

**THE AUSTRALIAN BASELINE SEA LEVEL
MONITORING PROJECT**

MONTHLY DATA REPORT

MARCH 2004



Australian Government

Bureau of Meteorology

This report was prepared under the Australian Greenhouse Science Program for the Australian Greenhouse Office, supported by the National Tidal Centre, Bureau of Meteorology.



Australian Government

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Quality Certification:

I authorise the issue of this Australian Baseline Sea Level Monitoring Project Monthly Data Report for March 2004 in accordance with National Tidal Centre Quality Assurance procedures.

William Mitchell
Manager - National Tidal Centre

The Australian Baseline Sea Level Monitoring Project

Monthly Data Report

MARCH 2004

NOTES ON THE DATA FOR MARCH 2004

The mission of this project is to operate and maintain a national array of high resolution sea level gauges and associated meteorological instruments, acquire observations, process observations into quality controlled data, archive the data, and make the information publicly available.

The Baseline Array, and a similar array in the South Pacific, have been widely acknowledged in the global science community as two of the most accurate and reliable sources for information on sea level and climate change anywhere in the world.

The visualisation techniques included in this report, and the comments provided, are for the purposes of quality control analysis. Interpretation of the sea level record for the trends or climatic episodes is not the purpose of these reports. Provisional interpretation may be undertaken from time to time for reporting purposes and may be found in other publications.

Readers are cautioned against drawing any conclusions from short duration records, particularly when in isolation from other phenomena. The sea level record includes natural variability, such as El Nino events and the effects of atmospheric, oceanographic and geological processes. Vertical movement of the observations relative to local topography is monitored and may be found on the Geosciences Australia web site. Movement of each station relative to the International Terrestrial Reference Frame is not monitored. It is important to note that as the sea level record becomes longer, the short term trend estimate becomes more stable and reliable.

Sea level data return (Figures 1 and 15) in March was excellent for all stations.

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 remained intermittently erroneous throughout March. All of the wind data from Cocos Islands was also erroneous in March. These values and the corresponding incident wind directions have been removed (Figures 4, 5 and 6). The air temperature data from Rosslyn Bay was erroneous throughout March and was removed from the record.

The sea level anomalies (Figure 10) changed from positive to negative at Port Kembla and from negative to positive at Rosslyn Bay and Cape Ferguson. They remained positive at Cocos Islands and Spring Bay and continued to be negative at all other stations in March.

The barometric pressure anomalies (Figure 11) changed from negative to positive at Hillarys and Esperance and remained negative at the remaining stations in March.

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

For most stations the mean air temperature for March 2004 was generally consistent with the long term March mean. The maximum air temperature at Cocos Islands (36.6°C), Hillarys (39.6°C) and Port Kembla (33.8°C) was higher than the previously recorded maximum for March. The minimum air temperature at Cocos Islands (22.4°C) and Thevenard (10.4°C) was lower than the previously recorded minimum for March.

The March 2004 mean water temperature for most sites was also consistent with the long-term March mean. The minimum water temperature at Broome (26.2°C) was lower than the previously recorded minimum for March.

The mean barometric pressure for March 2004 was generally consistent with the long-term March mean for all stations.

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.

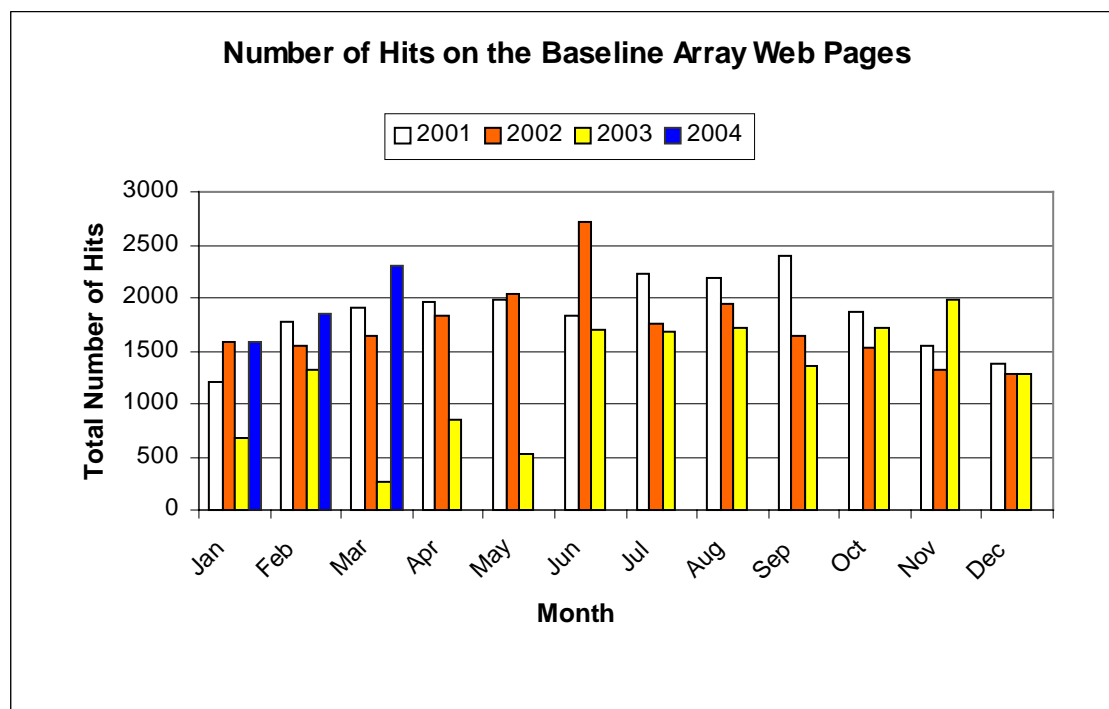
Figure 17 shows the short-term sea level trends for each site included in the Australian Baseline Sea Level Monitoring Project. Table 1 lists the commencement of operation, the sea level trend for the entire record (plotted in Figure 17) and the change in trend with respect to the analysis of the previous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

The number of hits to the Australian Baseline Sea Level Monitoring project web pages from 2001 to March 2004 is given in Table 2.

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.

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 March 2004.

Location	Installation Date	Sea Level Trend (mm/yr)	Change from previous month
Cocos Islands	Sep 1992	+11.7	0.0
Groote Eylandt	Sep 1993	+13.4	0.0
Darwin	May 1990	+10.9	-0.1
Broome	Nov 1991	+13.5	-0.2
Hillarys	Nov 1991	+10.3	-0.4
Esperance	Mar 1992	+7.4	-0.2
Thevenard	Mar 1992	+5.7	-0.1
Port Stanvac	Jun 1992	+6.7	-0.2
Portland	Jul 1991	+3.2	-0.1
Lorne	Jan 1993	+2.4	-0.1
Stony Point	Jan 1993	+1.9	-0.1
Burnie	Sep 1992	+3.7	0.0
Spring Bay	May 1991	+3.9	0.0
Port Kembla	Jul 1991	+5.2	-0.1
Rosslyn Bay	Jun 1992	+4.0	+0.1
Cape Ferguson	Sep 1991	+5.4	+0.1

Table 2: Number of hits on the Australian Baseline Sea Level Monitoring Project web pages from 2001 to March 2004.

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

Further information on the *Monthly Data Report* and other projects conducted by the NTC, Bureau of Meteorology can be obtained from the following address.

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

Please note the following:

While all care has been taken in the collection, analysis and compilation of the data, it is supplied on the condition that neither the *Commonwealth of Australia* nor the NTC, Bureau of Meteorology shall be liable for any loss or injury whatsoever arising from the use of the data. The Commonwealth of Australia holds copyright for material contained in this document.

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

Figure 1

MARCH 2004
SIX MINUTE SEA LEVEL OBSERVATIONS (m)

