

**THE AUSTRALIAN BASELINE SEA LEVEL
MONITORING PROJECT**

MONTHLY DATA REPORT

JUNE 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

Bureau of Meteorology

**National Tidal Centre
Bureau of Meteorology
Australia**

GPO Box 421
Kent Town, SA 5071
Australia

Tel: (+618) 8201 7532
Fax: (+618) 8201 7523
Email: <http://www.ntf.flinders.edu.au/TEXT/STAFF/contact.html>
Website: <http://www.ntf.flinders.edu.au>

Quality Certification:

I authorise the issue of this Australian Baseline Sea Level Monitoring Project Monthly Data Report for June 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

JUNE 2004

INTRODUCTION

The mission of this project is to operate and maintain a national array of high-resolution sea level gauges and associated meteorological instruments, in order to acquire observations that are quality controlled and processed to build a national database of information that is accessible by the scientific and wider communities.

The Baseline Array, and a similar array in the South Pacific, has 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 instrumentation relative to local topography is monitored and the results are listed on the Geoscience 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.

NOTES ON THE DATA FOR JUNE 2004

Sea level data return (Figures 1 and 17) in June was excellent for most stations with the exception of Hillarys where small gaps remain in the data due to a site visit for calibration and maintenance.

Wind speed and wind gust data from Stony Point remained intermittently erroneous throughout June. These values and the corresponding incident wind directions have been removed (Figures 4, 5 and 6).

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).

Figure 10 compares the mean, maximum and minimum values for air temperature, water temperature and barometric pressure for the current month with the long-term June

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

The air temperatures for June 2004 were generally consistent with the long term June air temperatures for most sites. Minimum air temperatures of 22.2 °C at Cocos Islands and 9.6 °C at Rosslyn Bay were below the previous minima for June.

The water temperatures for June 2004 were generally consistent with the long term June water temperatures for most sites. The notable exceptions were Portland where a minimum of 10.5 °C was well below the previous June minima and Spring Bay, where a minimum of 9.1 °C was below the previous June minima.

The barometric pressures for June 2004 were generally consistent with the long-term June barometric pressures for most sites. Minimum barometric pressures of 984.5 hPa (Burnie), 978.7 hPa (Spring bay) and 989.6 hPa (Port Kembla) were lower than the previous minima in June. Maximum barometric pressures of 1017.5 hPa (Cocos Islands), 1020.2 hPa (Groote Eylandt), 1019.7 hPa (Darwin) and 1021.6 hPa (Broome) were well above previous June maxima.

Figure 11 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 12), which has the seasonal signal removed from the data.

The sea level anomalies (Figure 12) changed from Positive to negative at Port Kembla and from negative to positive at Thevenard, Burnie, Rosslyn Bay and Cape Ferguson. The sea level anomalies remained positive at Port Stanvac, Portland, Lorne, Stony Point and Spring Bay and remained negative at all other stations in June.

Figure 13 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 13) and the change in trend with respect to the analysis of the previous month.

The barometric pressure anomalies (Figure 14) changed from negative to positive at Groote Eylandt, Darwin, Broome, Rosslyn Bay and Cape Ferguson and remained positive at Cocos Islands and negative at all the other stations in June.

