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REPORT 170

**Meteorological Data from the
Australian Coastal Experiment;
a Data Report**

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**METEOROLOGICAL DATA FROM THE AUSTRALIAN COASTAL EXPERIMENT;
A DATA REPORT**

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CSIRO Marine Laboratories Report No. 170

Abstract

This report presents meteorological data acquired by the CSIRO and the Australian Bureau of Meteorology during the Australian Coastal Experiment (ACE). Data presented are plots of wind (vectors and components), air pressure, air temperature, and some sea surface temperature.

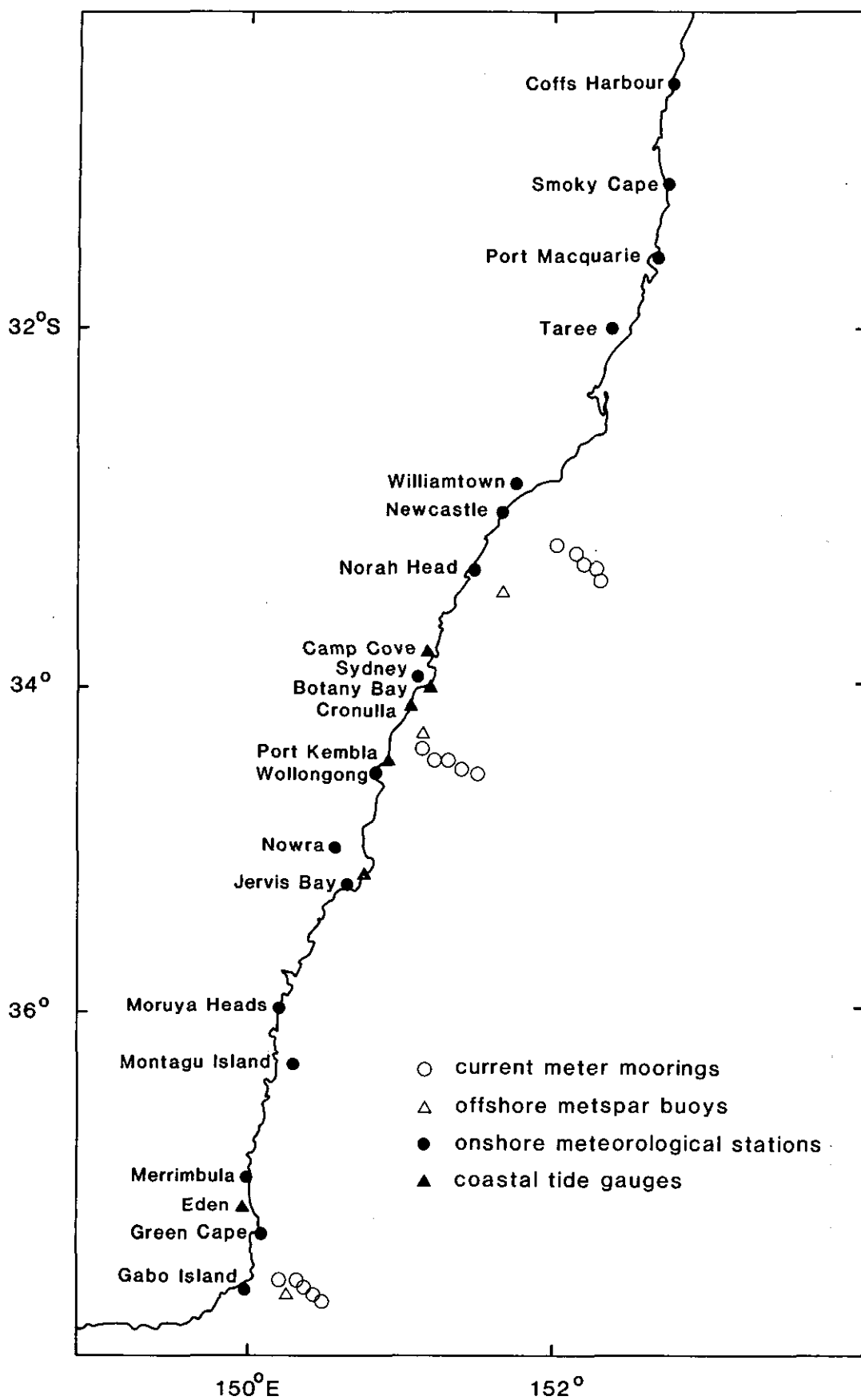


Figure 1 Locations of 'ACE' recording sites, including current meters, tide gauges, meteorological buoys and coastal meteorological stations.

- air pressure
- air temperature
- solar radiation
- sea surface temperature

In this report, only wind speed and direction, air pressure, air temperature and sea surface temperature (from the metspars only) are presented, as the other parameters are not directly relevant to the generation of coastally trapped waves.

The metspar buoys were first deployed in September 1983 on 20 mm dia. rope moorings. The rope was replaced with jacketed wire (as used on the current meter moorings) when it became available in October. Surface floats (to which the metspars were tethered) were originally made of foam-filled polyethylene drums, but after evidence of these being crushed at 20 m depth, they were replaced with steel floats. For a full description of the metspar buoys, see Appendix to Forbes (1985).

It was originally intended that the metspars be serviced (data tapes and batteries replaced) three months after deployment, but a high attrition rate, and some wind speed rotor problems meant that at least one buoy was serviced on every monthly cruise of 'Sprightly' except during November.

Data Recovery

Records from the 16 ABM coastal stations are virtually complete, with the exception of air pressure at Green Cape, Merrimbula, Wollongong and Newcastle. Figure 2 shows the data return from the three surviving metspar buoys. 'Sensor failure' refers to wind speed, which was the parameter of primary importance. Without that, the remaining parameters are of reduced value.

Table 1 Positions of metspar buoys during the Australian Coastal Experiment

Geographical Location	Latitude	Longitude	Water Depth (m)	Life (months)
Norah Head	33°24.3'S	151°45.9'E	135	6
Norah Head	33°31.2'S	151°57.4'E	200	3*
Stanwell Park	34°18.4'S	151°09.7'E	135	6
Stanwell Park	34°19.1'S	151°20.2'E	200	3*
Montagu Island	36°16.8'S	150°20.1'E	200	3*
Gabo Island	37°34.2'S	150°13.5'E	200	3

* No data

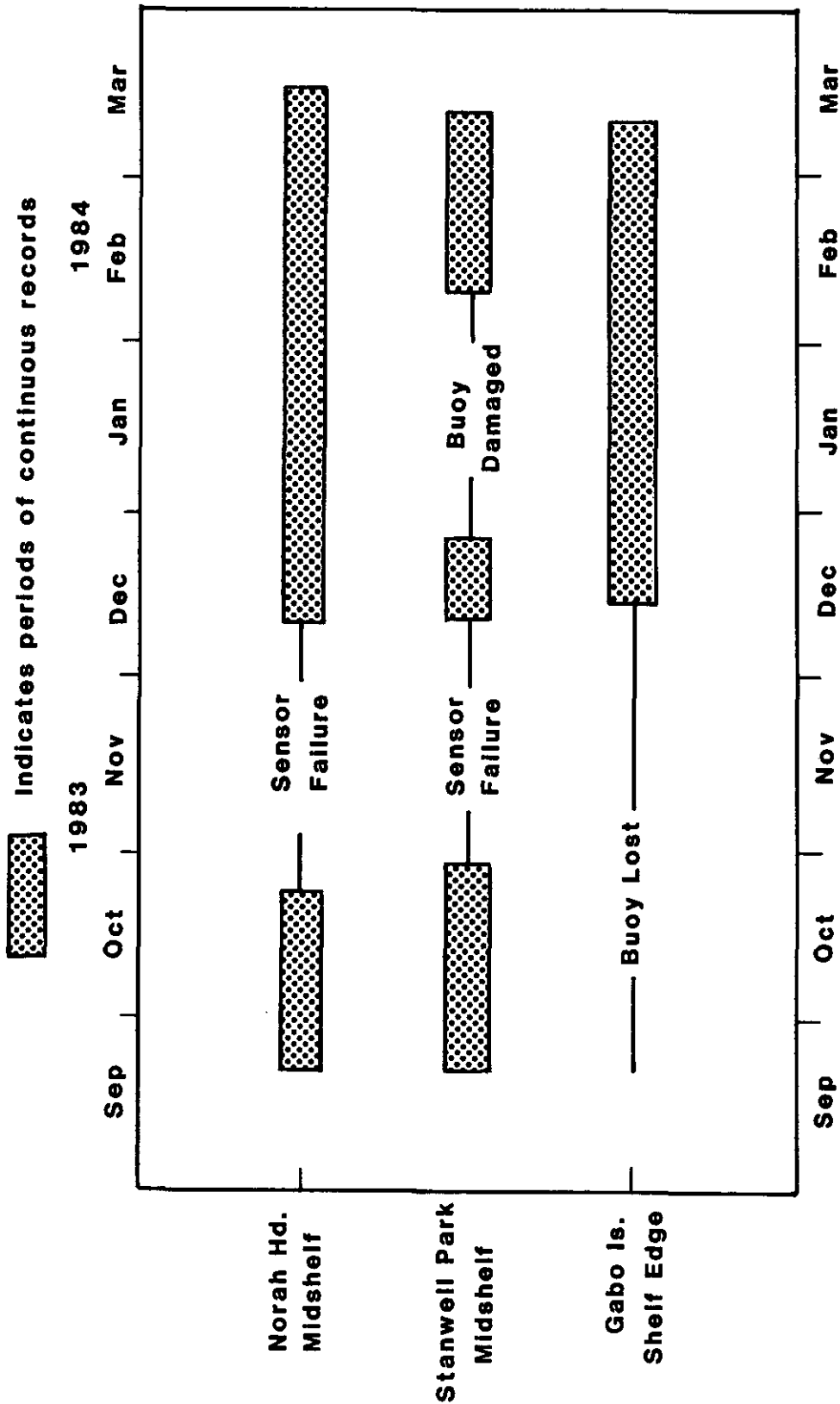


Figure 2 Bargraph showing 'Metspar' meteorological data acquired during the Australian Coastal Experiment. Periods of continuous records are shown as shaded bars.

Four metspar buoys were lost during November and December along the shelf-edge. Each was equipped with a radio beacon, which was monitored twice daily at the nearest ABM station, to enable them to be tracked if they came adrift from their moorings. However, transmissions from the beacons ceased abruptly, so only the time of their demise was monitored. The four were lost, presumed sunk, during a period of southward currents in excess of 3 knots, which coincided with strong southerly gales.

The first Gabo Island shelf-edge metspar ceased transmission in late November and was subsequently recovered by an Eden trawler. However, the buoy was badly damaged and the top section, including data logger and instruments, was missing. This was replaced in December with the only spare metspar, which survived until the end of the experiment in March, but the wind speed values are much lower than those recorded at the Gabo Island ABM station, due probably to a sensor malfunction.

Routine surveillance of the two mid-shelf buoys in December showed that the wind speed rotors stopped due to bearing corrosion. Subsequent analysis showed that they stopped in late October. The rotor assemblies were replaced in mid-December with new stainless steel bearings.

The mid-shelf metspar at Stanwell Park came adrift in January, and had to be returned to land for repairs to the spar. It was redeployed in February.

