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REPORT 180

**Satellite-tracked Buoy Data,
July 1982 to September 1984**

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SATELLITE-TRACKED BUOY DATA, JULY 1982 TO SEPTEMBER 1984

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Abstract

Track, speed, and sea surface temperature data were recorded by buoys released near Australia. The buoys gave information on the currents on the North West Shelf, the South Equatorial Current, the Leeuwin Current, and the East Australian Current.

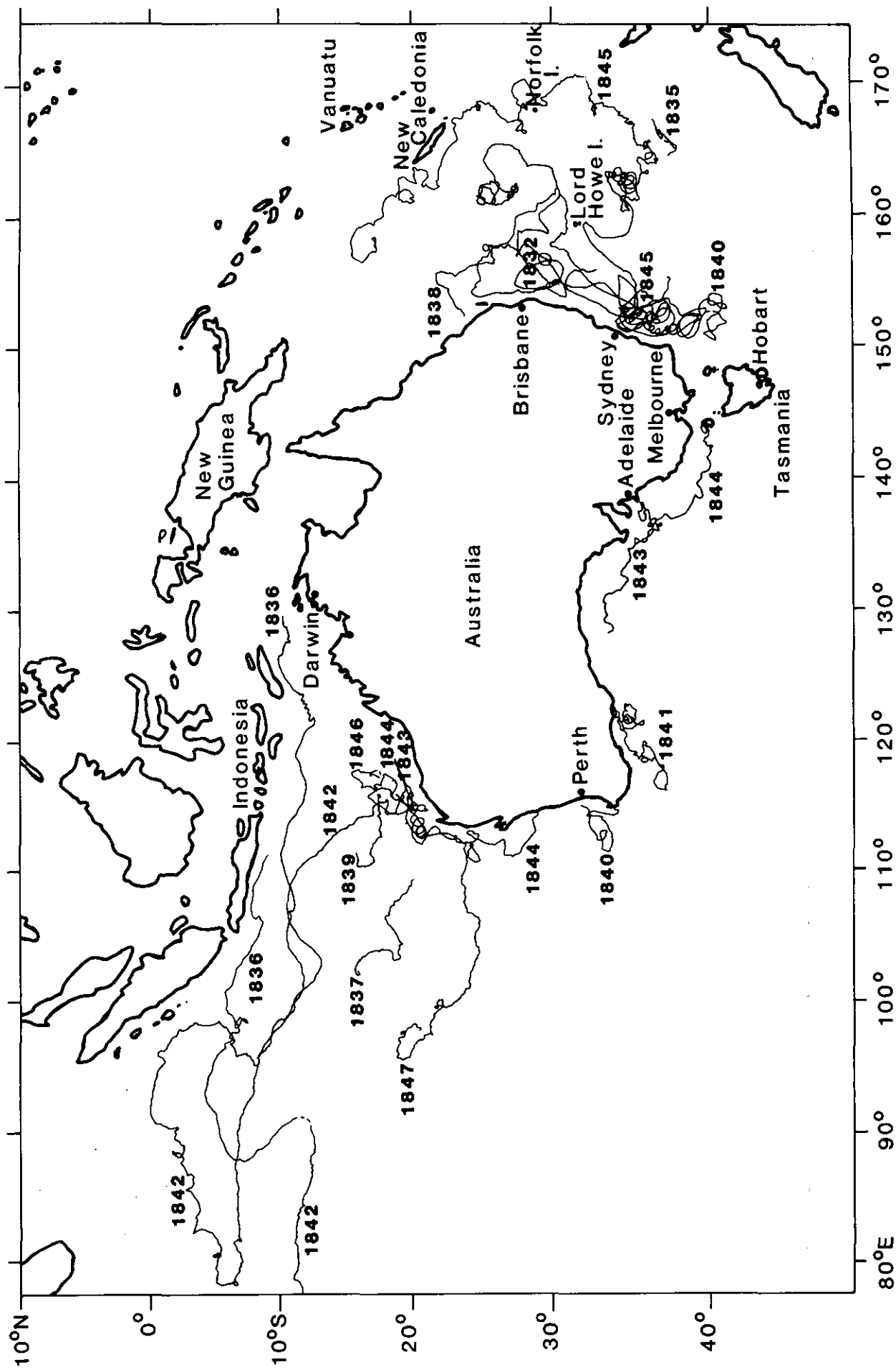


Figure 1 A composite of the buoy tracks treated in this report.

Introduction

The buoys that contributed data to this report were released to give information on water movements in the vicinity of the NW Shelf of Australia, on the Leeuwin Current off western and southern Australia, and on the contribution that eddies were making to the currents recorded by moored arrays off SE Australia. The arrays were part of ACE, the Australian Coastal Experiment, to study continental shelf waves (Freeland *et al.*, (1985)

The range covered by the buoys is given in the composite track chart in Figure 1.

Buoys

The buoys were the torpedo type as described in previous data reports (e.g. Vaudrey, Wells, and Cresswell, 1983). Unless stated otherwise the buoys were fitted with 200 metre polyethylene tether lines to their parachute drogues. Some of the buoys were fitted with mercury switches so that if they lost their drogue assemblies, then the condition of the tilt of the buoy exceeding 45° was included in the transmitted data.

The data from the buoys

The data presentation for this report is similar to that of the previous ones except that speeds are calculated between successive fixes, rather than between the first fixes on successive days. For buoys that are in strong currents this gives a good estimate of maximum speeds and speed variability. For buoys in weak currents the 1 km experimental error in the position fixes does, however, give rise to a noisy speed record.

If required, magnetic tapes of the data can be provided by the authors.

01832 was released into the ACE study area adjacent to southern NSW day 343 of 1983 and revealed anticyclonic features as well as northerly currents on

the eastern side of the East Australian Current (EAC) system. It most often travelled at speeds less than 0.5 ms^{-1} . It continued to operate beyond the end time of this report. It was not fitted with a tilt sensor.

01835 was released in December 1980 and was described in earlier reports in this series. Its earlier intermittent faults continued and the buoy ceased transmitting around day 260, 1982. It was not fitted with a tilt sensor.

01836 was released on day 131 of 1983 and had a drogue depth of 20 metres. It accelerated to reach speeds in excess of 1 ms^{-1} while it was in the channel between Timor and NW Australia. The buoy was carried from 129° E to 95° E in the South Equatorial Current of the Indian Ocean and then reversed direction around day 315 of 1983 to travel back to the east. Note, however, that while the buoy did not have a tilt sensor, the temperature record from day 303 onward suggests that the buoy was partly on its side due to losing its drogue assembly. In addition, there was a drastic reduction in the charging current from the solar panel. Restricting our comments to the period before this, the buoy speeds were generally less than 0.5 ms^{-1} , but on several occasions exceeded 1 ms^{-1} , and on one occasion 1.5 ms^{-1} . The temperature record occasionally showed a diurnal variation of 1°C or less.

01837 had been released with a 20 metre tether line off the NW Shelf on day 89 of 1982. It had battery charging problems from the time of release, stopped working on day 122, and then started to work again from day 203 through until 257. Its track suggested inflow into the South Equatorial Current. It was not fitted with a tilt sensor.

01838 was released into eddy Mario in mid-1981 and has been described in the two previous reports. It drifted into the southern Coral Sea and ran aground on Lady Fairfax Island in the Great Barrier Reef on day 312 of 1982. It was recovered by RV 'Sprightly'. This buoy did not have a tilt sensor. Examining its speed record in this and the previous data report suggests that the drogue may have been lost on about day 147 of 1982.

01839 was released on day 127 of 1982 on the NW Shelf with a 20 metre tether line and was described in Report IX. It failed for unknown reasons on day 241. It was in the process of being carried to the west, possibly as part of the inflow to the South Equatorial Current. The tilt sensor was intermittently activated for the whole of the buoy's voyage.

01840 was released on day 130 of 1982 off NW Cape and was described in the previous report. It had a 20 metre tether line. It was carried southward at up to 1 ms^{-1} in the Leeuwin Current and was off Fremantle at 32° S at the start of this report period (day 180, 1982). The buoy was then carried out to sea and entered an anticyclonic eddy in a manner very similar to that seen some years earlier (Cresswell, 1977). The buoy escaped from the eddy and ran aground on day 204 between Capes Naturaliste and Leeuwin. While in the eddy it attained speeds in excess of 1 ms^{-1} and then a speed of 1.8 ms^{-1} shortly after escaping.

The tilt sensor was intermittently activated between days 149 and 170, but indicated no buoy tilt before and after this time until on day 203 when it was ten nautical miles off the coast. The track and temperature record for the whole buoy voyage would suggest that the buoy kept its drogue until the last day. The uncertainty is difficult to resolve.

The buoy was refurbished and released into the ACE study area with a 200 metre tether line on day 293, 1983. It was particularly useful because it enabled the rapid movement of an eddy through the region to be followed. Its temperature record revealed a diurnal signal of up to 2° C. The speeds attained by the buoy were initially quite low (0.3-0.5 ms⁻¹) because it was near the eddy centre; as it moved outward into the faster annulus of the eddy it reached speeds of 1.0-1.5 ms⁻¹.

The buoy provided useful data until day 10 of 1984, when its tilt sensor indicated that it had lost its drogue assembly. This fault had the effects, obvious in the data, of exposing the temperature sensor to the sun and atmosphere and in enabling the buoy to be moved by wind.

01841 was released with a 20 metre tether line on day 172 of 1982 off Albany, Western Australia and worked through to day 318 when it ran aground. The buoy revealed mesoscale eddies on the seaward side of the Leeuwin Current. Its transmissions were intermittent at times and the position fixes inaccurate so that the speed trace shows many spikes. The transmitter had been repaired by the manufacturer, but its frequency turned out to be unstable. The buoy did not have a tilt sensor.

01842 was released on a 20 metre tether line at 116° E off the NW Shelf on day 212 of 1982. The nature of the speed and temperature traces suggest that the buoy may have lost its drogue early in its life. The buoy rode in the South Equatorial Current and reached 78° E by the end of 1982. It then reversed course to travel eastward until around day 155 of 1983 when it was at 98° E. Apart from one reversal from days 205 to 220 it drifted westward again to 75° E where it failed on day 300.

01843 was released in the Great Australian Bight with a 20 metre tether line on day 176 of 1982 and was carried eastward, possibly by the Leeuwin Current, until it ran aground on Kangaroo Island on day 255. The buoy did not have a tilt sensor.

The buoy was recovered, a tilt sensor was fitted, and it was released on the NW Shelf by FRV 'Soela' on day 104 of 1983. It only worked through until day 152, but it did reveal a flow to the SW and it entered an anticyclonic eddy with a rotation period of about 8 days on day 124. The tilt sensor was not activated during the buoy's voyage.

01844 was released south of the Eyre Peninsula by RV 'Sprightly' on day 179 of 1982. It had a tether line of 20 metres length and it drifted to the SE, running aground on King Island on day 260 of 1982. The buoy was not fitted with a tilt sensor.

The buoy was recovered, a tilt sensor was fitted, and it was later released on the NW Shelf by FRV 'Soela' on day 104 of 1983. It travelled outside the anticyclonic eddy that its sister buoy, 01843, had revealed between days 124 and 152 and then in the Leeuwin Current. Its tilt sensor was not activated until on day 237 when it was in the Abrolhos Islands. It ran aground near Geraldton on day 240 of 1983.

01845 was released on day 69 of 1983 into an eddy to the east of Jervis Bay, NSW (35° S). It stayed in the eddy until day 145 and it attained speeds sometimes in excess of 1 ms^{-1} . After this time it was carried eastward along a meandering path, perhaps one that marked the extension of the EAC, until day 200. Its eastward motion was then arrested when it entered an eddy for several months. On day 270 it recommenced its eastward progression, albeit with considerable meandering. At the start of 1984 it turned to travel northward and then northwestward passing close to both Norfolk Island and New Caledonia. The tilt sensor was not activated during the voyage. Some of the variations in speed seem quite fast and call for closer examination in the future.

01846 was released with a 20 metre tether line by FRV 'Soela' on the NW Shelf on day on day 325 of 1982. It travelled quite slowly at about 0.2 ms^{-1} and failed on day 65 of 1983. It recovered briefly between days 81 and 85 and again on day 150, by which time it had drifted westward to 18° S, 106° E. The buoy was fitted with a tilt sensor that was not activated during the voyage.

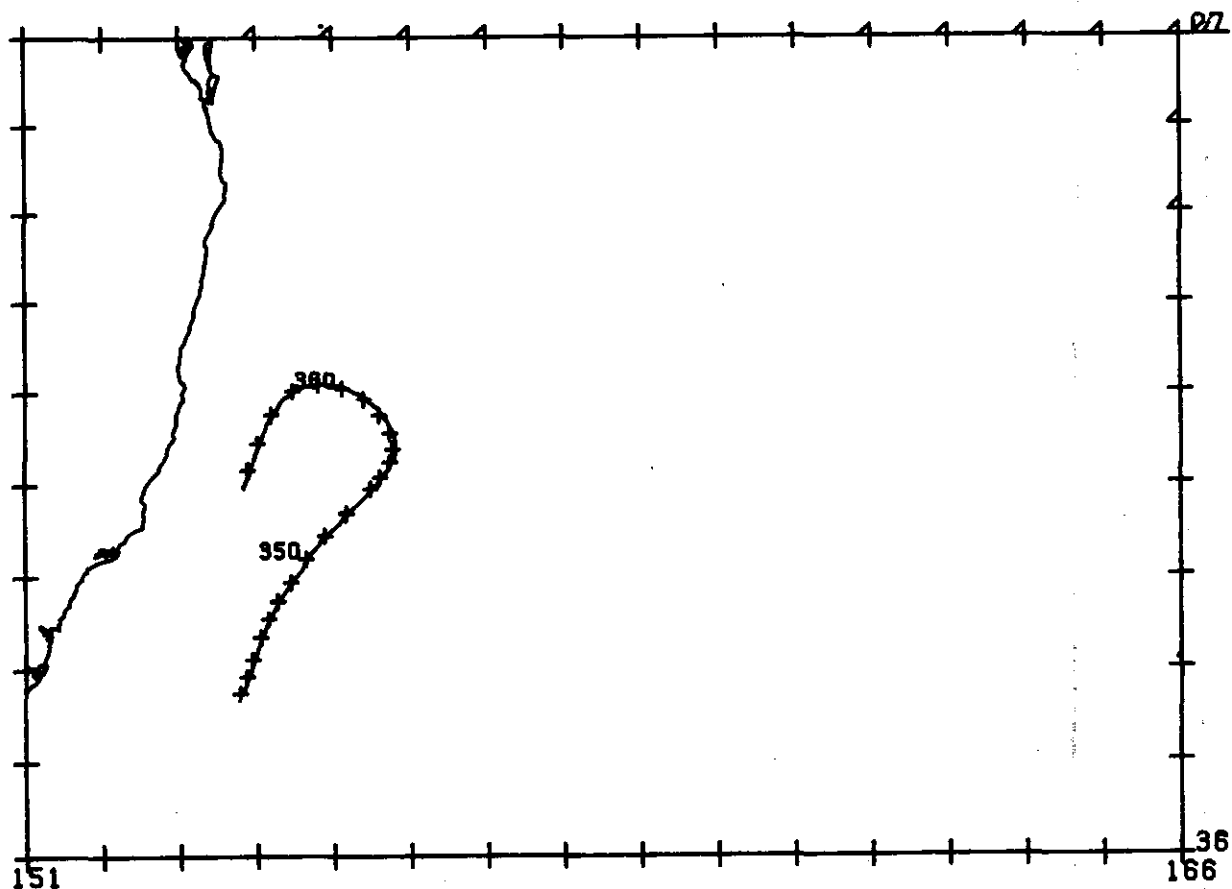
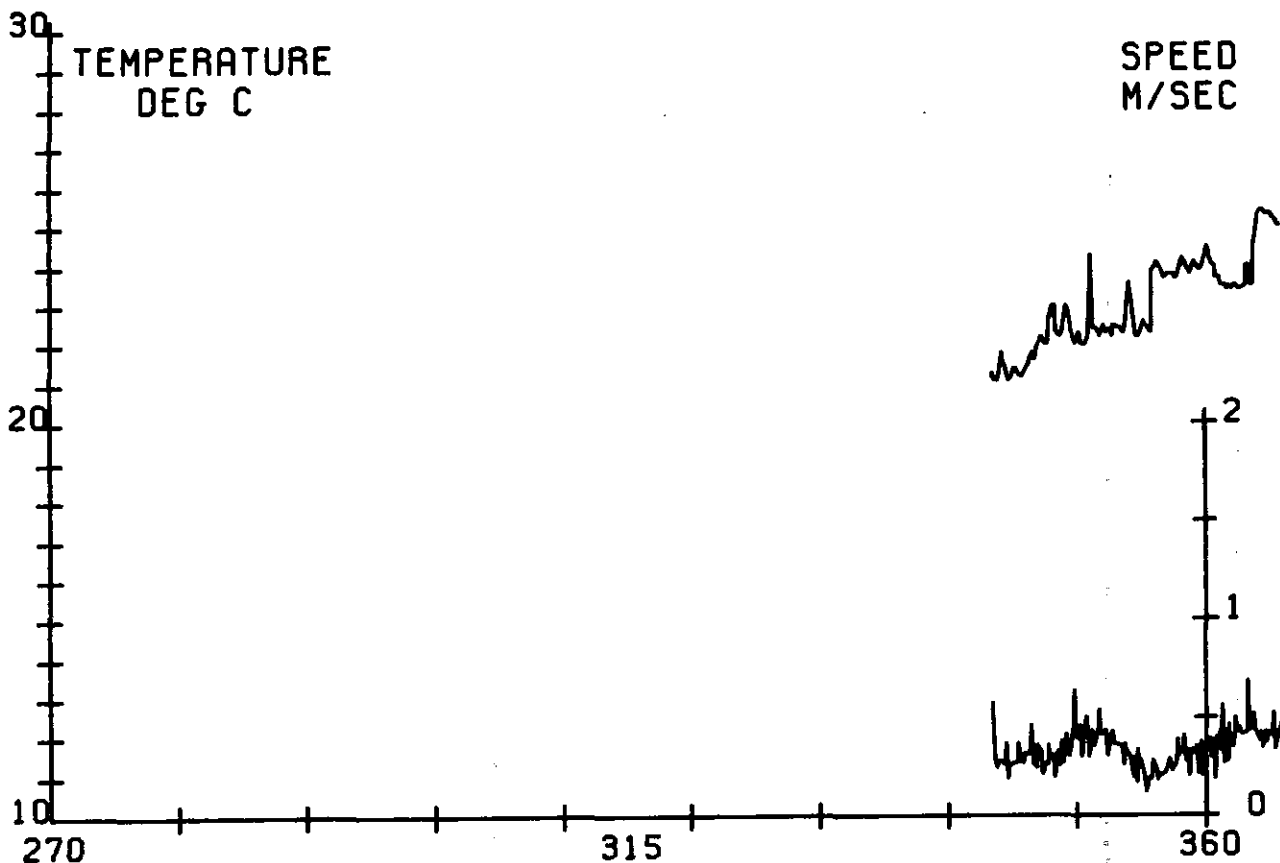
01847 was released along with 01846 on day 325 of 1982. It also had a 20 metre tether line. From day 80 of 1983 it showed consistent flows, first to the SW until day 120, probably in the Leeuwin Current, and then to the west until day 220, probably in an inflow into the South Equatorial Current. The tilt sensor indicated the loss of the drogue on day 205 and this exposed the sea surface temperature sensor to the sun and atmosphere. The buoy ceased working on day 246 of 1983.

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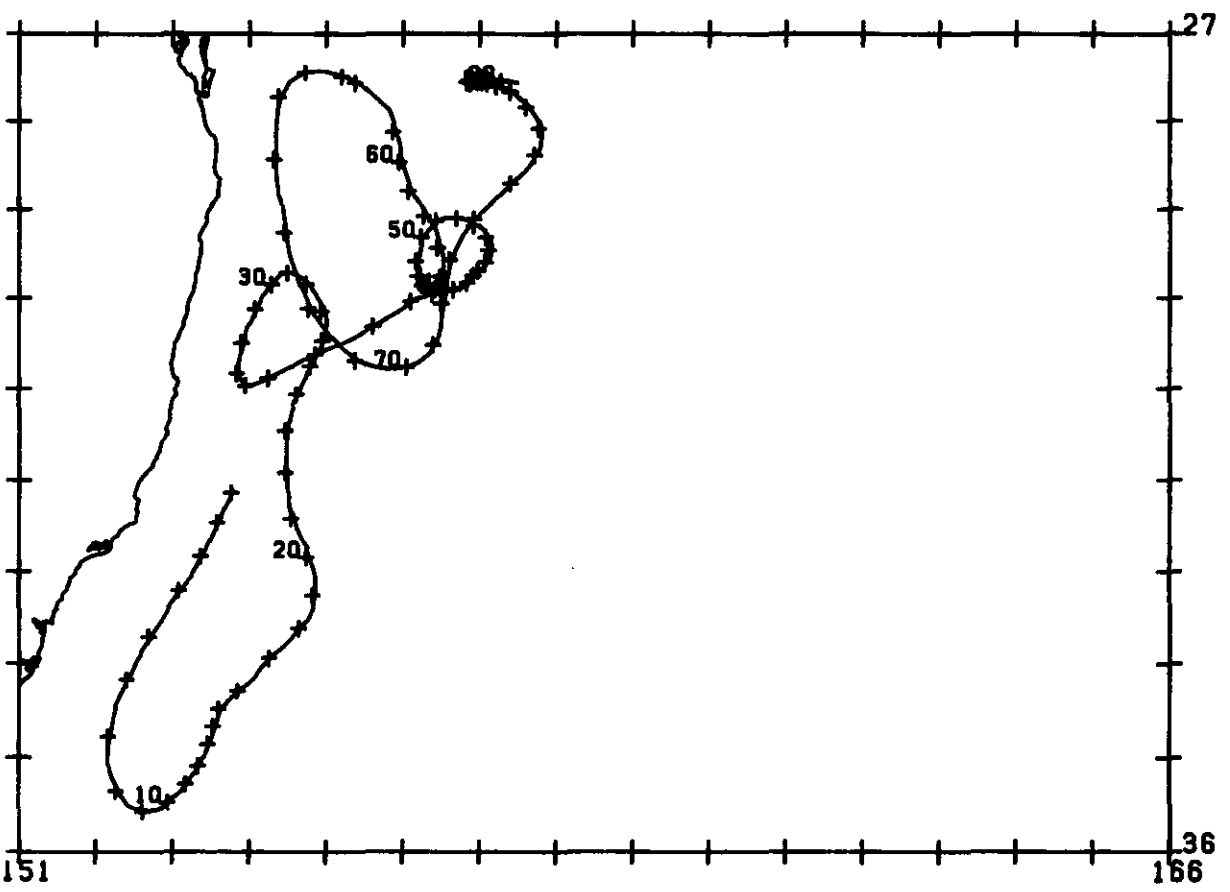
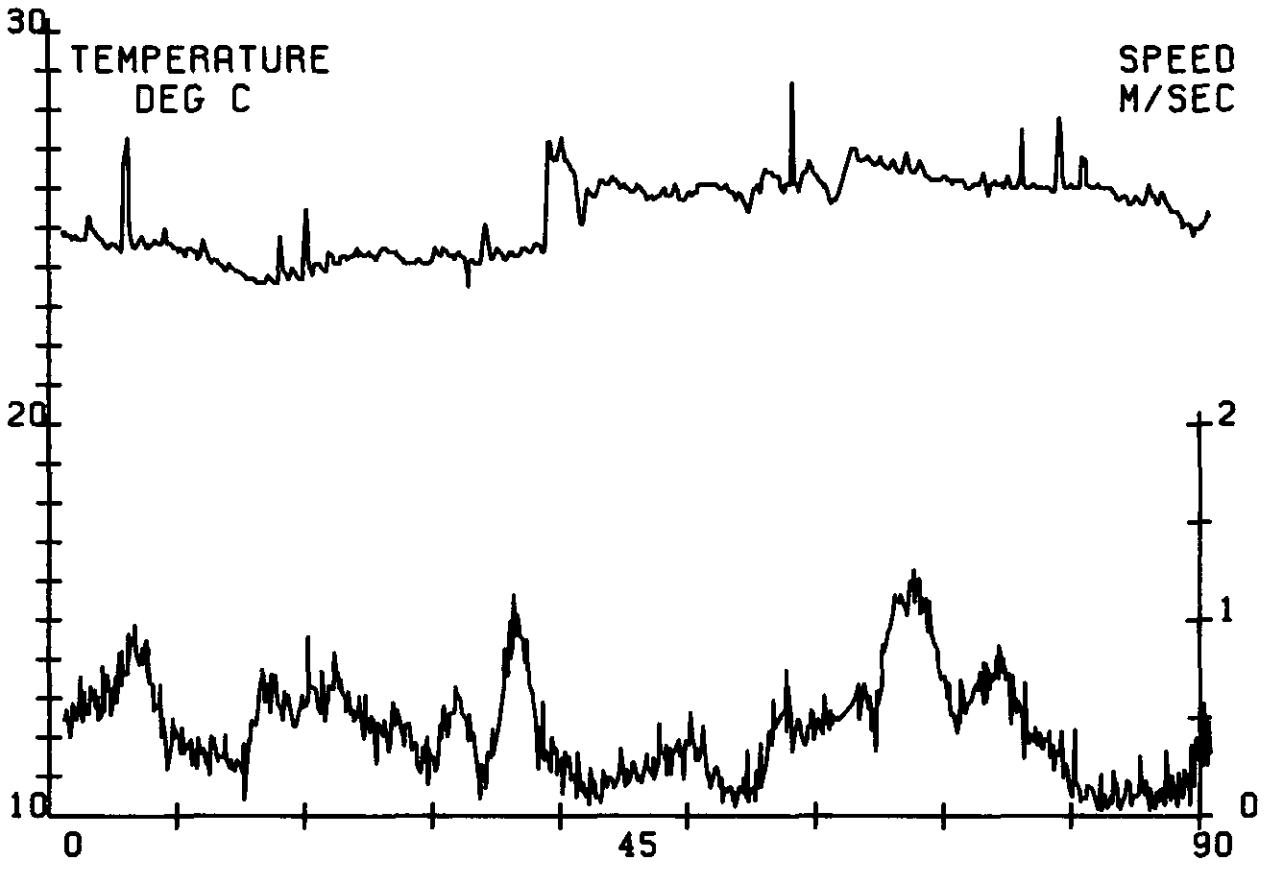
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Tracks of buoys 01832 - 01847

