

# **THE AUSTRALIAN BASELINE SEA LEVEL MONITORING PROJECT**

## **MONTHLY DATA REPORT**

**APRIL 2001**



## **NOTES ON THE DATA FOR APRIL 2001**

Sea level data return this month was excellent at all stations.

This month, maintenance of the Portland SEAFRAME gauge was performed by NTF Australia technicians, over the 3<sup>rd</sup> and 4<sup>th</sup> April. Both the primary and backup water temperature, air temperature and backup pressure (secondary sea level) sensors were replaced. At Broome the primary water temperature sensor failed so data from the backup was used. At Thevenard the air temperature sensor readings were too high (as in previous months) and were removed from the record.

Wind direction data has been removed for Portland for this month. A comparison between the NTF SEAFRAME and Bureau of Meteorology wind directions show that the SEAFRAME data is suspect.

Looking at the sea level anomalies this month (Figure 10), the majority of the stations have positive anomalies (with the exceptions of Hillarys, Esperance and Broome which are slightly negative, and Thevenard and Cocos Islands which are close to zero).

The barometric pressure anomalies, presented in Figure 11, correlate reasonably well with the sea level anomalies this month for most stations. Strongly positive sea level anomalies correspond to strongly negative barometric pressure anomalies as would be expected.

The residuals (Figures 2 and 3), or difference between the observations and the tidal predictions, are the non-tidal components of the sea level observations. The residuals are primarily the consequence of short-term meteorological effects (Figures 5 and 9) and may give the result of elevated or depressed sea level observations, as seen for Thevenard and Port Stanvac around April 7<sup>th</sup>. Residual heights attained during this event were under a metre.

With regard to the water and air temperature anomalies in Figures 12 and 13 respectively, it must be noted that there are large gaps in the data for several stations, where the data collected appeared to be erroneous. Please note that for several stations there were no backup water temperature sensors in operation, so the quality of this data is unknown. Similarly, air temperatures are compared to the temperature recorded by a sensor located in the upper levels of the environmental housing of the tide gauge. These will not exactly agree, as in locations where the housing is in the sun, the housing temperature will be higher than the actual air temperature. The temperature fluctuations inside the housing will also be less pronounced compared to the actual temperature fluctuations. This is due to the smaller amount of ventilation within the environmental housing. So although this can be used as a rough gauge in determining the quality of air temperature data, it is not an exact measure, and so is not used to fill the gaps.

It is difficult to relate the water and air temperature anomalies directly to those of barometric pressure and sea level without considering other effects, such as localised currents, wind speeds and directions. However, the anomalies are very useful in controlling the quality of the water and air temperatures at the Baseline stations.

The mean, maximum and minimum values for barometric pressure, air and water temperatures at each station for April 2001 are compared with the long-term April

values. These comparisons are shown in Figure 16. Please remember that the long-term ranges are calculated using the historical sets of April data for each station *excluding* the current month of data.

The mean barometric pressures for April for all of the stations were quite consistent with the long term April means. The long term Baseline record barometric pressure low for Broome occurred in April 2000. This was a result of the passage of Tropical Cyclone Rosita through the area.

A similar comparison was made between the long-term spread of April air temperature data and that which occurred this month. The means for this month at all of the Baseline stations were consistent with the long term April means. A record high Baseline air temperature was recorded at Hillarys this month.

The mean water temperatures for April 2001 were quite consistent with the long-term means for all locations (Figure 16).

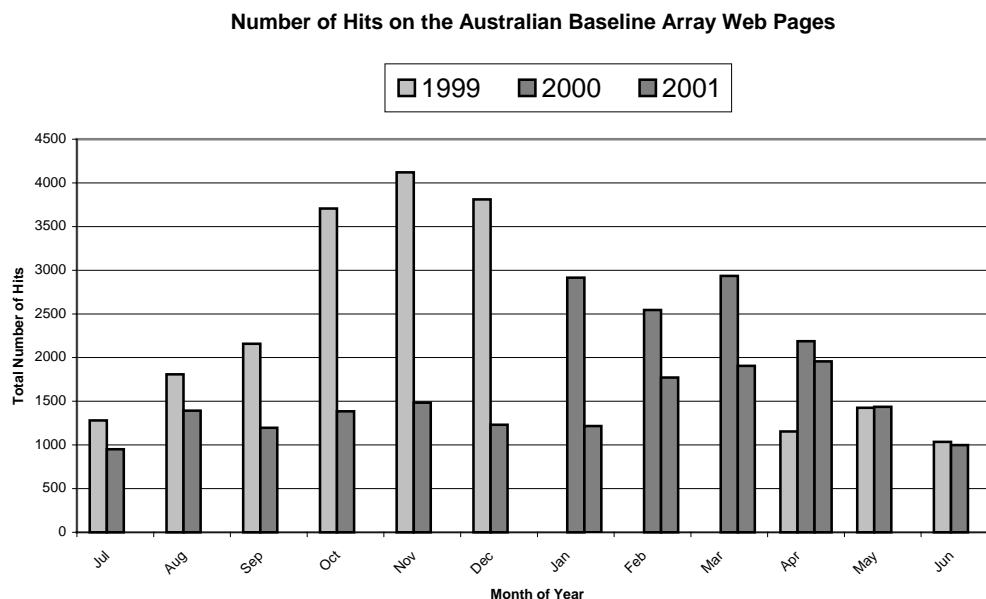
The month of commencement of operation of each gauge is listed in Table 1. Also shown is the short-term sea level trend for the entire record and the change from the previous month's analysis. Figure 14 shows the short-term sea level trends for each station.

**Table 1: Installation dates and short-term sea level trends for the Baseline array.**

Station	Installation Date	Sea Level Trend (mm/yr)	Change from previous month
Cocos Islands	Sep 1992	+9.8	-0.1
Groote Eylandt	Sep 1993	+35.5	+0.4
Darwin	May 1990	+19.9	+0.0
Broome	Nov 1991	+27.3	-0.1
Hillarys	Nov 1991	+21.9	-0.2
Esperance	Mar 1992	+16.2	-0.2
Thevenard	Mar 1992	+12.0	-0.1
Port Stanvac	Jun 1992	+10.6	+0.0
Portland	Jul 1991	+5.6	+0.1
Lorne	Jan 1993	+4.6	+0.1
Stony Point	Jan 1993	+4.8	+0.0
Burnie	Sep 1992	+6.1	+0.0
Spring Bay	May 1991	+4.3	+0.1
Port Kembla	Jul 1991	+5.6	+0.4
Rosslyn Bay	Jun 1992	+8.8	+0.1
Cape Ferguson	Sep 1991	+10.8	+0.1

Figure 17 shows the monthly mean sea levels with respect to an arbitrary fixed offset from the zero of the tide gauge. This plot clearly shows significant correlation in seasonal signals between stations, in contrast to the sea level anomalies plot, which has had the seasonal signal removed from the data.

The following chart shows the number of hits on the Australian Baseline project web pages over 1999, 2000 and 2001.



*Please note:*

*Tide gauges at Stony Point and Lorne do not record air temperature, water temperature and barometric pressure data and are not present in Figures 3,7,8,9,11,12,13 and 16. The tide gauge at Lorne does not record wind data and is not present in Figures 4,5 and 6.*

The *Monthly Data Report* is prepared by NTF Australia for Environment Australia. Staff members produce the text, plots and tables.

Further information on the *Monthly Data Report* and other projects conducted by NTF Australia can be obtained from the following address.

Contact address: NTF Australia  
The Flinders University of South Australia  
GPO BOX 2100, Adelaide SA 5001  
Tel: [+61 8] 8201 7534  
Fax: [+61 8] 8201 7523  
Email: [ntf@flinders.edu.au](mailto:ntf@flinders.edu.au)  
Website: <http://www.ntf.flinders.edu.au>

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Individuals and organisations are advised that quality controlled six-minute or hourly data from these stations are available on request from NTF Australia. Some handling fees may be charged. For commercial agencies requesting data, some additional costs may be levied.

