THE AUSTRALIAN BASELINE SEA LEVEL MONITORING PROJECT

MONTHLY DATA REPORT

DECEMBER 2000

NOTES ON THE DATA FOR DECEMBER 2000

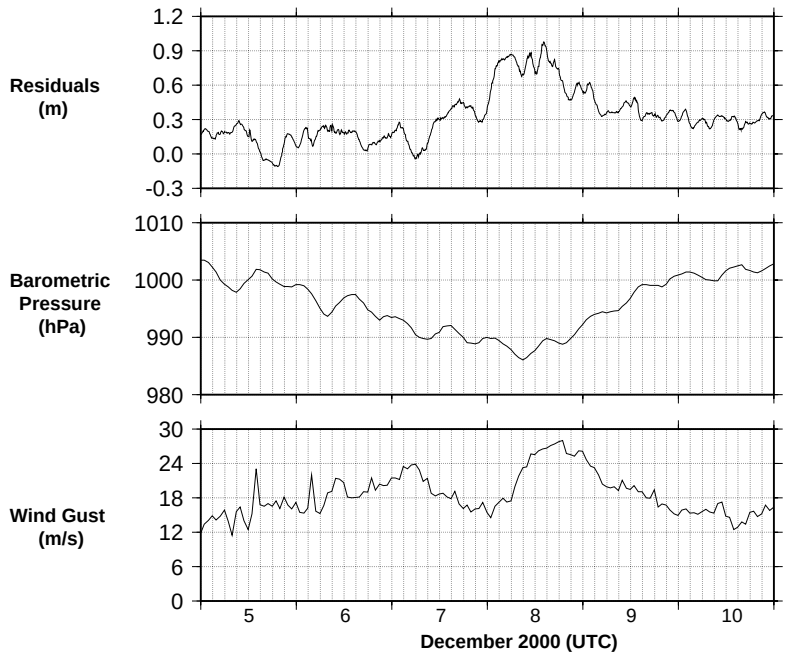
Sea level data return this month was excellent at all stations.

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

Looking at the sea level anomalies this month (Figure 10), the majority of the stations have small anomalies (with the exceptions of Hillarys, which is strongly negative and Port Kembla, which is strongly positive). Sea level anomalies in the south, east of Port Stanvac, are all slightly negative. Of the remaining stations, the majority of the anomalies in the north are all slightly positive, with the exception of Broome, which is slightly negative. Sea level anomalies at Portland, Lorne, Stony Point and Burnie 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. Exceptions are evident in the south for stations east of Port Stanvac. Otherwise, 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. This month the passage of Tropical Cyclone Sam through Broome is clearly evident in the sea level residuals between the 7th and 9th of December. The following plot shows the influence of the cyclone on sea level, barometric pressure and winds in the Broome vicinity.



Residual heights attained during this event were around one metre above average. A corresponding drop in barometric pressure, reaching a low of 986.1hPa, is also evident over the same time scale as the rise in sea level. The maximum wind gust reached during this period was approximately 28m/s.

The track of Tropical Cyclone Sam can be viewed at the following web address. This track was produced by Thomas R. Metcalf. at the University of Hawaii.

http://www.solar.ifa.hawaii.edu/Tropical/GifArchive/SAM-00.gif

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 December 2000 are compared with the long-term December values. These comparisons are shown in Figure 16. Please remember that the long-term ranges are calculated using the historical sets of December data for each station ***excluding*** the current month of data.

The mean barometric pressures for December for all of the stations were slightly lower than the long term December means. Baseline record low barometric pressures were recorded at both Broome (a result of the passage of Tropical Cyclone Sam) and Spring Bay this month.

A similar comparison was made between the long-term spread of December air temperature data and that which occurred this month. There are no significant differences between the long-term December mean and the December 2000 mean at each station. Figure 16 indicates that Baseline record high air temperatures (which were close to the long term maximum) were recorded at Broome and Port Kembla. A Baseline record low was also recorded at Hillarys this month.

The water temperature mean values for December 2000 were quite consistent with the long-term means for all locations (Figure 16). Three of the Baseline stations exhibited record high water temperatures this month (Thevenard, Port Stanvac and Port Kembla). Record lows were recorded at Broome and Portland.

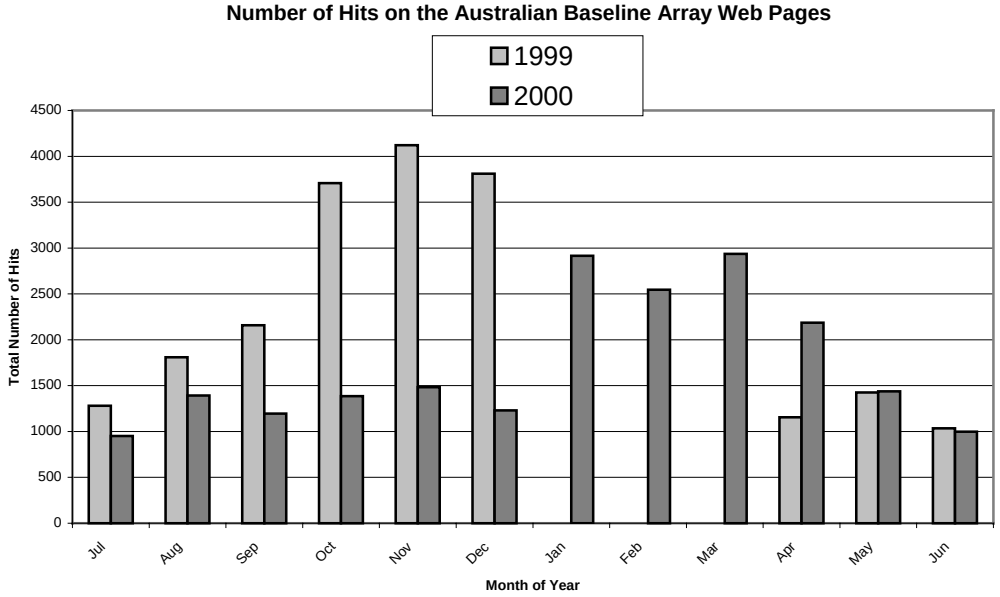
The month of commencement of operation of each gauge is listed in Table 1. Also shown is the short-term sea level trend for the entire record and the change from the previous month's analysis. Figure 14 shows the short-term sea level trends for each station.

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	+9.9	–0.3
Groote Eylandt	Sep 1993	+34.4	+0.5
Darwin	May 1990	+19.2	+0.2
Broome	Nov 1991	+27.4	–0.2
Hillarys	Nov 1991	+23.3	–0.9
Esperance	Mar 1992	+16.3	–0.4
Thevenard	Mar 1992	+11.4	–0.2
Port Stanvac	Jun 1992	+9.9	–0.1
Portland	Jul 1991	+5.1	+0.0
Lorne	Jan 1993	+4.0	+0.2
Stony Point	Jan 1993	+4.3	+0.2
Burnie	Sep 1992	+5.8	+0.0
Spring Bay	May 1991	+3.6	+0.4
Port Kembla	Jul 1991	+3.7	+0.7
Rosslyn Bay	Jun 1992	+8.9	+0.1
Cape Ferguson	Sep 1991	+10.7	+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 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

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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

DECEMBER 2000
SIX MINUTE OBSERVATIONS FROM SEAFRAME STATIONS (m)