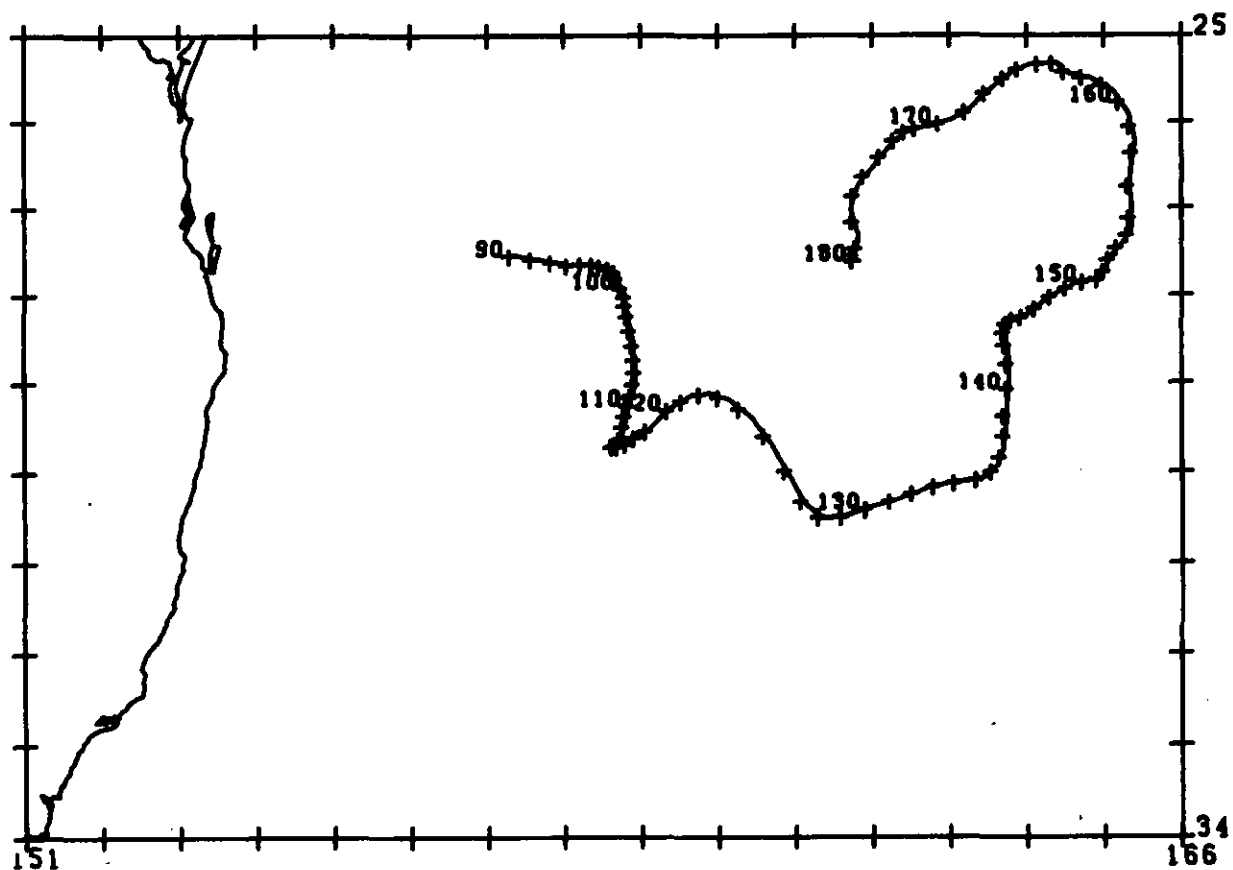
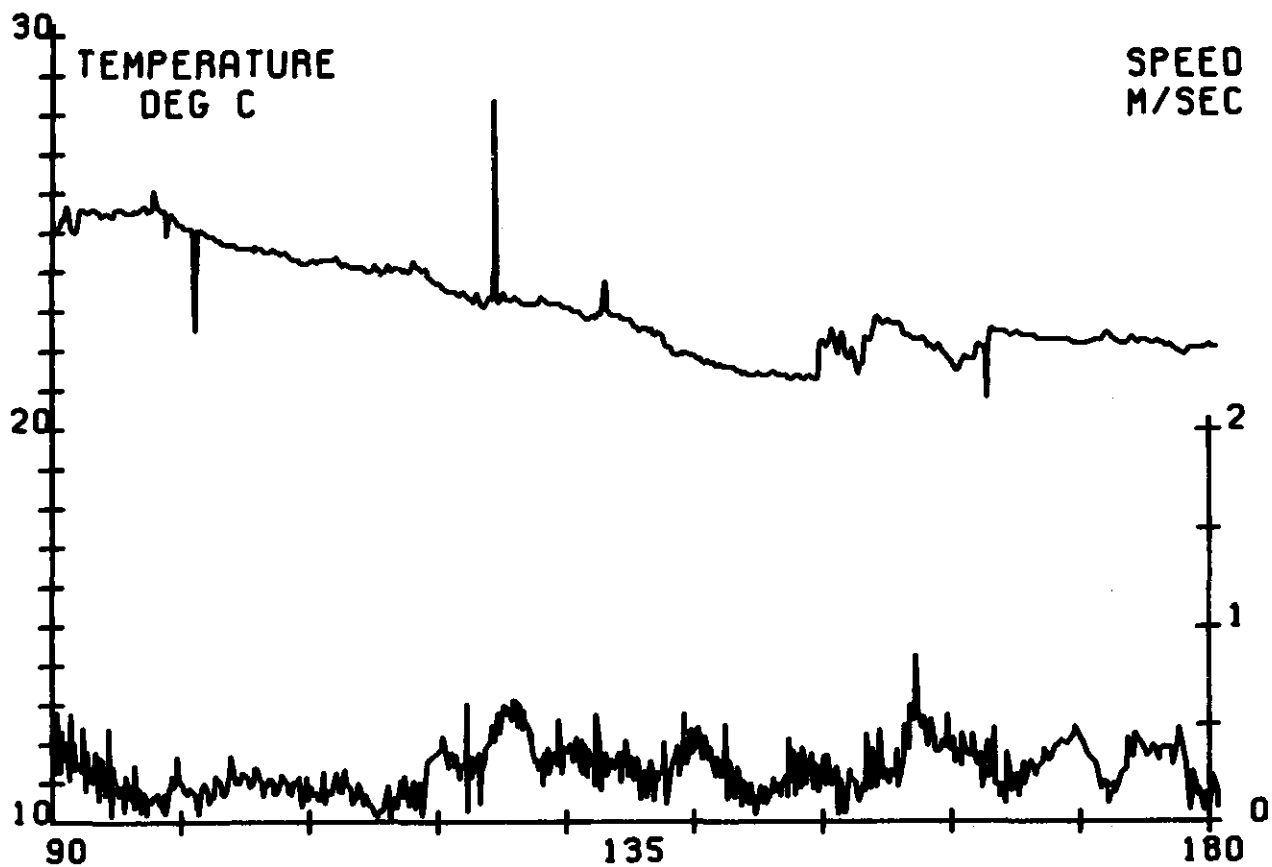
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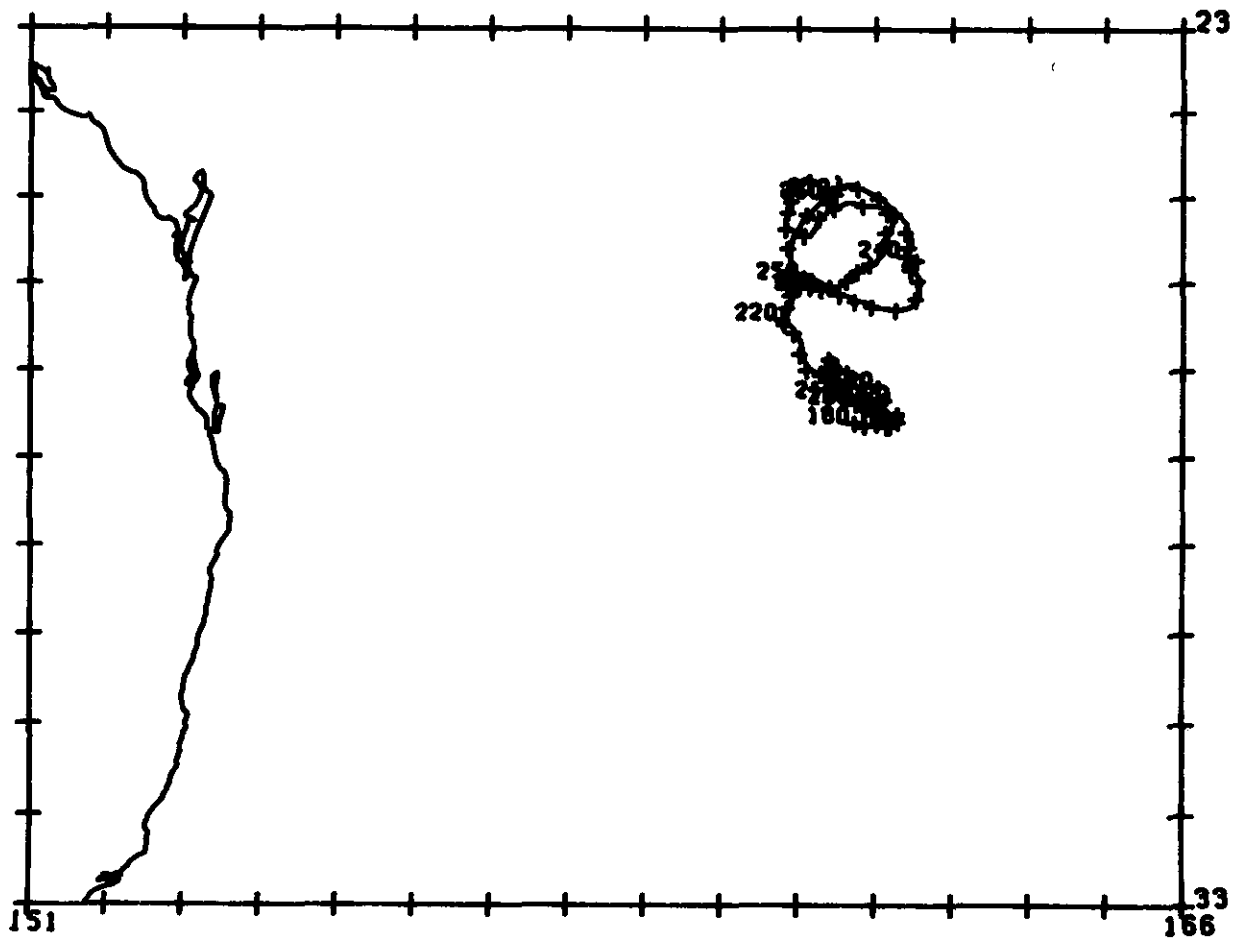
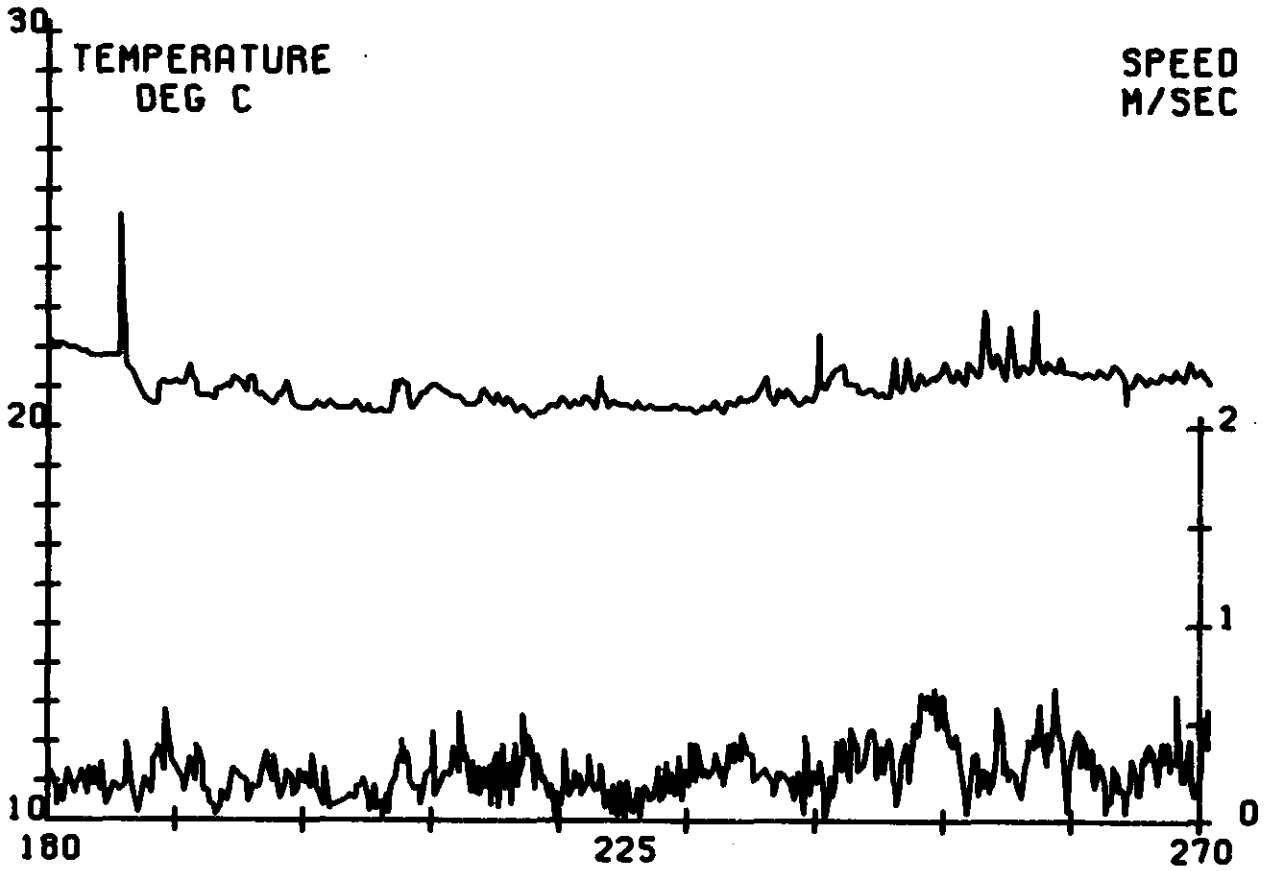
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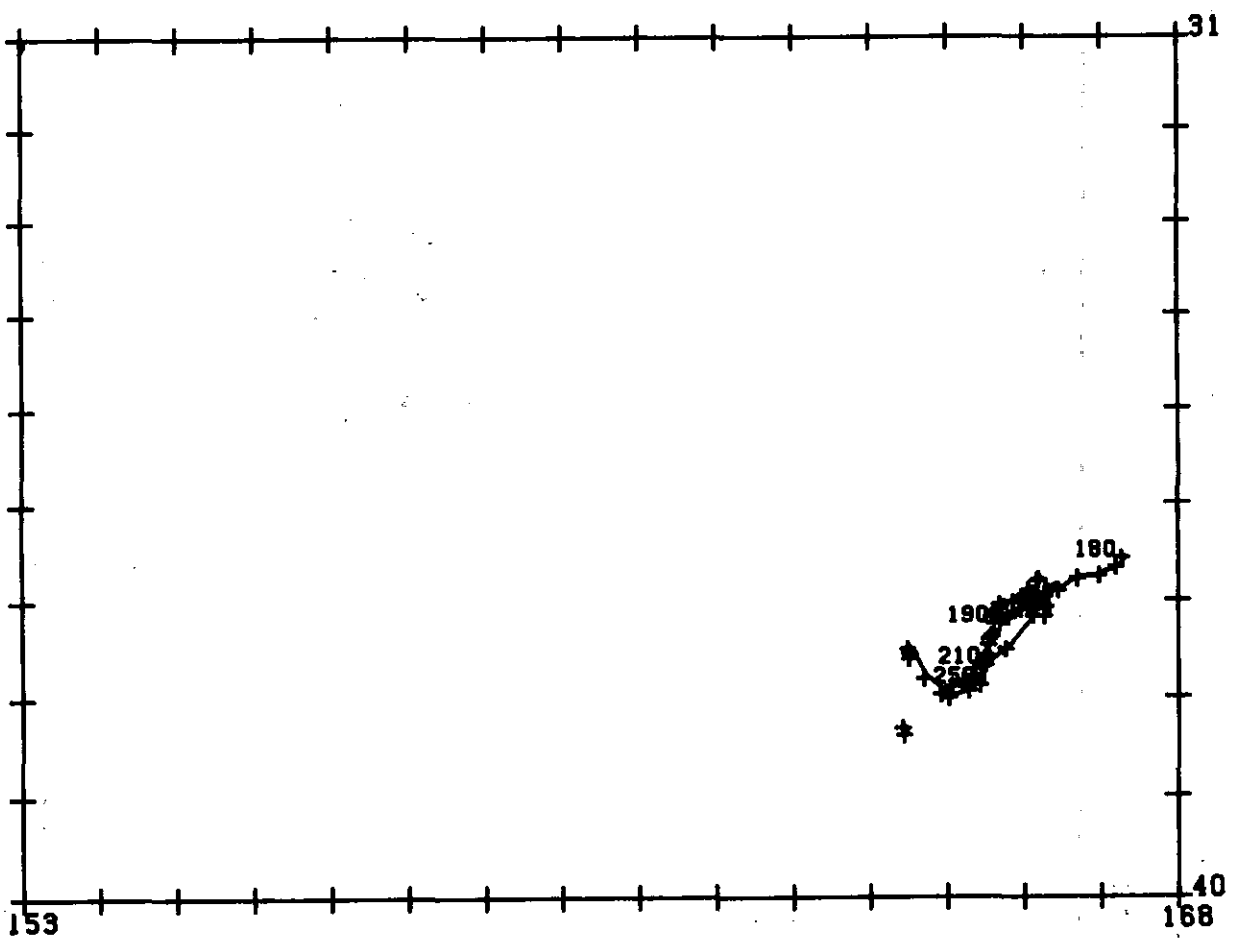
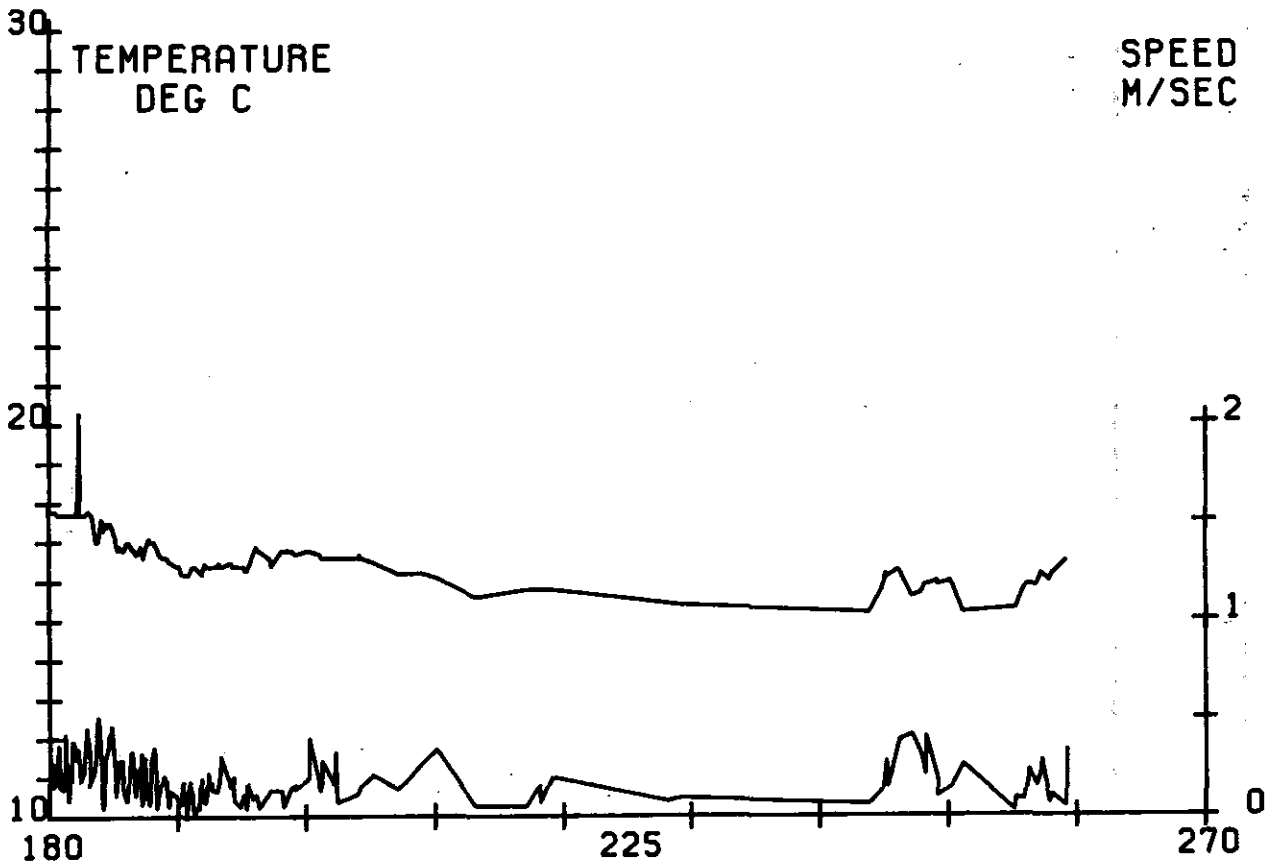
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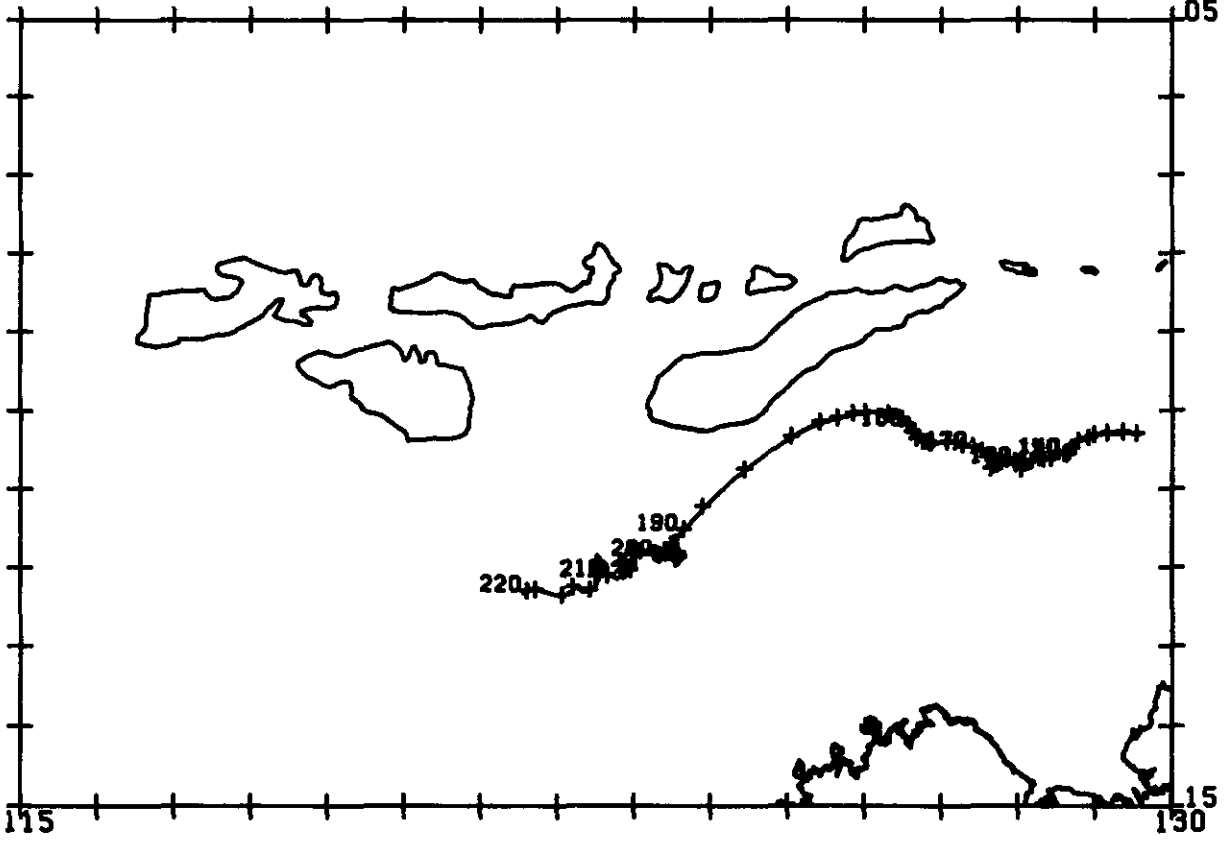
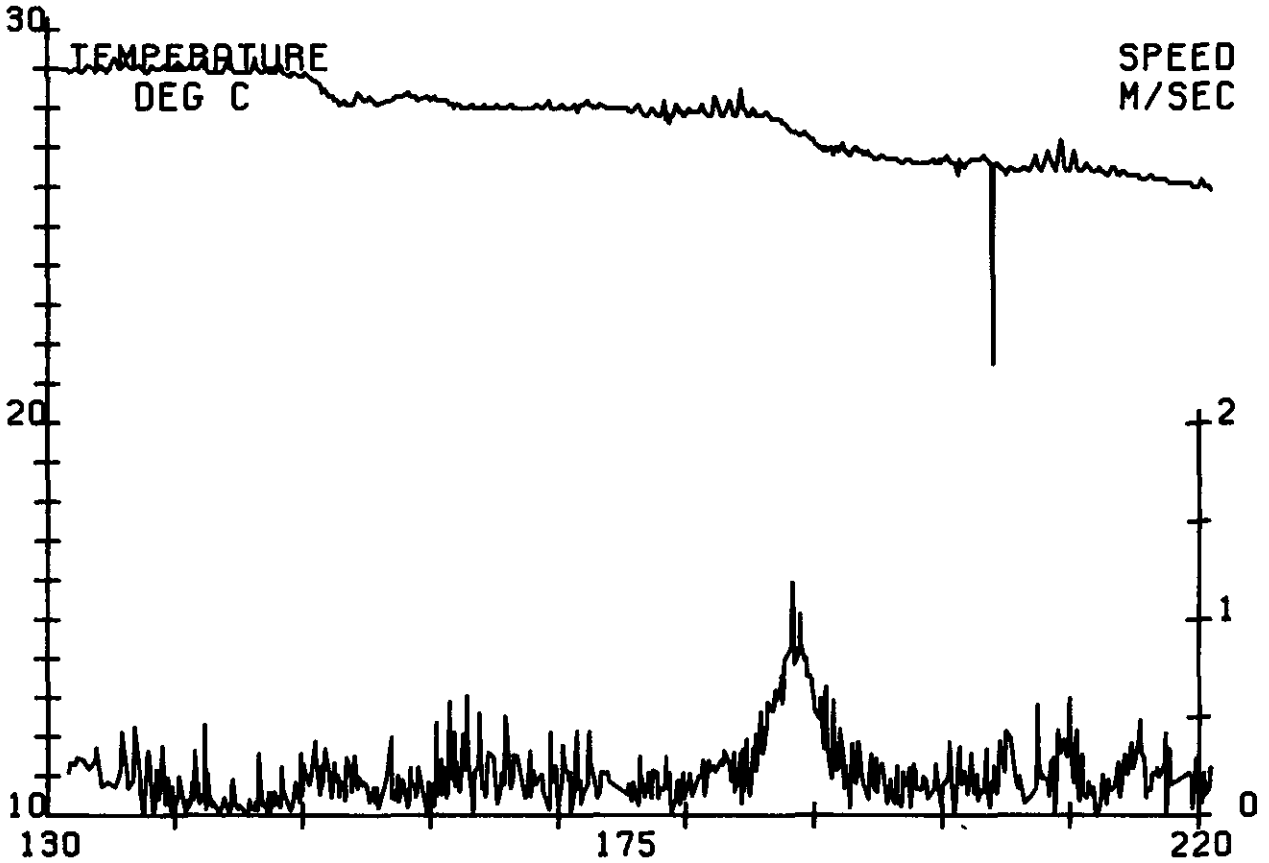
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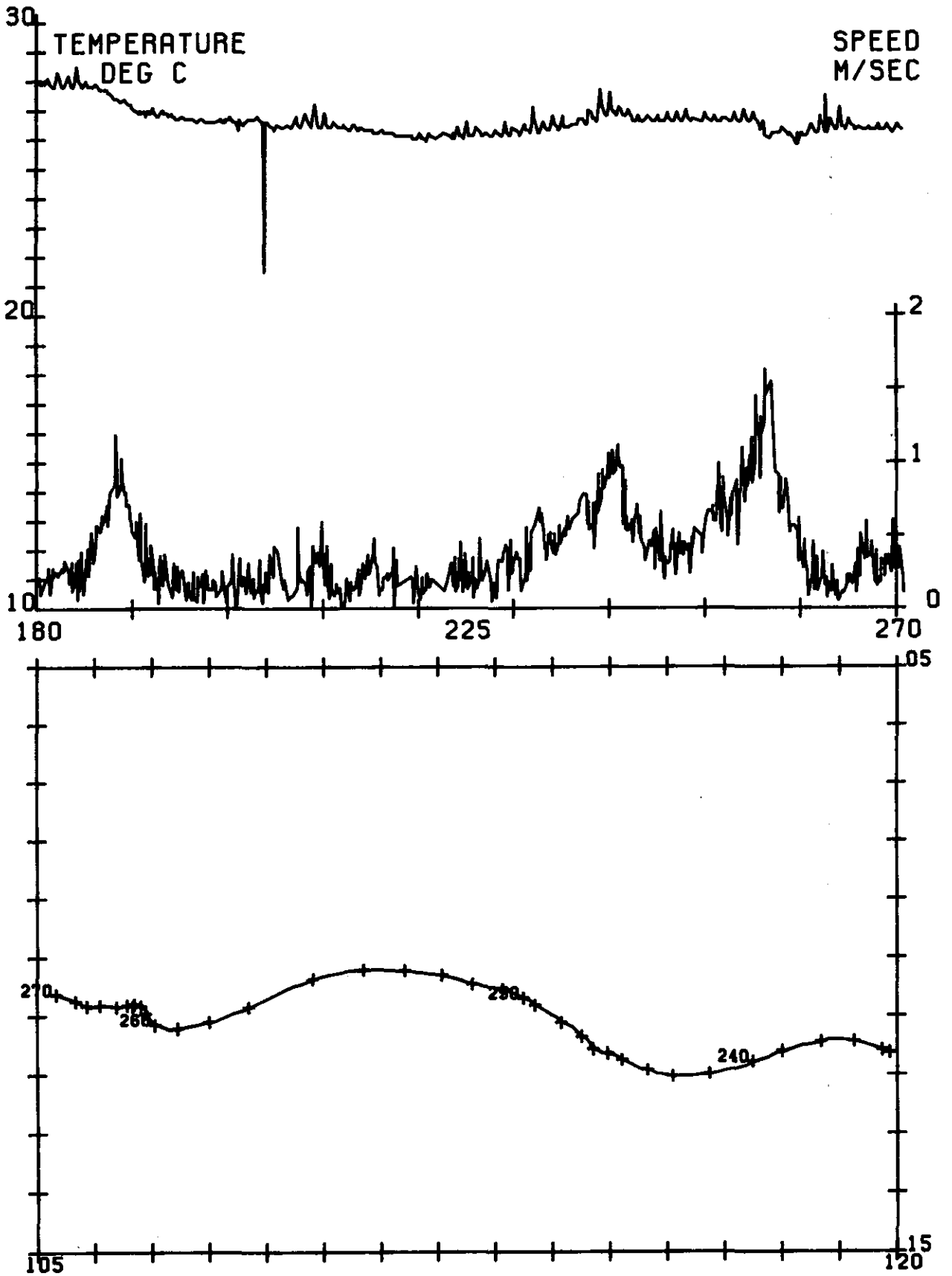
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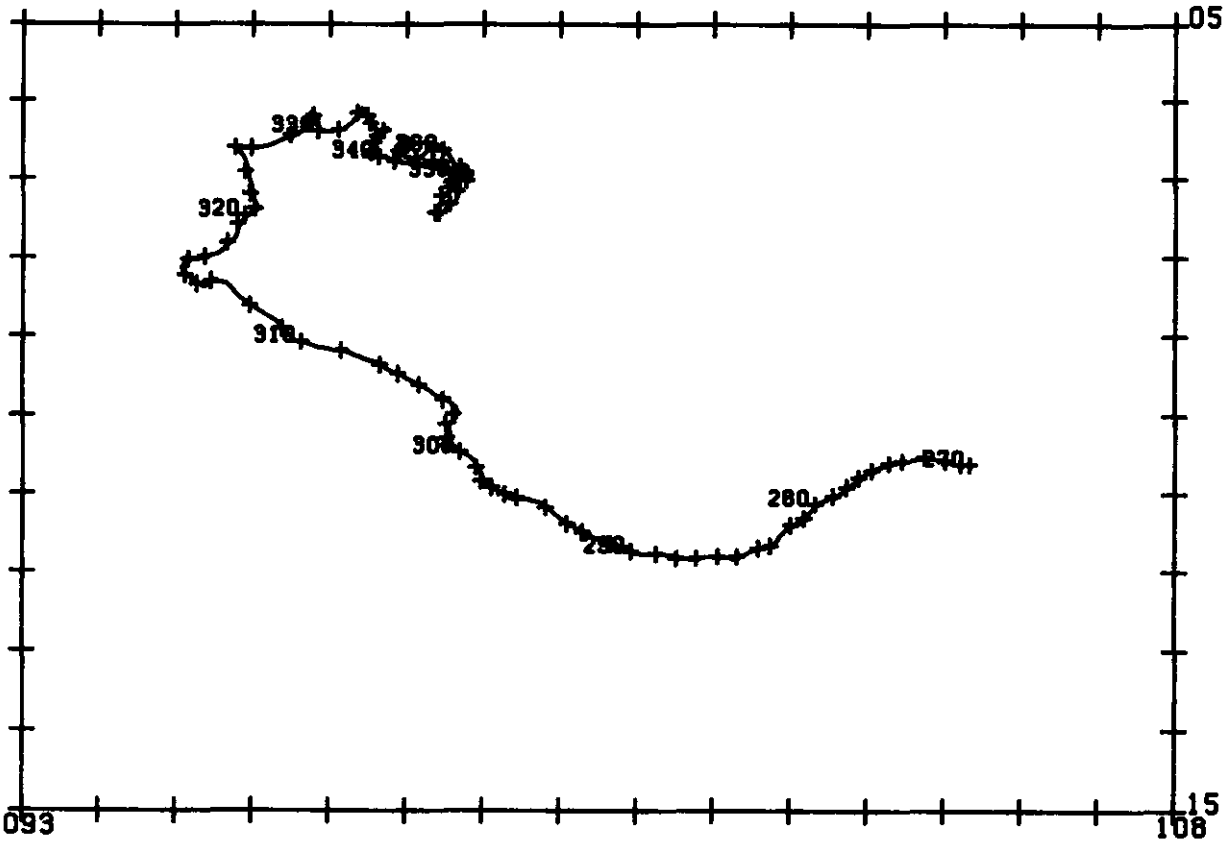
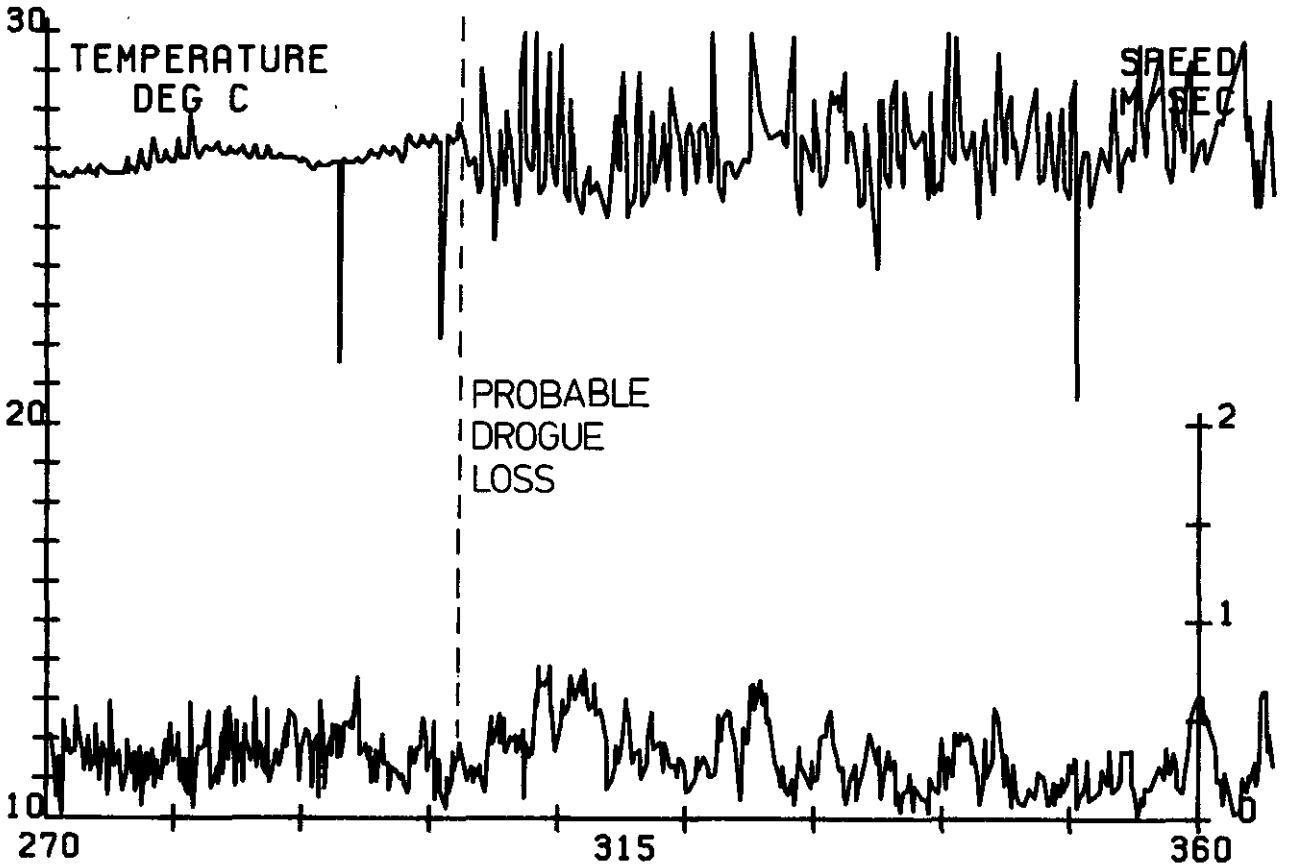
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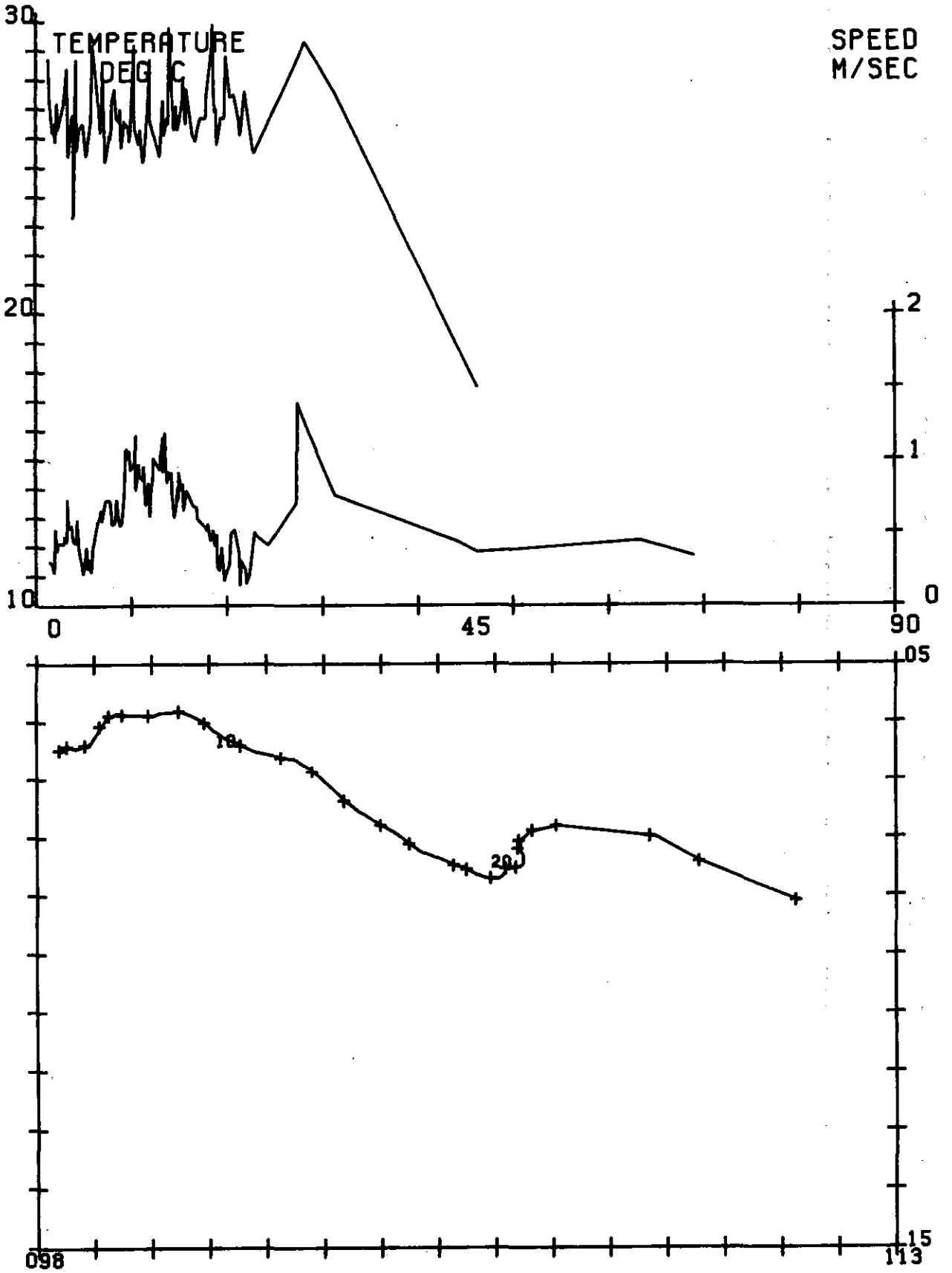
