THE AUSTRALIAN BASELINE SEA LEVEL MONITORING PROJECT

MONTHLY DATA REPORT

DECEMBER 2001

This project was prepared under the Australian Greenhouse Science Project for the Australian Greenhouse Office, supported by NTF Australia at the Flinders University of South Australia.

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Quality Certification:

I authorise the issue of this Australian Baseline Sea Level Monitoring Project Monthly Data Report for December 2001 in accordance with National Tidal Facility Australia Quality Assurance procedures.

Wolfgang Scherer
Director - National Tidal Facility Australia

The Australian Baseline Sea Level Monitoring Project

Monthly Data Report

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NOTES ON THE DATA FOR DECEMBER 2001

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

The Broome primary water temperature sensor remains faulty and the backup water temperature again was used. The Thevenard air temperature sensor remains faulty and the data has consequently been removed from the record.

Looking at the sea level anomalies this month (Figure 10), the majority of the stations have small anomalies and are close to zero.

Overall, the barometric pressure anomalies, presented in Figure 11, correlate reasonably well with the sea level anomalies for most stations. Strongly positive sea level anomalies correspond to strongly negative barometric pressure anomalies as would be expected. A correlation for December is difficult to discern due to the small sea level anomalies this month.

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.

A fault was identified in the Stony Point wind speed and wind gust data logging software that resulted in zero values being recorded. The zero data were treated as erroneous and removed, resulting in the Stony Point gaps in Figures 5 and 6.

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 temperature data at the Baseline stations.

Figure 16 compares the mean, maximum and minimum values for air temperature, water temperature and barometric pressure for the current month with the long-term December values. 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 air temperature for December 2001 was consistent with the long term December means. A record maximum air temperature of 33.5 was recorded at Cocos Islands this month. Failure of the sensor at Thevenard meant that no comparison could be made.

The water temperatures recorded at all sites for December 2001 were quite consistent with the long-term values. No comparison was possible for Broome as a result of the sensor failure.

The barometric pressures were quite consistent with the long-term values at all sites for December 2001.

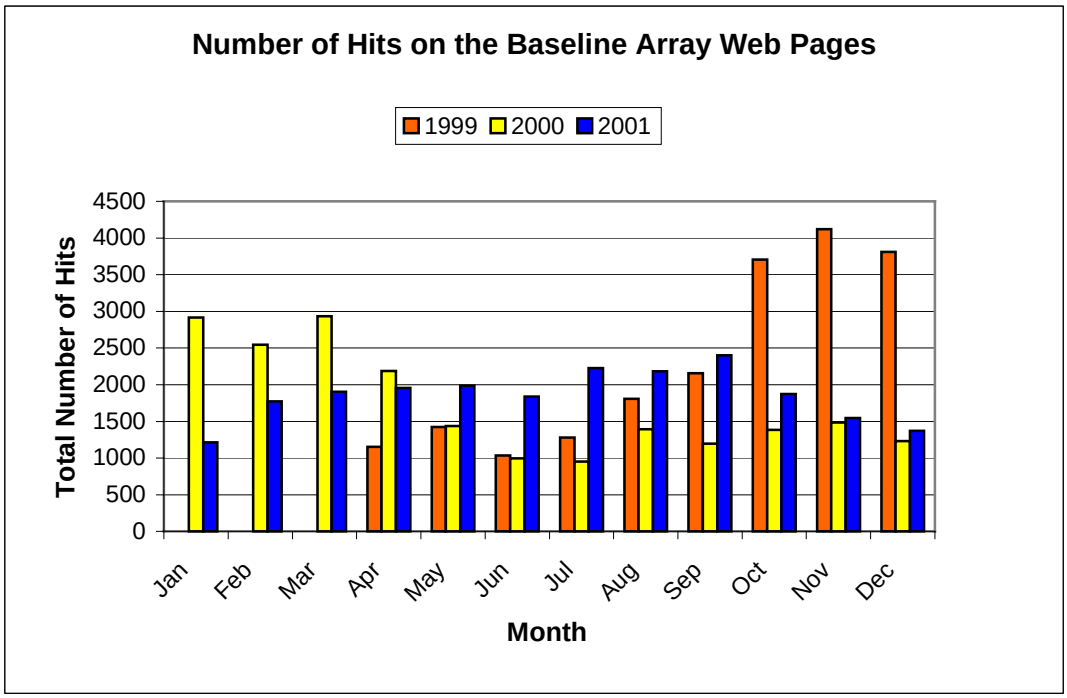
Figure 14 shows the short-term sea level trends for each SEAFRAME location included in the Australian Baseline Sea Level Monitoring Project. Table 1 lists the commencement of operation, the sea level trend for the entire record (plotted in Figure 14) and the change in trend with respect to the previous month's analysis.

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	+12.3	+0.1
Groote Eylandt	Sep 1993	+32.2	-0.5
Darwin	May 1990	+19.0	-0.2
Broome	Nov 1991	+25.0	-0.5
Hillarys	Nov 1991	+19.1	-0.4
Esperance	Mar 1992	+13.7	-0.4
Thevenard	Mar 1992	+11.1	-0.2
Port Stanvac	Jun 1992	+10.5	+0.1
Portland	Jul 1991	+5.8	+0.1
Lorne	Jan 1993	+5.1	+0.2
Stony Point	Jan 1993	+5.1	+0.1
Burnie	Sep 1992	+6.5	+0.2
Spring Bay	May 1991	+4.4	+0.3
Port Kembla	Jul 1991	+7.3	+0.4
Rosslyn Bay	Jun 1992	+7.4	-0.3
Cape Ferguson	Sep 1991	+9.0	-0.5

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 Sea Level Monitoring 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.

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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 2001
SIX MINUTE OBSERVATIONS FROM SEAFRAME STATIONS (m)

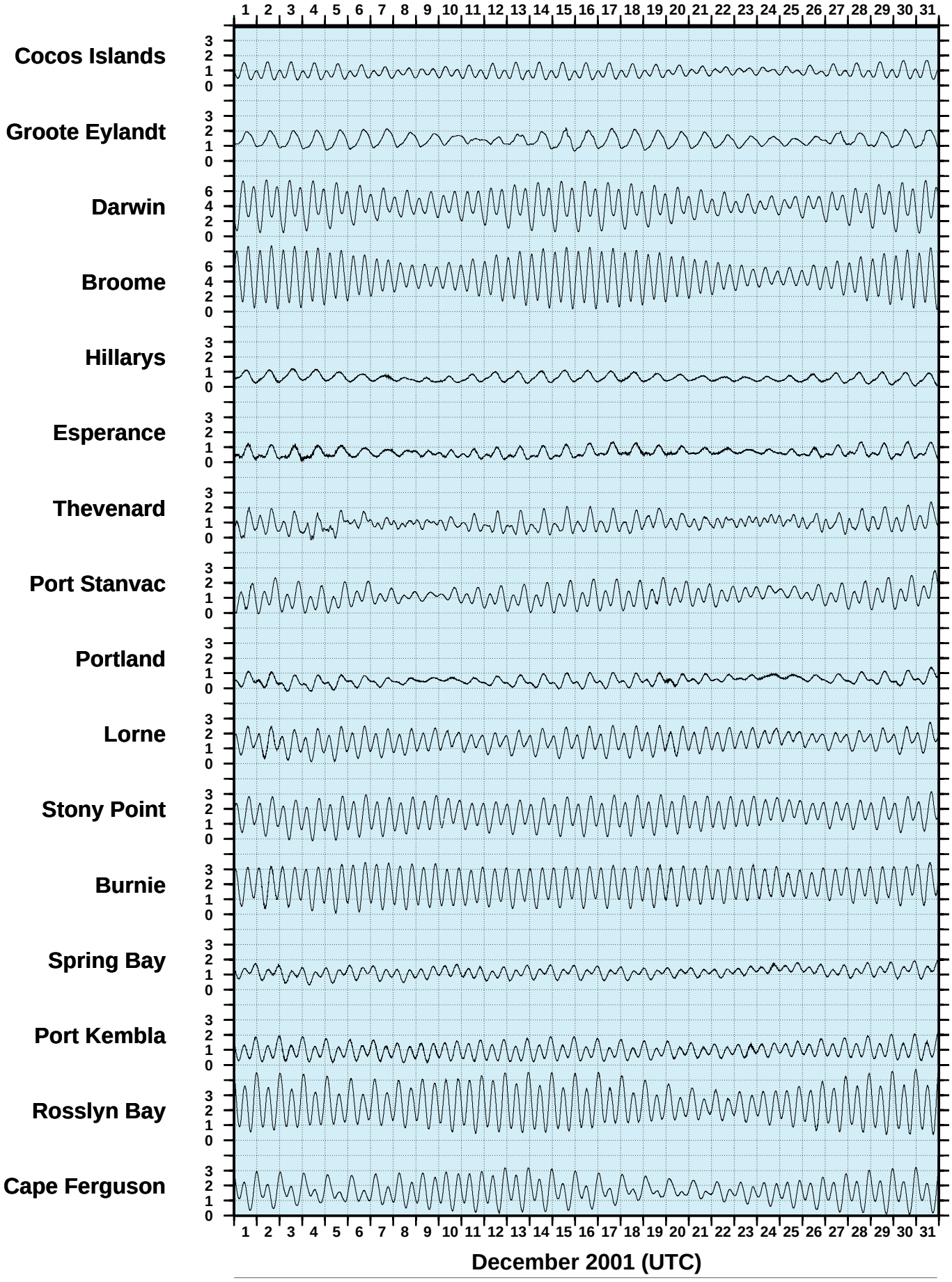


Figure 2

DECEMBER 2001
RESIDUALS AT SIX MINUTE INTERVALS FROM SEAFRAME STATIONS (m)

