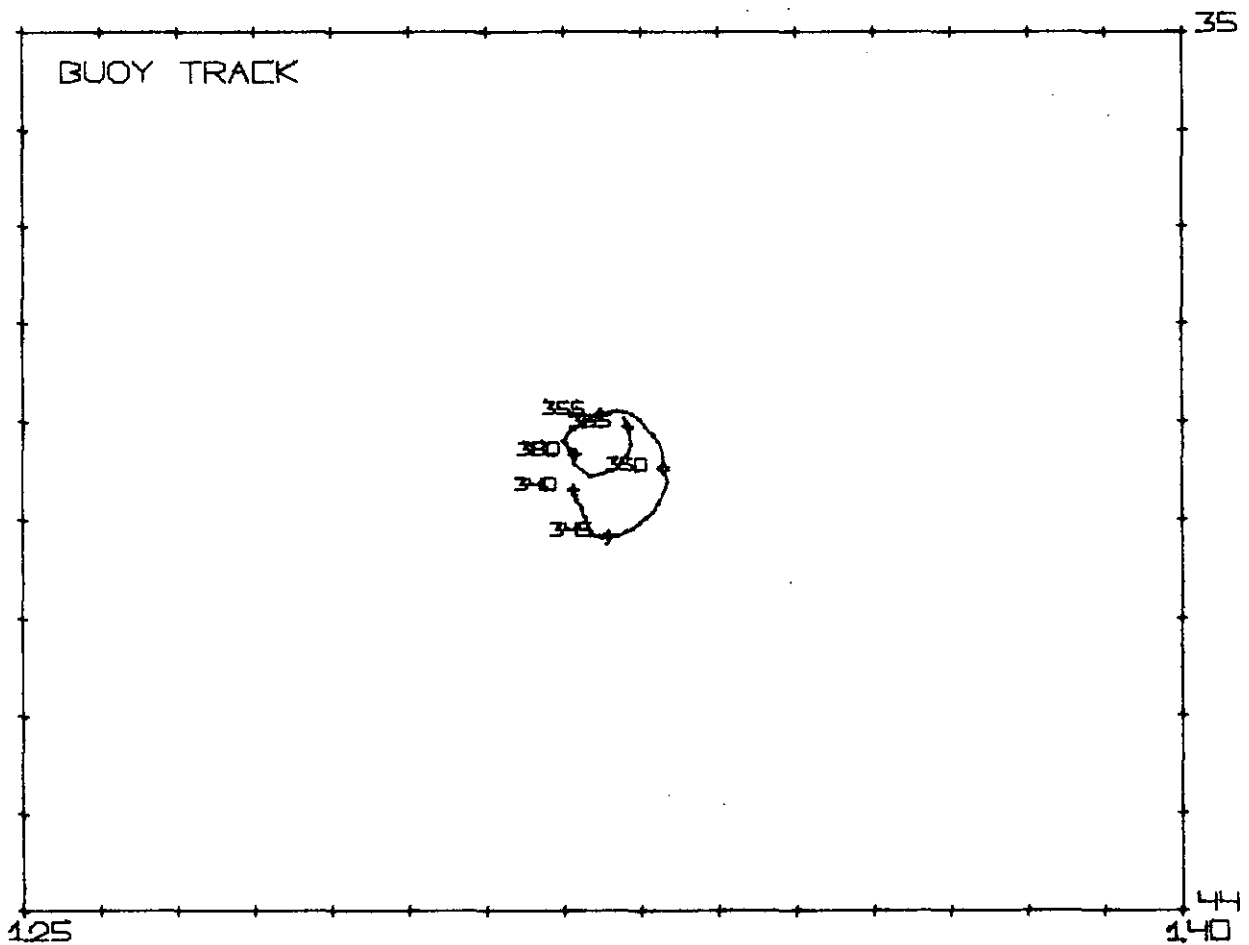
