THE AUSTRALIAN BASELINE SEA LEVEL MONITORING PROJECT

MONTHLY DATA REPORT

DECEMBER 2003

This report was prepared under the Australian Greenhouse Science Program 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 2003 in accordance with National Tidal Facility Australia Quality Assurance procedures.

William Mitchell
A/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 2003

Sea level data return (Figures 1 and 15) in December was good for most stations with some notable exceptions. Several gaps remain in the Stony Point sea level data due to failure (and subsequent replacement, calibration and levelling) of the Aquatrak head. There were also small gaps in the data from Broome, Darwin and Groote Eylandt following calibration and maintenance visits. Note that the sea level data from Cape Ferguson will be adjusted after a levelling survey is conducted and a new datum is determined (currently the previous datum is being used).

The residuals (Figures 2 and 3), the 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).

Wind speed and wind gust data from Stony Point was again intermittently erroneous throughout December. All of the wind data from Cocos Islands was also erroneous in December. These values and the corresponding incident wind directions have been removed (Figures 4, 5 and 6). At Groote Eylandt the air and water temperature and wind direction sensors (which share the same input/output module) were reinstated on the 8th during a maintenance visit. The data for these three sensors prior to the 8th has been removed from the record (along with the incident wind data), as it was erroneous (Figures 7 and 8).

The sea level anomalies (Figure 10) remained negative at most sites in December, with the exception of Port Stanvac, Portland, Lorne, Stony Point and Rosslyn Bay where the sea level anomalies changed from negative to positive.

The barometric pressure anomalies (Figure 11) continued to be positive at Cocos Islands Esperance, Rosslyn Bay and Cape Ferguson and remained negative at Hillarys in December. The barometric pressure anomalies changed from positive to negative at all other sites in December.

It is difficult to relate the water and air temperature anomalies (Figures 12 and 13) directly to those of barometric pressure and sea level without considering other effects, such as localised currents, wind speeds and directions. The anomalies are primarily used to quality check the water and air temperature data.

Figure 14 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. Note that the long-term ranges are calculated using the historical sets of December data for each station ***excluding*** the current month of data.

For all stations the mean air temperature for December 2003 was generally consistent with the long term December mean. The maximum air temperature at Esperance (38.4°C) was higher than the previously recorded maximum for December.

The December 2003 mean water temperature for most sites was also consistent with the long-term December mean. The minimum water temperature at Portland (13.0°C) was lower than the previously recorded minimum for December. The maximum water temperature at Thevenard (25.0°C) was higher than the previously recorded maximum for December.

The mean barometric pressure for December 2003 was consistent with the long-term December mean for each site. The minimum barometric pressures at Darwin (996.1hPa), Hillarys (999.0hPa), Portland (990.2hPa) and Burnie (986.9hPa) were lower than the previously recorded minimums for December.

Figure 16 shows the monthly mean sea levels with respect to an arbitrary fixed offset from the zero of the tide gauge. The mean sea level plot shows seasonal variations in sea level in contrast to the sea level anomalies plot (Figure 10), which has the seasonal signal removed from the data.

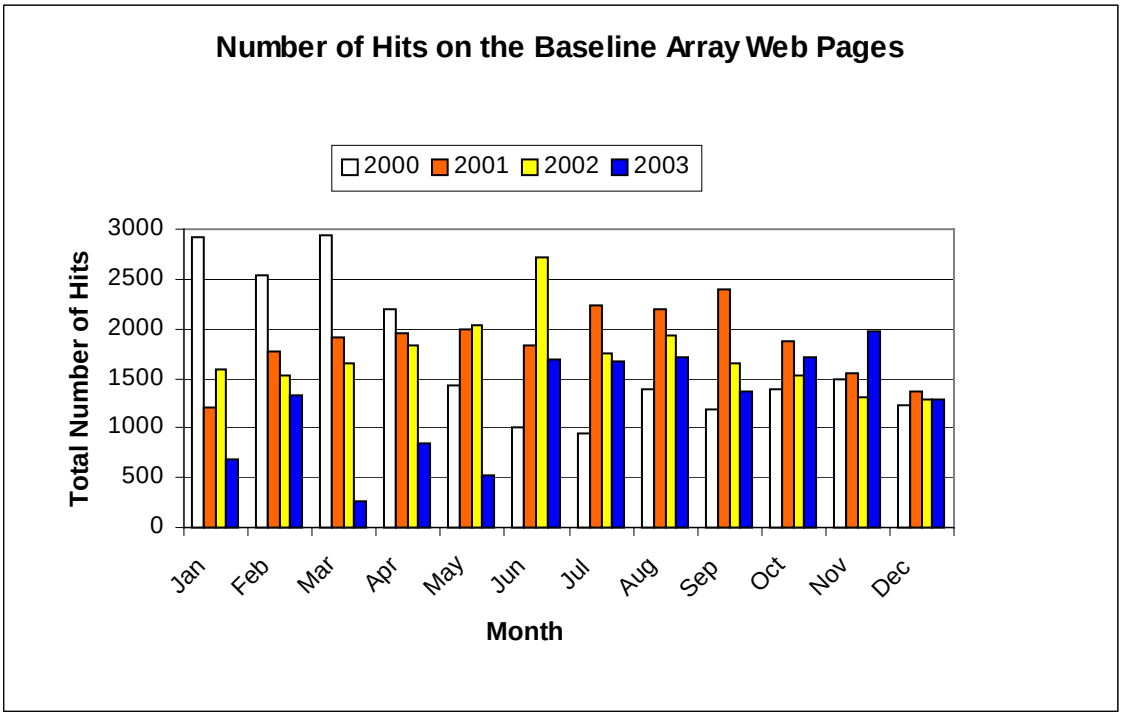
Figure 17 shows the short-term sea level trends for each SEAFRAME location included in the Australian Baseline Sea Level Monitoring Project. Table 1 lists the commencement of operation, the sea level trend for the entire record (plotted in Figure 17) and the change in trend with respect to the analysis of the previous month.

Table 1: Tide gauge installation dates, short-term sea level trends and change in trend from the previous month for the Australian Baseline array to December 2003.

Location	Installation Date	Sea Level Trend (mm/yr)	Change from previous month
Cocos Islands	Sep 1992	+11.6	0.0
Groote Eylandt	Sep 1993	+14.2	-0.1
Darwin	May 1990	+11.3	-0.1
Broome	Nov 1991	+14.3	-0.2
Hillarys	Nov 1991	+11.0	-0.3
Esperance	Mar 1992	+7.9	-0.1
Thevenard	Mar 1992	+6.1	0.0
Port Stanvac	Jun 1992	+7.0	+0.1
Portland	Jul 1991	+3.2	+0.1
Lorne	Jan 1993	+2.3	+0.1
Stony Point	Jan 1993	+1.9	+0.1
Burnie	Sep 1992	+3.8	0.0
Spring Bay	May 1991	+3.6	0.0
Port Kembla	Jul 1991	+5.2	-0.1
Rosslyn Bay	Jun 1992	+4.5	+0.1
Cape Ferguson	Sep 1991	+5.8	0.0

The number of hits to the Australian Baseline Sea Level Monitoring project web pages from 2000 to December 2003 is given in Table 2.

Table 2: Number of hits on the Australian Baseline Sea Level Monitoring Project web pages from 2000 to December 2003.



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:

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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

DECEMBER 2003
SIX MINUTE SEA LEVEL OBSERVATIONS (m)