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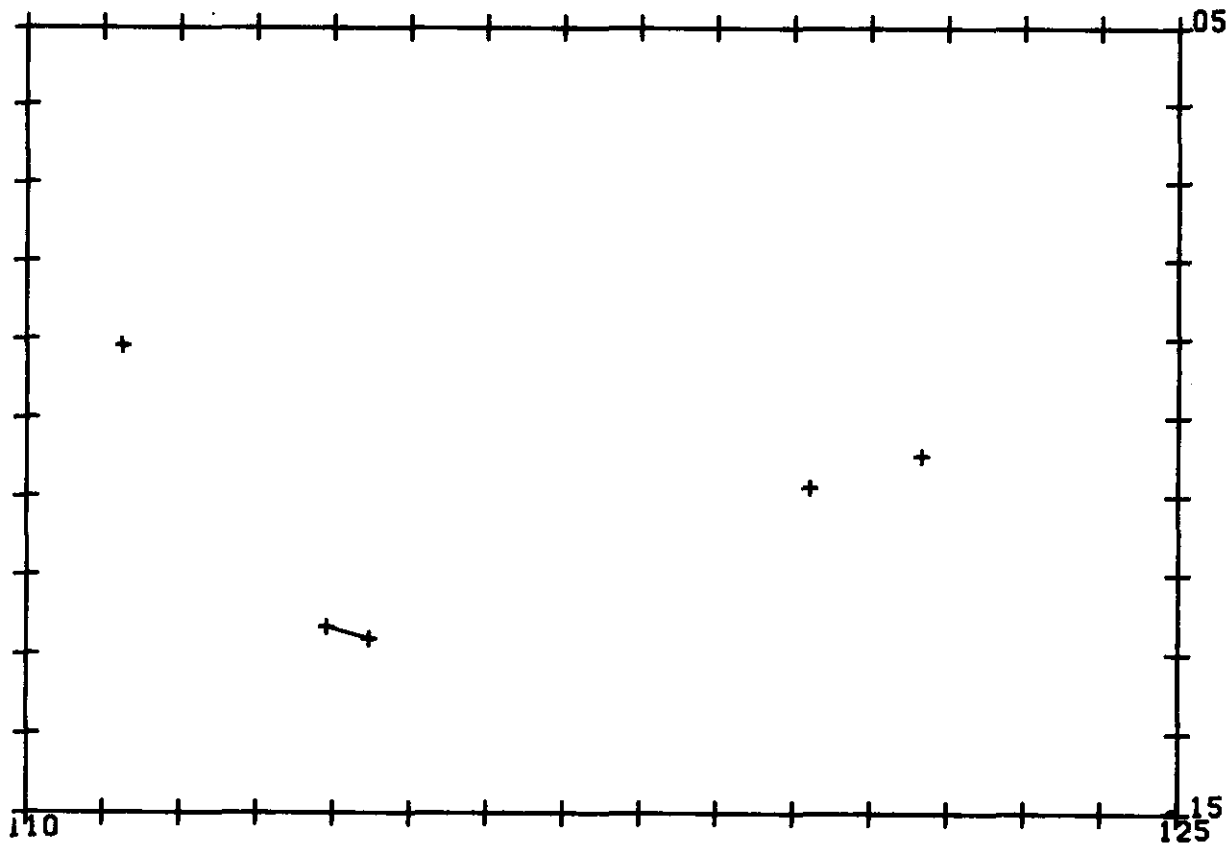
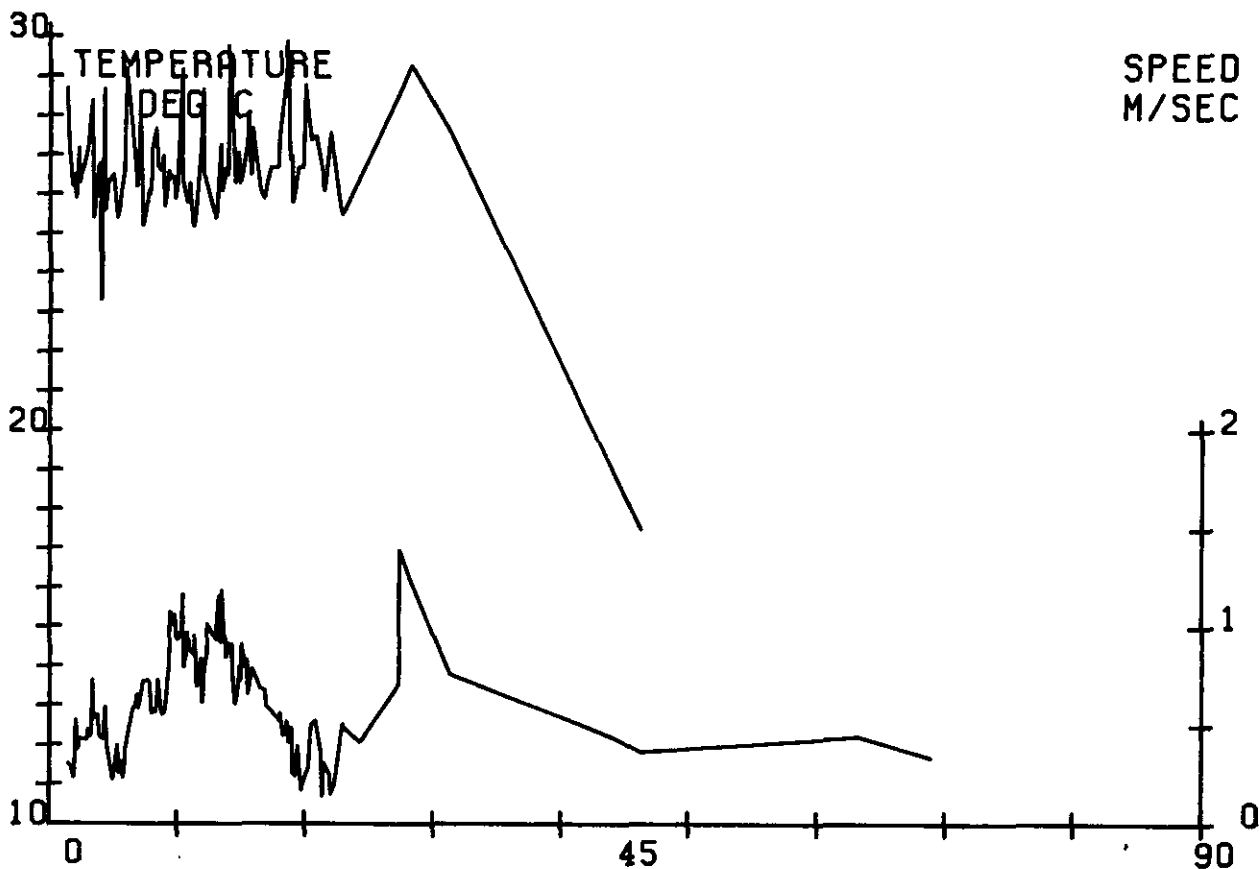
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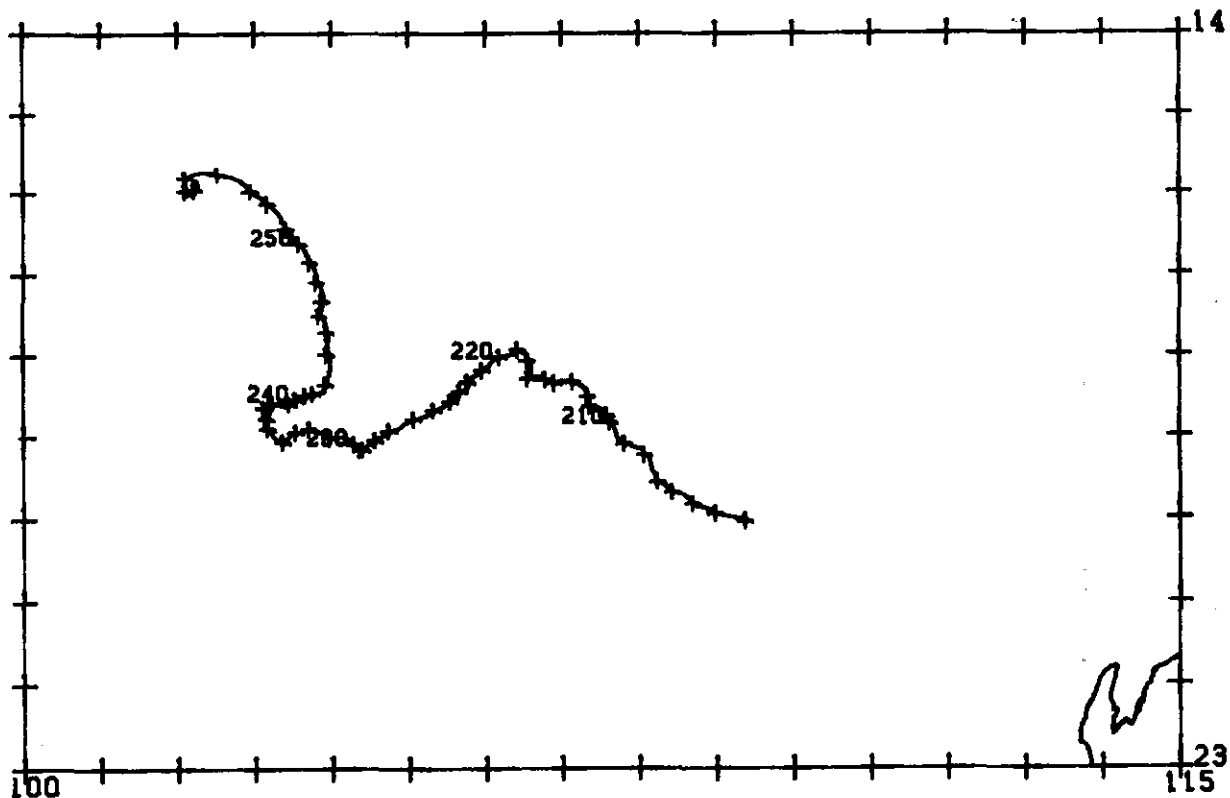
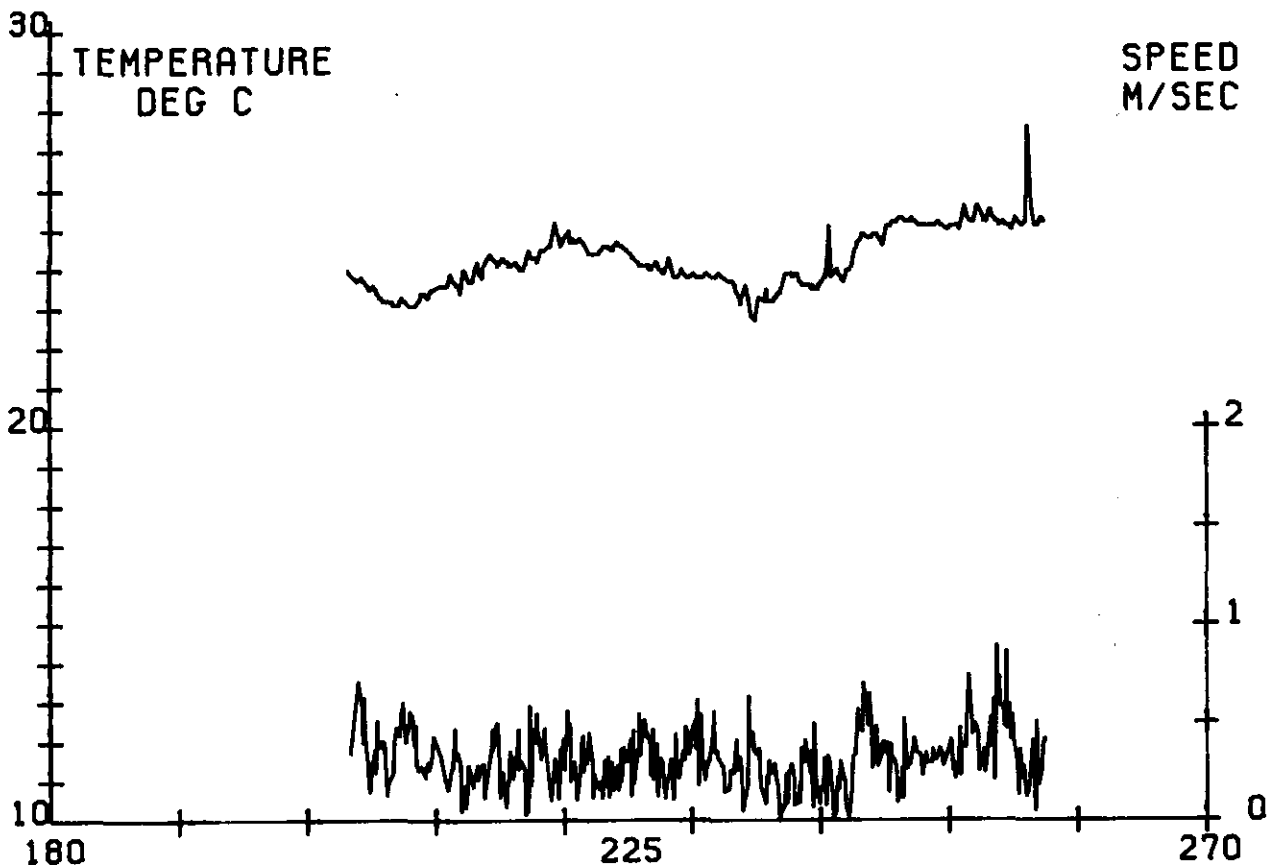
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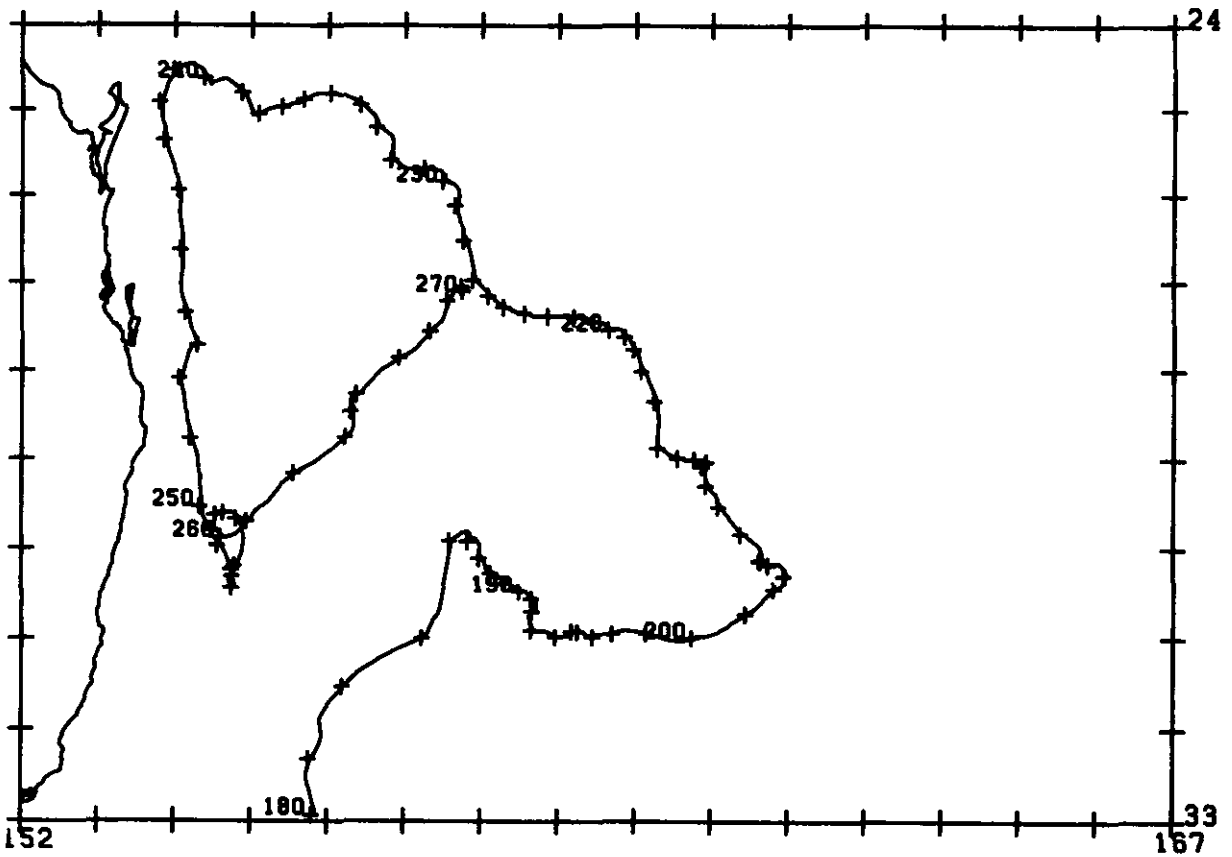
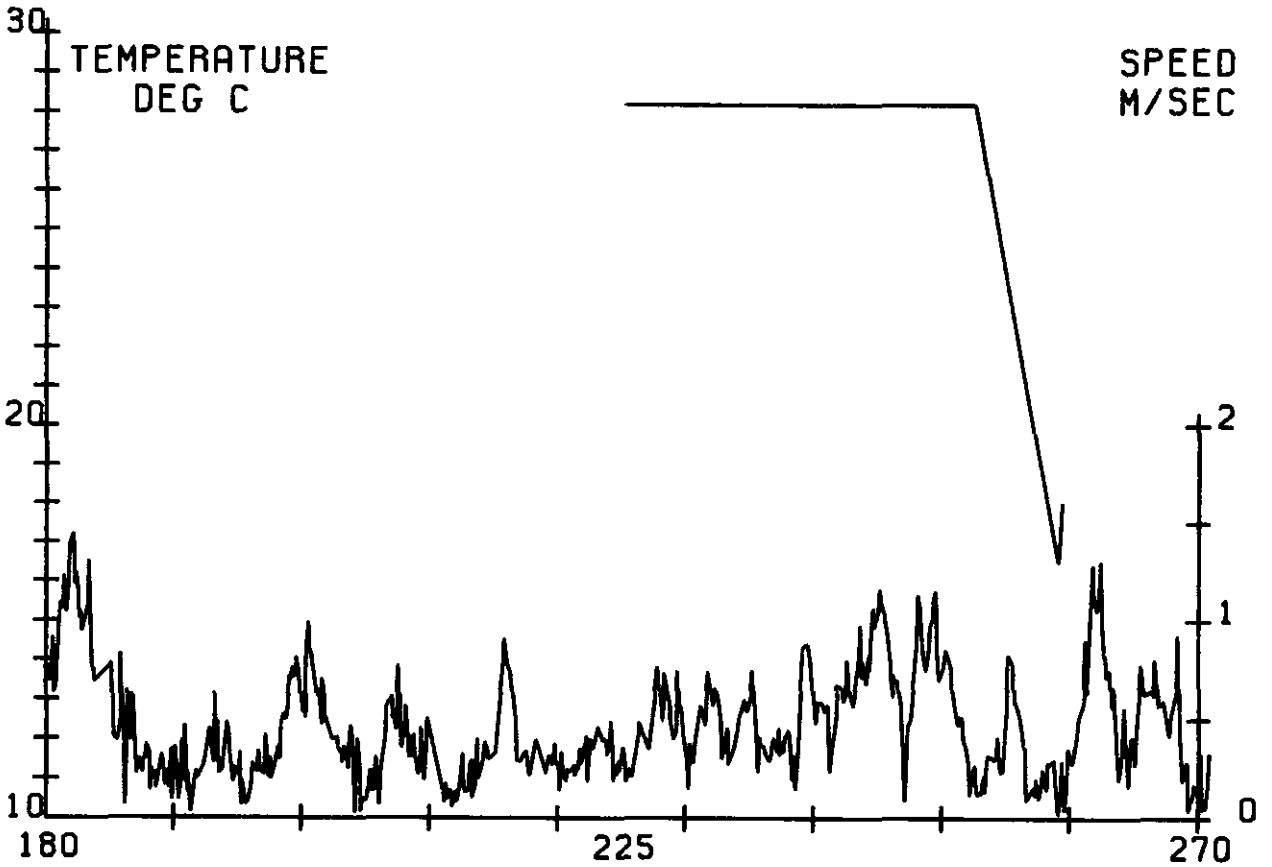
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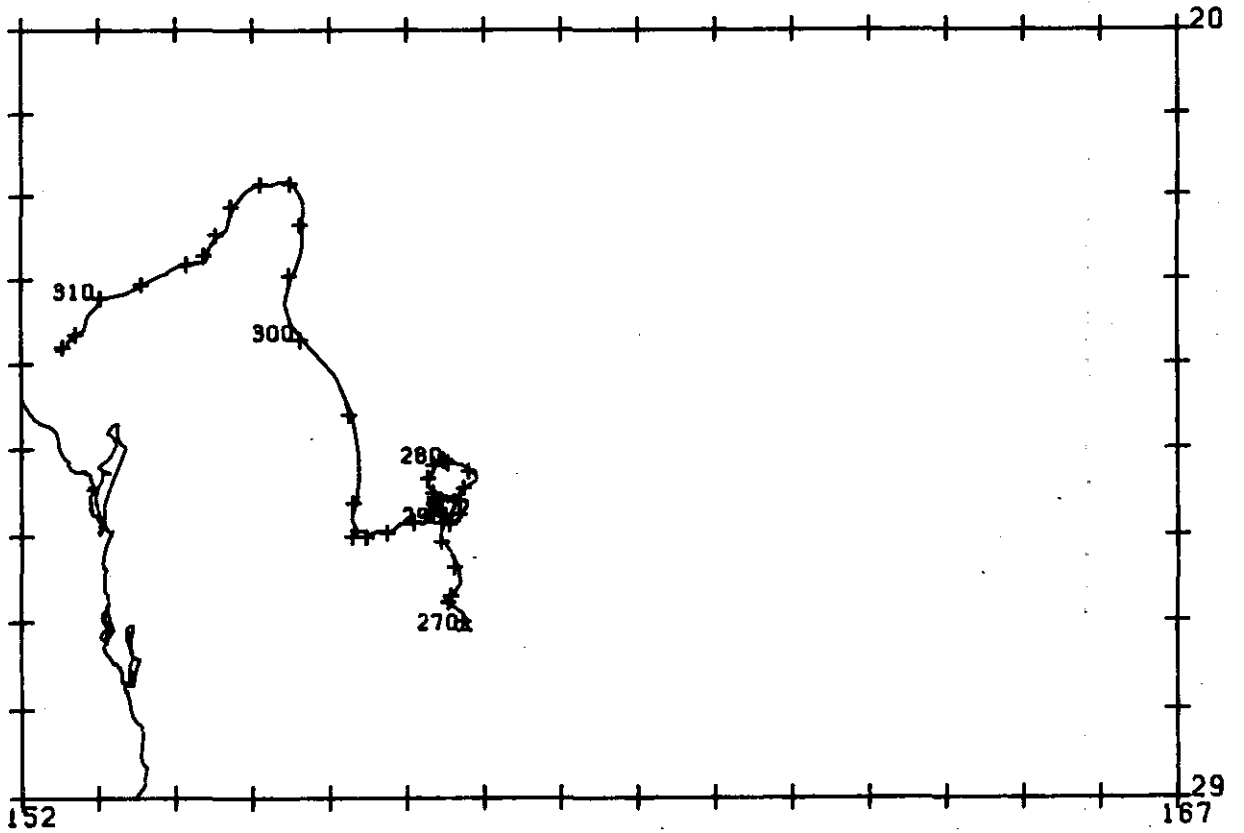
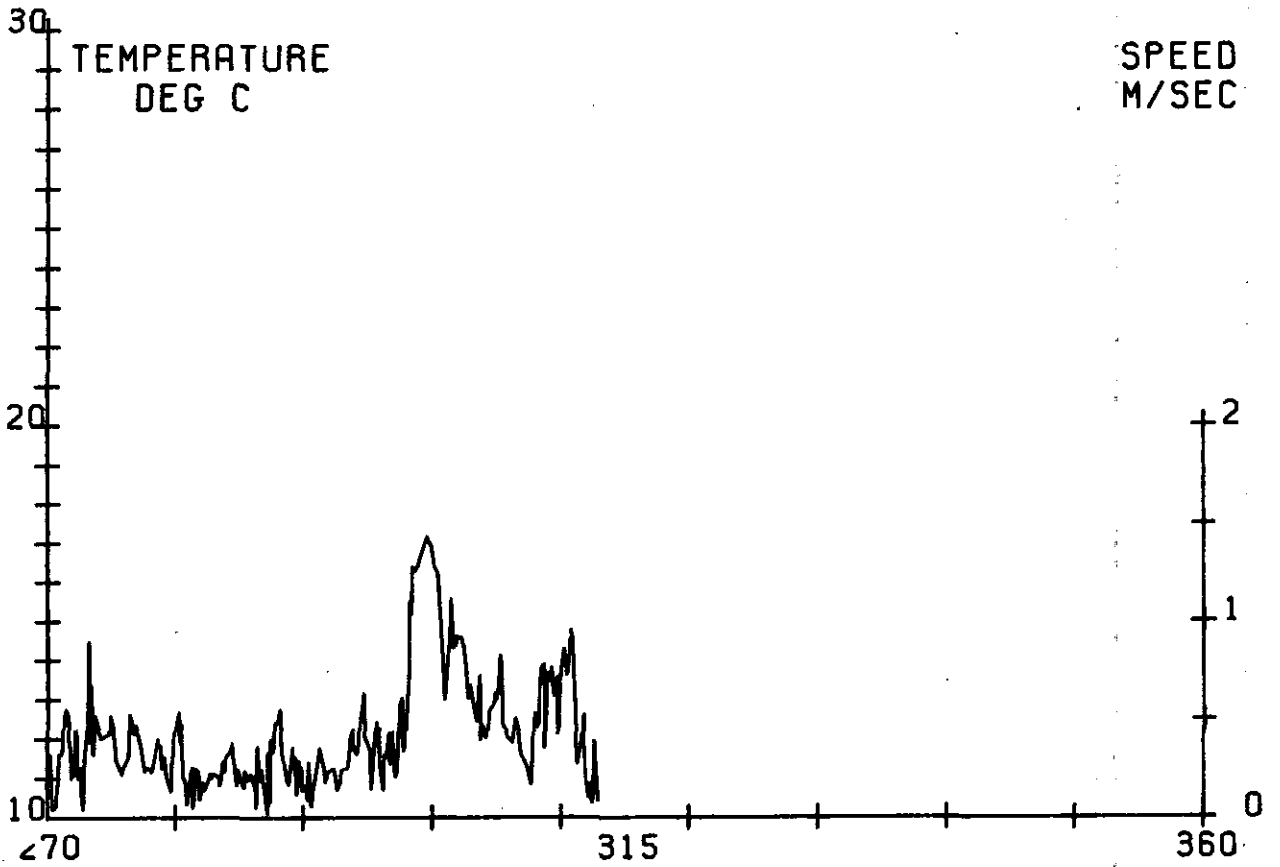
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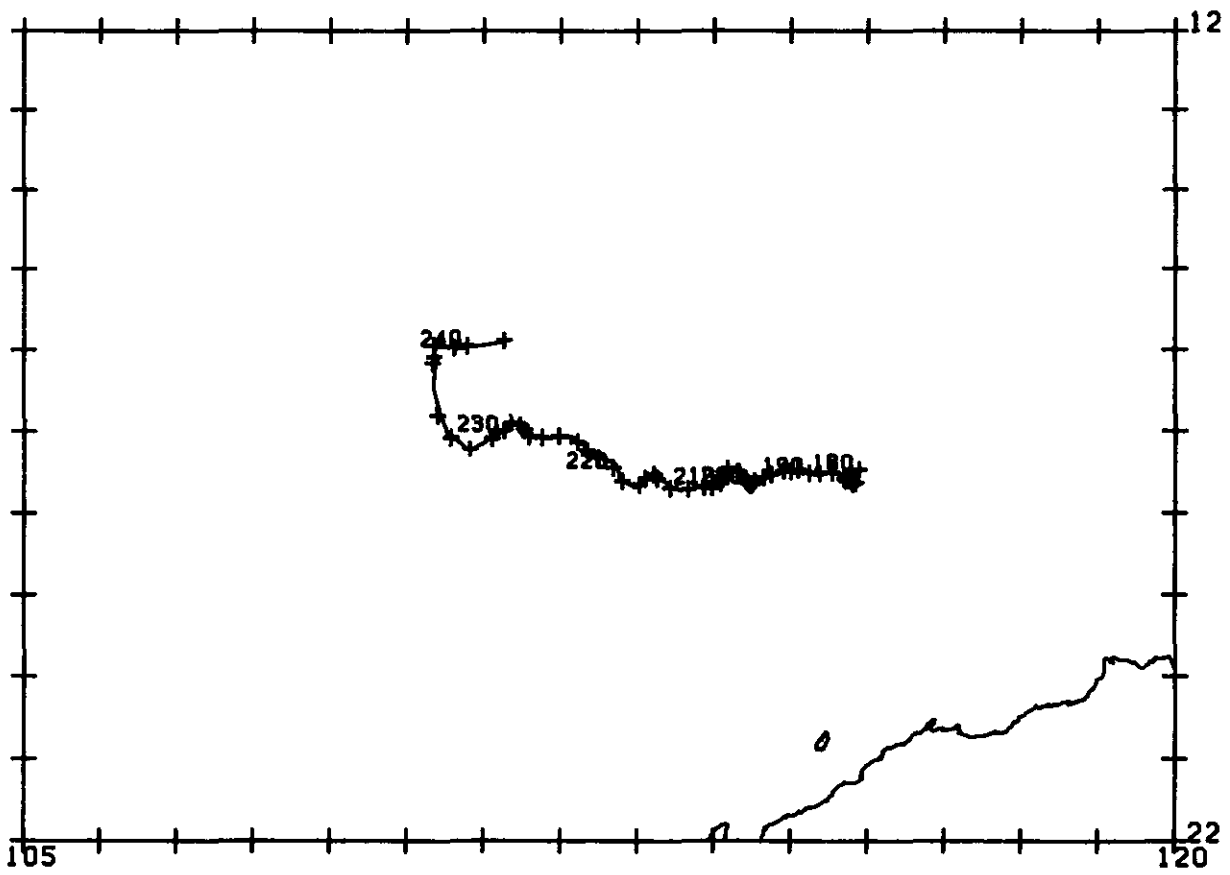
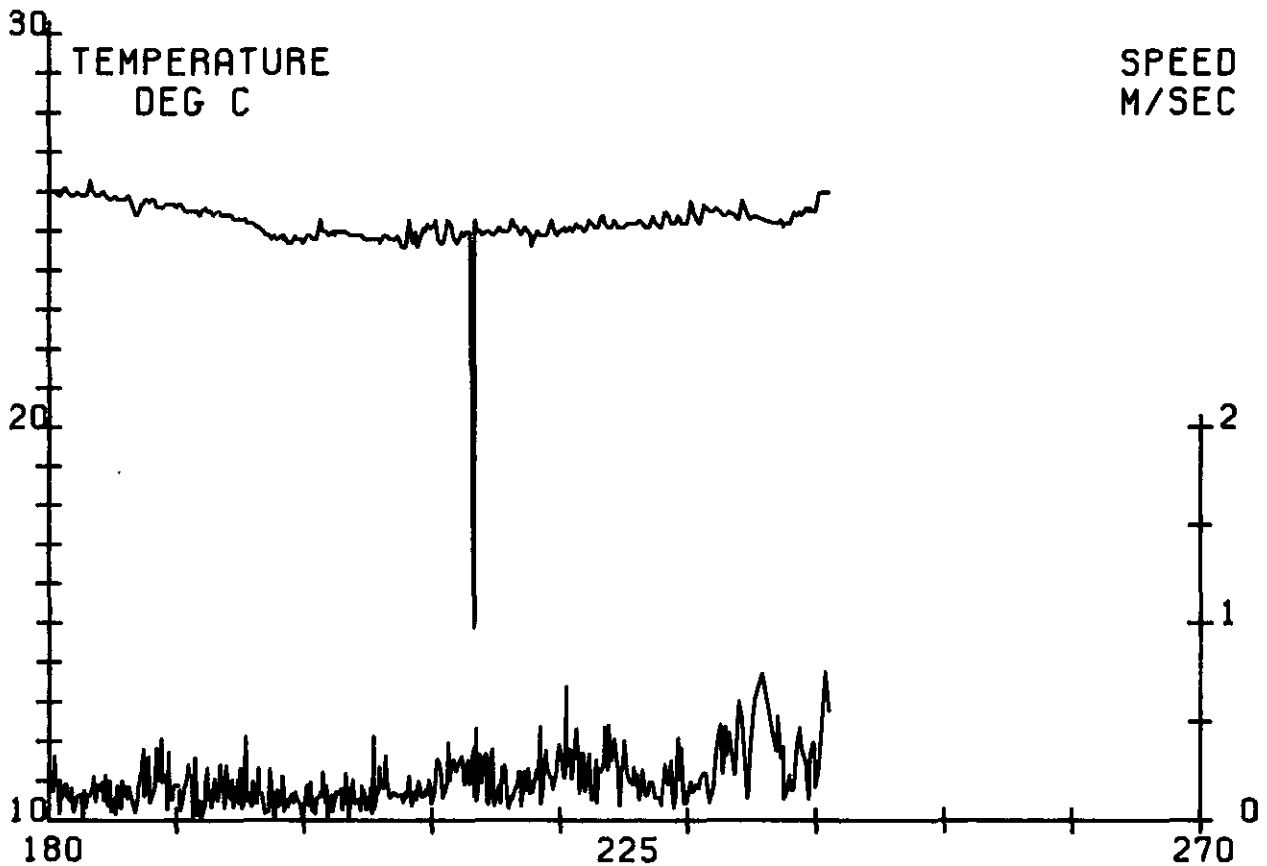
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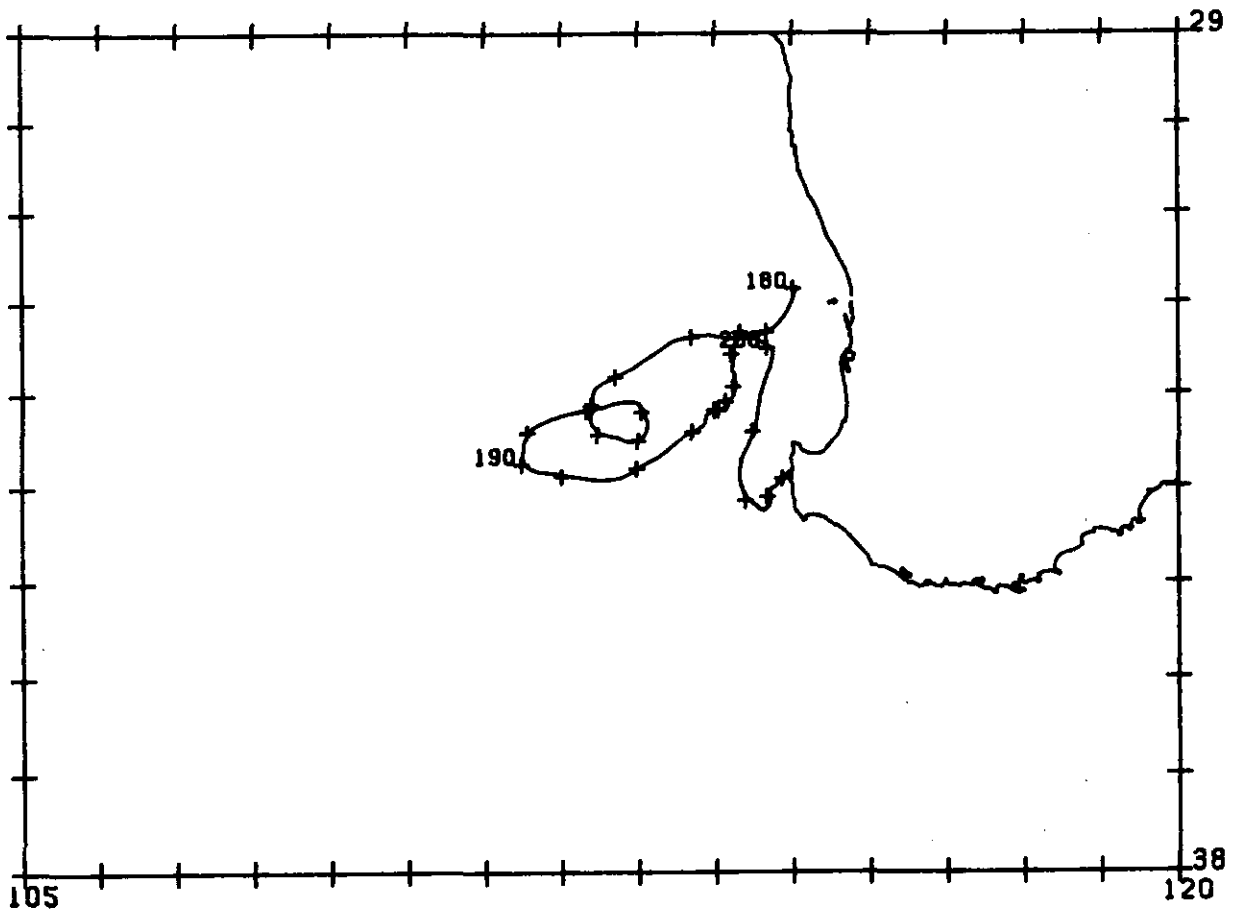
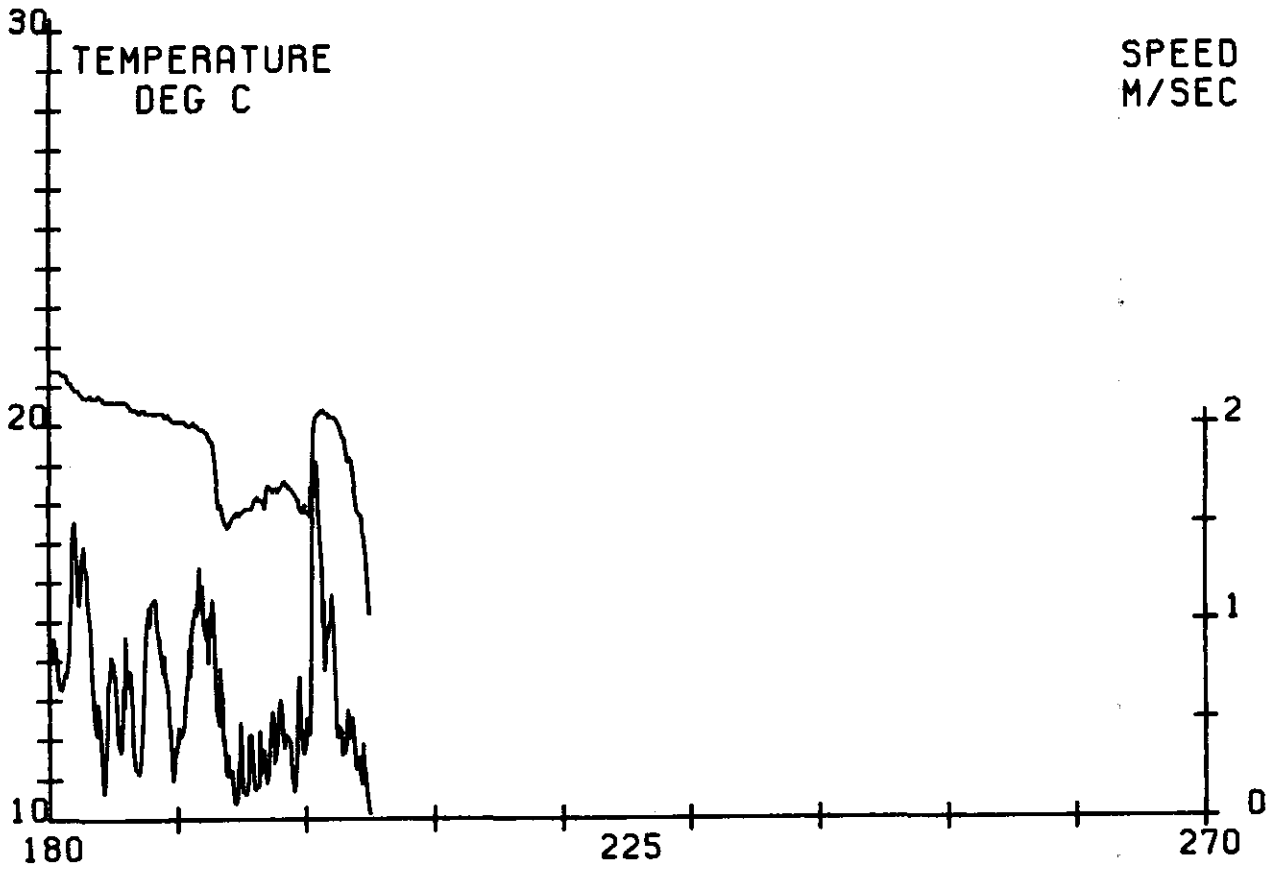