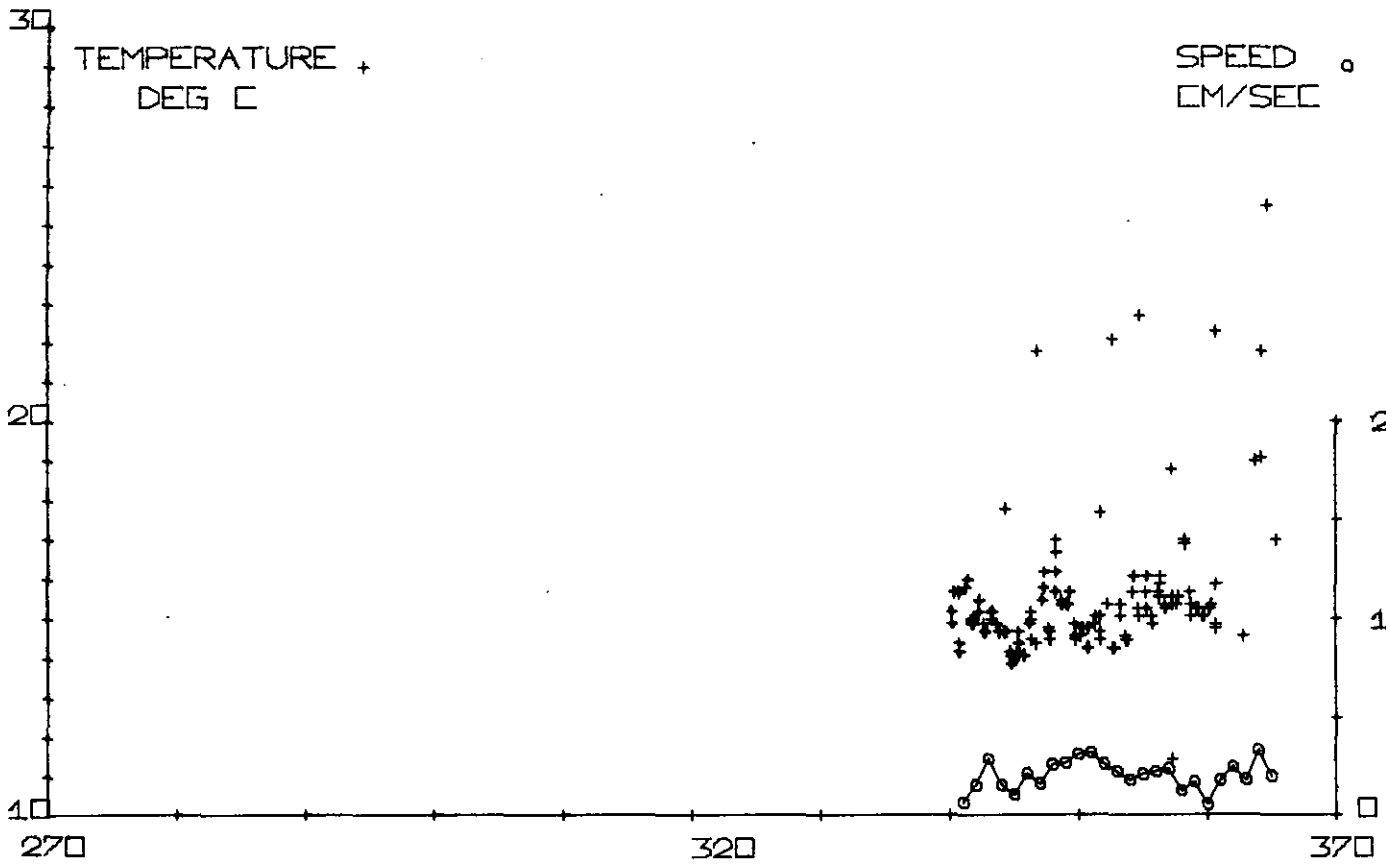
0- 90 79