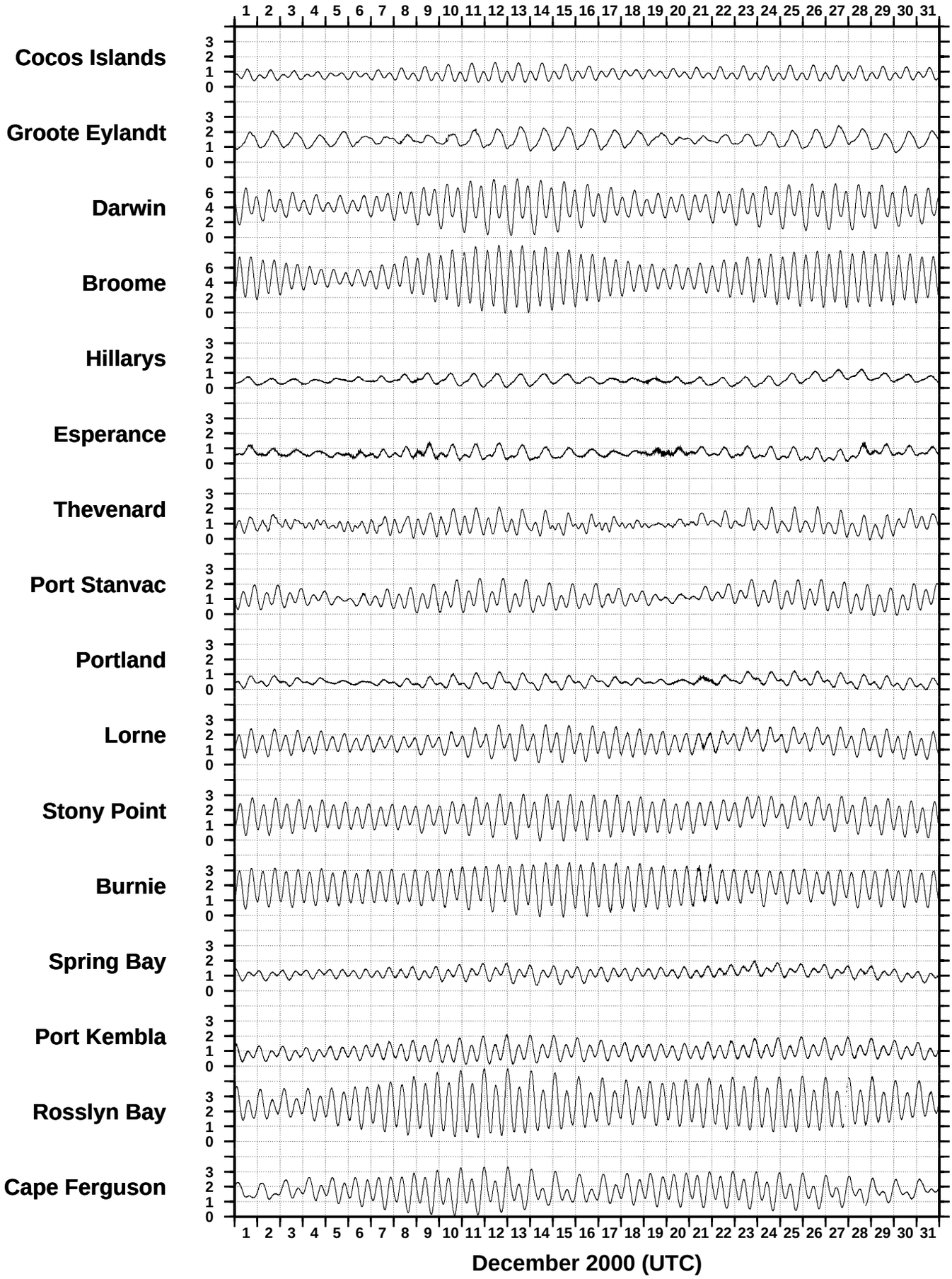

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Figure 2

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

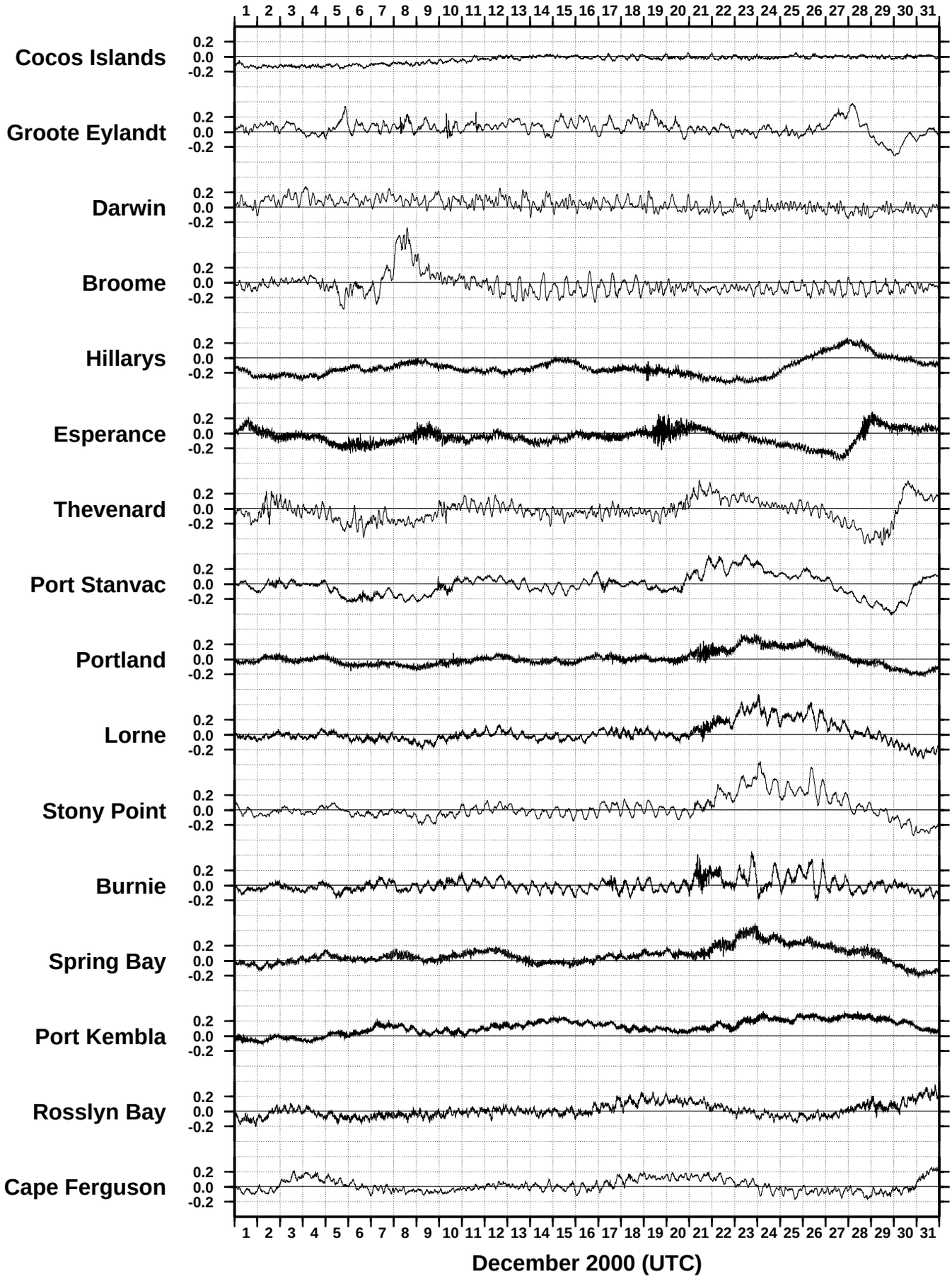

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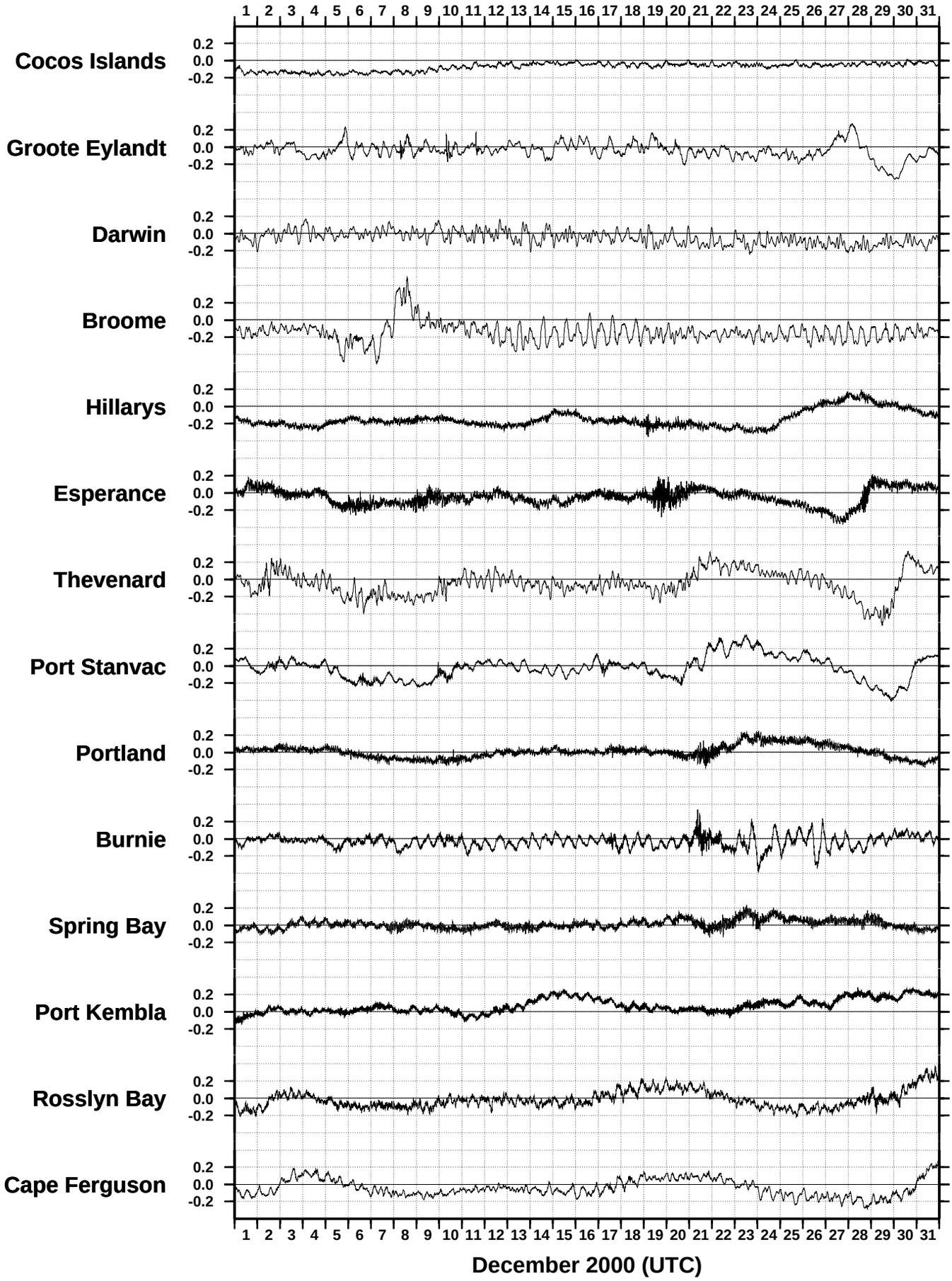
Figure 3