Figure 1

**APRIL 2001**  
**SIX MINUTE OBSERVATIONS FROM SEAFRAME STATIONS (m)**

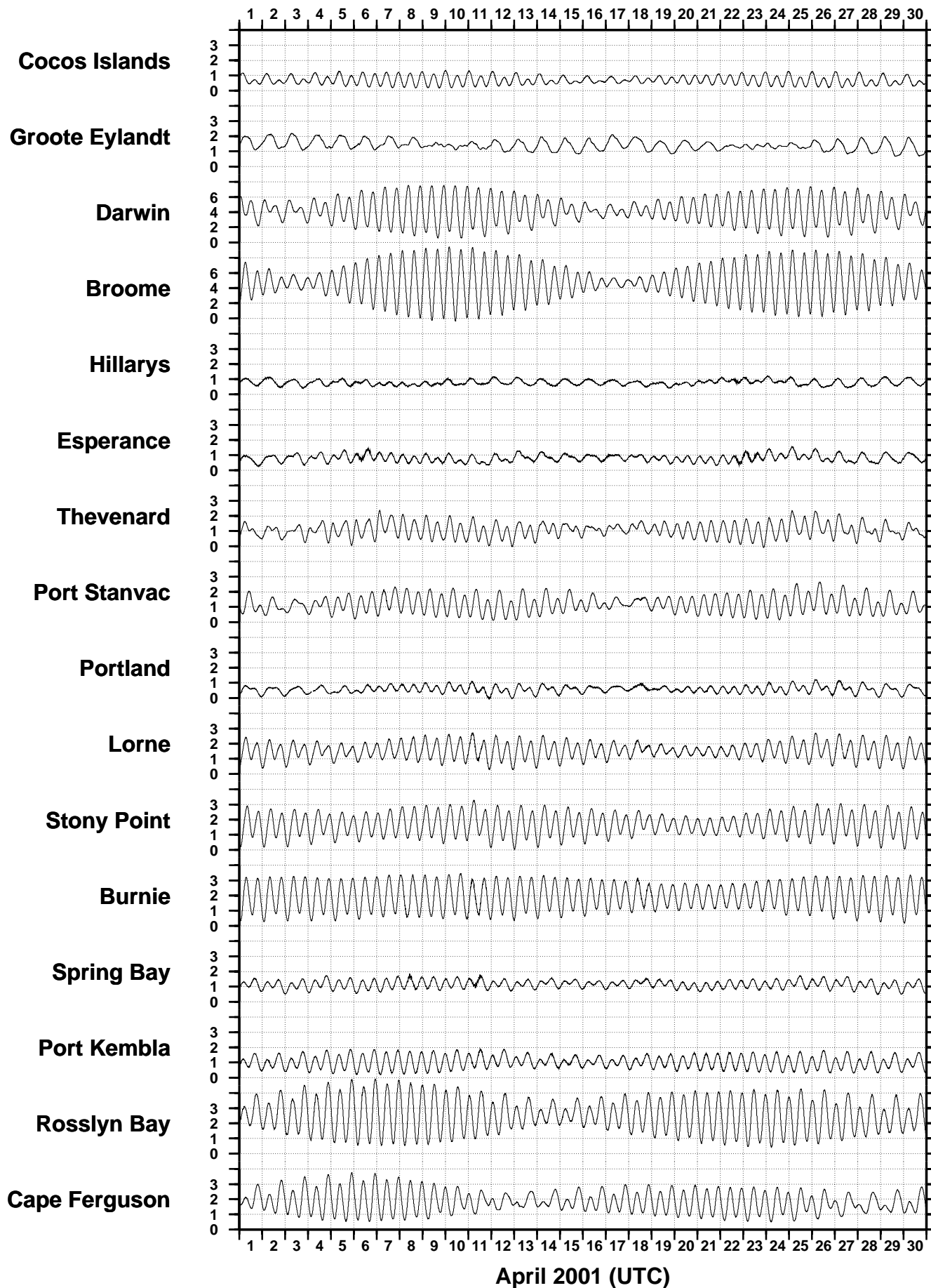


Figure 2

APRIL 2001

RESIDUALS AT SIX MINUTE INTERVALS FROM SEAFRAME STATIONS (m)