Data Handling and Presentation

There were three frequencies of sampling the meteorological data. At ABM stations, it was either three-hourly or twice daily (0900 and 1500 h); at the CSIRO metspar stations, it was hourly.

For presentation here, and to be consistent with the current meter data report (Freeland , 1985), the time series were low pass filtered using a Lanczos-cosine filter on the hourly and three-hourly data, then subsampled at 12-hourly intervals for plotting. A simple 'boxcar' filter was applied to the twice-daily data. Wind vectors were resolved into components of a longshelf-crossshelf coordinate system, defined at each location by the bearing of the 200 m isobath, which represents the orientation of the edge of the continental shelf.

Each plot (Fig. 3a-s) consists of a vector time series of the wind, together with longshelf and cross-shelf components of the wind, air pressure and air temperature (and sea surface temperature from the metspars). Note that there are two wind velocity scales, 10 m/s and 25 m/s, depending on the maximum magnitude of the wind at each station during the 6-month period. The bearing that defines the local shelf orientation is shown on each plot as a coordinate rotation angle, together with a compass rose whose arrow indicates true north.

These 12-hourly subsampled time series plots are designed to show the type and quantity of data available. Analyses to be published elsewhere used the archived full data sets.

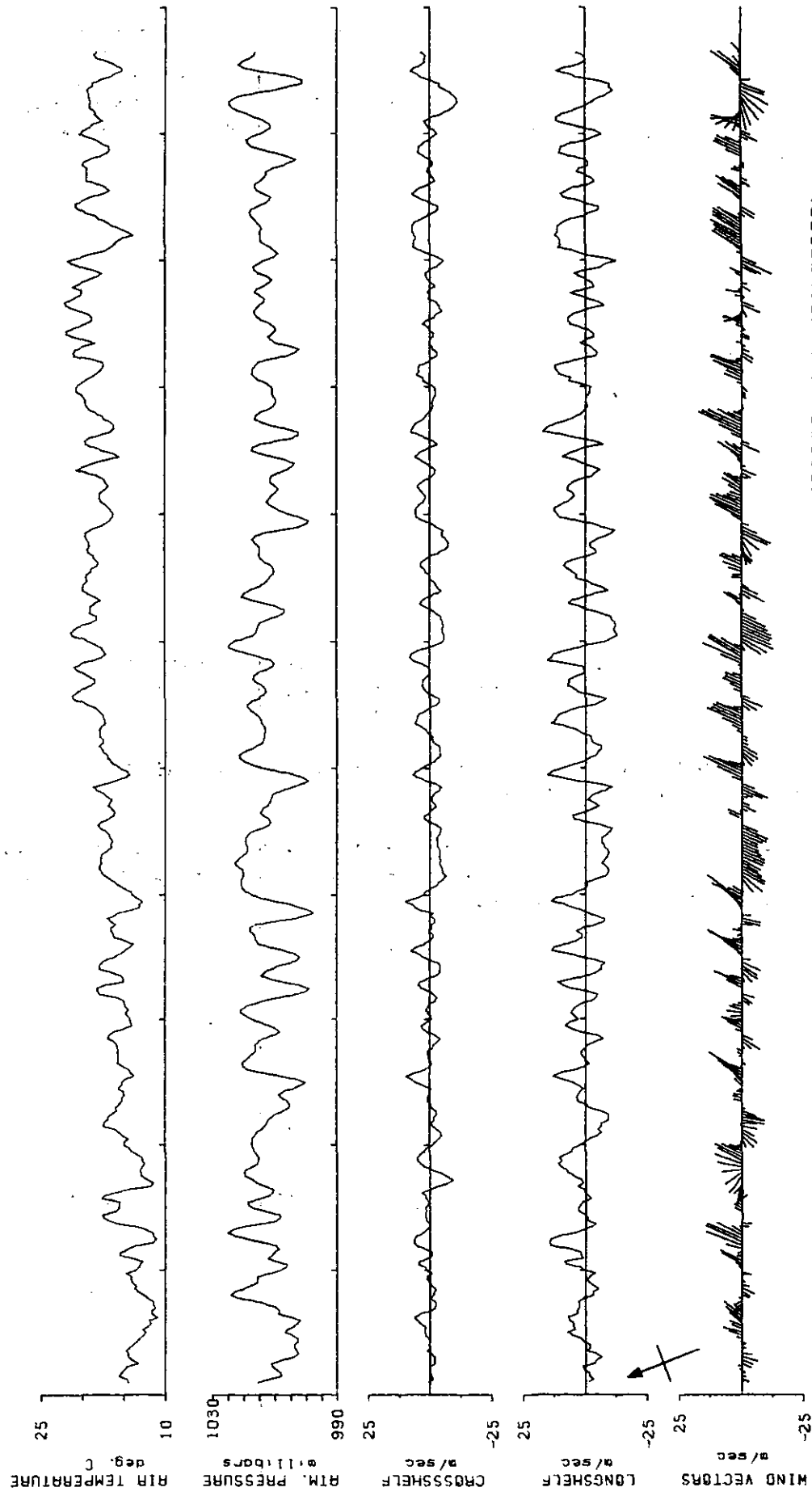
Results

Preliminary analysis comparing onshore and offshore meteorological data shows that wind speed, wind direction and air pressure do not vary significantly in the cross-shelf direction. There is, however, a significant equatorward decrease in the longshelf component of wind. Also, some of the onshore stations proved better 'exposed' than others because they were sited on headlands or islands.

References

- Clarke, A.J. and Thompson, R.O.R.Y. (1984) Large-scale wind-driven ocean response in the Australian Coastal Experiment region. *Journal of Physical Oceanography*, **14**: 338-52.
- Forbes, A.M.G. (1985) Wind stress in the Australian Coastal Experiment region. (in preparation).
- Freeland, H., Church, J., Smith, R. and Boland, F. (1985) Current meter data from the Australian Coastal Experiment; a data report. CSIRO Marine Labs Report No. 169.

0 SEP 20 SEP 10 OCT 30 OCT 19 NOV 9 DEC 29 DEC 18 JAN 7 FEB 160 180 200 220 7 APR 7 APR 220



FILE: MET. DAT STATION : CABO ISLAND SPARSE DATA (FILTERED)
 CO-ORD. ROTN. = -21.0 DEG. STATION CODE : 84016
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Figure 3a Meteorological data from Gabo Island station

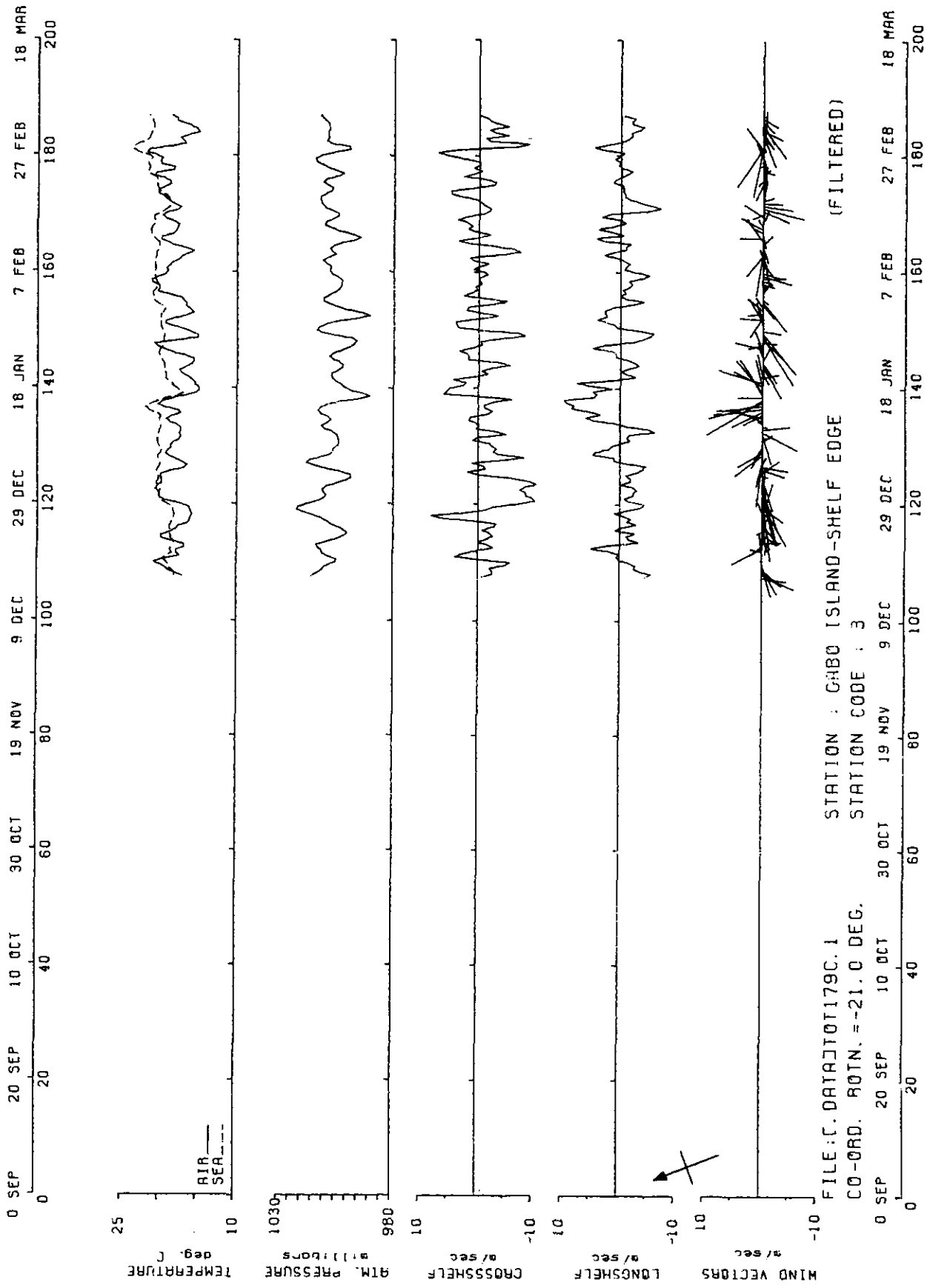
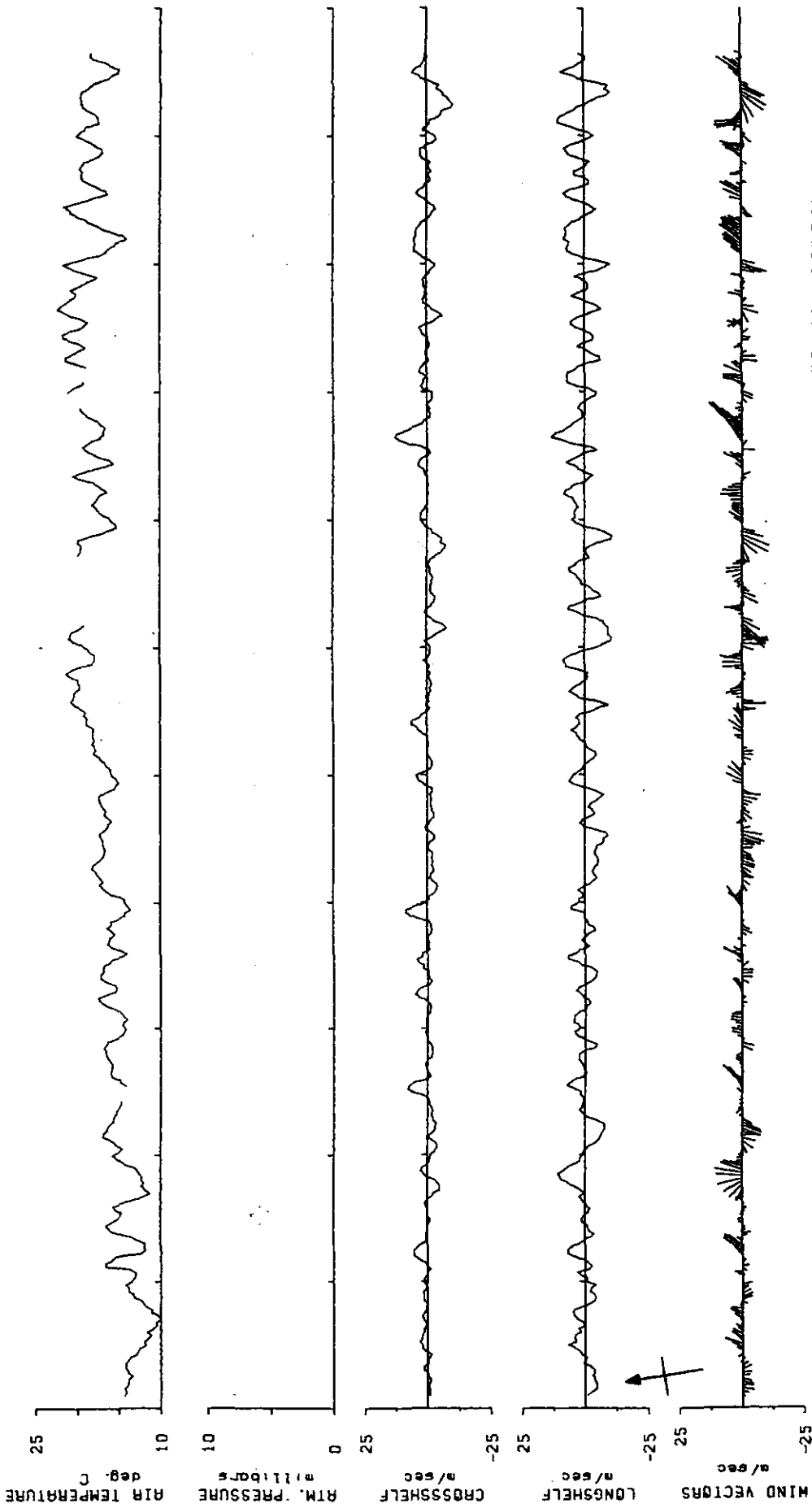


