THE AUSTRALIAN BASELINE SEA LEVEL MONITORING PROJECT

MONTHLY DATA REPORT

SEPTEMBER 2000

NOTES ON THE DATA FOR SEPTEMBER 2000

Sea level data return this month was good for most stations, the only exception being Thevenard (Figures 1 and 15). Two days are missing at Thevenard as power was cut to the wharf due to refurbishments. This has caused some technical problems with the gauge as the battery has failed to hold charge since the power cut. The local port authority sent a technician to charge the battery manually. This fixed the problem for some time, however the battery began to lose charge again towards the end of the month. The barometric pressure, air and water temperatures also ceased to be recorded from the 26th September. The technicians are currently at the site and the problems will be rectified over the next couple of days.

The NTF Australia technicians carried out routine maintenance visits to Groote Eylandt, Darwin and Broome this month. At all three stations the primary water temperature sensors were routinely replaced. In addition, at Darwn and Broome, new wind bird sensors were installed. At Broome both the air temperature sensor (which was rendered inoperable by damage from Tropical Cyclone Rosita back in April) and backup sea level sensor were replaced and became operational from the 20th September.

The air temperature sensor and wind anemometer are still not installed at Esperance. They cannot be installed until some more gantry is put into place. This should be done within one to two weeks.

At Portland this month, data from the backup water temperature sensor was used, as the data from the primary water temperature sensor appears to be erroneous.

The malfunctioning circuit board at Port Kembla, that rendered the barometric pressure sensor inoperable, has been fixed with the assistance of the Port Kembla Port Corporation. The pressure sensor record resumed on the 12th September.

Looking at the sea level anomalies this month (Figure 10) it can be seen that stations located in the southern half of Australia exhibit positive anomalies (with the exception of Hillarys which was slightly negative), with the strongest anomalies being evident along the southern coastline. The amplitudes of the anomalies in the north are small, with Cape Ferguson and Rosslyn Bay being slightly negative, Broome and Groote Eylandt being close to zero, and Darwin being slightly positive. The sea level anomaly at Cocos Islands was strongly positive this month.

The barometric pressure anomalies, presented in Figure 11, correlate well with the sea level anomalies this month. 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 4, 6 and 9) and may give the result of elevated sea level observations, as seen for Thevenard and Port Stanvac around September 7th. Residual heights attained during this event were over 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 September 2000 are compared with the long-term September values. These comparisons are shown in Figure 16. Please remember that the long-term ranges are calculated using the historical sets of September data for each station ***excluding*** the current month of data.

The mean barometric pressures for September for some of the southern stations (stations 7 to 11) were in general lower than the long term September means (as was the case for August). All other stations exhibited a consistent relationship between the September mean and the long term mean.

A similar comparison was made between the long-term spread of September air temperature data and that which occurred this month. There are no significant differences between the long-term September mean and the September 2000 mean at each station. Figure 16 indicates that record high air temperatures were recorded at Port Kembla (29.7^{o}C) and Rosslyn Bay (29.9^{o}C) this month over the length of the Baseline data set.

The water temperature mean values for August 2000 were quite consistent with the long-term means for all locations (Figure 16). Record high water temperatures were recorded at Cocos Islands (29.7 ^{o}C) and Hillarys (19.7 ^{o}C) this month.

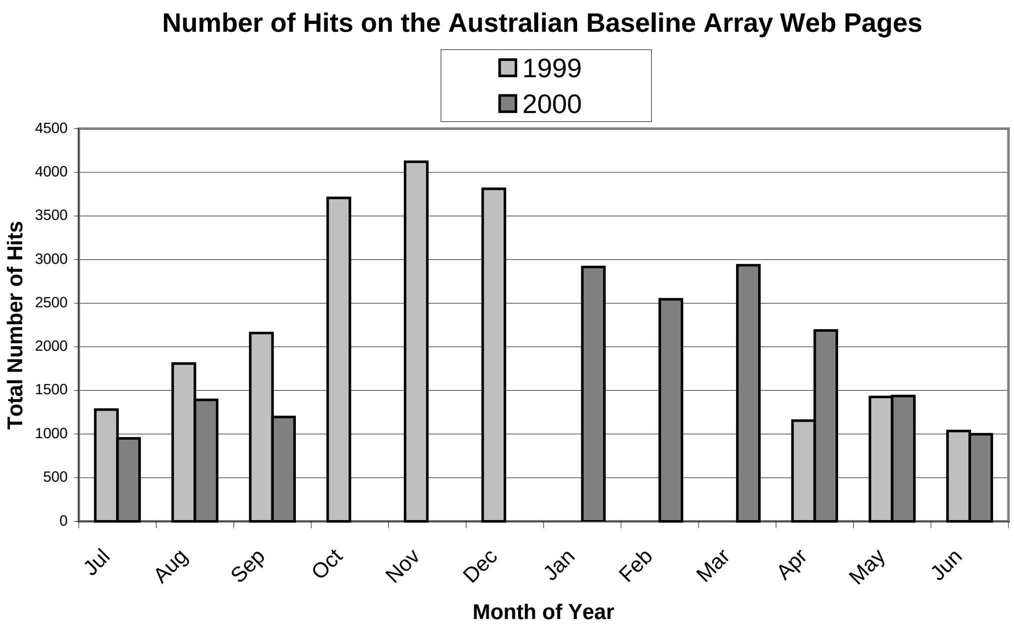
The month of commencement of operation of each gauge is listed in Table 1. Also shown is the short-term sea level trend for the entire record and the change from the previous month's analysis. Figure 14 shows the short-term sea level trends for each station.

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	+8.8	+0.9
Groote Eylandt	Sep 1993	+33.9	–0.2
Darwin	May 1990	+19.1	+0.1
Broome	Nov 1991	+27.5	+0.0
Hillarys	Nov 1991	+23.4	–0.1
Esperance	Mar 1992	+16.1	+0.3
Thevenard	Mar 1992	+11.3	+0.8
Port Stanvac	Jun 1992	+9.9	+1.2
Portland	Jul 1991	+5.1	+0.7
Lorne	Jan 1993	+4.1	+1.1
Stony Point	Jan 1993	+4.6	+1.0
Burnie	Sep 1992	+5.8	+0.8
Spring Bay	May 1991	+3.9	+0.6
Port Kembla	Jul 1991	+3.6	+0.3
Rosslyn Bay	Jun 1992	+8.8	–0.2
Cape Ferguson	Sep 1991	+10.7	–0.2

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 the seasonal signal removed from the data.

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



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.

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Website: http://www.ntf.flinders.edu.au

Please note the following:

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

SEPTEMBER 2000
SIX MINUTE OBSERVATIONS FROM SEAFRAME STATIONS (m)