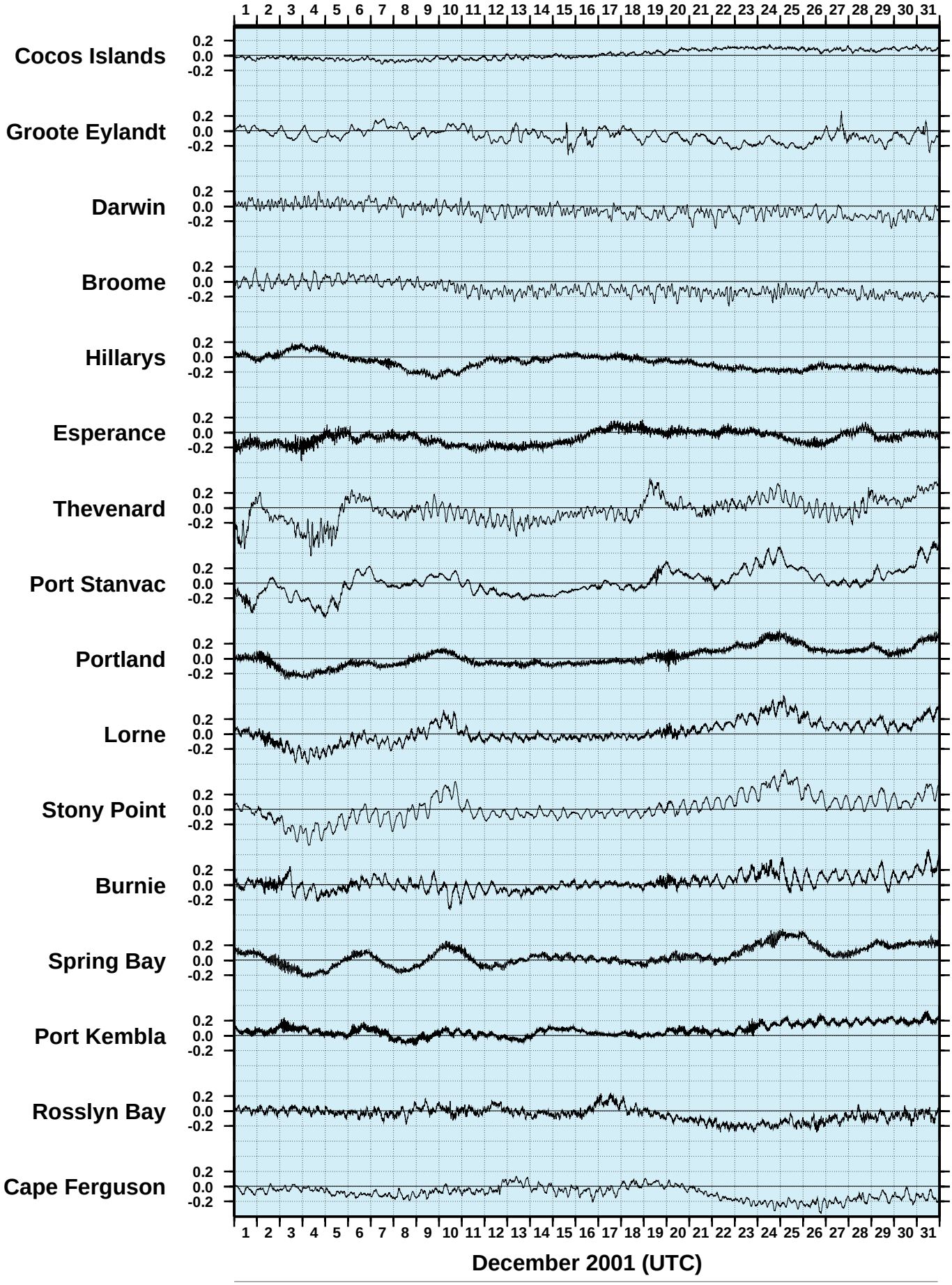


Figure 3

DECEMBER 2001
RESIDUALS AT SIX MINUTE INTERVALS FROM SEAFRAME STATIONS (m)
ADJUSTED FOR ATMOSPHERIC PRESSURE

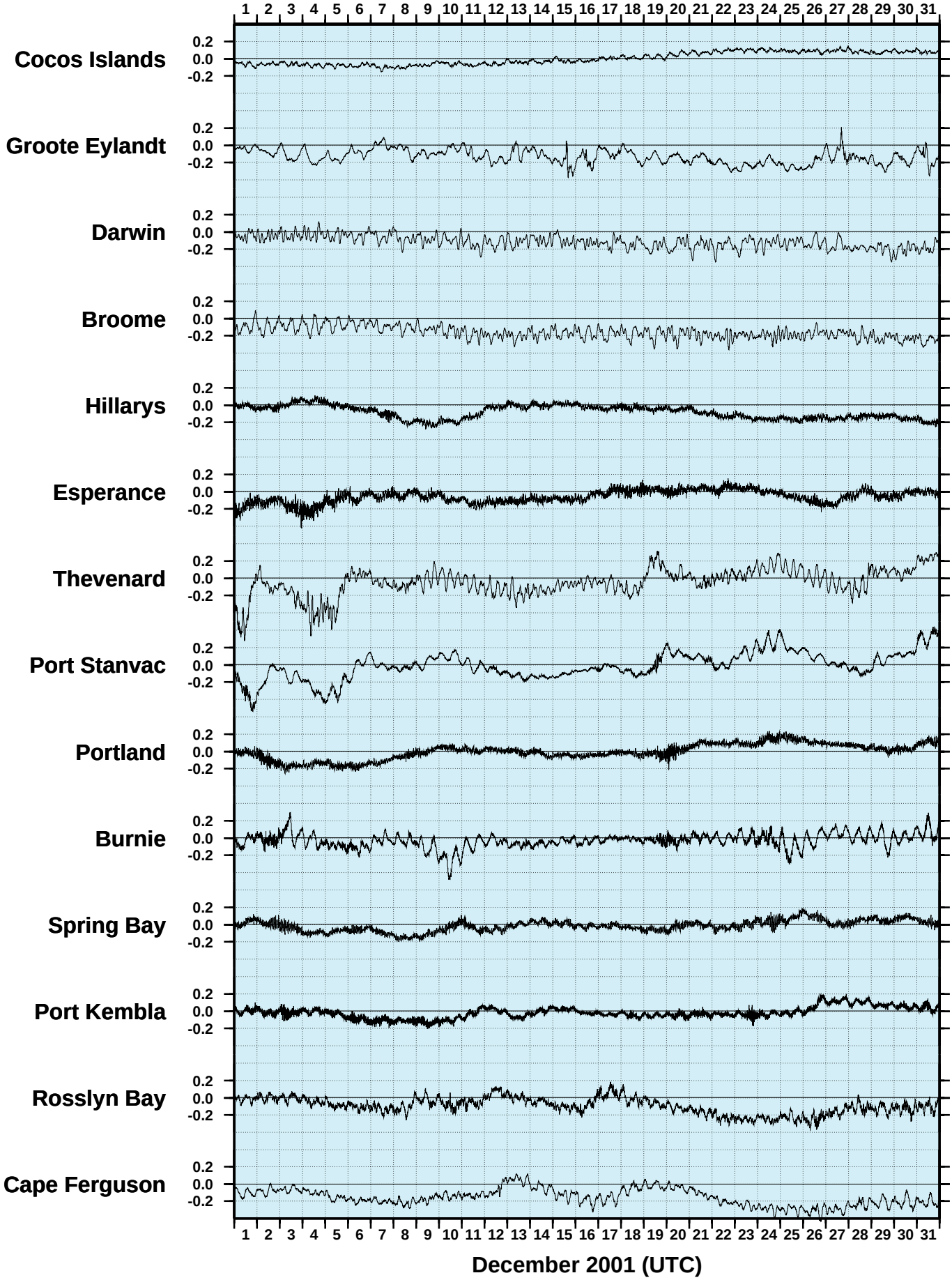


Figure 4