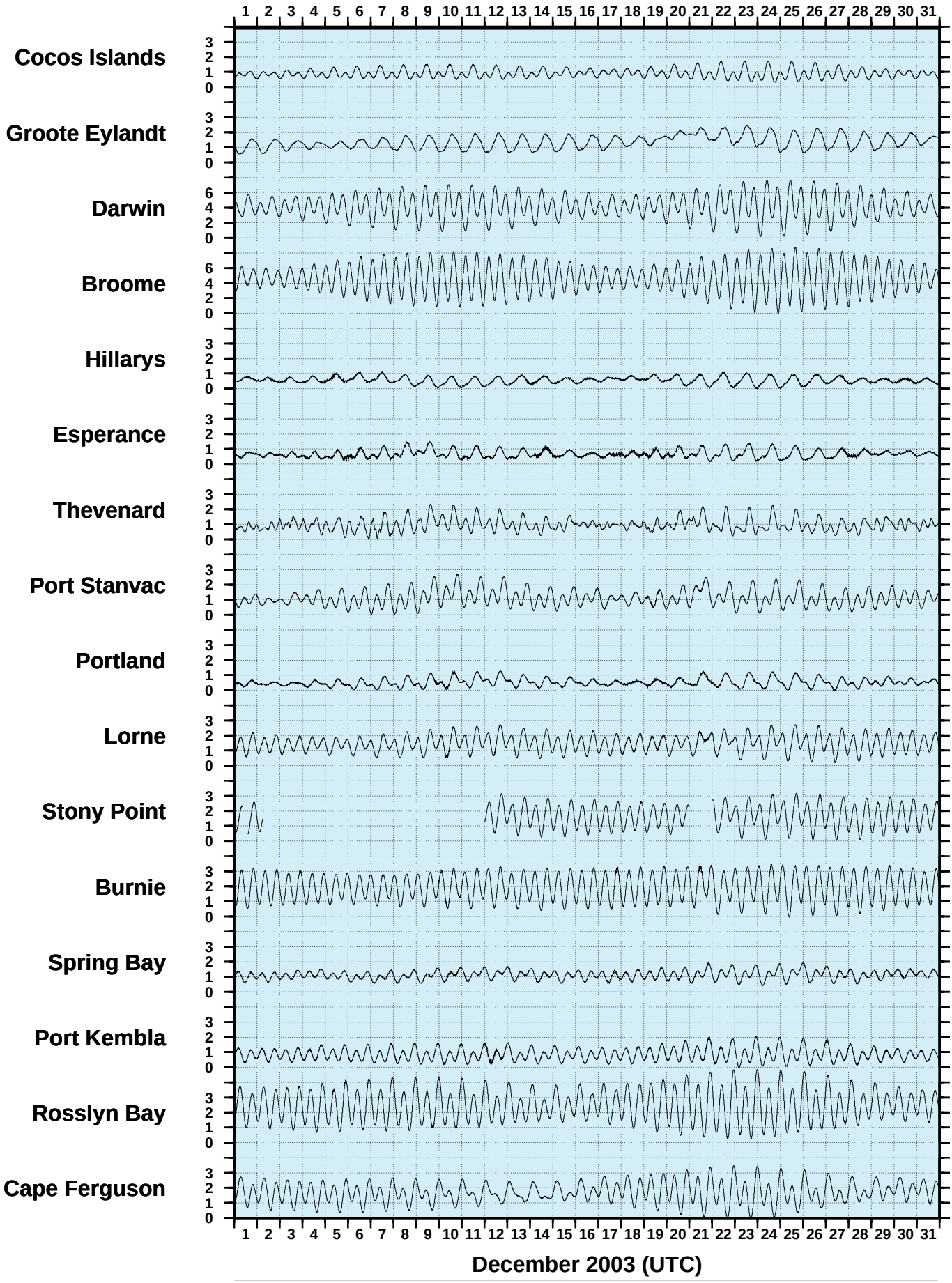


Figure 2

DECEMBER 2003
SIX MINUTE RESIDUAL WATER LEVELS (m)

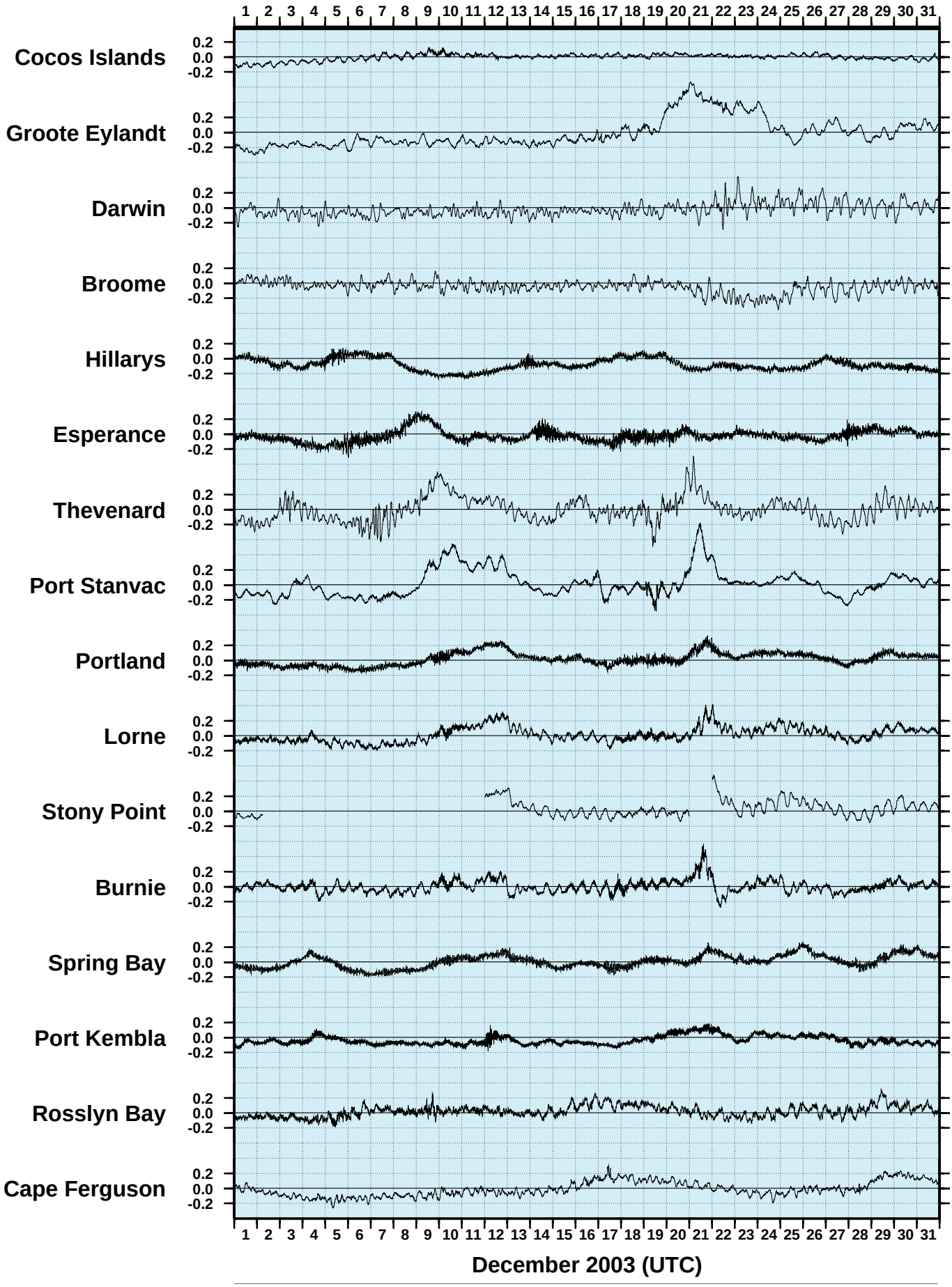


Figure 3

DECEMBER 2003
SIX MINUTE RESIDUALS
ADJUSTED FOR ATMOSPHERIC PRESSURE (m)

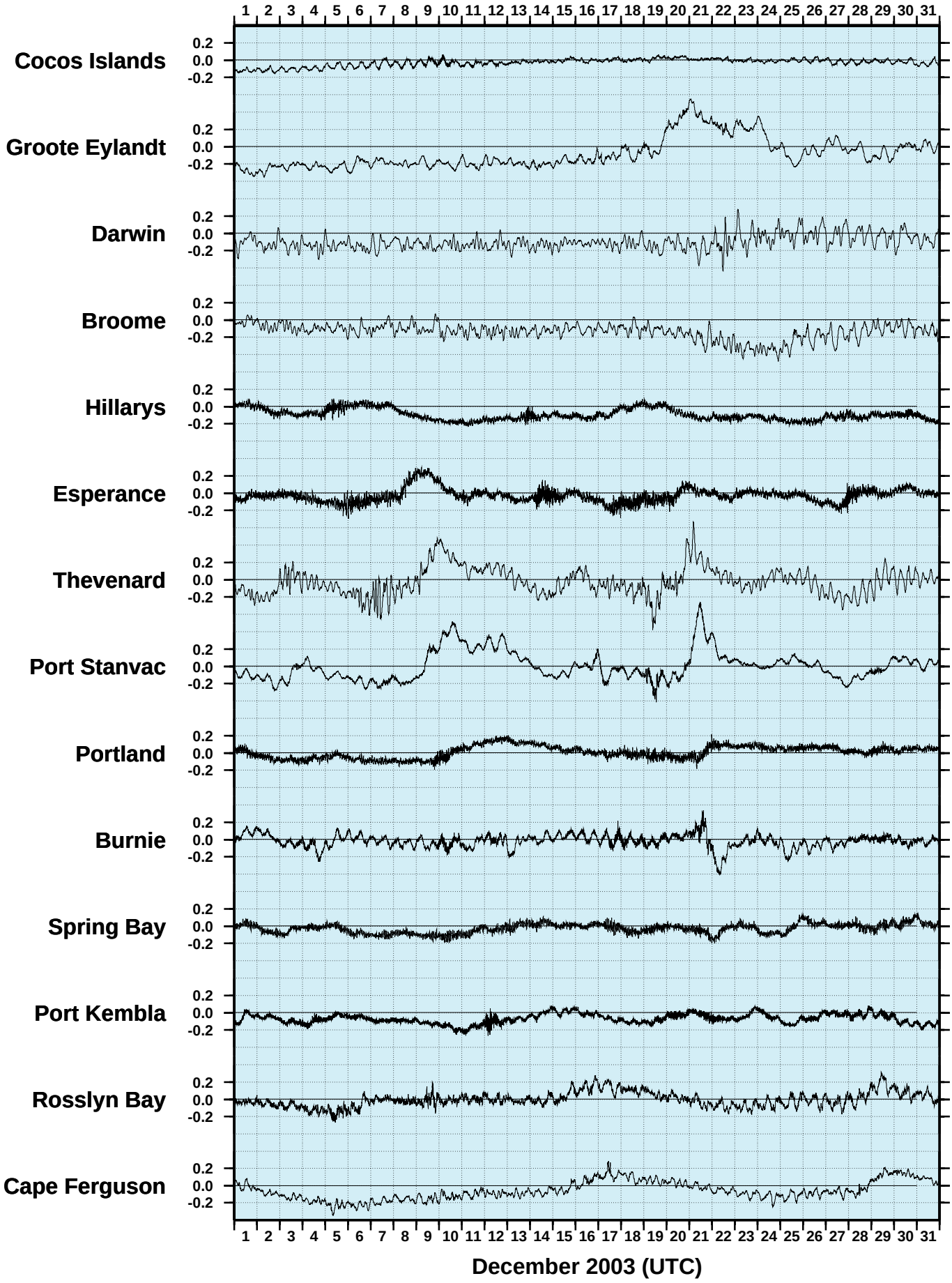


Figure 4

DECEMBER 2003
HOURLY WIND SPEEDS (m/s)