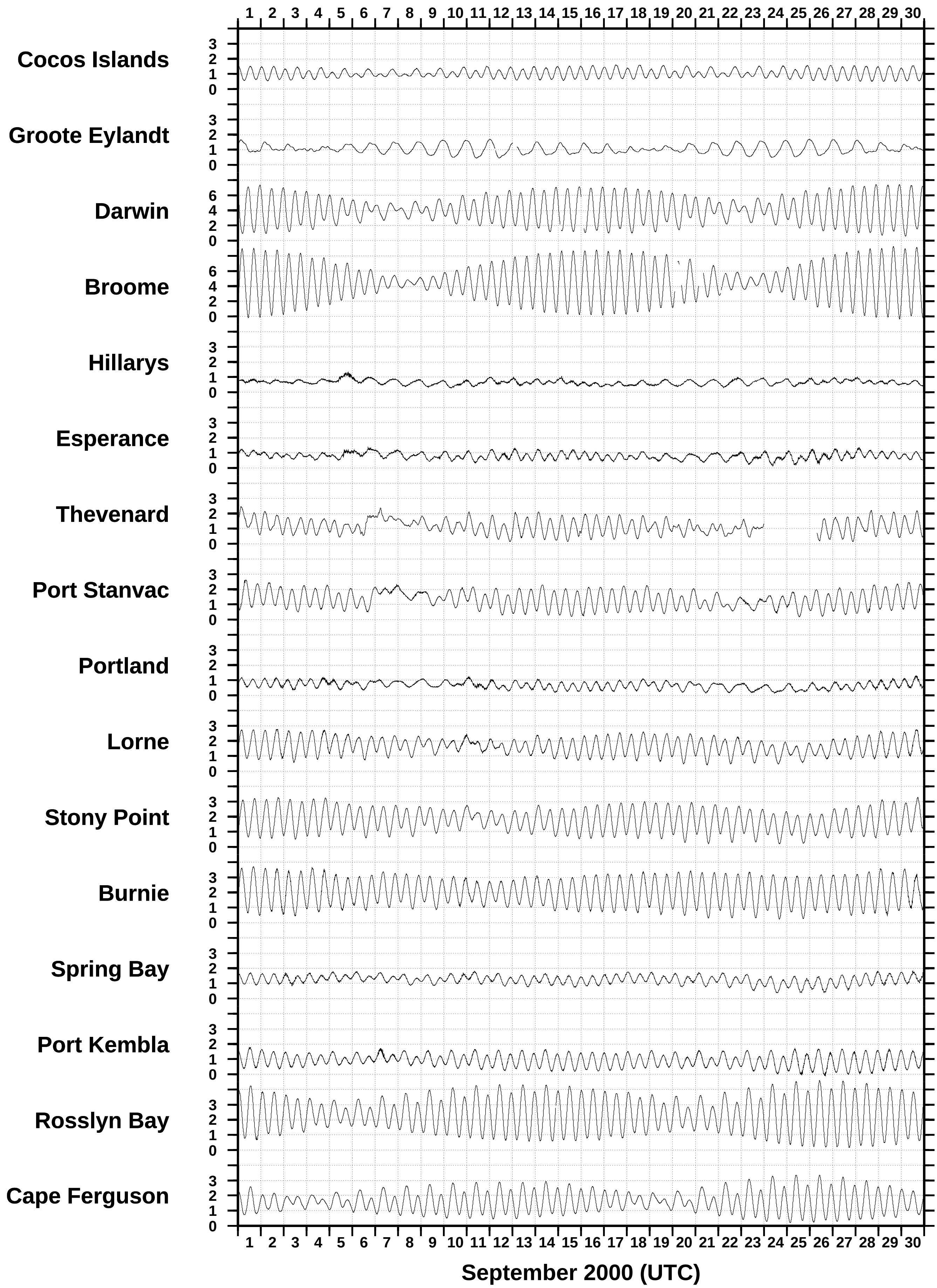


Figure 2

SEPTEMBER 2000
RESIDUALS AT SIX MINUTE INTERVALS FROM SEAFRAME STATIONS (m)

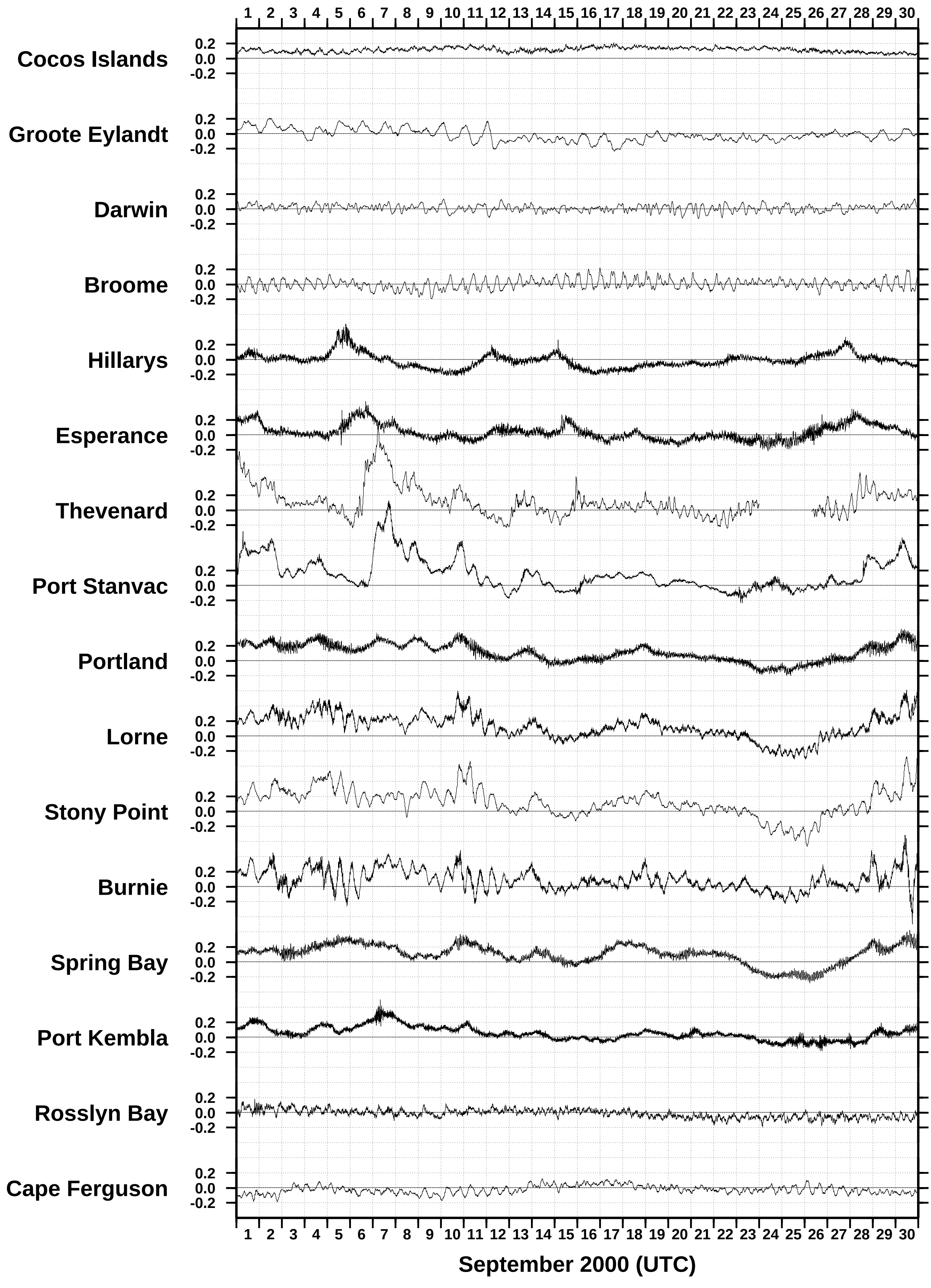


Figure 3

SEPTEMBER 2000
RESIDUALS AT SIX MINUTE INTERVALS FROM SEAFRAME STATIONS (m)
ADJUSTED FOR ATMOSPHERIC PRESSURE

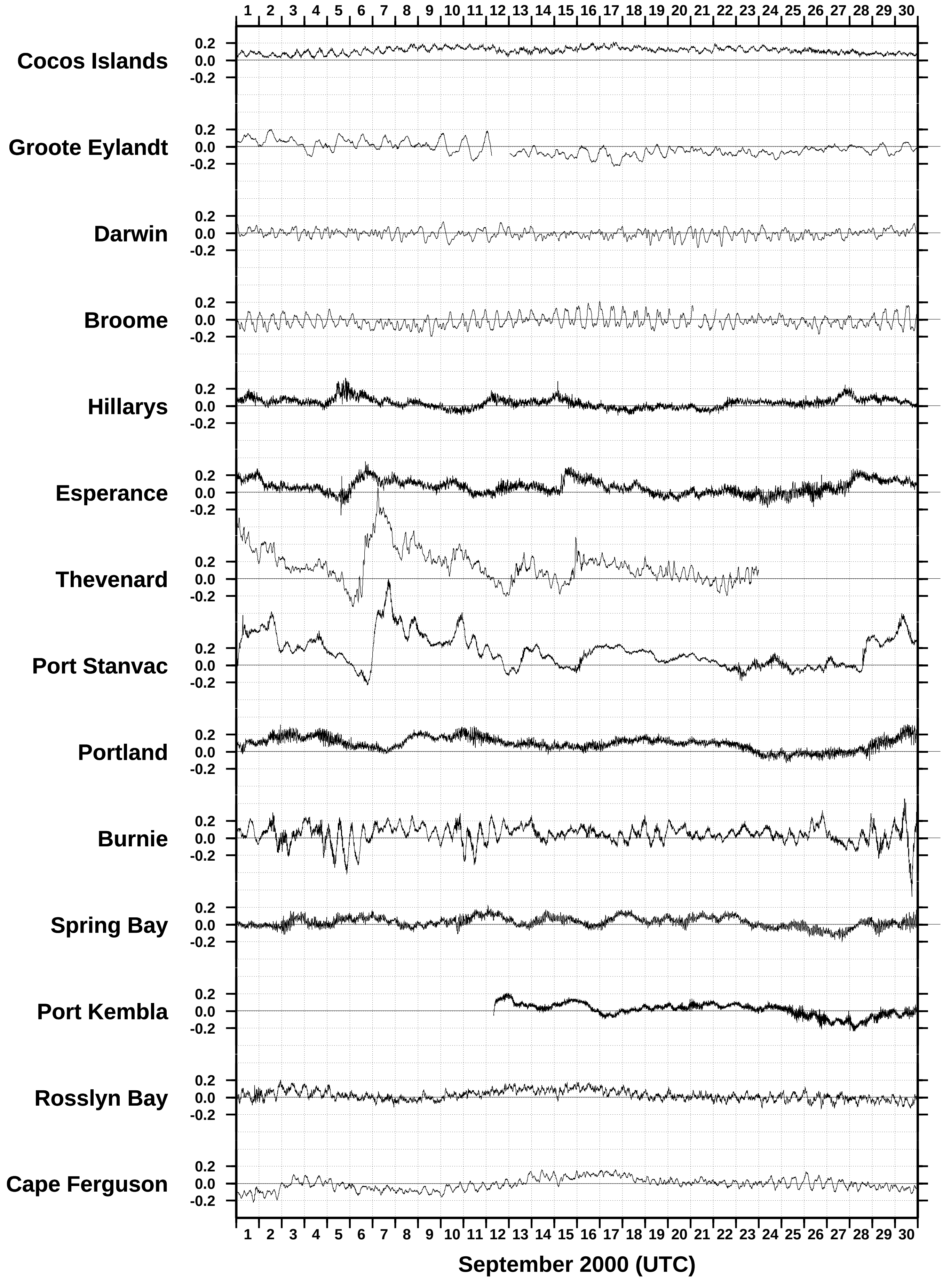


Figure 4

SEPTEMBER 2000
HOURLY WIND SPEEDS FROM SEAFRAME STATIONS (m/s)