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

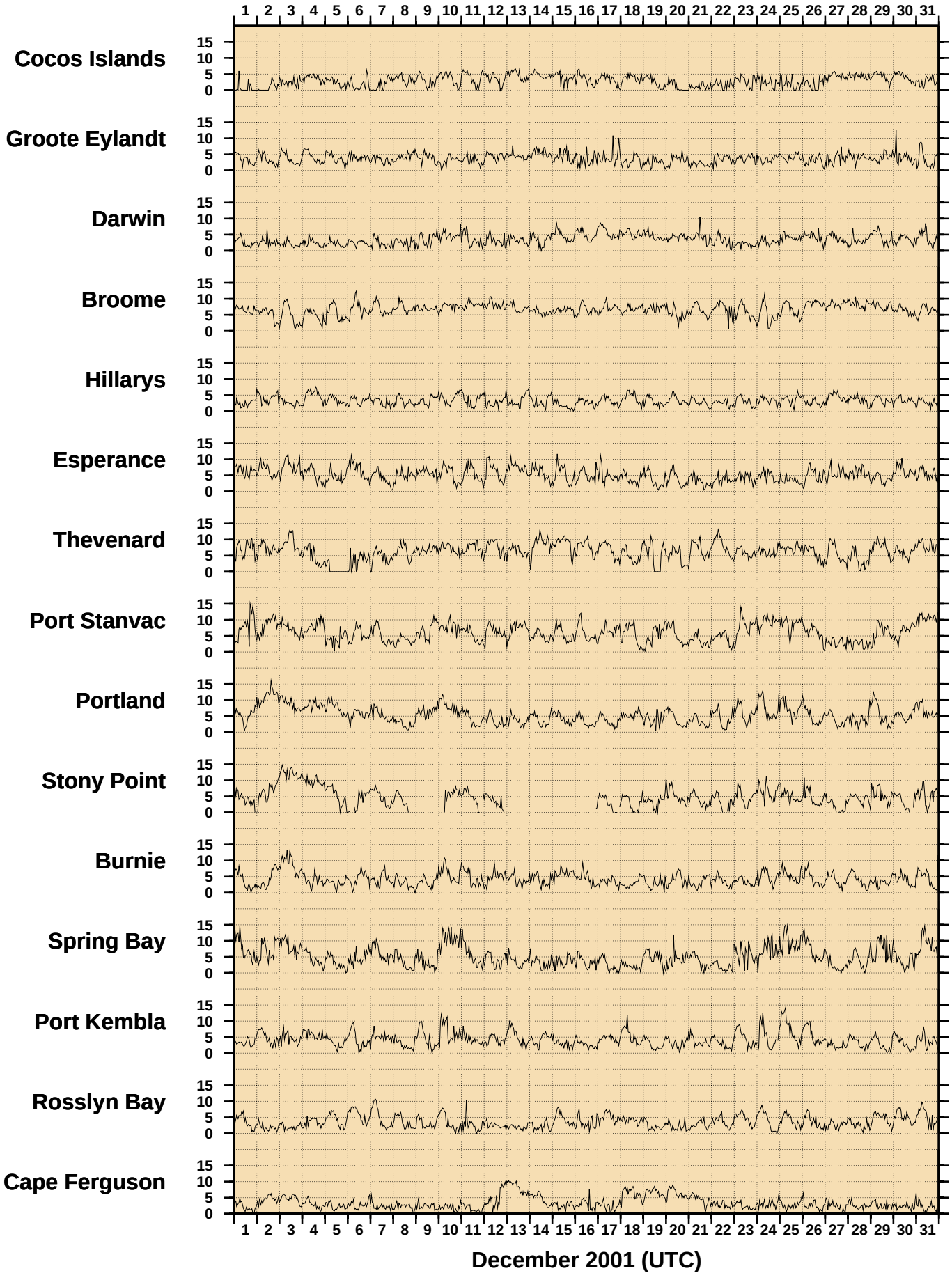


Figure 5

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

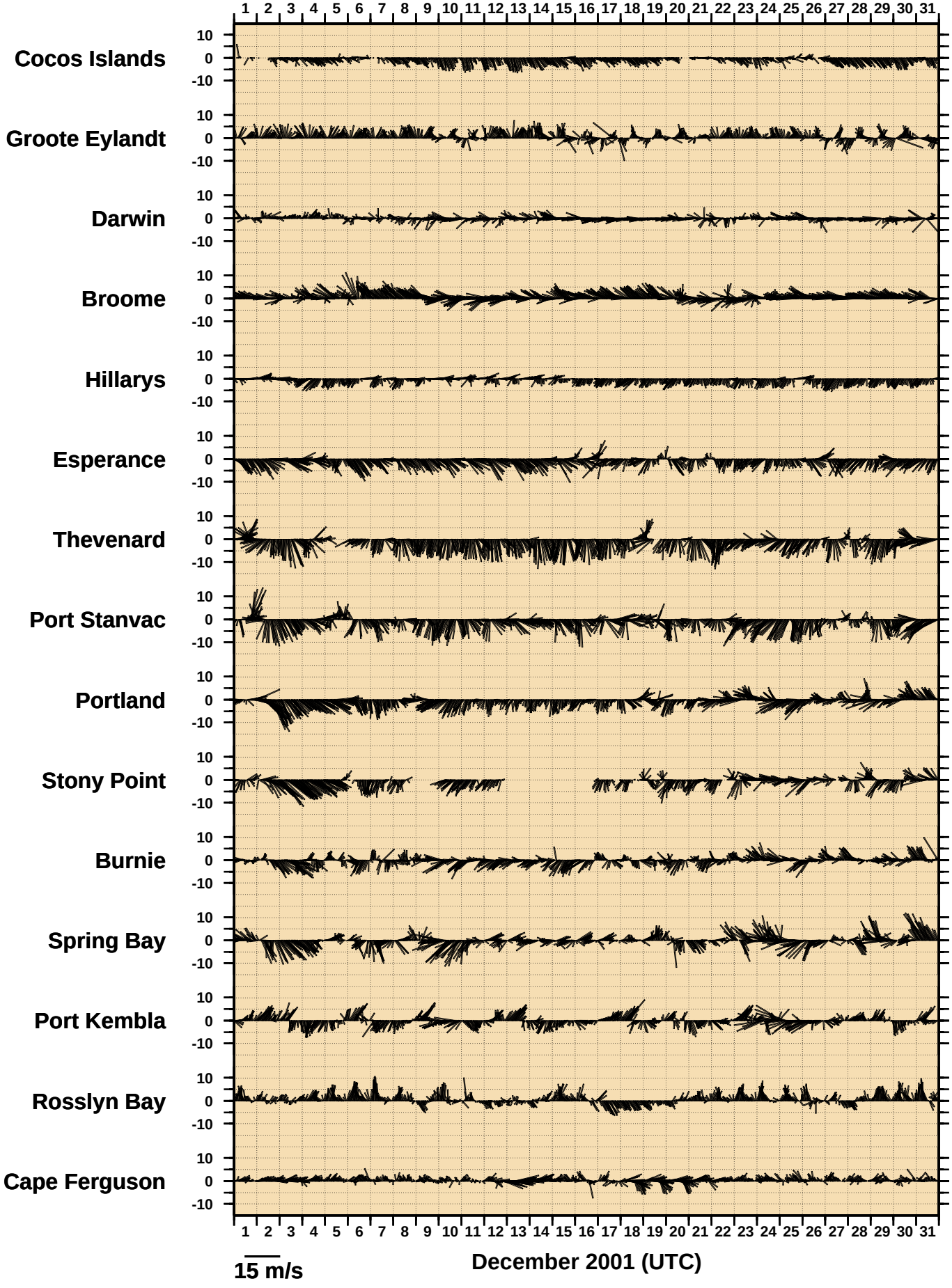


Figure 6

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