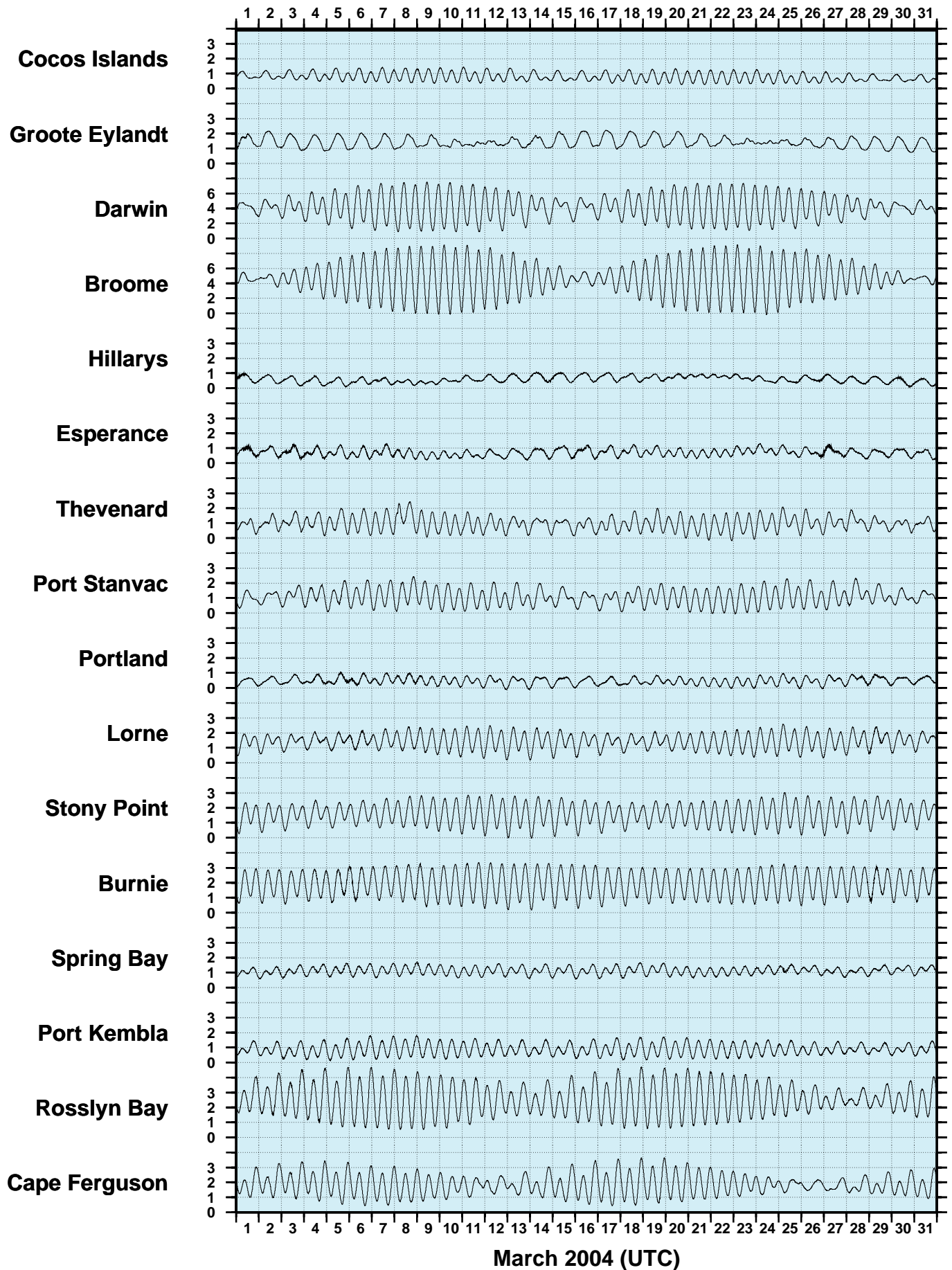


Figure 2

MARCH 2004
SIX MINUTE RESIDUAL WATER LEVELS (m)

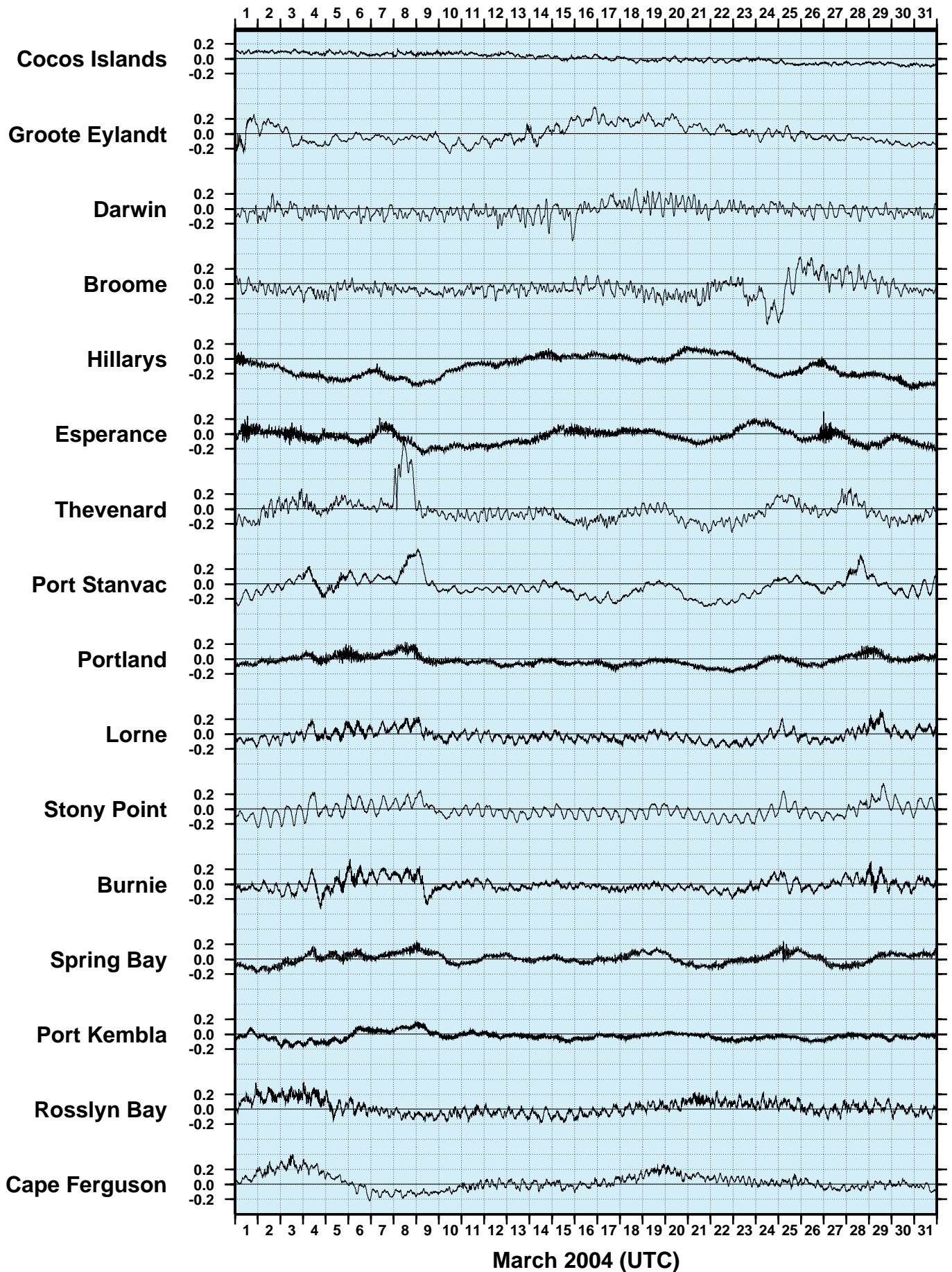


Figure 3
MARCH 2004
SIX MINUTE RESIDUALS
ADJUSTED FOR ATMOSPHERIC PRESSURE (m)