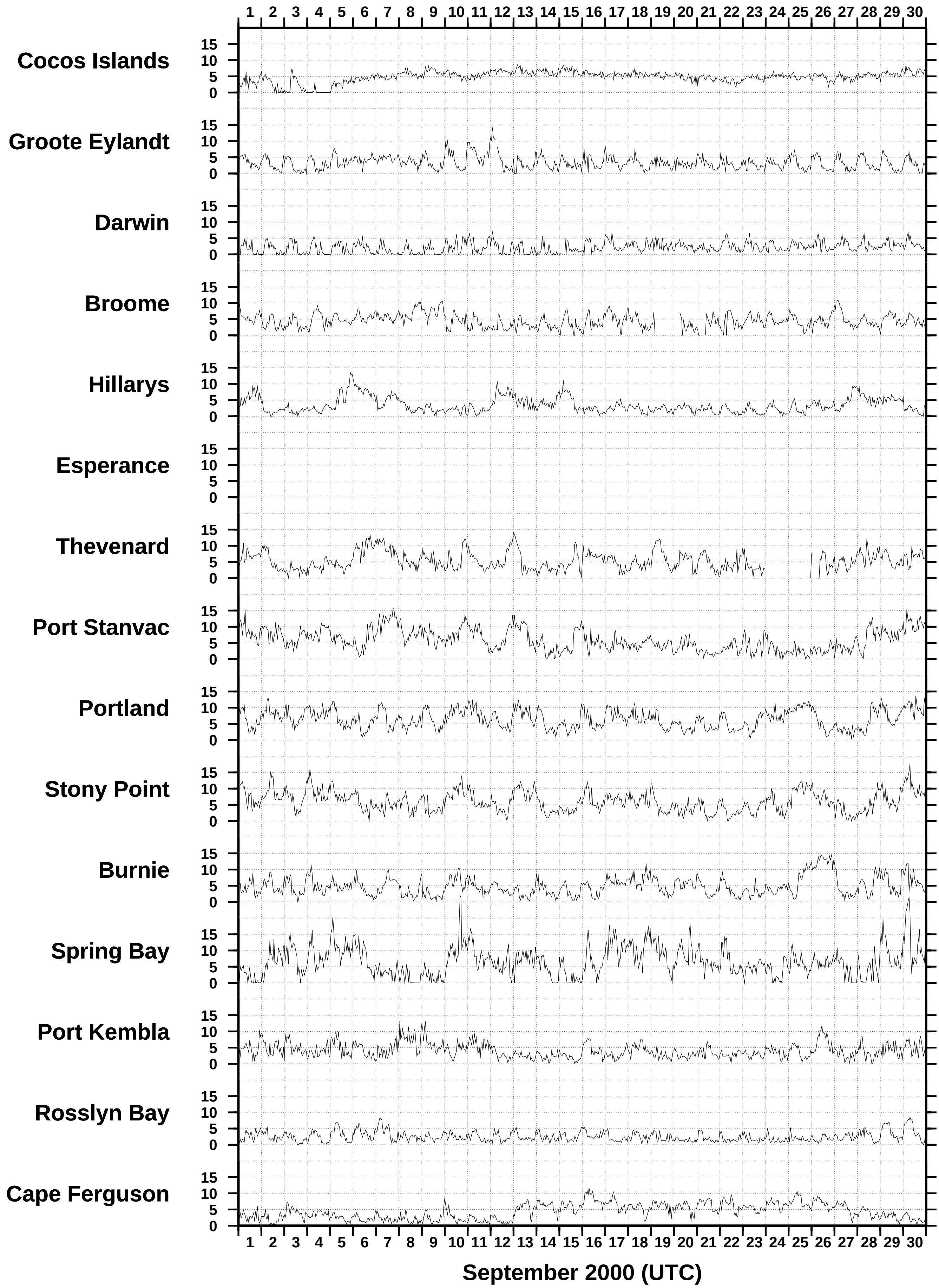


Figure 5

SEPTEMBER 2000
HOURLY INCIDENT WINDS FROM SEAFRAME STATIONS (m/s, deg True)

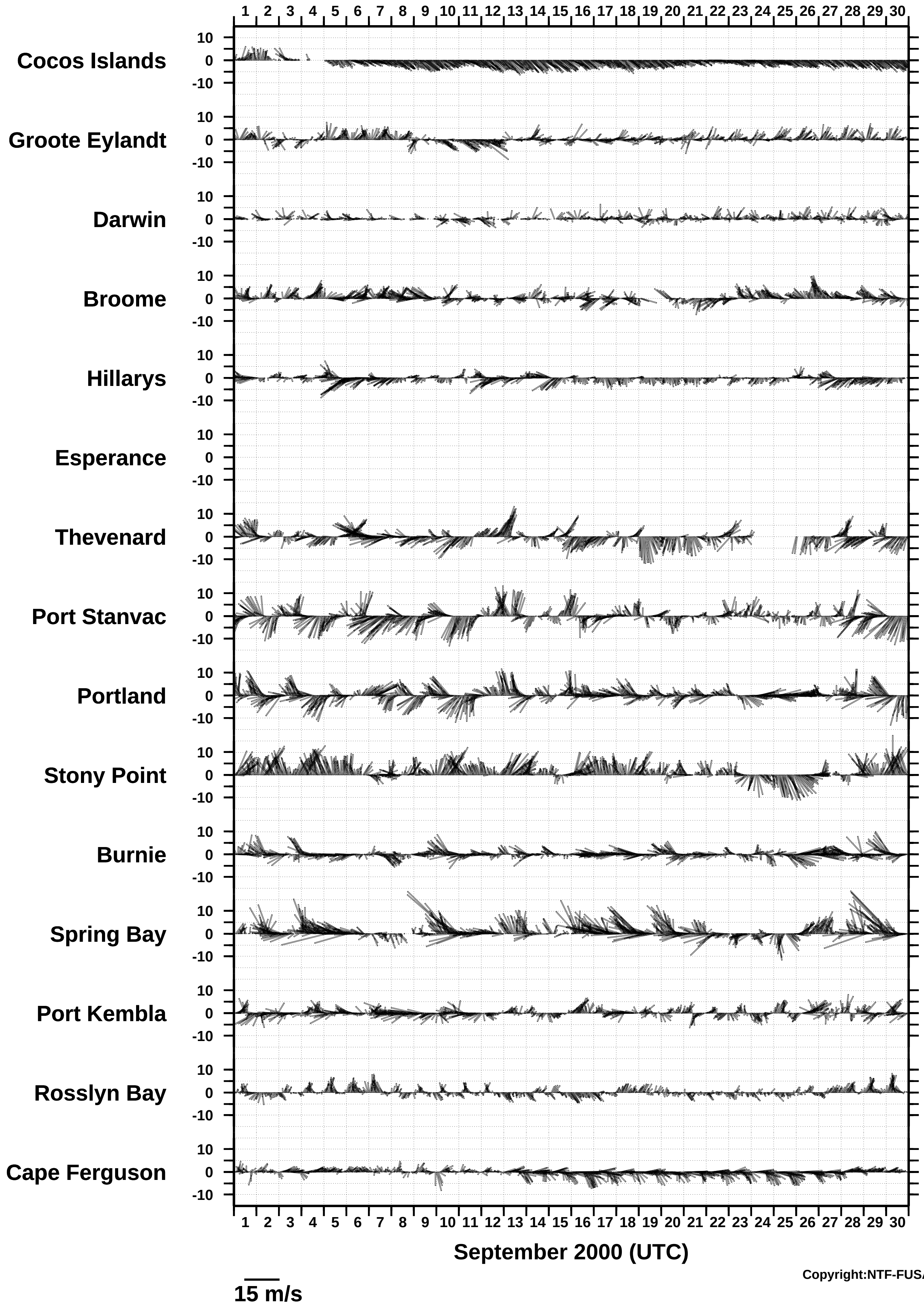


Figure 6

SEPTEMBER 2000
HOURLY MAXIMUM WIND GUSTS FROM SEAFRAME STATIONS (m/s)