Figure 3b Meteorological data from Gabo Island-Shelf Edge station

0 SEP 20 SEP 10 OCT 30 OCT 19 NOV 9 DEC 29 DEC 18 JAN 7 FEB 18 MAR 27 FEB 18 MAR 7 APR 220



FILE:MET.DAT STATION: GREEN CAPE SPARSE DATA (FILTERED)
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Figure 3c Meteorological data from Green Cape station

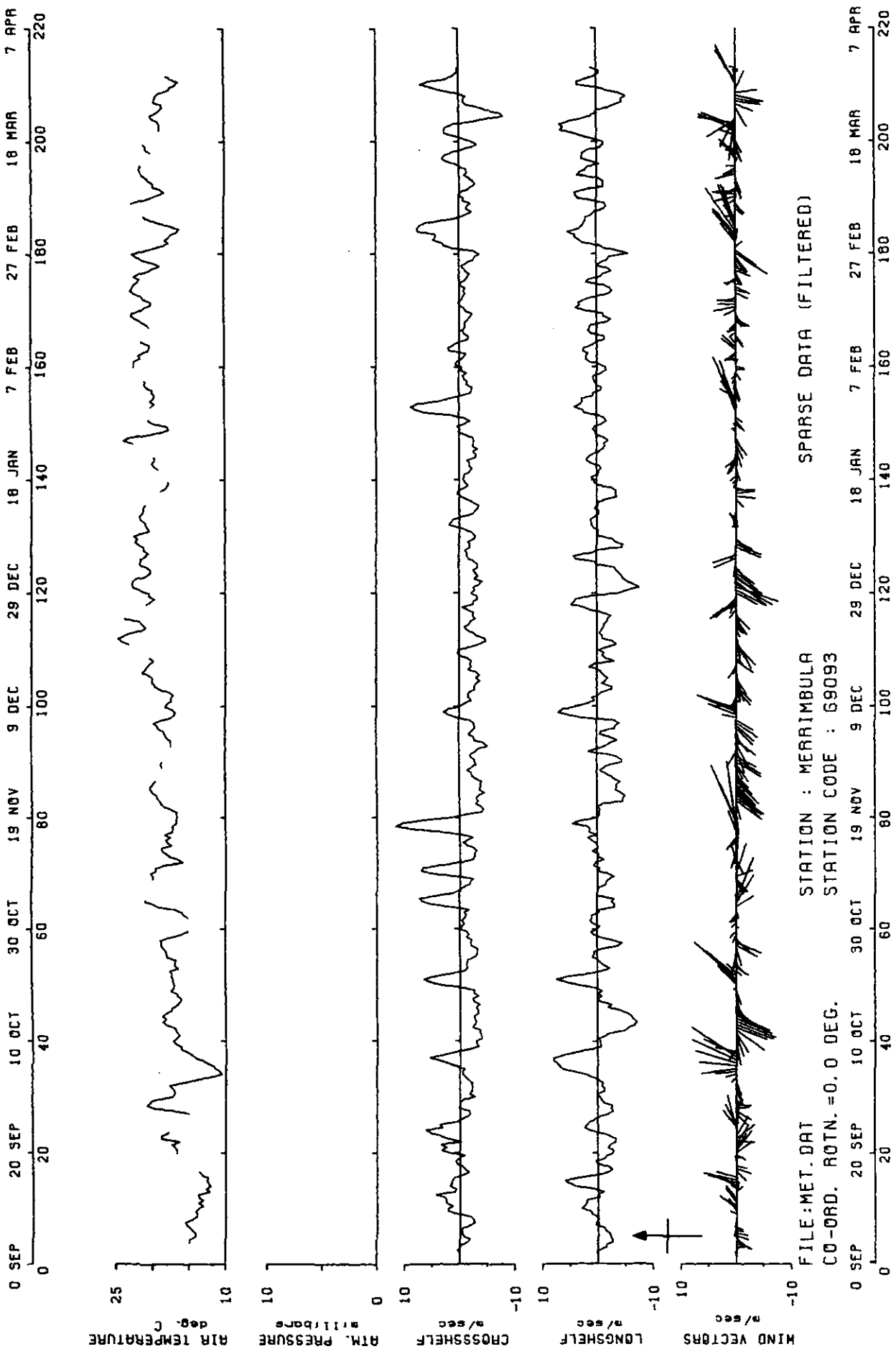
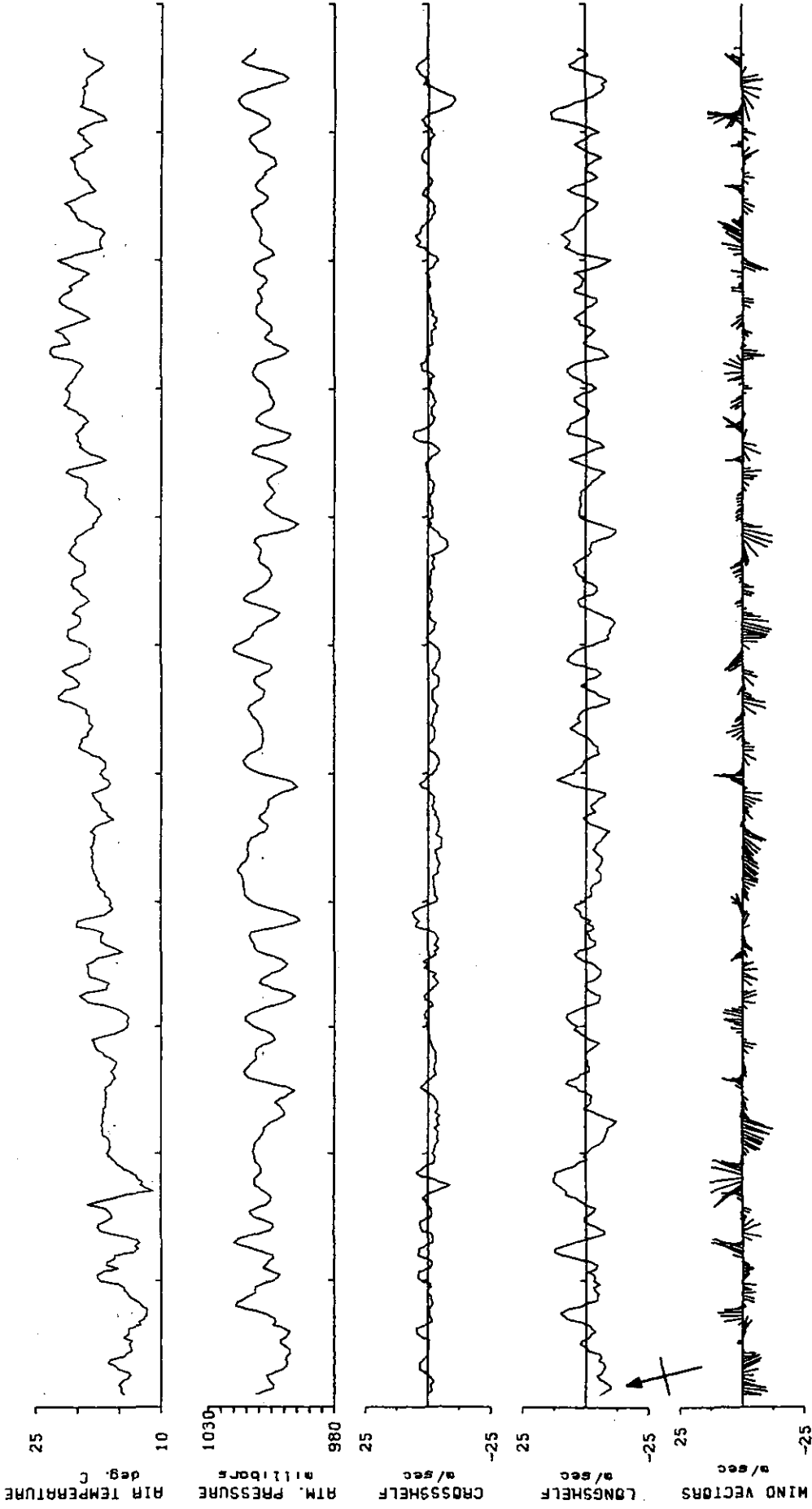


Figure 3d Meteorological data from Merrimbula station

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FILE:MET.DAT STATION : MONTAGU ISLAND SPARSE DATA (FILTERED)
 CO-ORD. ROTN. = -14.0 DEG. STATION CODE : 69017

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Figure 3e Meteorological data from Montagu Island station