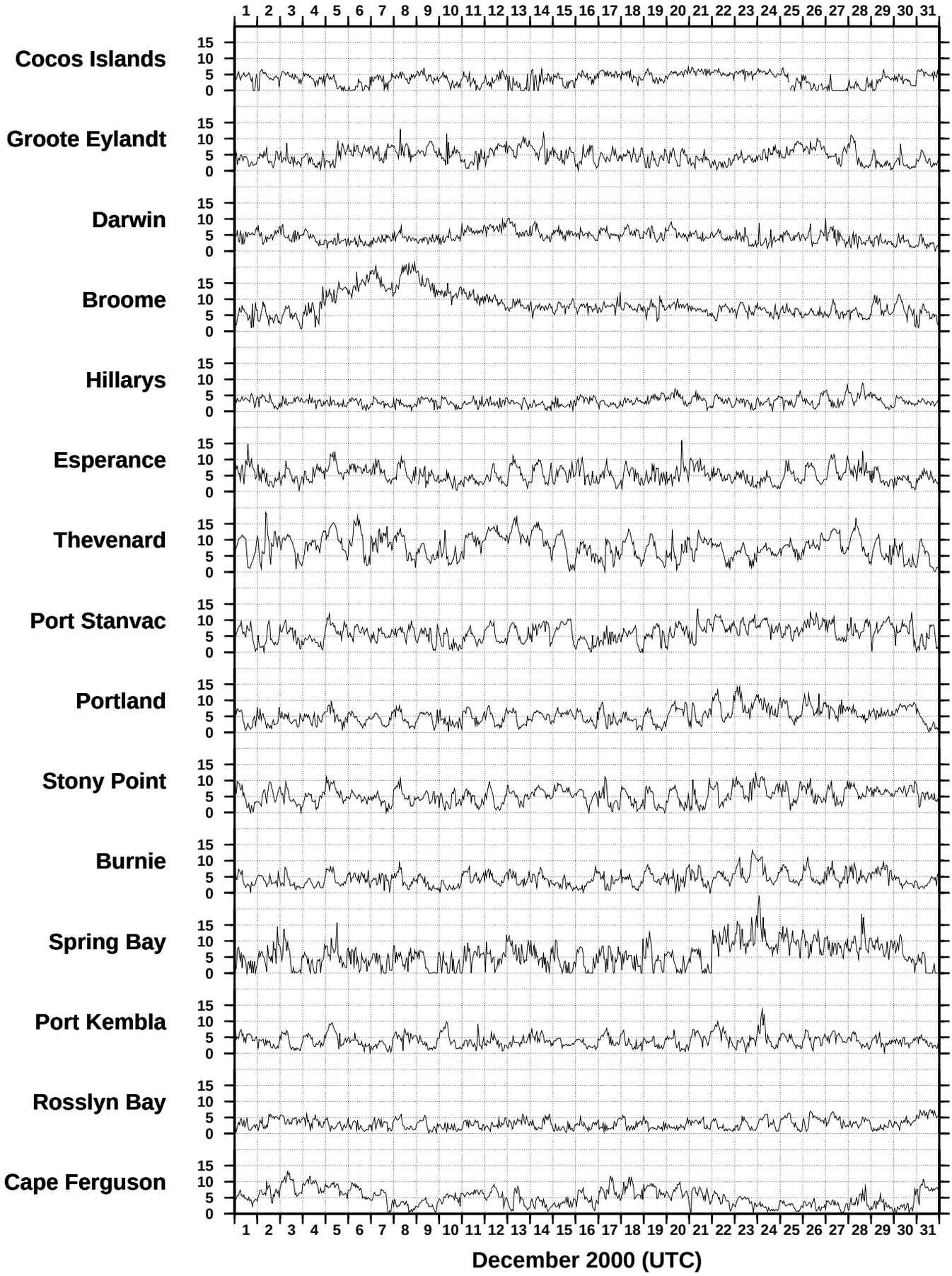
DECEMBER 2000
RESIDUALS AT SIX MINUTE INTERVALS FROM SEAFRAME STATIONS (m)
ADJUSTED FOR ATMOSPHERIC PRESSURE



Copyright:NTF-FUSA

Figure 4

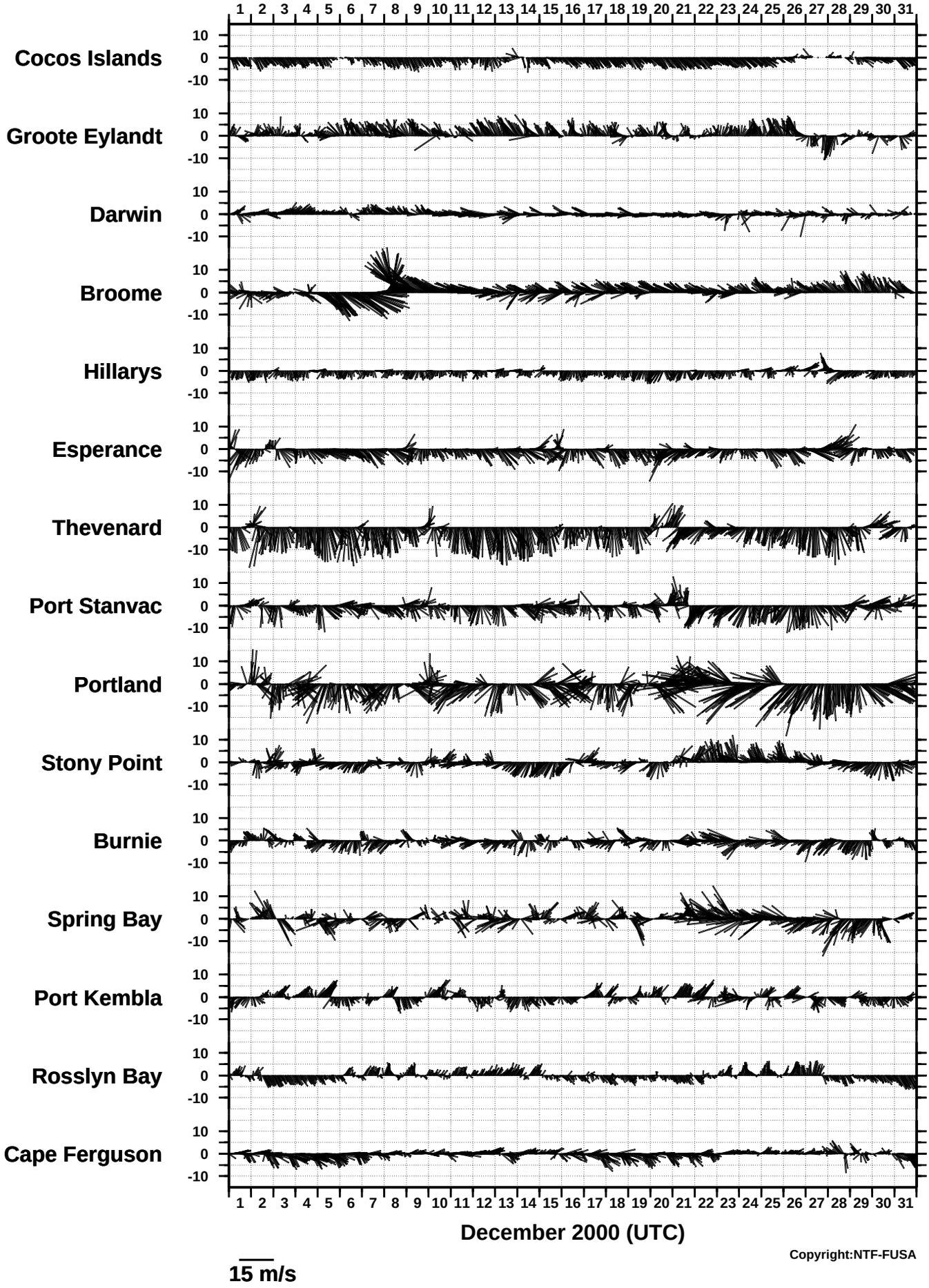
DECEMBER 2000
HOURLY WIND SPEEDS FROM SEAFRAME STATIONS (m/s)