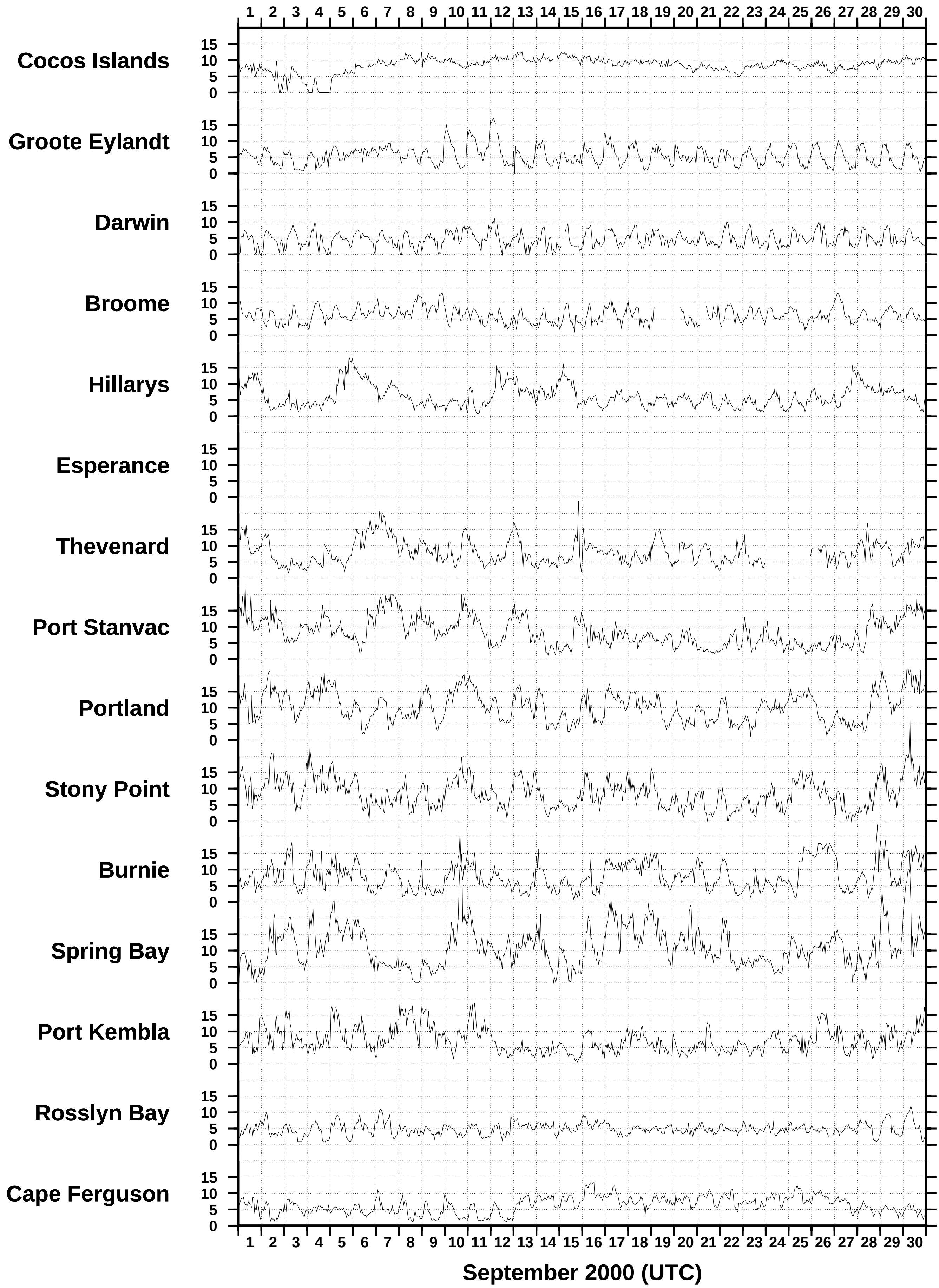


Figure 7

SEPTEMBER 2000
HOURLY AIR TEMPERATURES FROM SEAFRAME STATIONS (deg C)

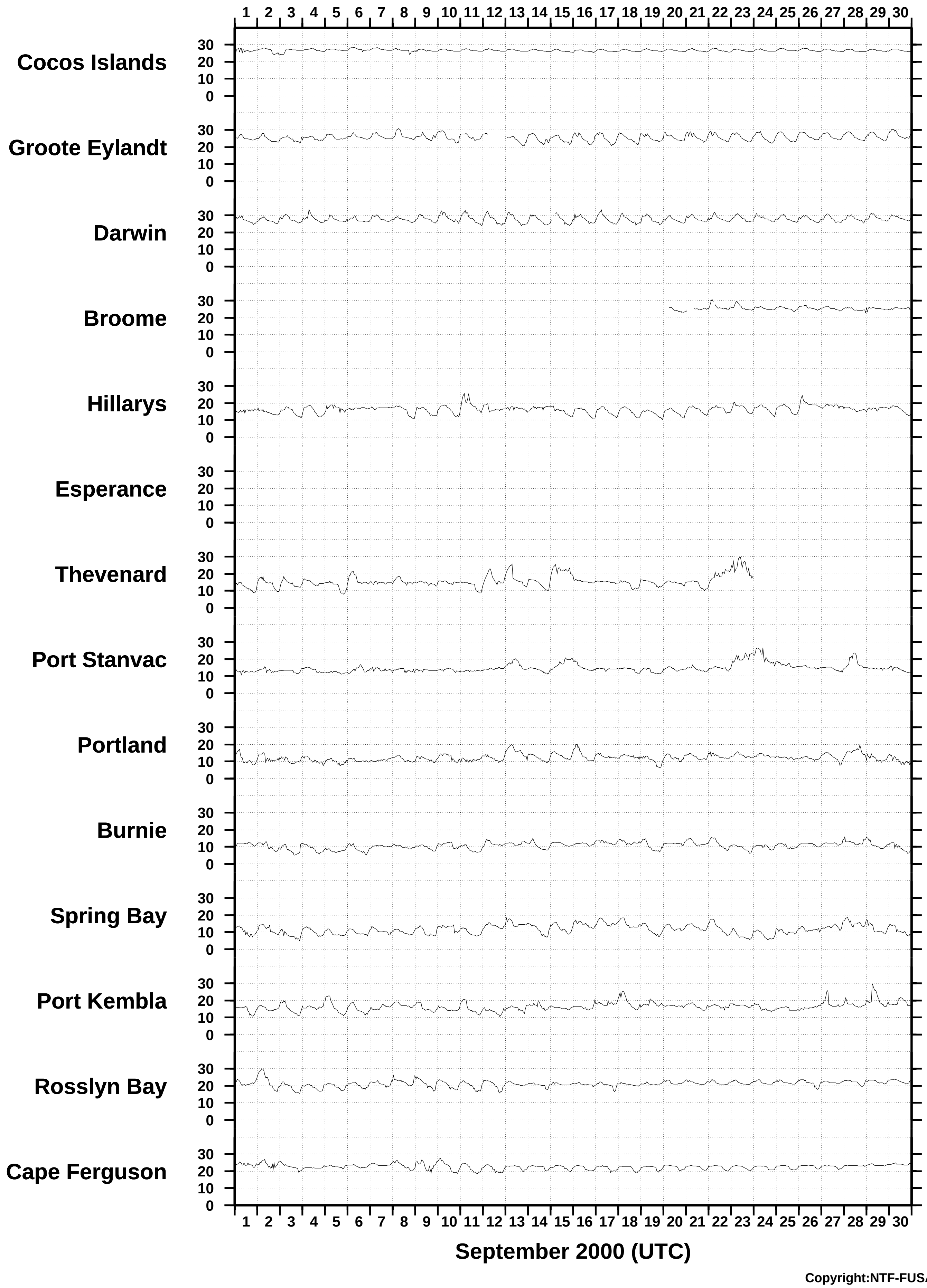


Figure 8

SEPTEMBER 2000
HOURLY WATER TEMPERATURES FROM SEAFRAME STATIONS (deg C)