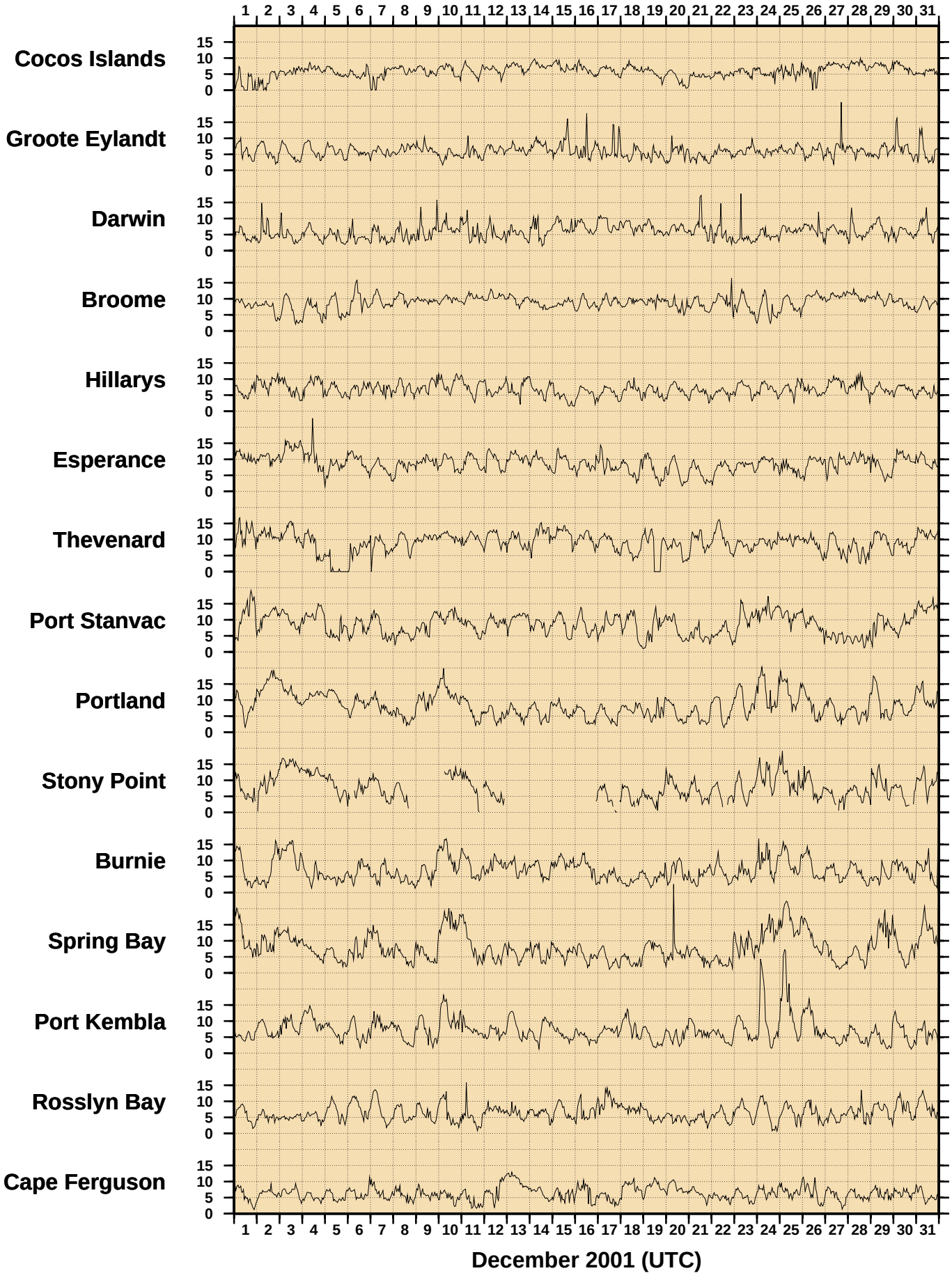


Figure 7

DECEMBER 2001
HOURLY AIR TEMPERATURES FROM SEAFRAME STATIONS (˚C)

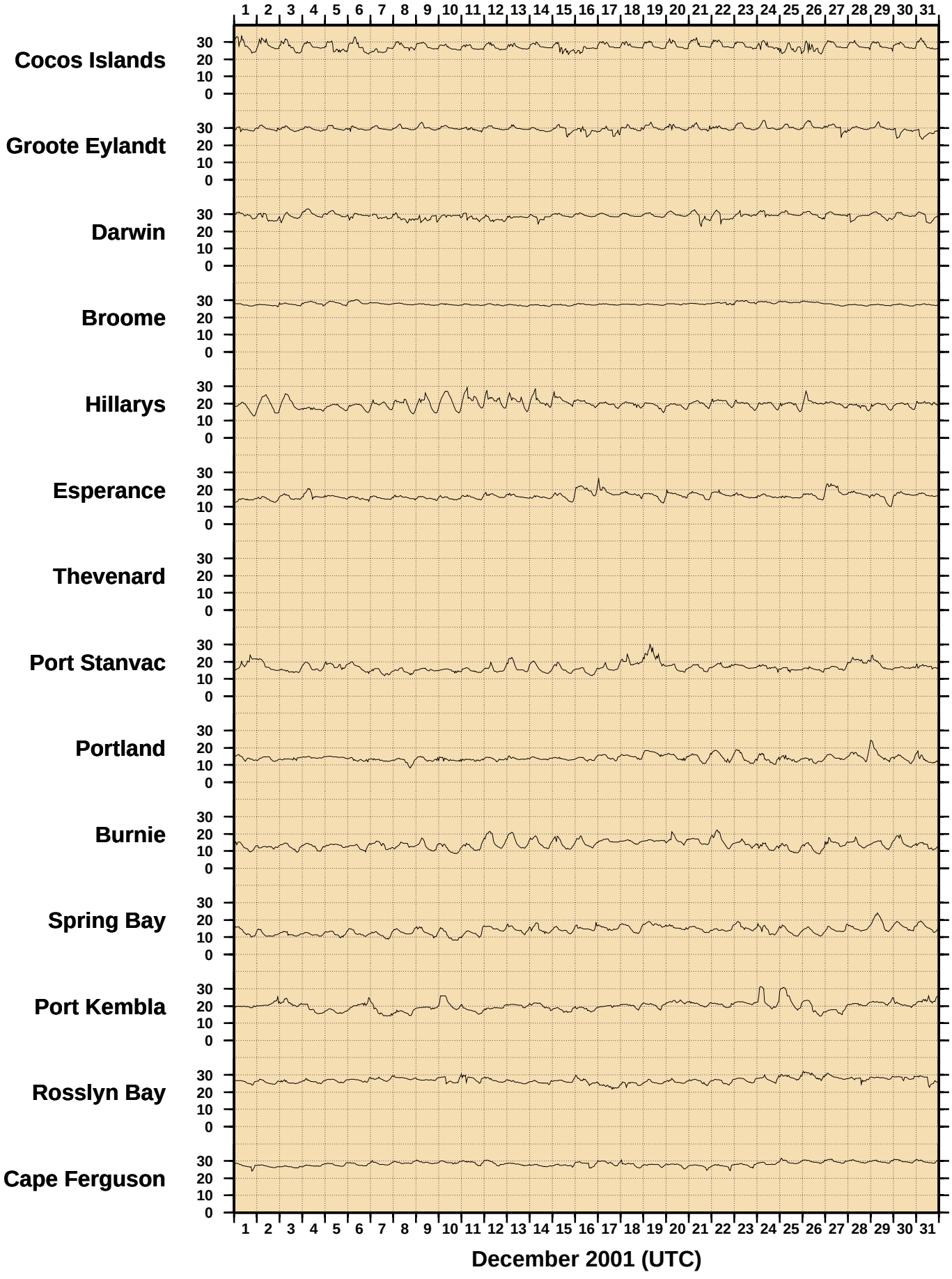


Figure 8

DECEMBER 2001
HOURLY WATER TEMPERATURES FROM SEAFRAME STATIONS (˚C)