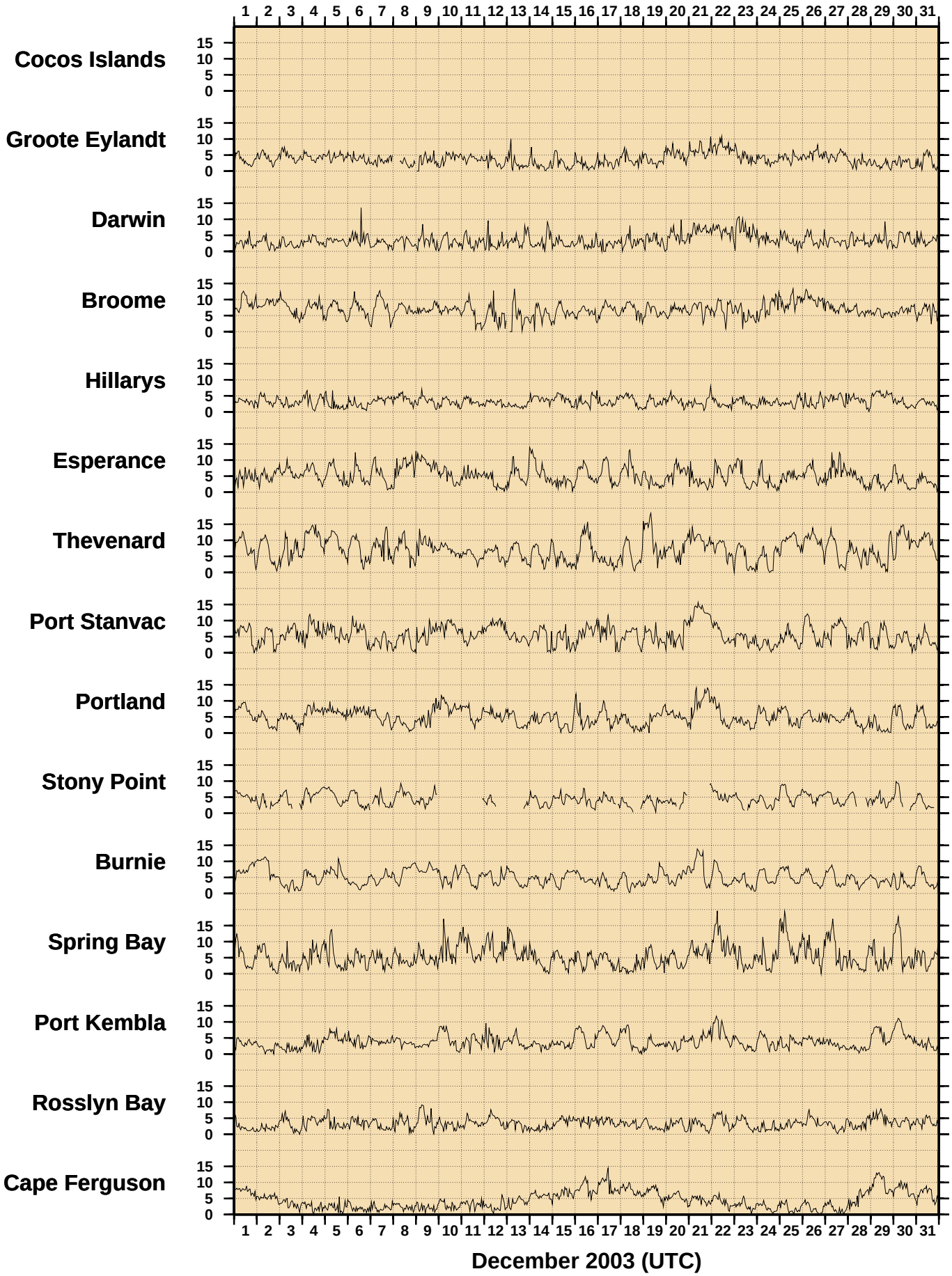


Figure 5

DECEMBER 2003
HOURLY INCIDENT WINDS (m/s, deg True)

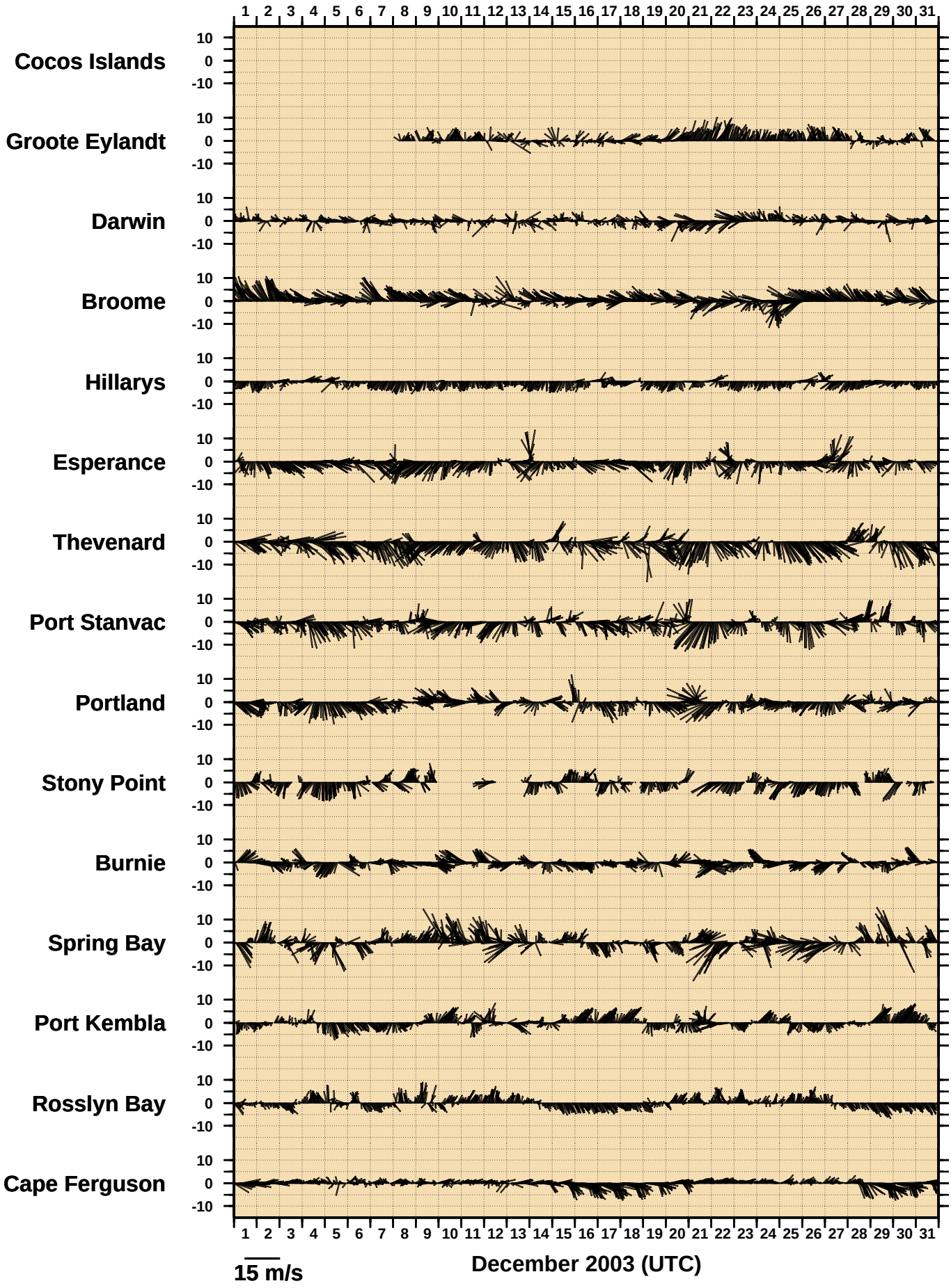


Figure 6

DECEMBER 2003
HOURLY MAXIMUM WIND GUSTS (m/s)