Copyright:NTF-FUSA

Figure 5

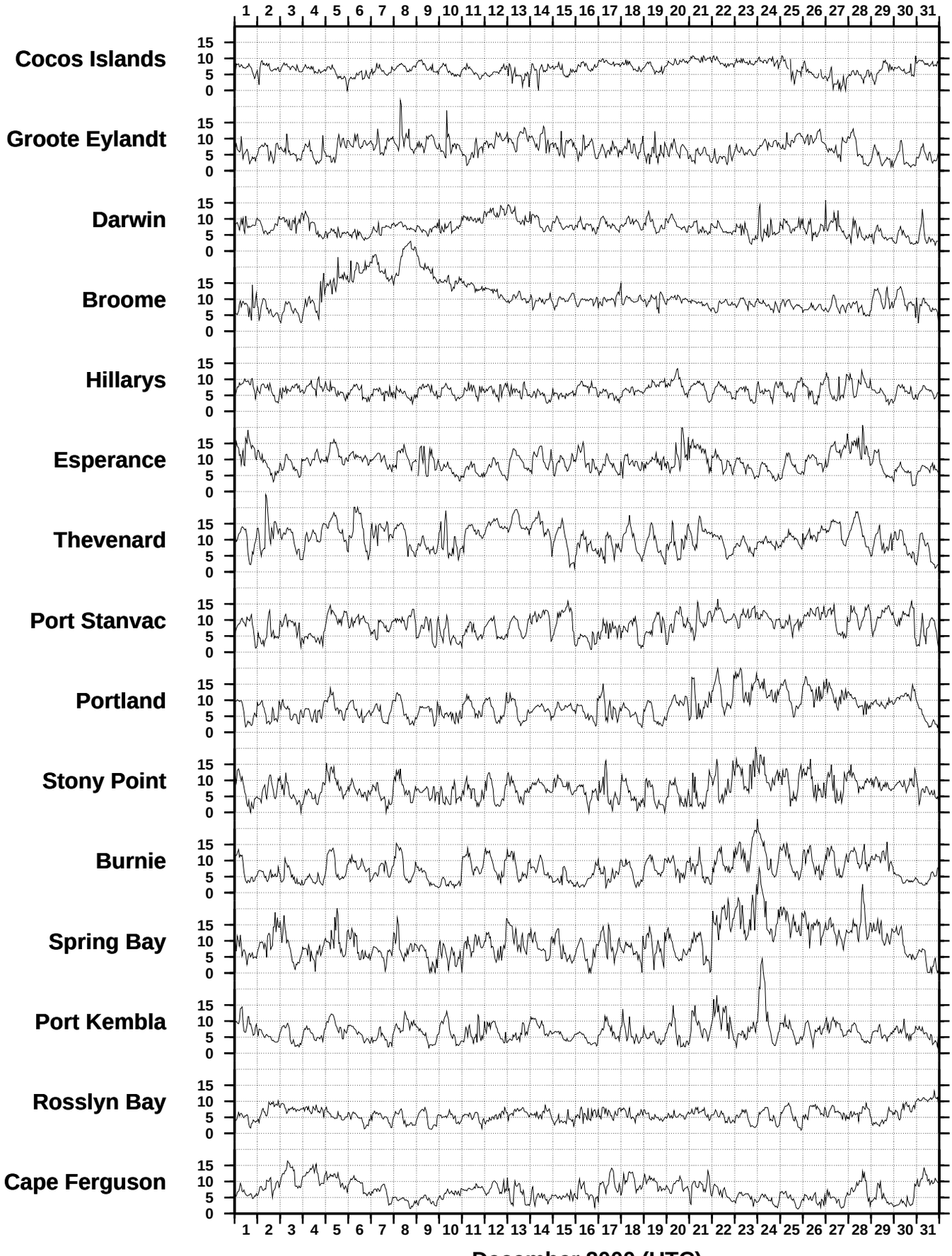
DECEMBER 2000
HOURLY INCIDENT WINDS FROM SEAFRAME STATIONS (m/s, deg True)



Copyright:NTF-FUSA

Figure 6

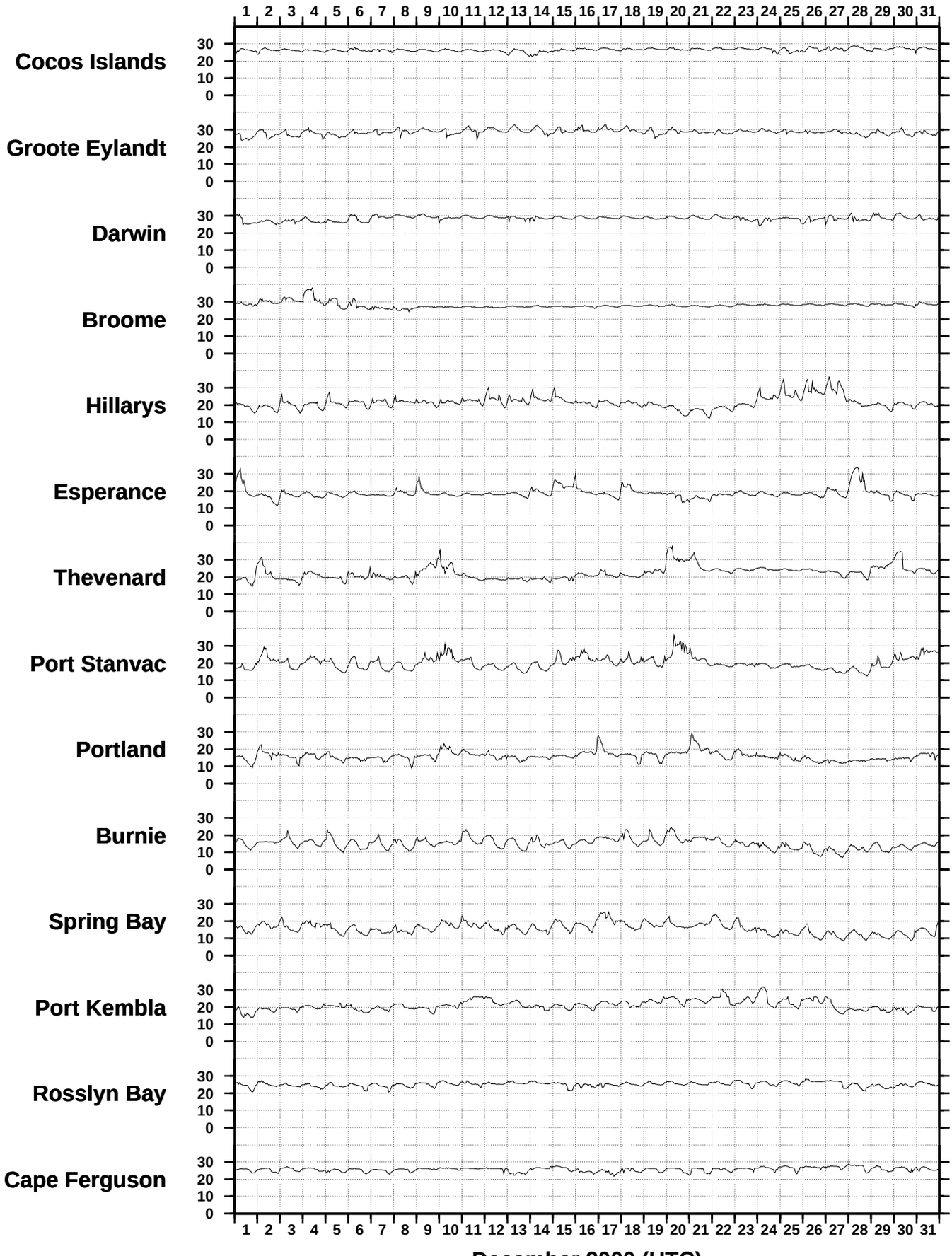
DECEMBER 2000
HOURLY MAXIMUM WIND GUSTS FROM SEAFRAME STATIONS (m/s)