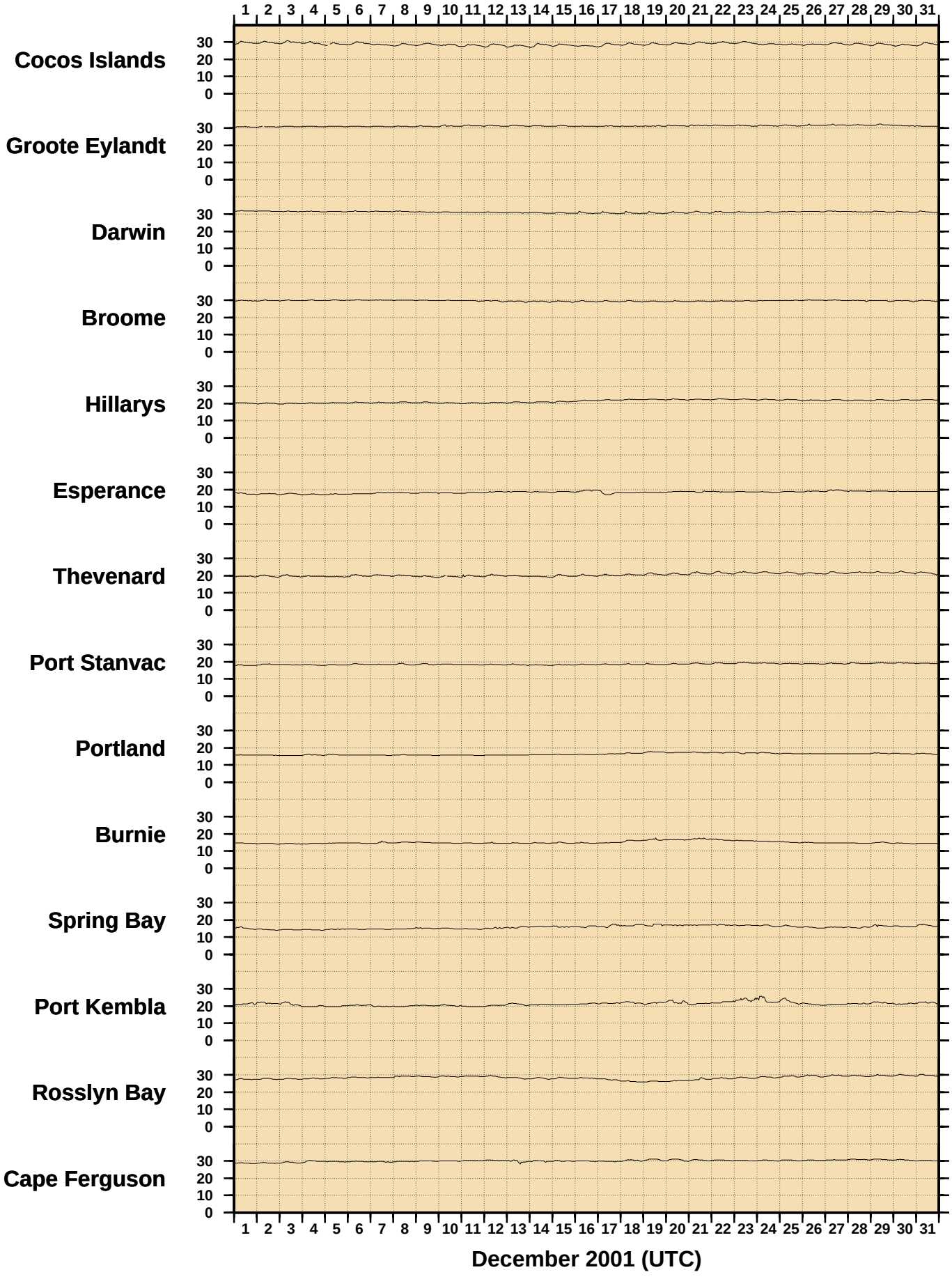


Figure 9

DECEMBER 2001
HOURLY ATMOSPHERIC PRESSURE FROM SEAFRAME STATIONS (hPa)

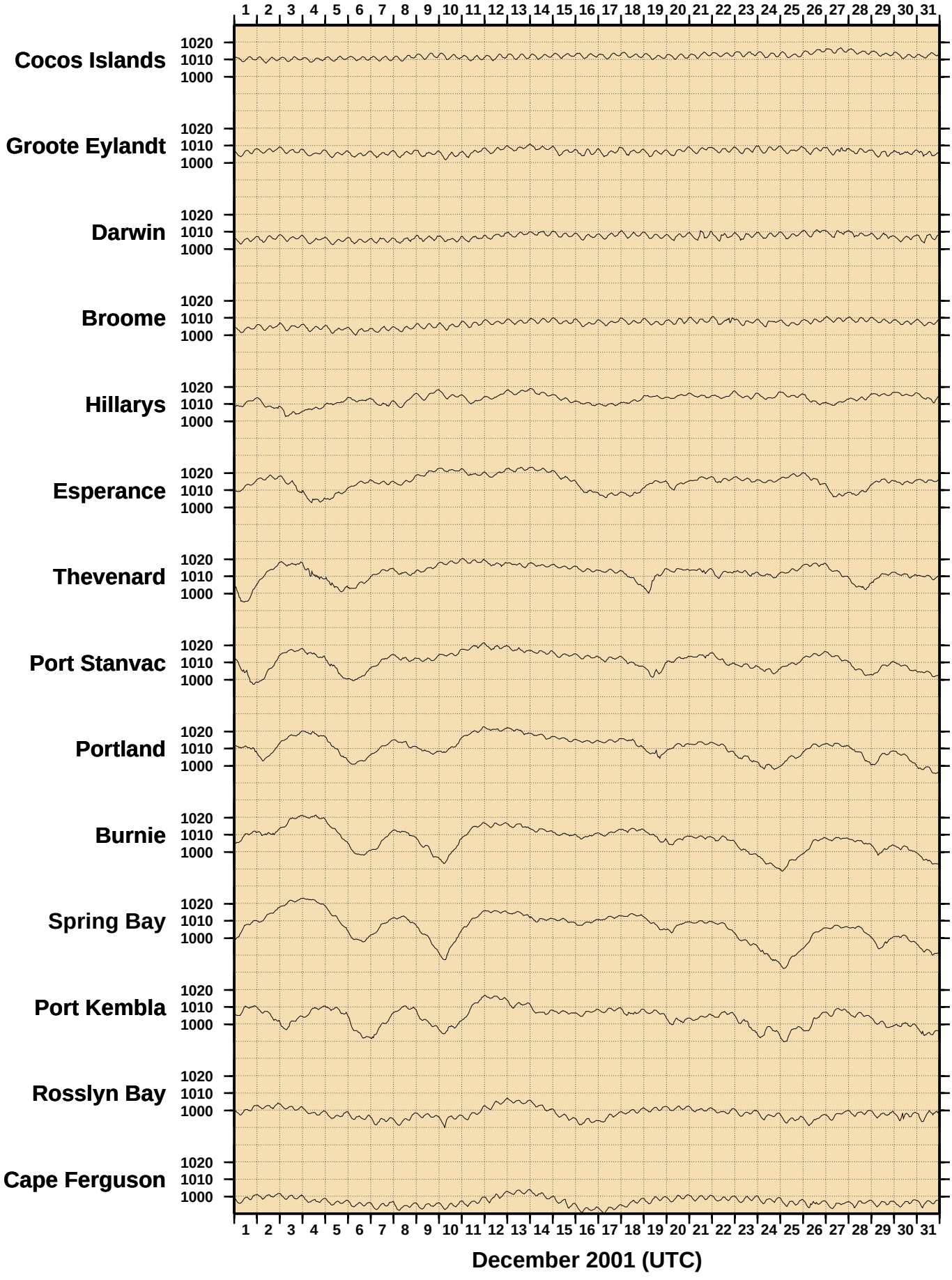


Figure 10

SEA LEVEL ANOMALIES THROUGH DECEMBER 2001 (m)

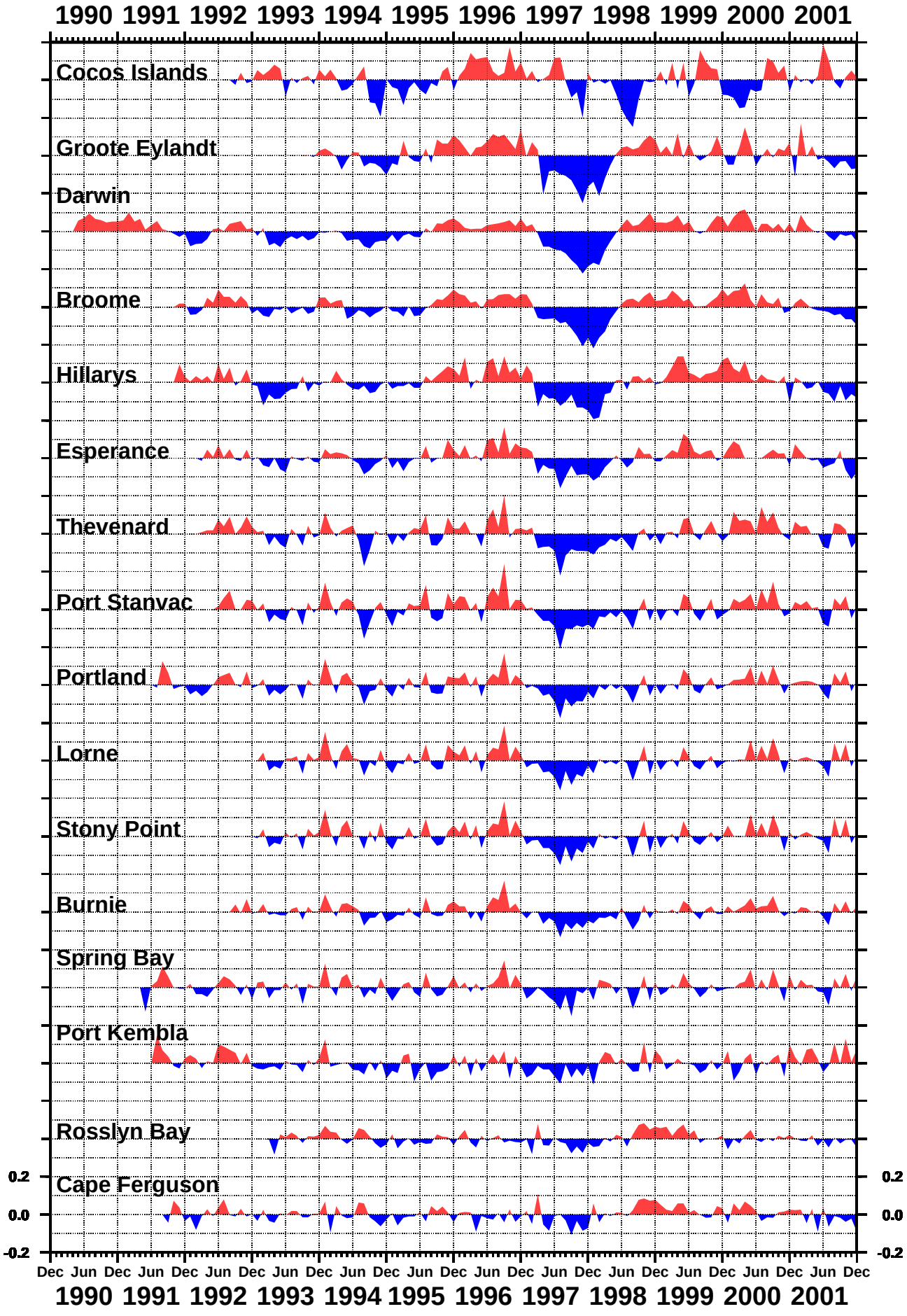


Figure 11

BAROMETRIC PRESSURE ANOMALIES THROUGH DECEMBER 2001 (hPa)