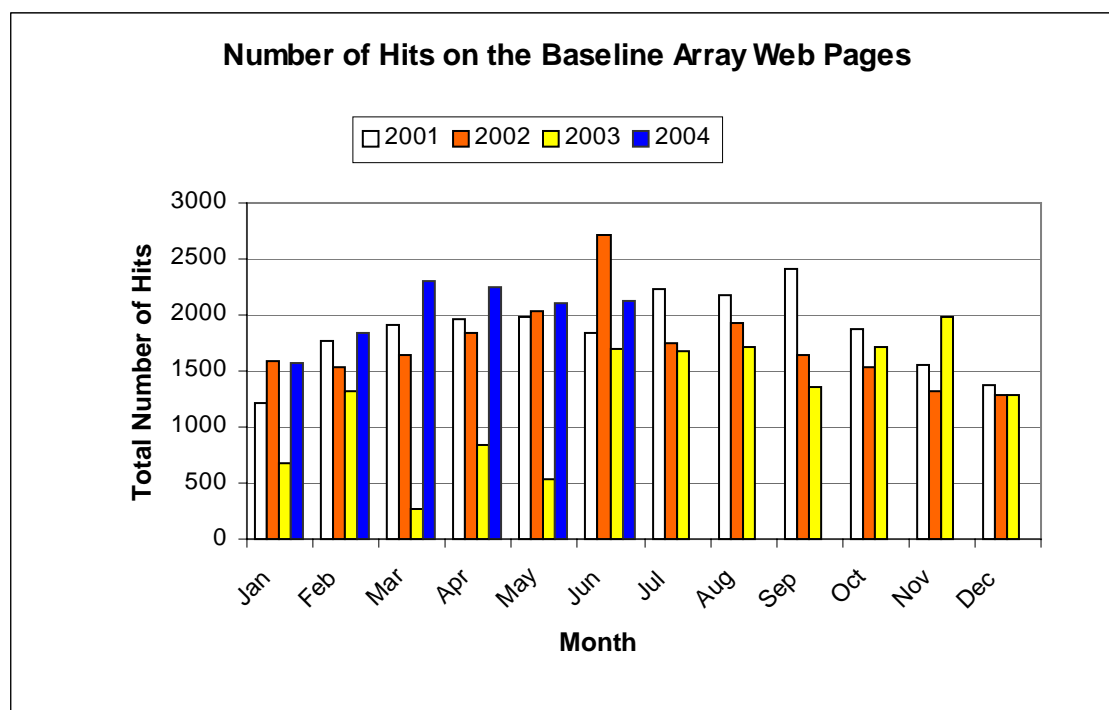
It is difficult to relate the water and air temperature anomalies (Figures 15 and 16) directly to those of barometric pressure and sea level without considering other effects, such as localised currents, wind speeds and directions. The anomalies are primarily used to quality check the water and air temperature data.

The number of hits to the Australian Baseline Sea Level Monitoring project web pages from 2001 to June 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 through June 2004.

| Location | Installation Date | Sea Level Trend (mm/yr) | Change from previous month |
|----------------|-------------------|-------------------------|----------------------------|
| Cocos Islands | Sep 1992 | +11.3 | -0.1 |
| Groote Eylandt | Sep 1993 | +12.6 | -0.3 |
| Darwin | May 1990 | +10.6 | -0.2 |
| Broome | Nov 1991 | +13.0 | -0.1 |
| Hillarys | Nov 1991 | +9.8 | -0.1 |
| Esperance | Mar 1992 | +7.2 | -0.1 |
| Thevenard | Mar 1992 | +5.7 | +0.1 |
| Port Stanvac | Jun 1992 | +6.9 | +0.3 |
| Portland | Jul 1991 | +3.3 | +0.2 |
| Lorne | Jan 1993 | +2.7 | +0.4 |
| Stony Point | Jan 1993 | +2.2 | +0.4 |
| Burnie | Sep 1992 | +3.7 | +0.1 |
| Spring Bay | May 1991 | +4.0 | +0.2 |
| Port Kembla | Jul 1991 | +5.2 | 0.0 |
| Rosslyn Bay | Jun 1992 | +3.8 | +0.1 |
| Cape Ferguson | Sep 1991 | +5.2 | +0.1 |

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

Contact address:

National Tidal Centre
The Commonwealth Bureau of Meteorology
GPO BOX 421, Kent Town SA 5071
Tel: [+61 8] 8201 7532
Fax: [+61 8] 8201 7523
Email: <http://www.ntf.flinders.edu.au/TEXT/STAFF/contact.html>
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