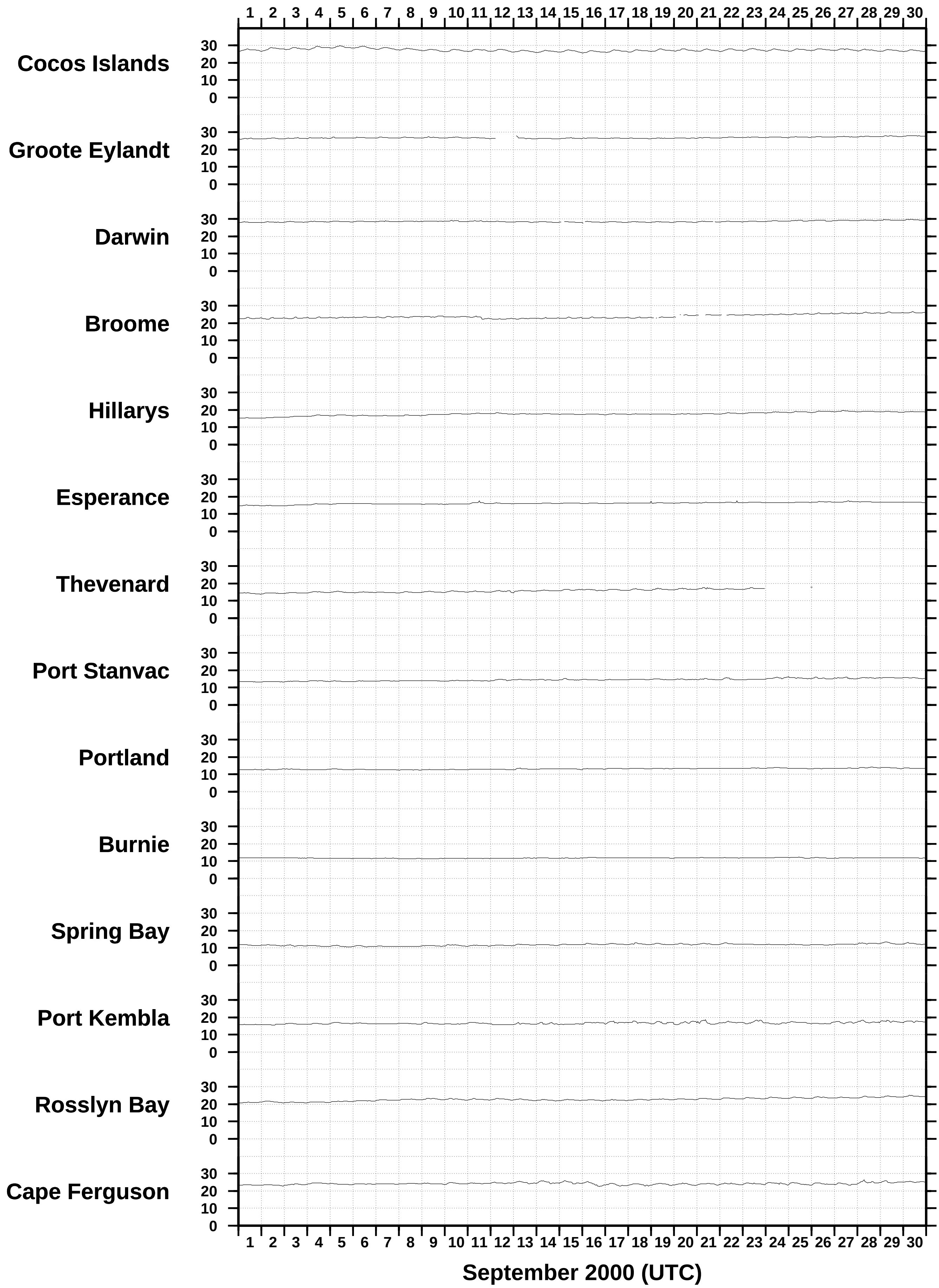


Figure 9

SEPTEMBER 2000
HOURLY ATMOSPHERIC PRESSURE FROM SEAFRAME STATIONS (hPa)

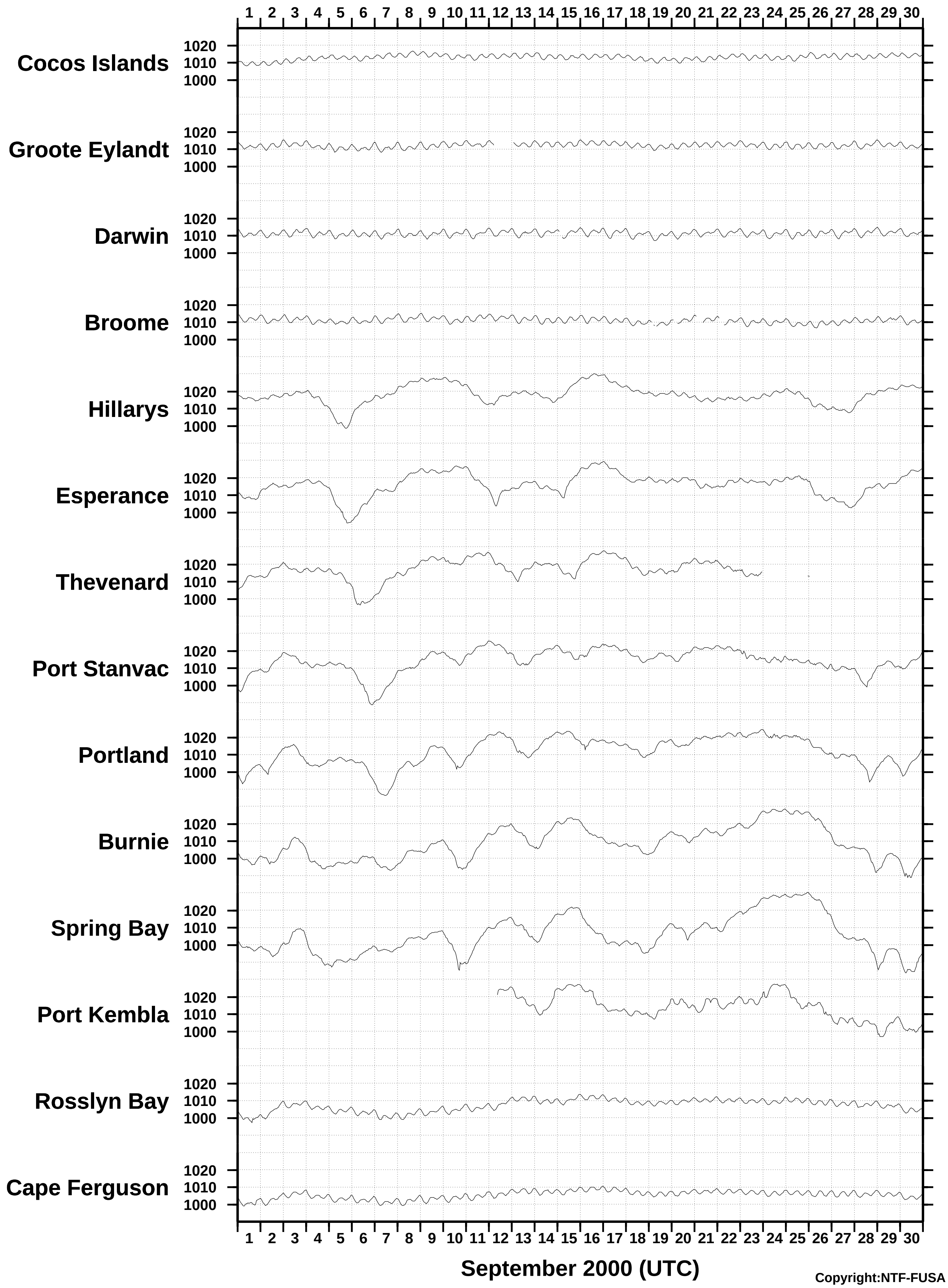


Figure 10

SEA LEVEL ANOMALIES THROUGH SEPTEMBER 2000 (m)