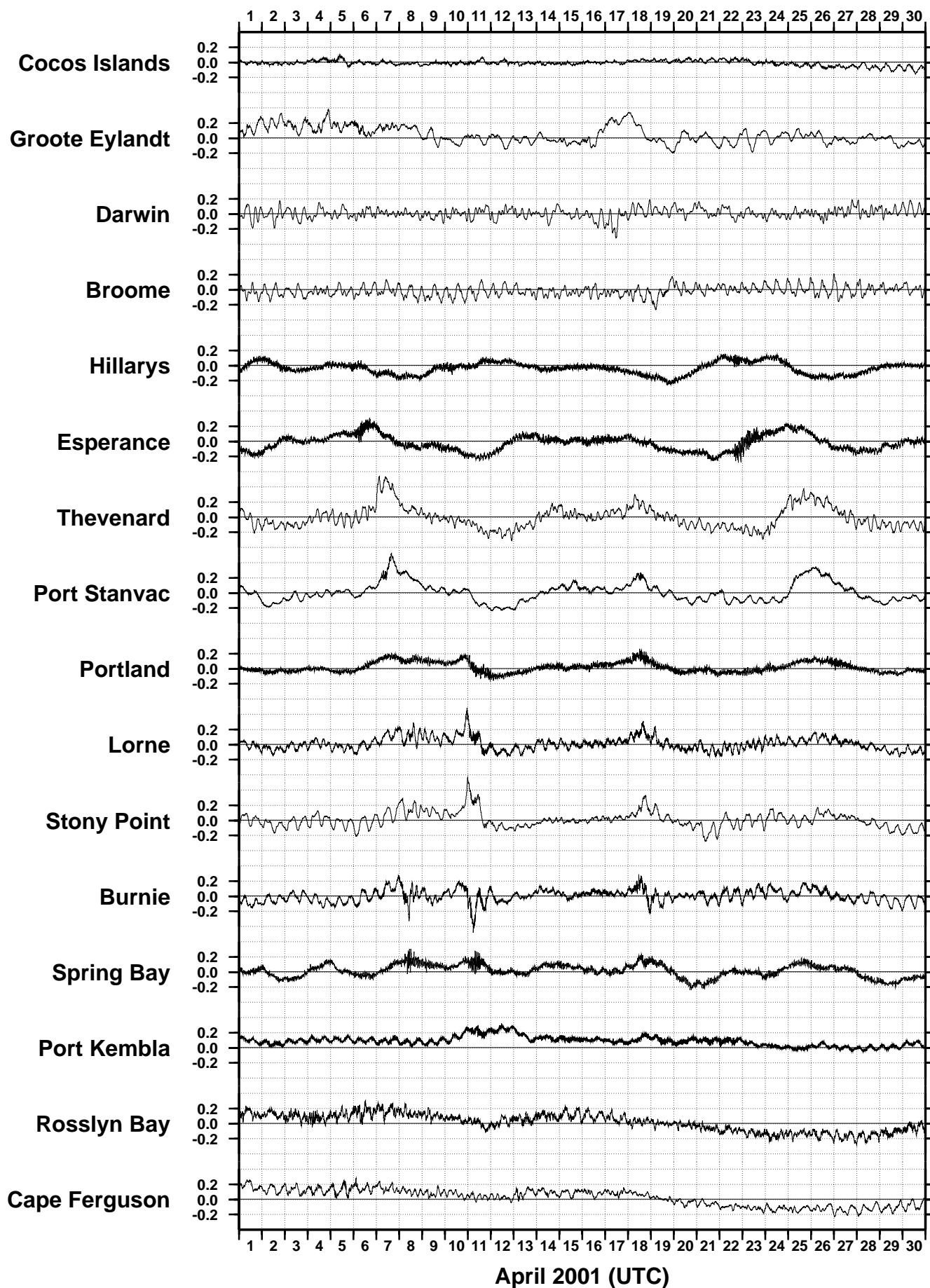


Figure 3

APRIL 2001

RESIDUALS AT SIX MINUTE INTERVALS FROM SEAFRAME STATIONS (m)  
ADJUSTED FOR ATMOSPHERIC PRESSURE

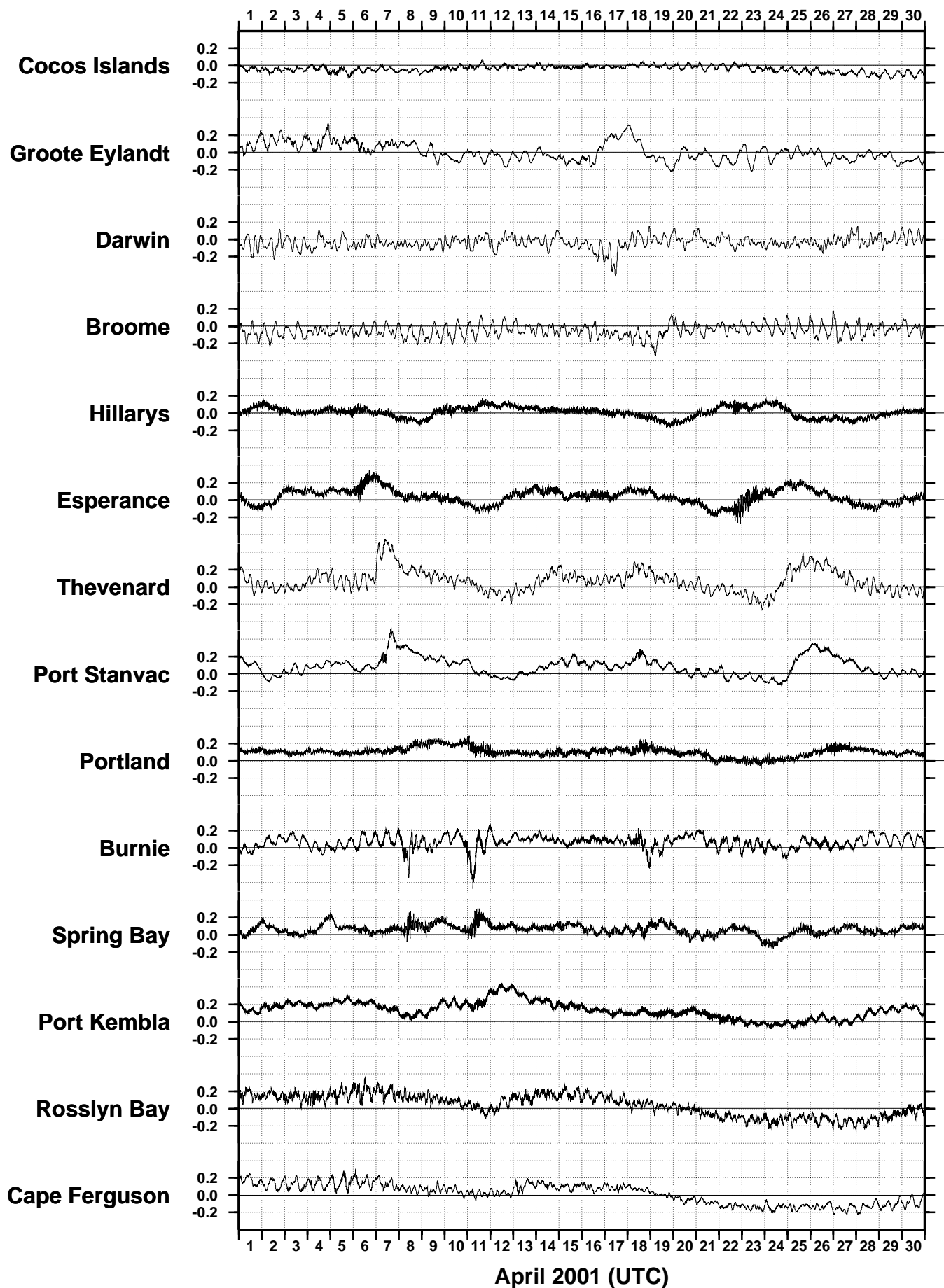


Figure 4

**APRIL 2001**  
**HOURLY WIND SPEEDS FROM SEAFRAME STATIONS (m/s)**

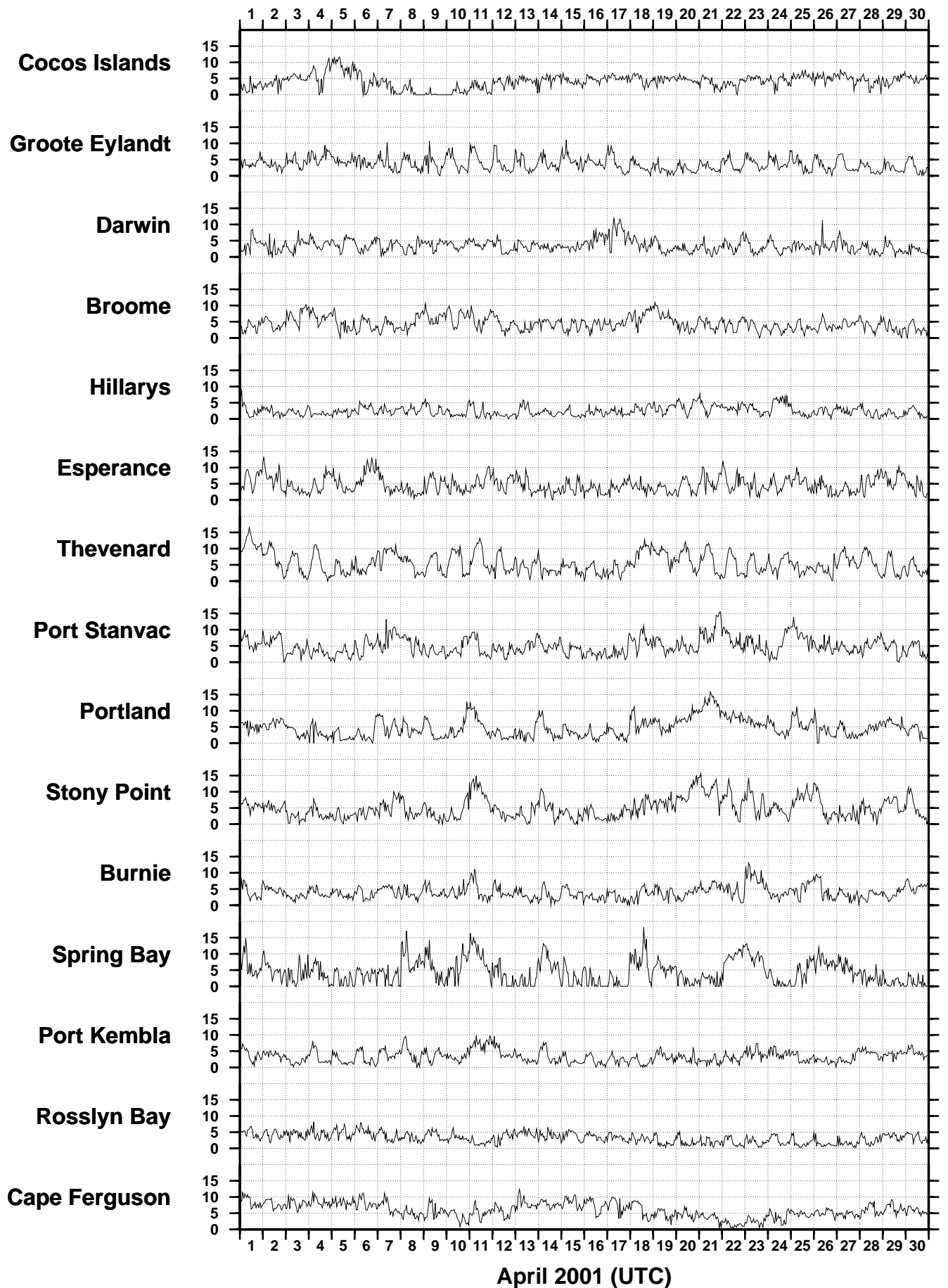




Figure 5

APRIL 2001  
HOURLY INCIDENT WINDS FROM SEAFRAME STATIONS (m/s, deg True)