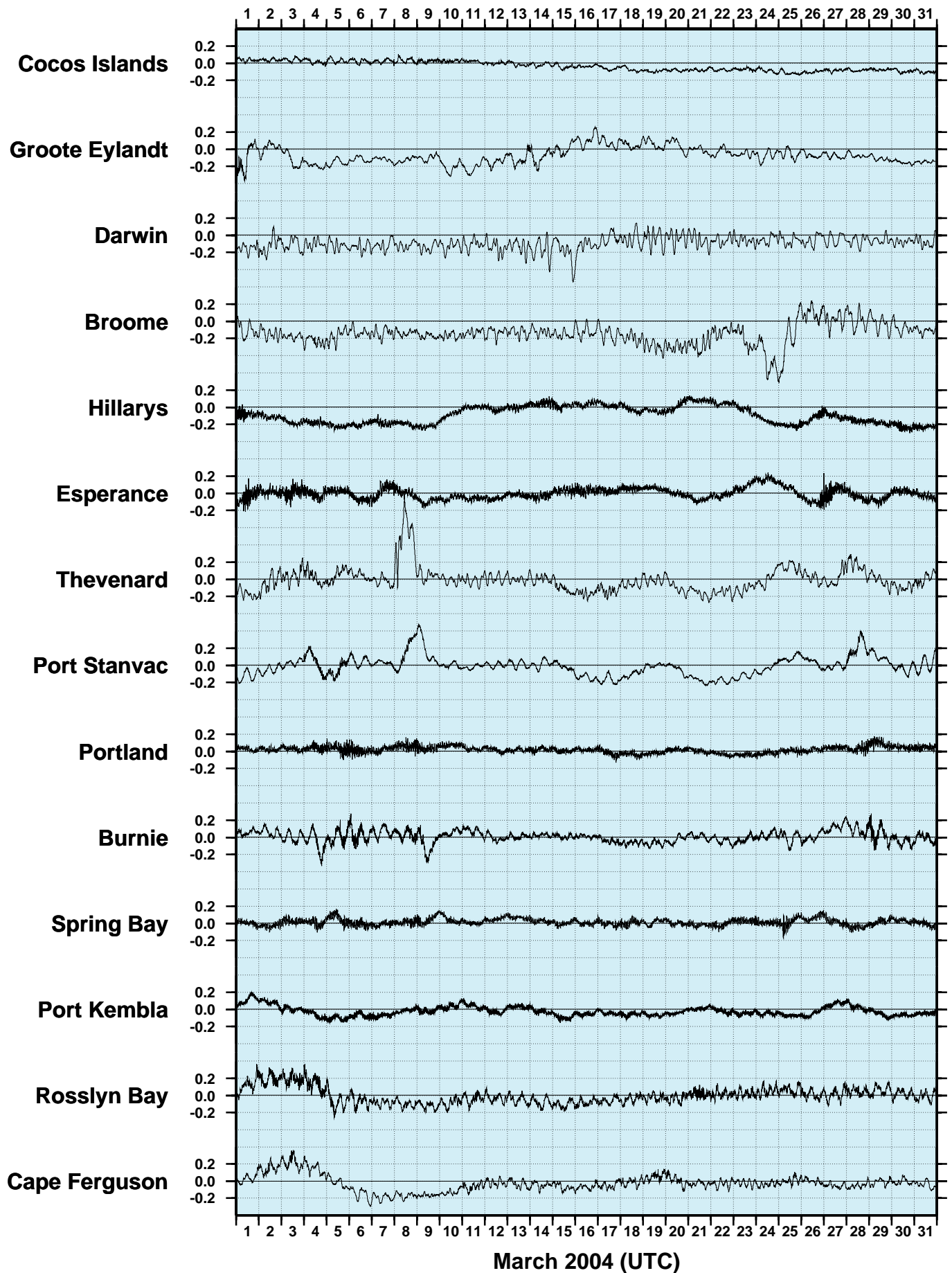


Figure 4

MARCH 2004
HOURLY WIND SPEEDS (m/s)

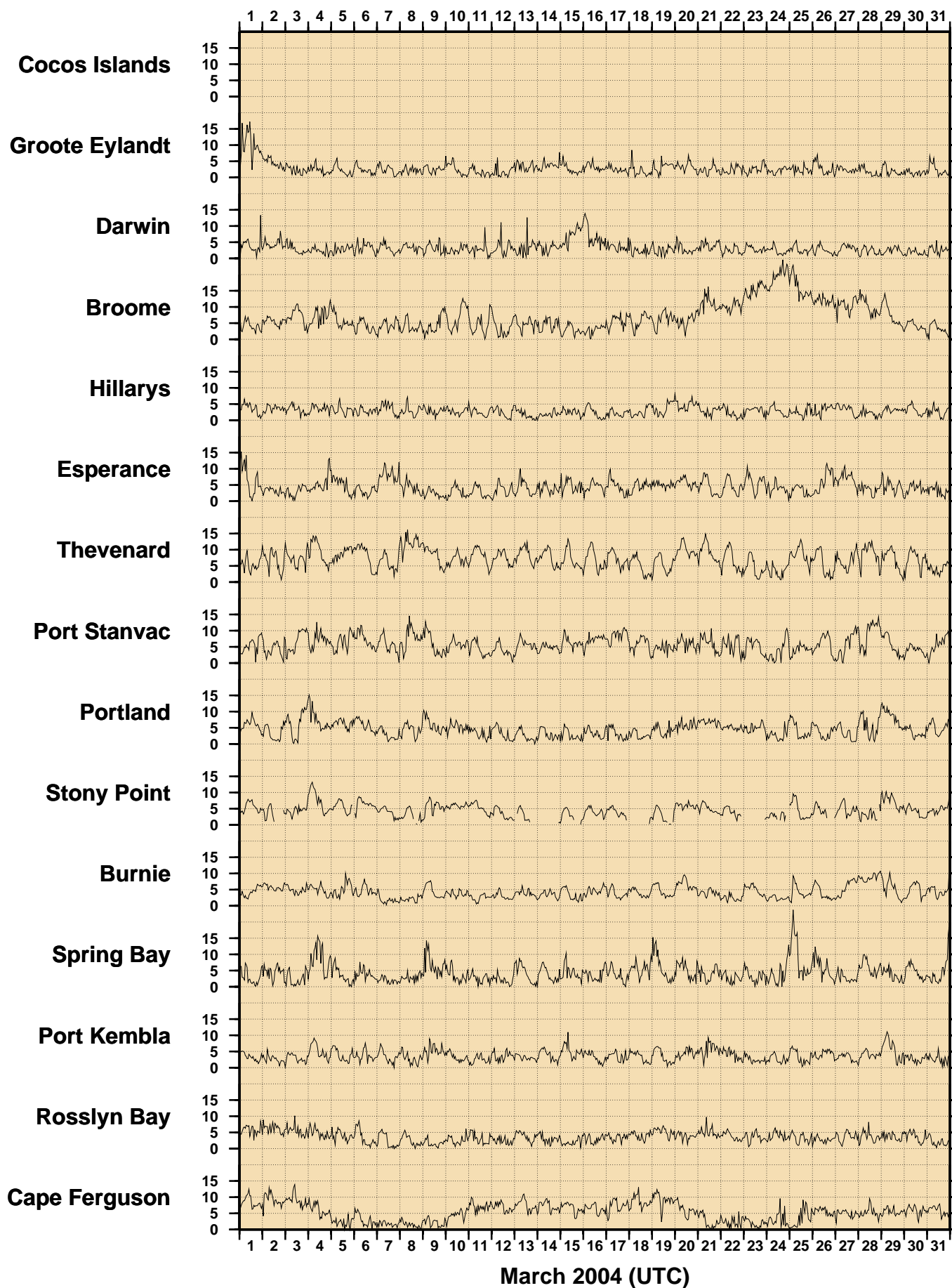


Figure 5

MARCH 2004
HOURLY INCIDENT WINDS (m/s, deg True)

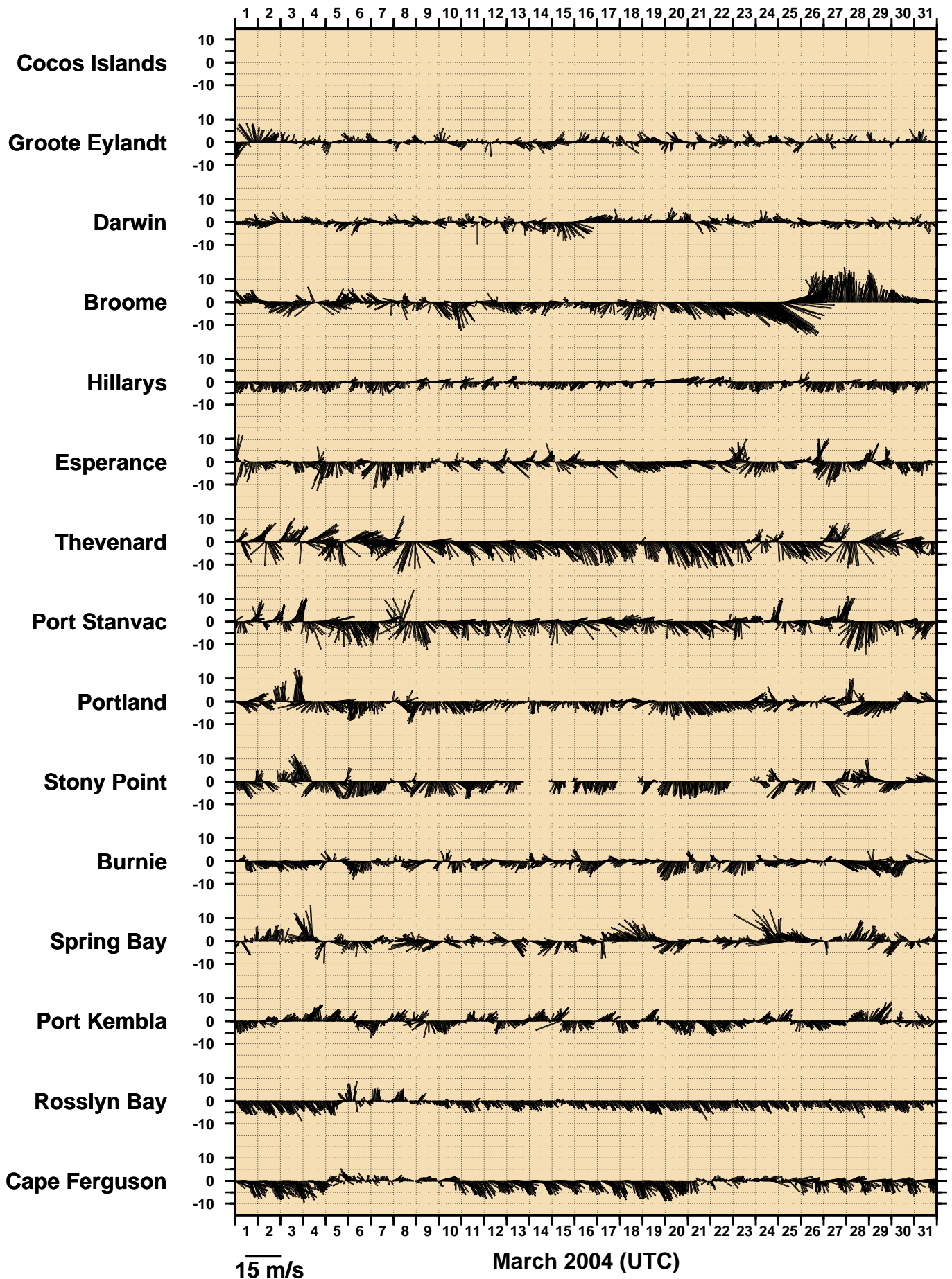


Figure 6

MARCH 2004
HOURLY MAXIMUM WIND GUSTS (m/s)