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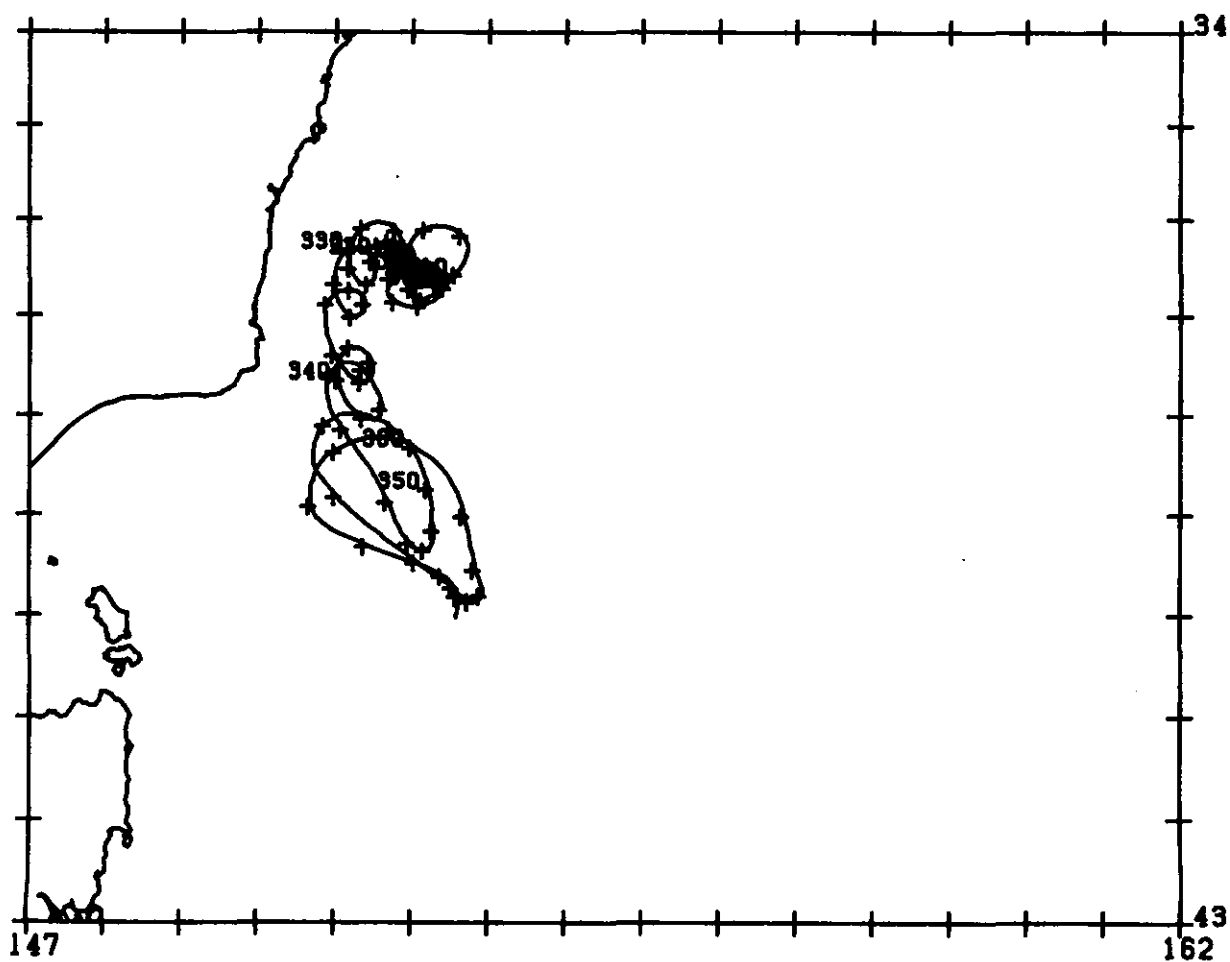
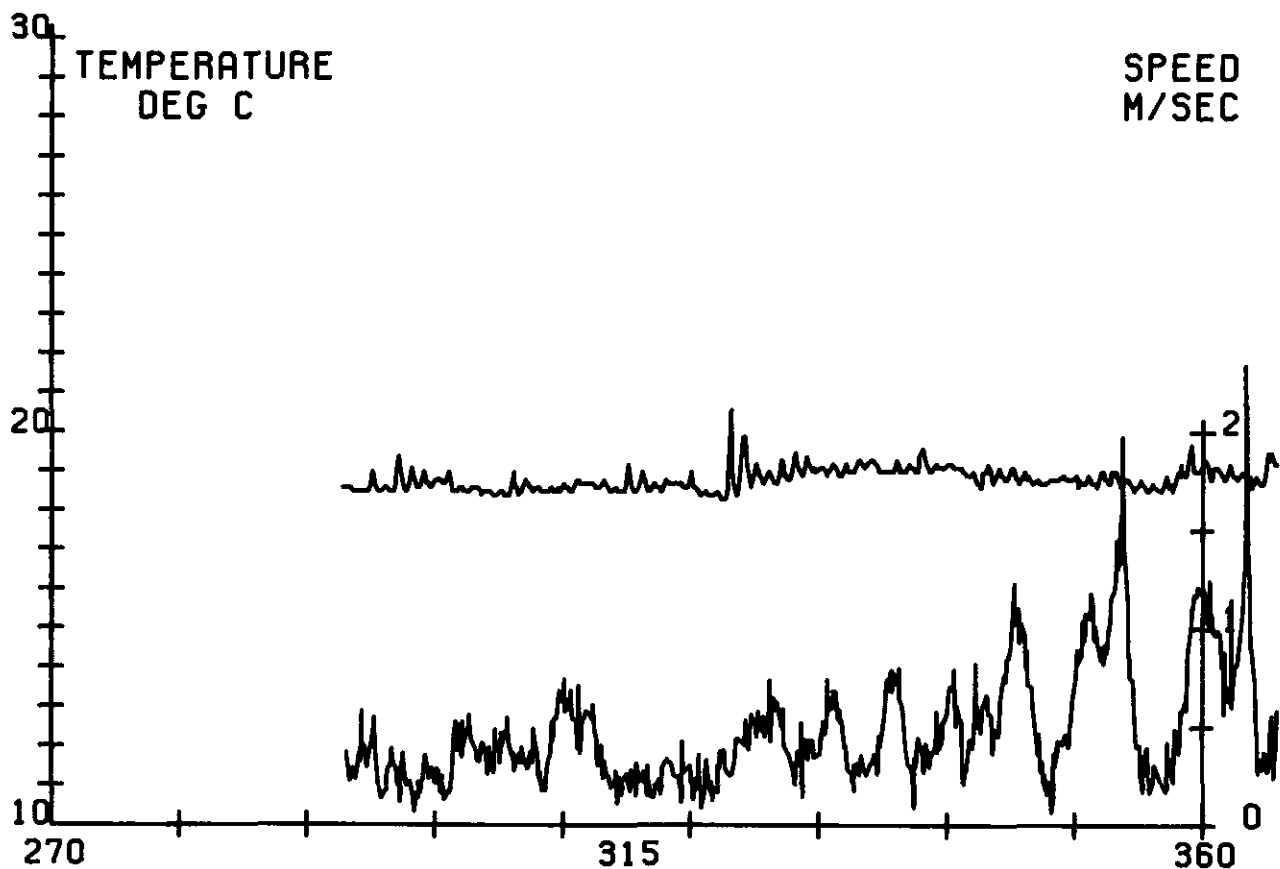