**JUNE 2004
SIX MINUTE SEA LEVEL OBSERVATIONS (m)**

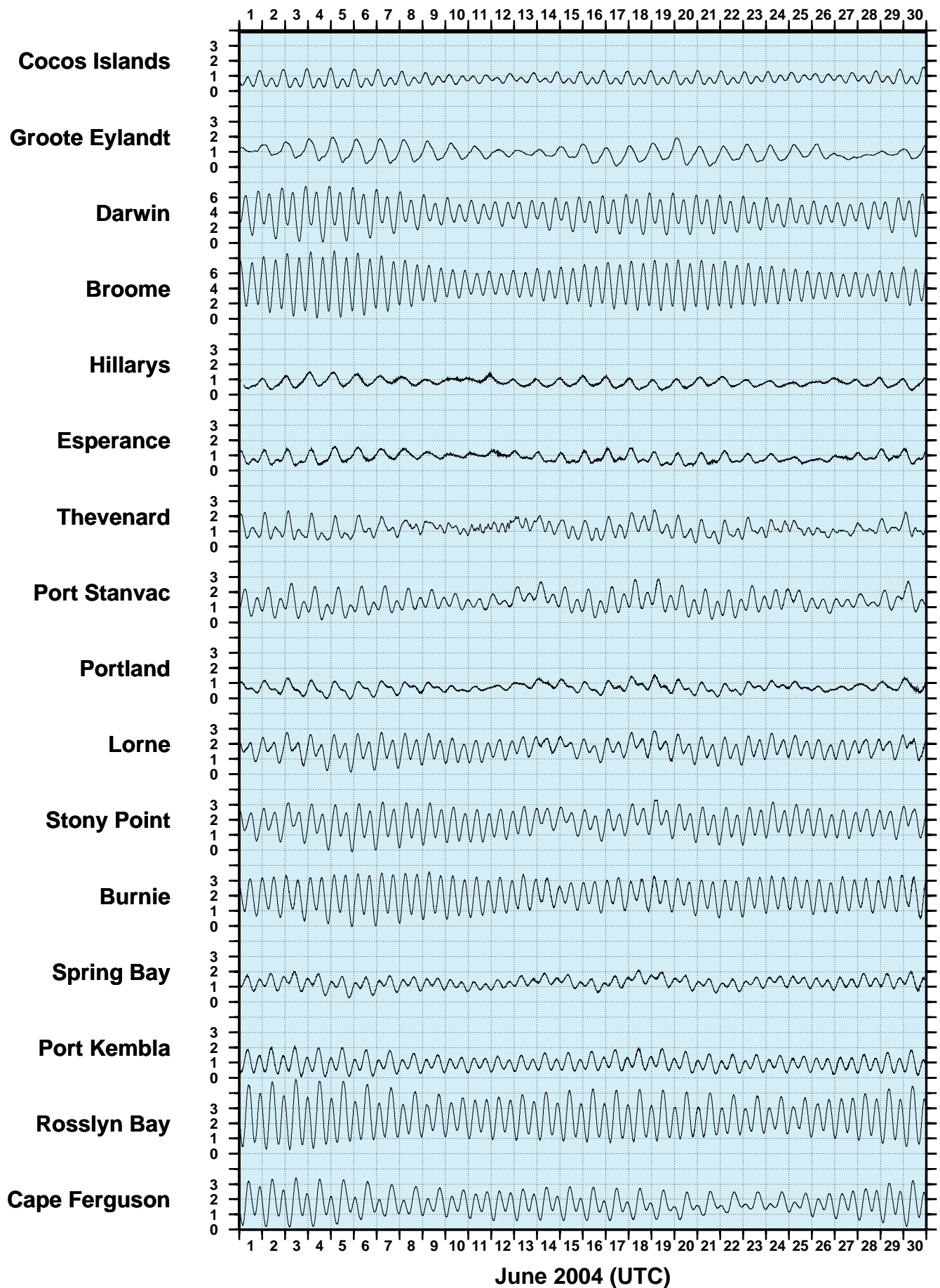


Figure 2
JUNE 2004
SIX MINUTE RESIDUAL WATER LEVELS (m)