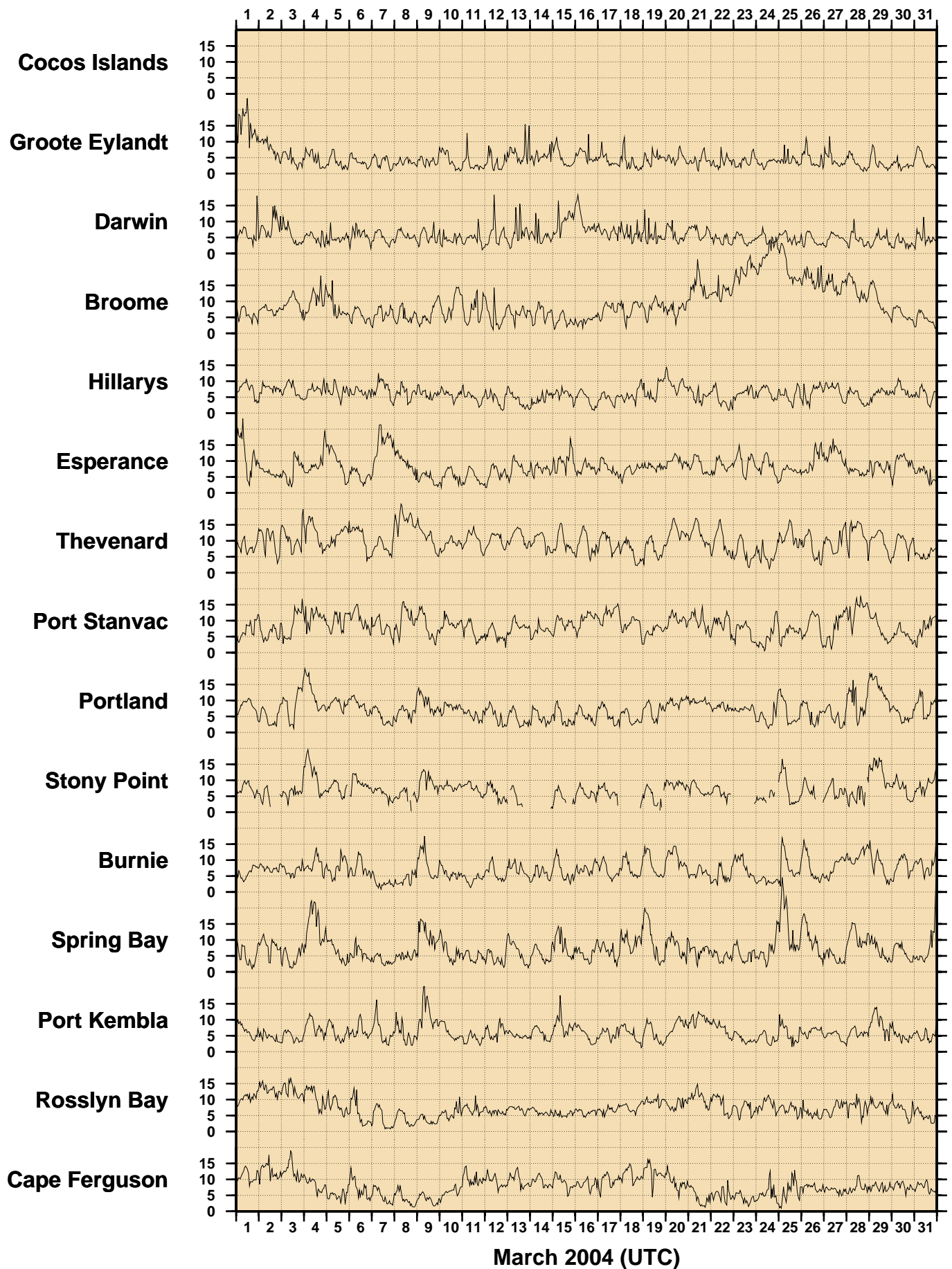


Figure 7

MARCH 2004
HOURLY AIR TEMPERATURES (°C)

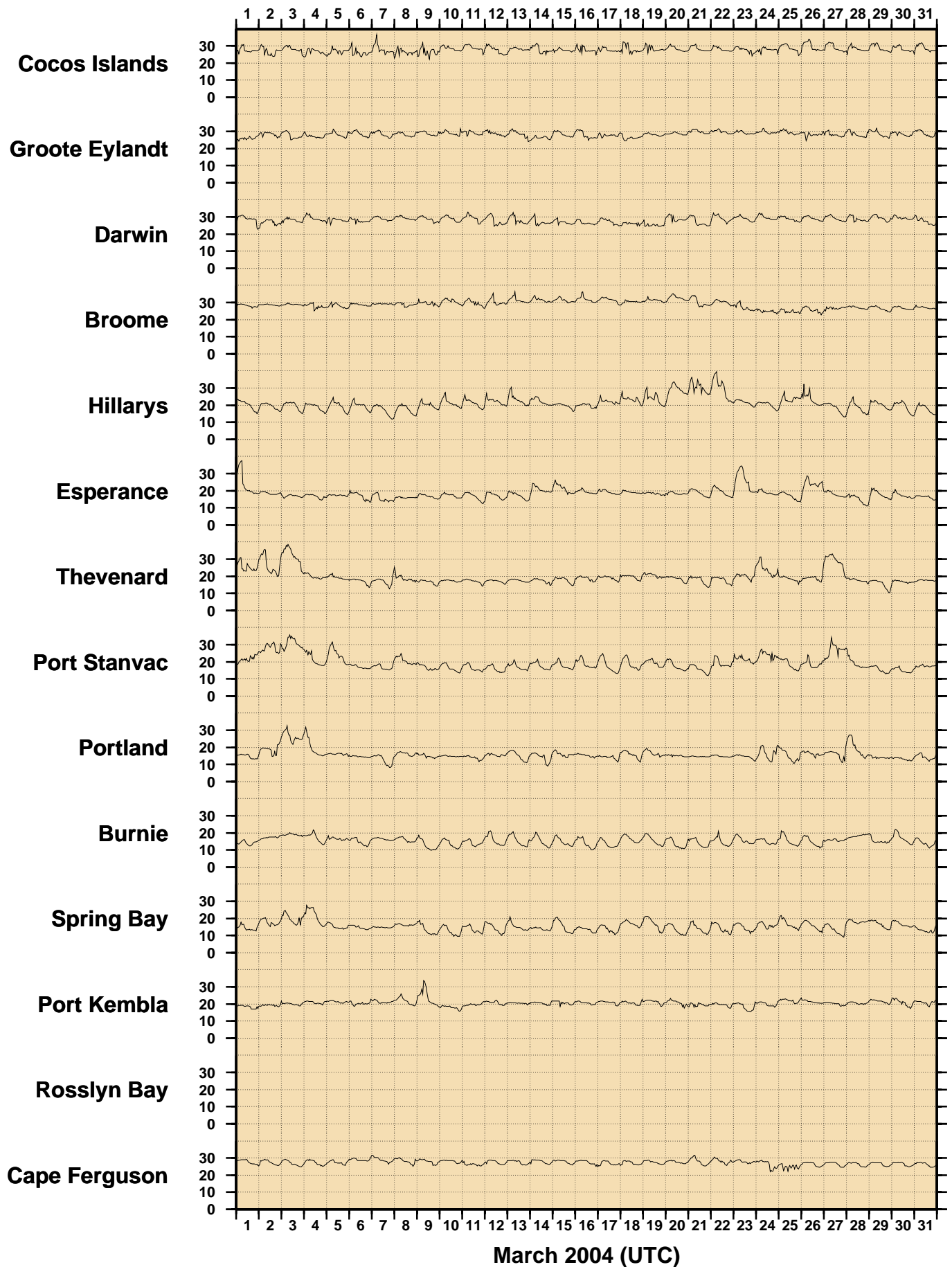


Figure 8

MARCH 2004
HOURLY WATER TEMPERATURES (°C)