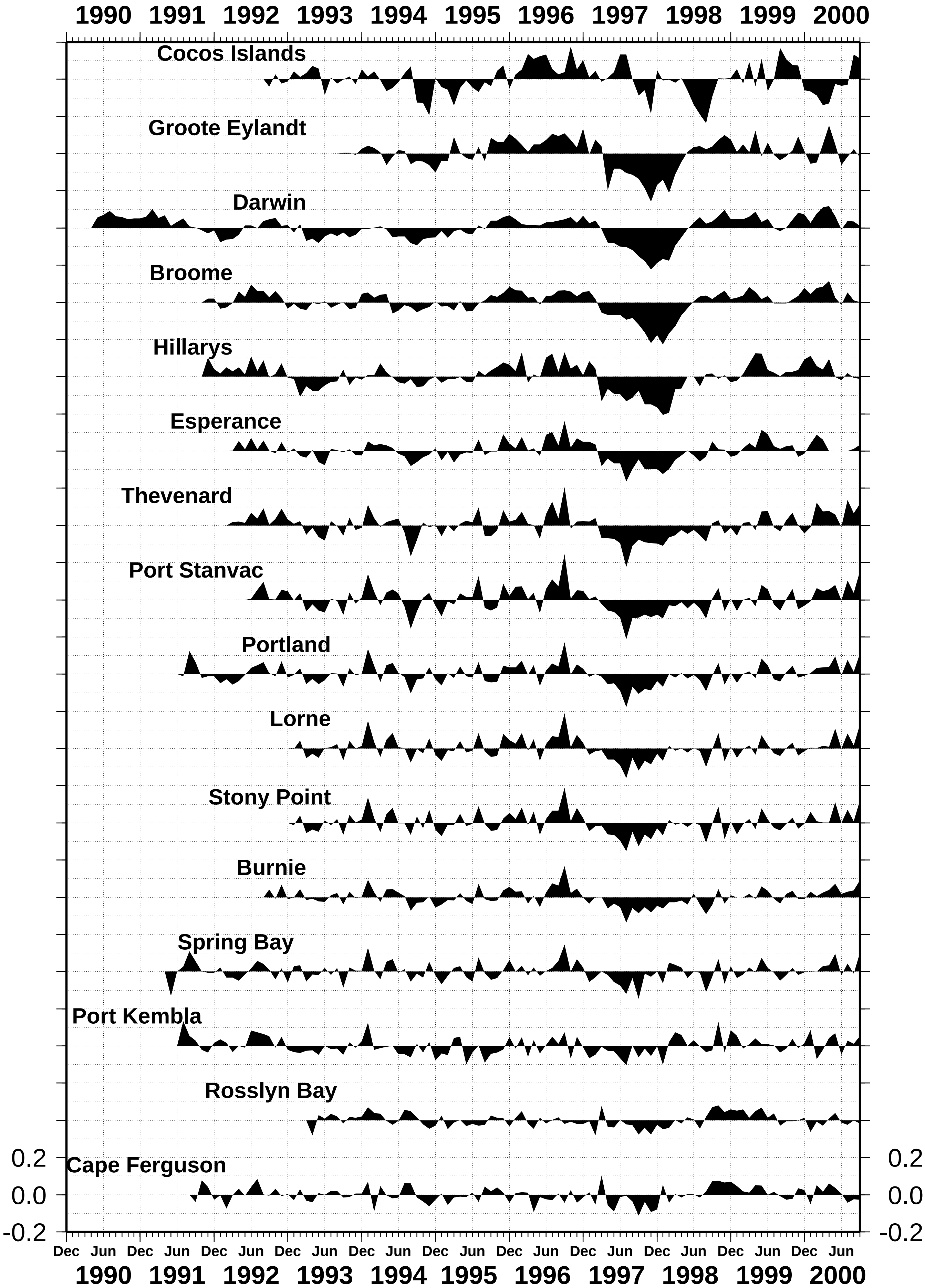


Figure 11

BAROMETRIC PRESSURE ANOMALIES THROUGH SEPTEMBER 2000 (hPa)

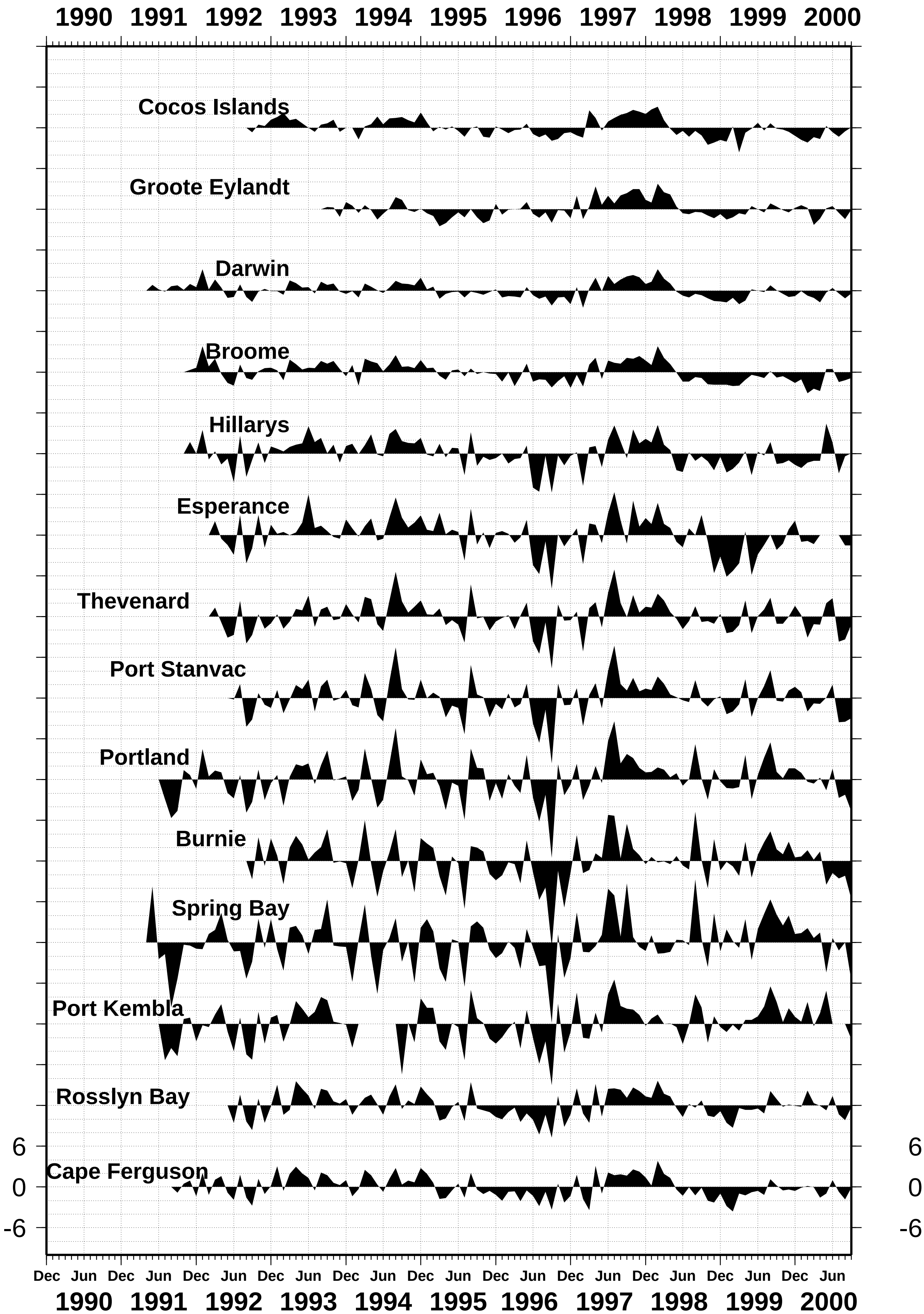


Figure 12

WATER TEMPERATURE
ANOMALIES THROUGH SEPTEMBER 2000 (degC)

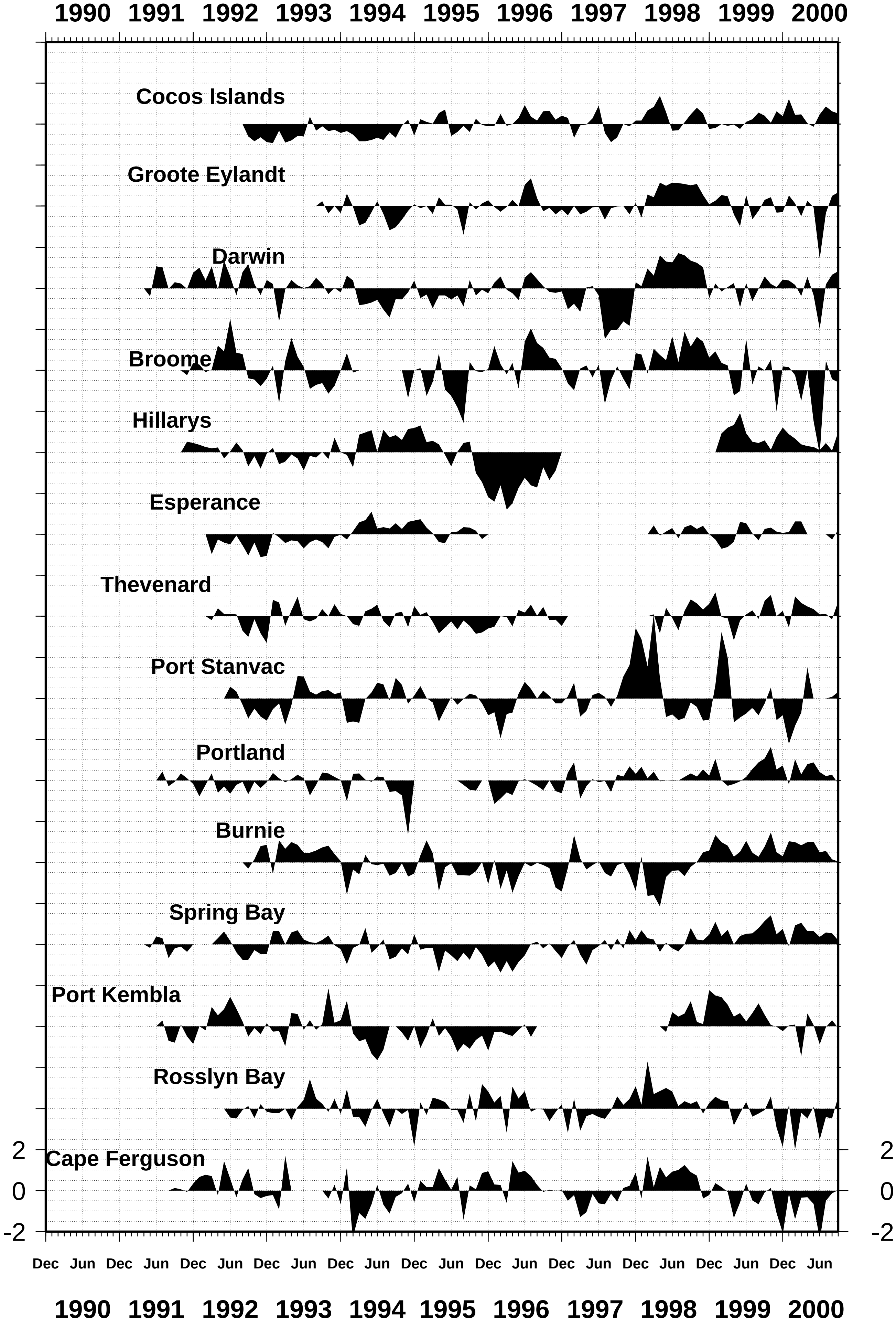


Figure 13

AIR TEMPERATURE ANOMALIES THROUGH SEPTEMBER 2000 (degC)