(v) Buoys tracked in the Great Australian Bight.

BUOY 1111

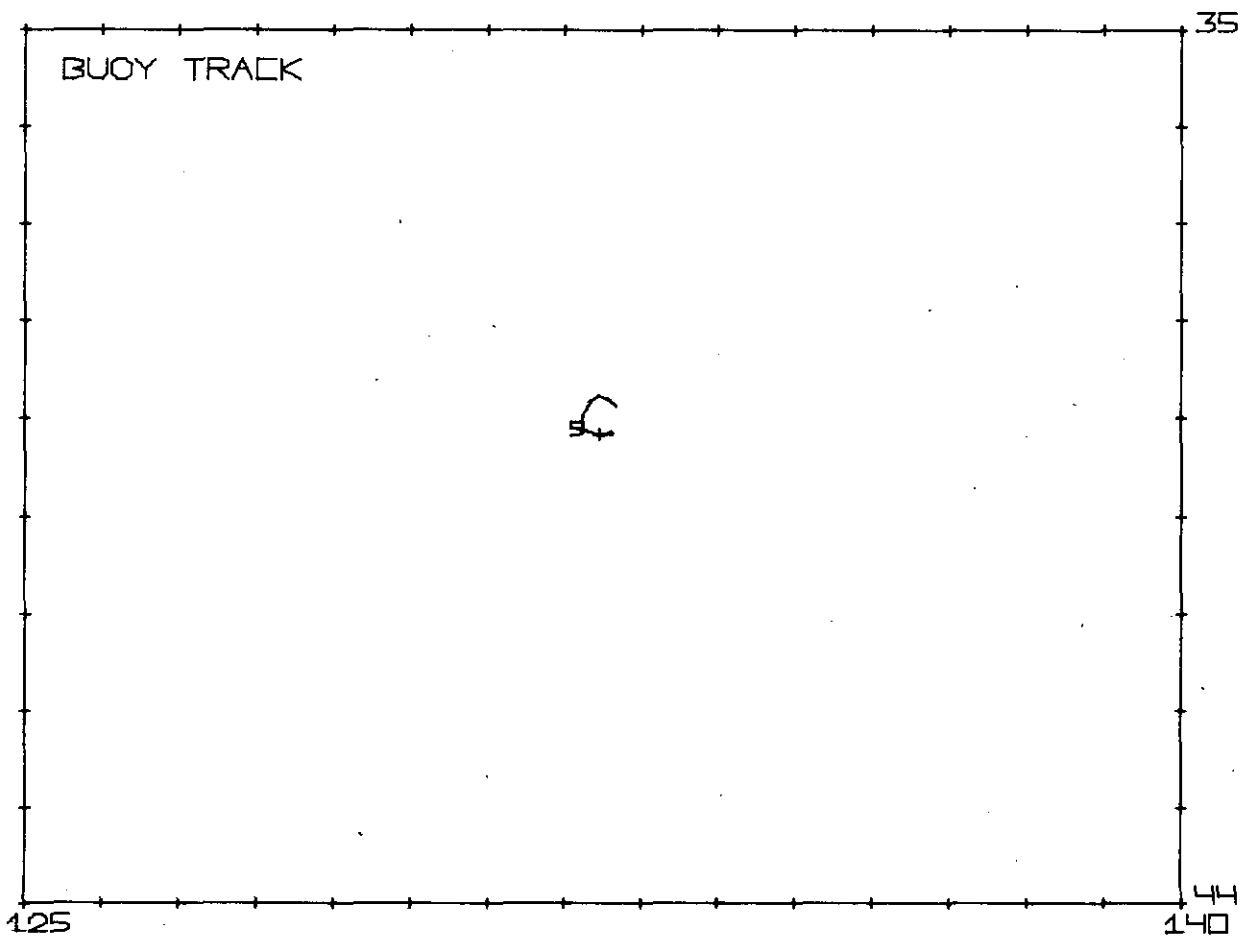
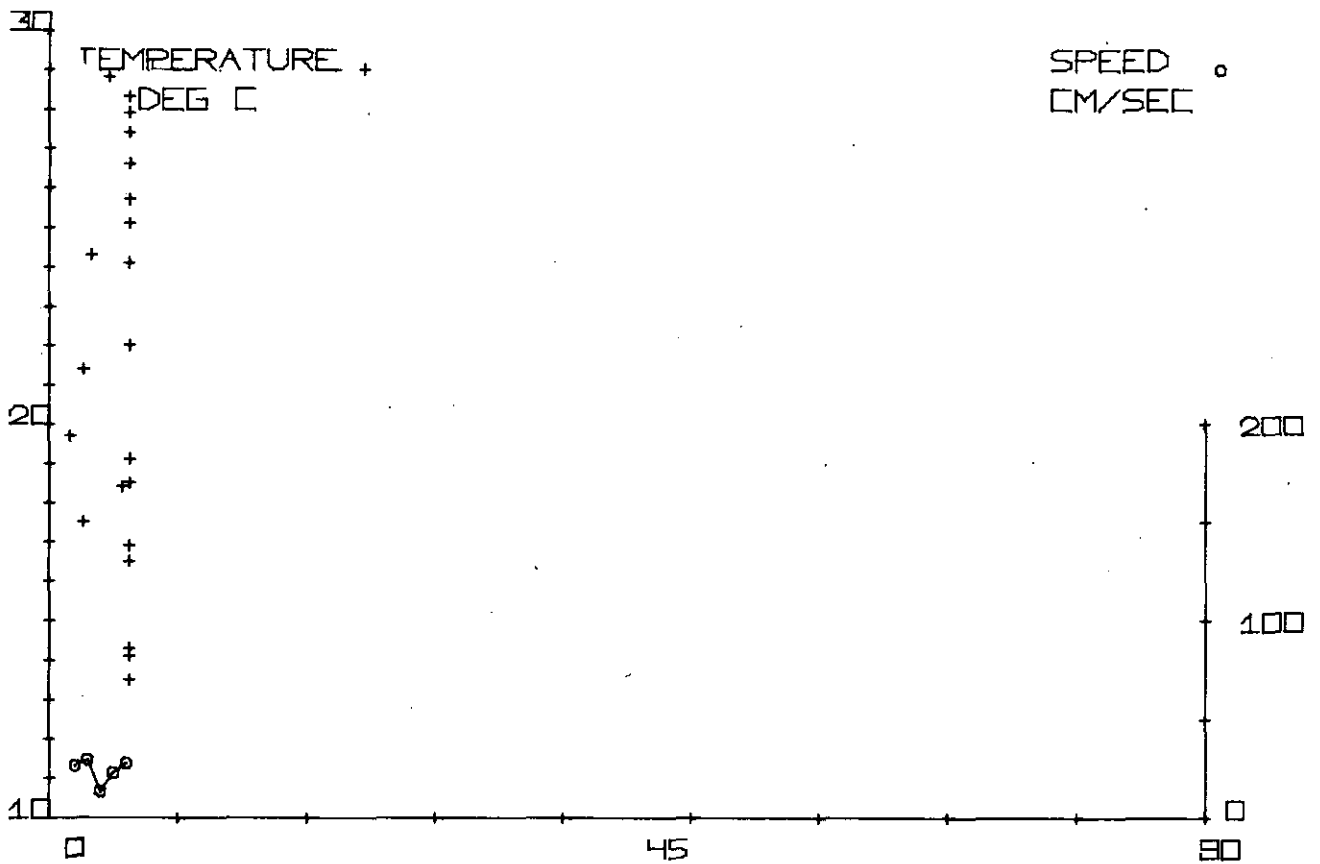