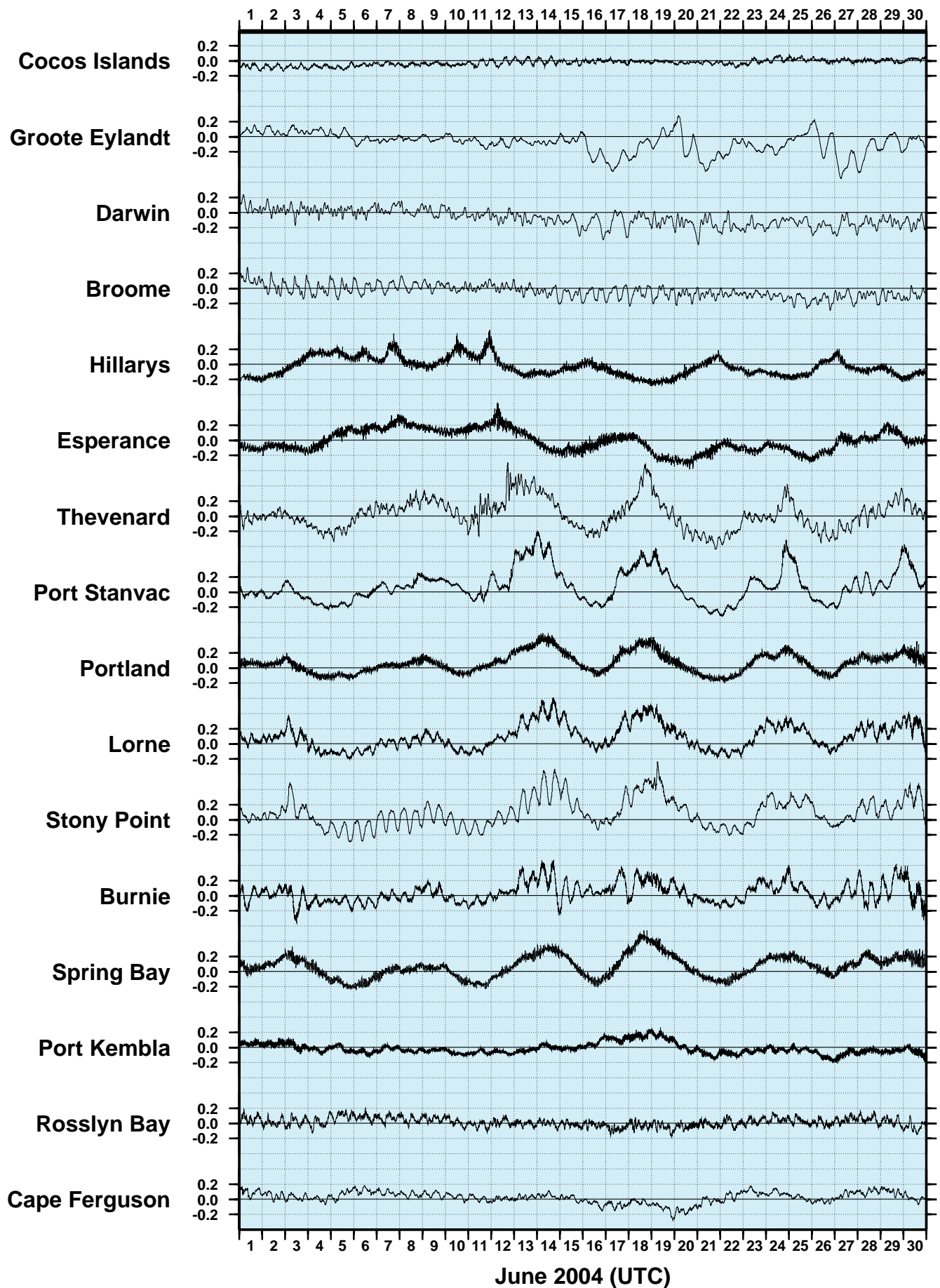


Figure 3
JUNE 2004
SIX MINUTE RESIDUALS
ADJUSTED FOR ATMOSPHERIC PRESSURE (m)