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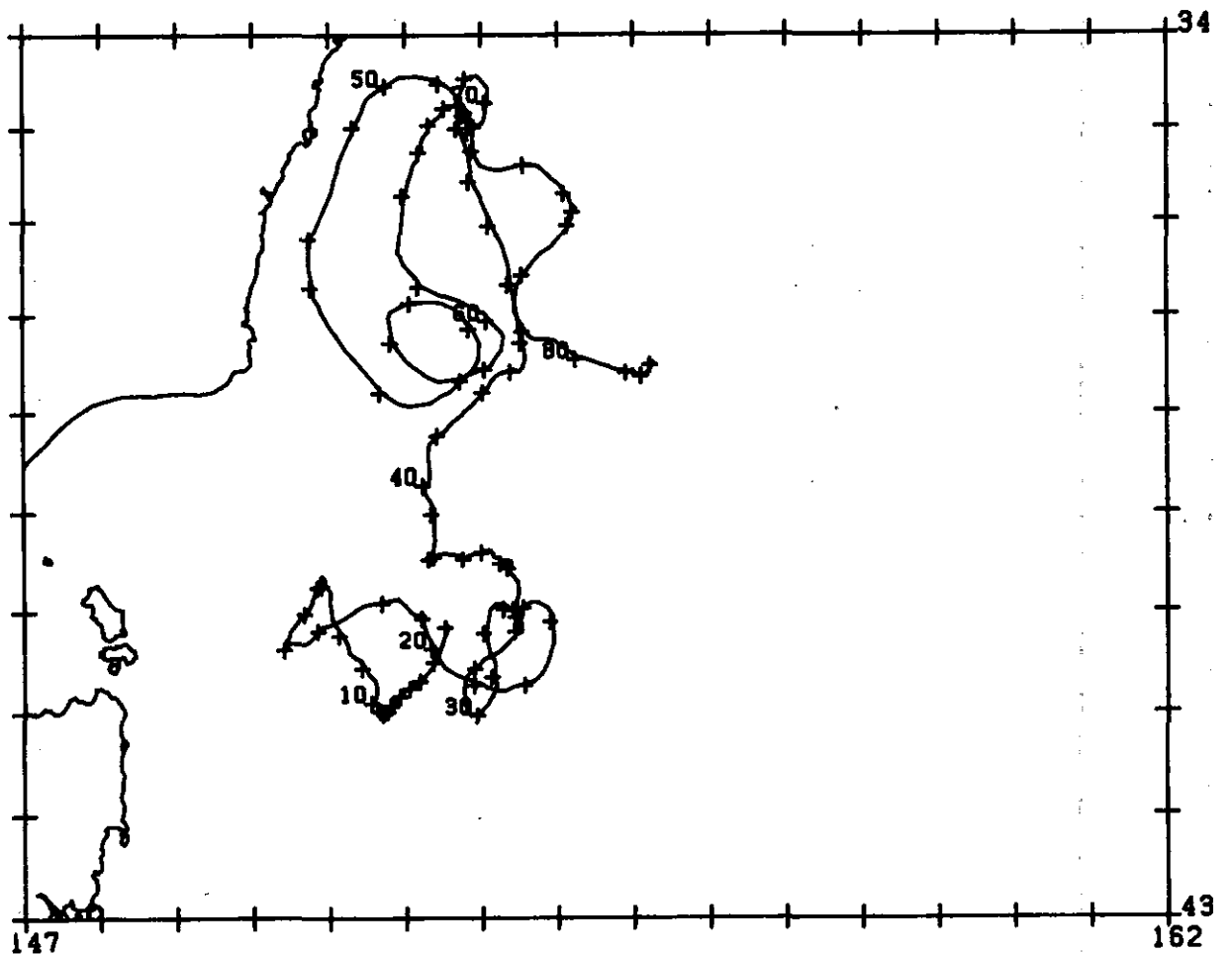
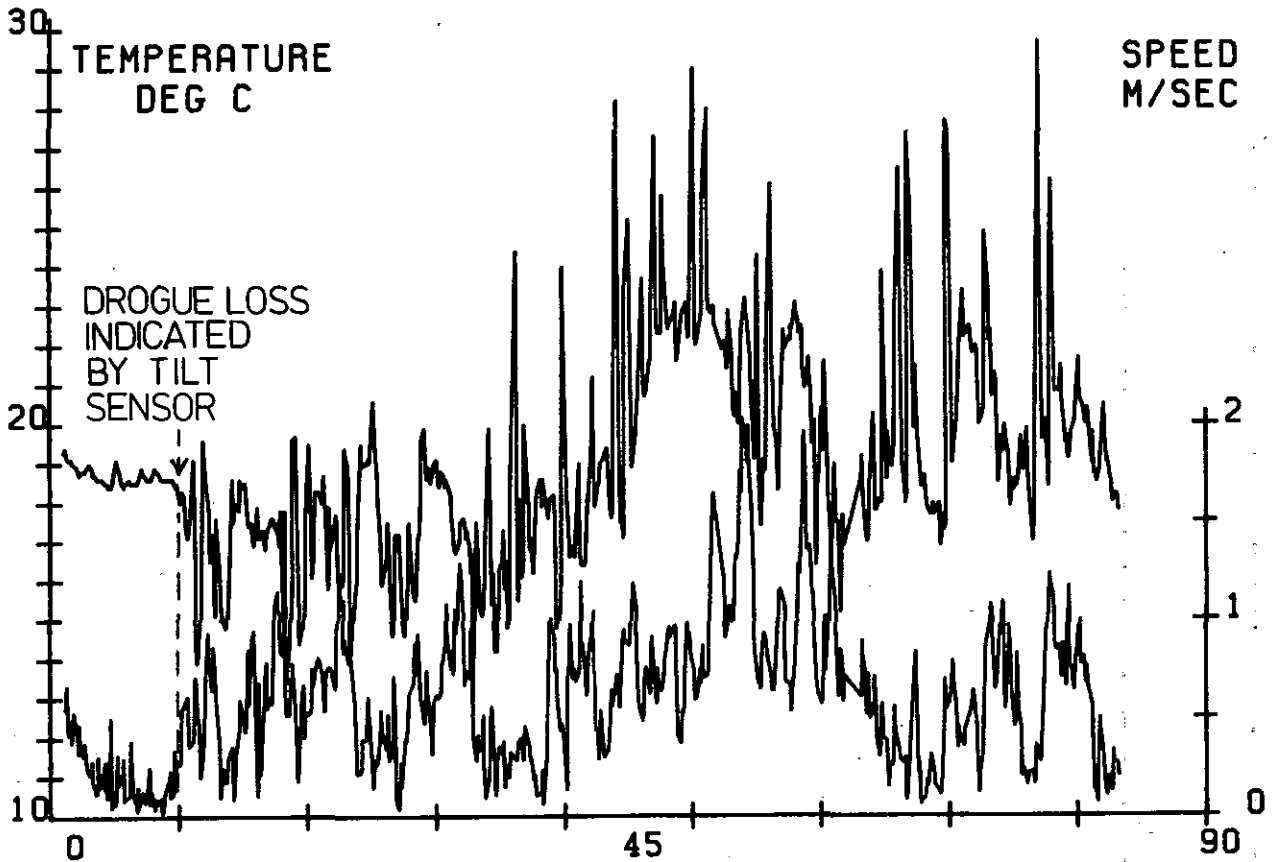
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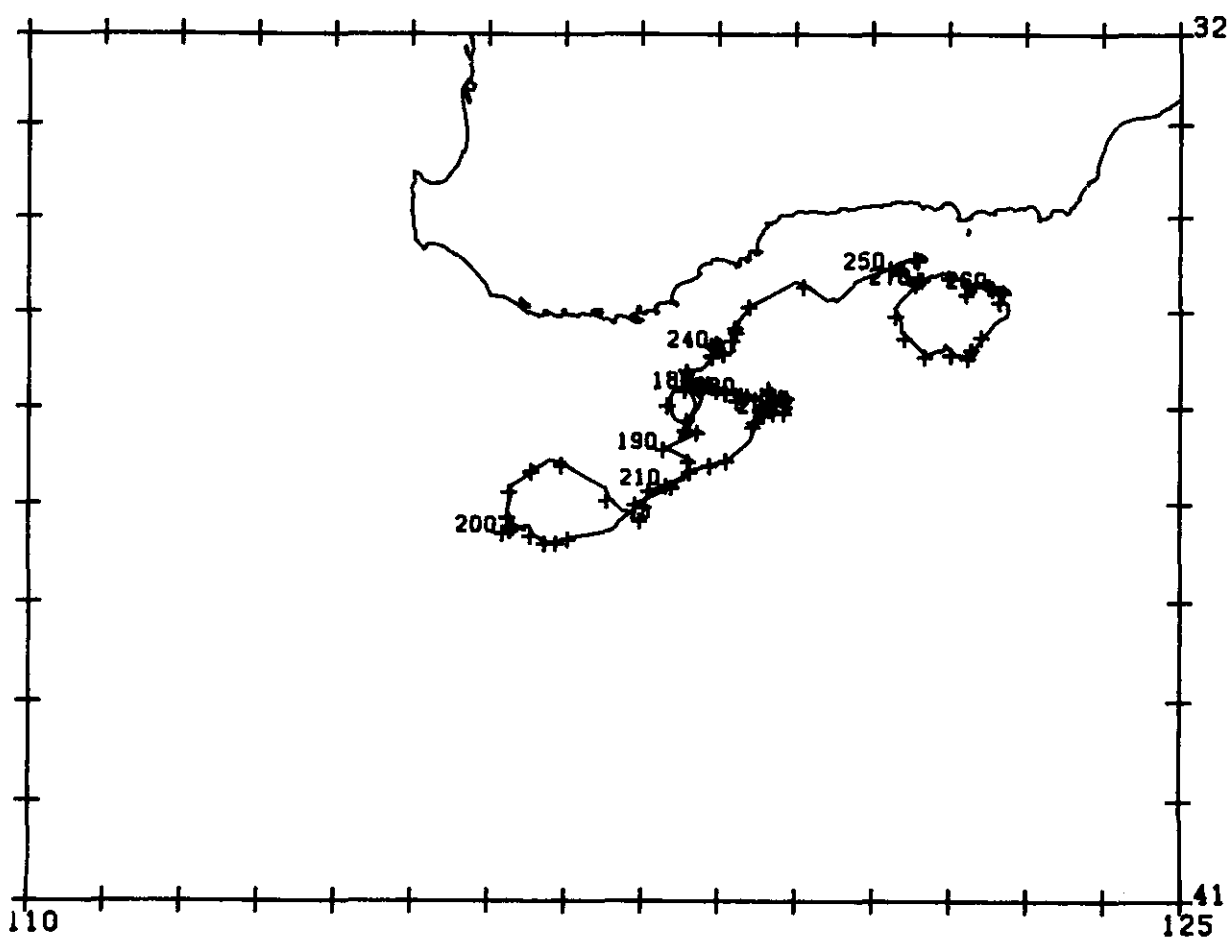
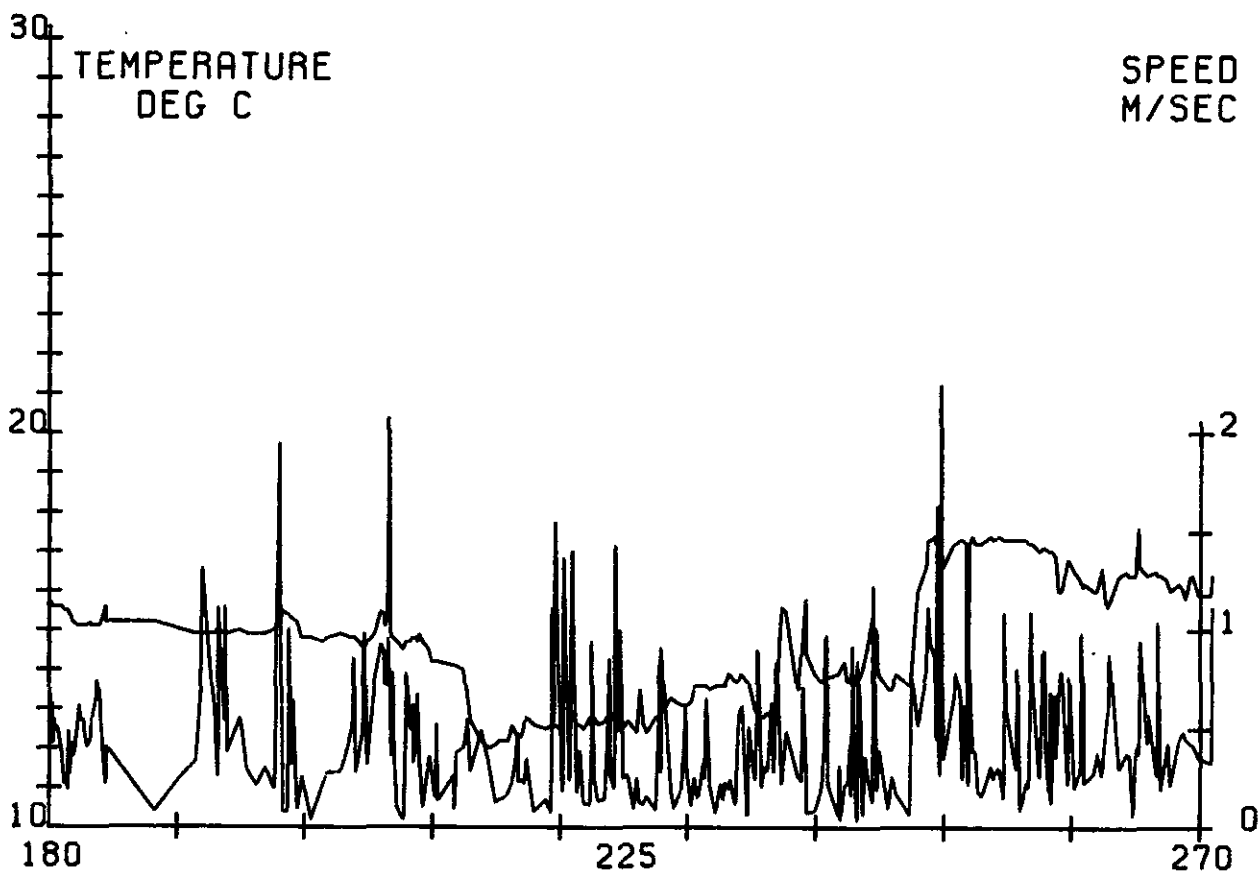
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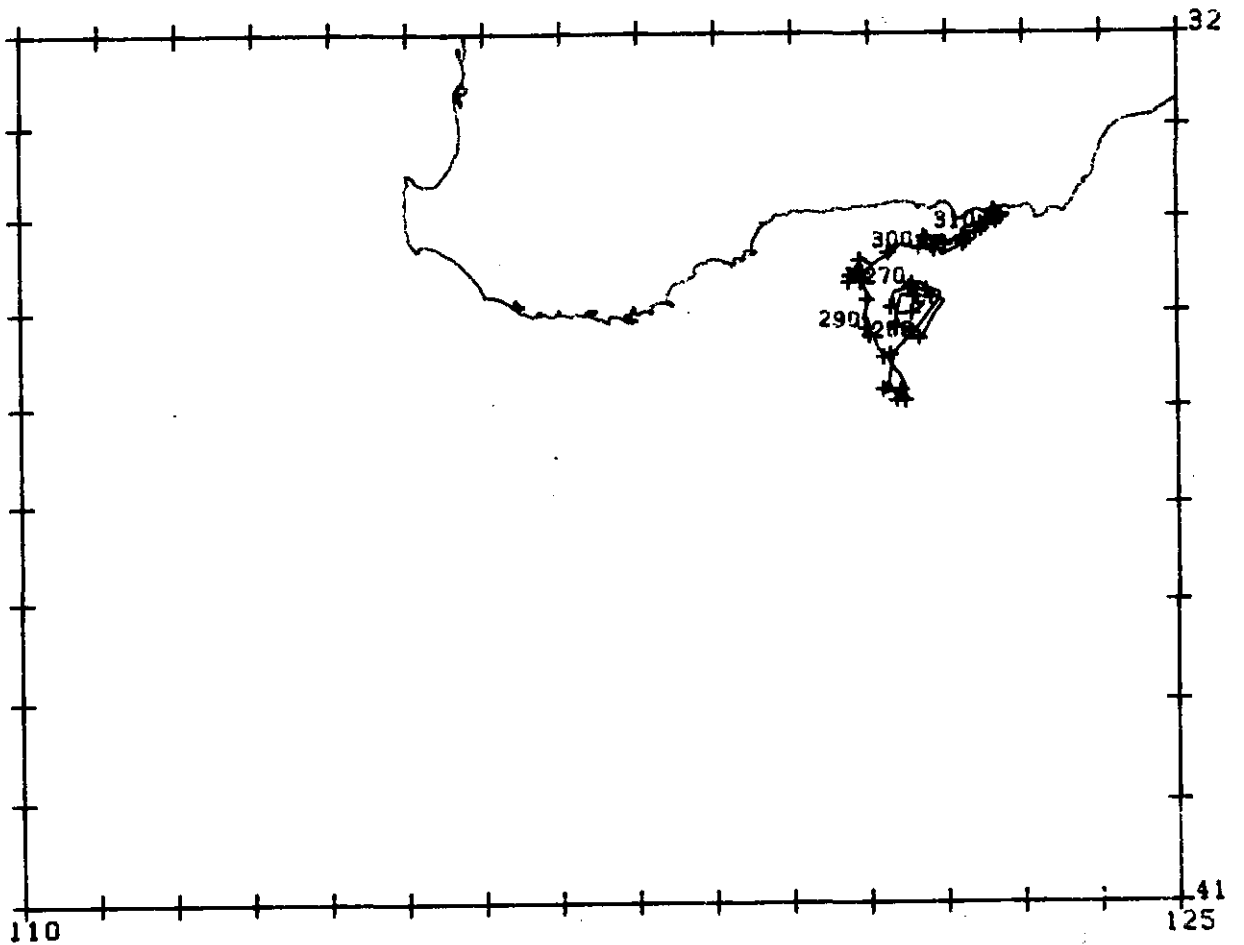
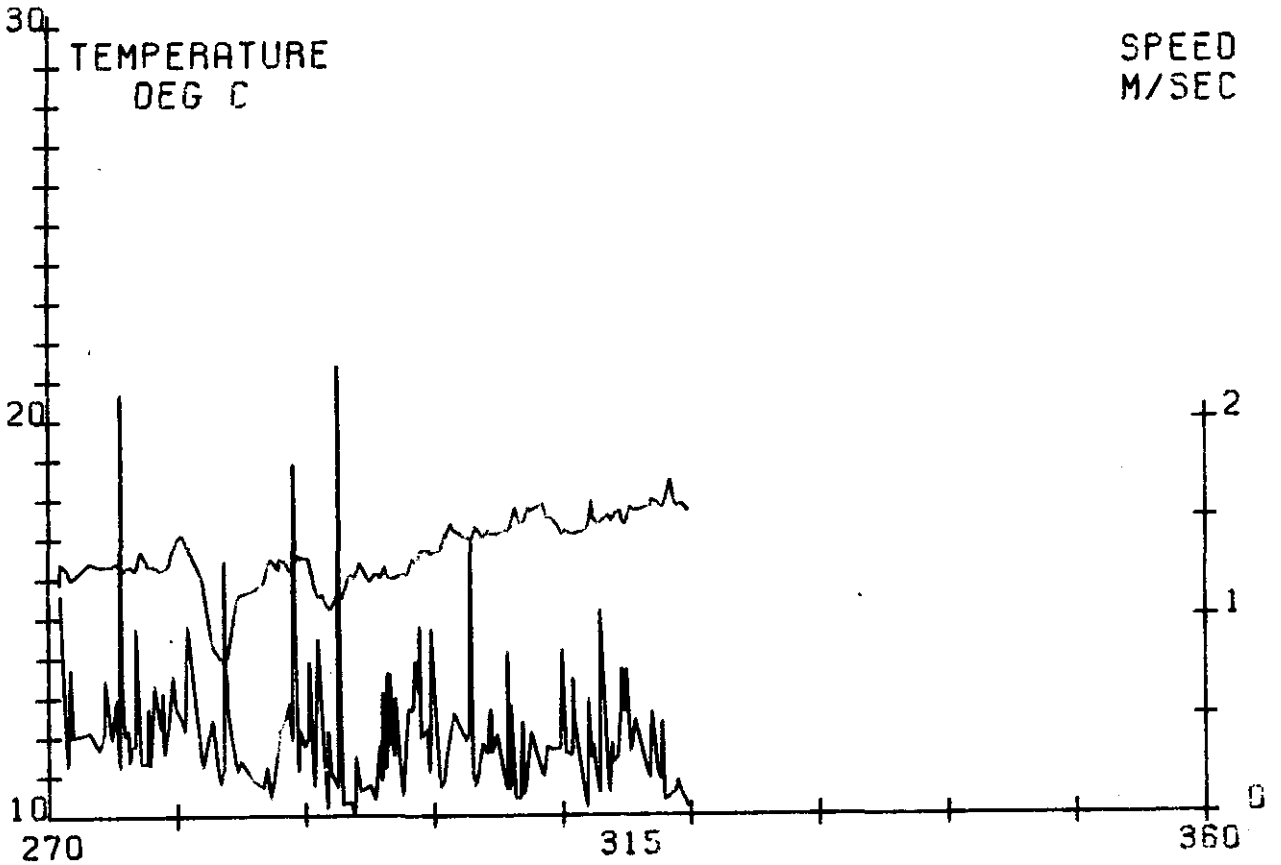
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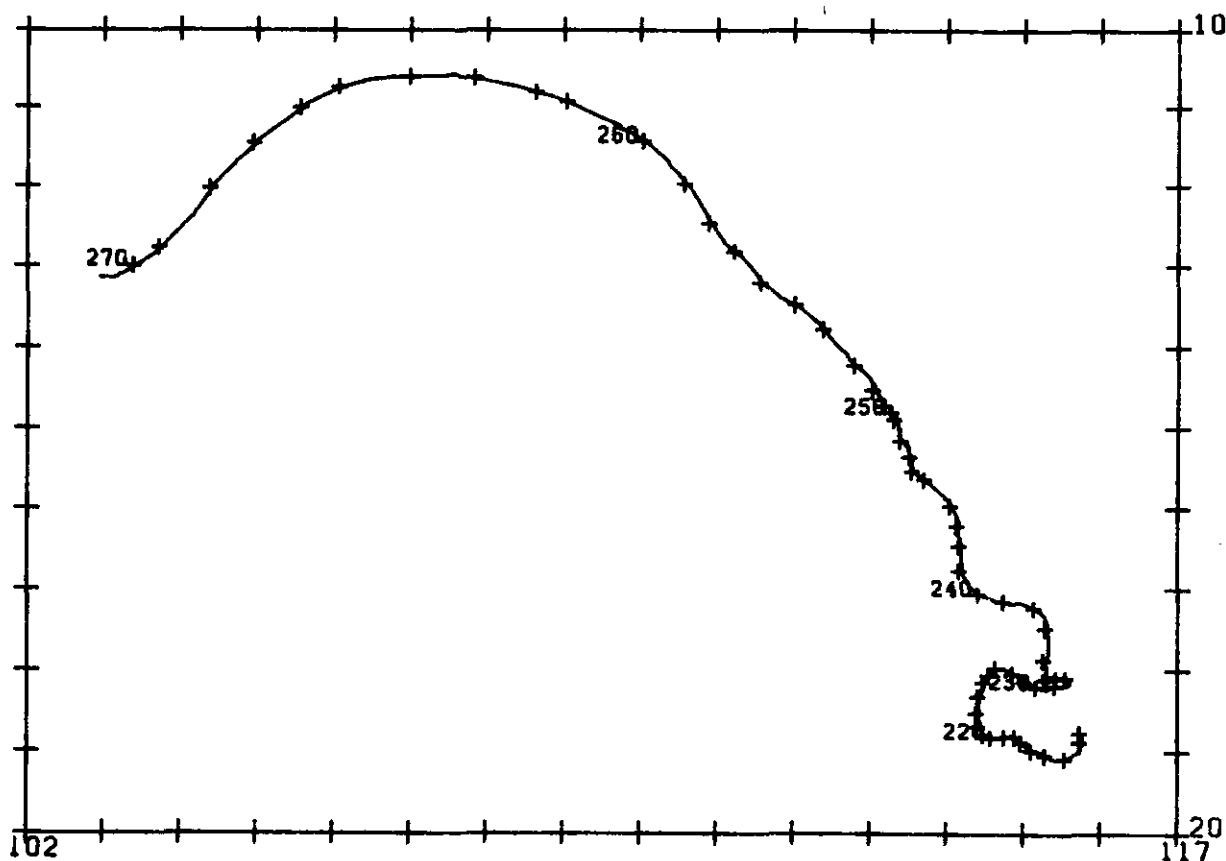
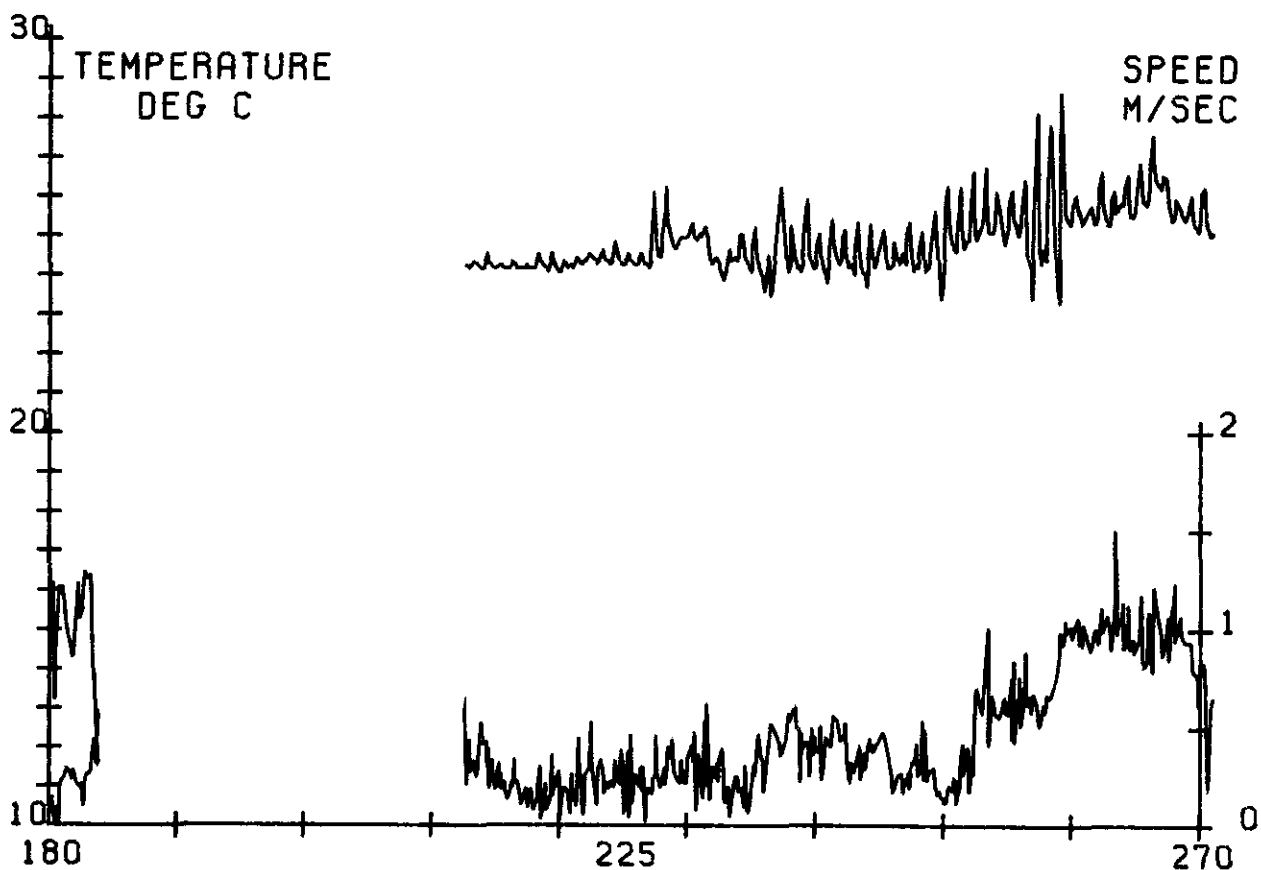
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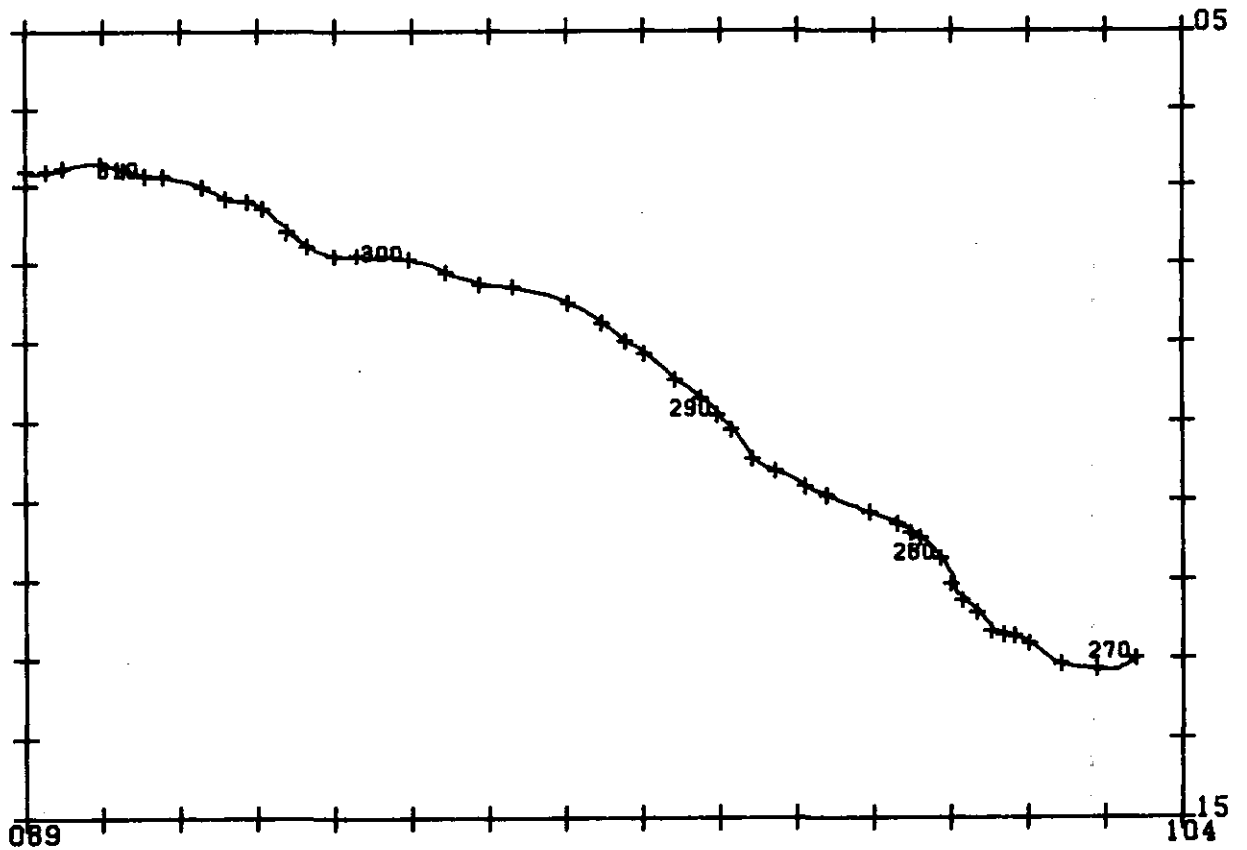
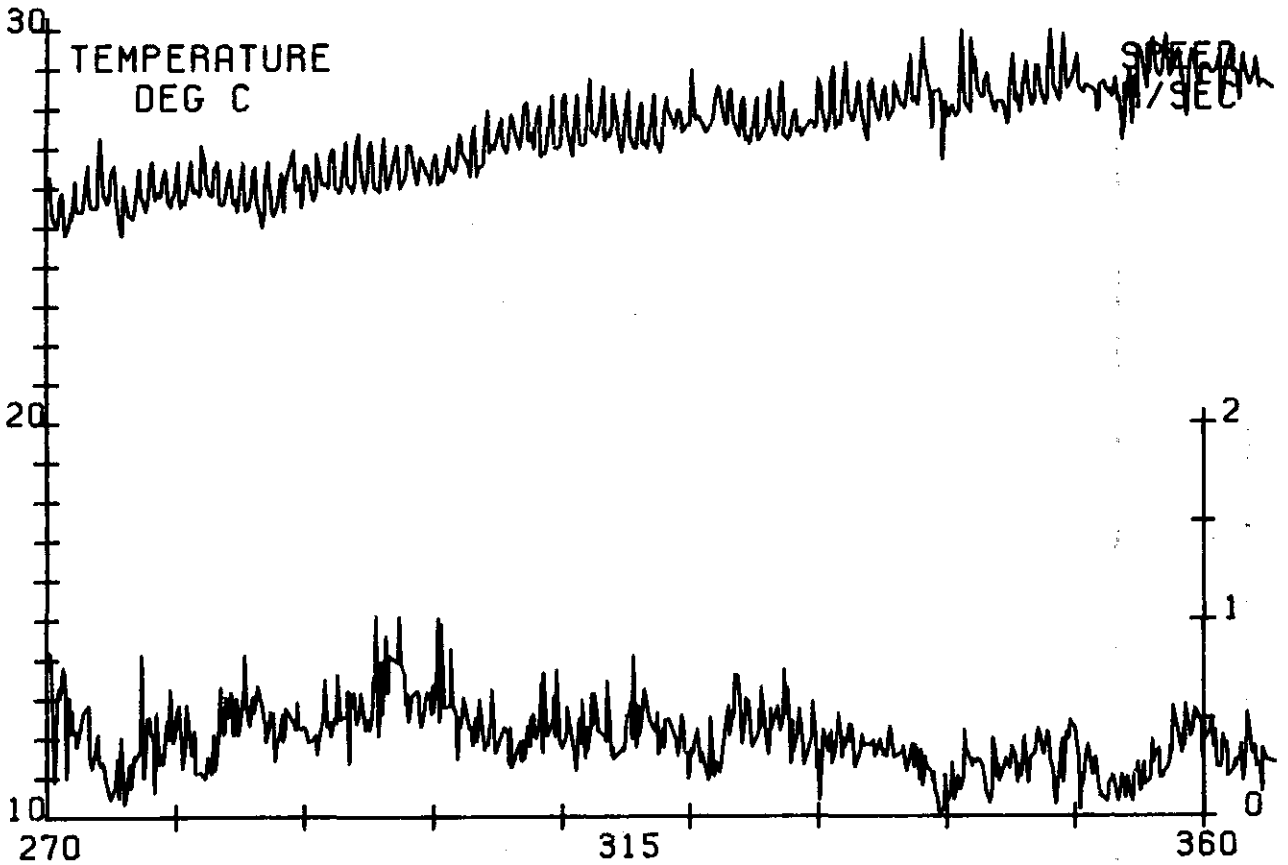
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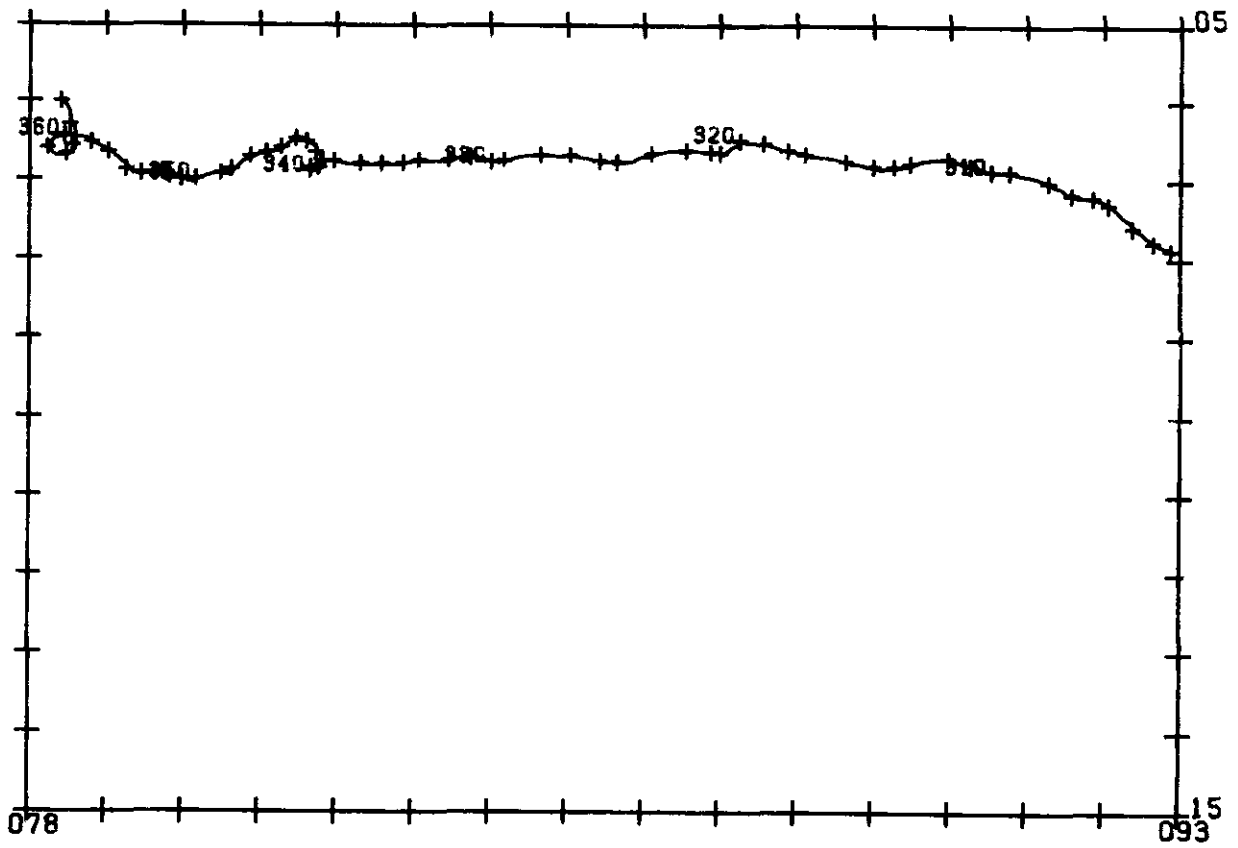
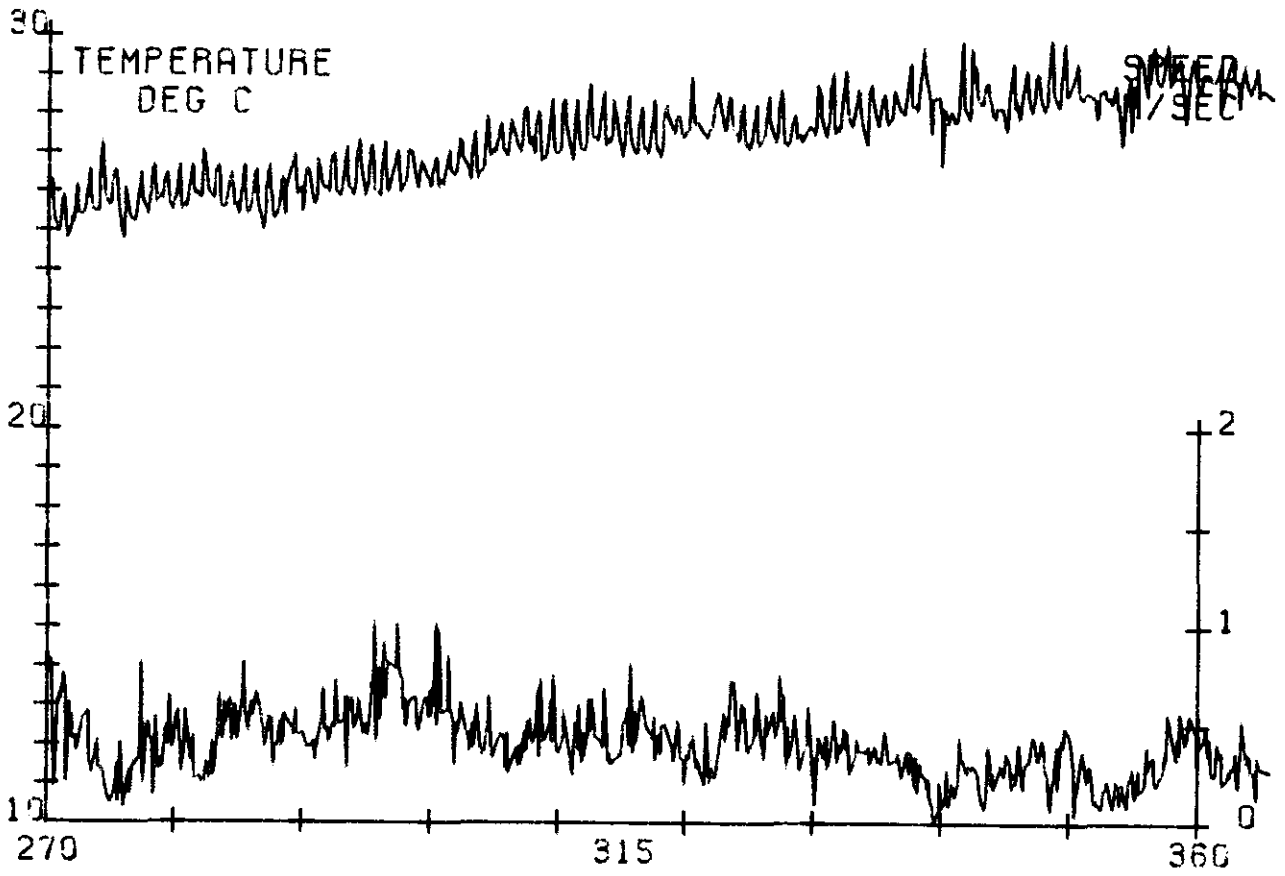
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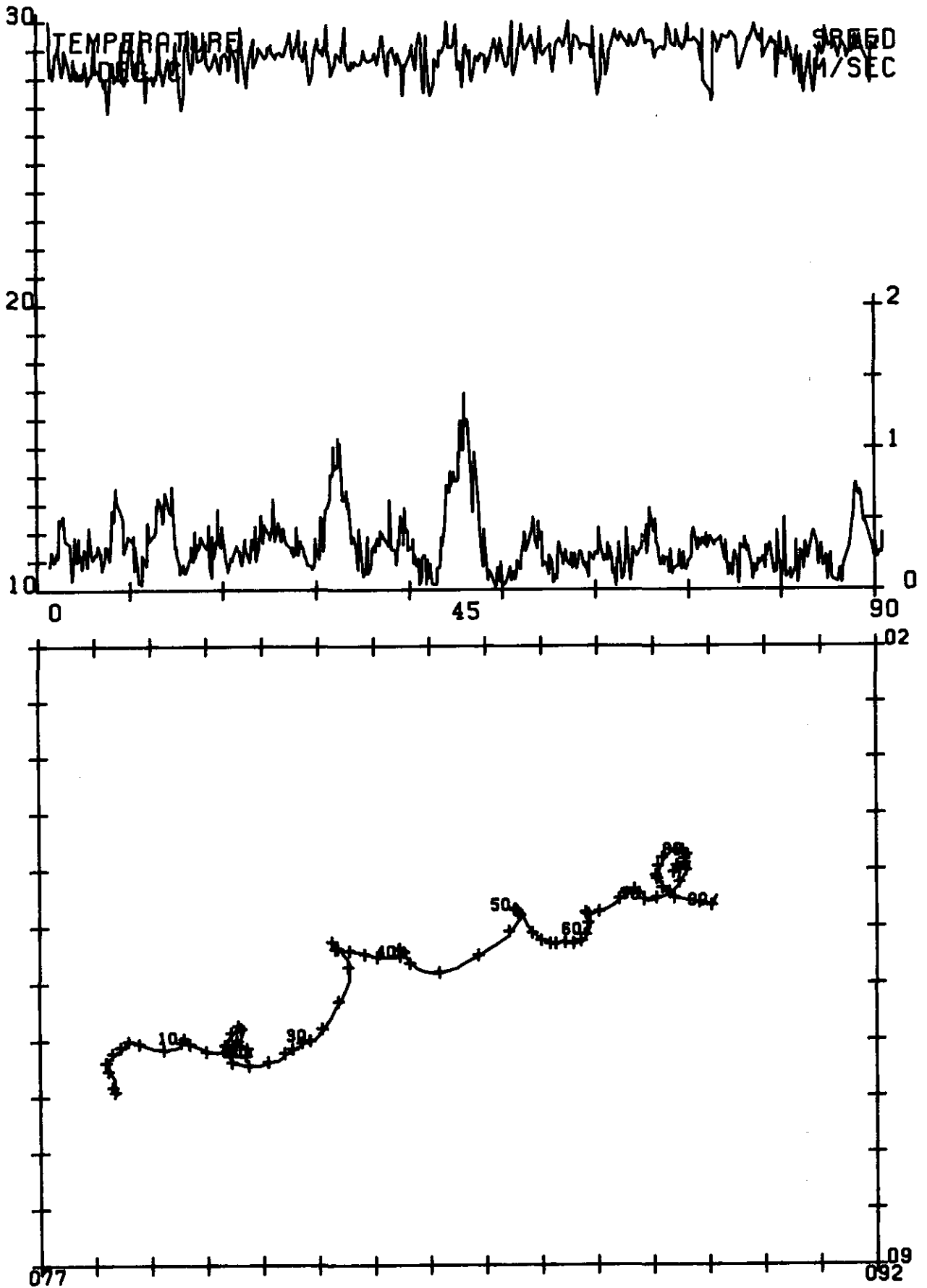