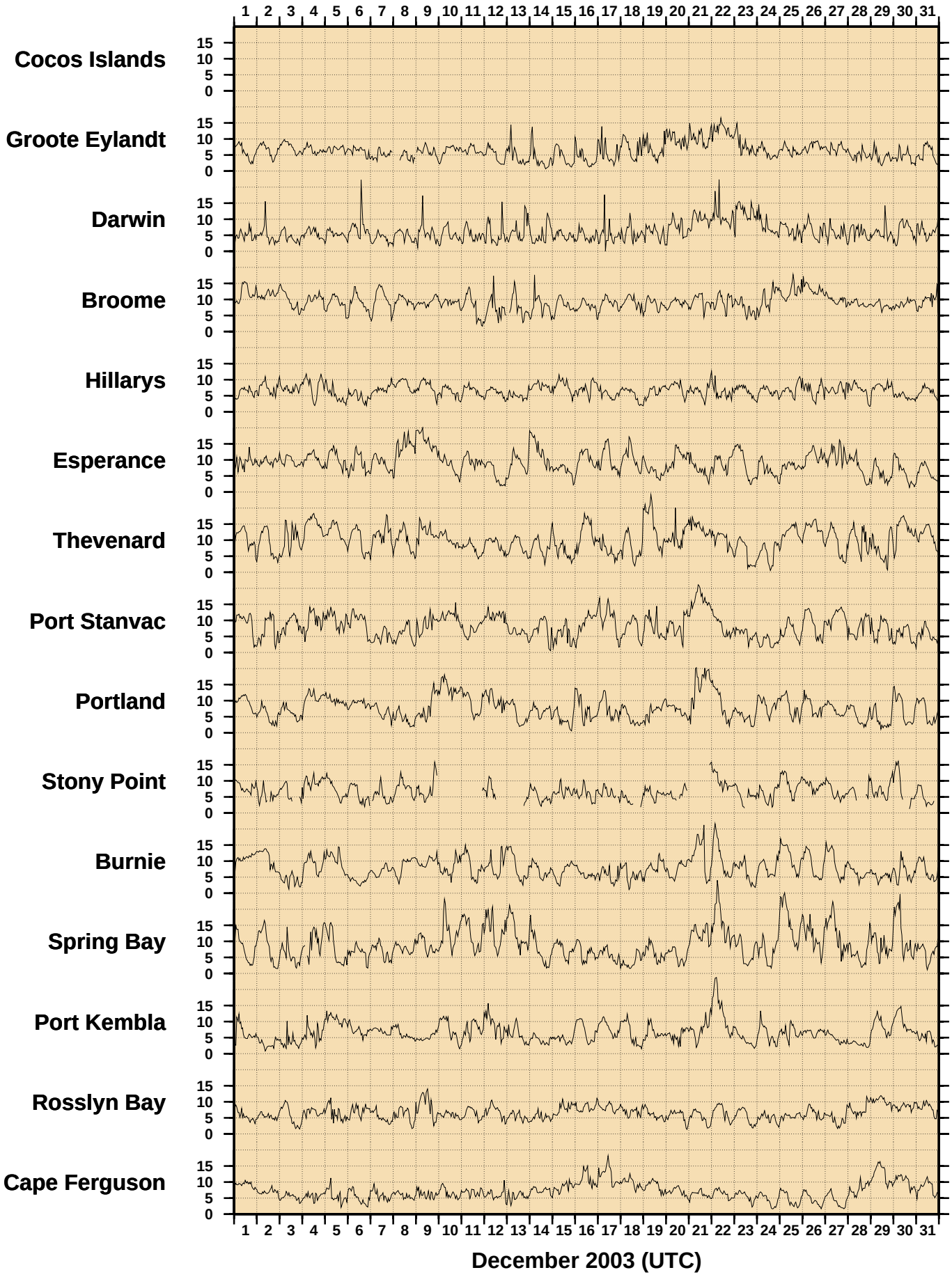


Figure 7

DECEMBER 2003
HOURLY AIR TEMPERATURES (°C)

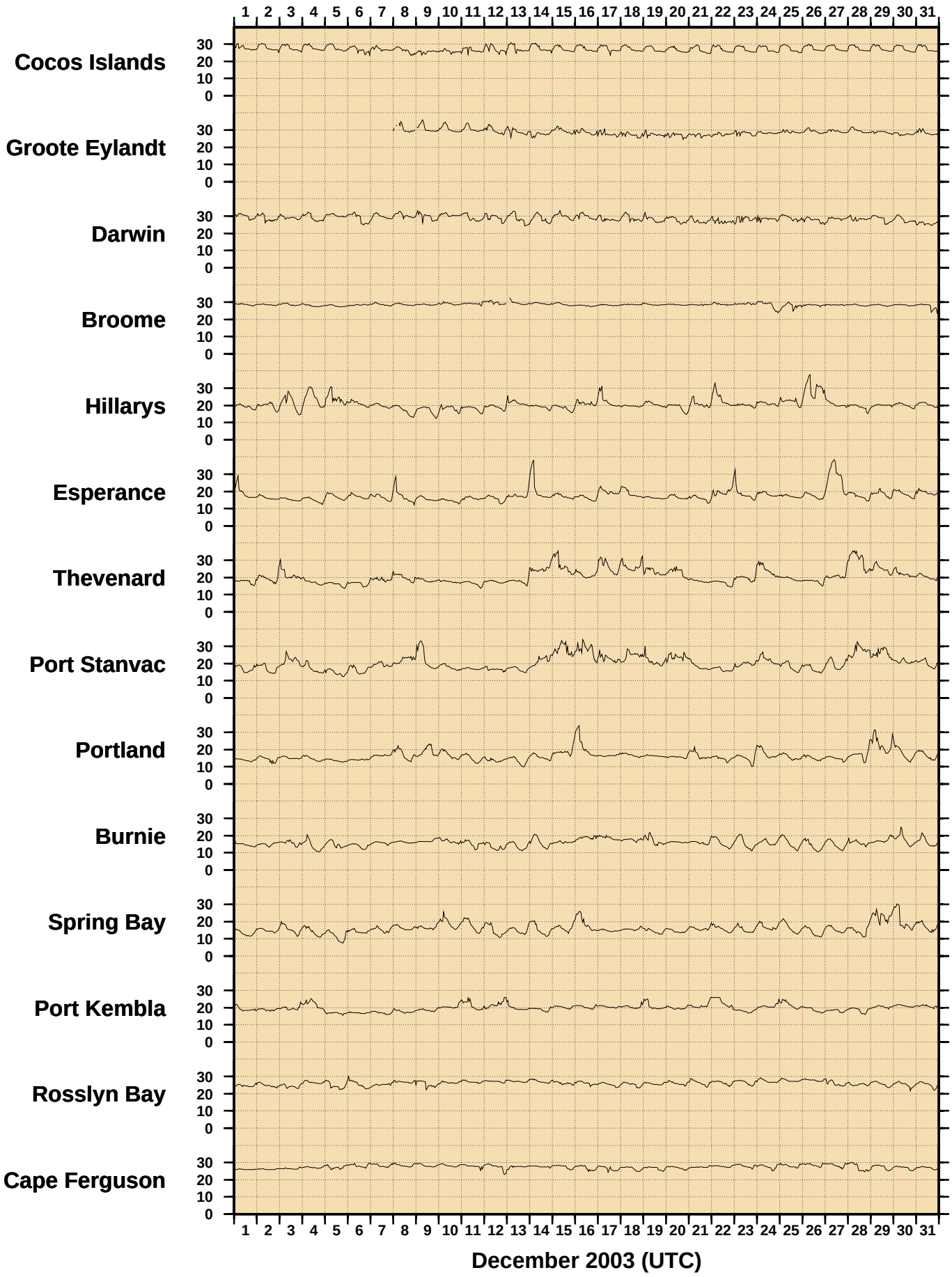


Figure 8

DECEMBER 2003
HOURLY WATER TEMPERATURES (˚C)