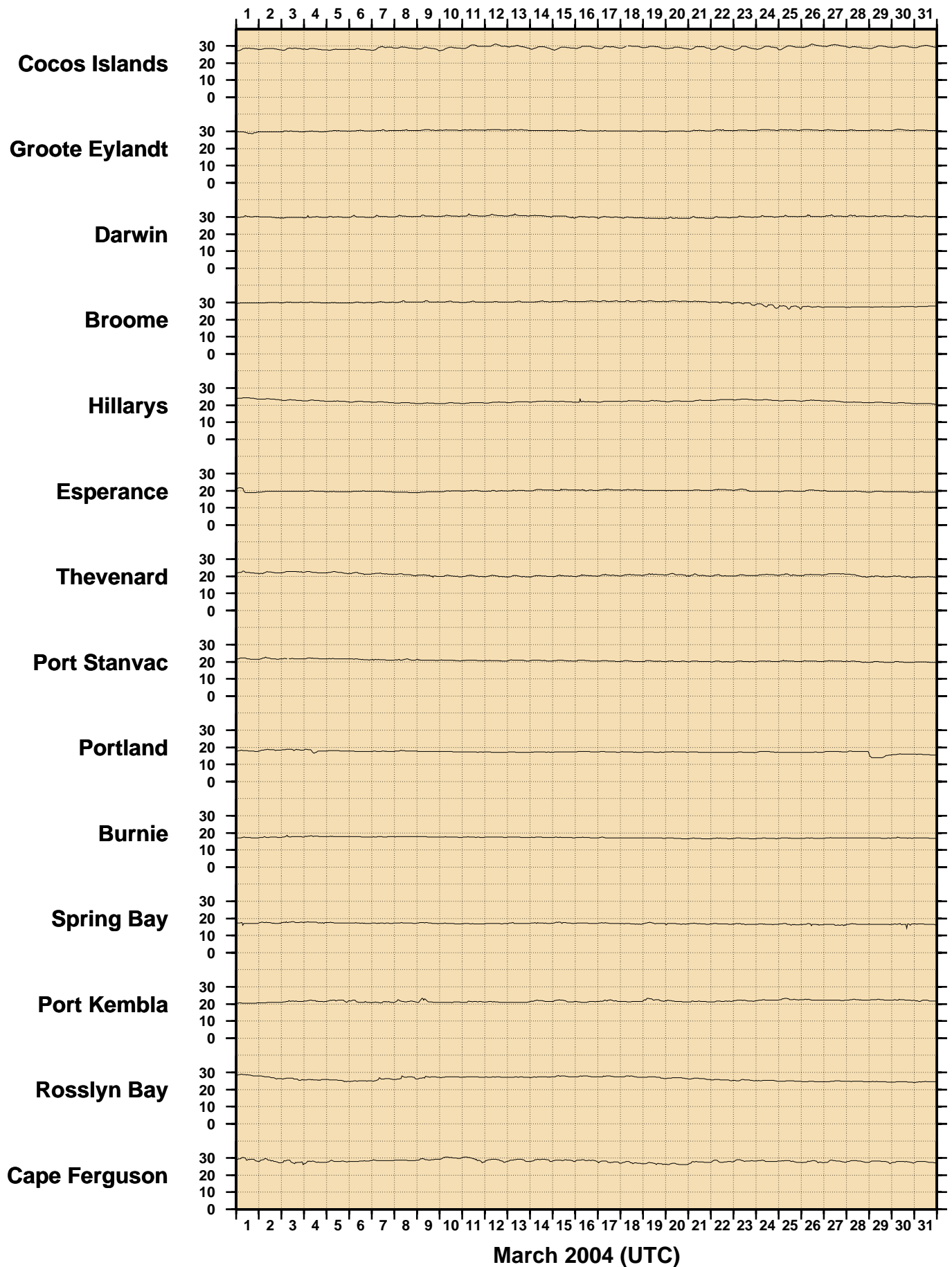


Figure 9

MARCH 2004
HOURLY ATMOSPHERIC PRESSURE (hPa)

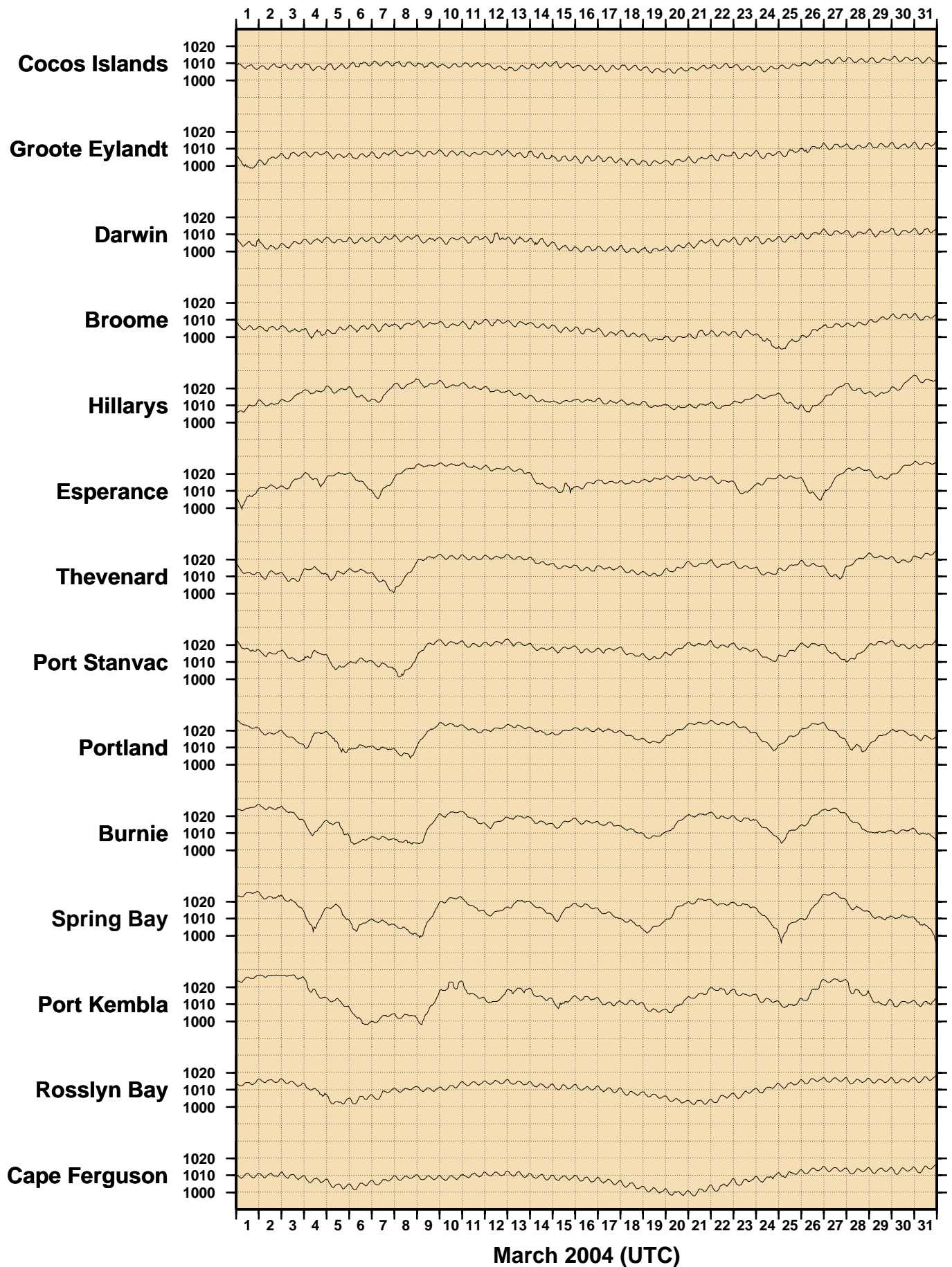


Figure 10
SEA LEVEL ANOMALIES THROUGH MARCH 2004 (m)