Copyright:NTF-FUSA

Figure 7

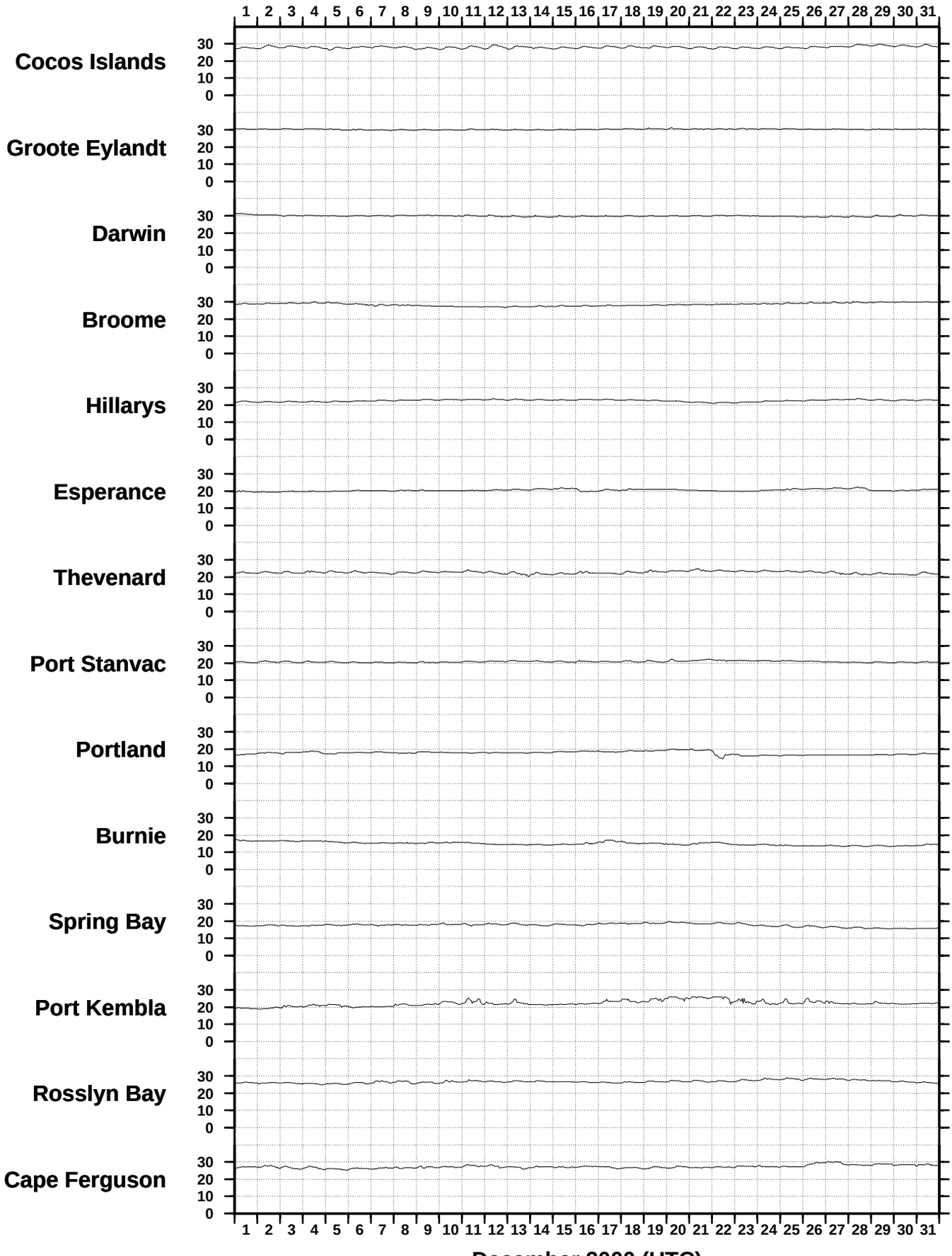
DECEMBER 2000
HOURLY AIR TEMPERATURES FROM SEAFRAME STATIONS (deg C)



Copyright:NTF-FUSA

Figure 8

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



Copyright:NTF-FUSA

Figure 9

DECEMBER 2000
HOURLY ATMOSPHERIC PRESSURE FROM SEAFRAME STATIONS (hPa)

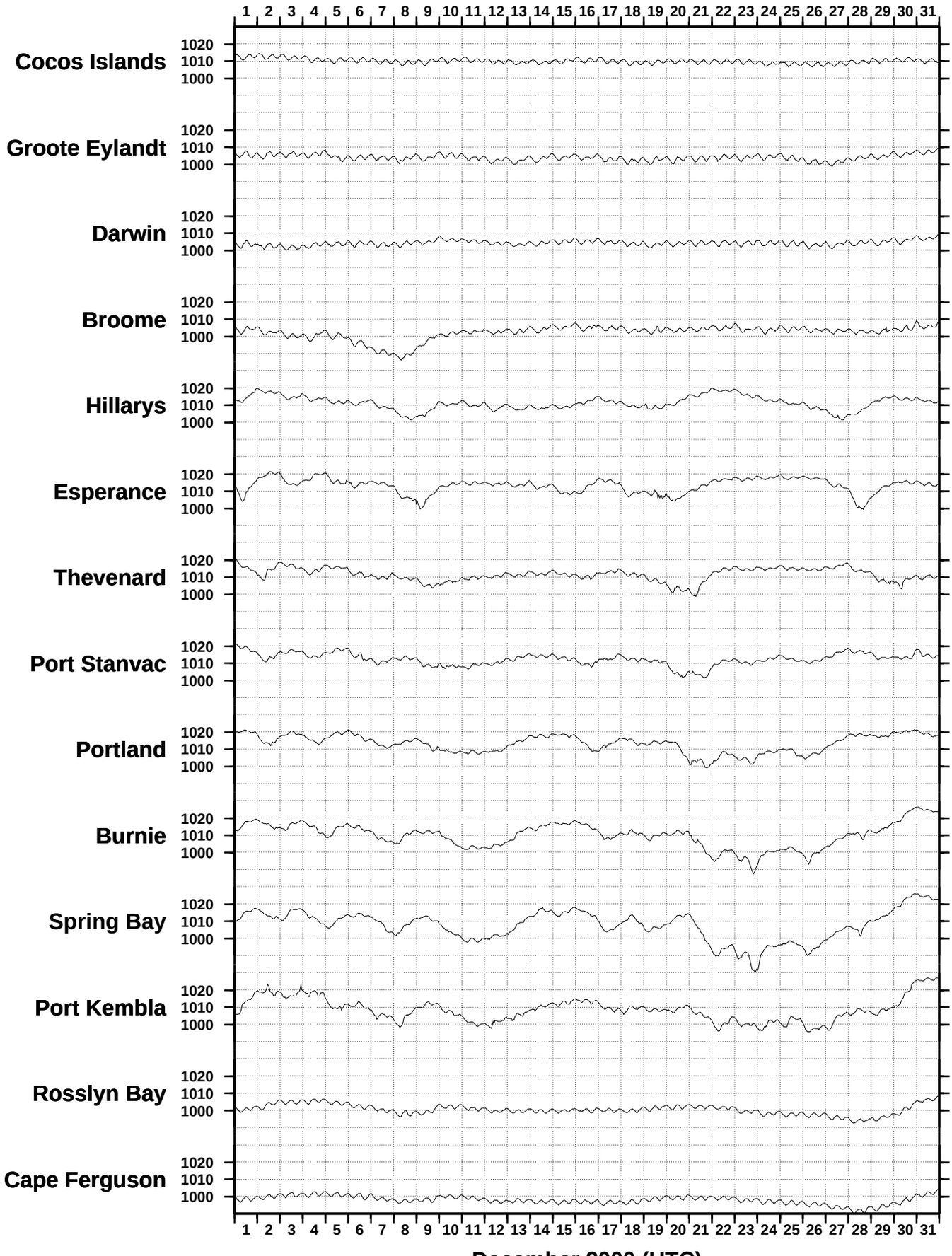


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Figure 10

SEA LEVEL ANOMALIES THROUGH DECEMBER 2000 (m)