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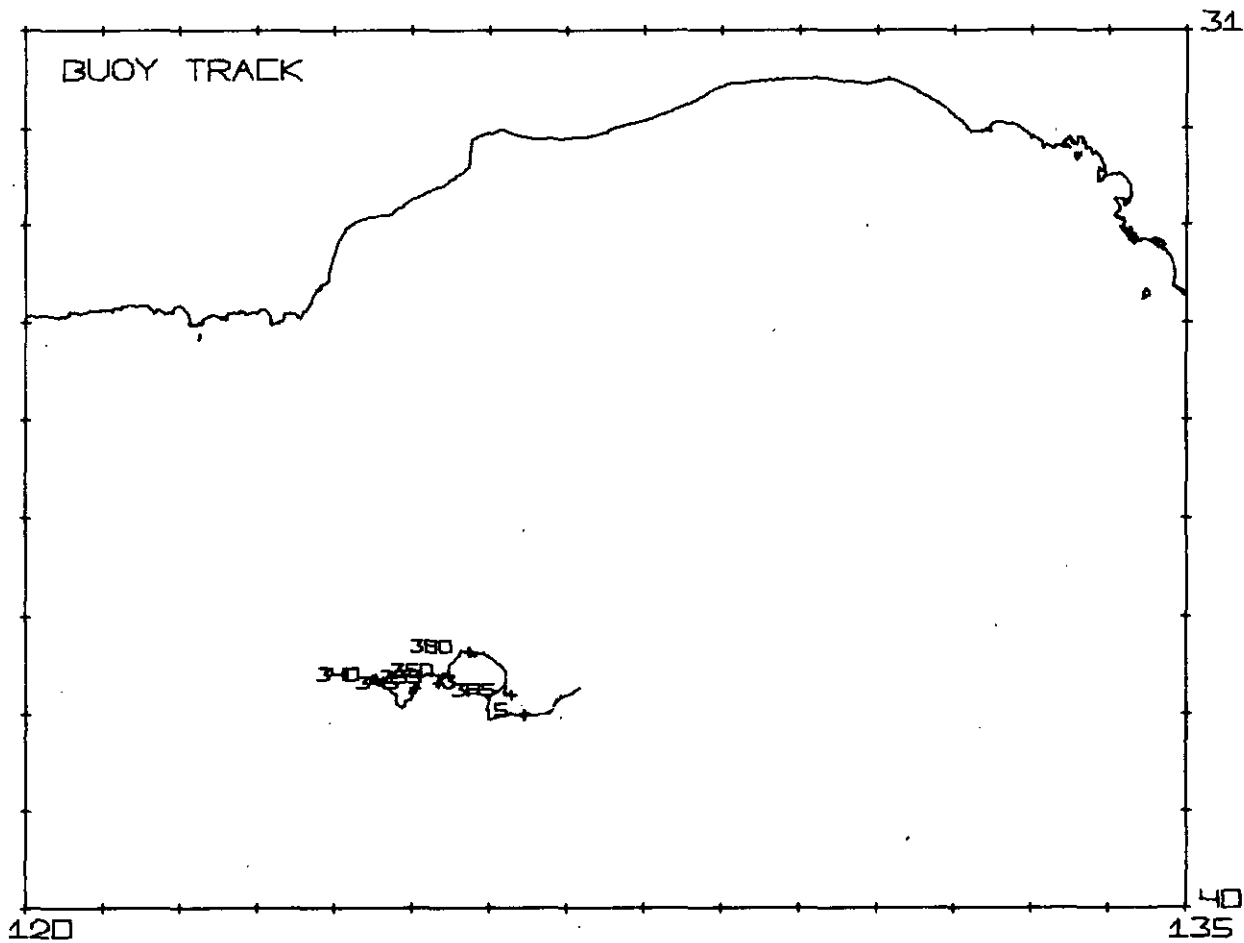
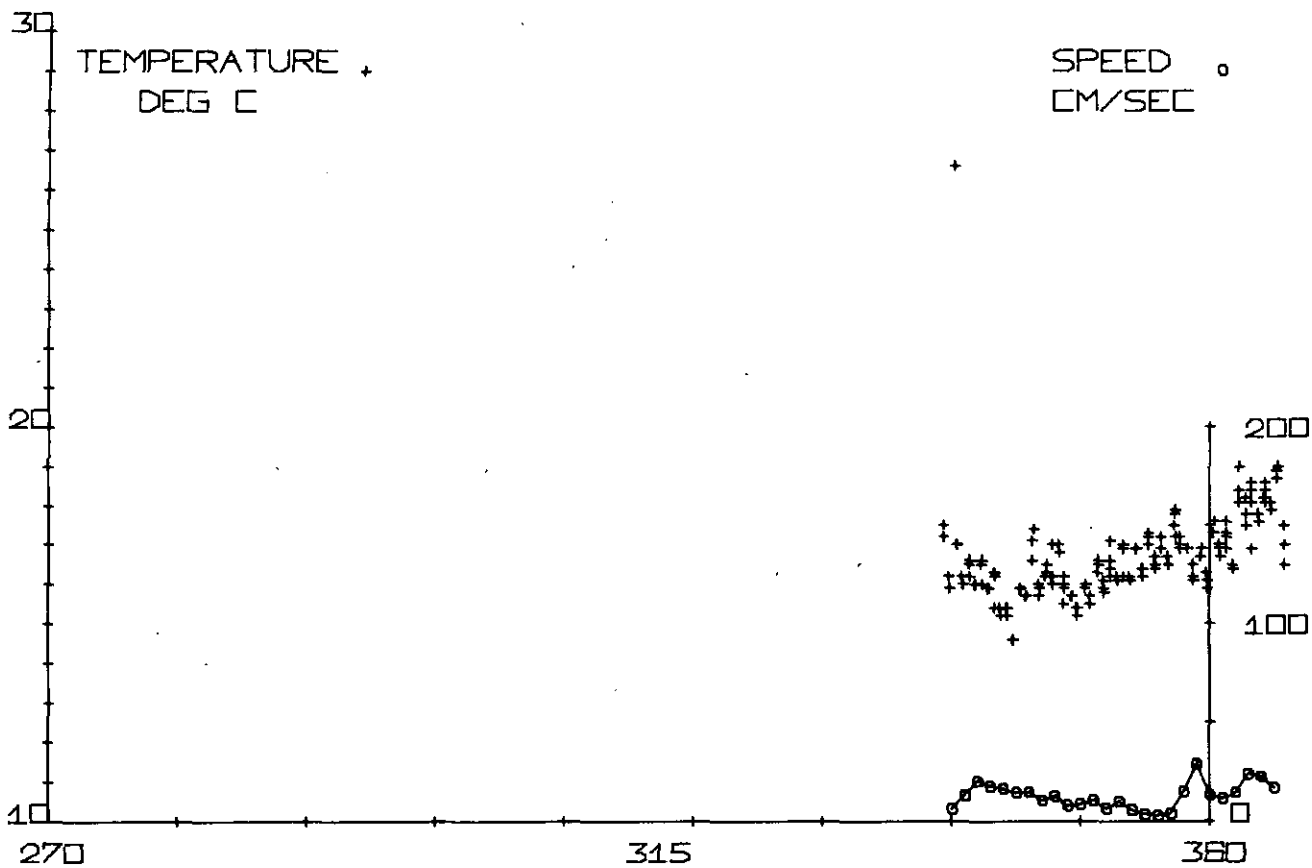
DAYS

0 - 30 79



BUOY 1107

DAYS 270-360 78



CSIRO
Division of Fisheries and Oceanography

HEADQUARTERS

202 Nicholson Parade, Cronulla, NSW
P.O. Box 21, Cronulla, NSW 2230

NORTHEASTERN REGIONAL LABORATORY

233 Middle Street, Cleveland, Qld
P.O. Box 120, Cleveland, Qld 4163

WESTERN REGIONAL LABORATORY

Leach Street, Marmion, WA 6020
P.O. Box 20, North Beach, WA 6020