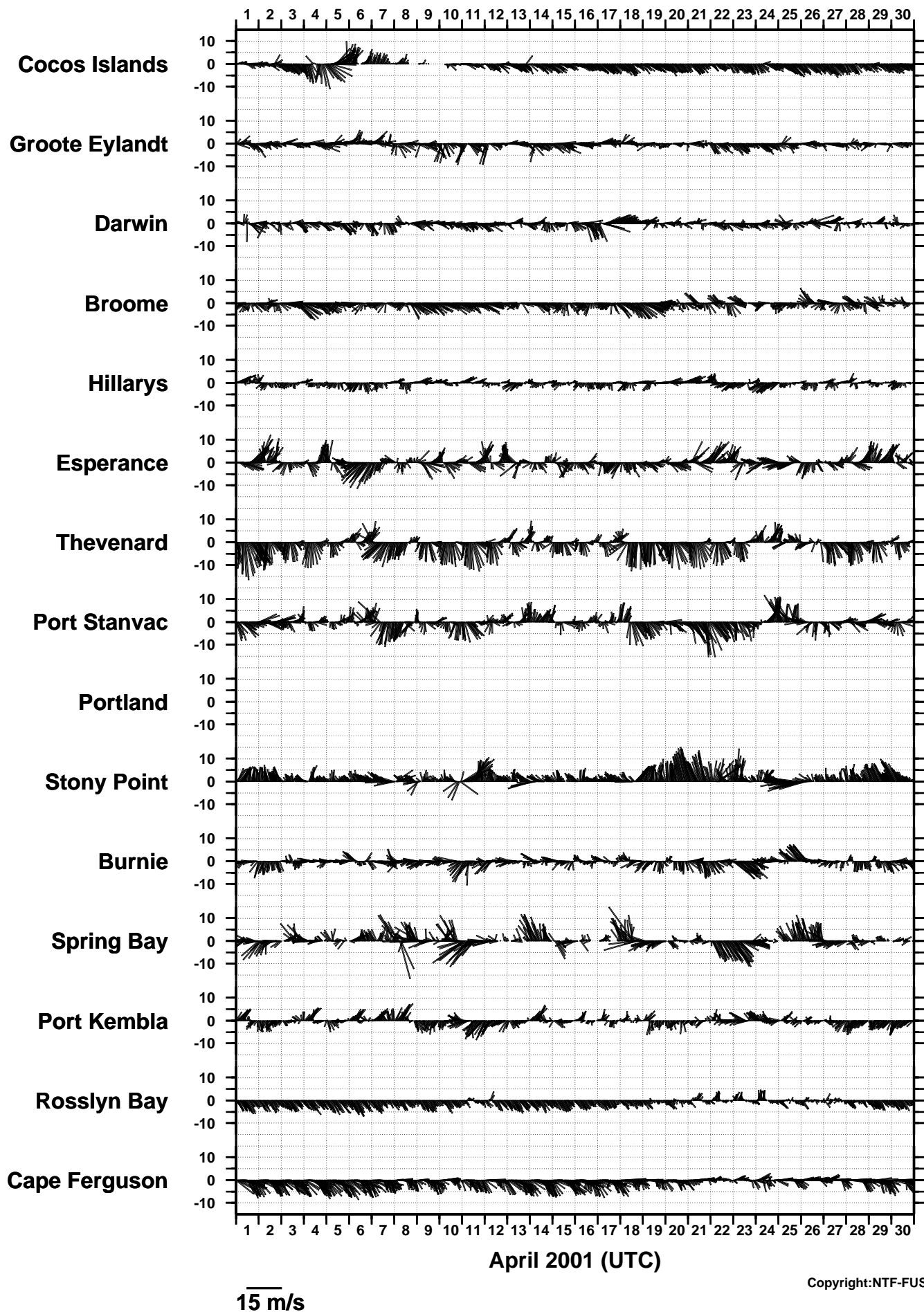


Figure 6

**APRIL 2001**  
**HOURLY MAXIMUM WIND GUSTS FROM SEAFRAME STATIONS (m/s)**

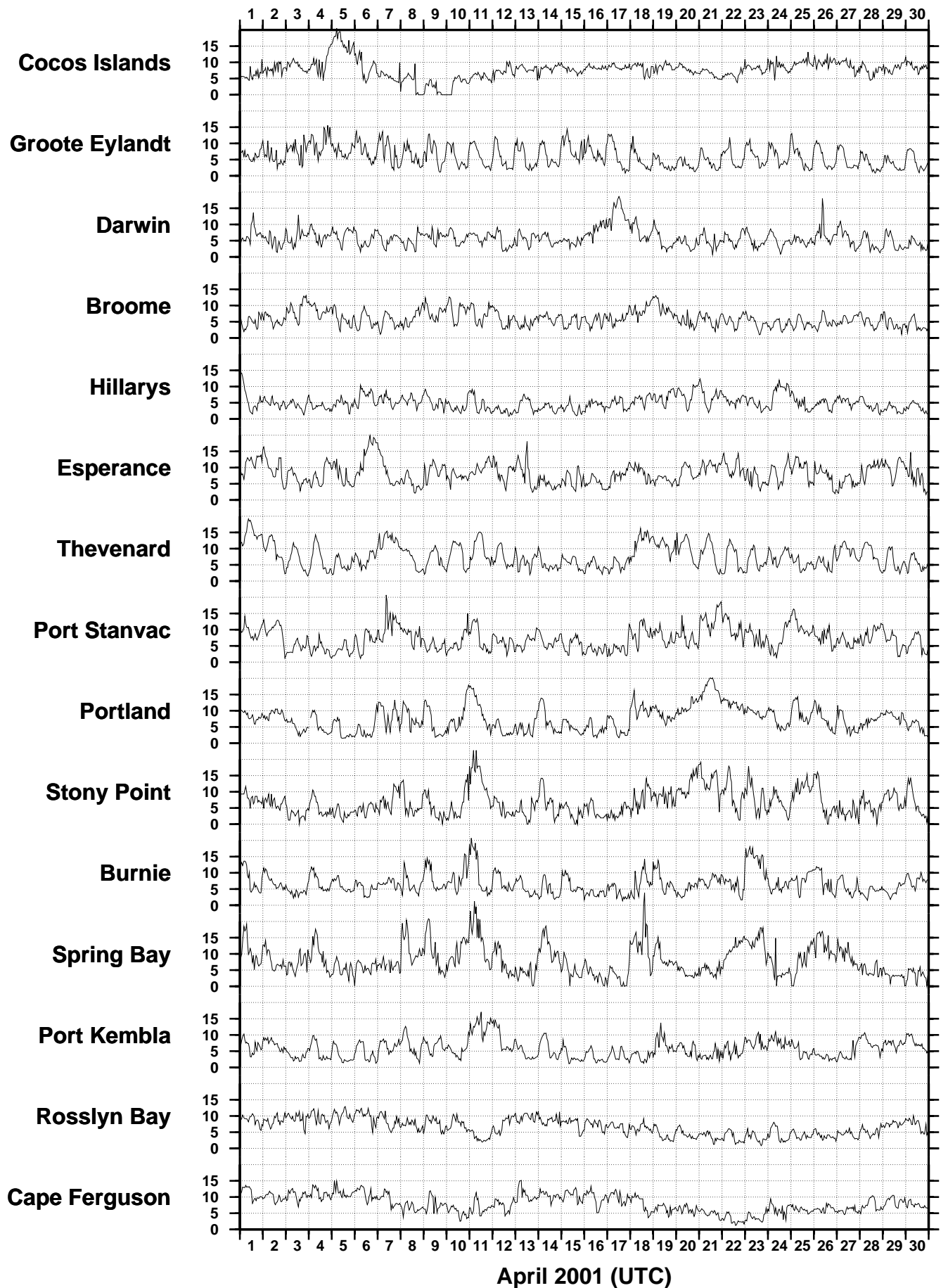


Figure 7

**APRIL 2001**  
**HOURLY AIR TEMPERATURES FROM SEAFRAME STATIONS (°C)**