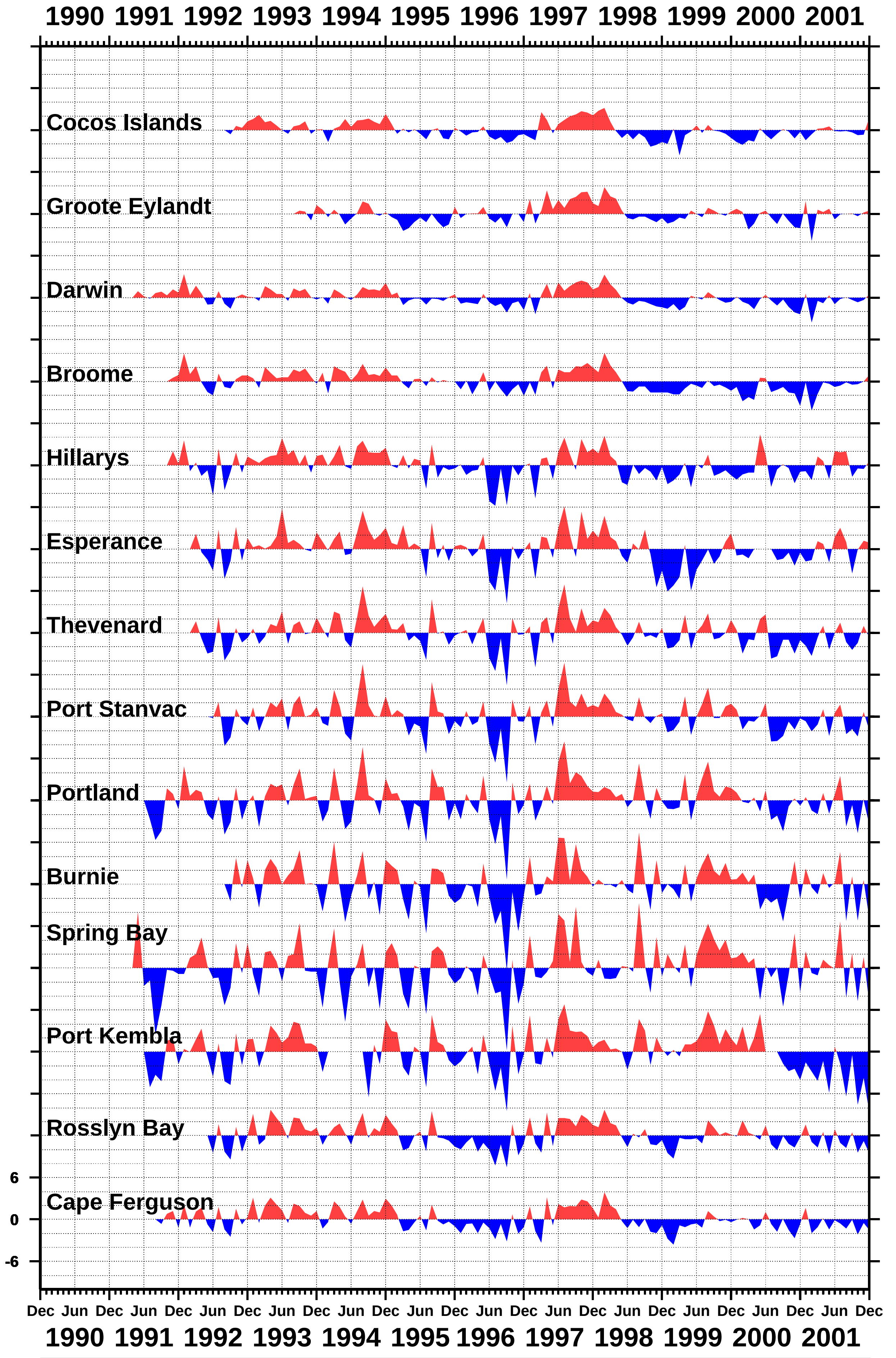


Figure 12

WATER TEMPERATURE ANOMALIES THROUGH DECEMBER 2001 (°C)

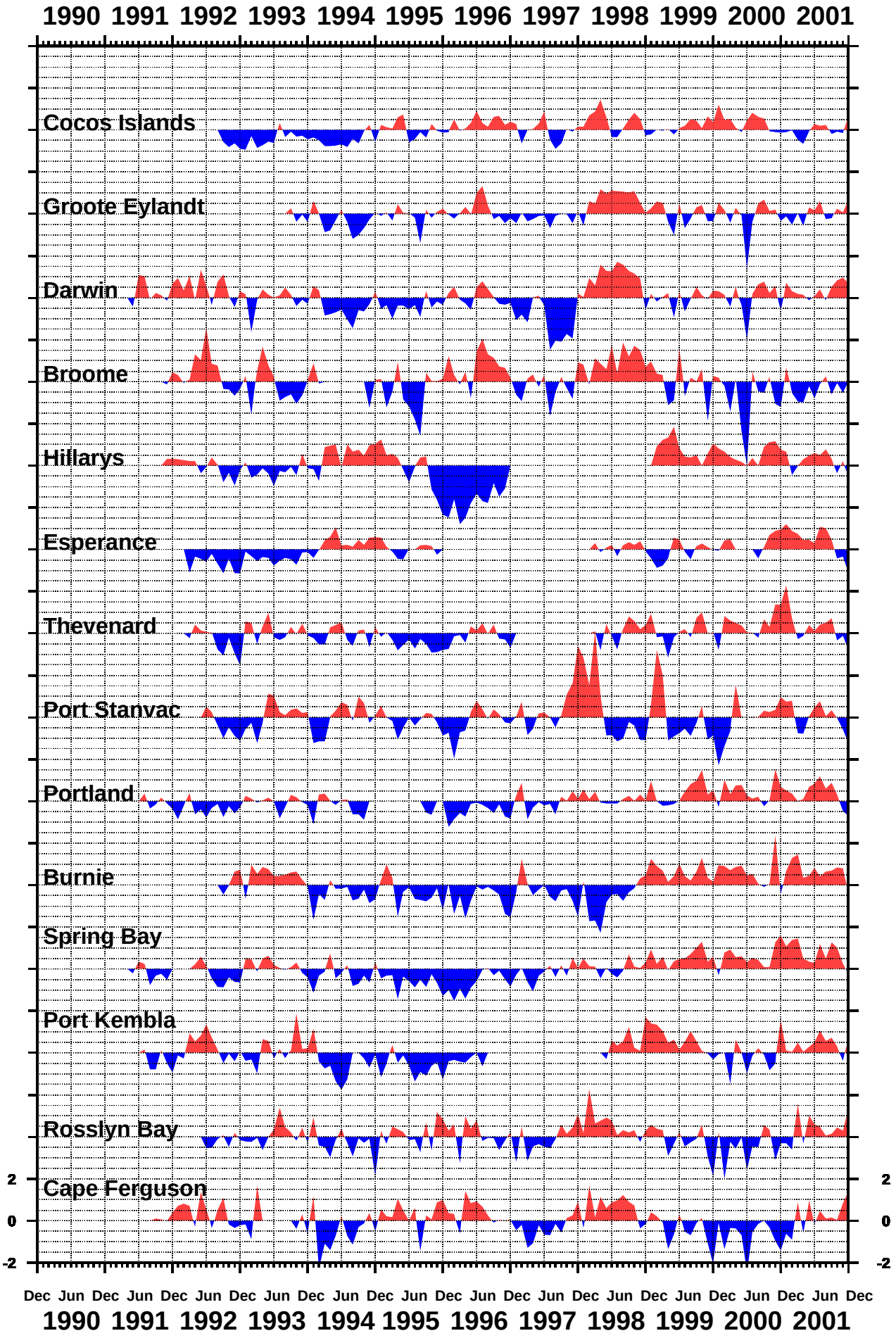


Figure 13

AIR TEMPERATURE ANOMALIES THROUGH DECEMBER 2001 (˚C)