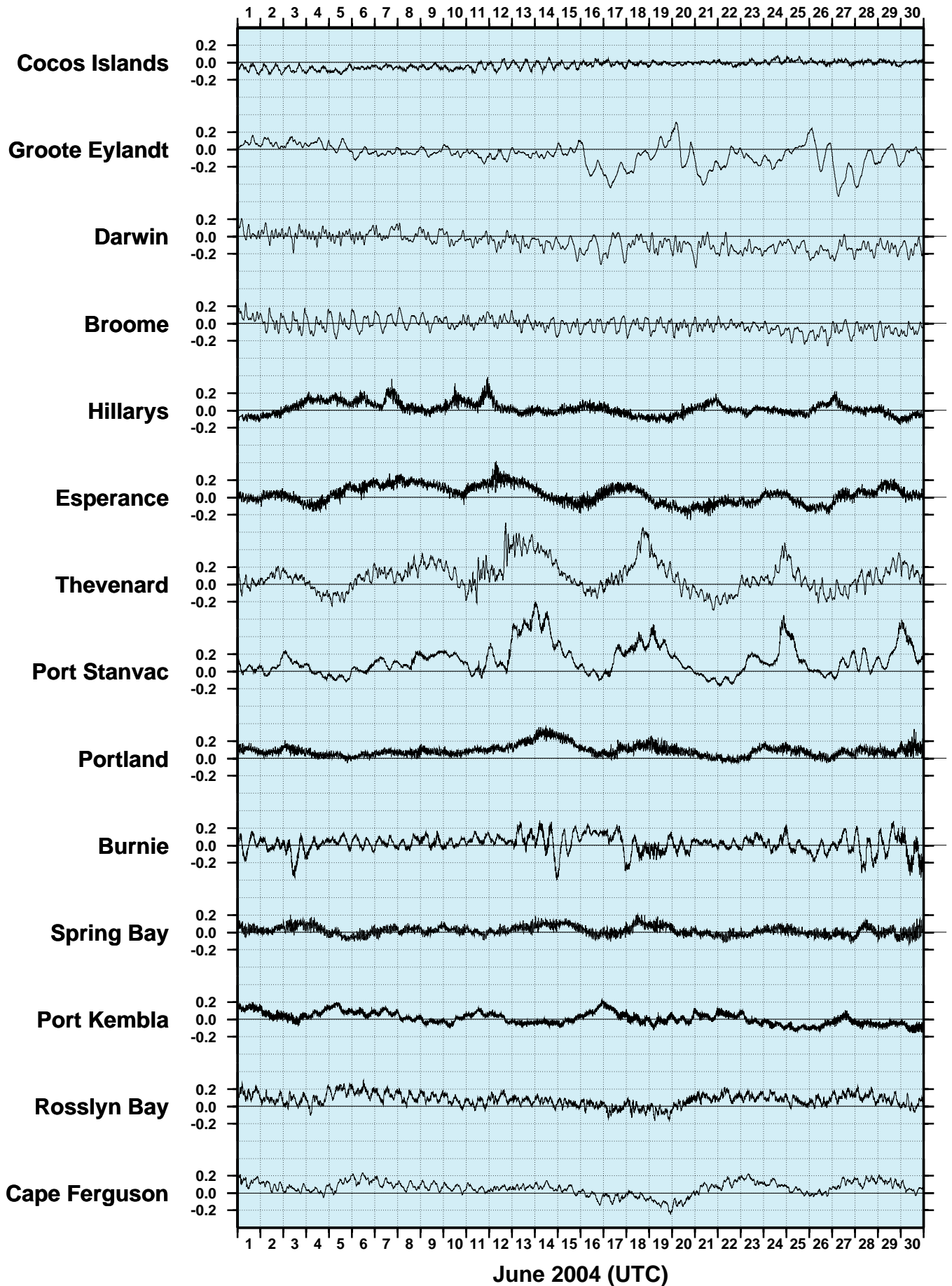


Figure 4

JUNE 2004
HOURLY WIND SPEEDS (m/s)