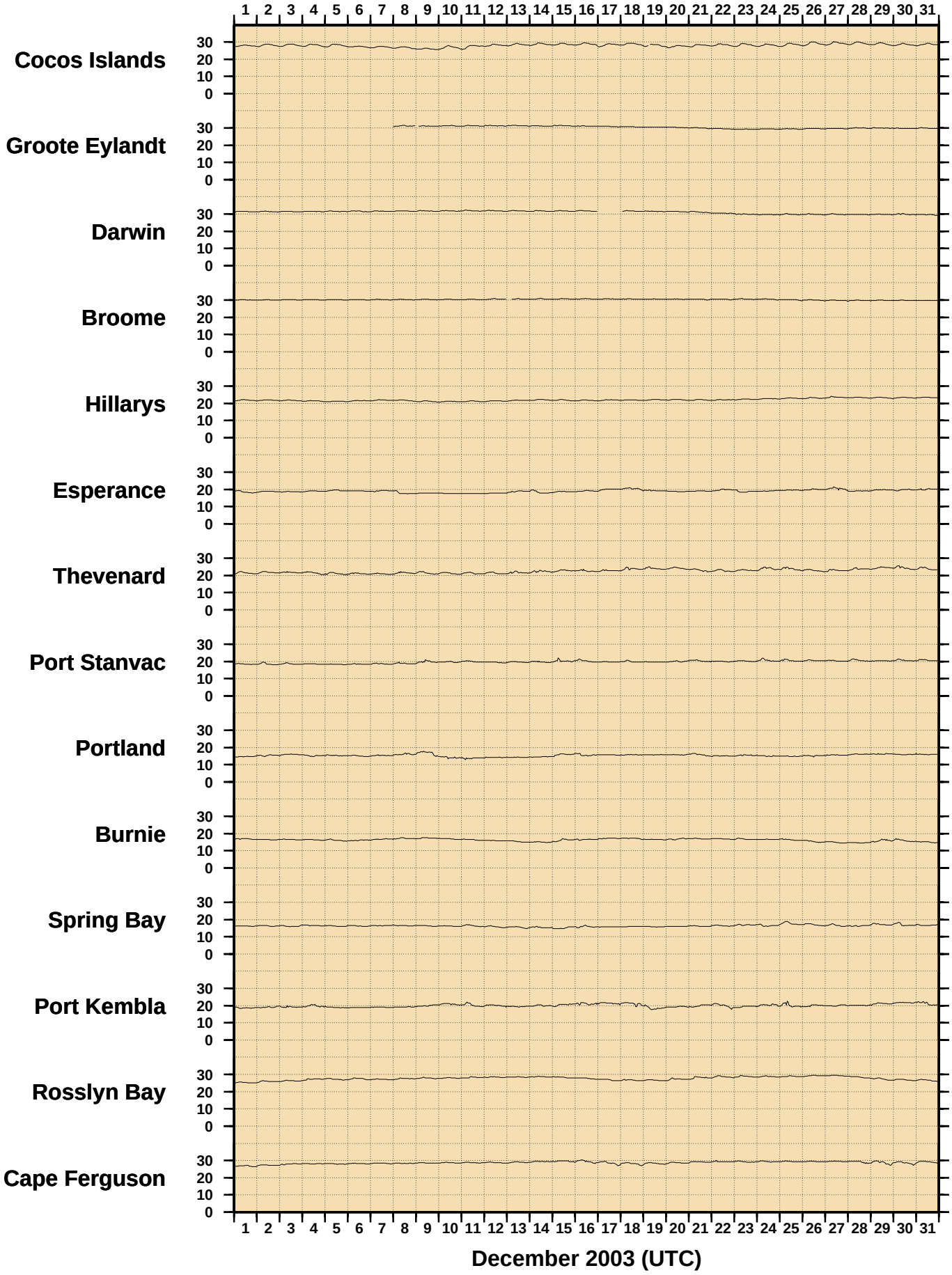


Figure 9

DECEMBER 2003
HOURLY ATMOSPHERIC PRESSURE (hPa)

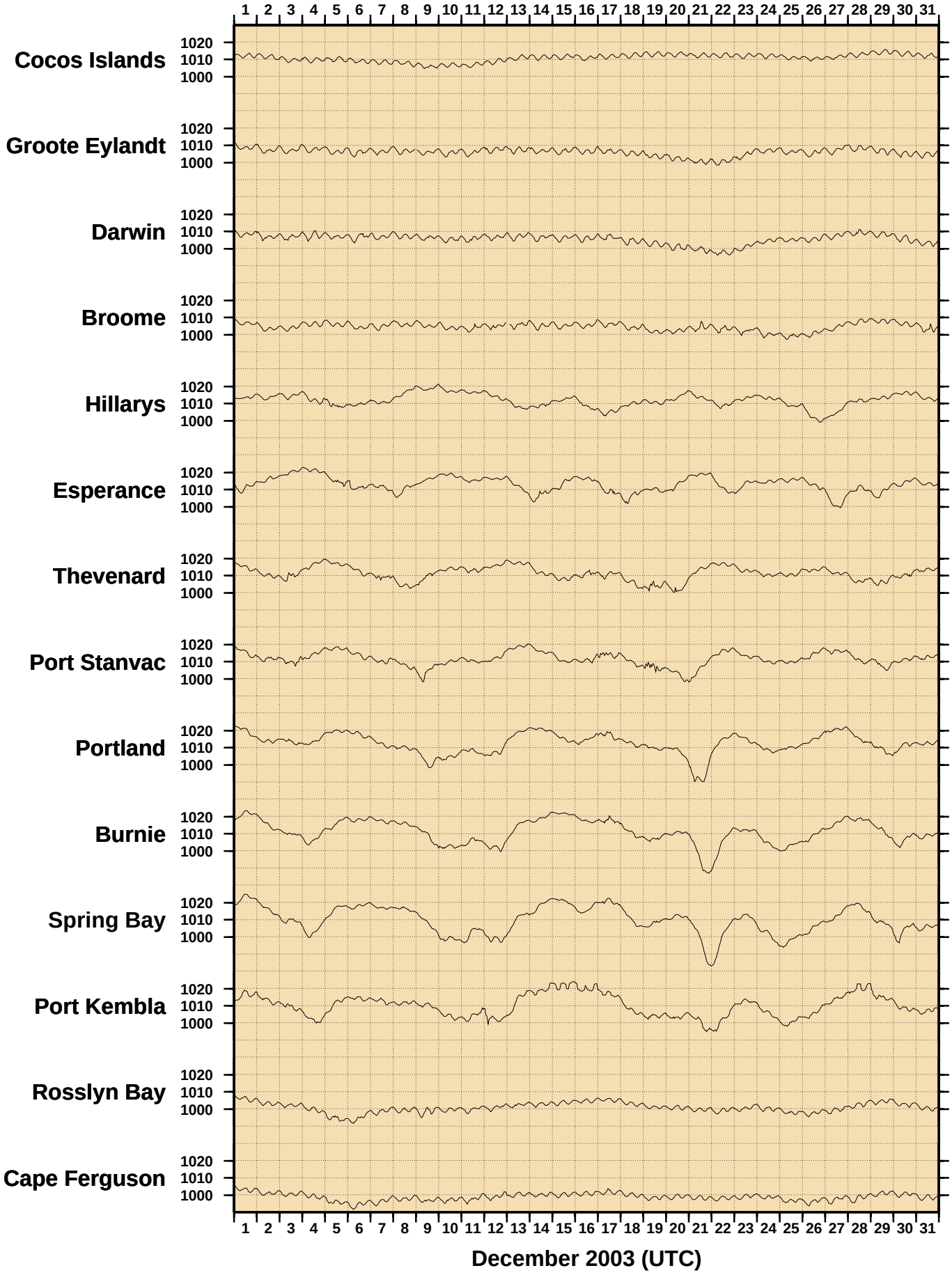


Figure 10

SEA LEVEL ANOMALIES THROUGH DECEMBER 2003 (m)