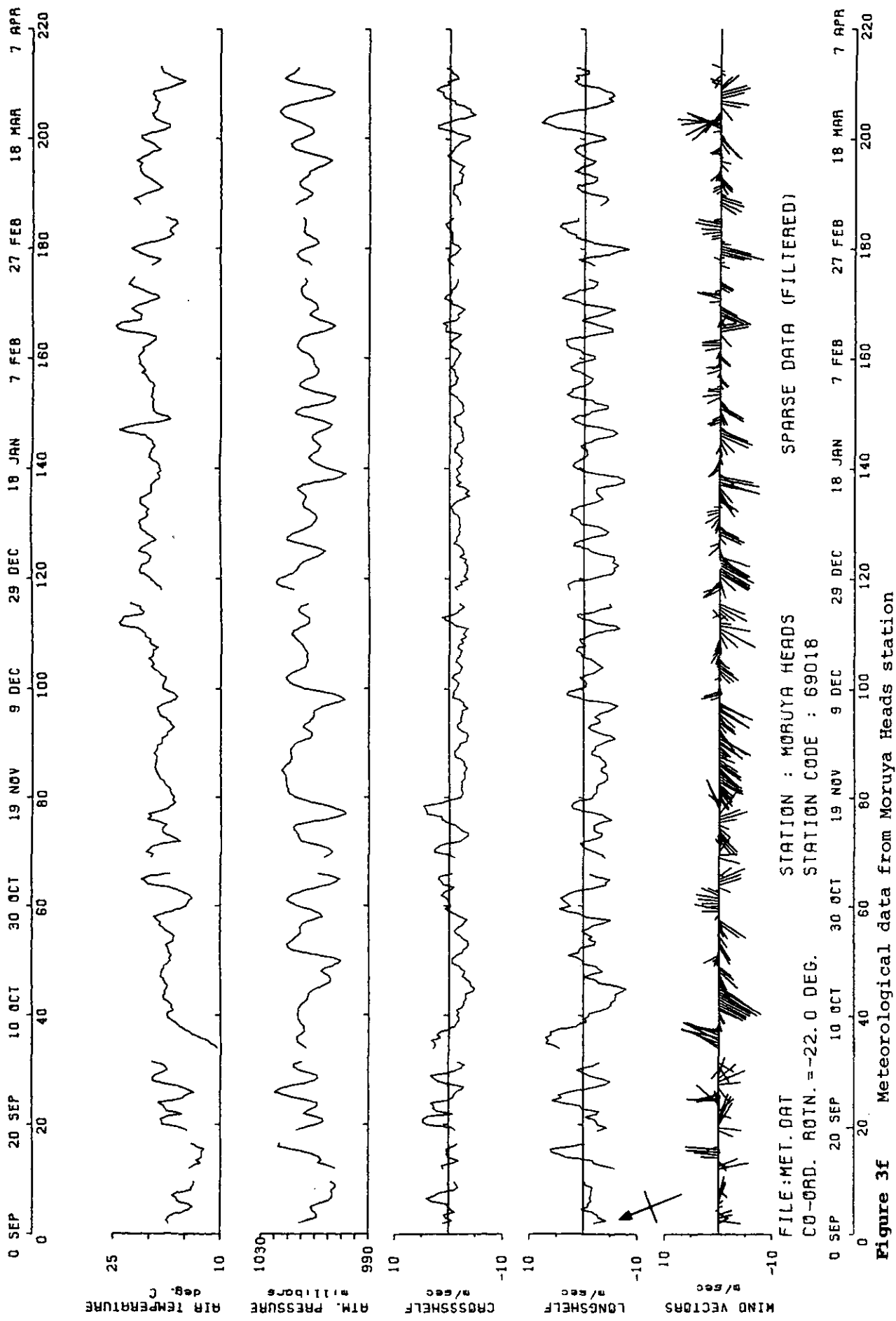
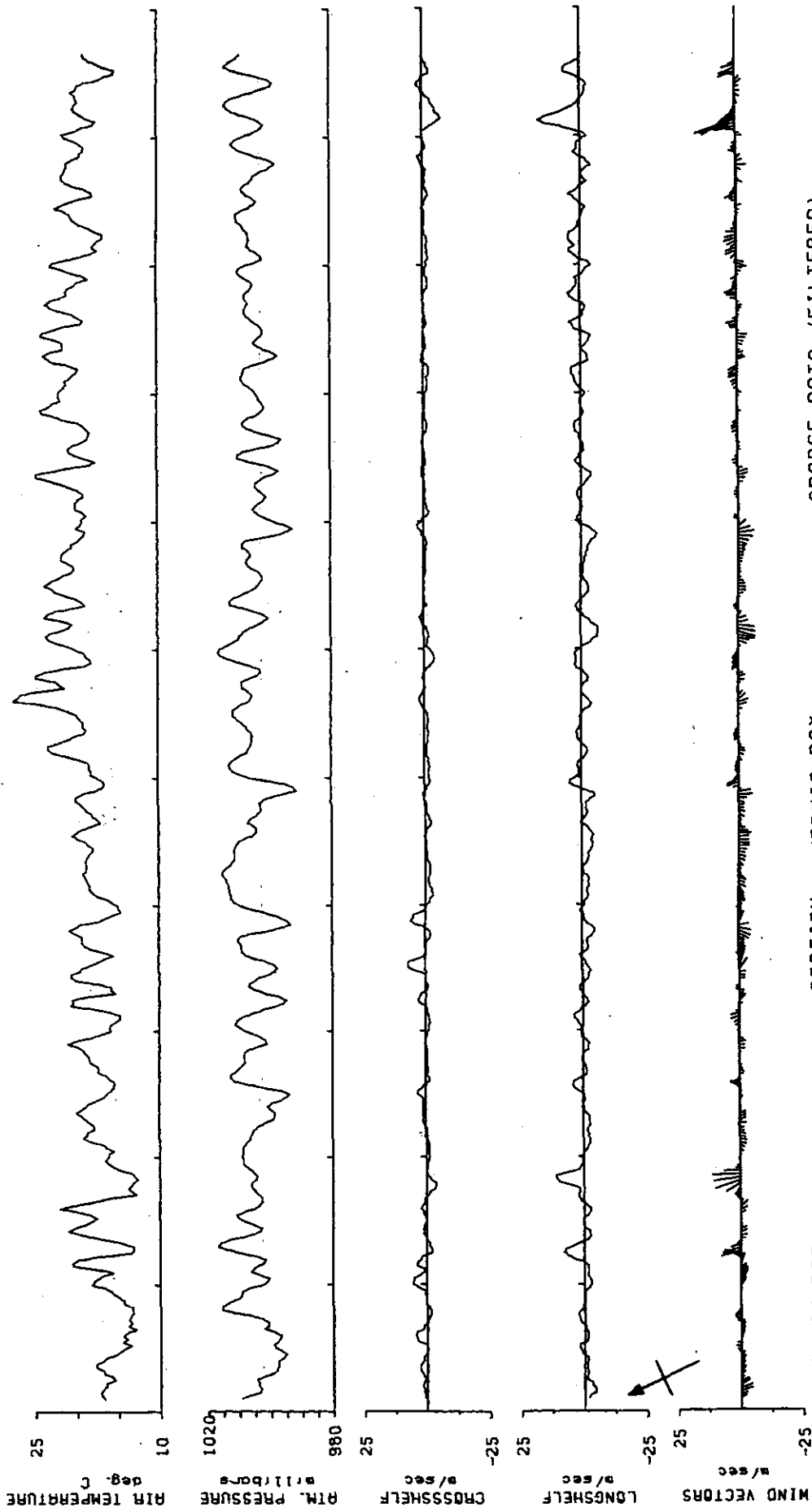


Figure 3f Meteorological data from Moruya Heads station

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FILE:MET.DAT STATION: JERVIS BAY SPARSE DATA (FILTERED)