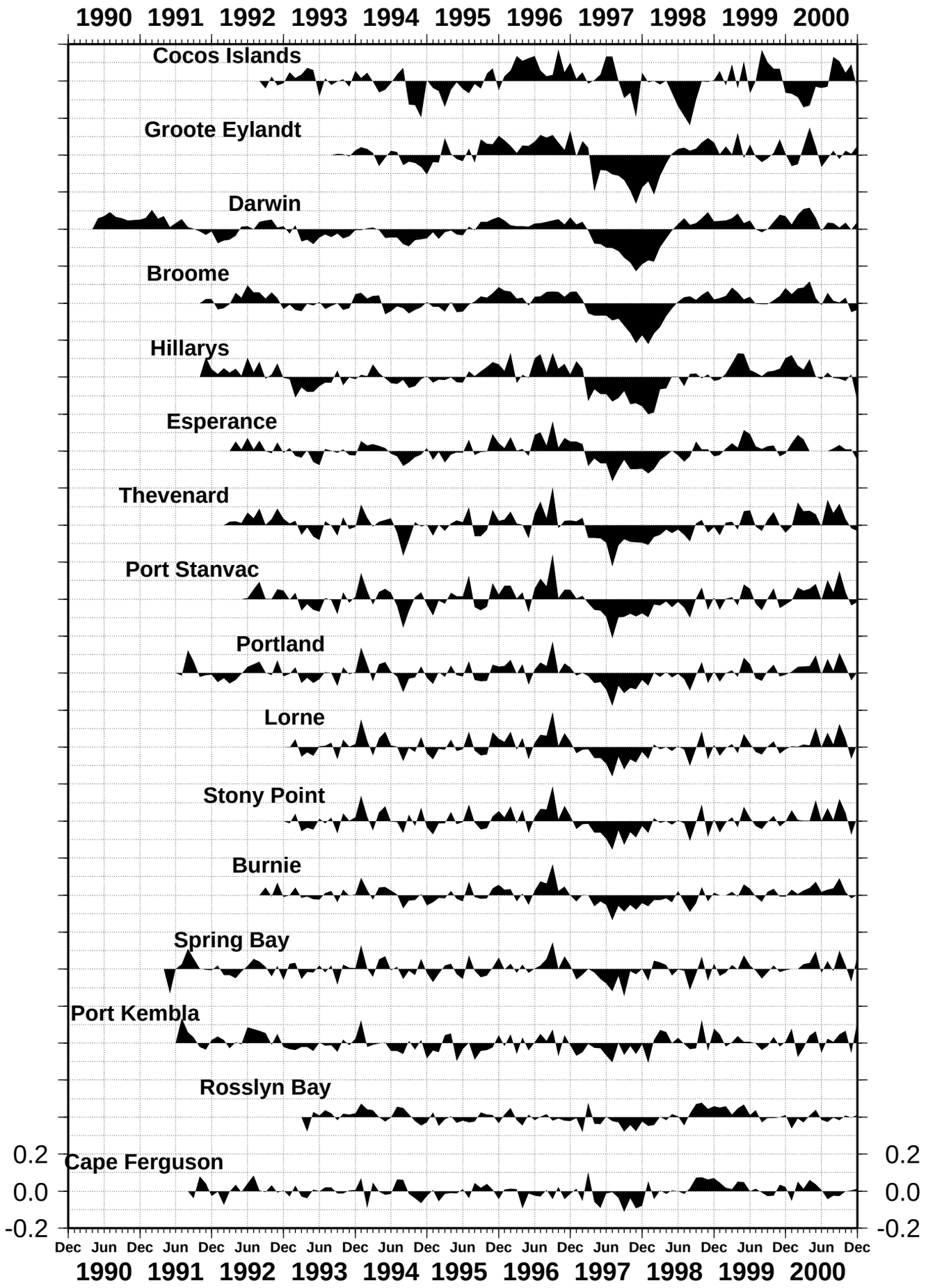

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Figure 11

BAROMETRIC PRESSURE ANOMALIES THROUGH DECEMBER 2000 (hPa)

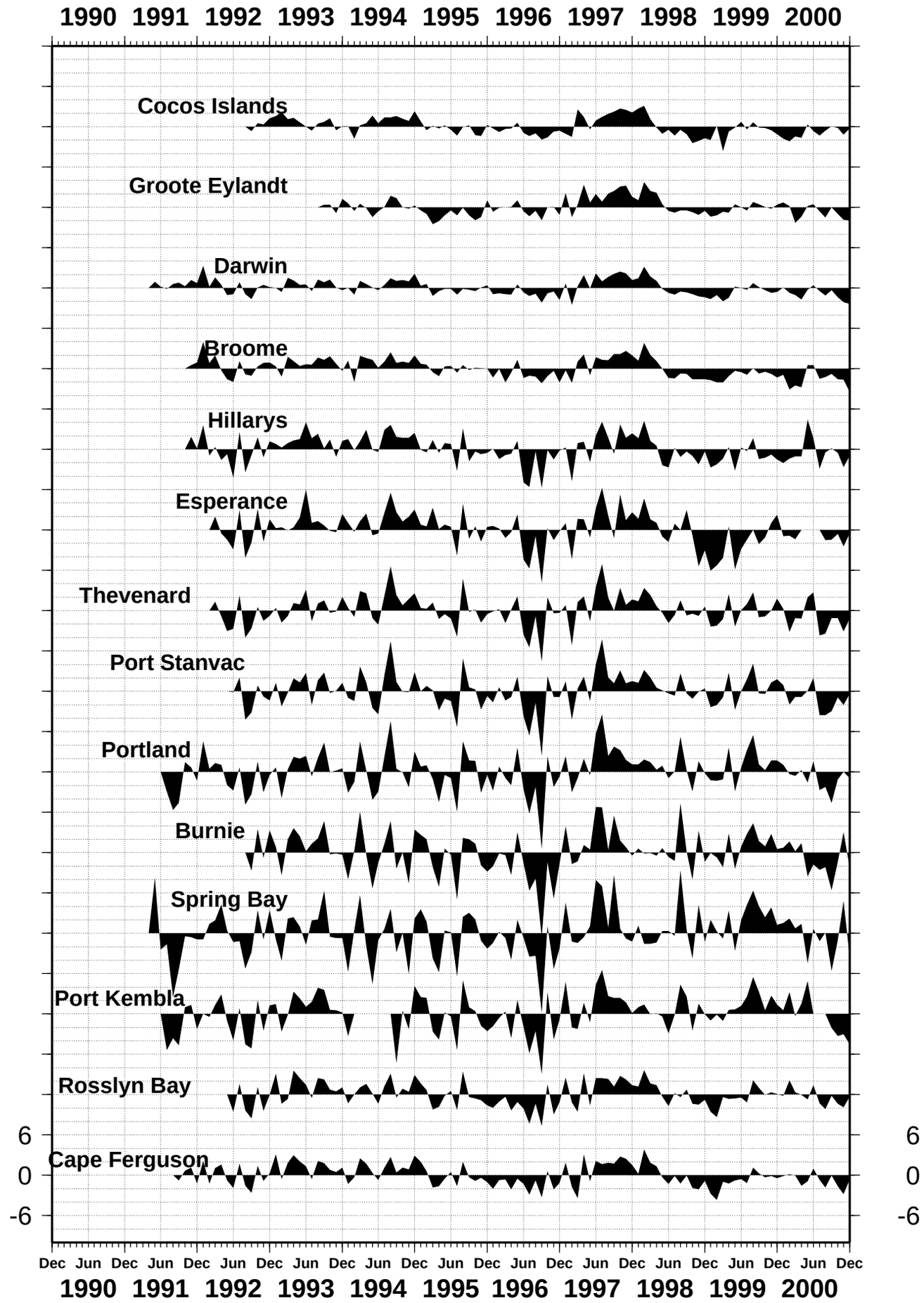

Figure 12

WATER TEMPERATURE ANOMALIES THROUGH DECEMBER 2000 (degC)

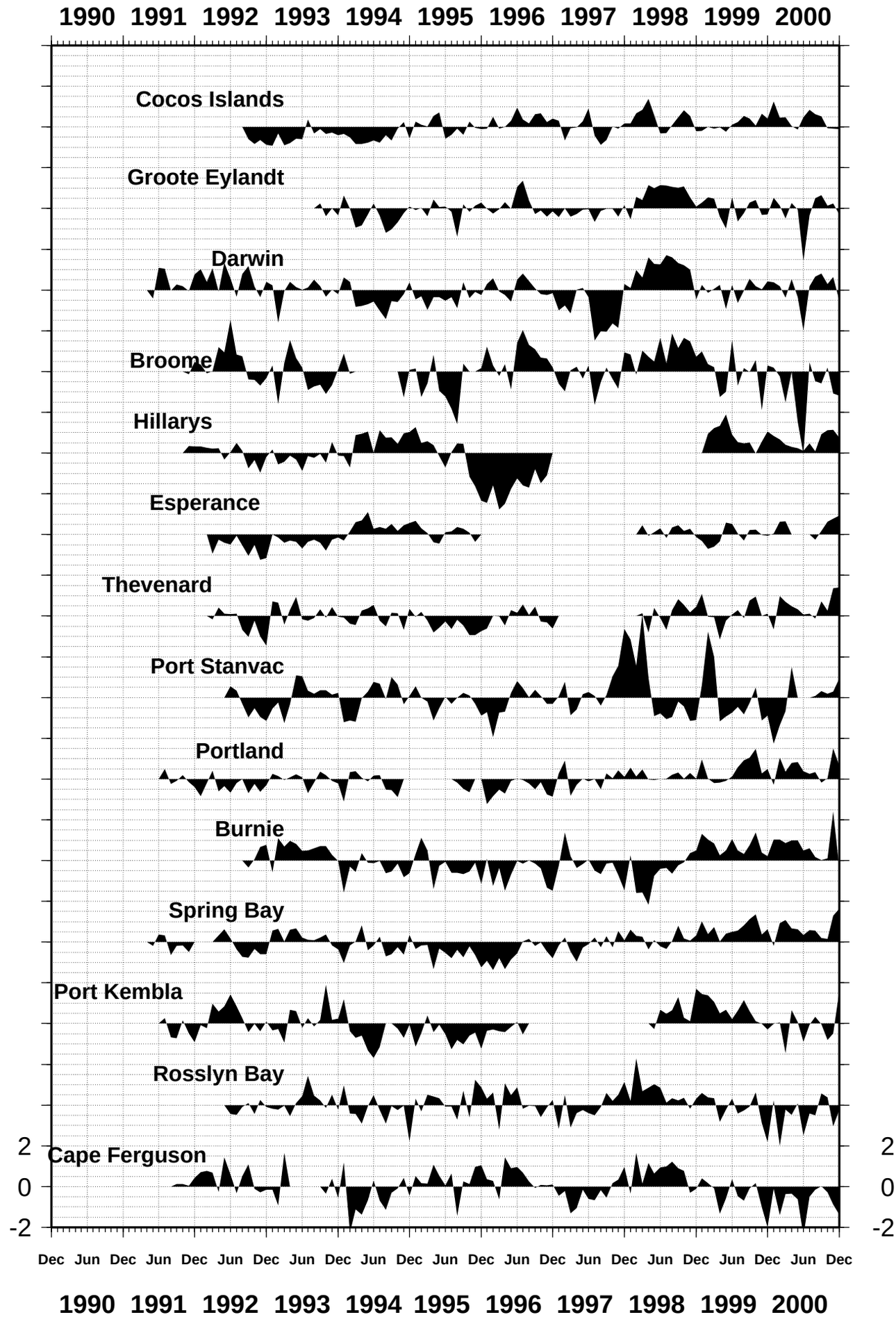

Figure 13

AIR TEMPERATURE ANOMALIES THROUGH DECEMBER 2000 (degC)