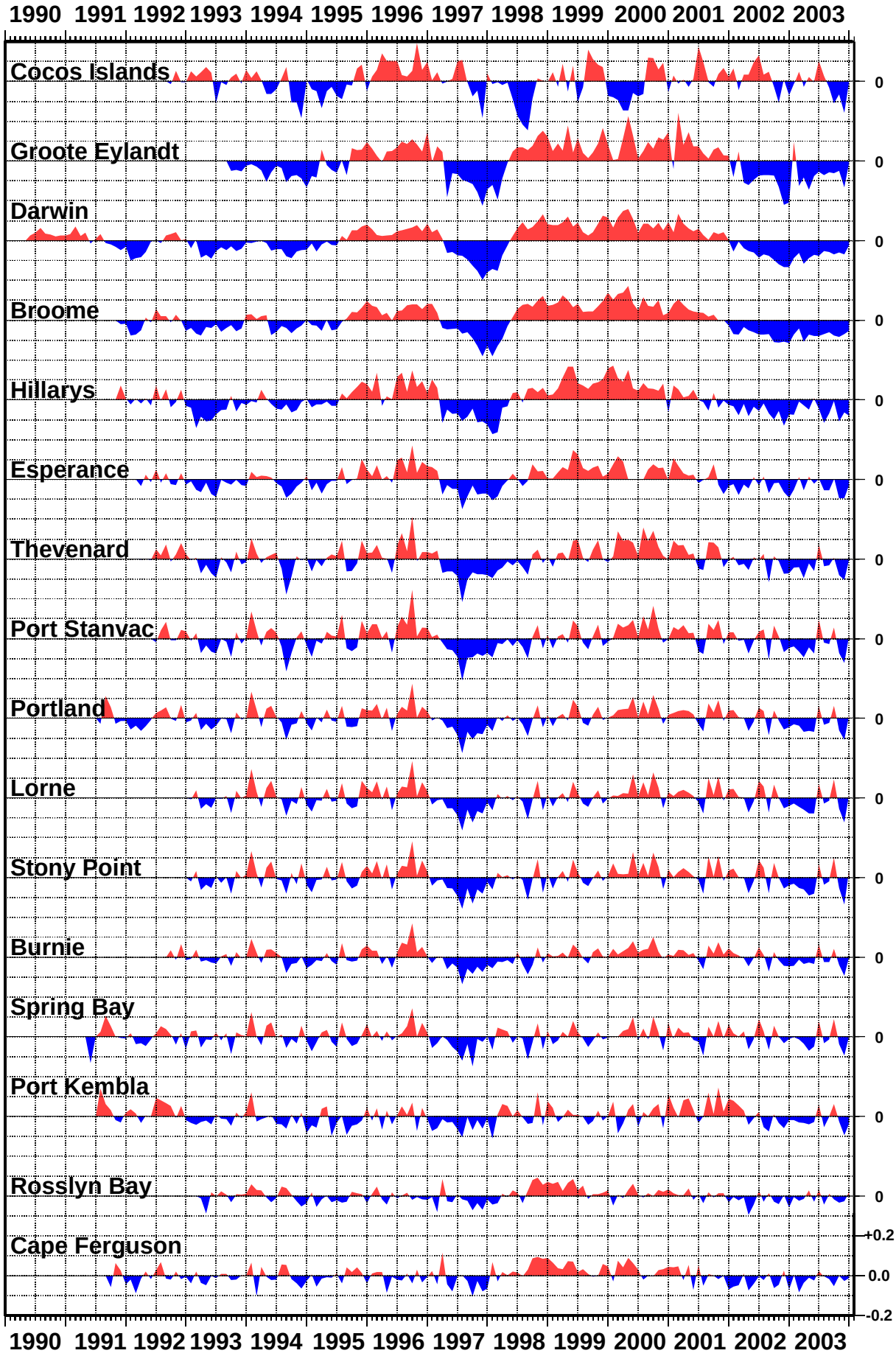


Figure 11

BAROMETRIC PRESSURE ANOMALIES THROUGH DECEMBER 2003 (hPa)

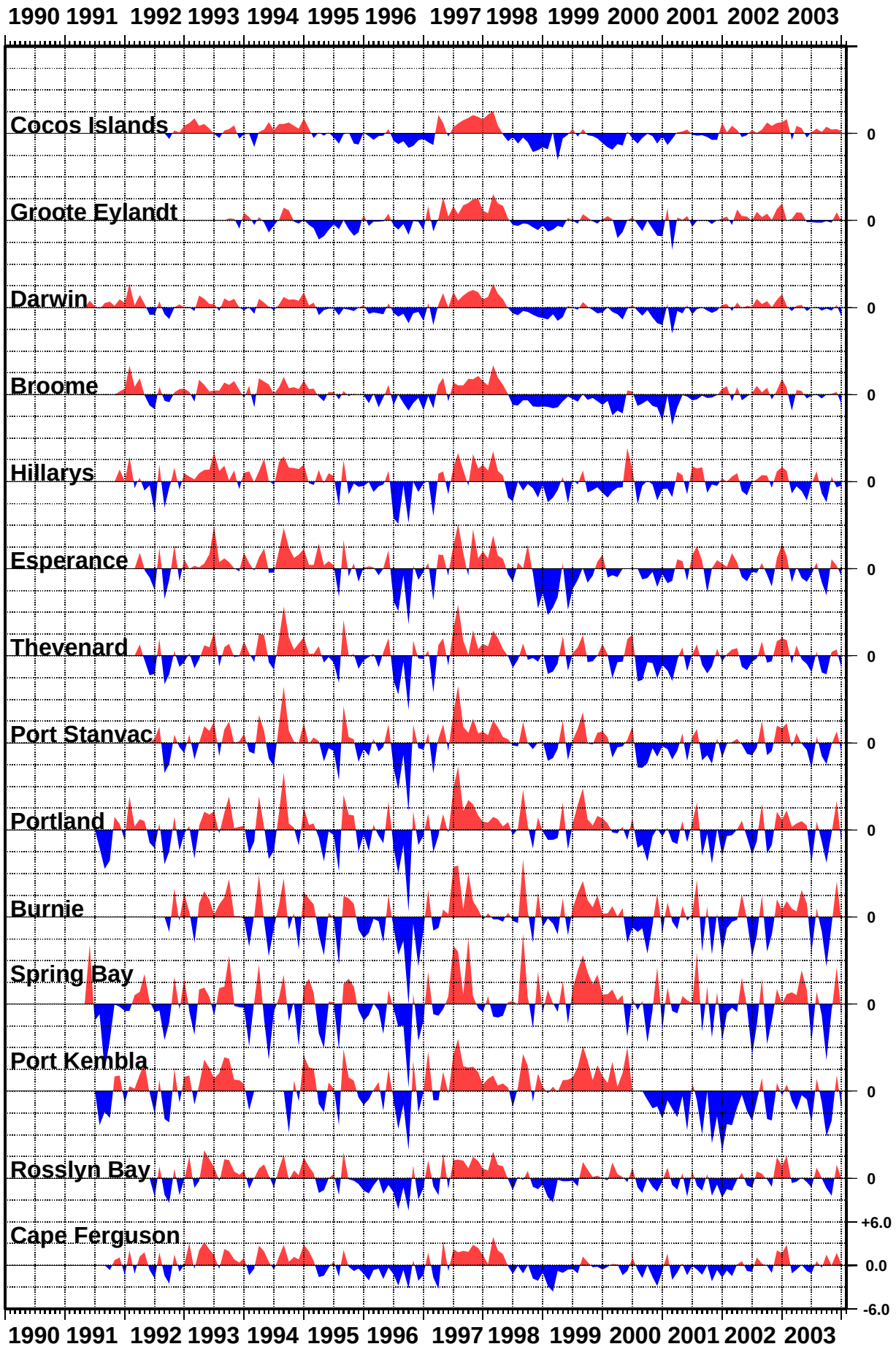


Figure 12

WATER TEMPERATURE ANOMALIES THROUGH DECEMBER 2003 (˚C)

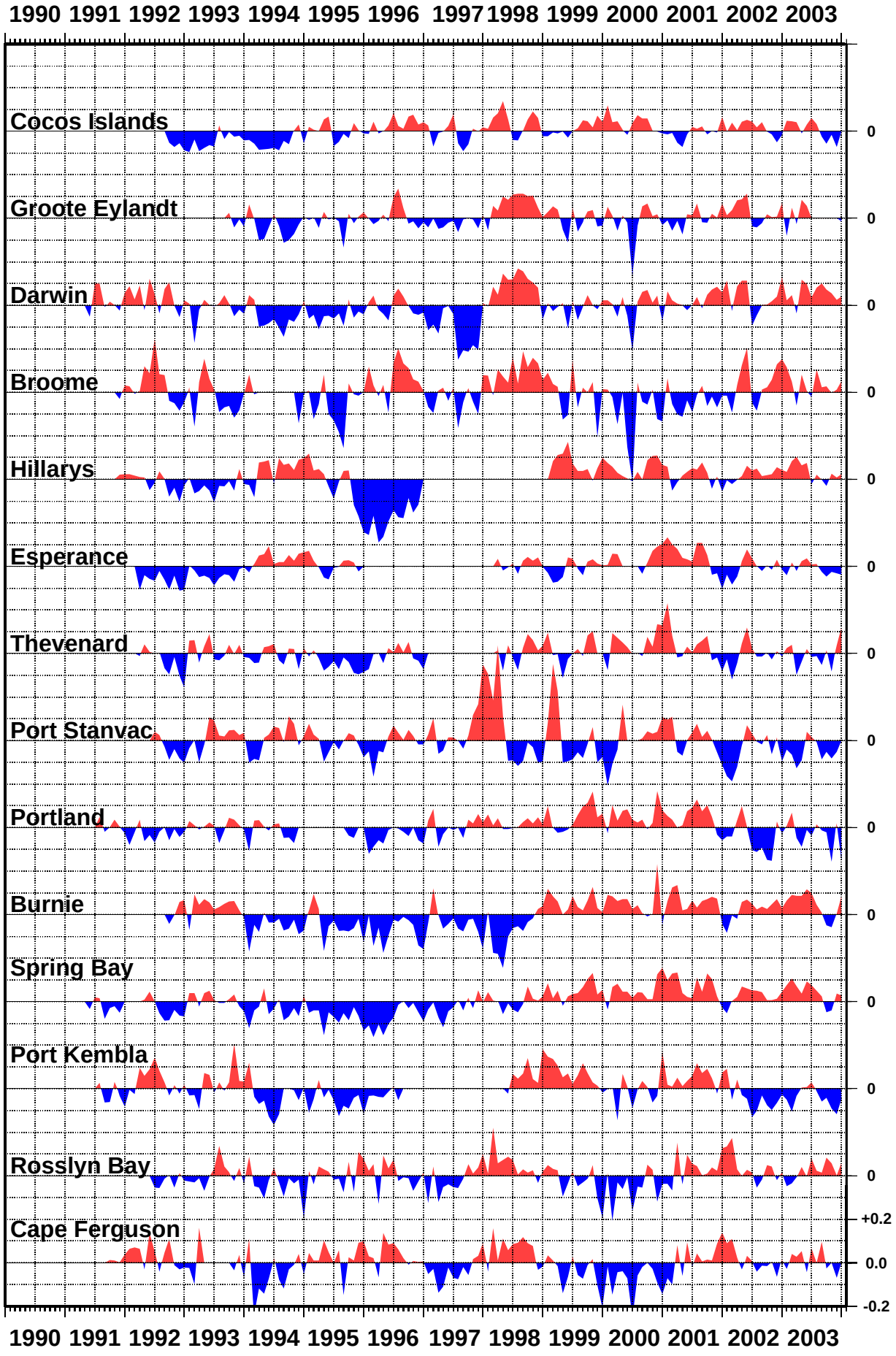


Figure 13

AIR TEMPERATURE ANOMALIES THROUGH DECEMBER 2003 (˚C)