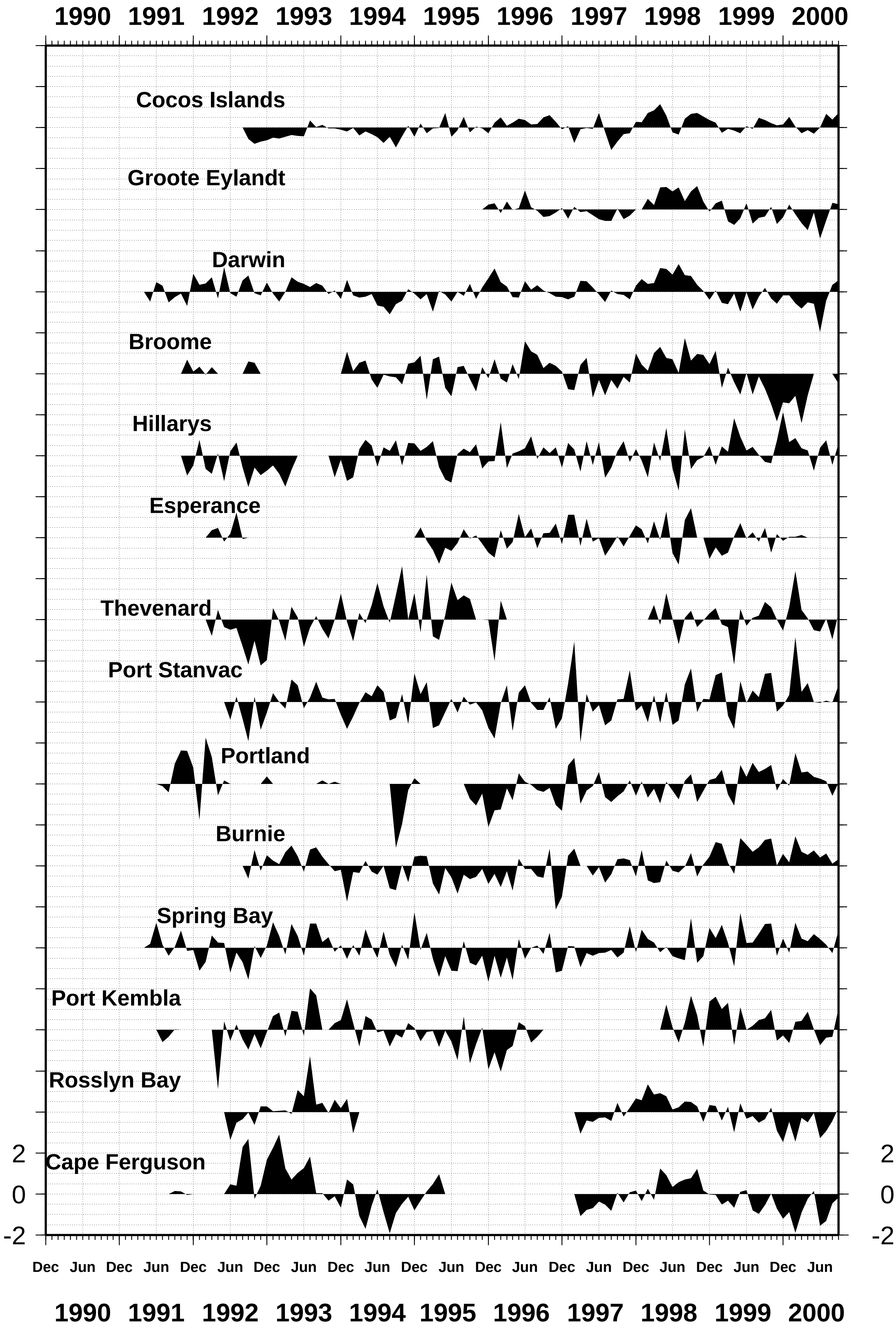
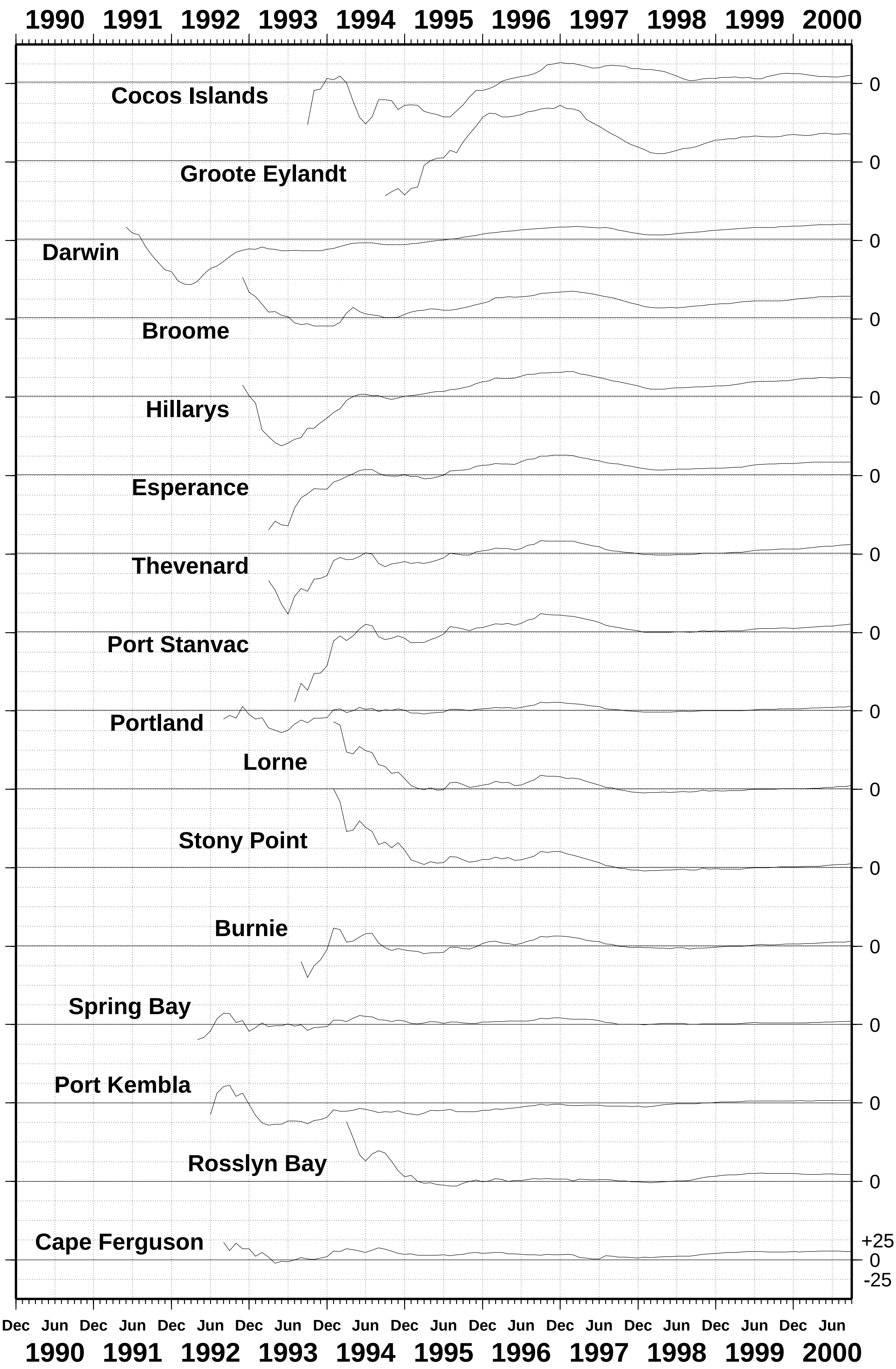


Figure 14

SEA LEVEL TRENDS THROUGH SEPTEMBER 2000 (mm/year)