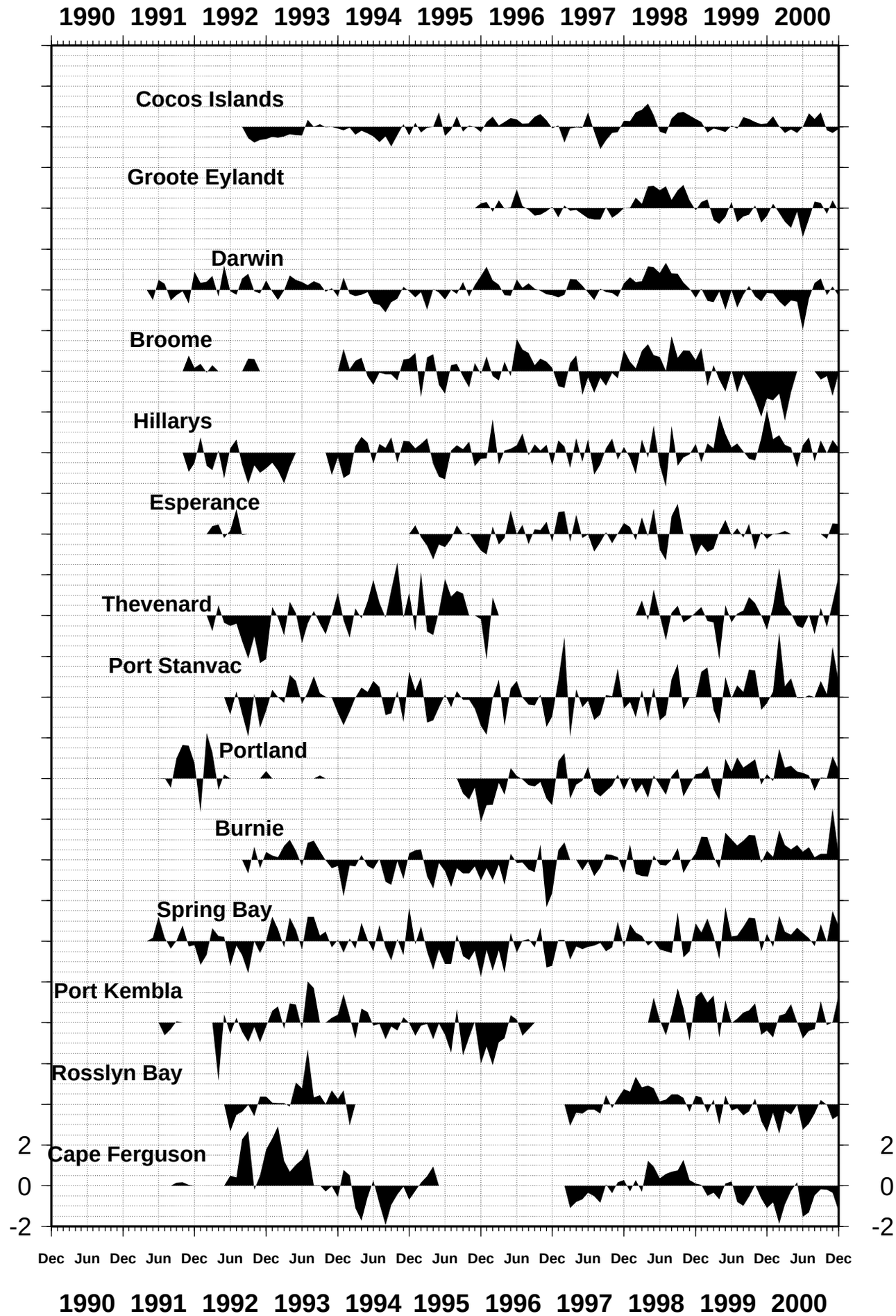

Figure 14

SEA LEVEL TRENDS THROUGH DECEMBER 2000 (mm/year)