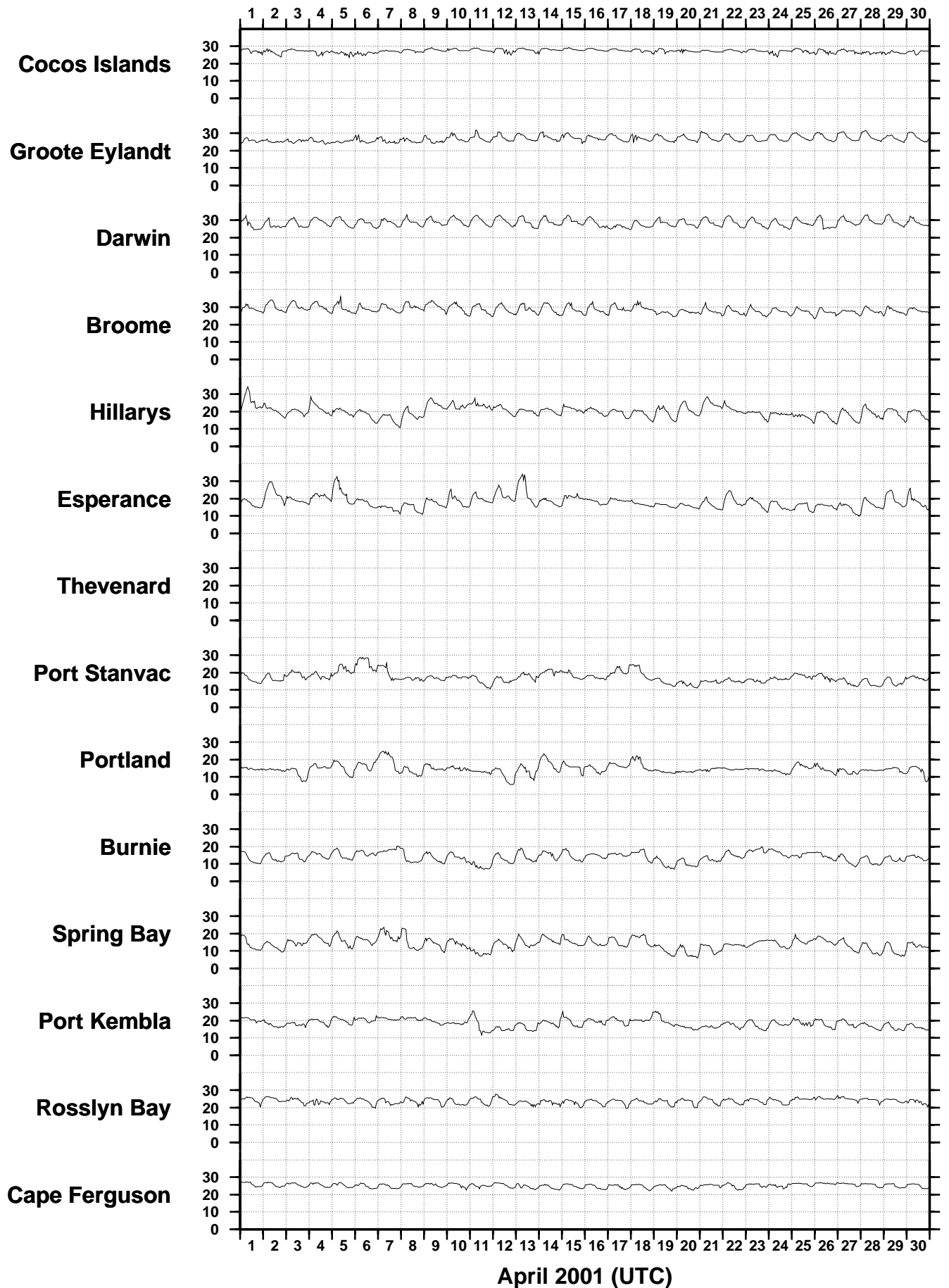


Figure 8

**APRIL 2001**  
**HOURLY WATER TEMPERATURES FROM SEAFRAME STATIONS (°C)**

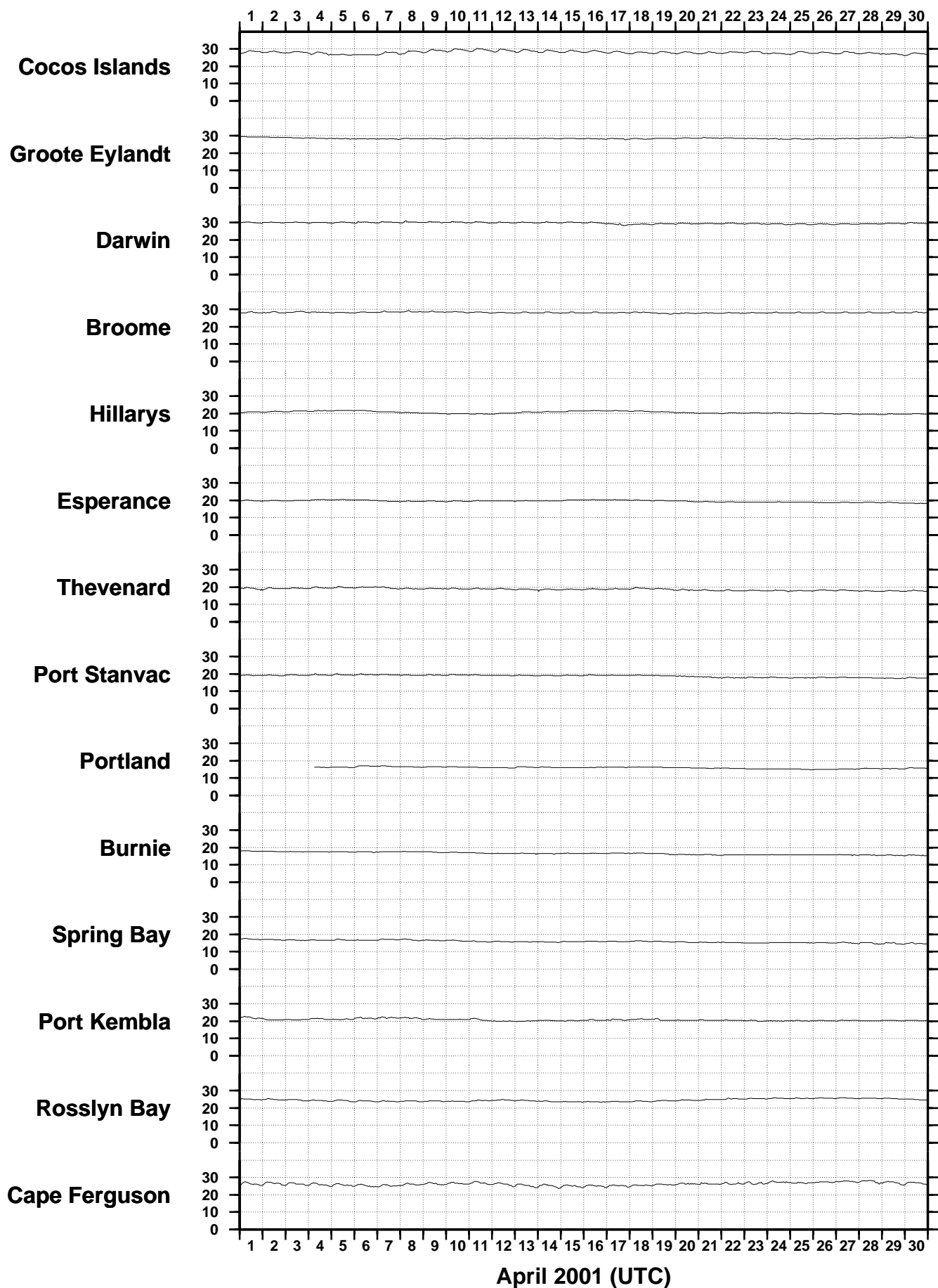
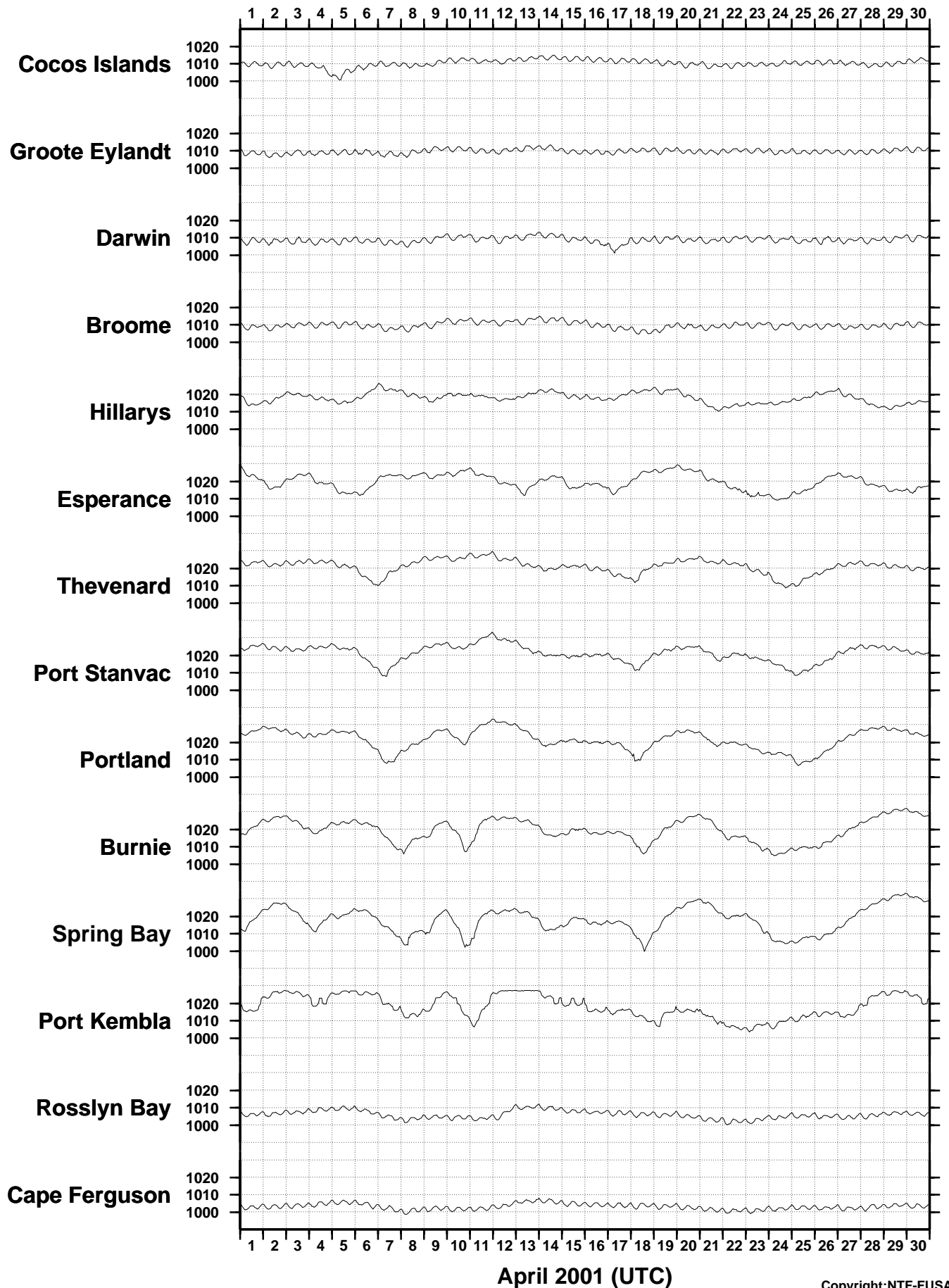
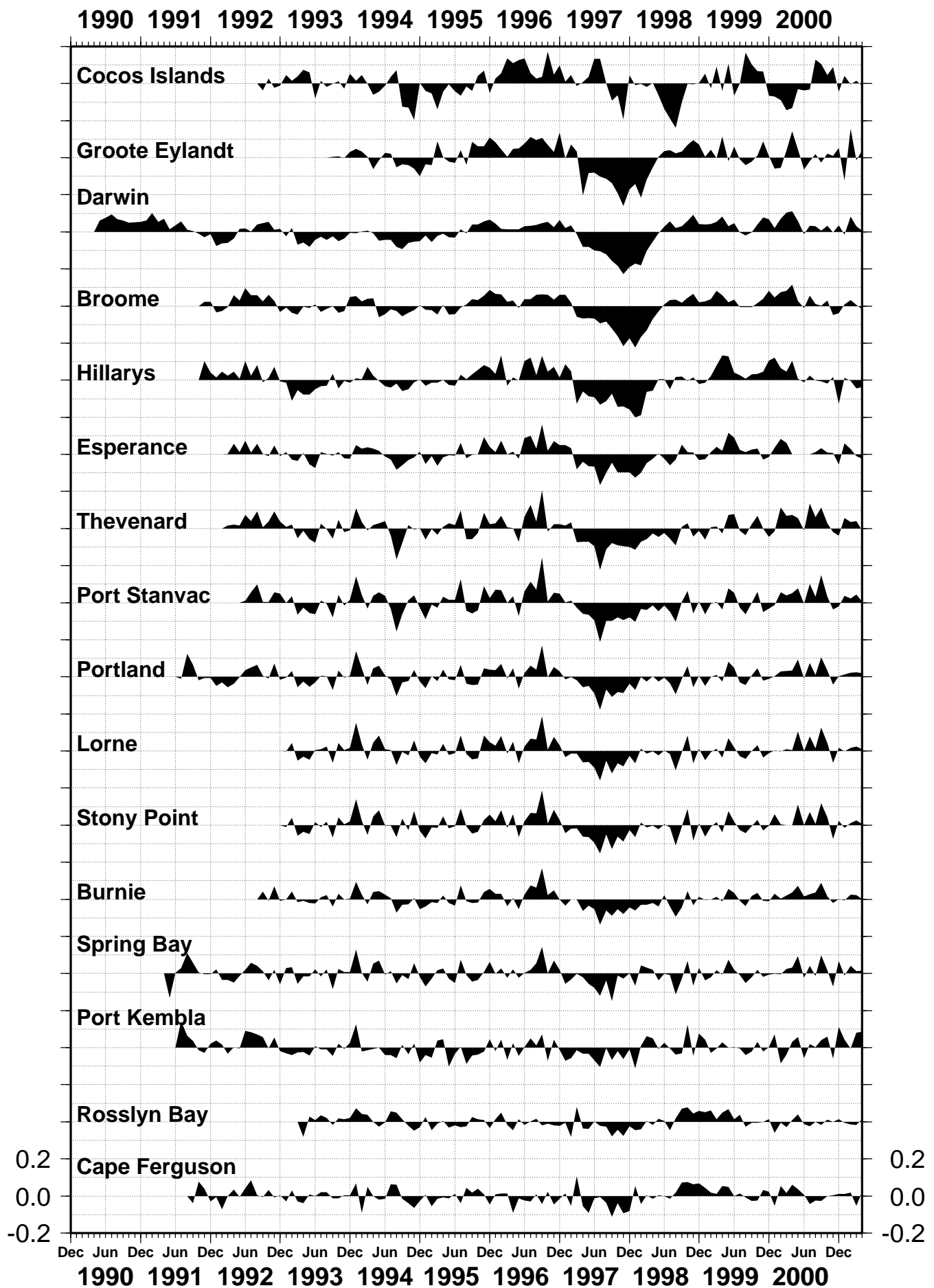