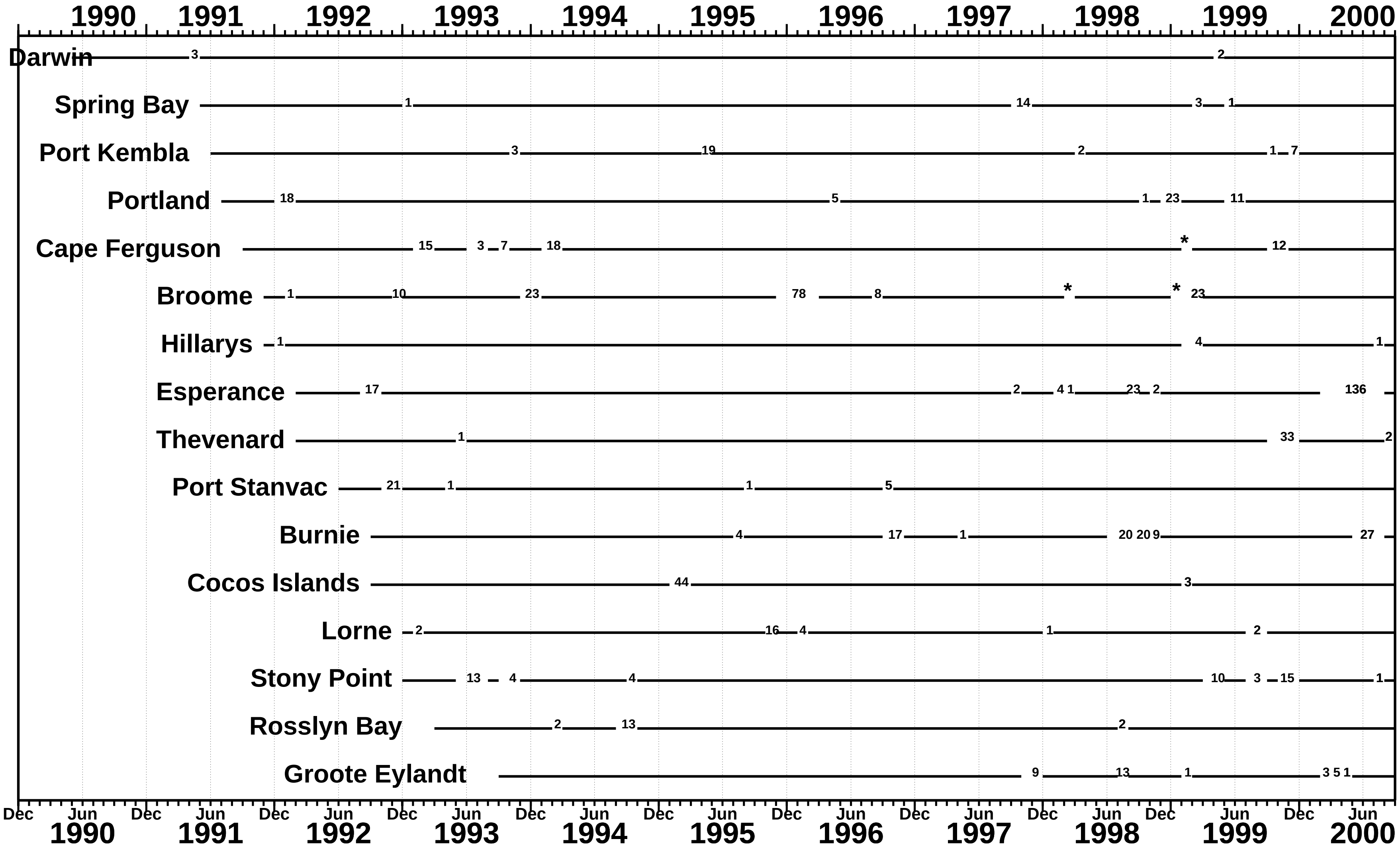


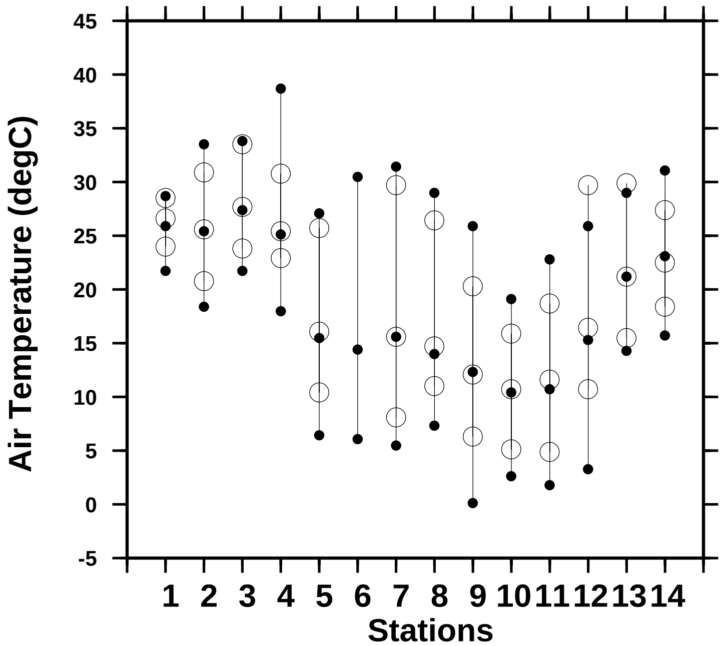
Figure 15

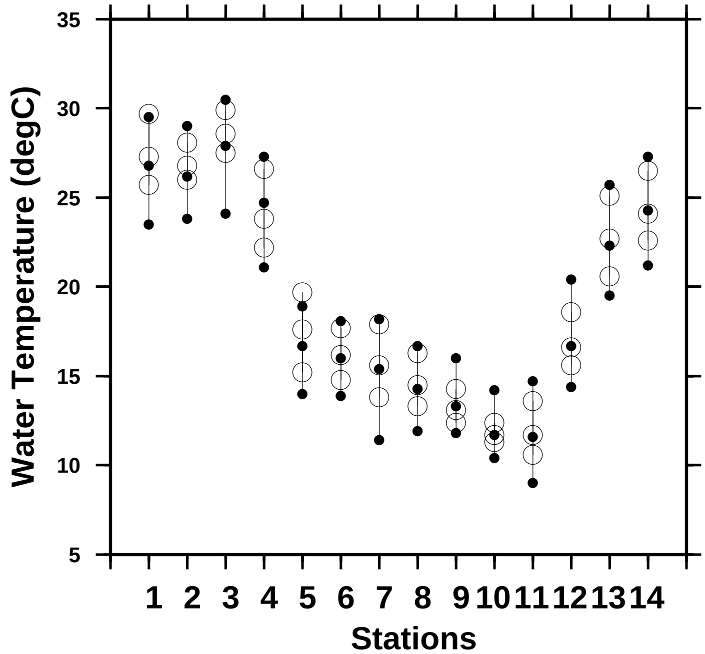
SEA LEVEL DATA RETURN

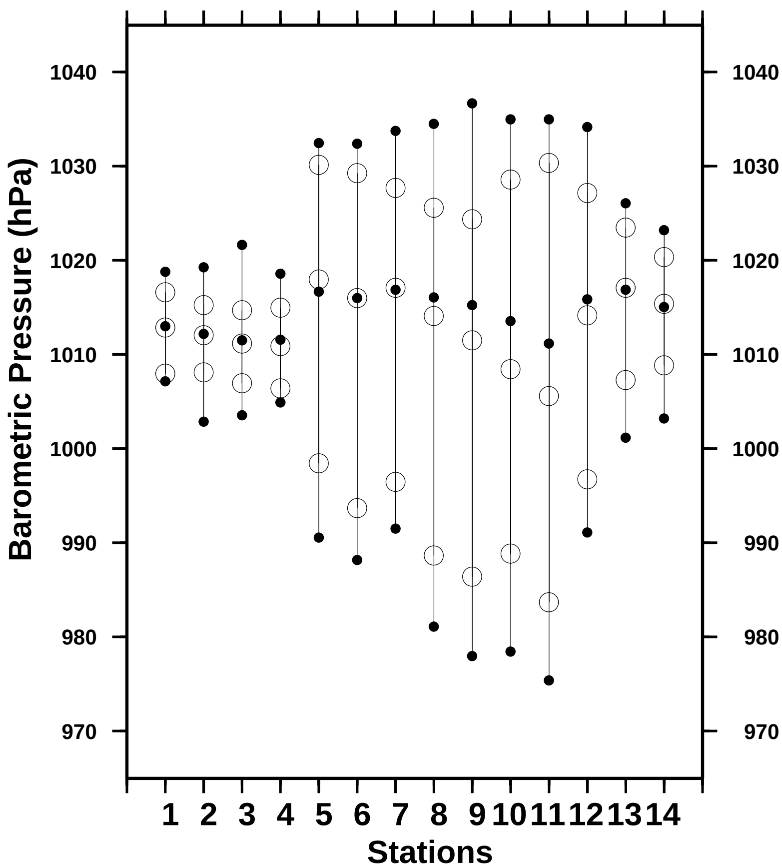
THE NUMBER OF DAYS OF MISSING DATA ARE INDICATED
GAPS INCLUDE TRANSMISSION, POWER AND LOGGER FAILURE
* Patchy record

Figure 16

Comparison of September 2000 Max, Min & Mean with Long Term September 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

September 2000 Maximum
September 2000 Mean
September 2000 Minimum

Long Term September Maximum
Long Term September Mean
Long Term September Minimum

Figure 17

MONTHLY MEAN SEA LEVELS TO SEPTEMBER 2000 (m)

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