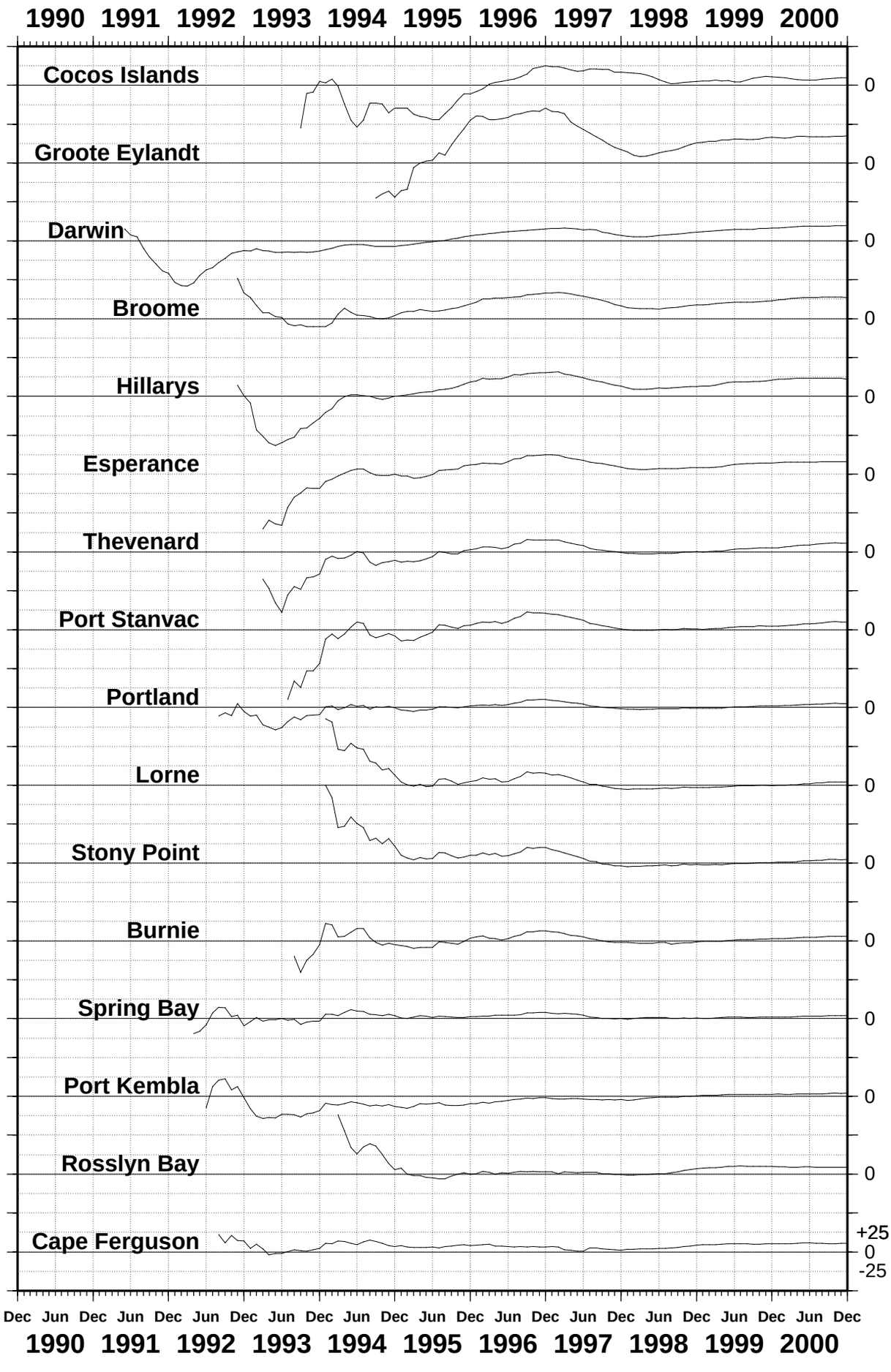

Figure 15

SEA LEVEL DATA RETURN

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

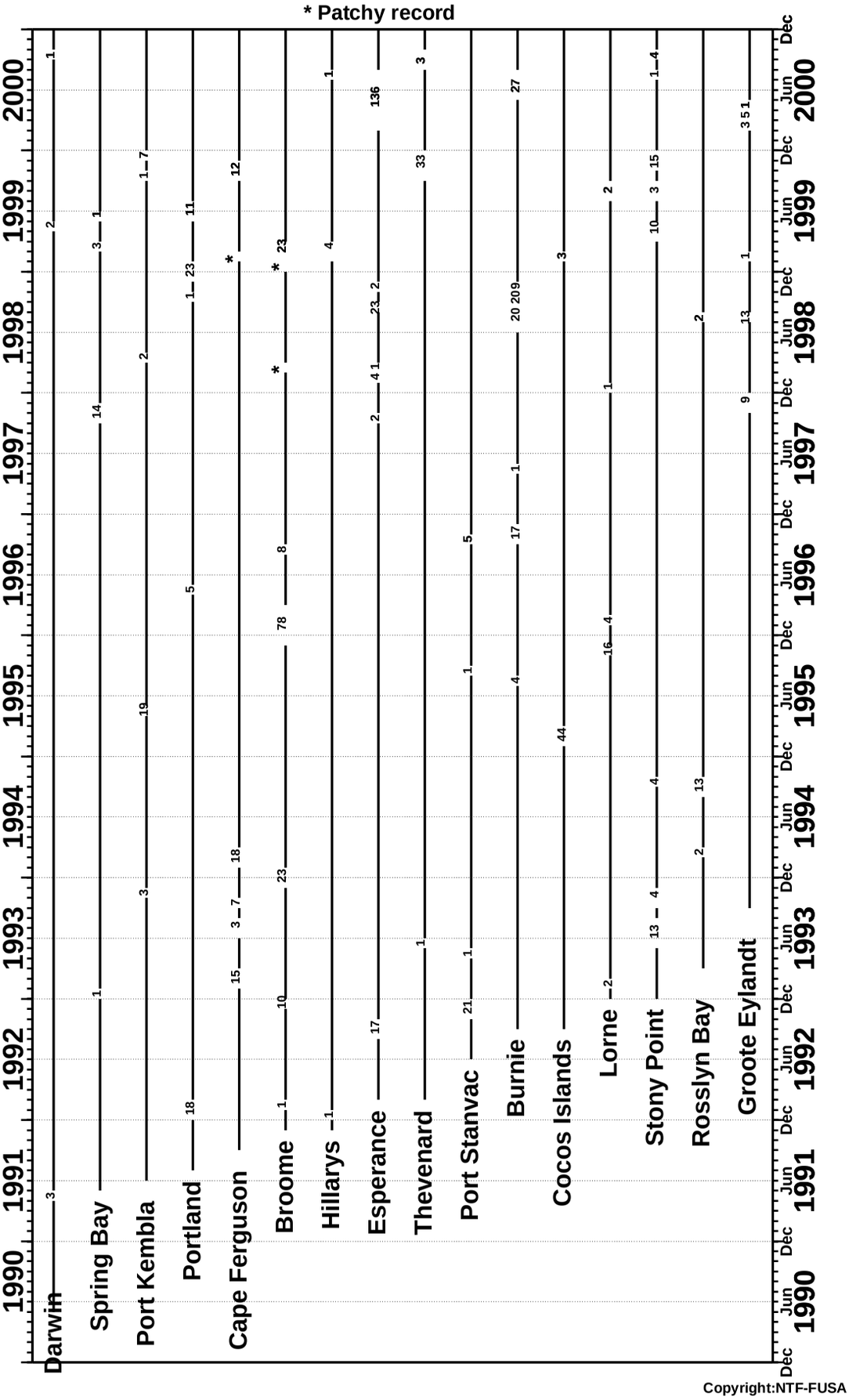

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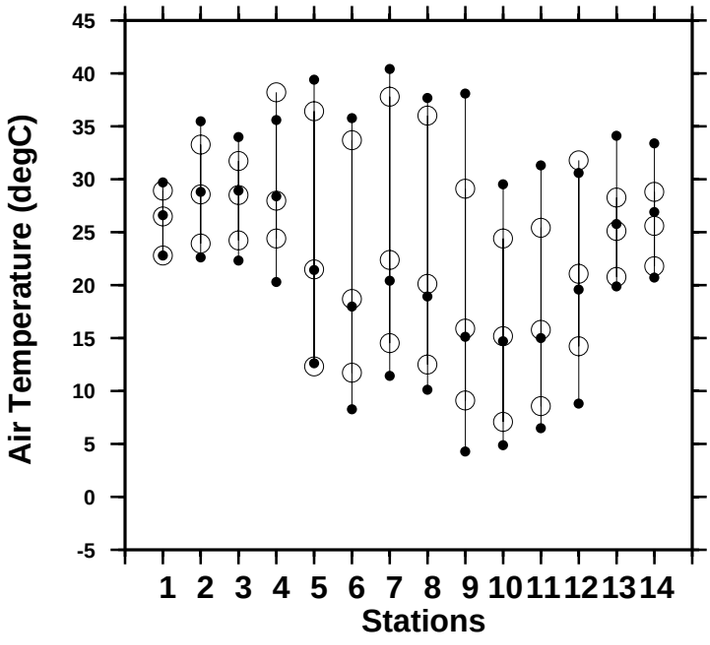
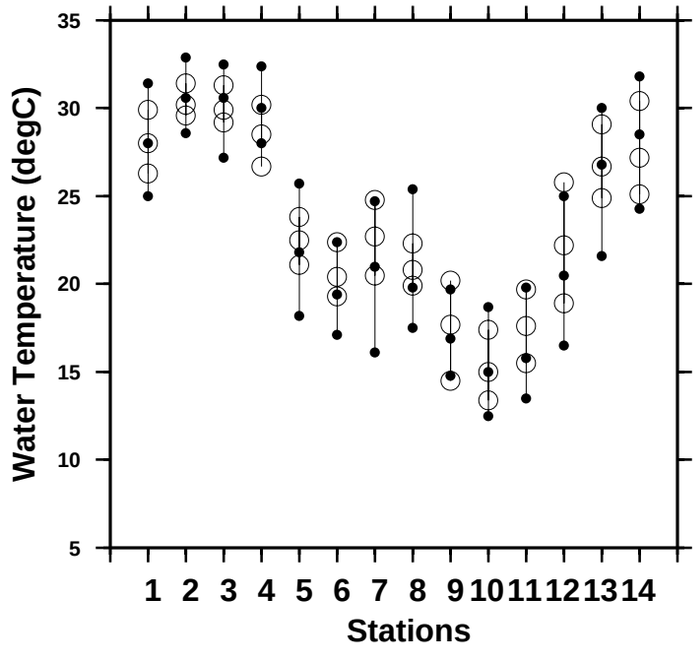
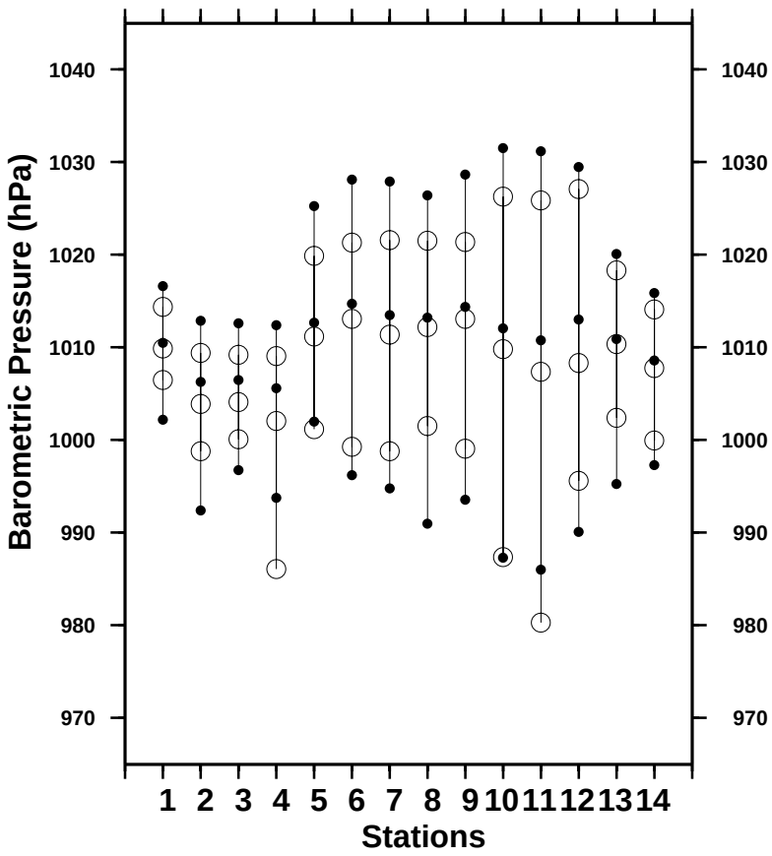
Figure 16

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

December 2000 Maximum
December 2000 Mean
December 2000 Minimum

Long Term December Maximum
Long Term December Mean
Long Term December Minimum

Figure 17

MONTHLY MEAN SEA LEVELS TO DECEMBER 2000 (m)

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