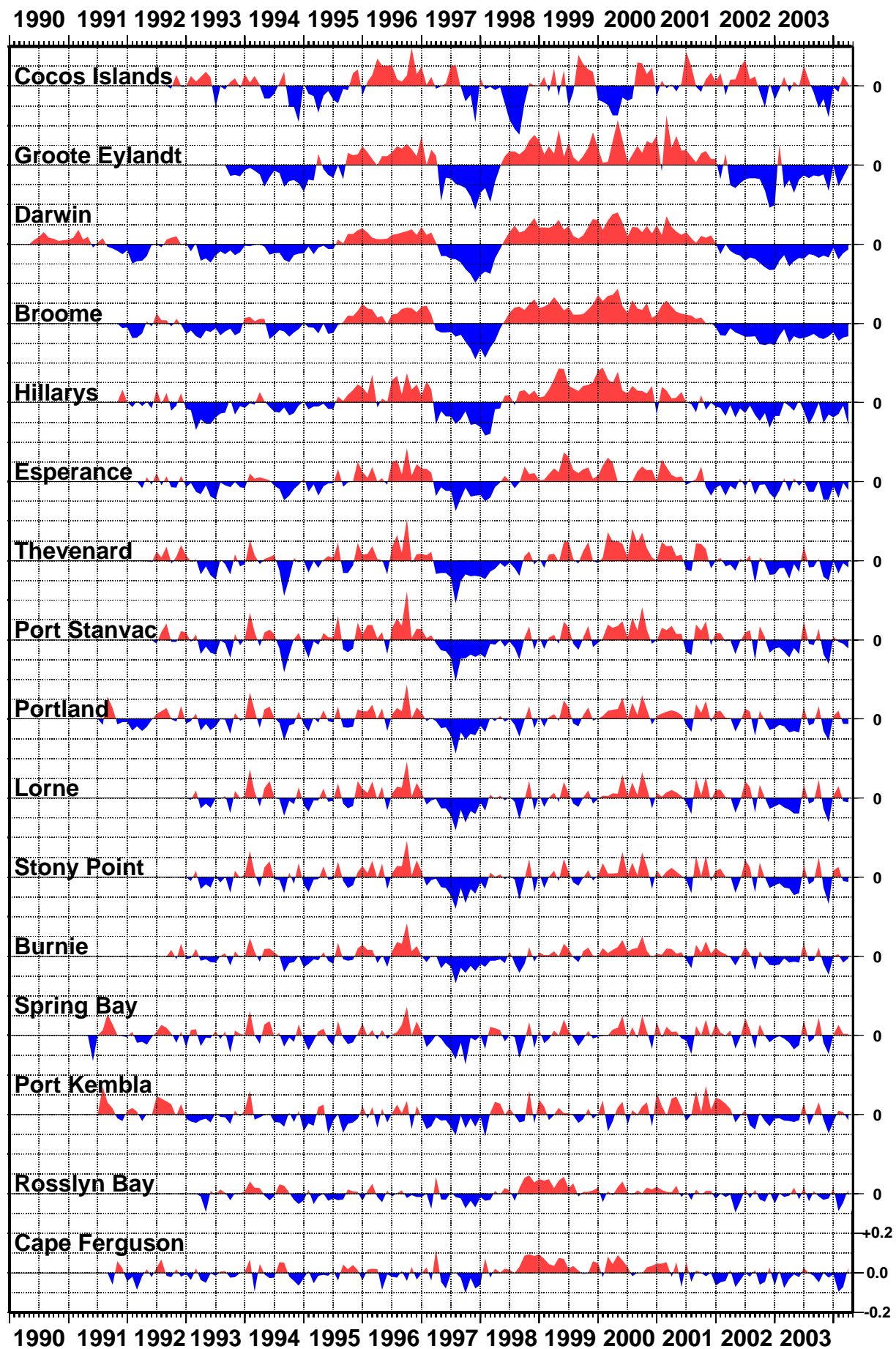


Figure 11

BAROMETRIC PRESSURE ANOMALIES THROUGH MARCH 2004 (hPa)

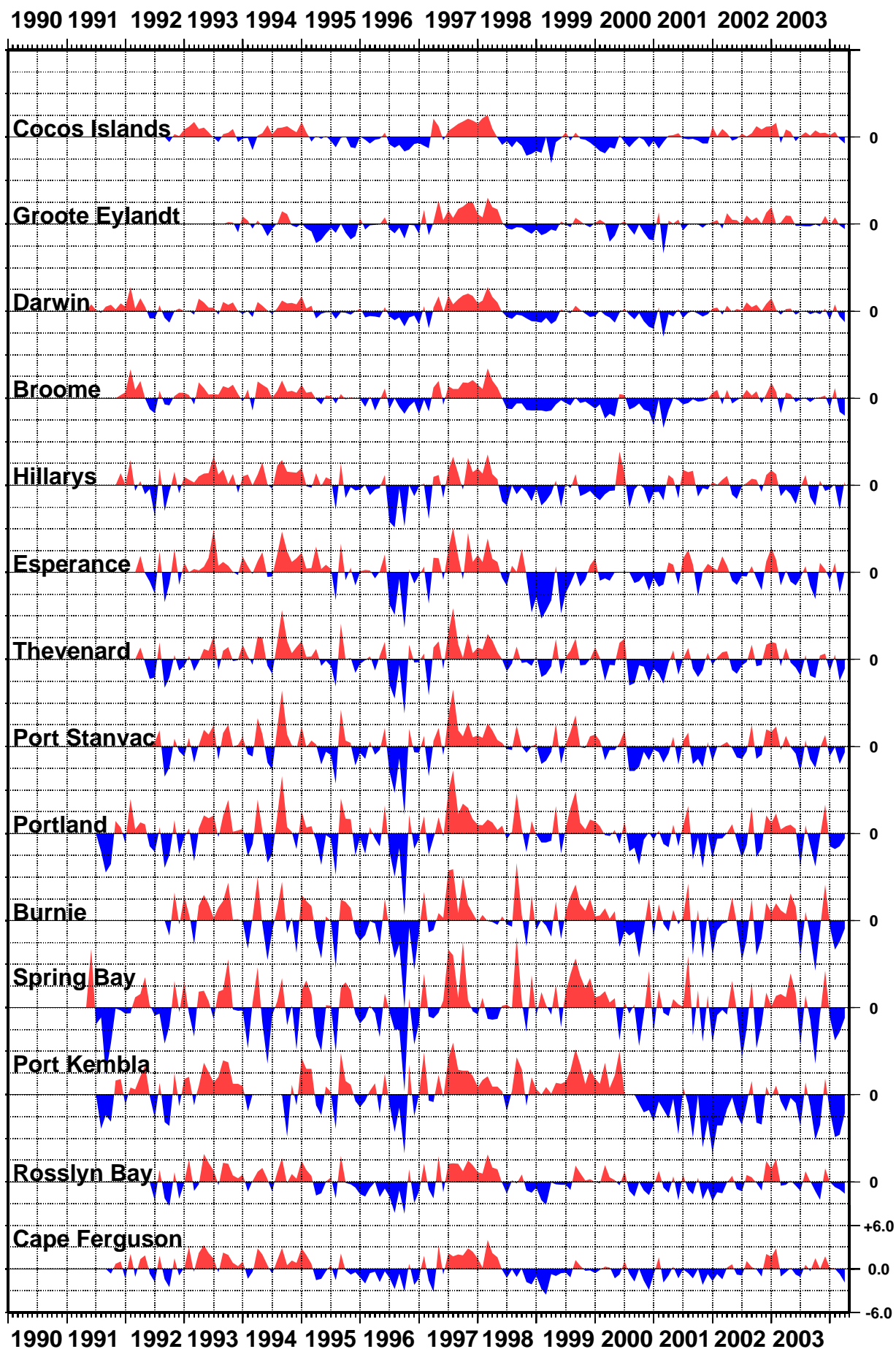


Figure 12

WATER TEMPERATURE ANOMALIES THROUGH MARCH 2004 (°C)

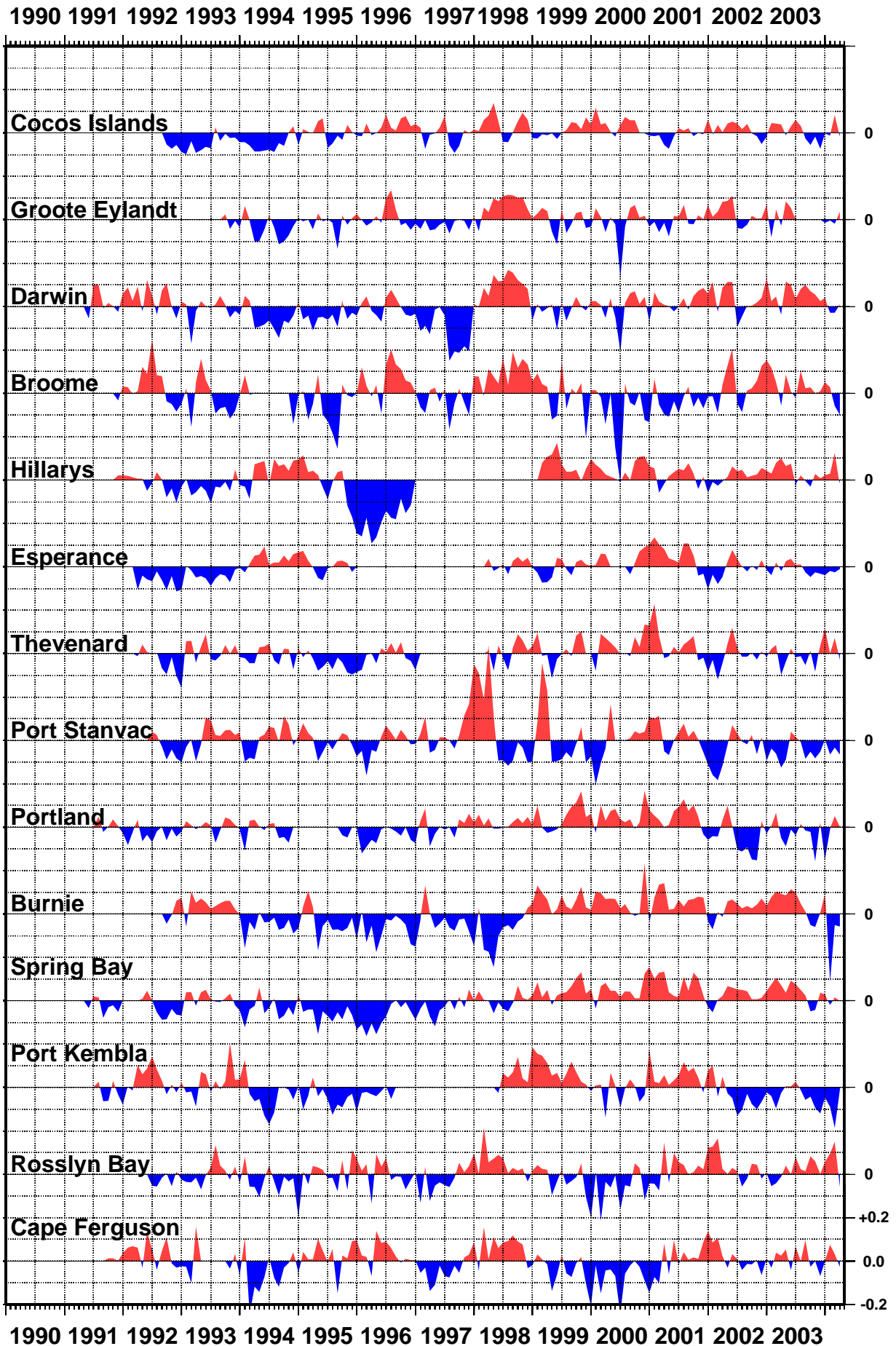


Figure 13
AIR TEMPERATURE ANOMALIES
THROUGH MARCH 2004 (°C)