CO-ORD. ROTN. = -25.0 DEG. STATION CODE: 68034

0 SEP 20 SEP 10 OCT 30 OCT 19 NOV 9 DEC 29 DEC 18 JAN 7 FEB 27 FEB 18 MAR 7 APR 220

Figure 3g Meteorological data from Jervis Bay station

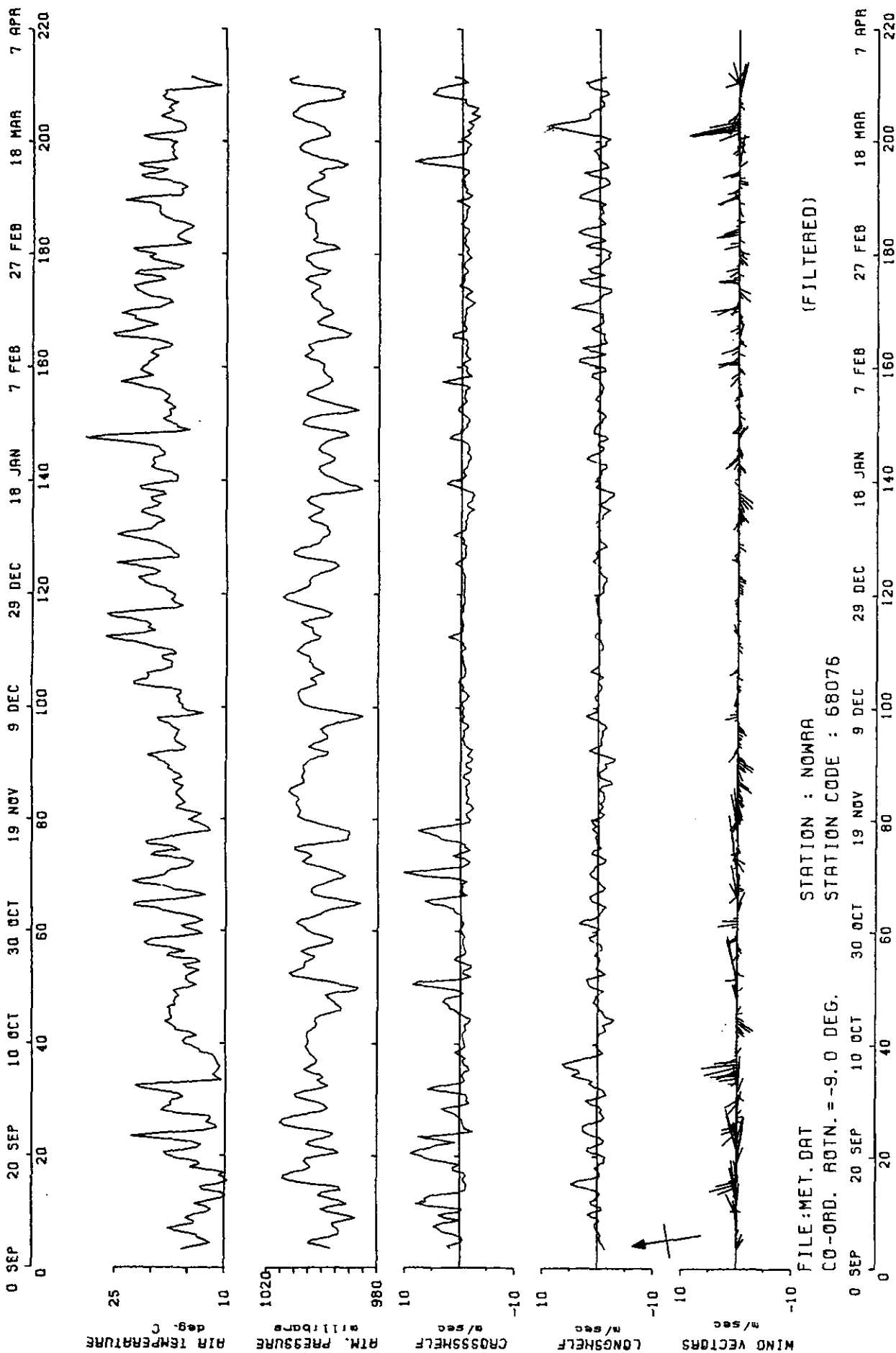


Figure 3h Meteorological data from Nowra station

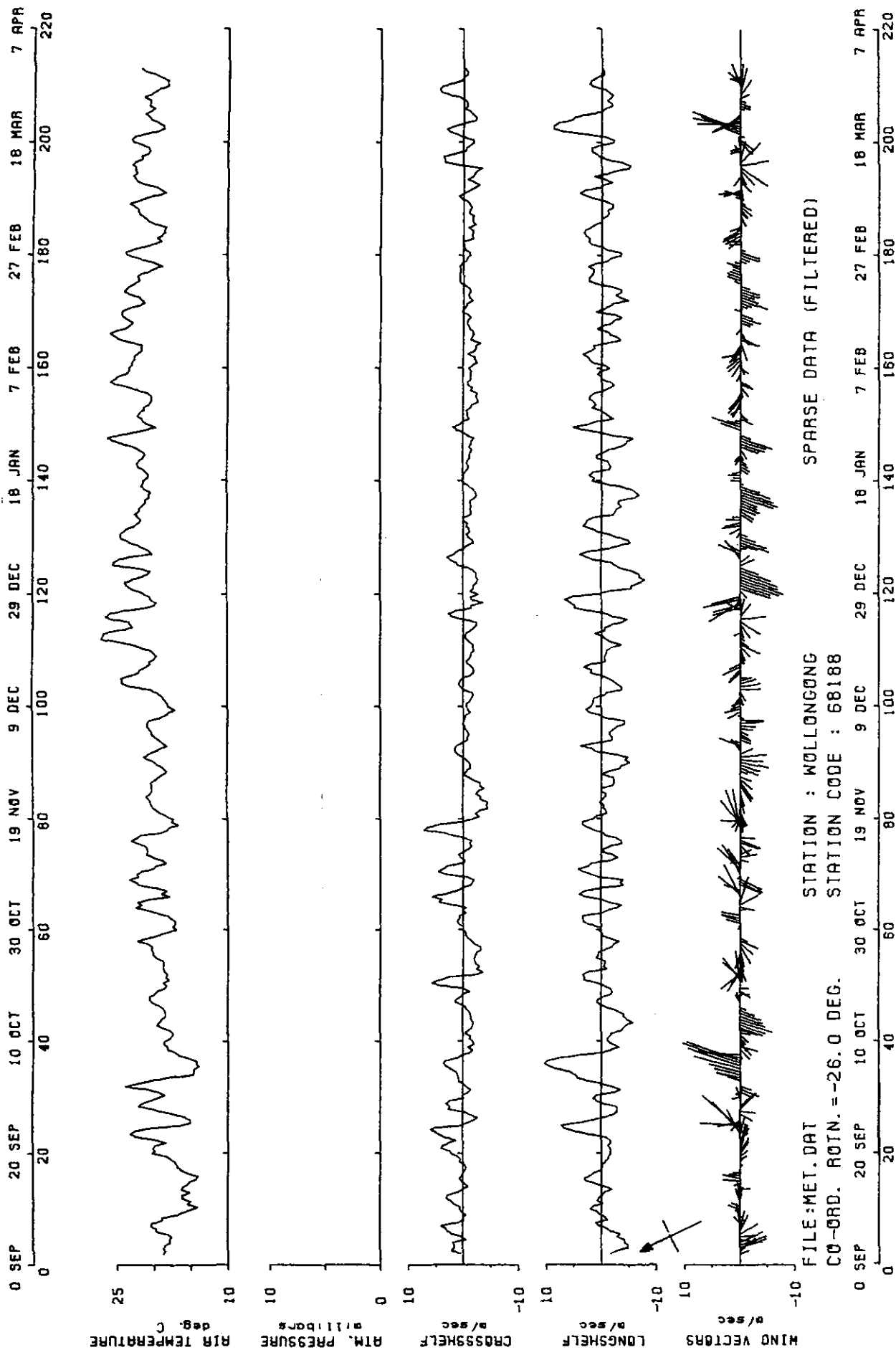


Figure 3i Meteorological data from Wollongong station

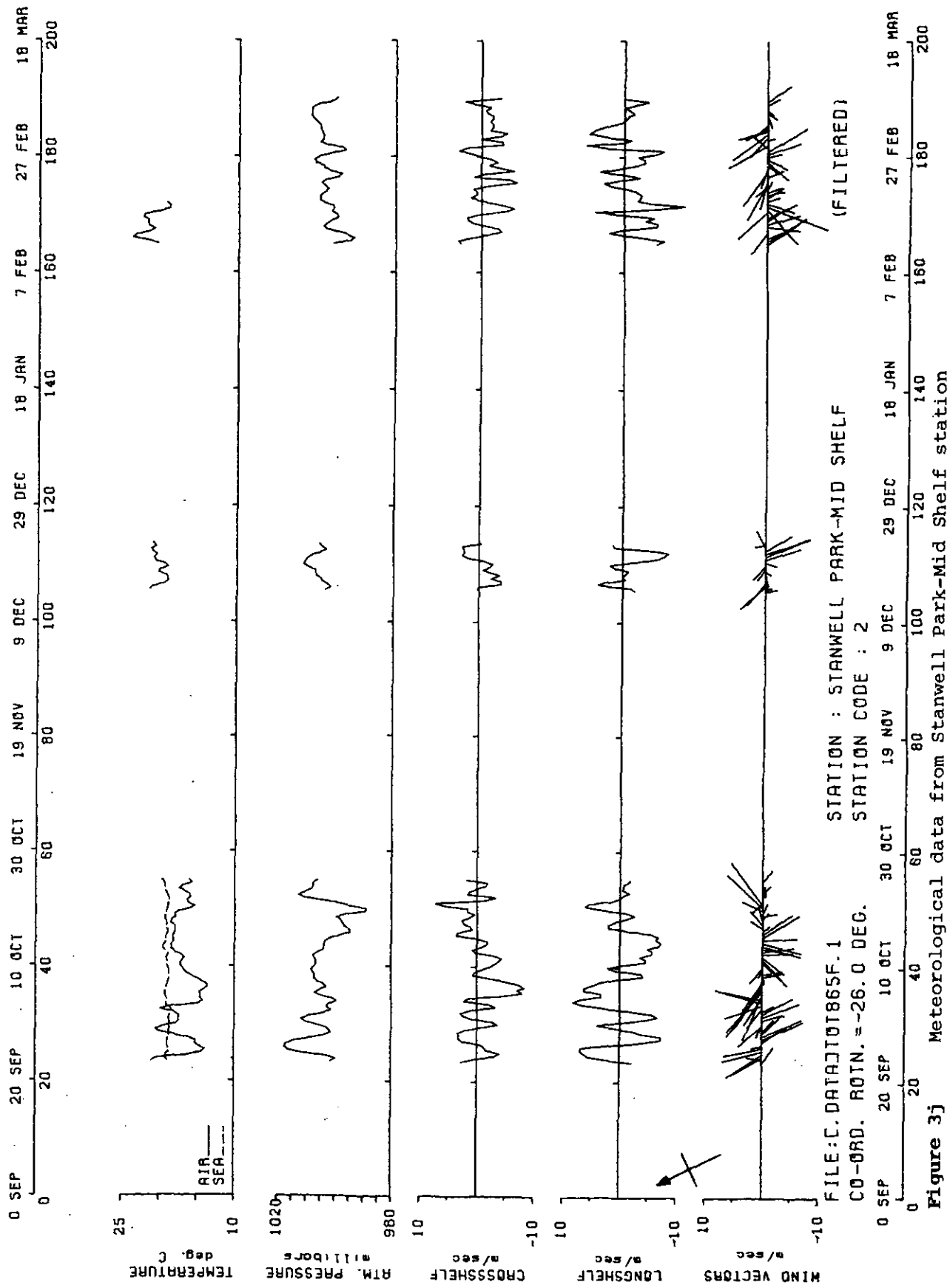
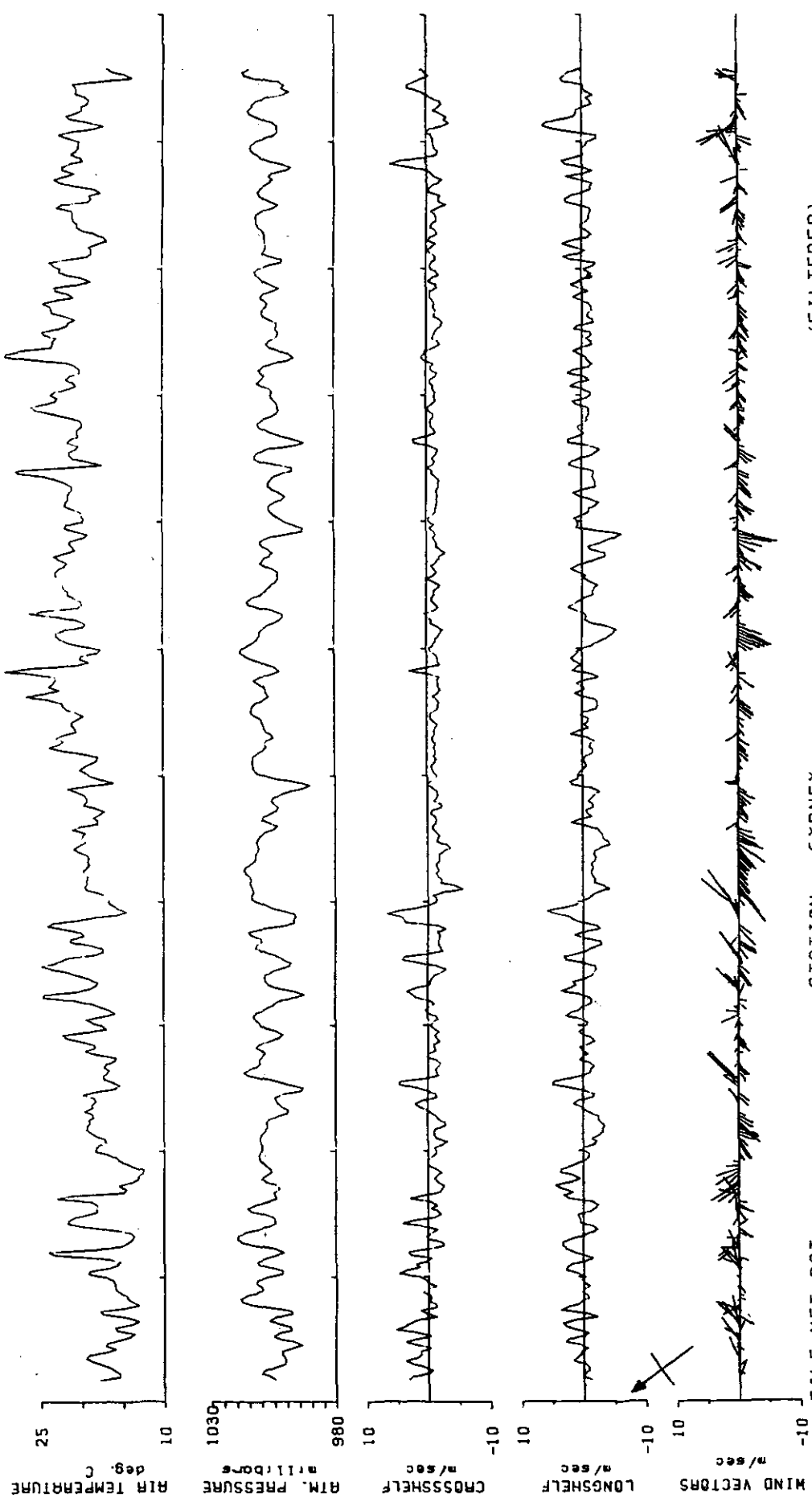