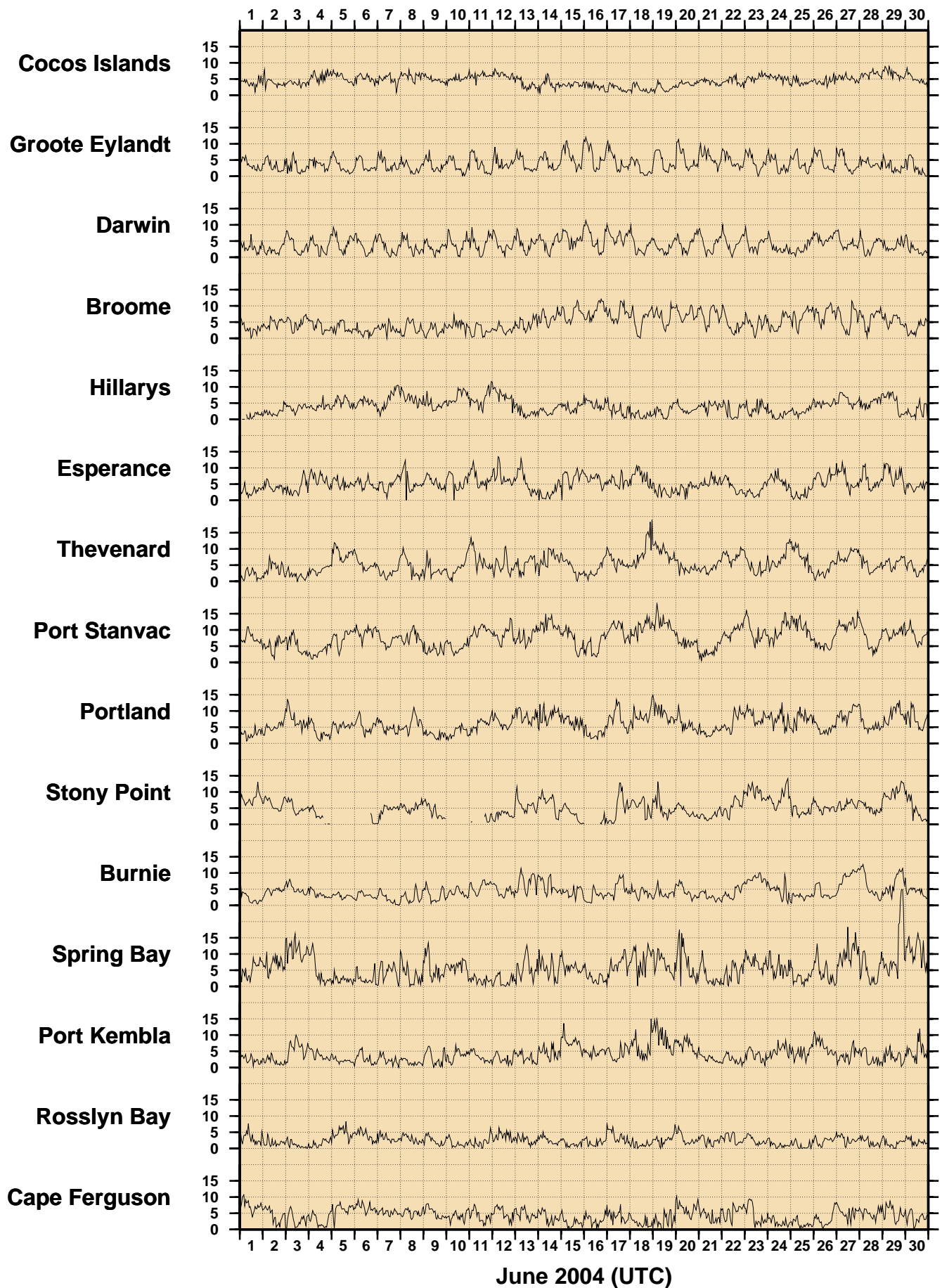


Figure 5

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