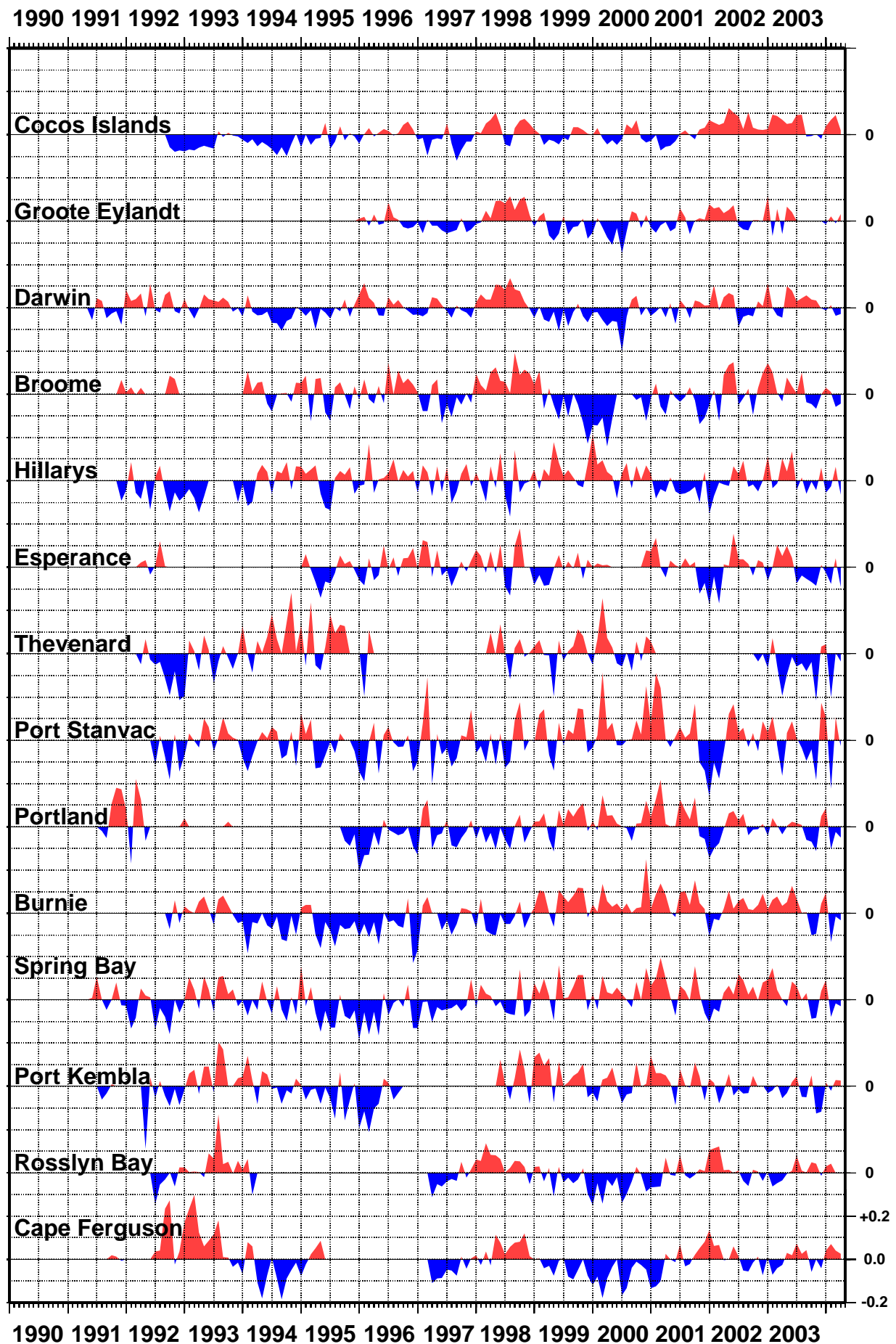
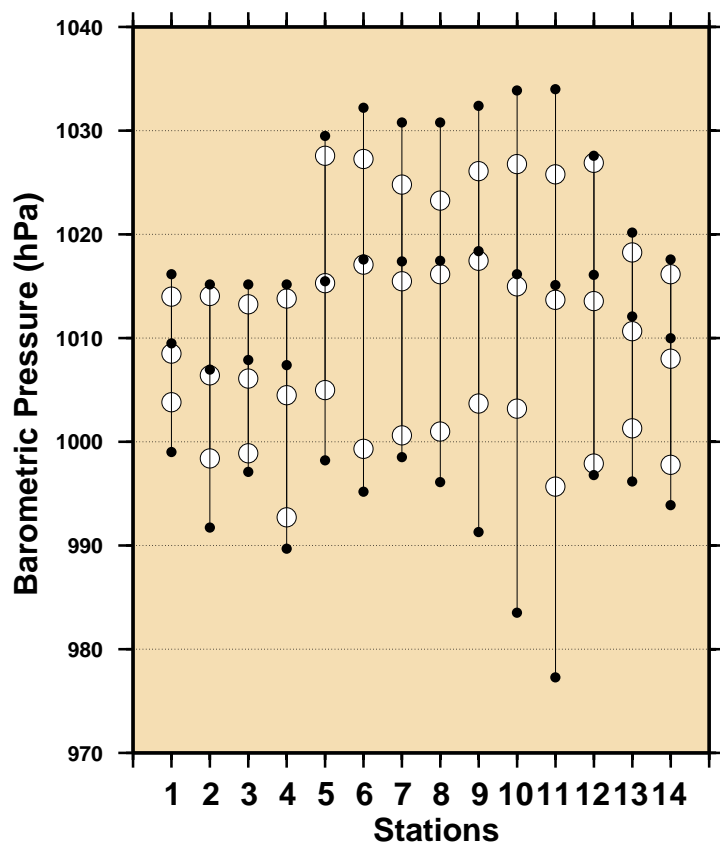
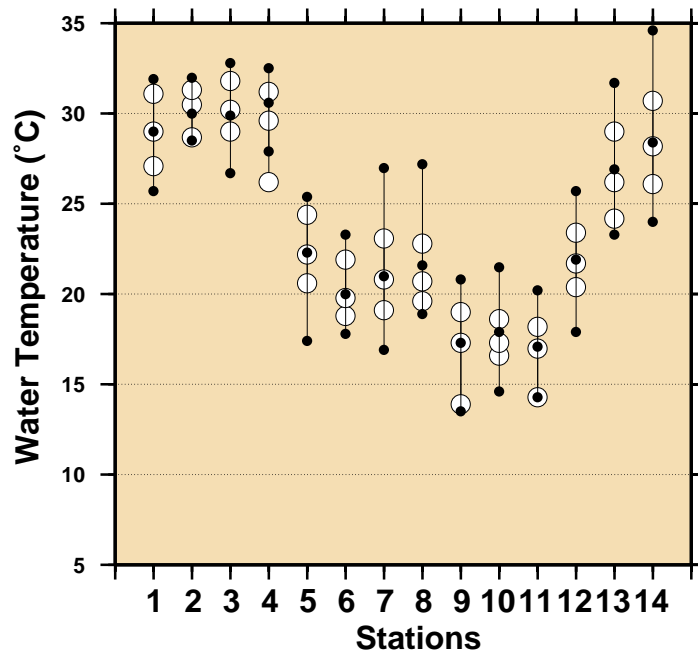
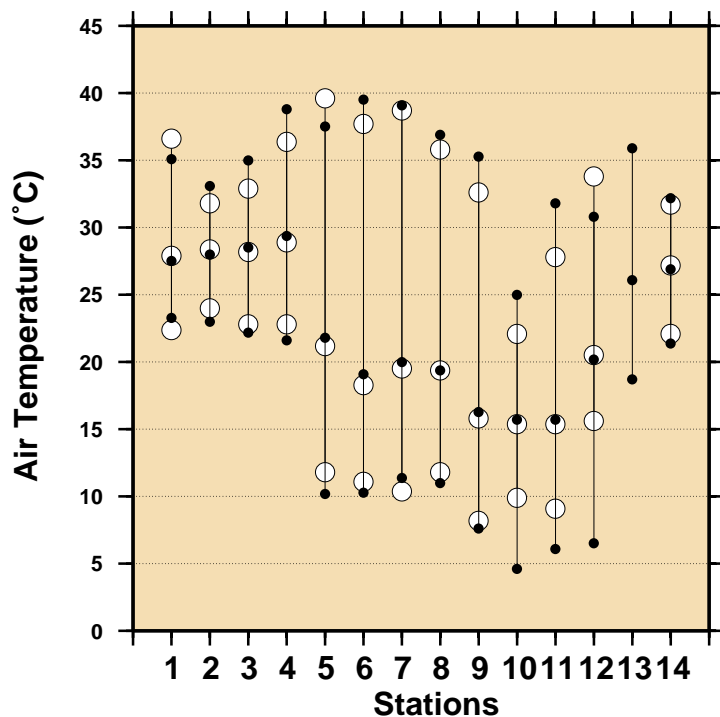


Figure 14
Comparison of March 2004 Max, Min & Mean with
Long Term March Values.