Figure 3j Meteorological data from Stanwell Park-Mid Shelf station

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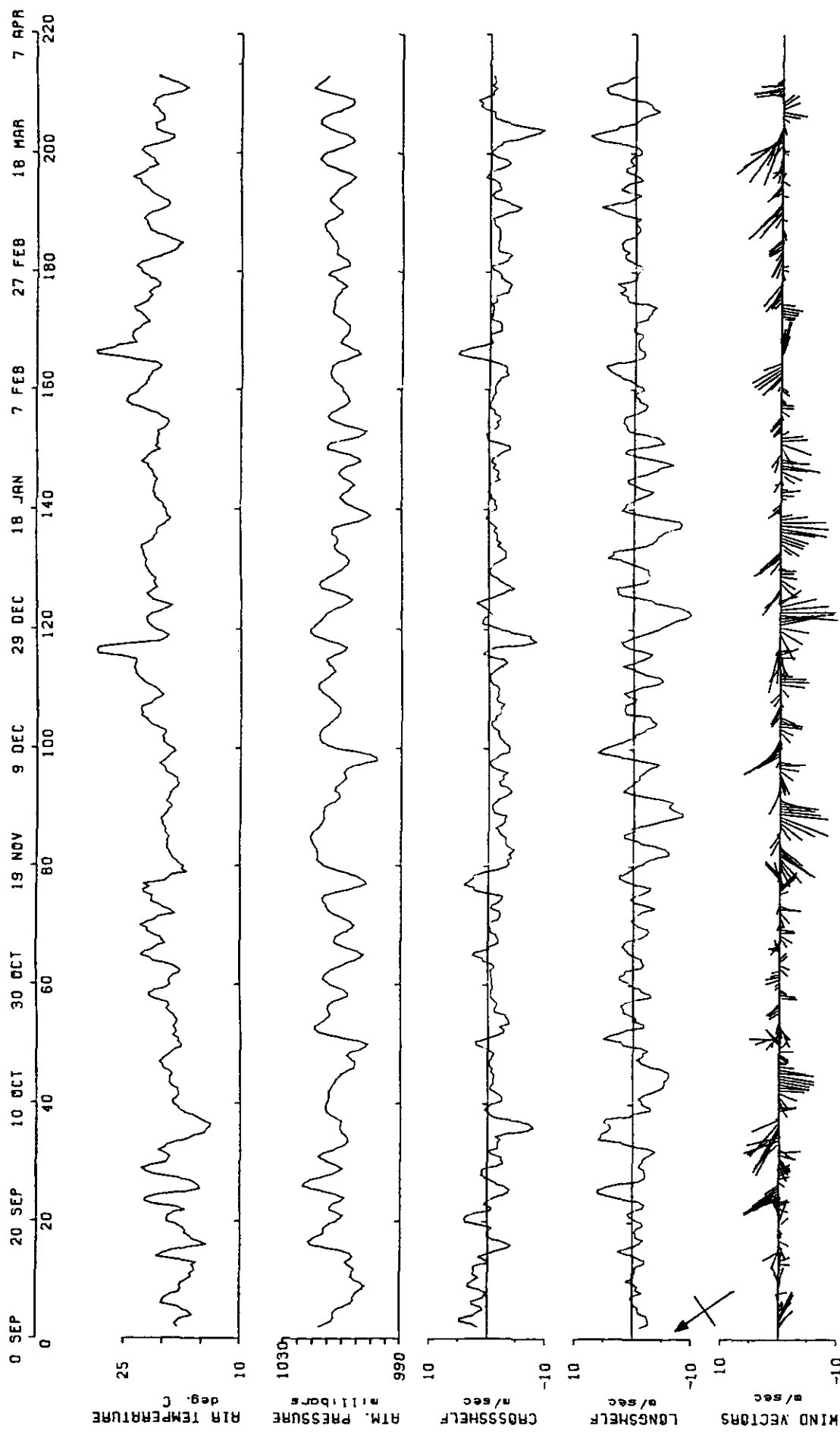


(FILTERED)

FILE: MET. DAT STATION: SYDNEY
 CO-ORD. ROTN. = -36.0 DEG. STATION CODE: 66062

0 SEP 20 SEP 10 OCT 30 OCT 19 NOV 9 DEC 29 DEC 18 JAN 7 FEB 160 27 FEB 180 18 MAR 200 7 APR 220

Figure 3k Meteorological data from Sydney station



FILE: MET.DAT
 STATION: NORAH HEAD
 CO-ORD. ROTN. = -35.0 DEG. STATION CODE: 61273
 SPARSE DATA (FILTERED)

0 SEP 20 SEP 10 OCT 30 OCT 19 NOV 9 DEC 29 DEC 18 JAN 7 FEB 27 FEB 18 MAR 7 APR

Figure 31 Meteorological data from Norrah Head station

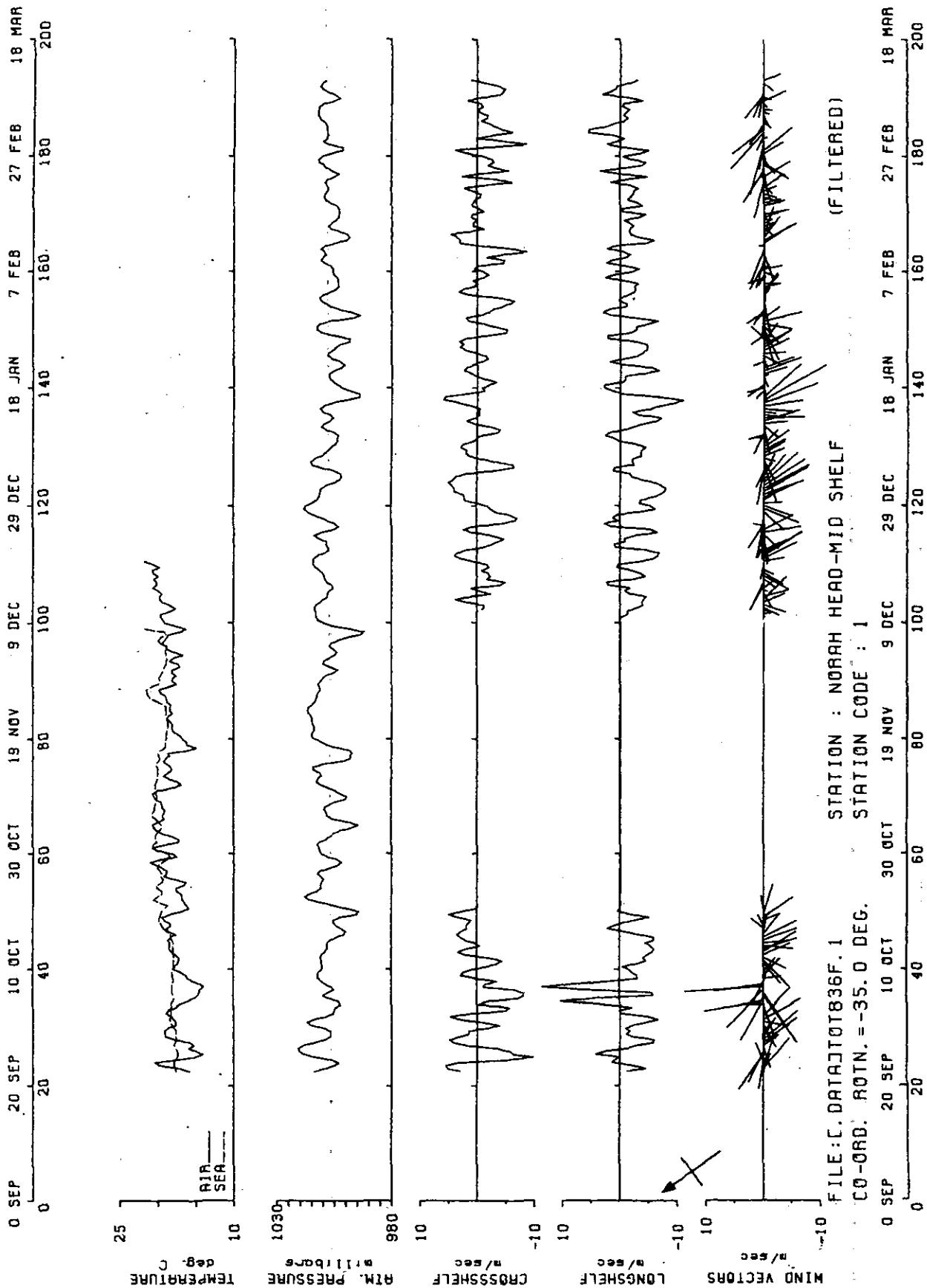
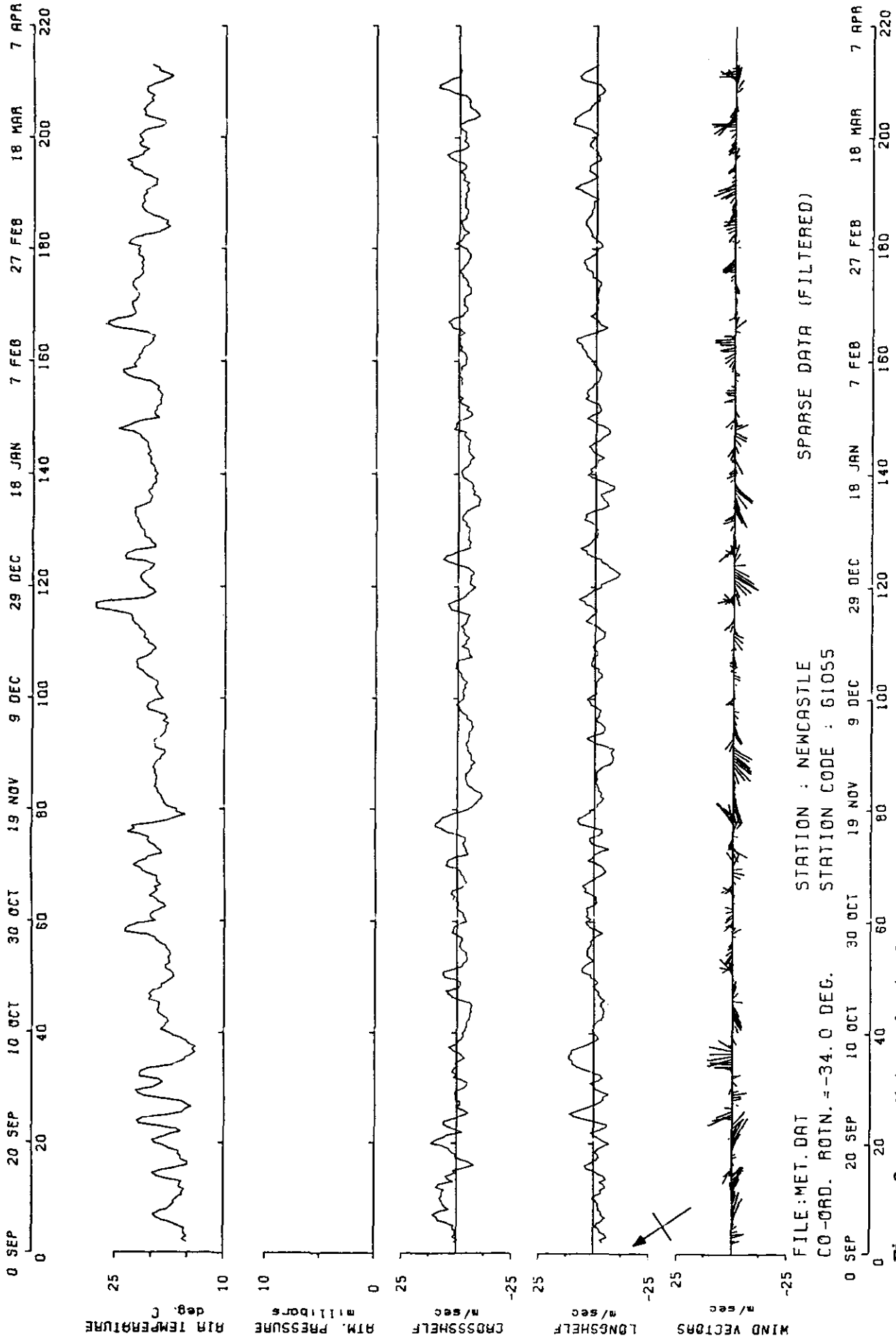