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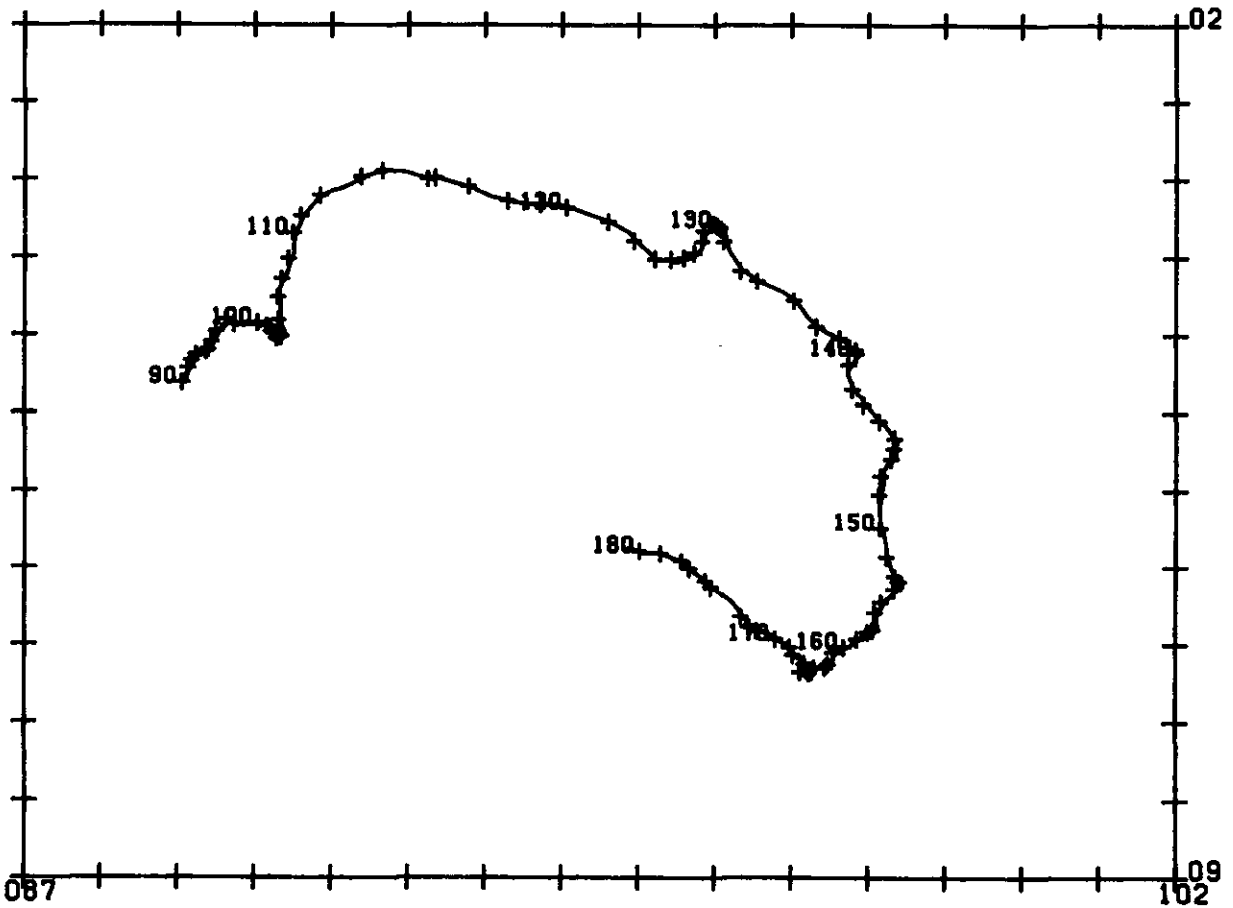
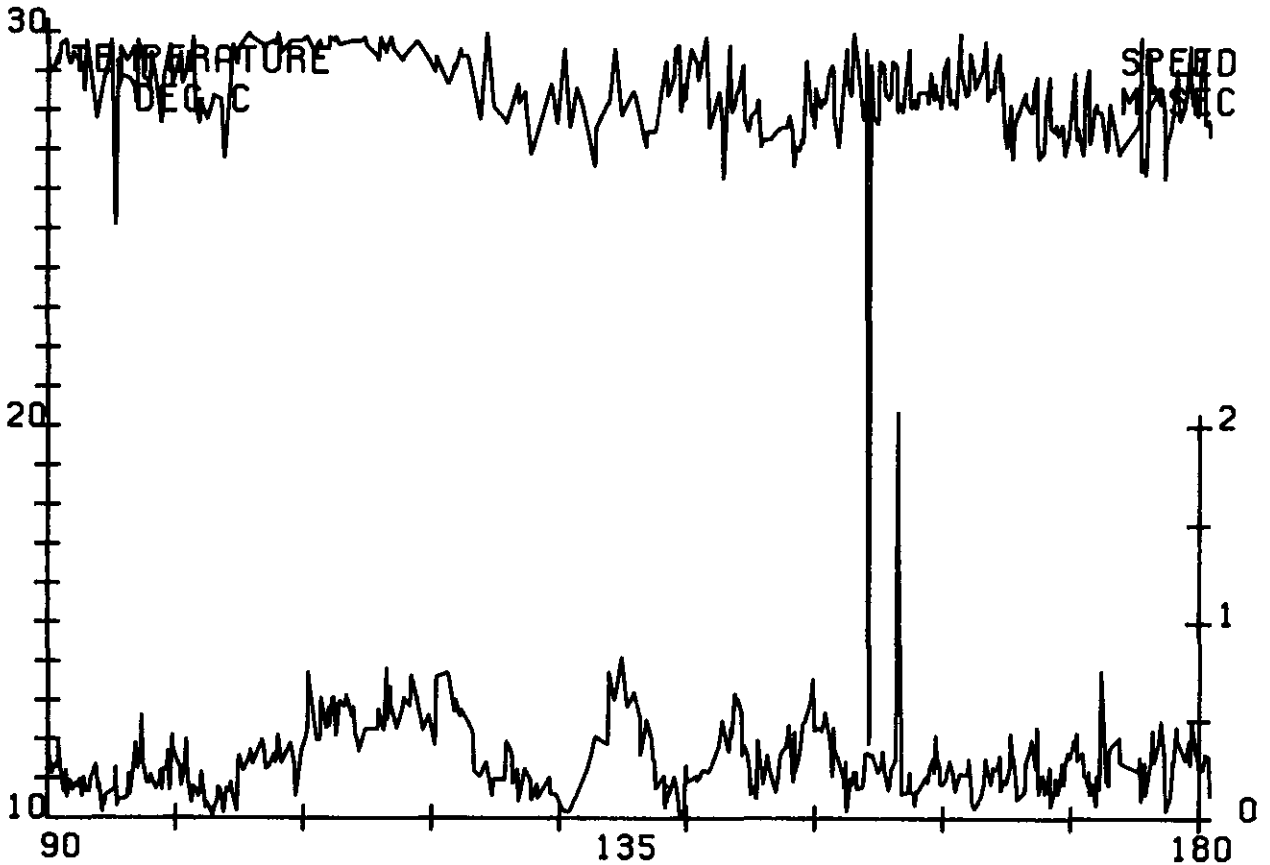
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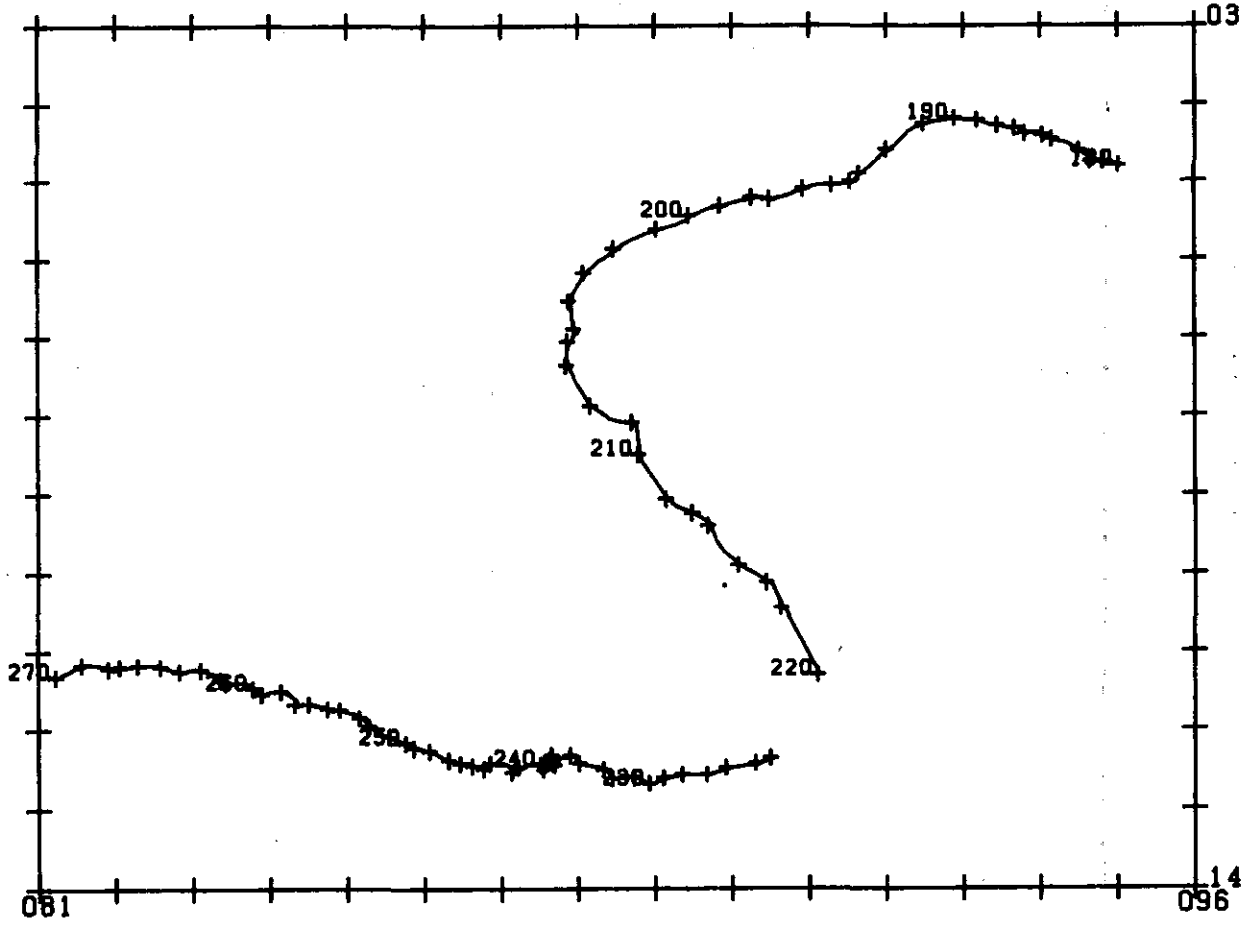
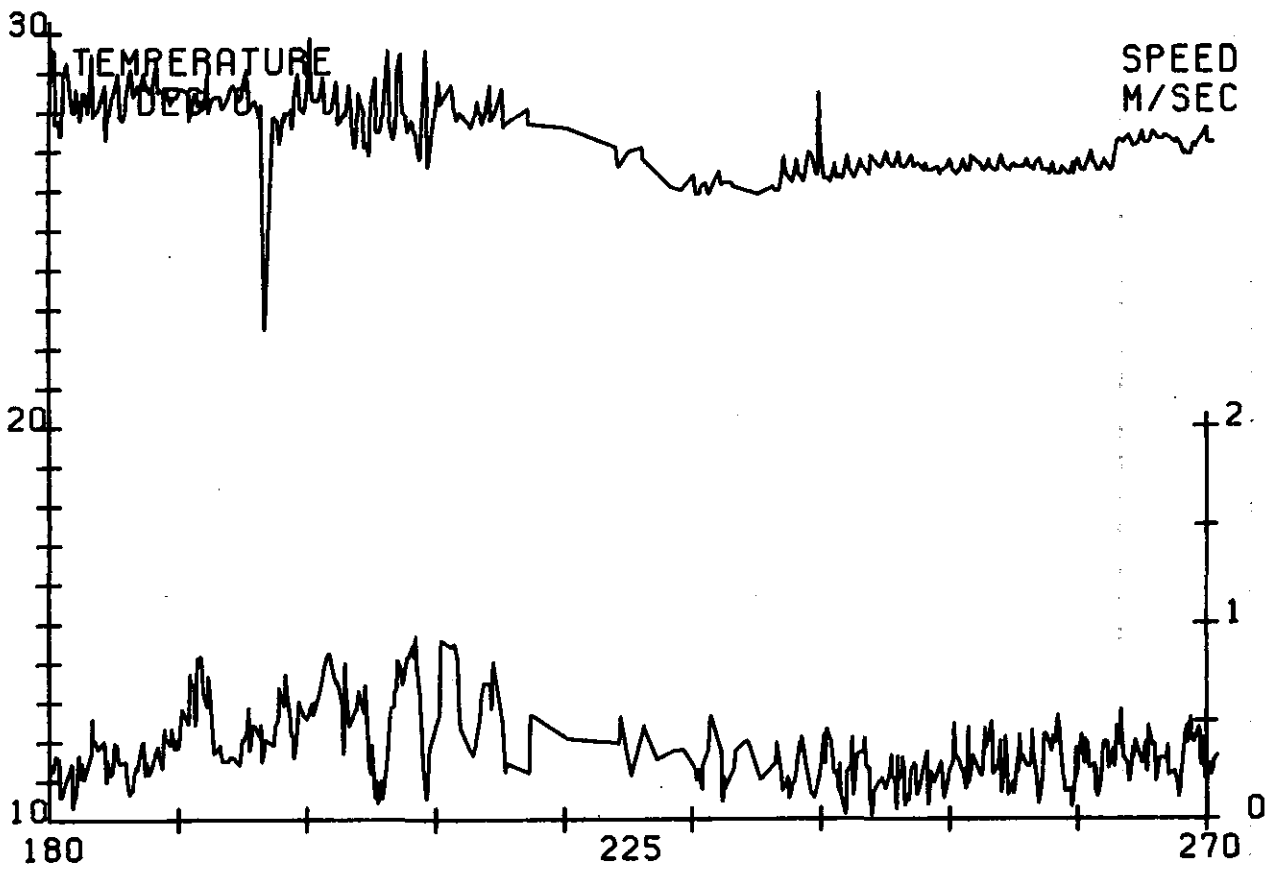
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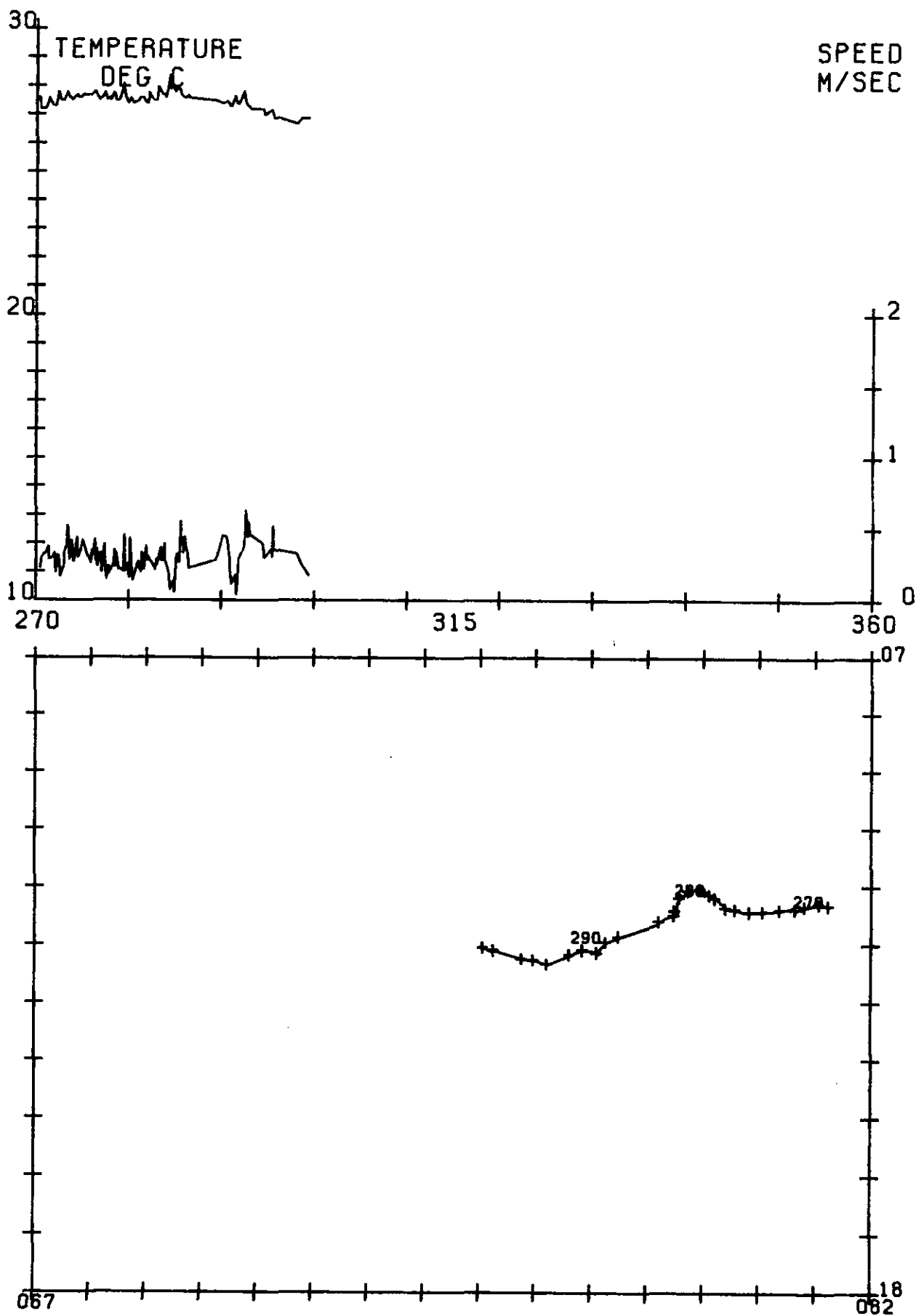
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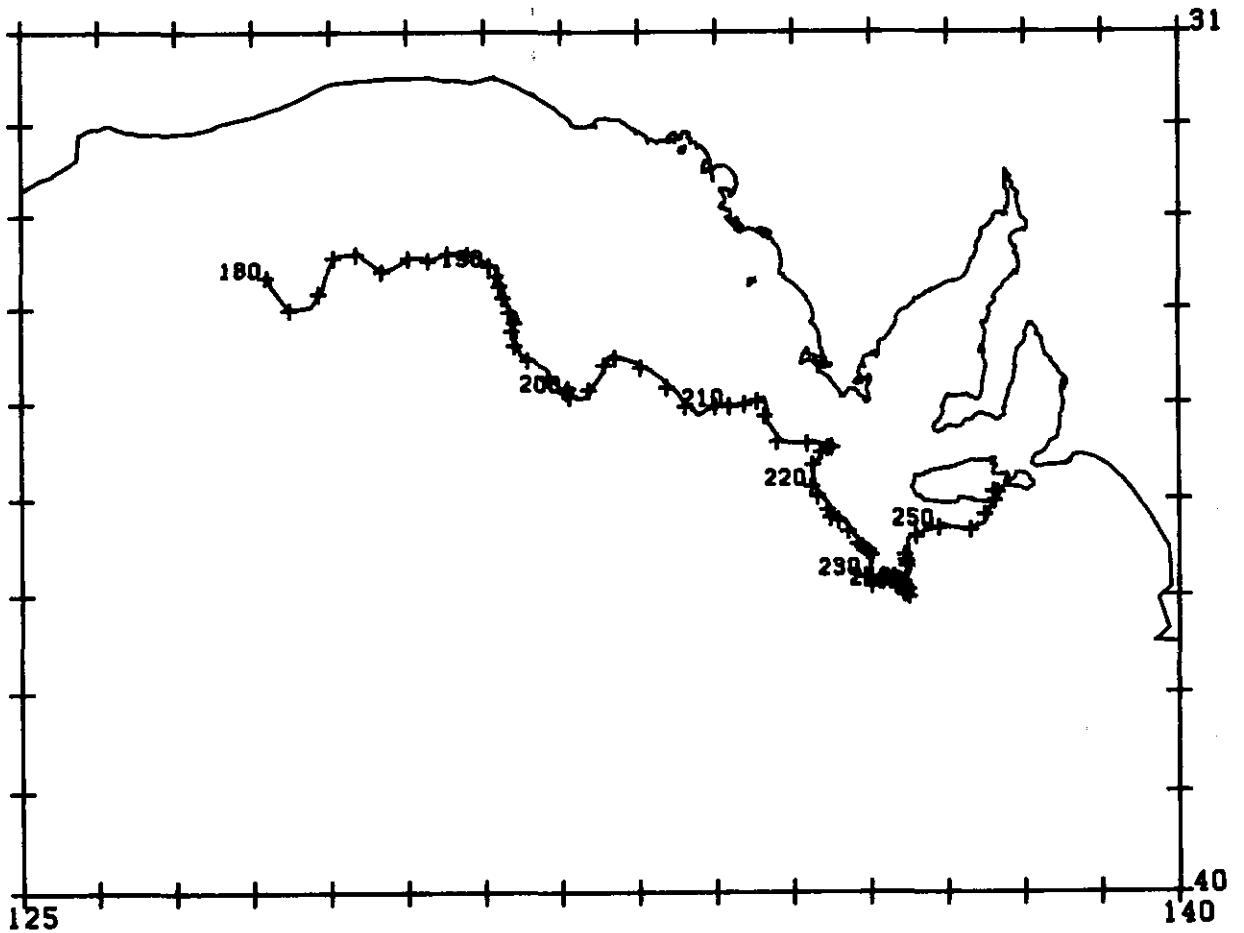
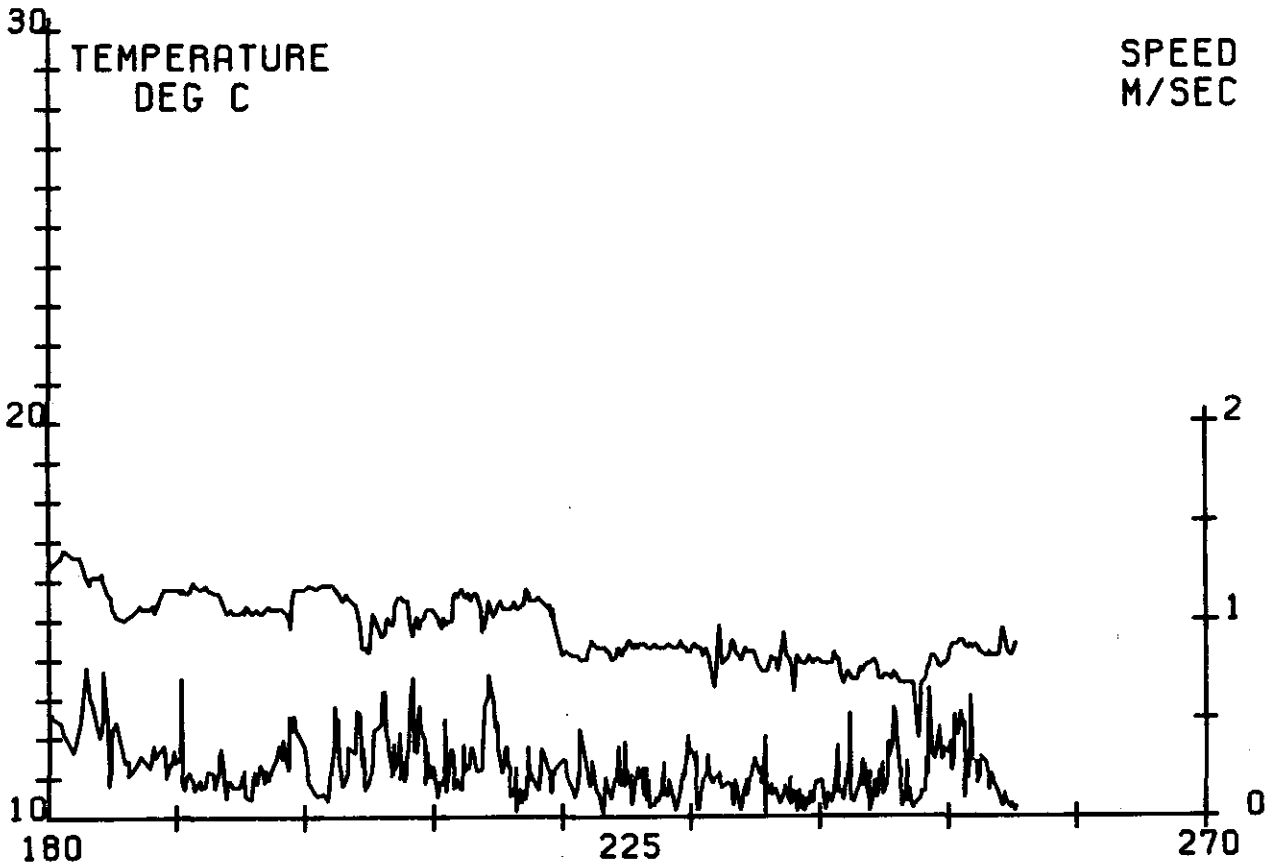
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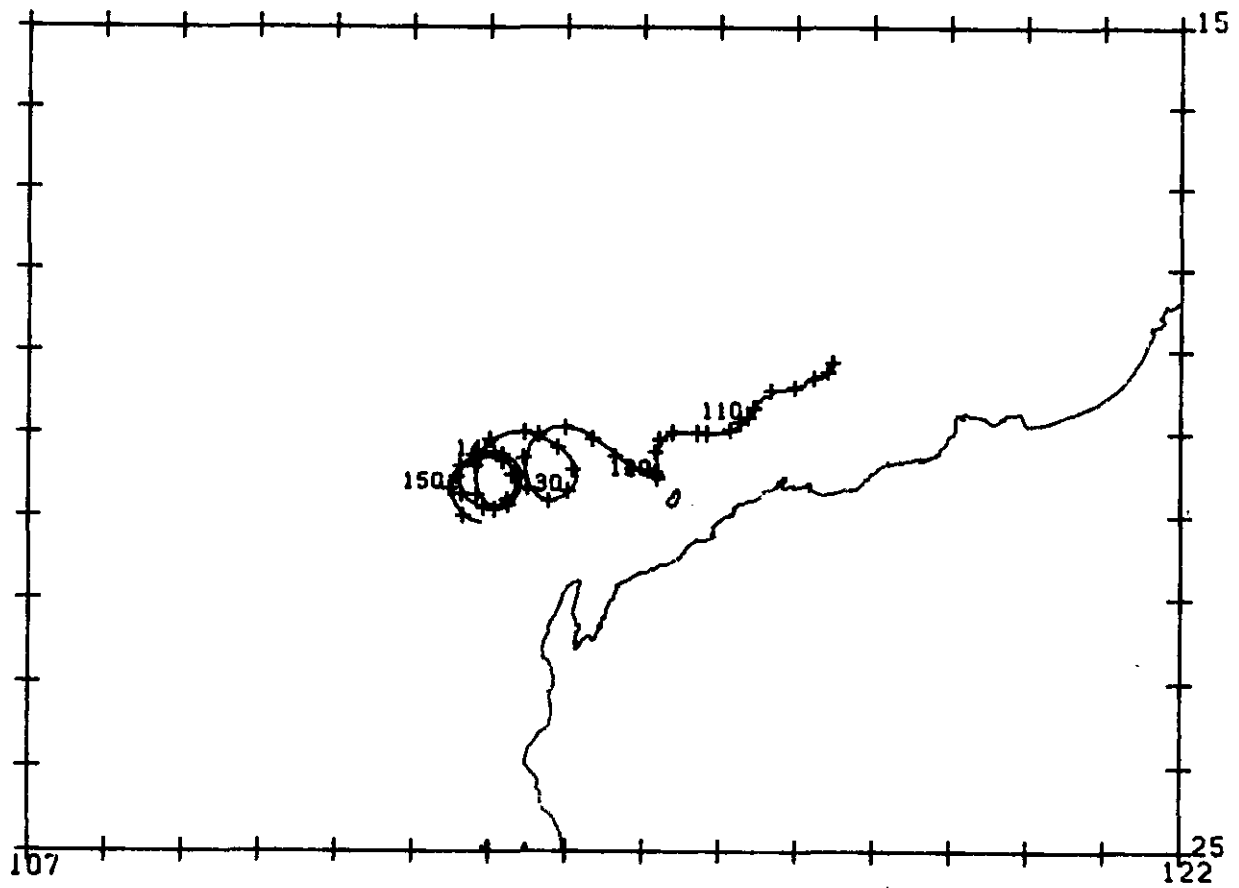
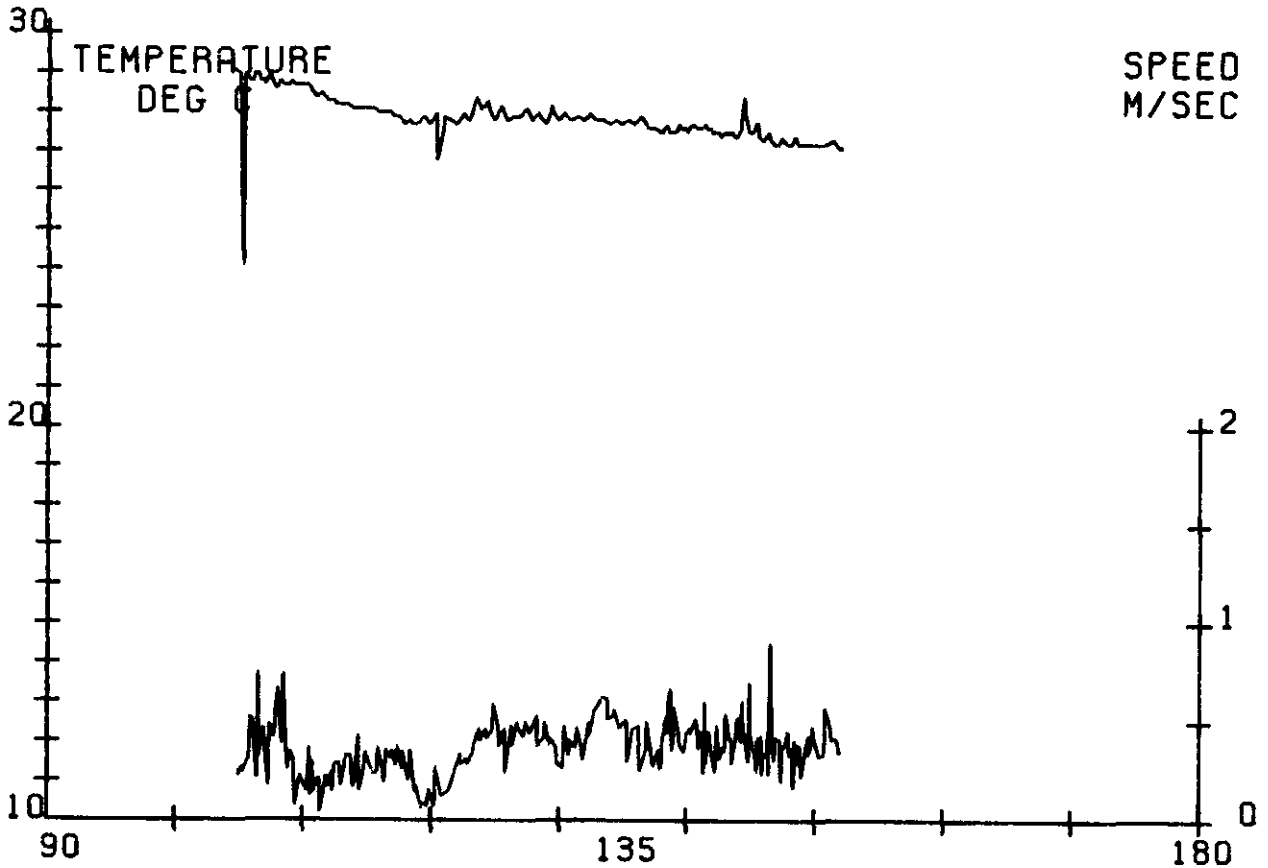
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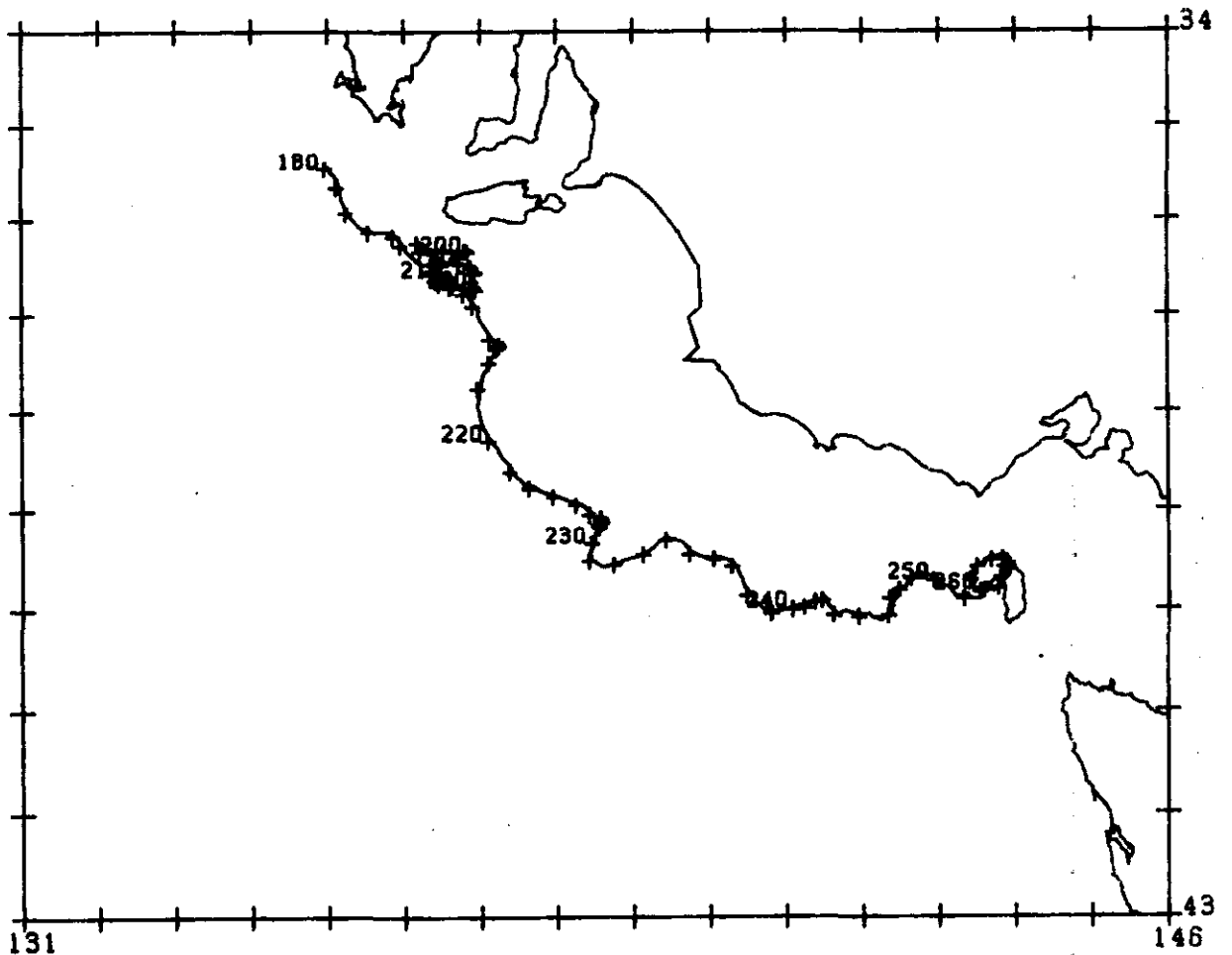
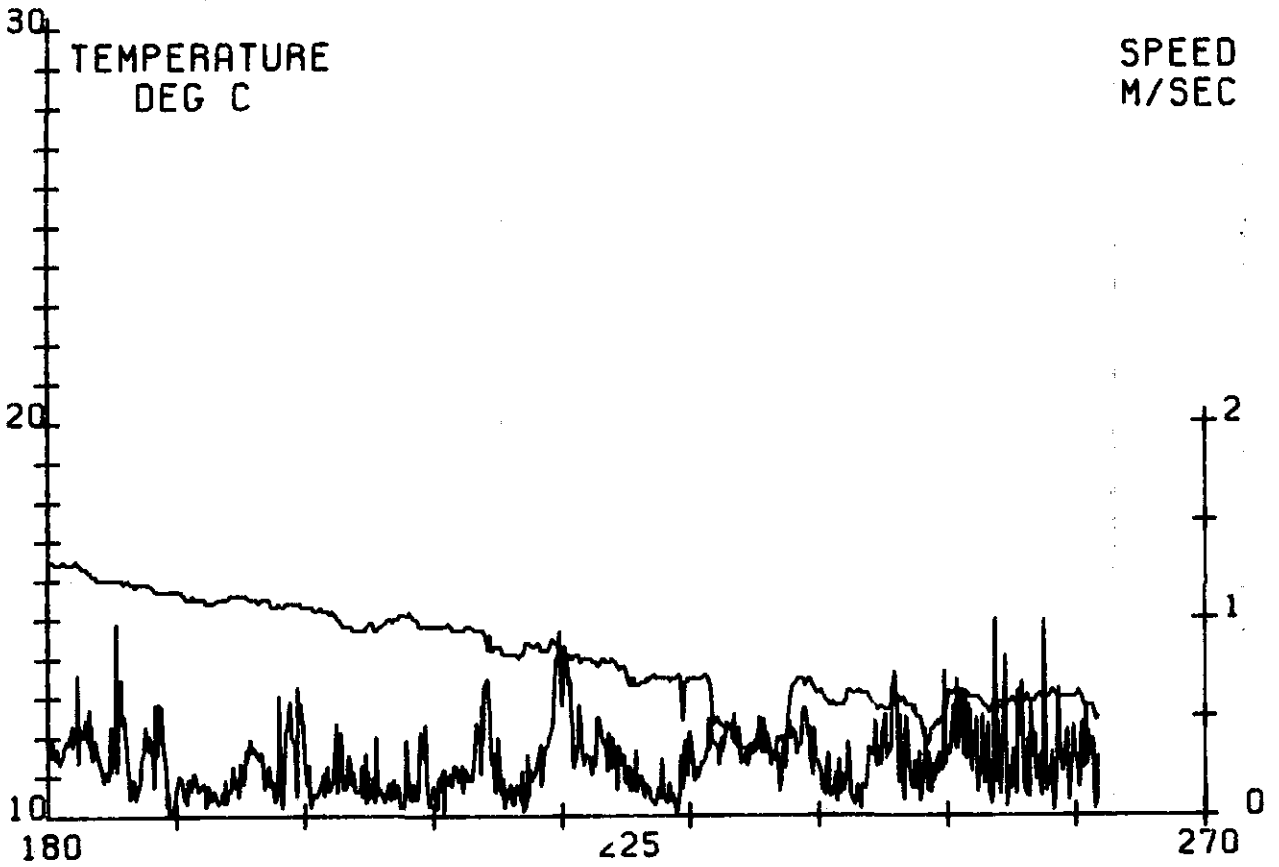
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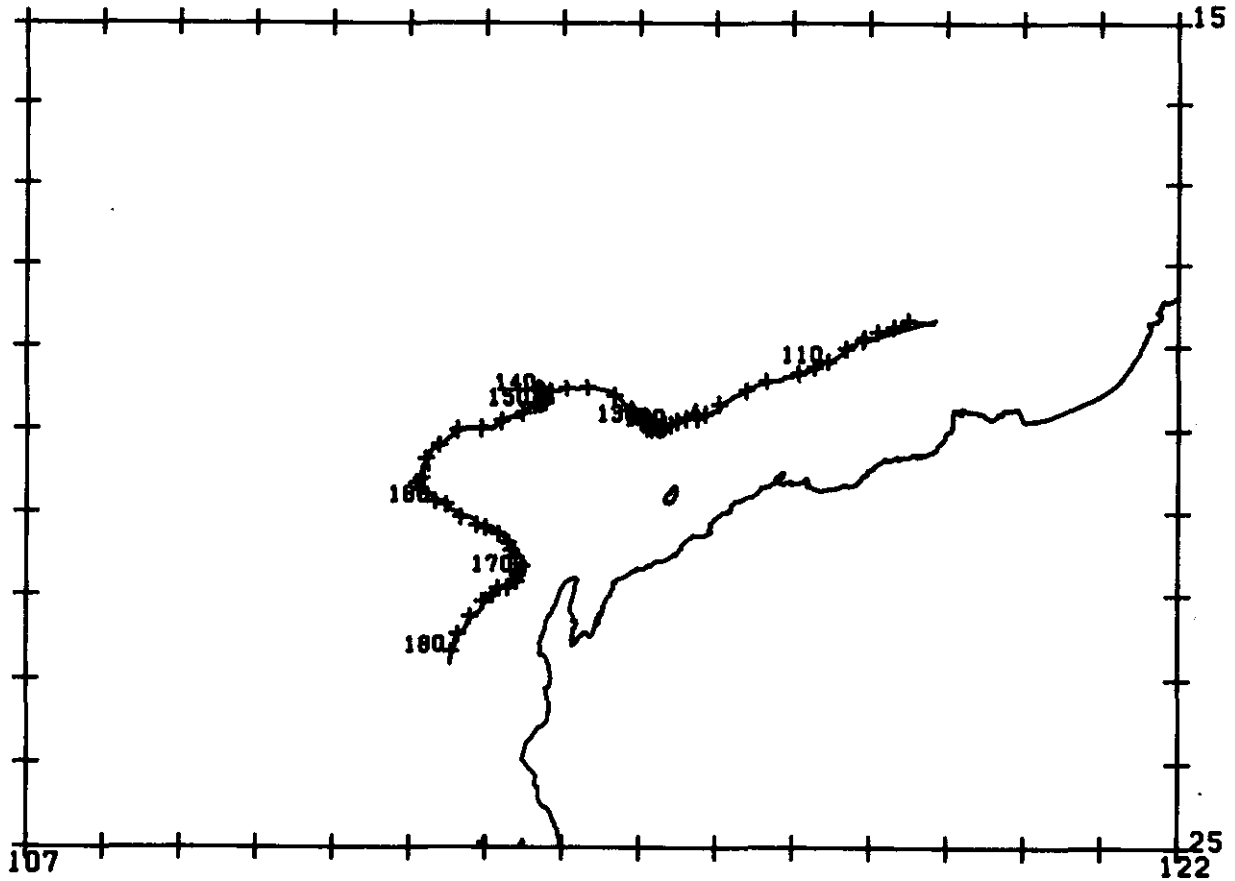
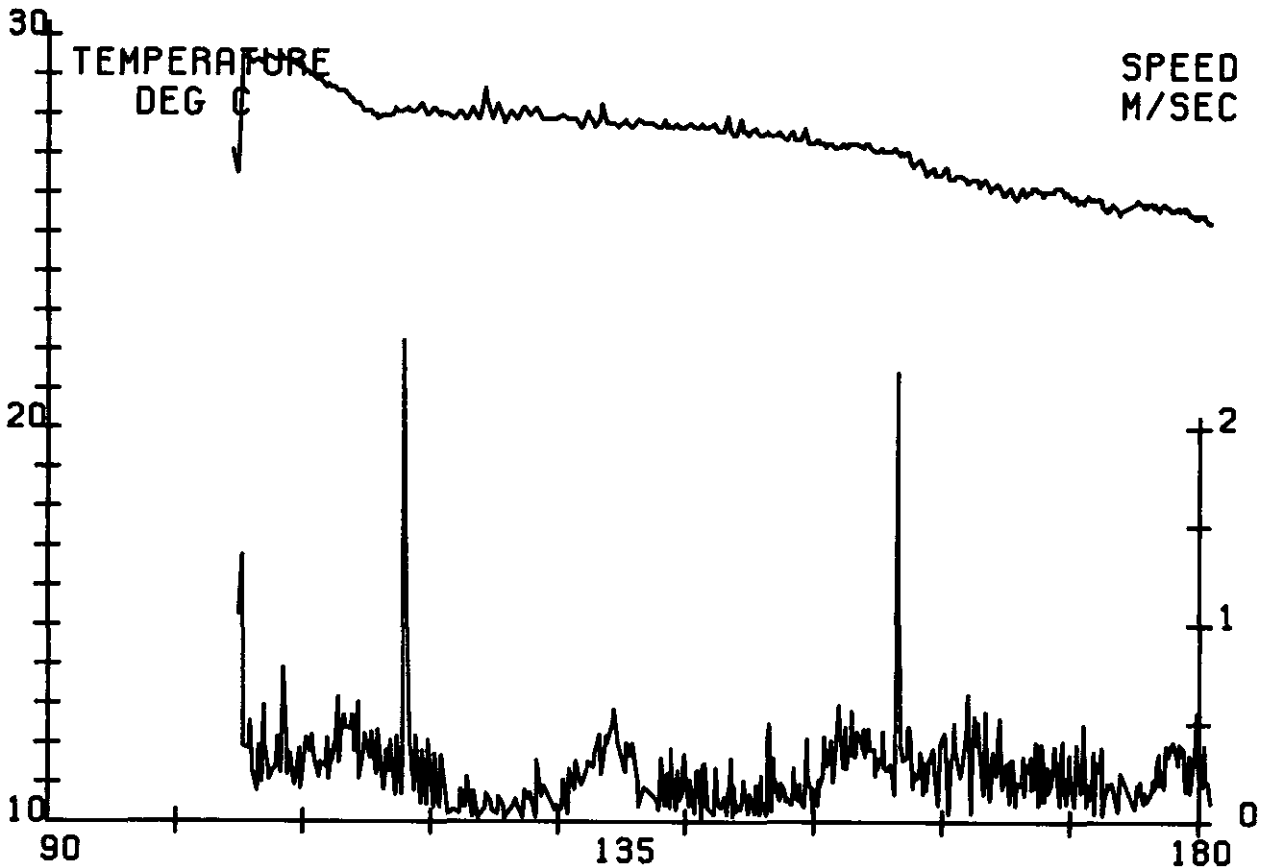
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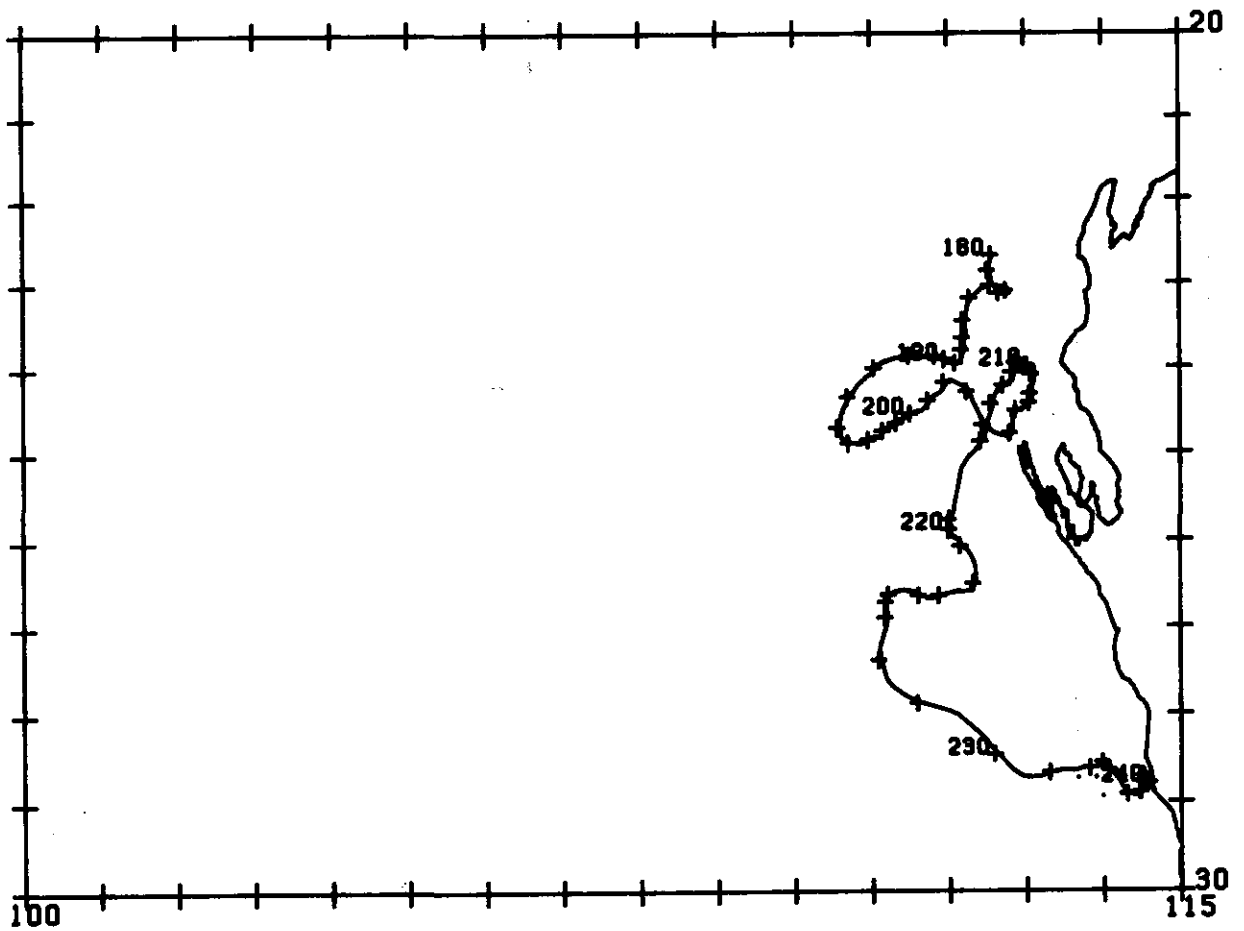