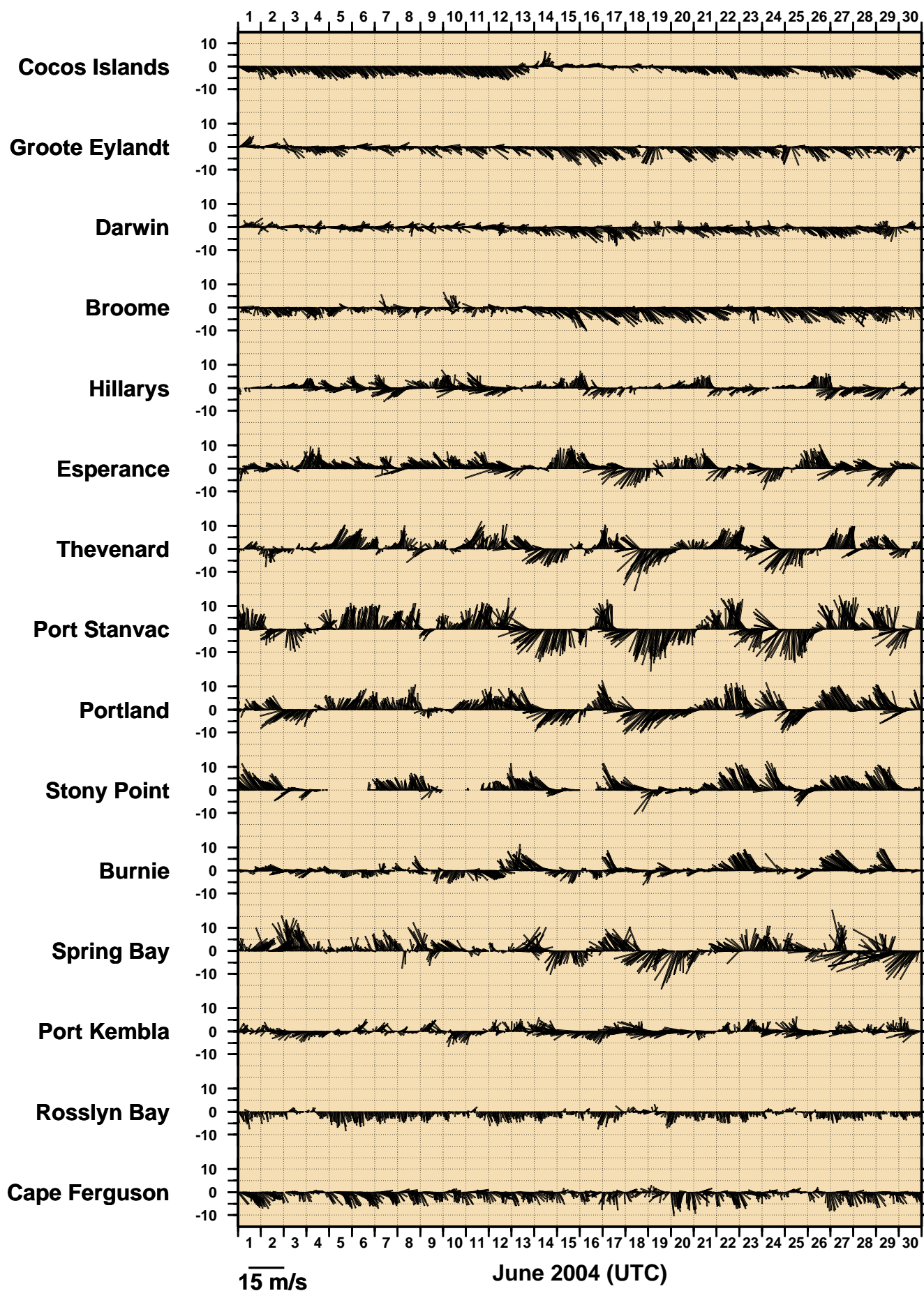


Figure 6

JUNE 2004
HOURLY MAXIMUM WIND GUSTS (m/s)