Figure 3m Meteorological data from Norah Head-Mid Shelf station



FILE: MET. DAT STATION : NEWCASTLE SPARSE DATA (FILTERED)
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Figure 3n Meteorological data from Newcastle station

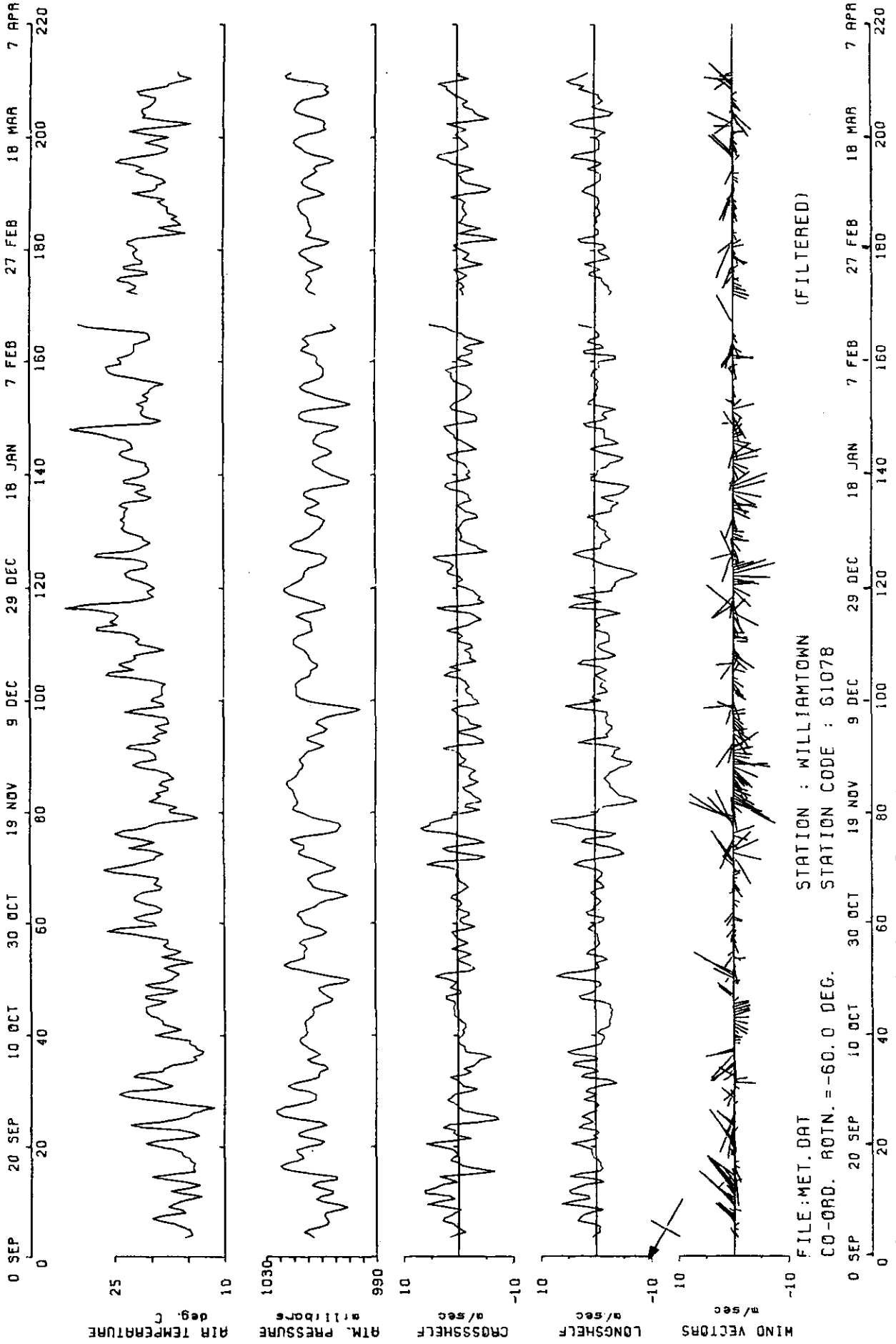
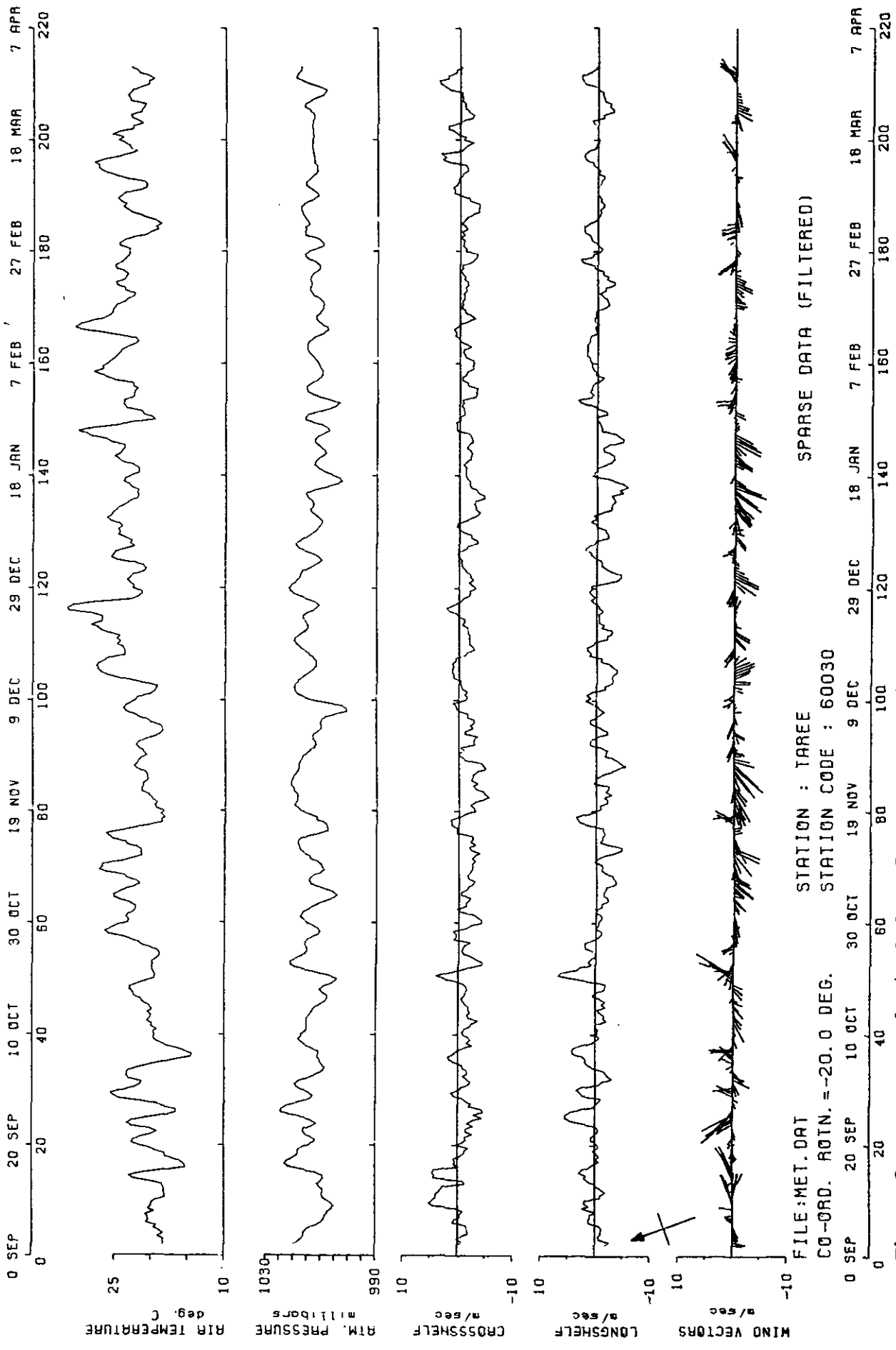


Figure 30 Meteorological data from Williamtown station



FILE:MET.DAT STATION : TAREE
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 SPARSE DATA (FILTERED)