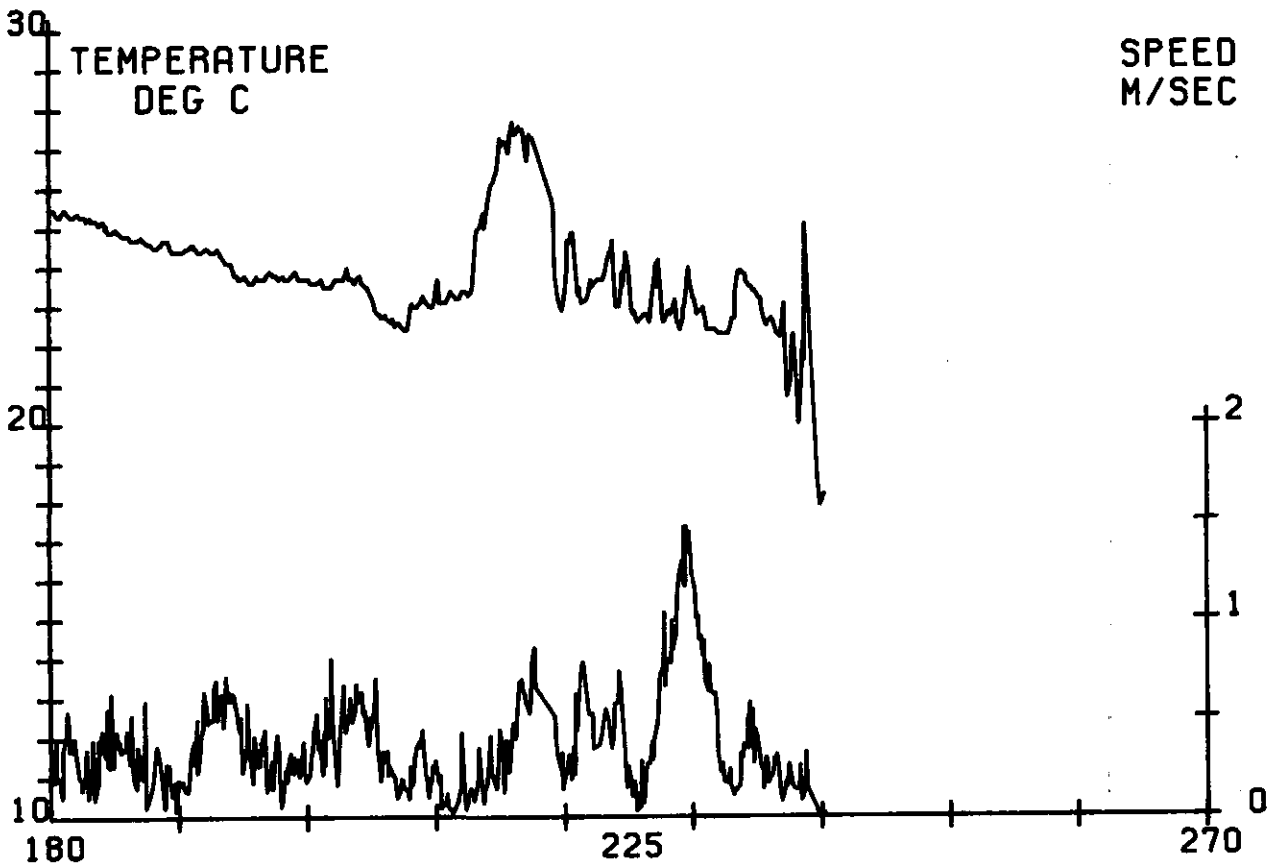
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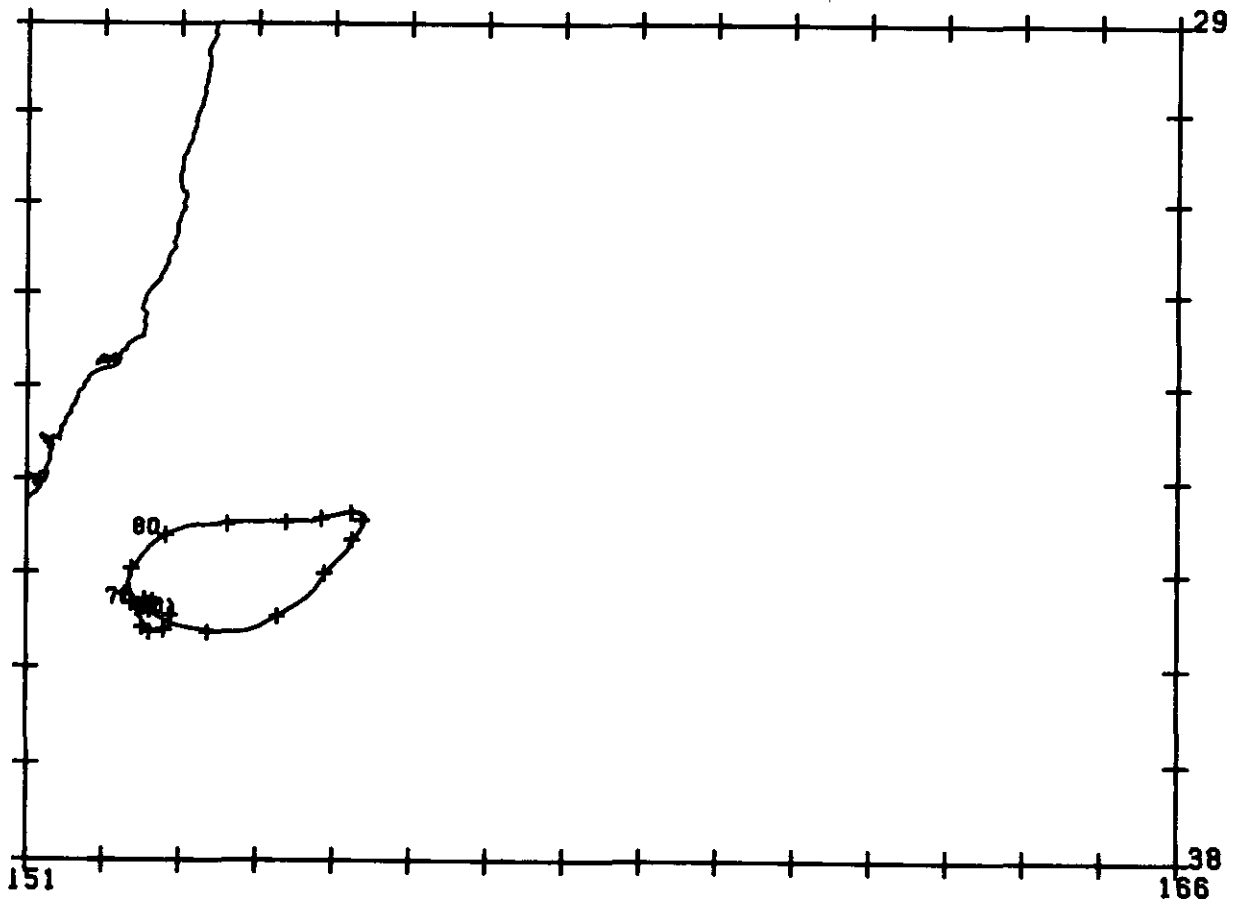
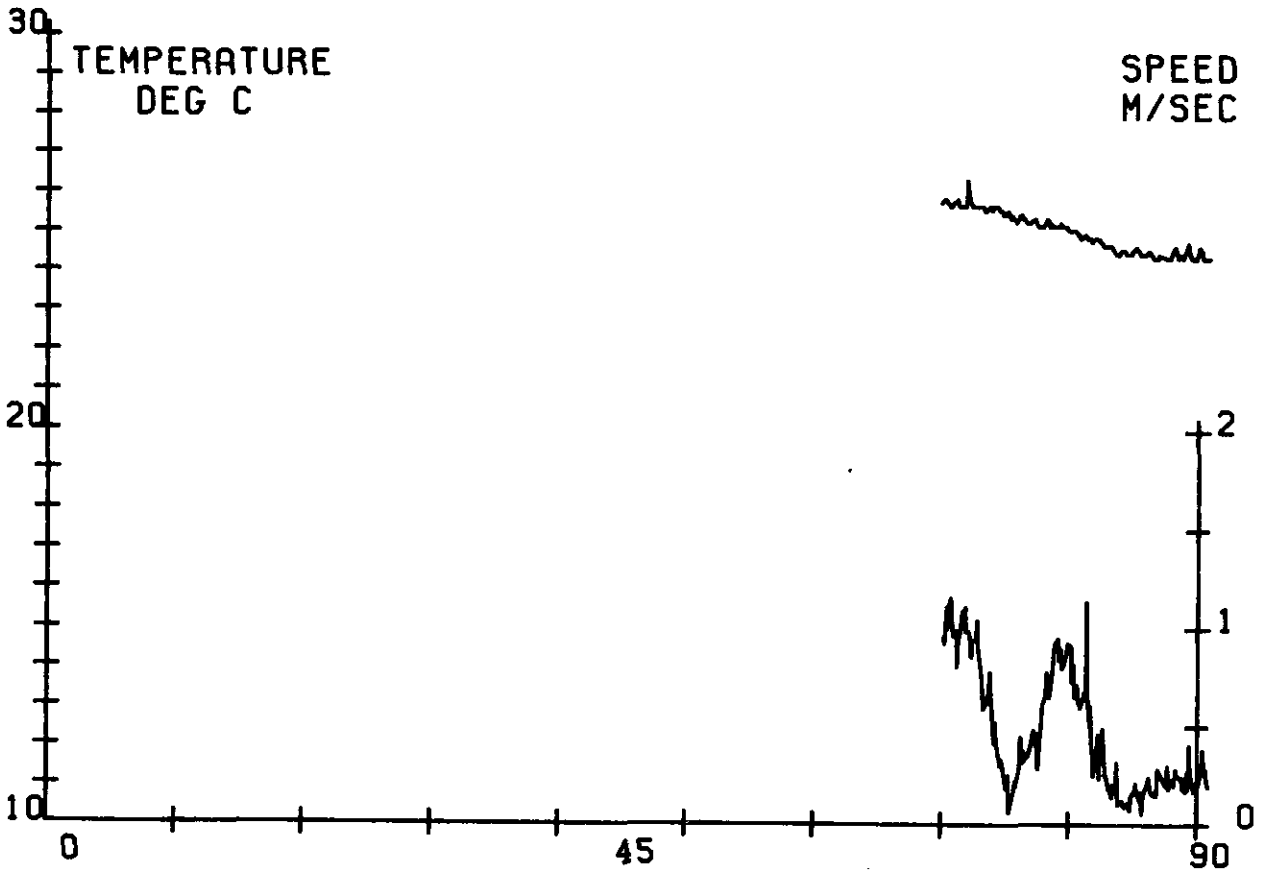
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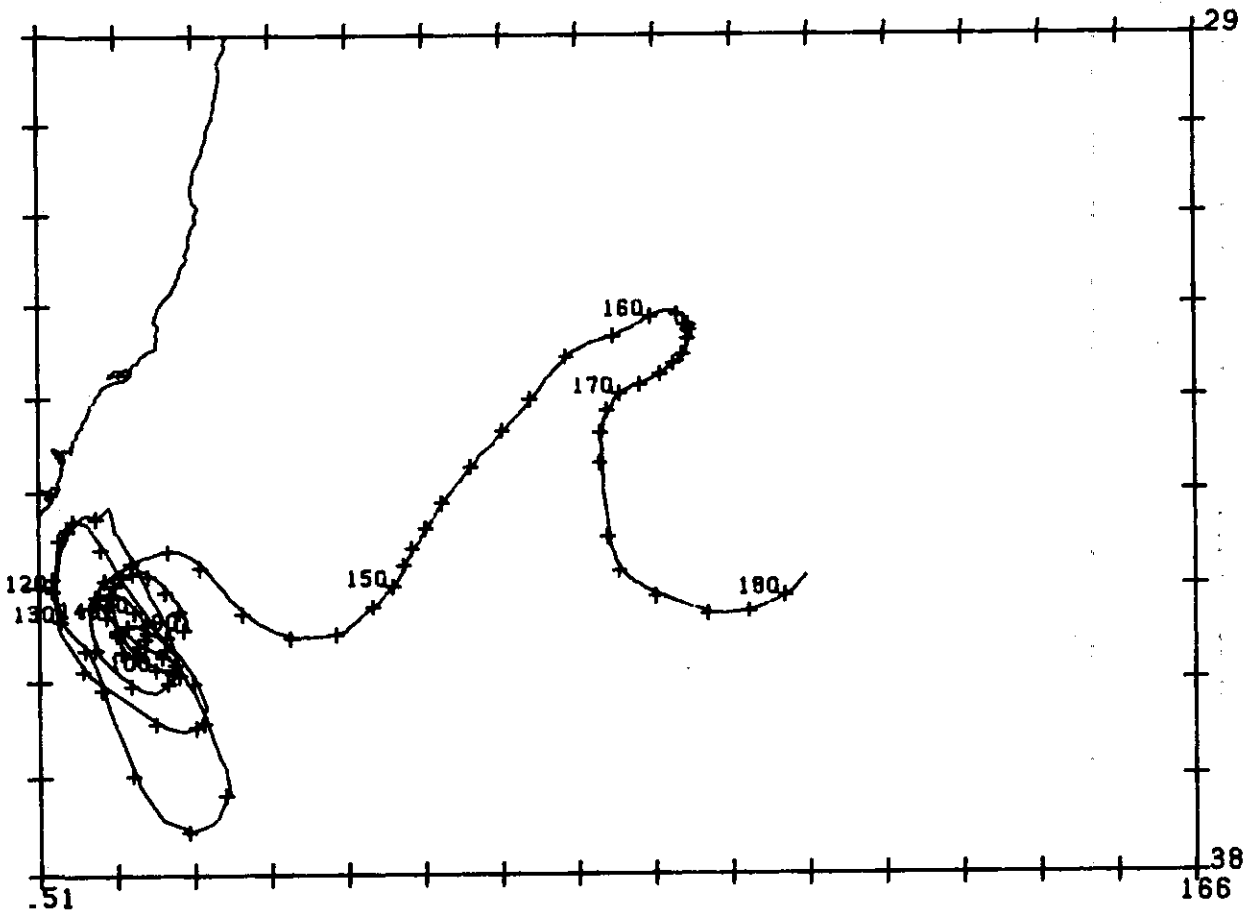
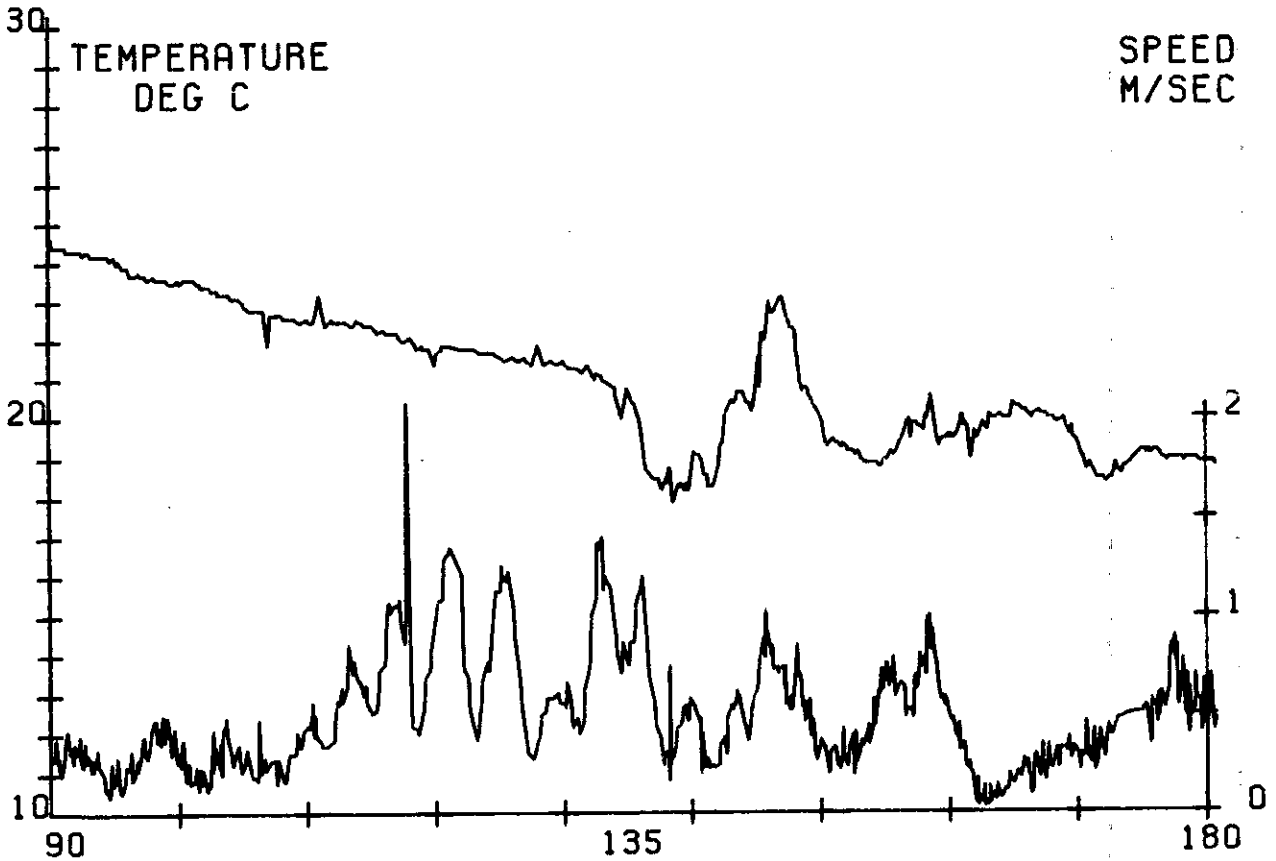
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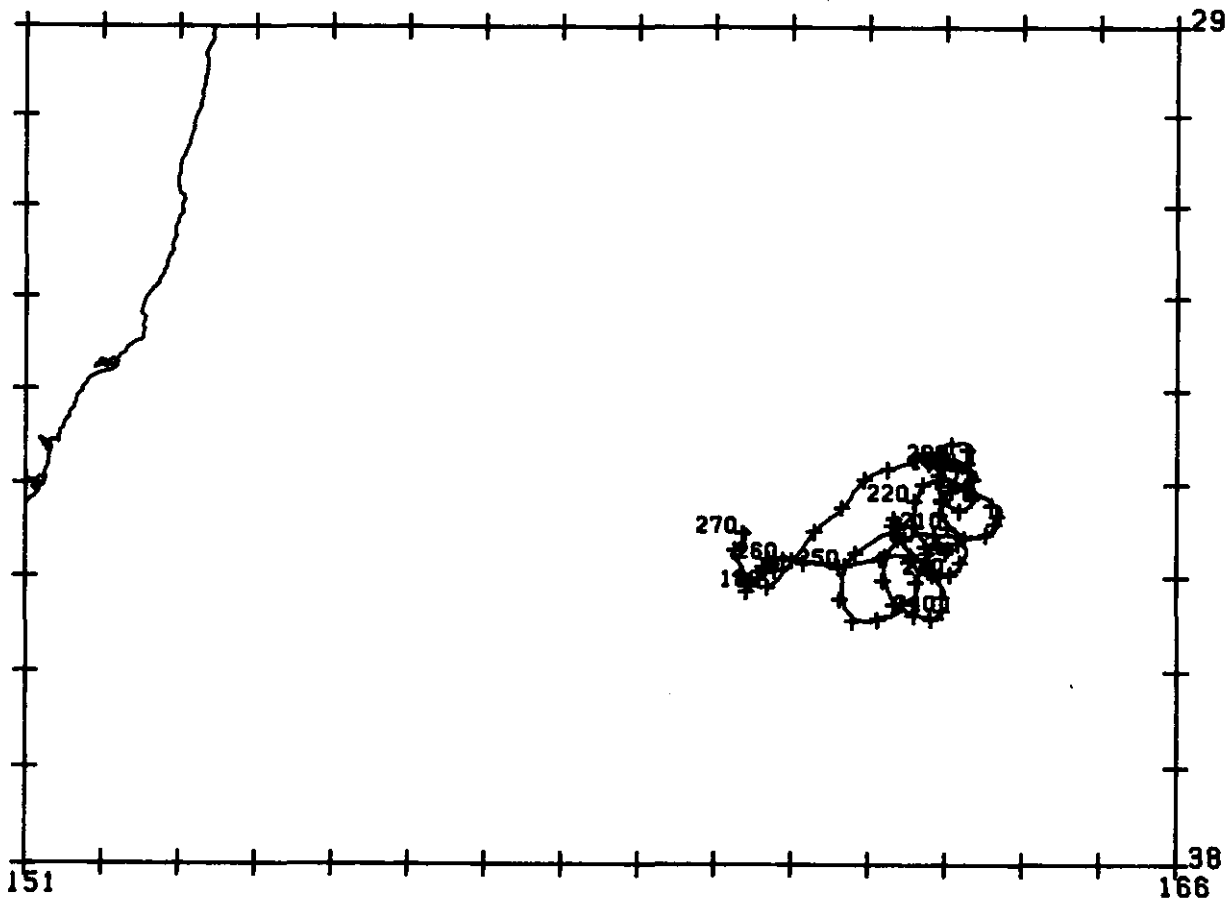
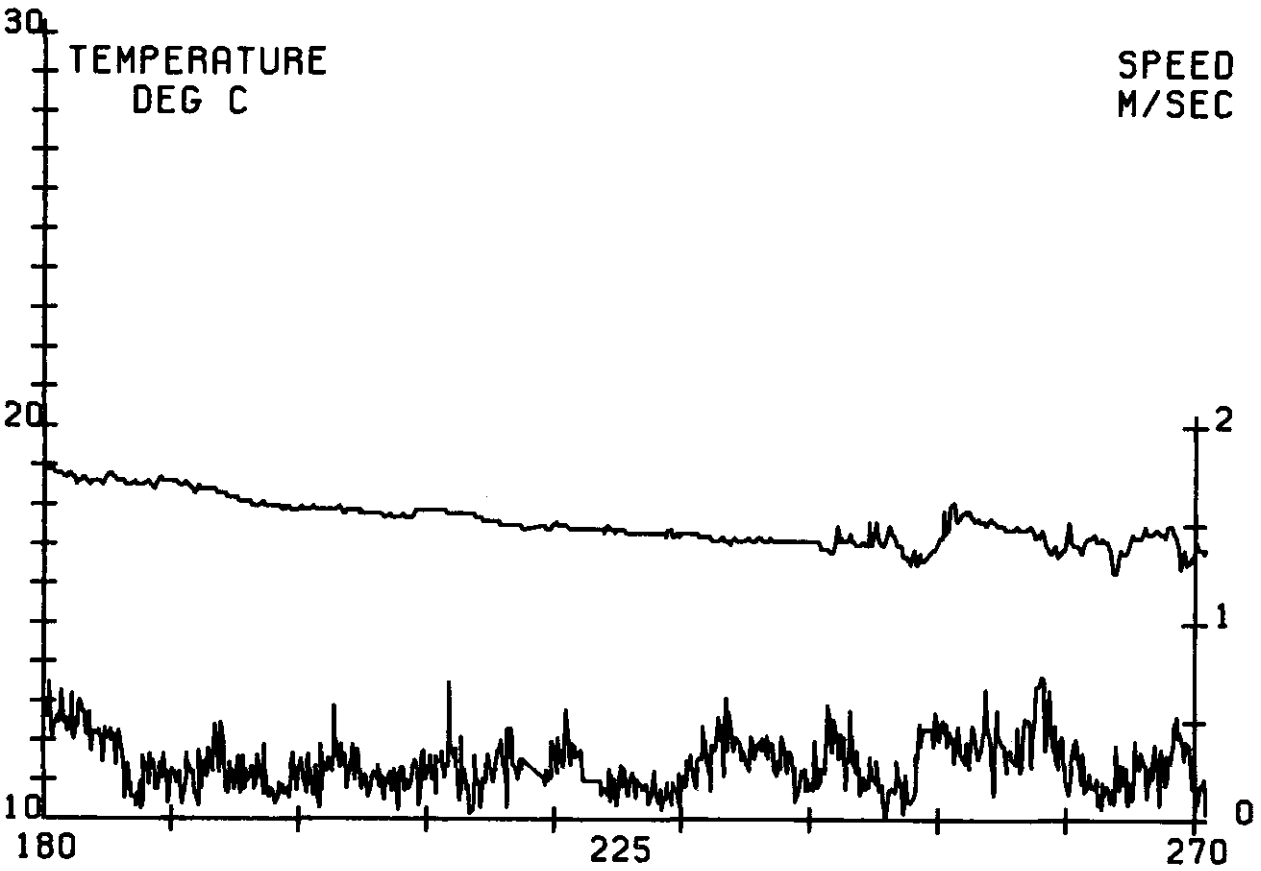
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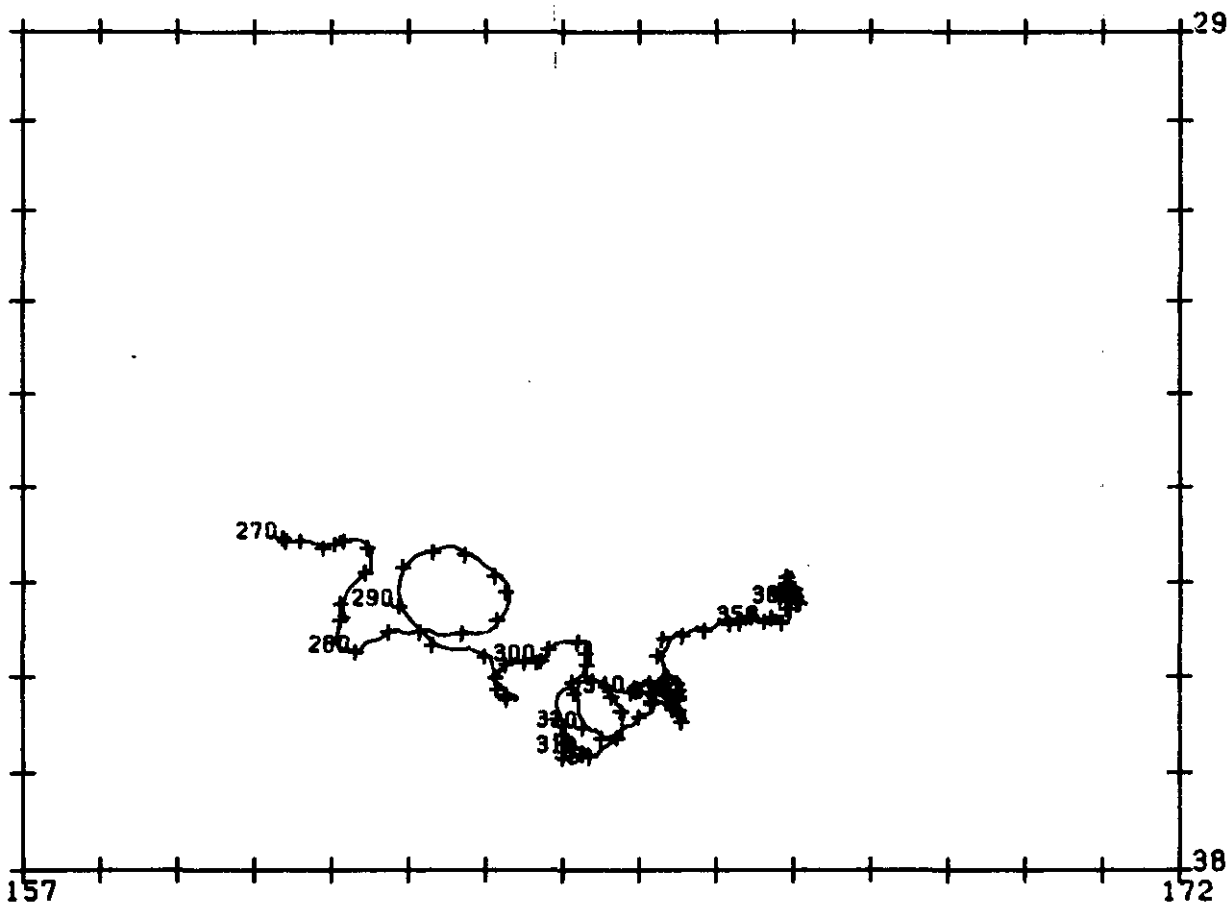
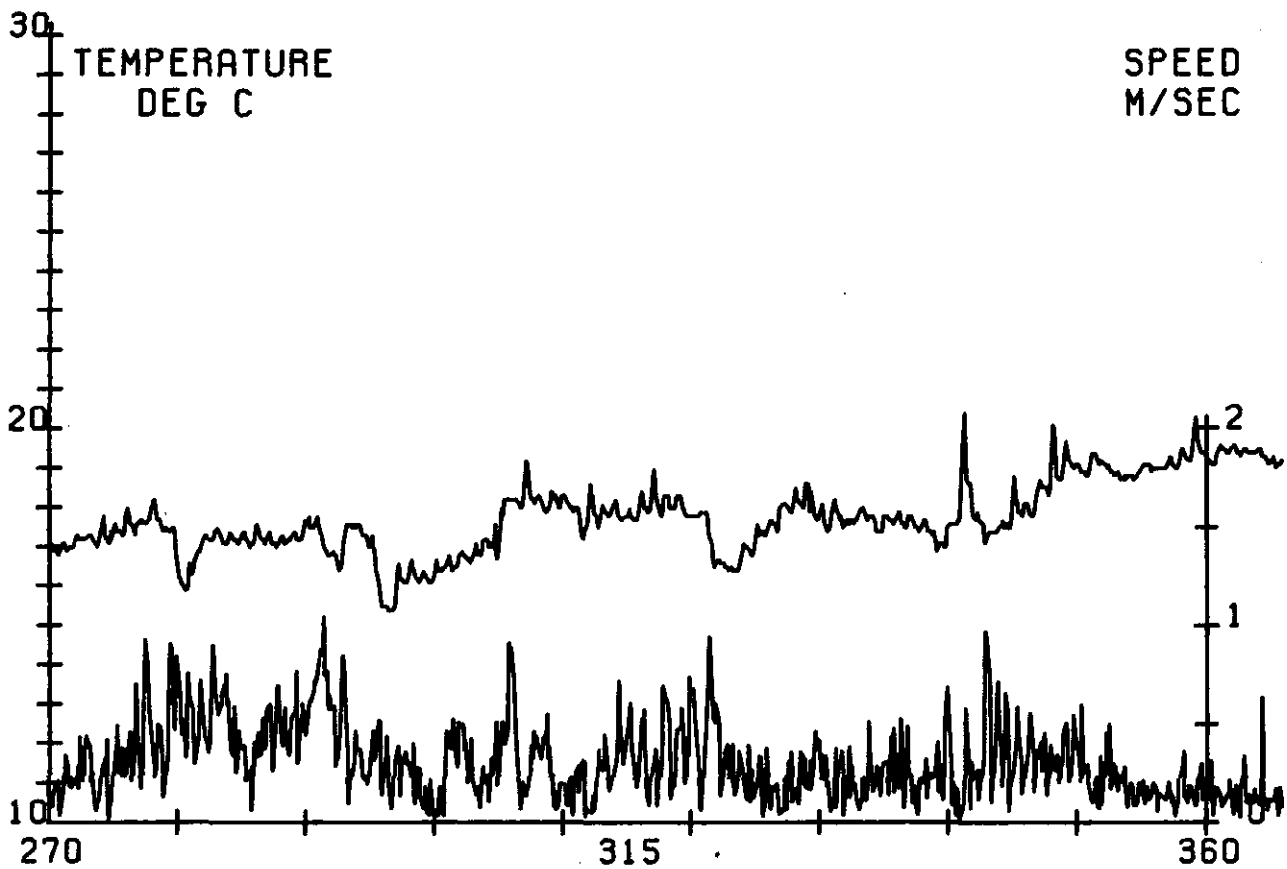
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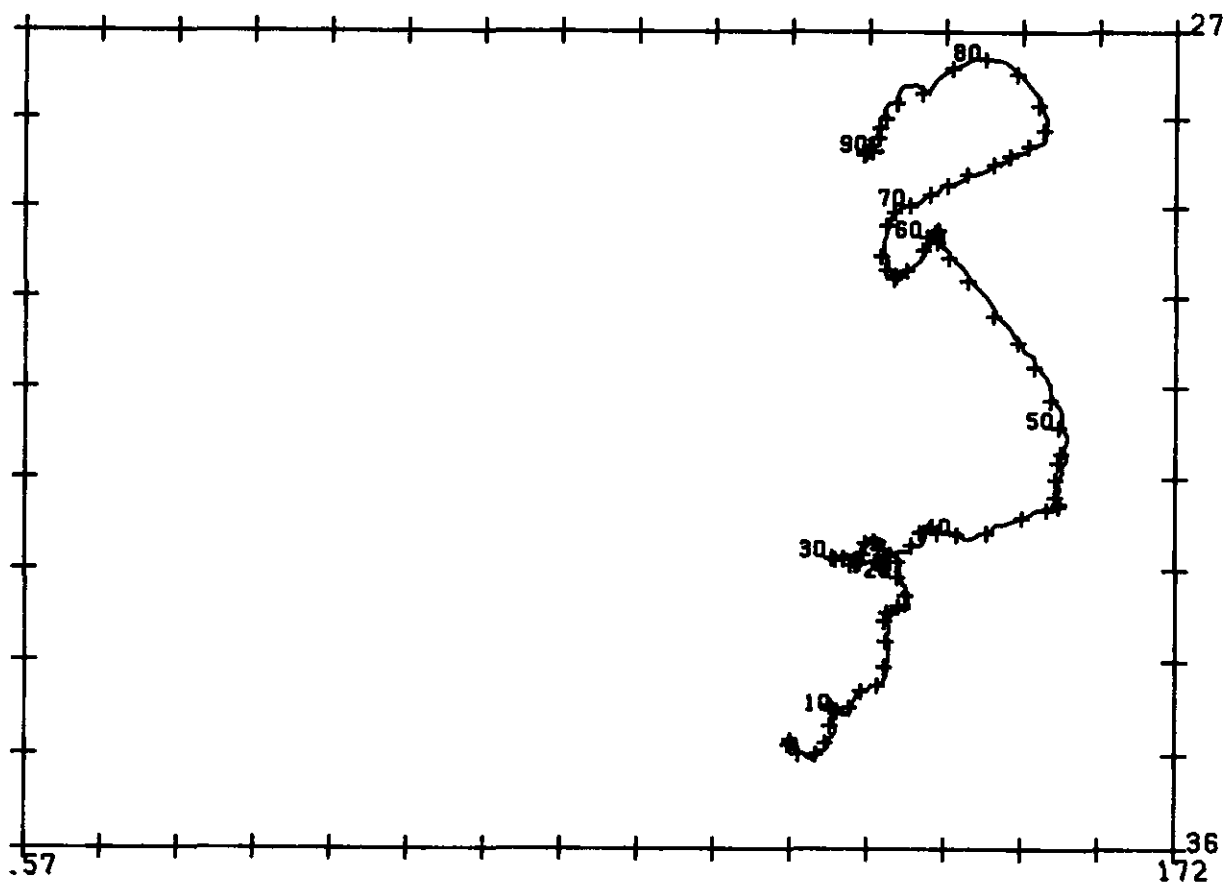
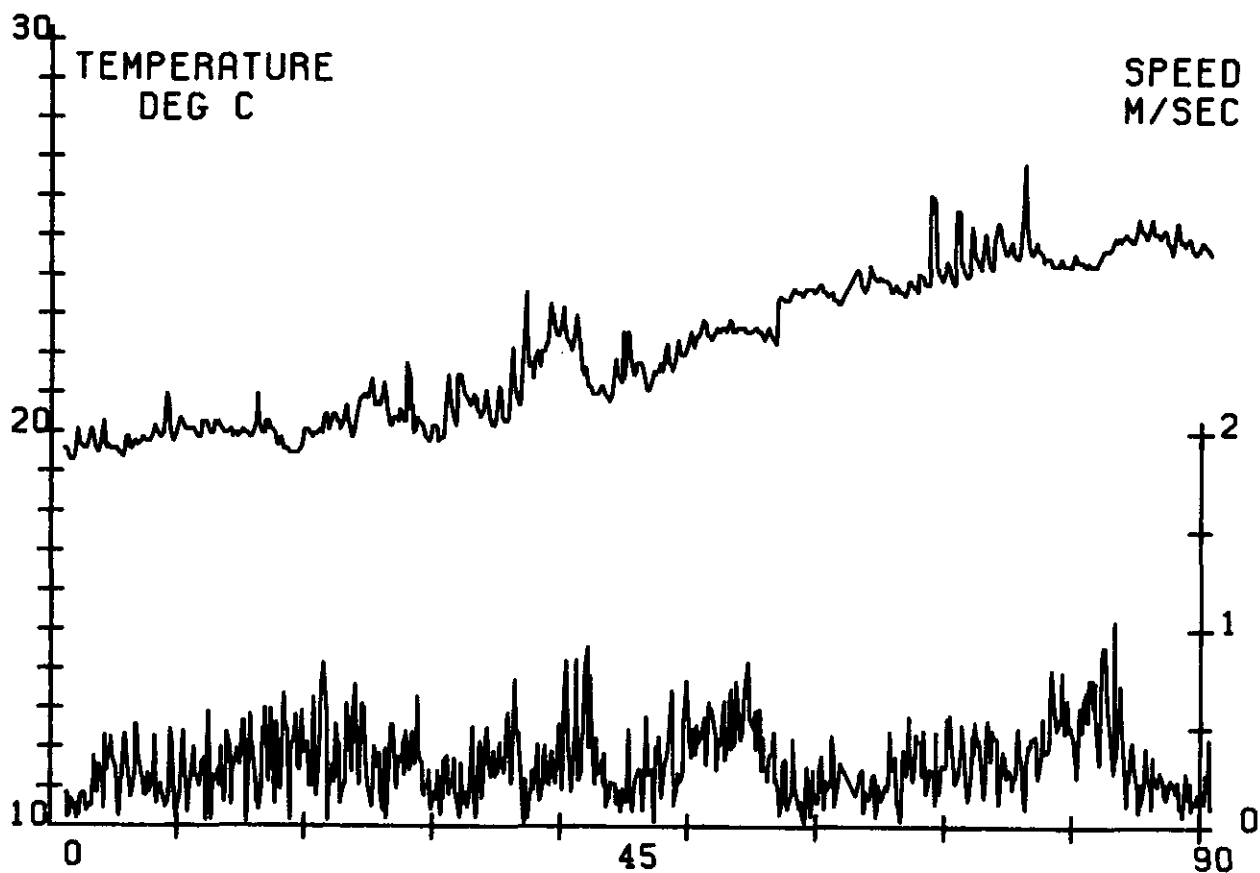
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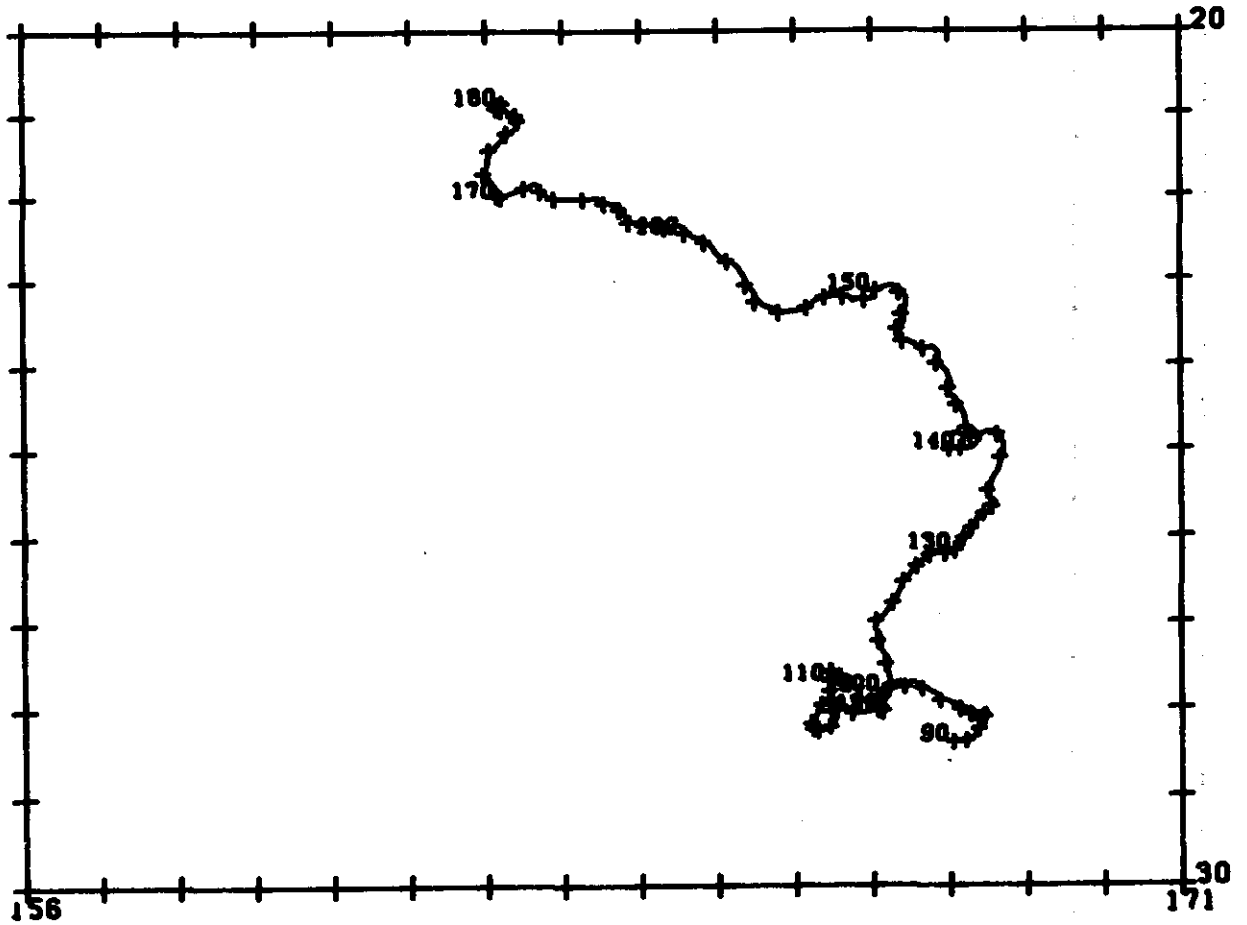
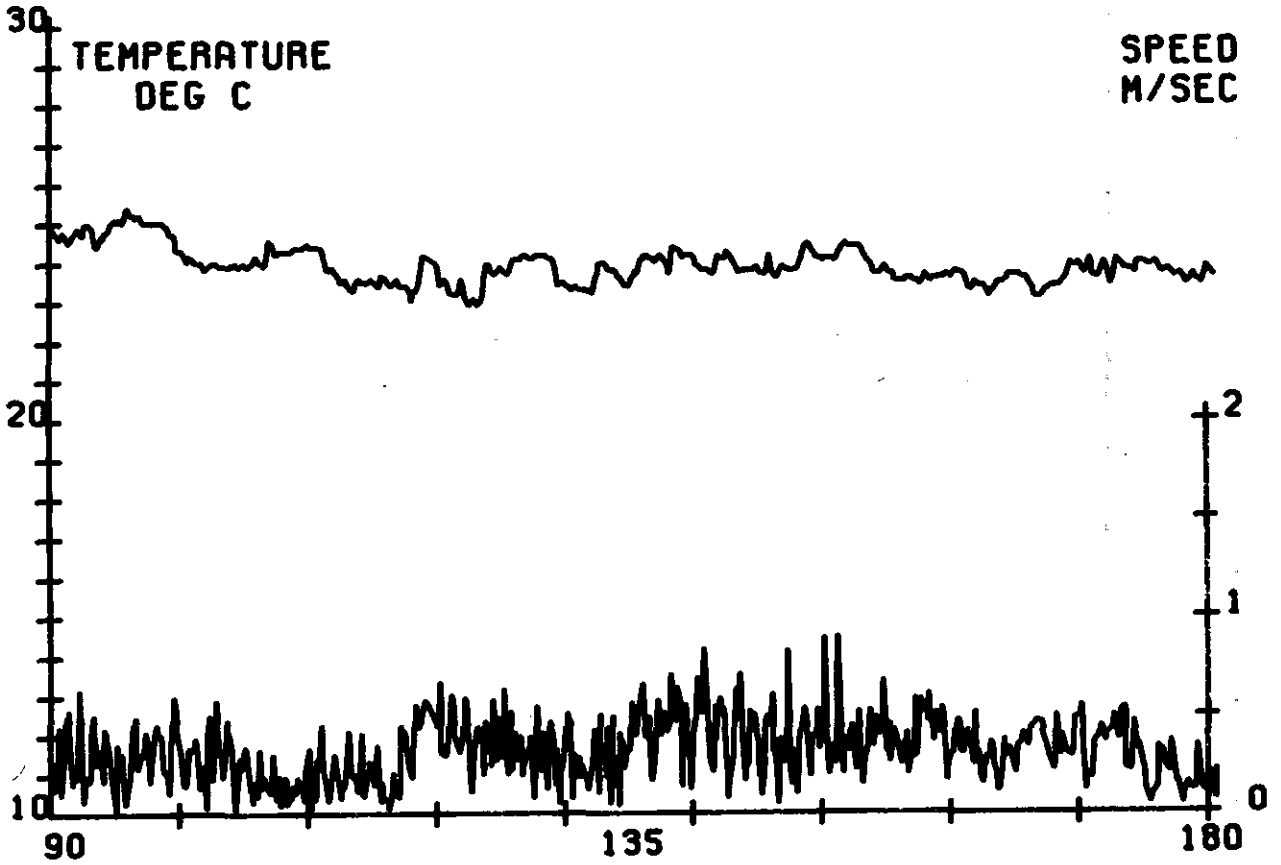
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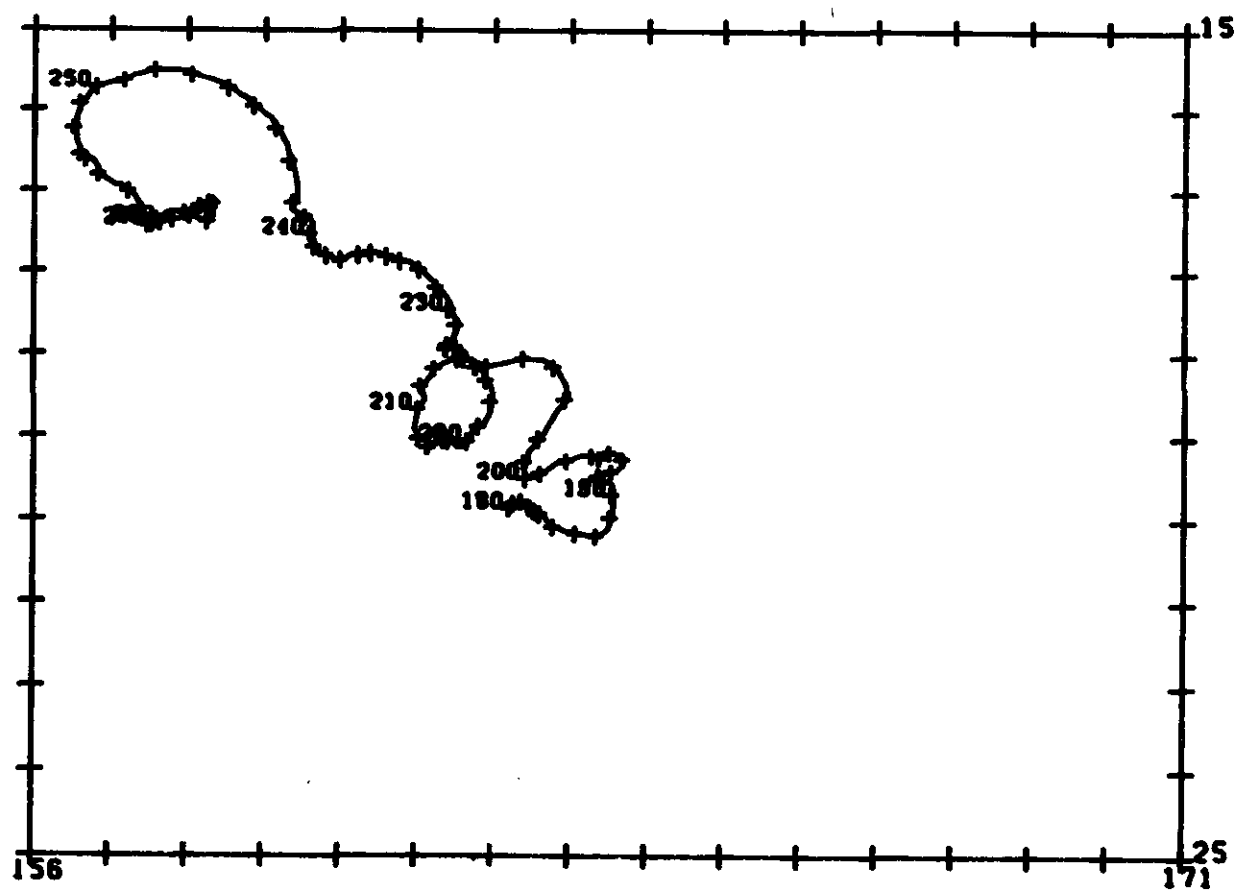