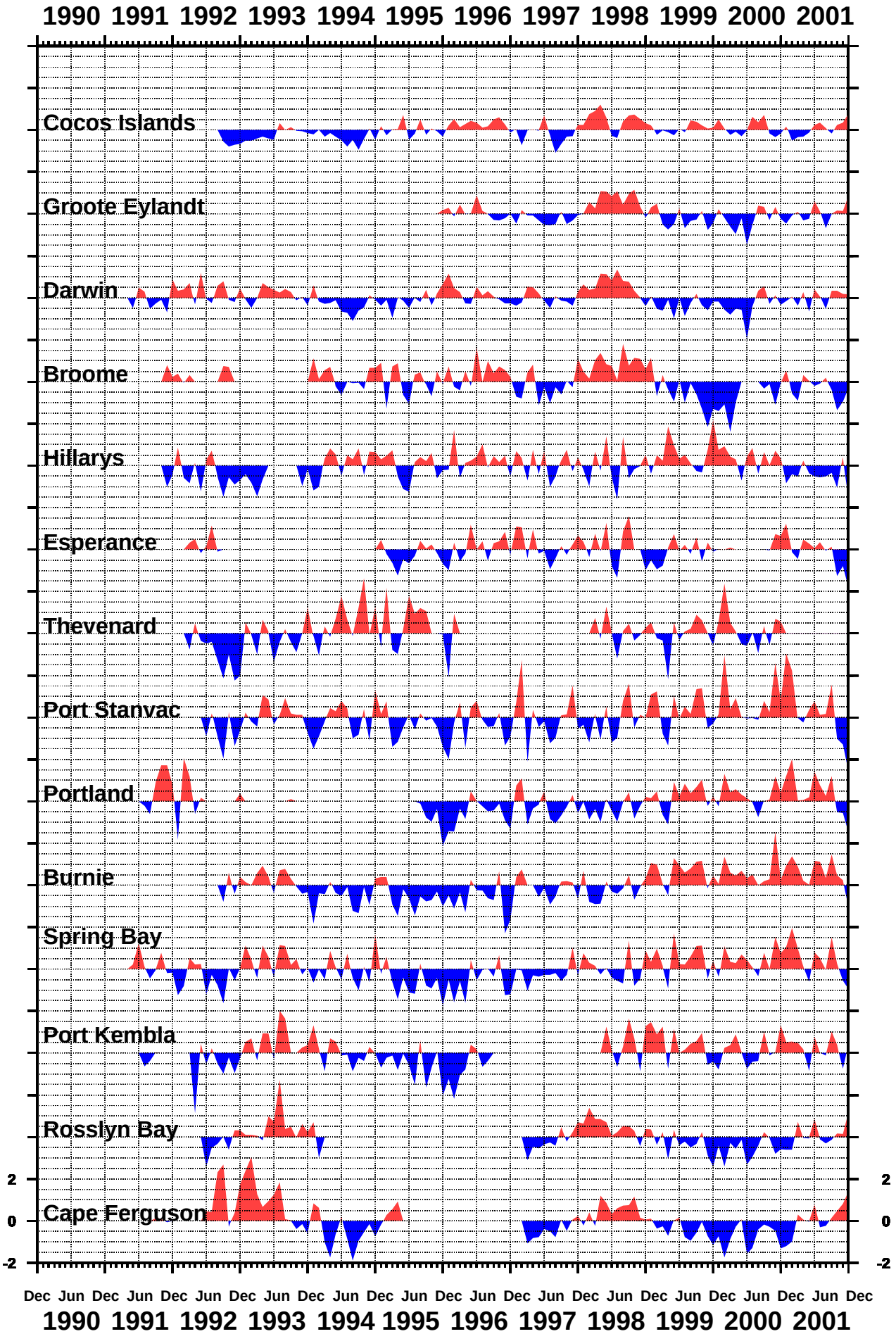


Figure 14

SEA LEVEL TRENDS THROUGH DECEMBER 2001 (mm/year)

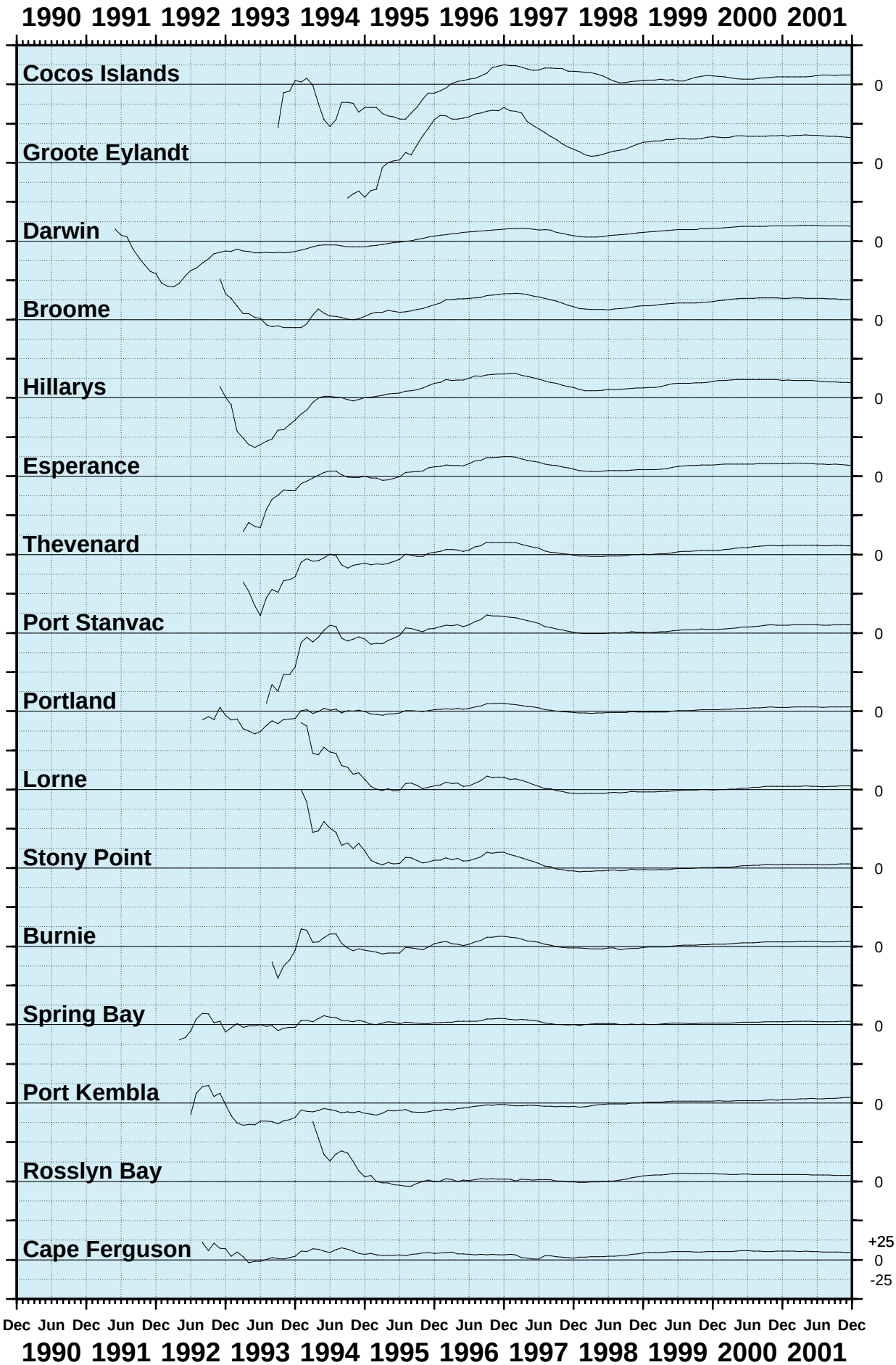
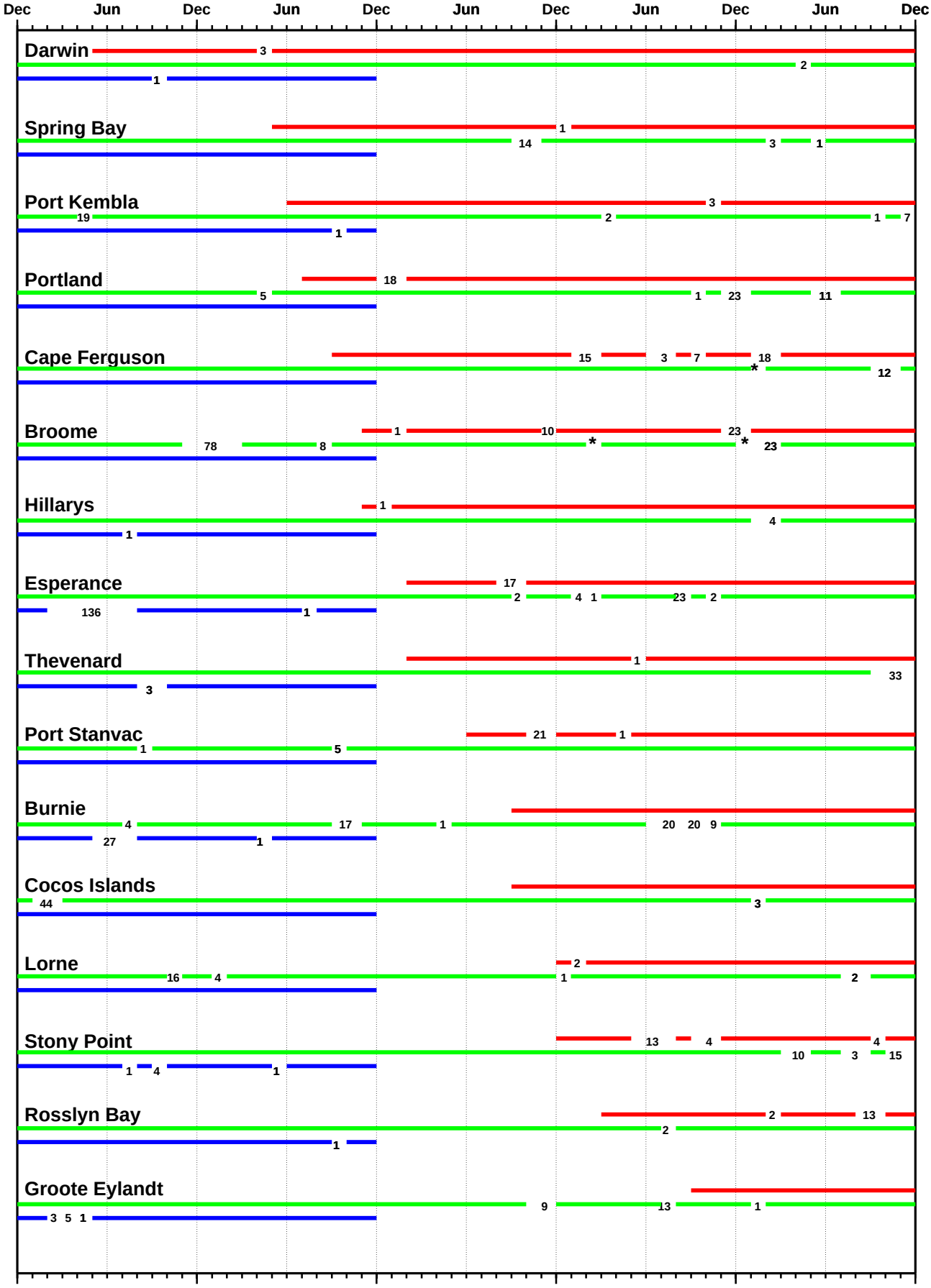