Figure 9

**APRIL 2001**  
**HOURLY ATMOSPHERIC PRESSURE FROM SEAFRAME STATIONS (hPa)**



**Figure 10**  
**SEA LEVEL ANOMALIES THROUGH APRIL 2001 (m)**



## BAROMETRIC PRESSURE ANOMALIES THROUGH APRIL 2001 (hPa)

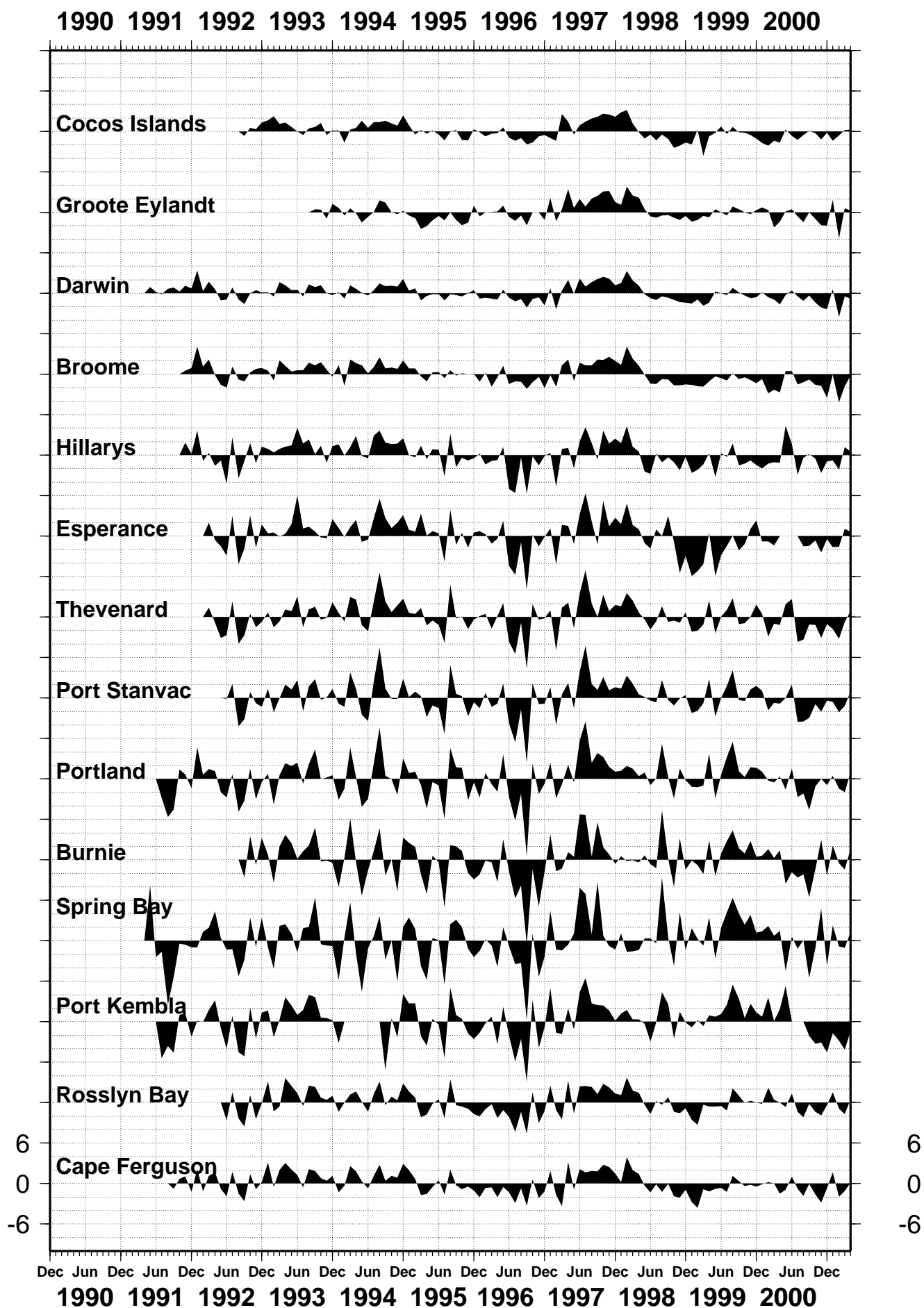


Figure 12

**WATER TEMPERATURE  
ANOMALIES THROUGH APRIL 2001 (°C)**

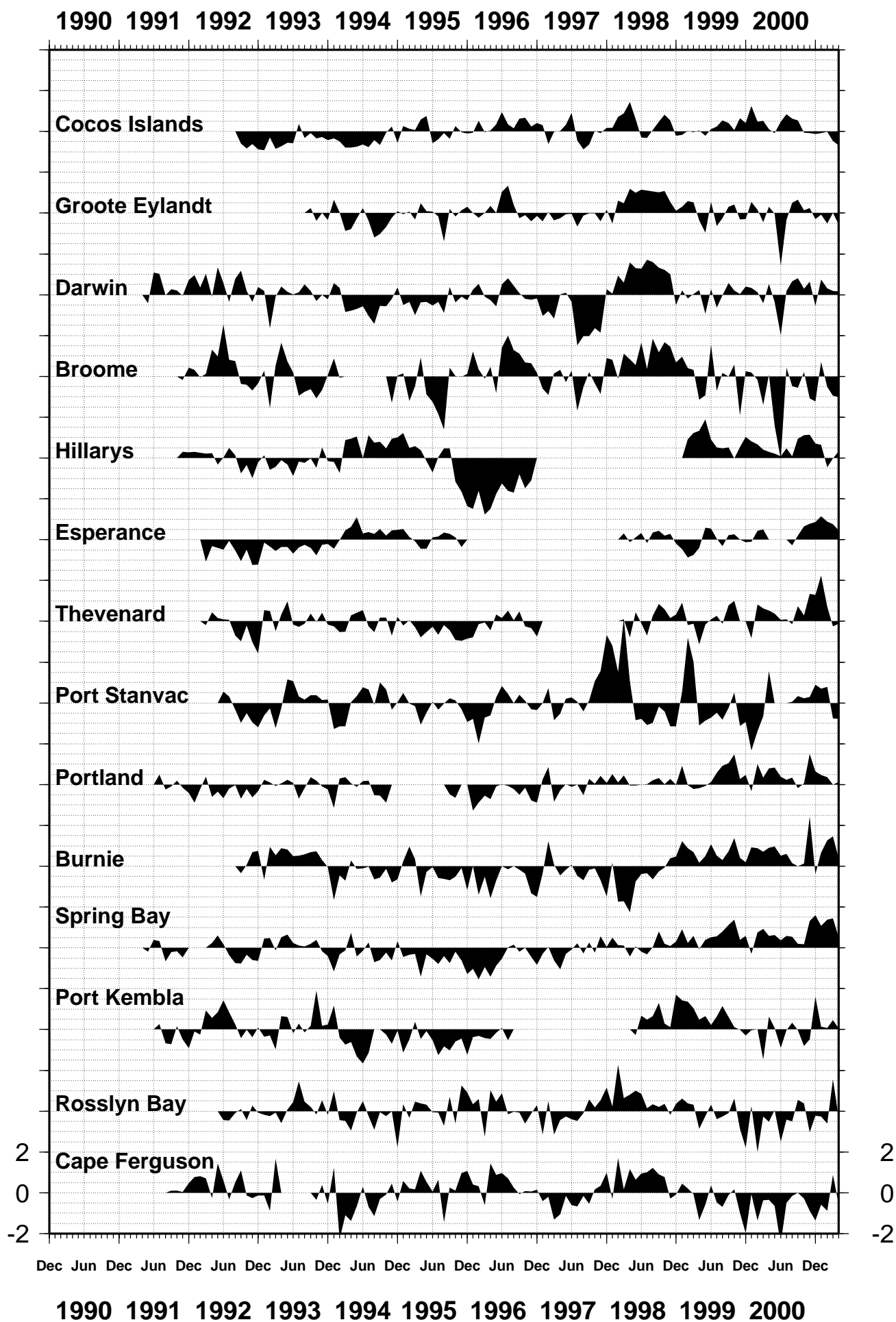




Figure 13

AIR TEMPERATURE ANOMALIES  
THROUGH APRIL 2001 (°C)