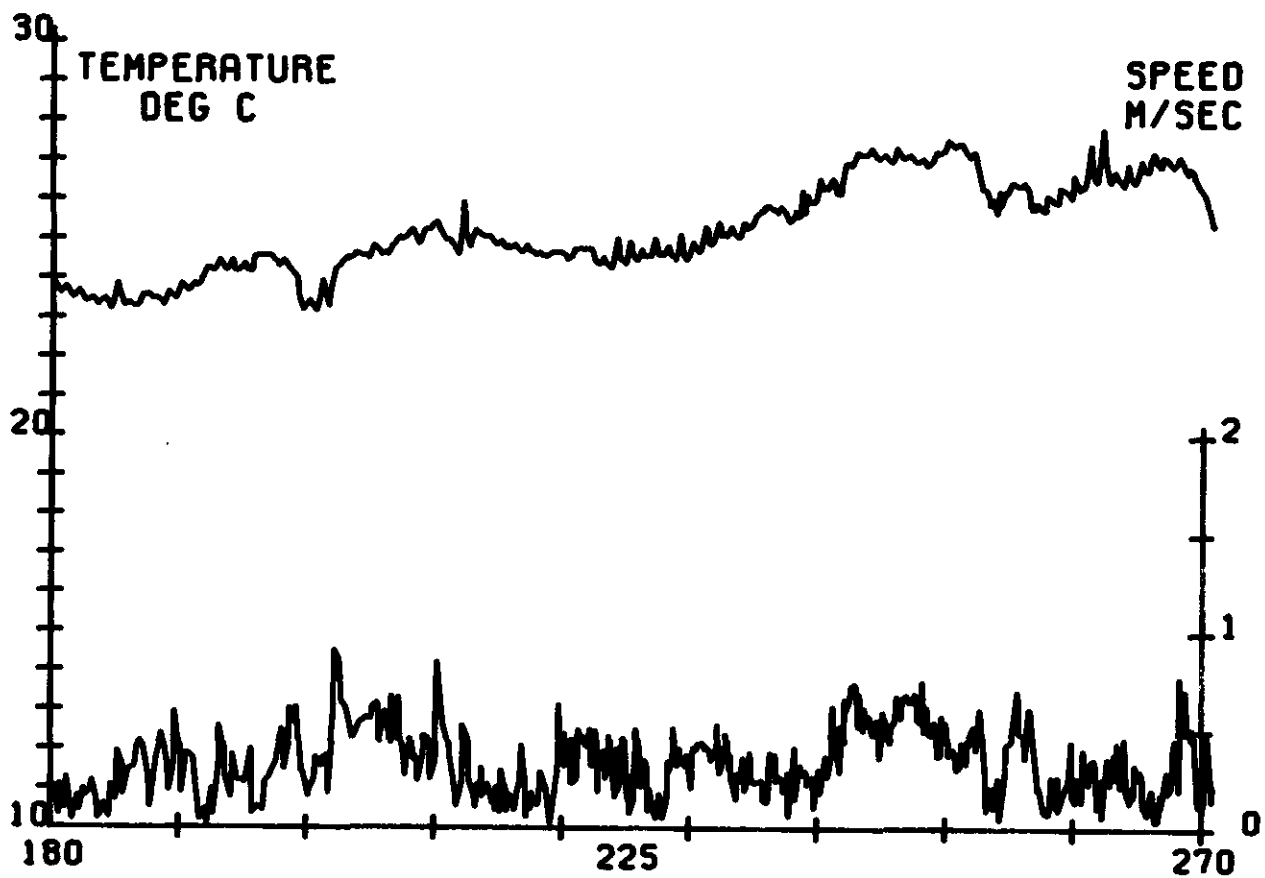
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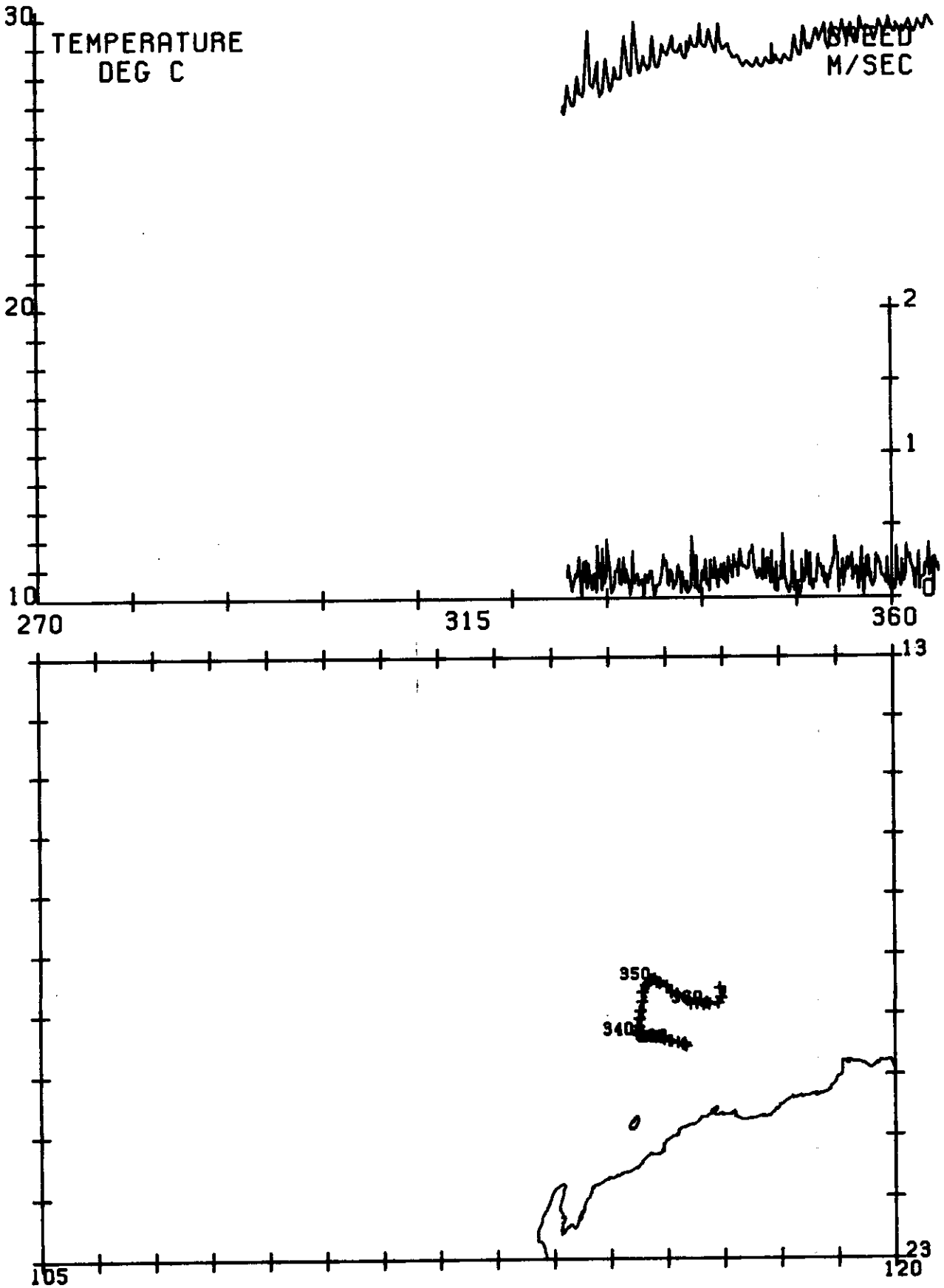
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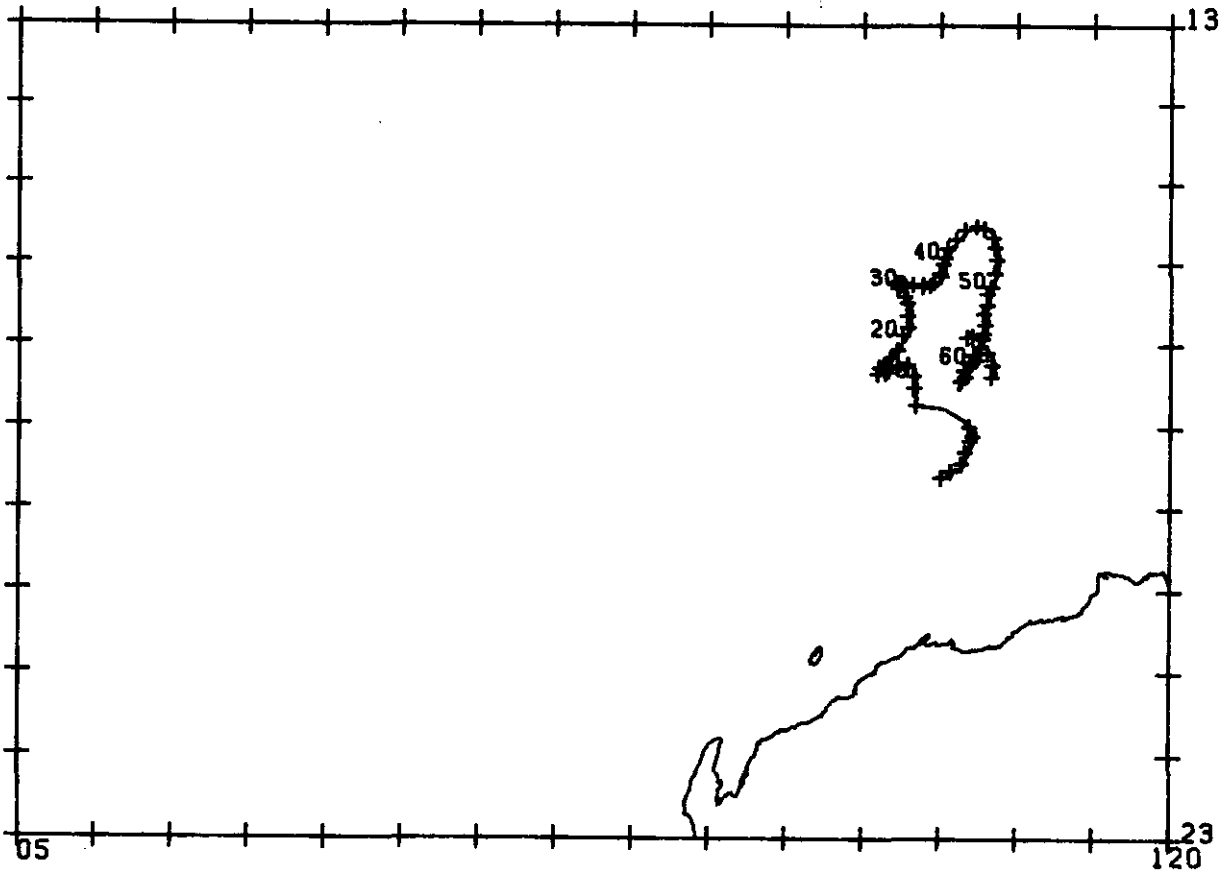
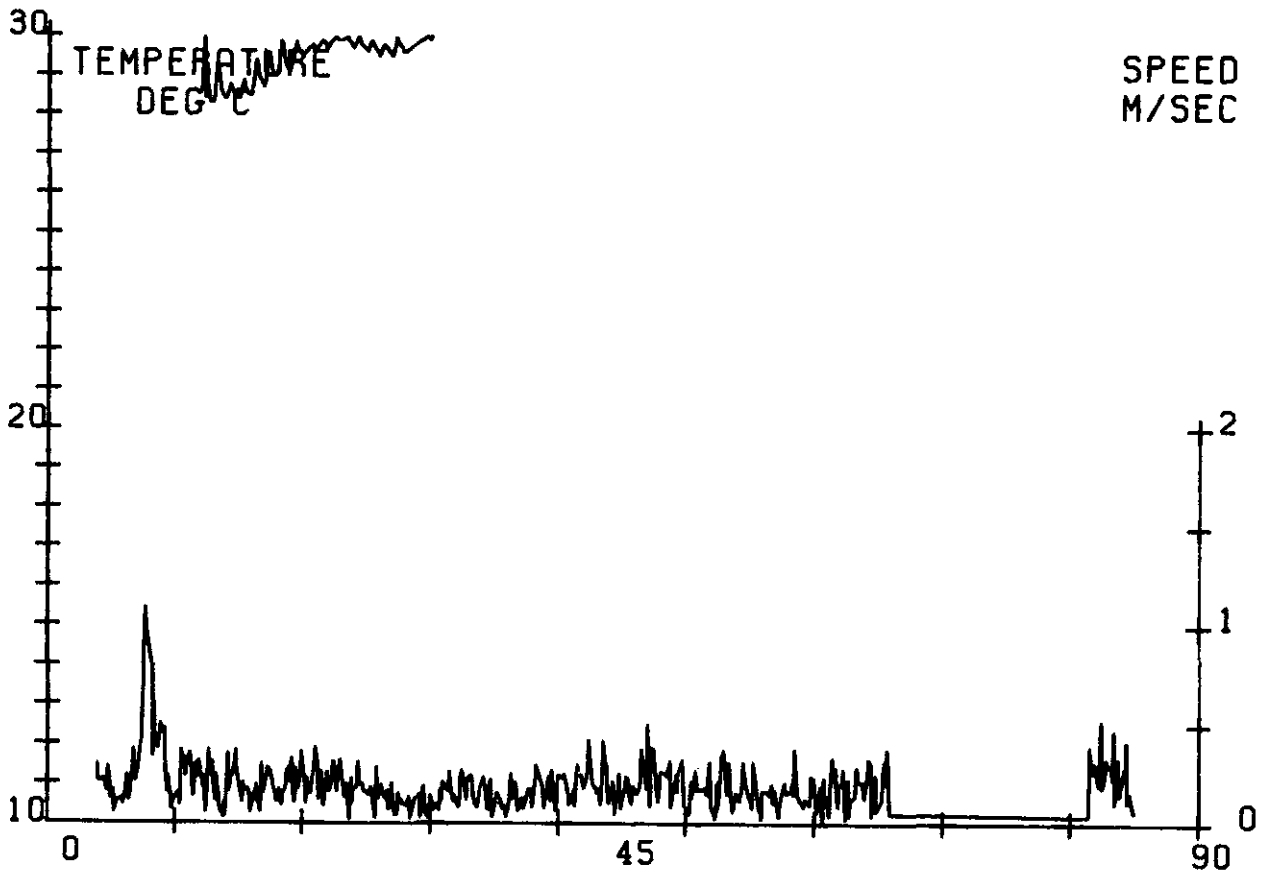
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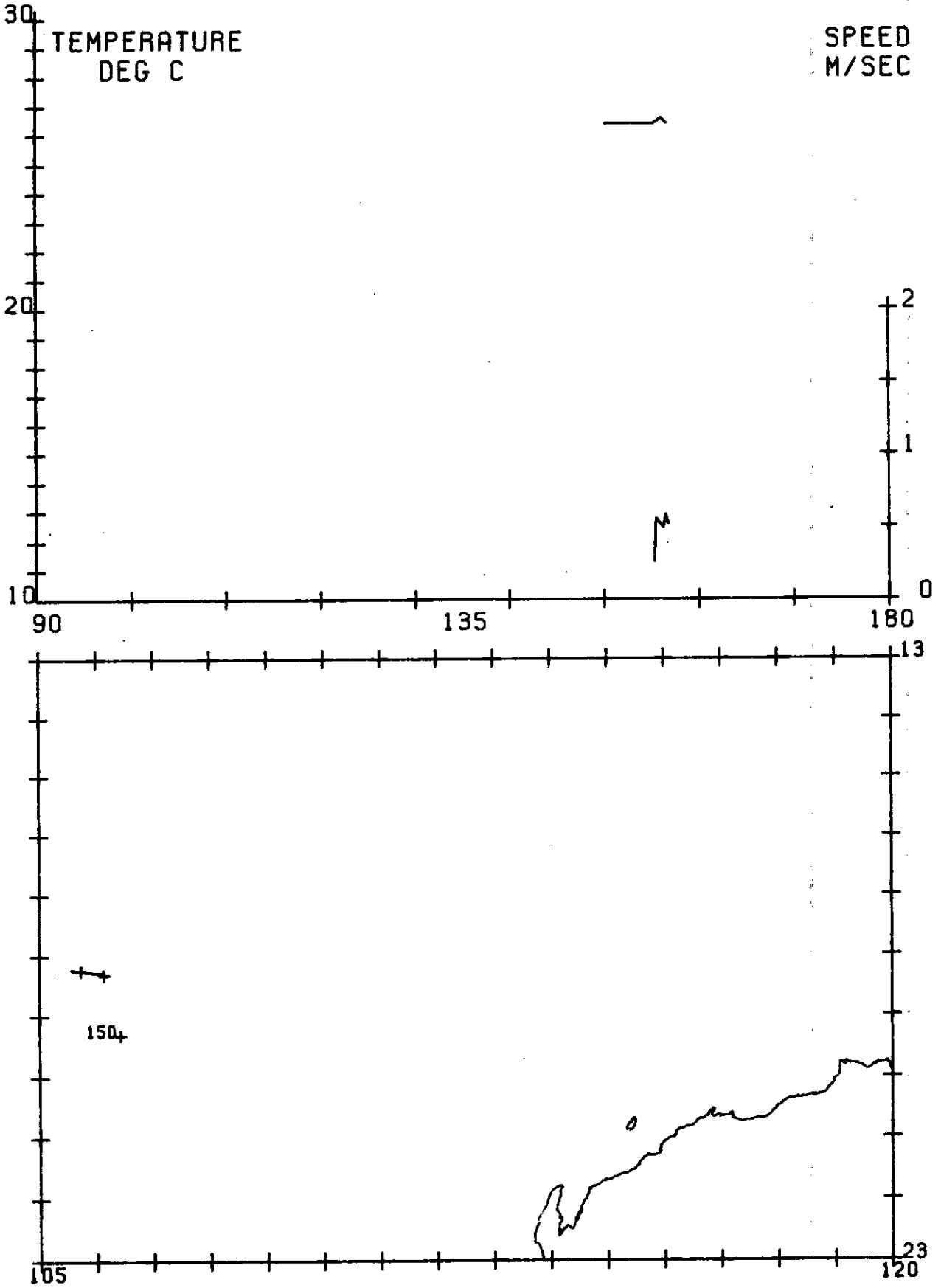
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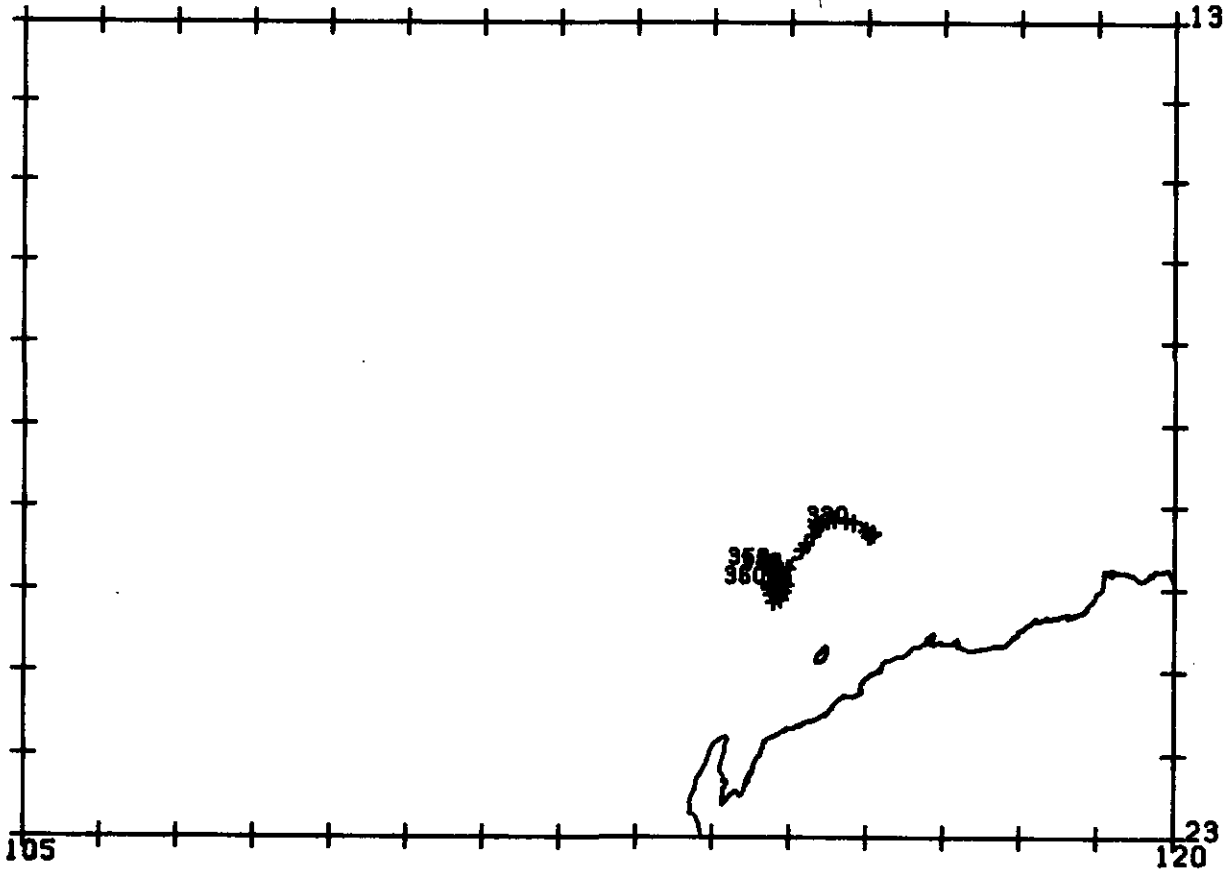
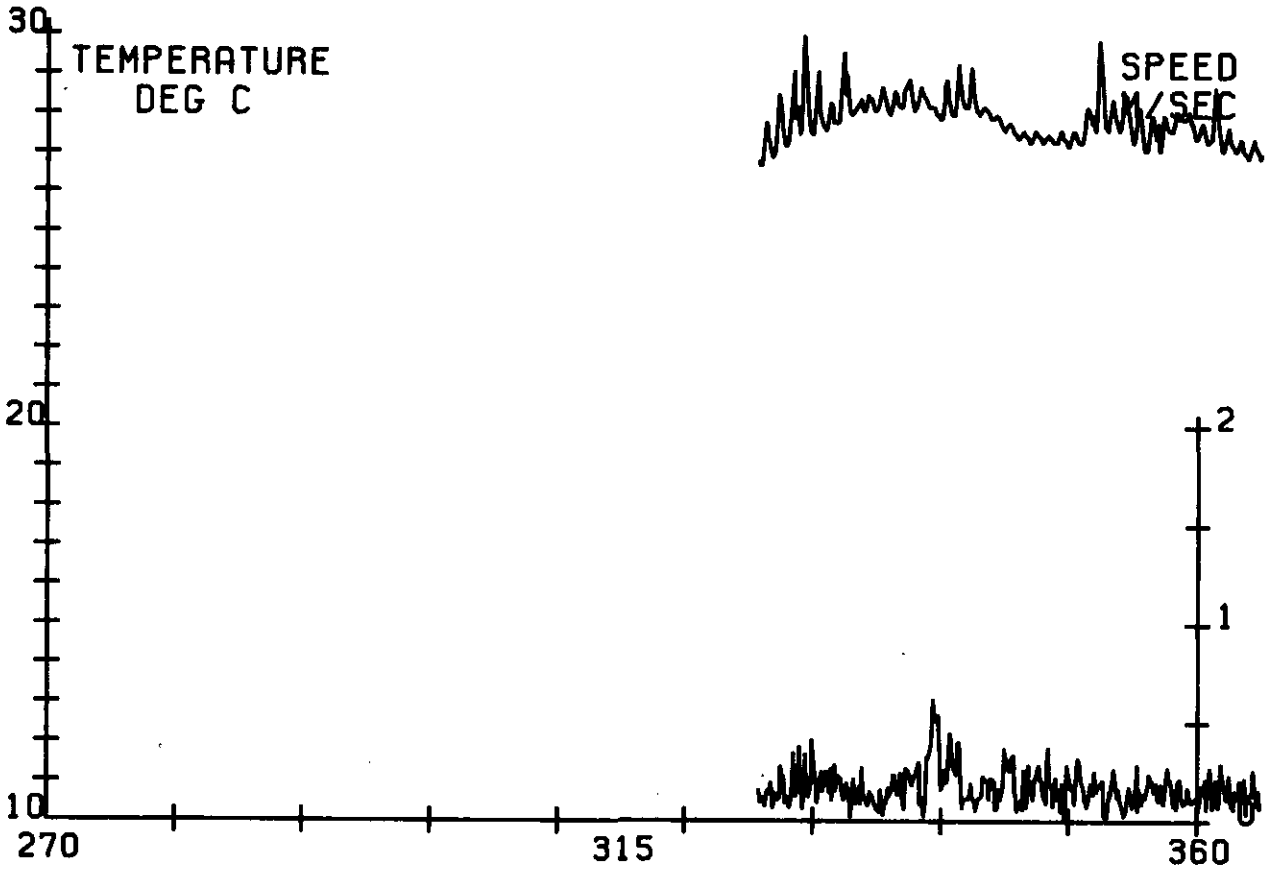
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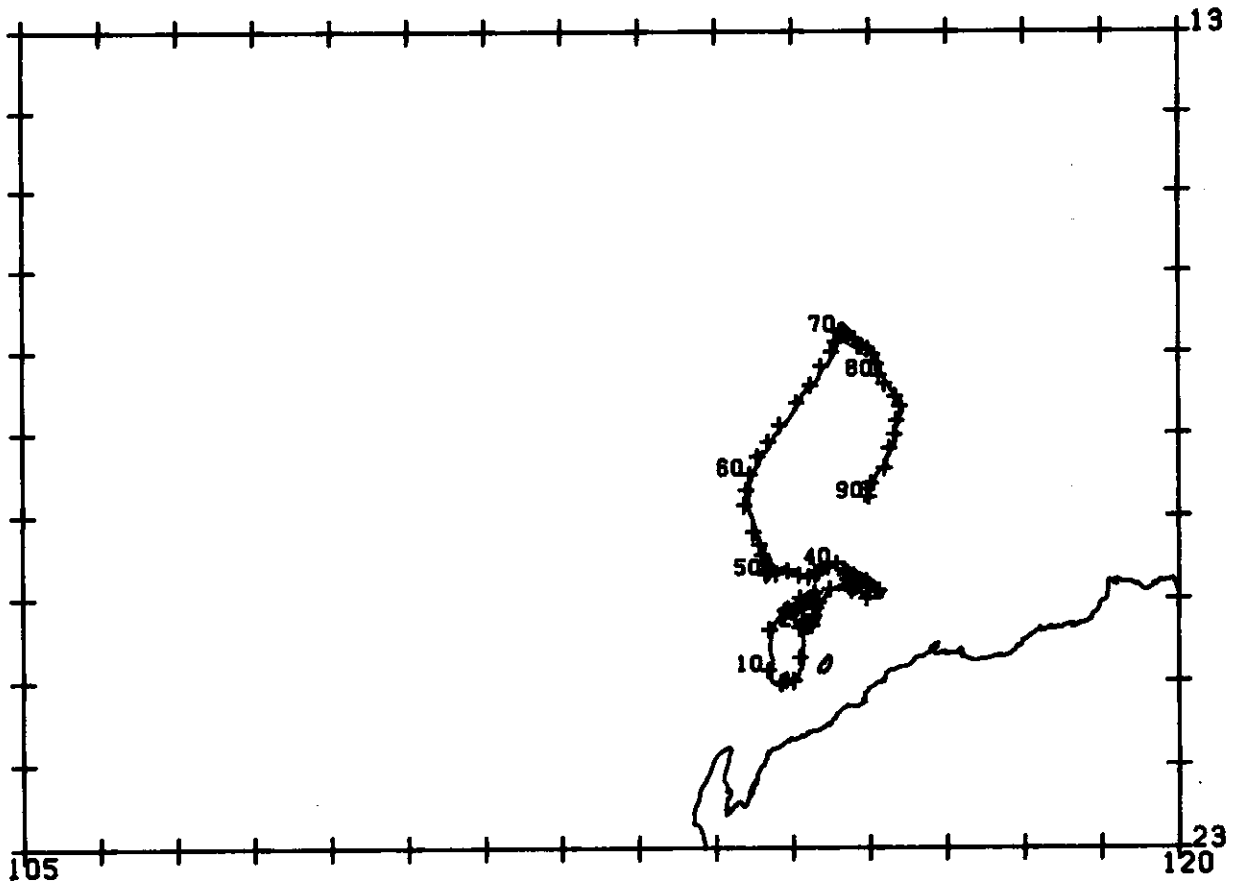
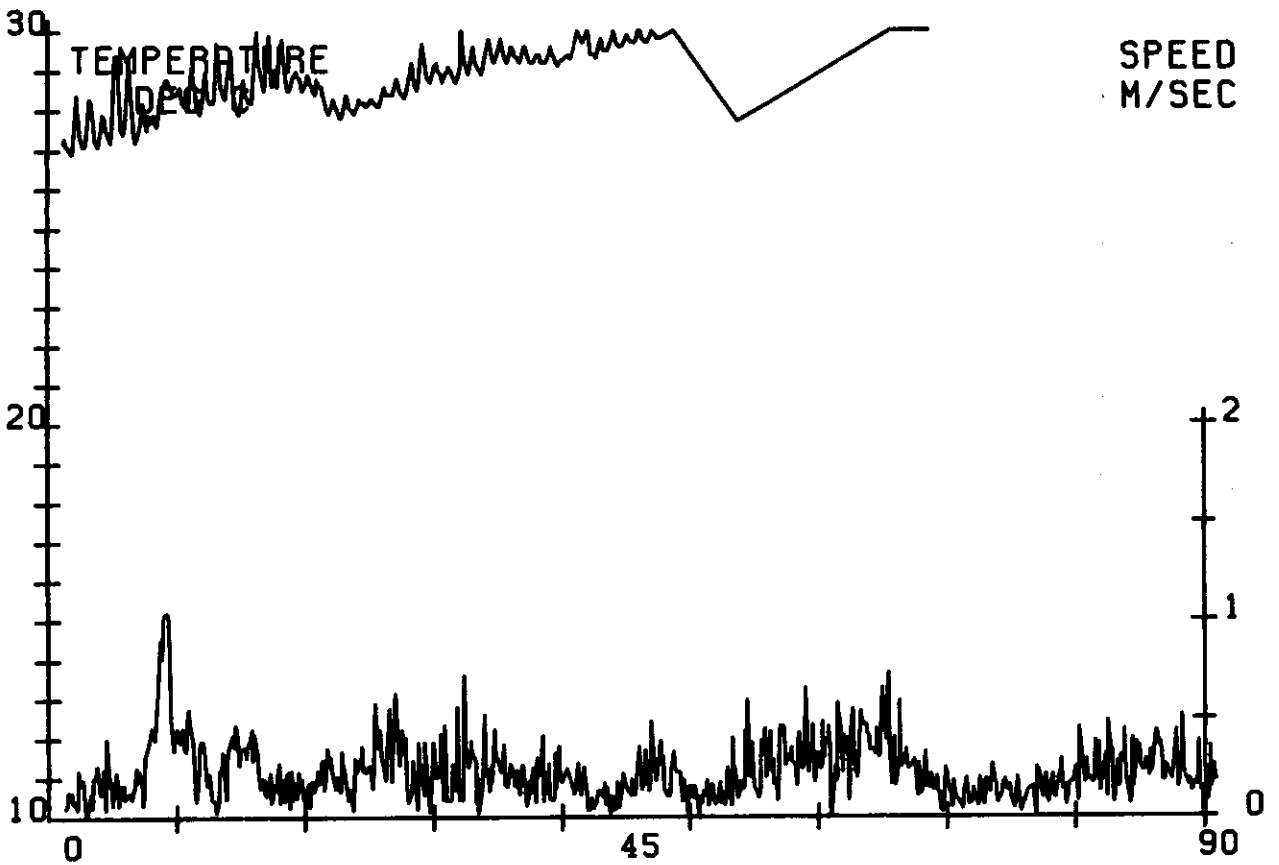
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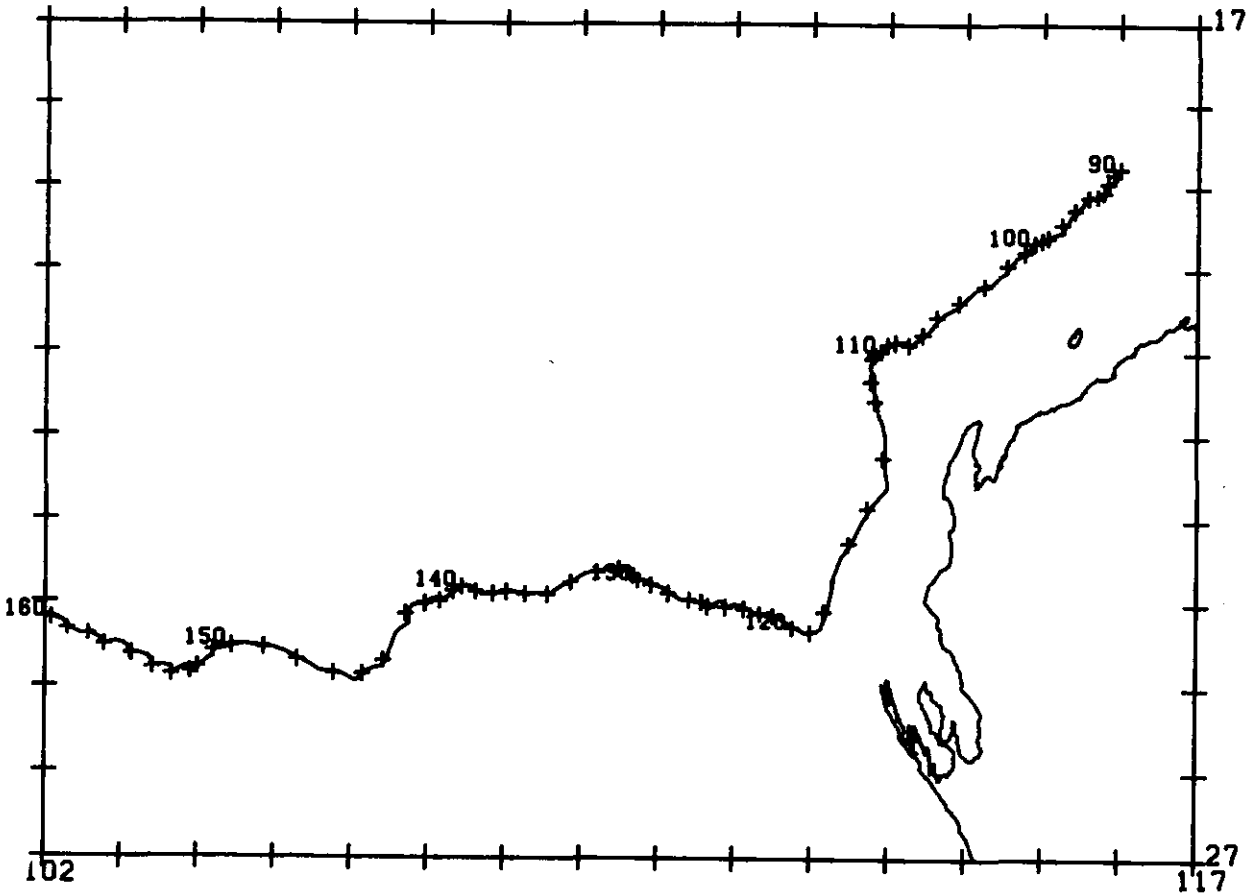
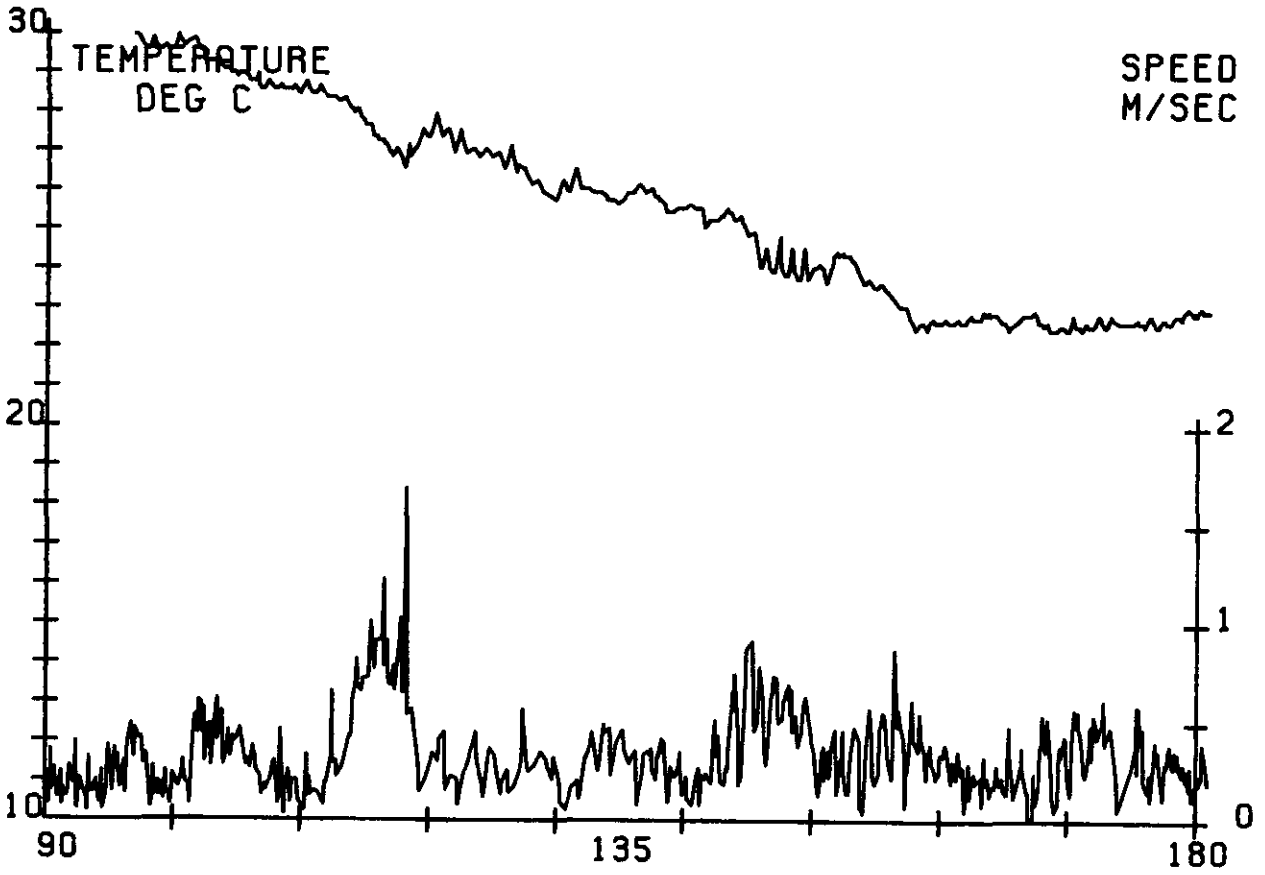
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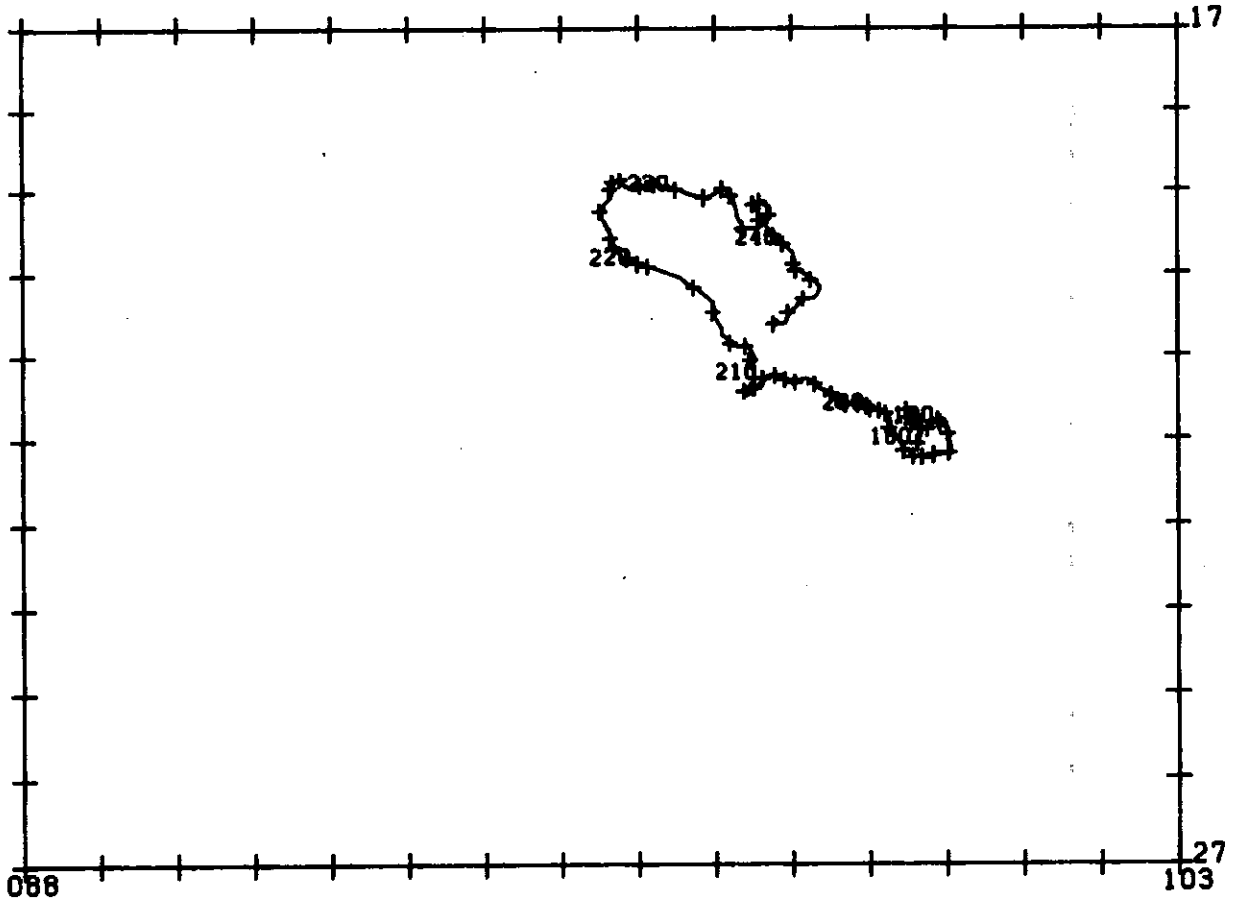
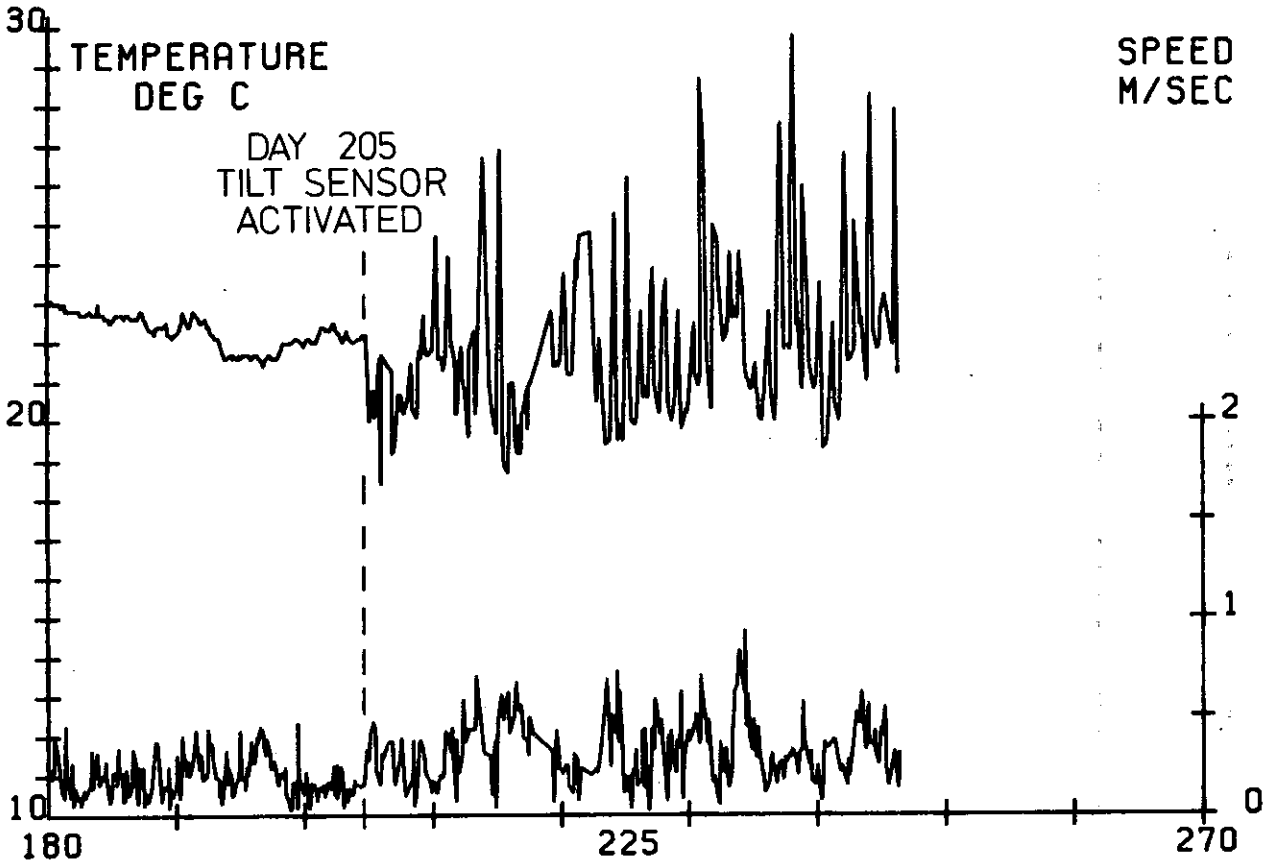
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