Figure 15

SEA LEVEL DATA RETURN

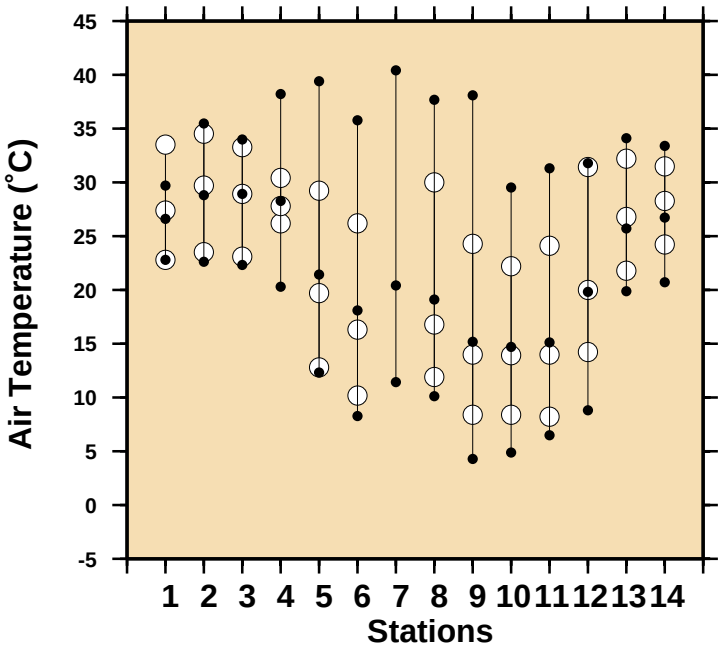
THE NUMBER OF DAYS OF MISSING DATA ARE INDICATED
GAPS INCLUDE TRANSMISSION, POWER AND LOGGER FAILURE
*** Patchy record**

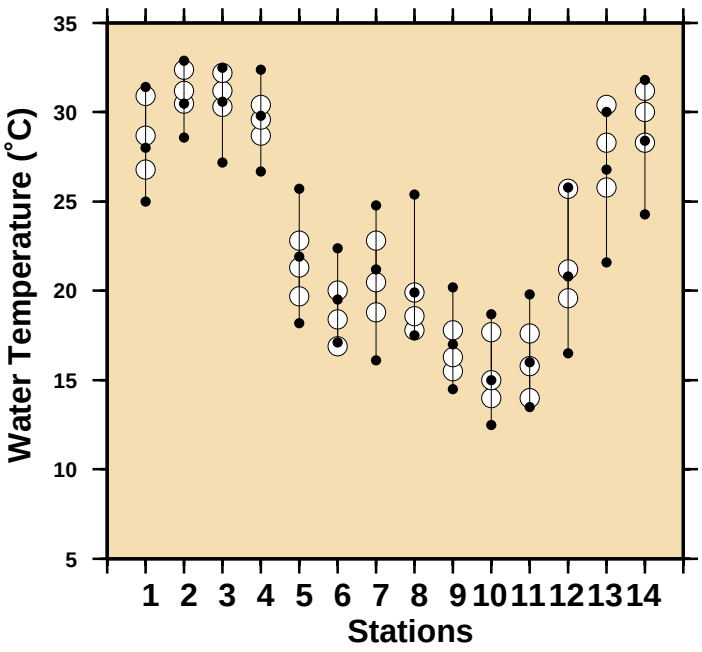


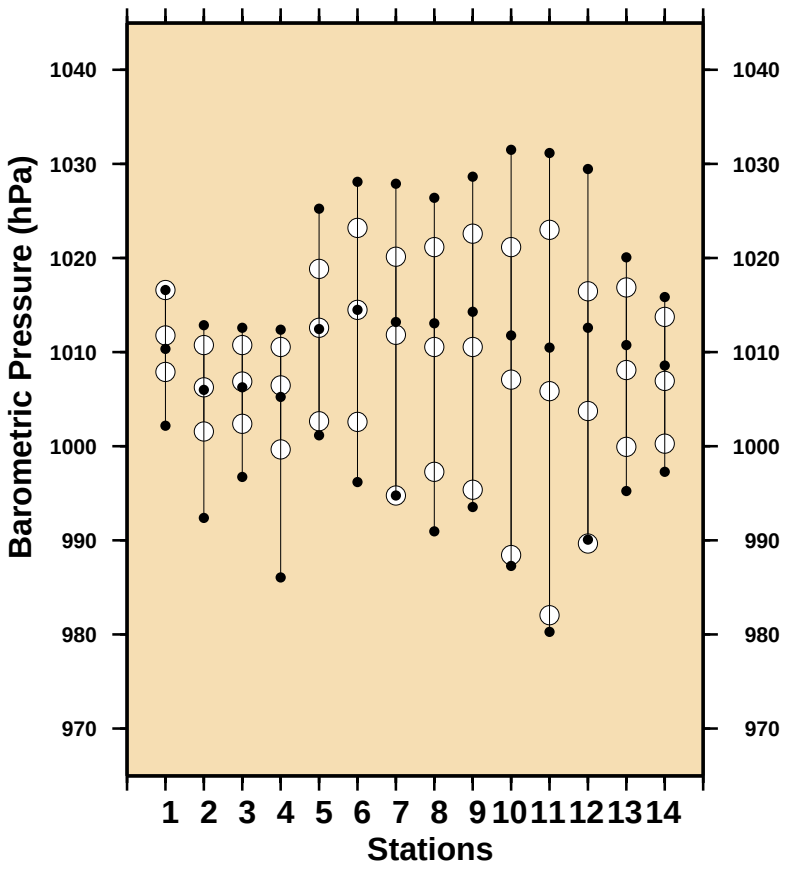
1990 1991 1992 1993 1994
1995 1996 1997 1998 2009
2000 2001 2002 2003 2004

Figure 16

Comparison of December 2001 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 2001 Maximum
December 2001 Mean
December 2001 Minimum

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

Figure 17

MONTHLY MEAN SEA LEVELS TO DECEMBER 2001 (m)

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