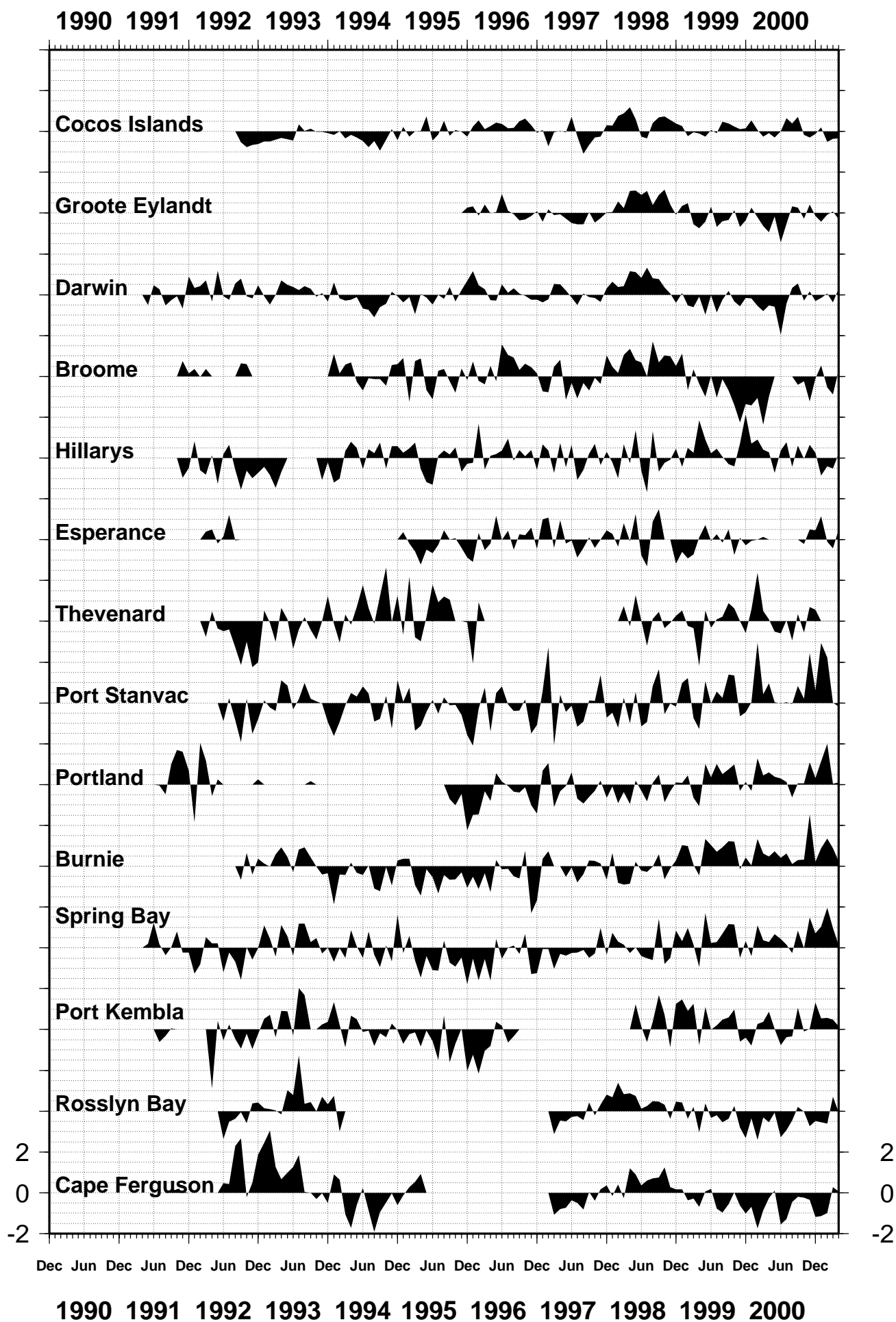
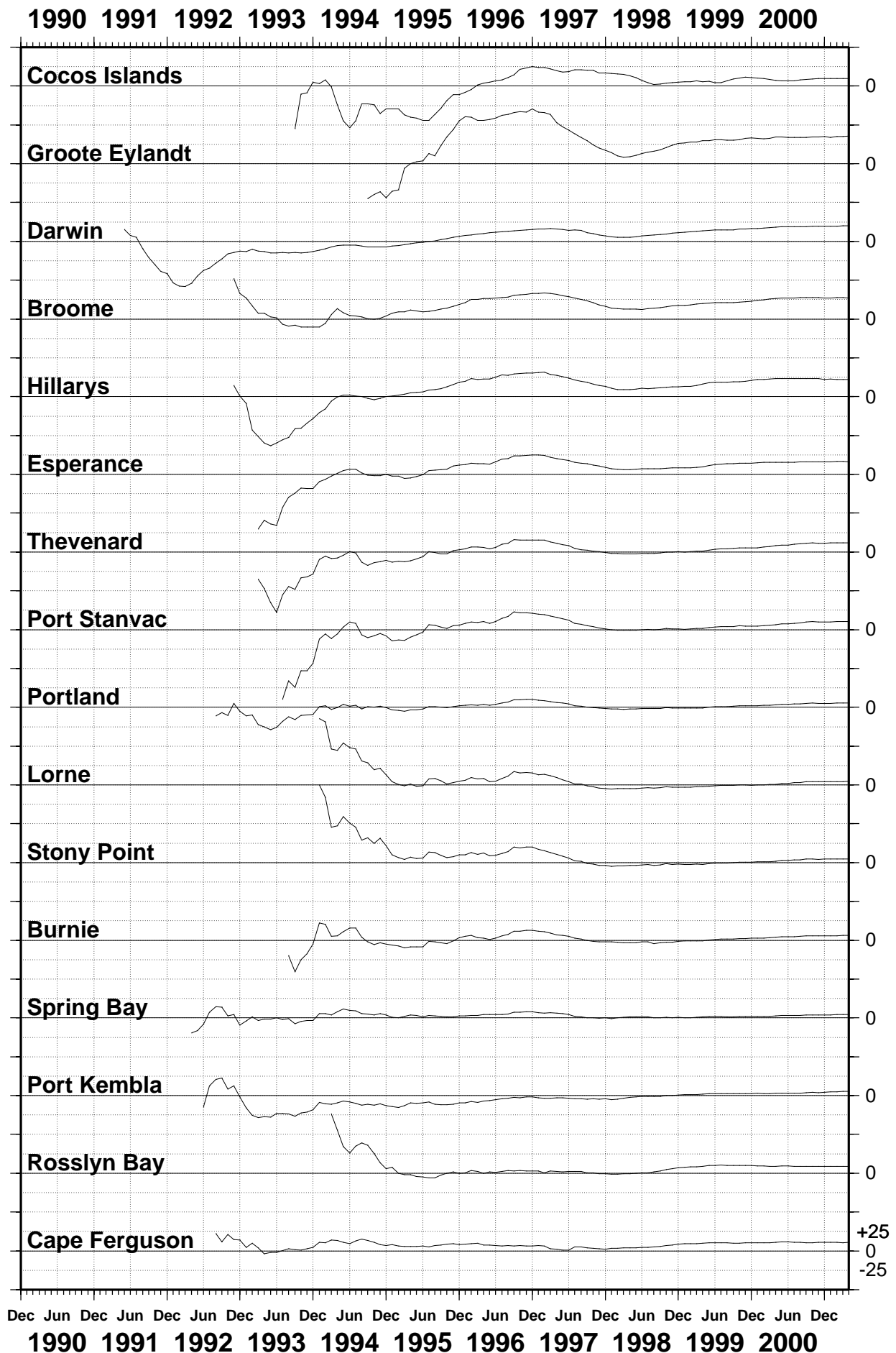