Figure 3p Meteorological data from Taree station

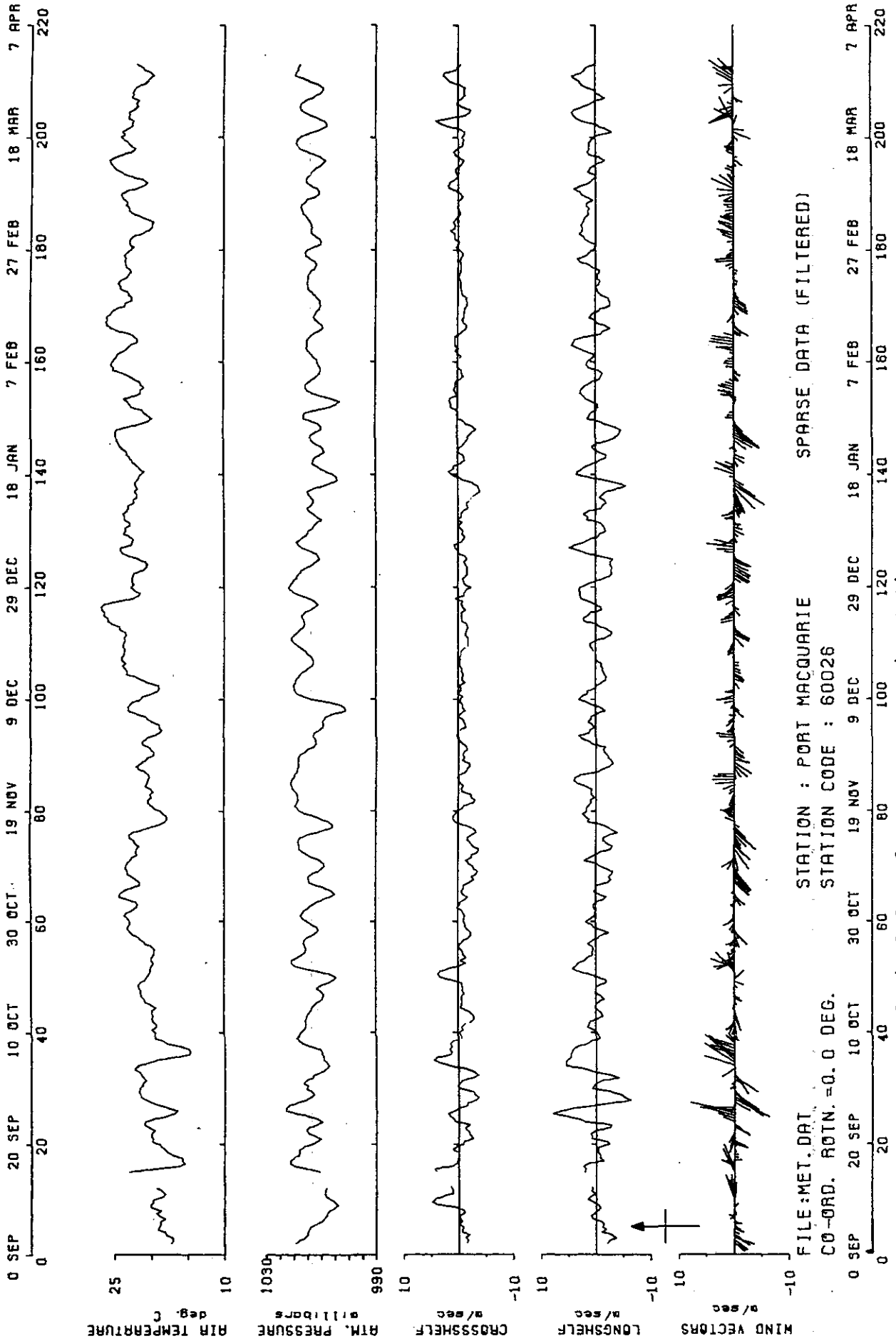


Figure 3q Meteorological data from Port Macquarie station

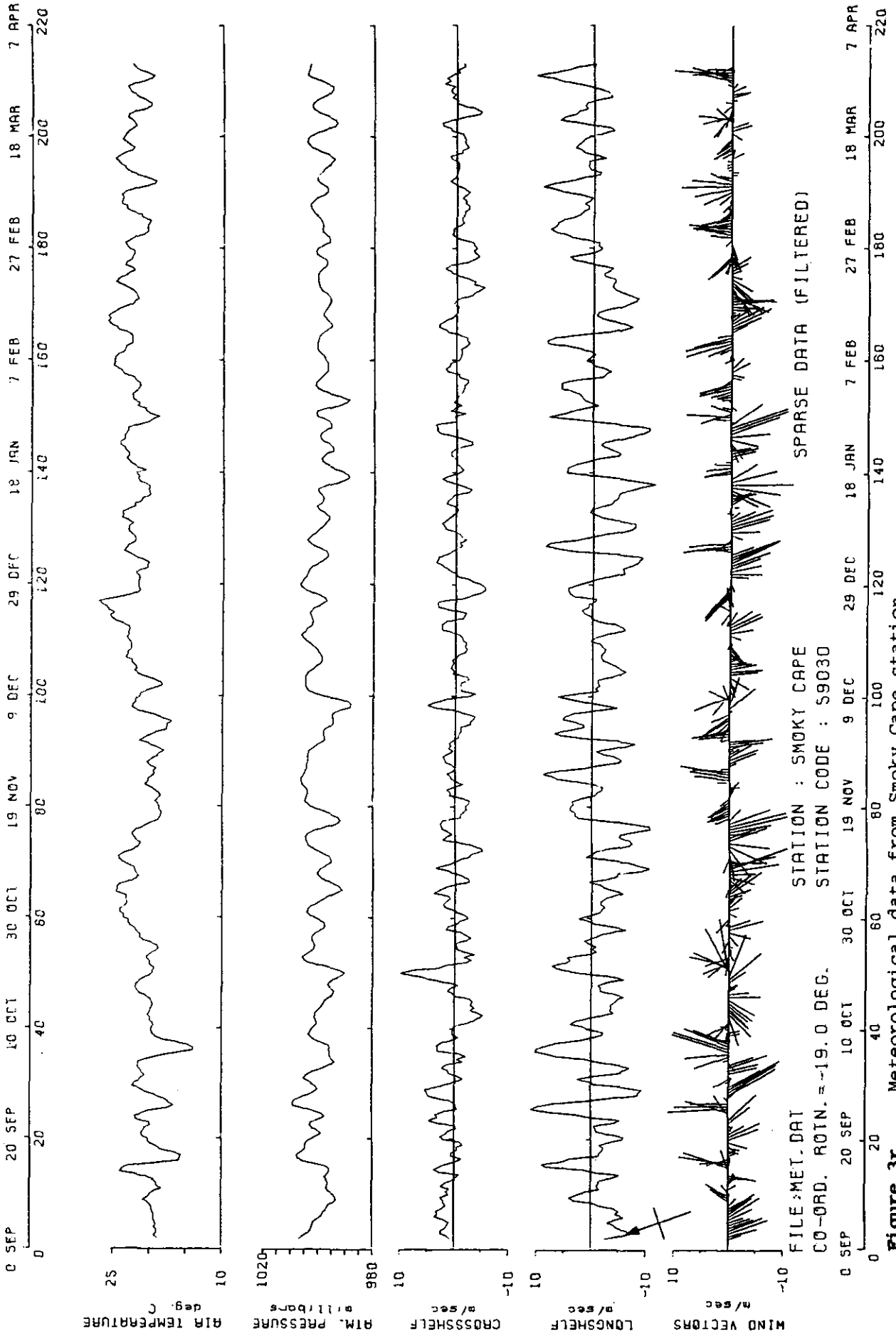
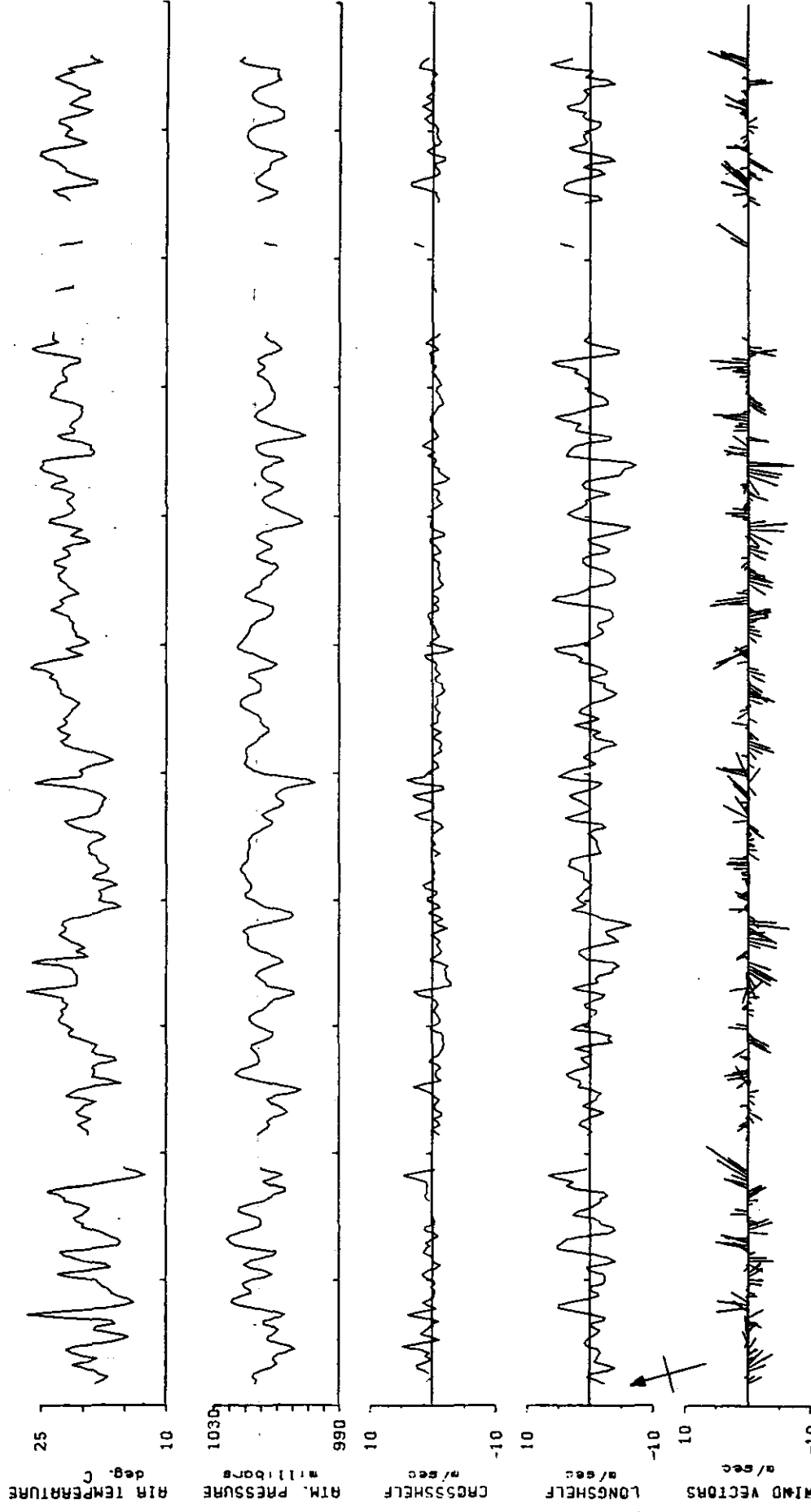


Figure 3r Meteorological data from Smoky Cape station

0 SEP 20 SEP 10 OCT 30 OCT 19 NOV 9 DEC 29 DEC 18 JAN 7 FEB 27 FEB 18 MAR 7 APR 220



FILE: MET. DAT. STATION: COFF'S HARBOUR (FILTERED)
 CO-ORD. ROTN. = -16.0 DEG. STATION CODE: 59040
 0 SEP 20 SEP 10 OCT 30 OCT 19 NOV 9 DEC 29 DEC 18 JAN 7 FEB 27 FEB 18 MAR 7 APR 220

Figure 3s Meteorological data from Coff's Harbour station

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