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

- March 2004 Maximum
- March 2004 Mean
- March 2004 Minimum
- Long Term March Maximum
- Long Term March Mean
- Long Term March 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

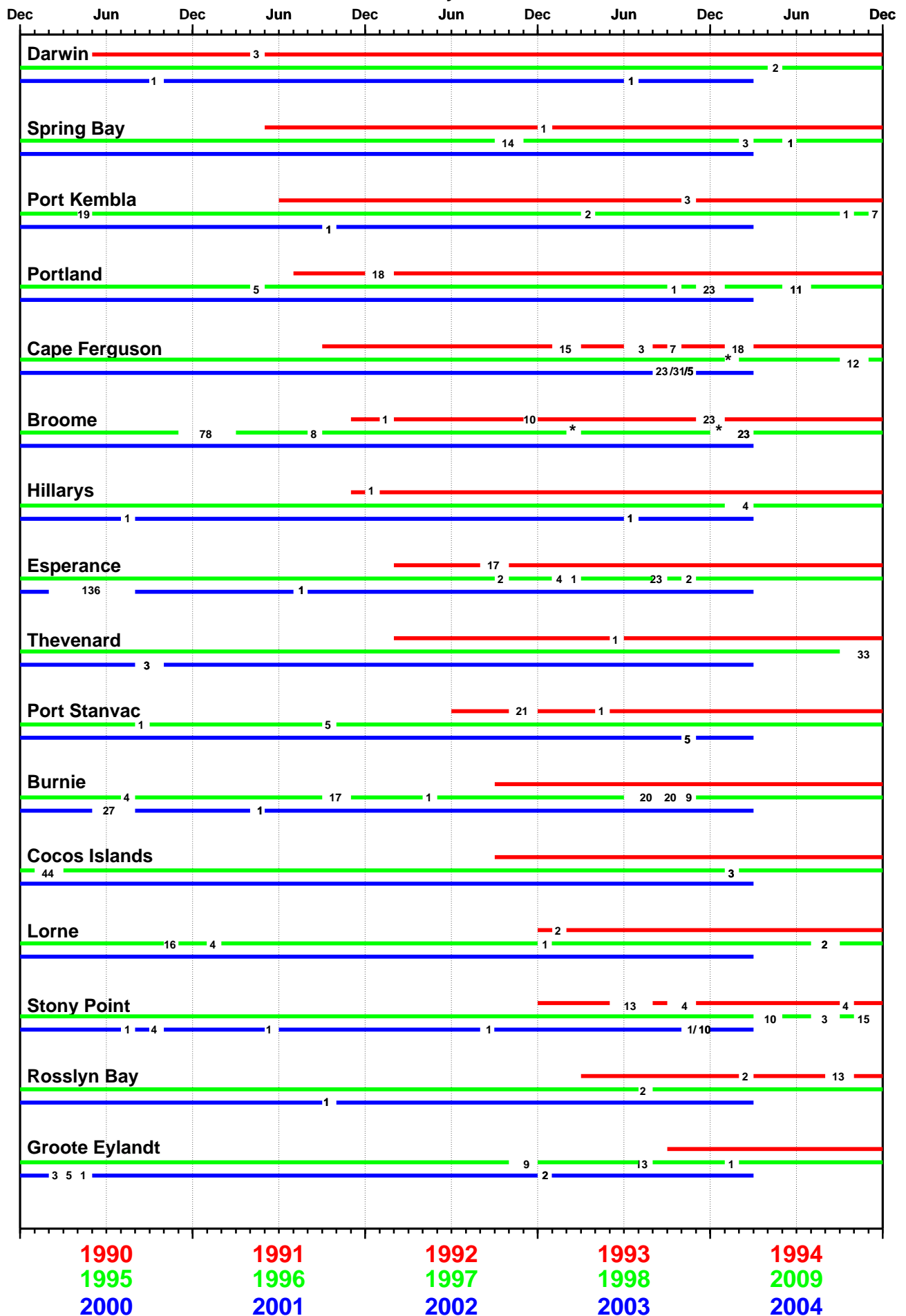


Figure 16

MONTHLY MEAN SEA LEVELS TO MARCH 2004 (m)

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

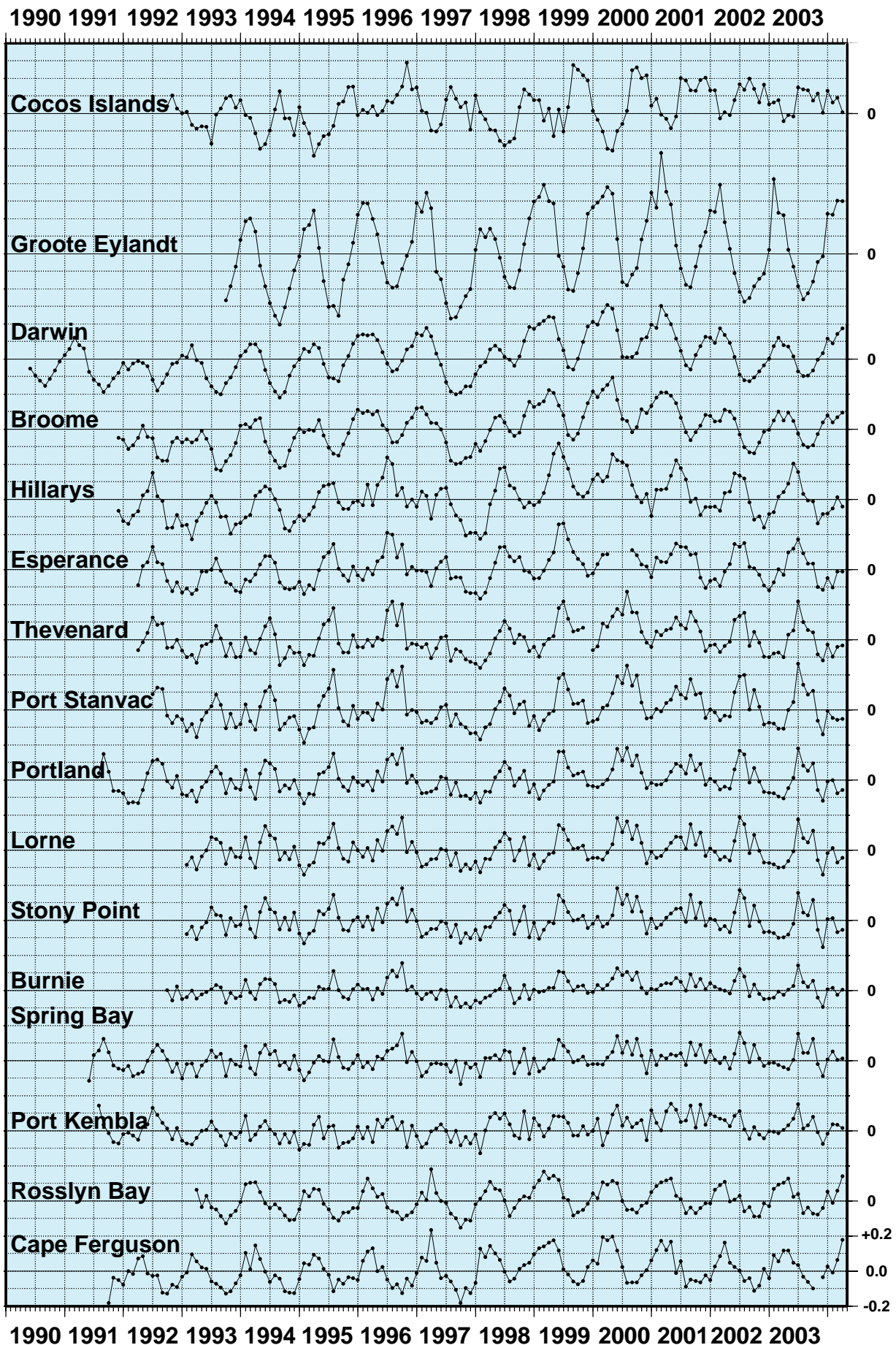


Figure 17

SEA LEVEL TRENDS THROUGH MARCH 2004 (mm/year)