Figure 14

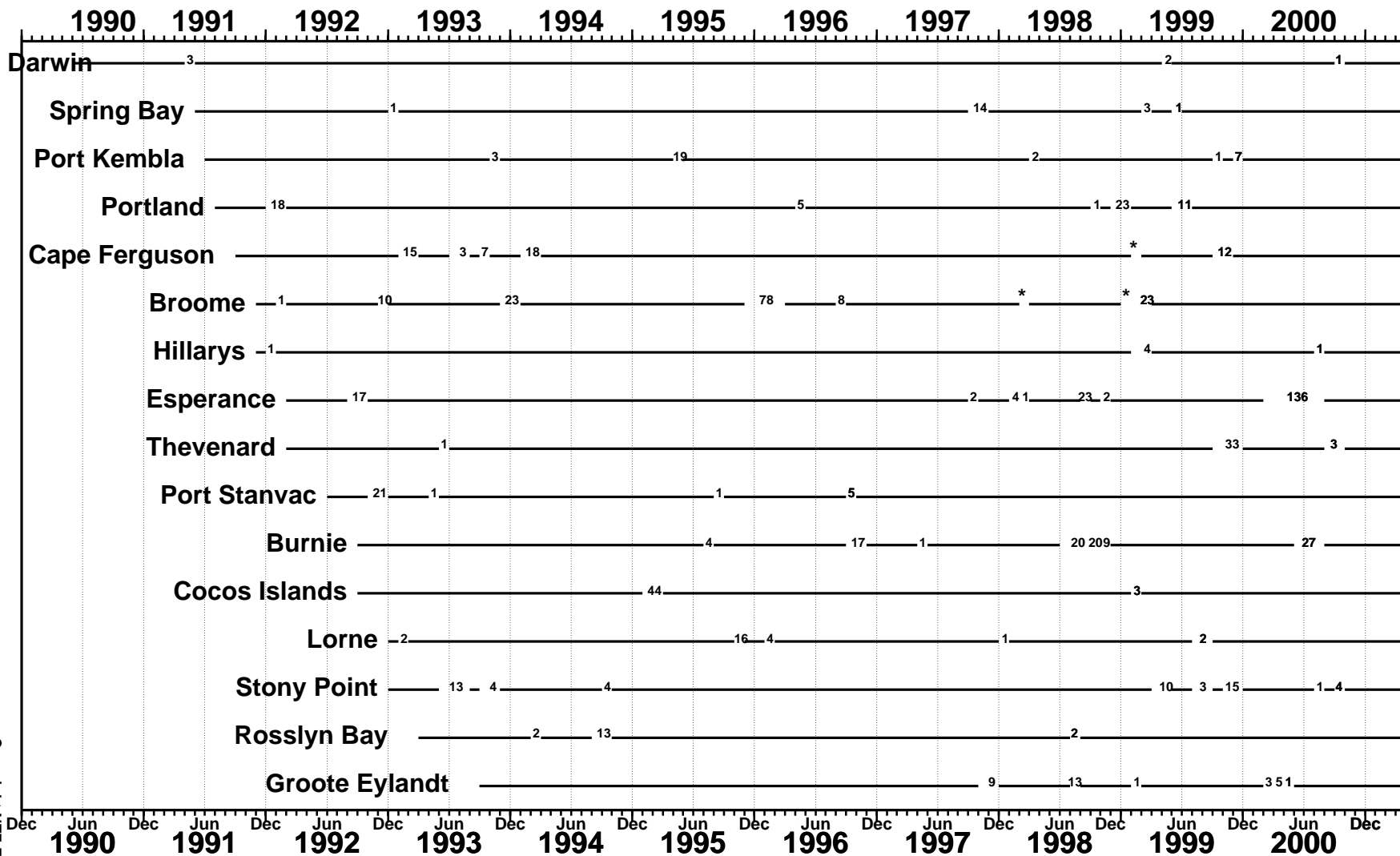
## SEA LEVEL TRENDS THROUGH APRIL 2001 (mm/year)



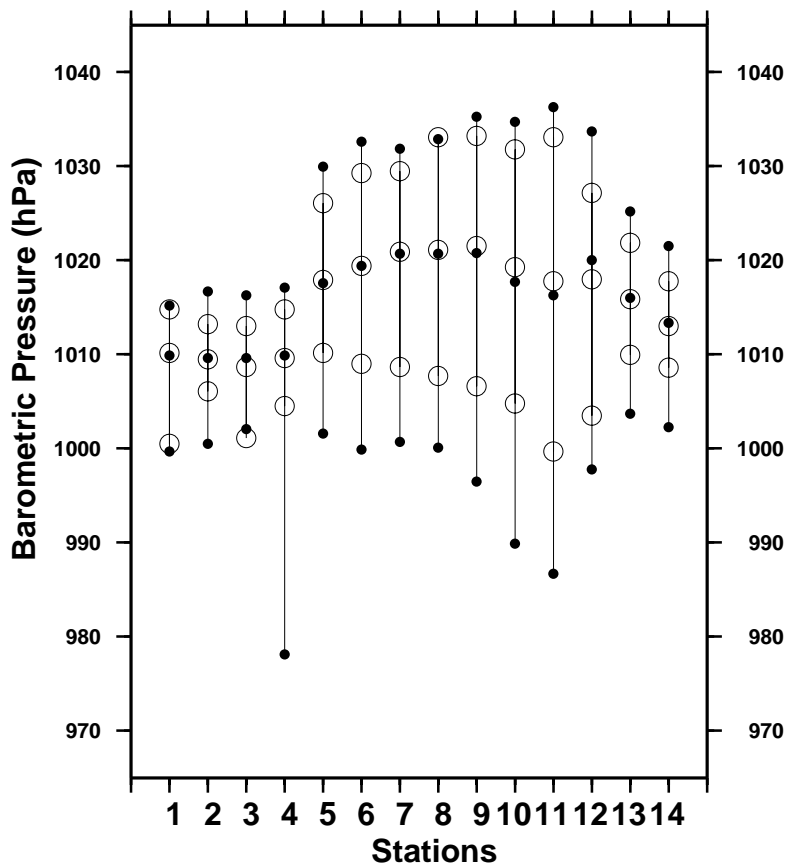
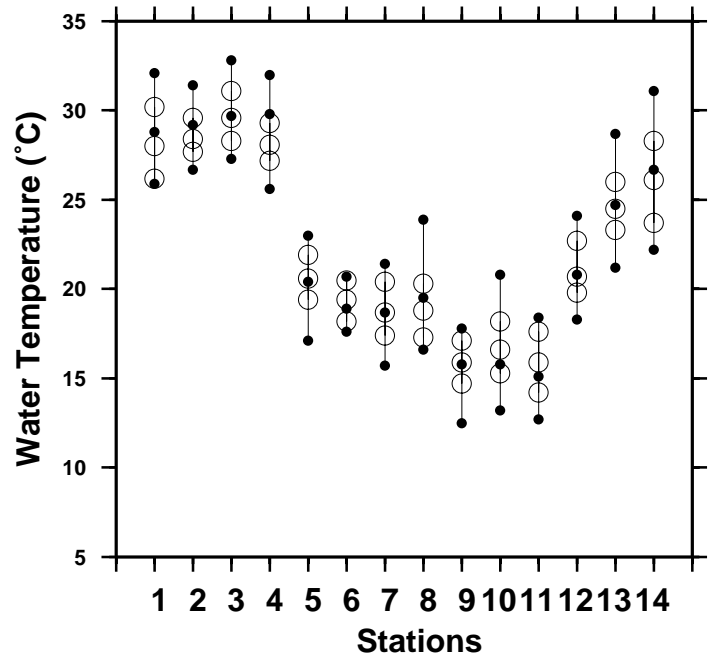
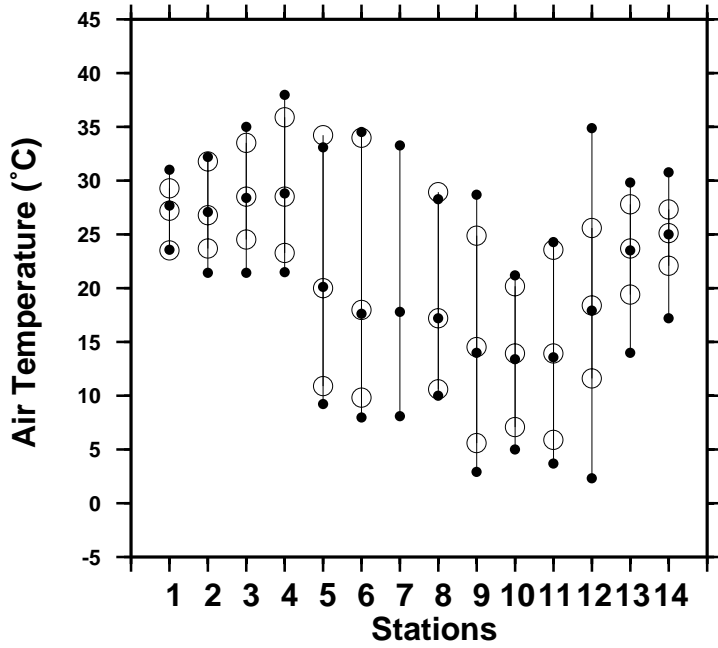
# SEA LEVEL DATA RETURN

Figure 15

THE NUMBER OF DAYS OF MISSING DATA ARE INDICATED  
GAPS INCLUDE TRANSMISSION, POWER AND LOGGER FAILURE  
\* Patchy record



**Figure 16**  
**Comparison of April 2001 Max, Min & Mean with**  
**Long Term April Values.**



### Stations

- 1 - Cocos Islands
- 2 - Groote Eylandt
- 3 - Darwin
- 4 - Broome
- 5 - Hillarys
- 6 - Esperance
- 7 - Thevenard
- 8 - Port Stanvac
- 9 - Portland
- 10 - Burnie
- 11 - Spring Bay
- 12 - Port Kembla
- 13 - Rosslyn Bay
- 14 - Cape Ferguson

- April 2000 Maximum
- April 2000 Mean
- April 2000 Minimum
- Long Term April Maximum
- Long Term April Mean
- Long Term April Minimum

Figure 17

## MONTHLY MEAN SEA LEVELS TO APRIL 2001 (m)

The zero line represents an arbitrary fixed offset from the zero of the tide gauge.