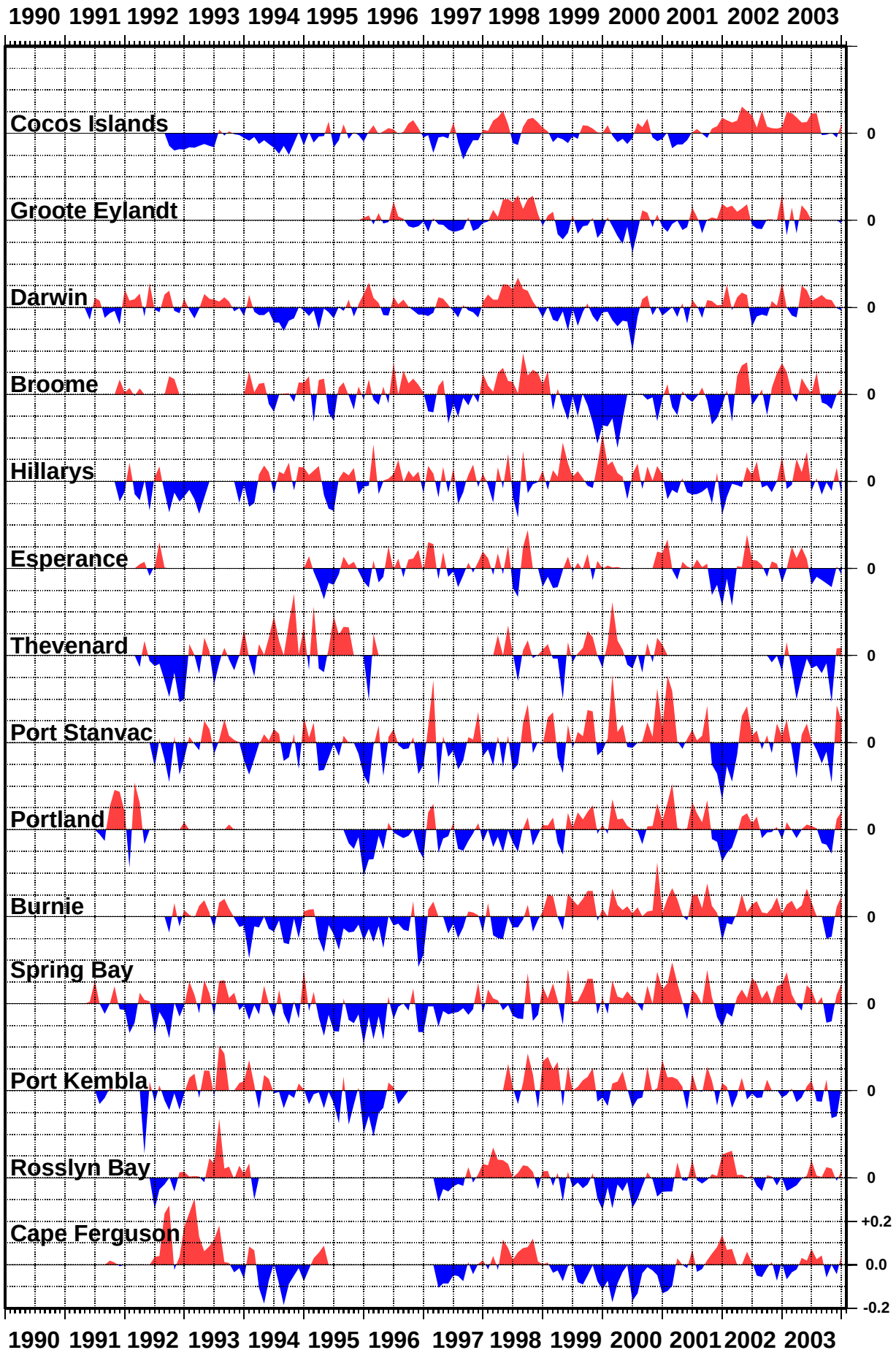
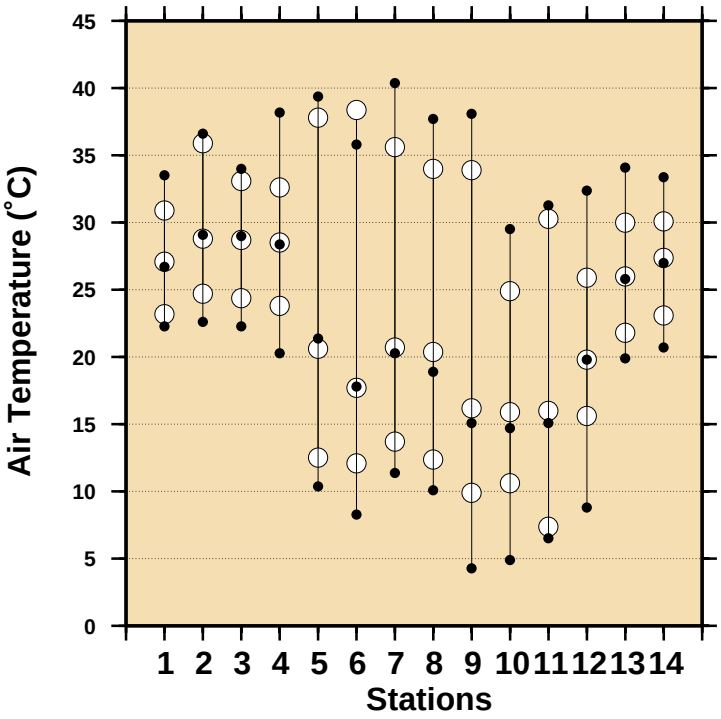
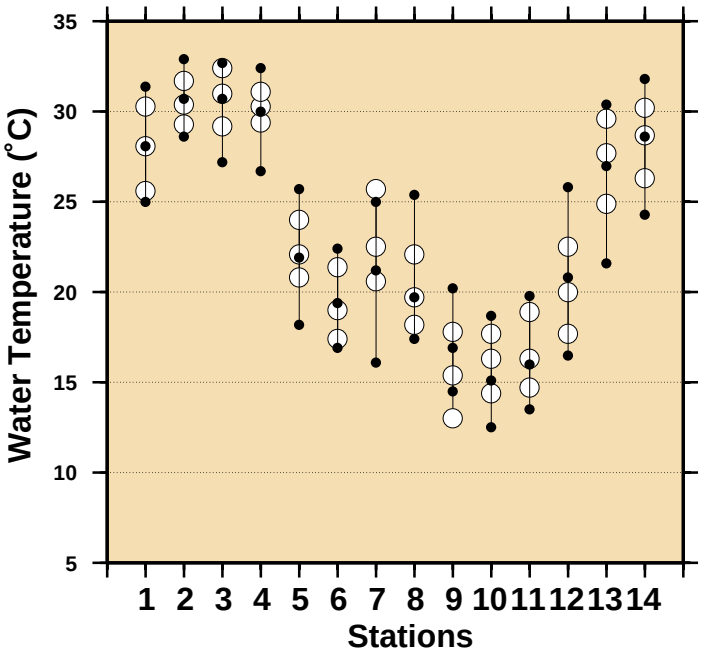
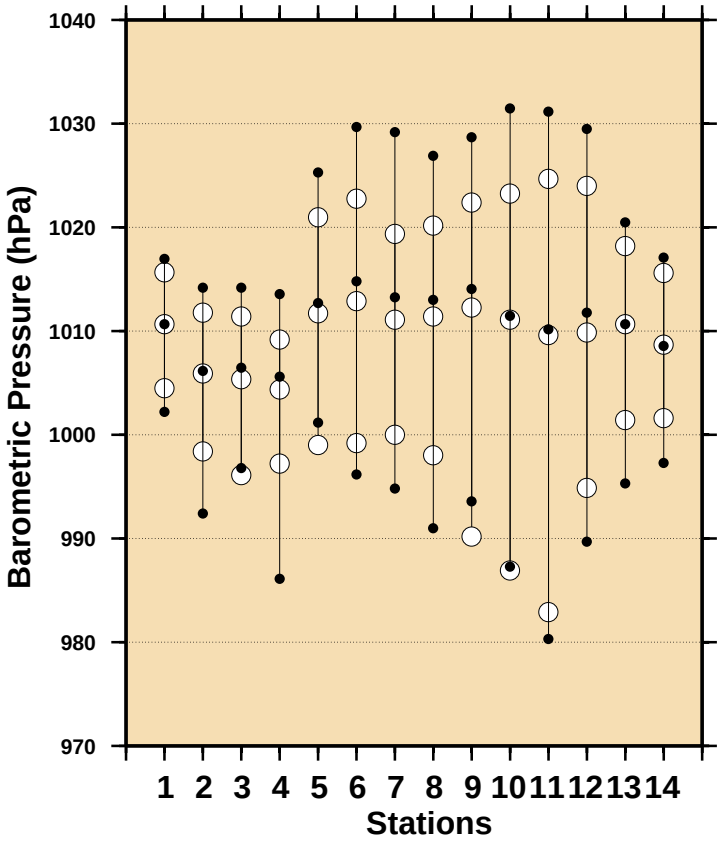


Figure 14

Comparison of December 2003 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 2003 Maximum
December 2003 Mean
December 2003 Minimum

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

Figure 15

SEA LEVEL DATA RETURN

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

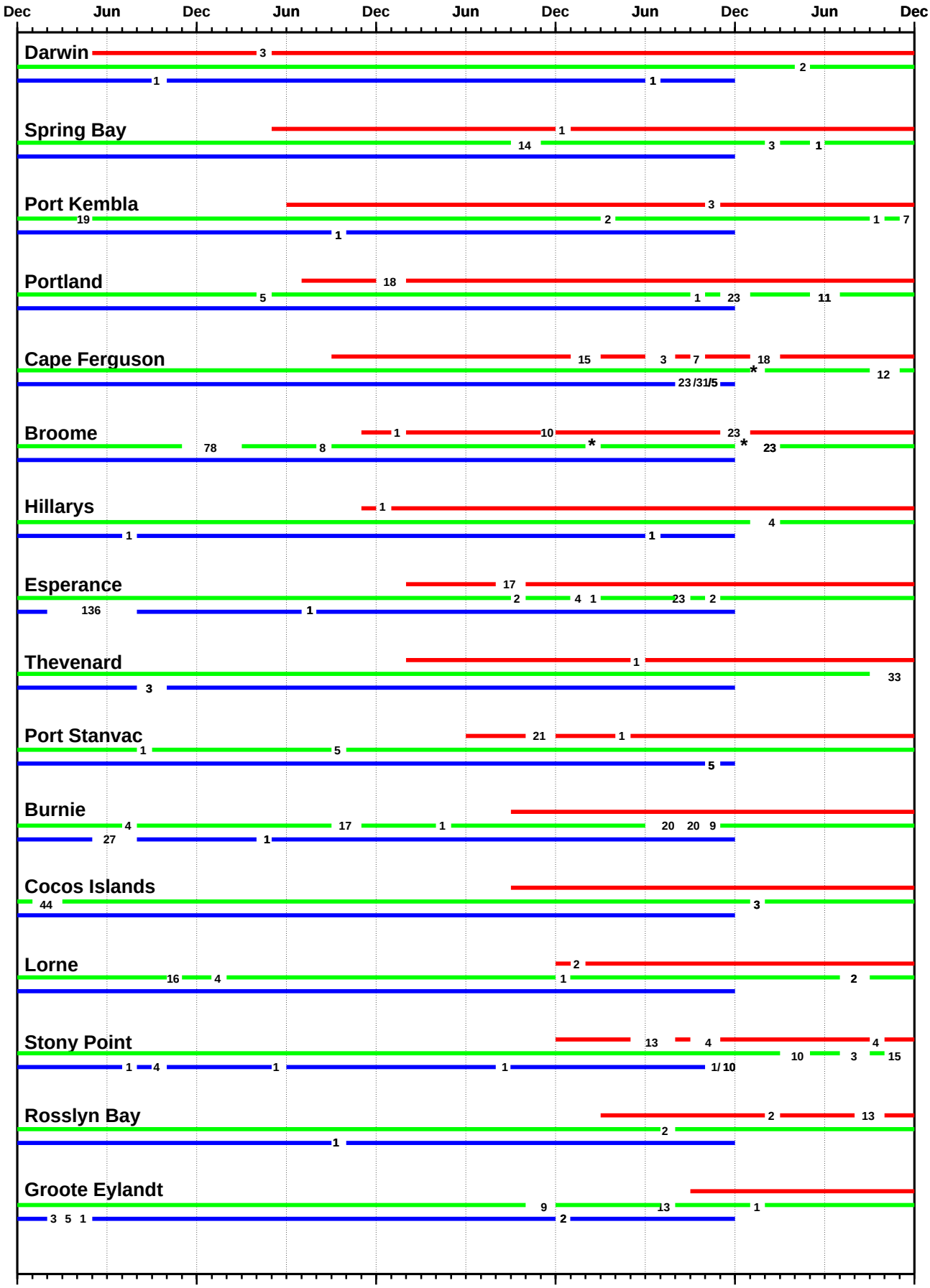


Figure 16
MONTHLY MEAN SEA LEVELS TO DECEMBER 2003 (m)

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

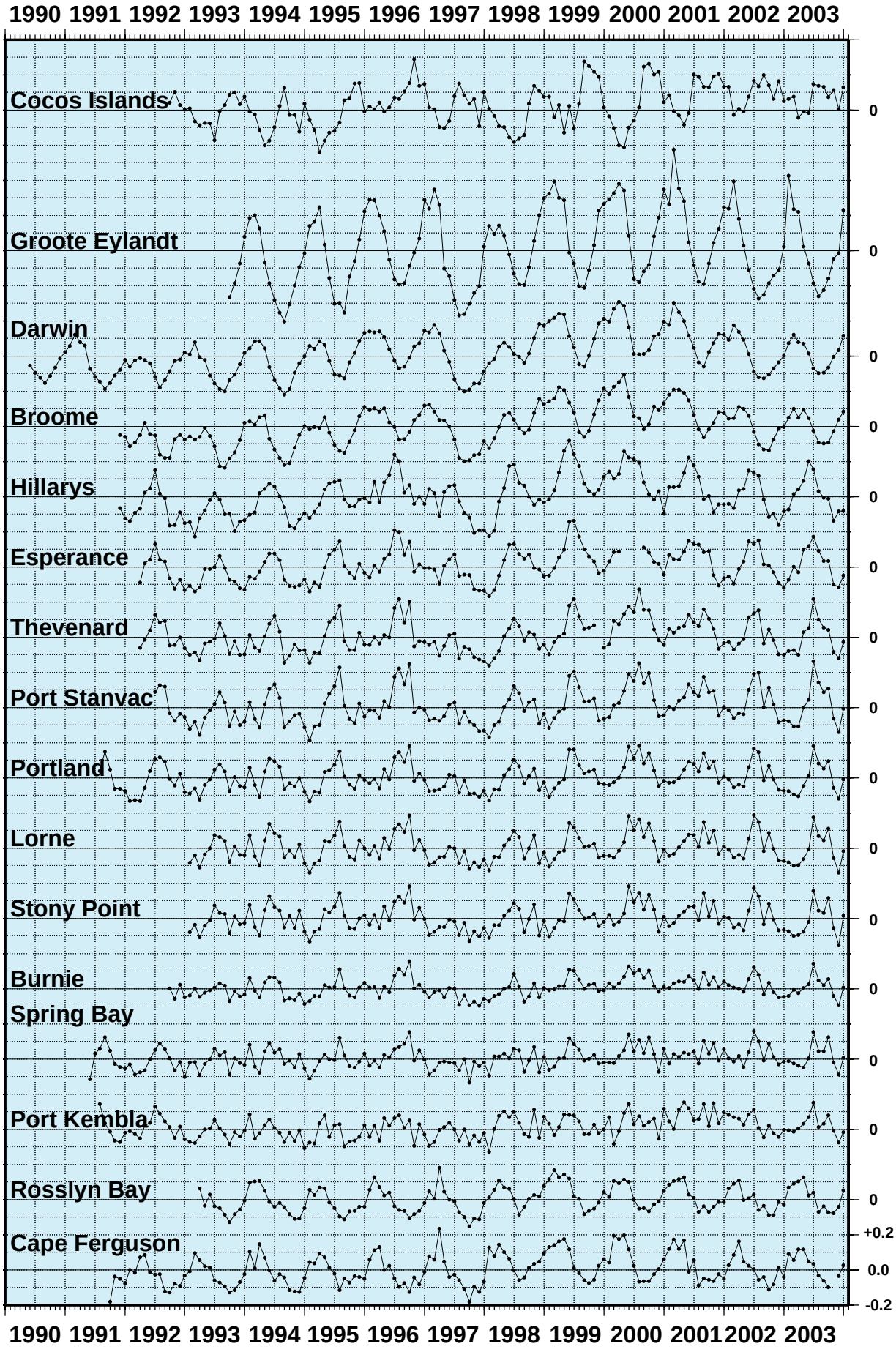


Figure 17

SEA LEVEL TRENDS THROUGH DECEMBER 2003 (mm/year)