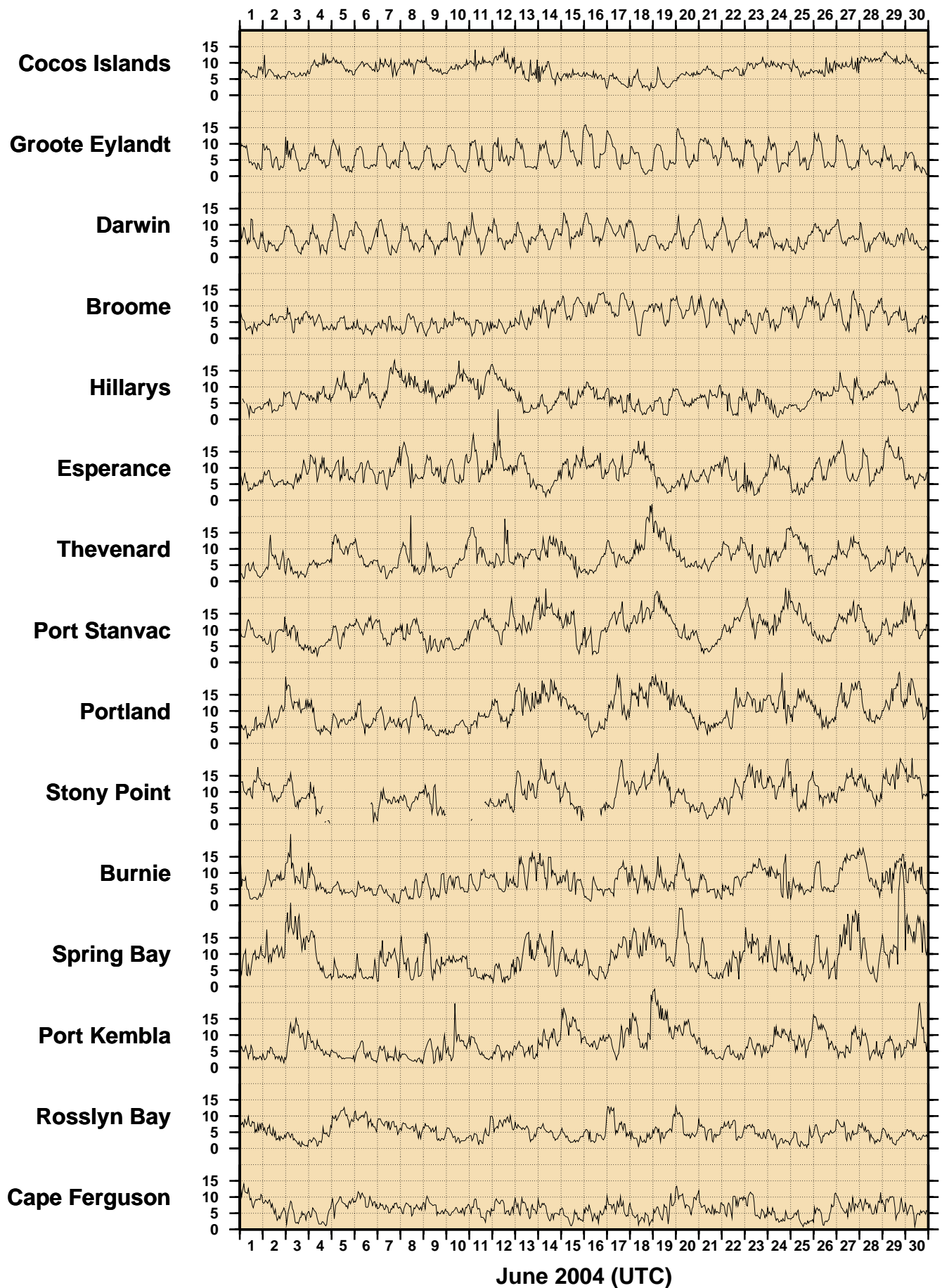


Figure 7

JUNE 2004

HOURLY AIR TEMPERATURES (°C)

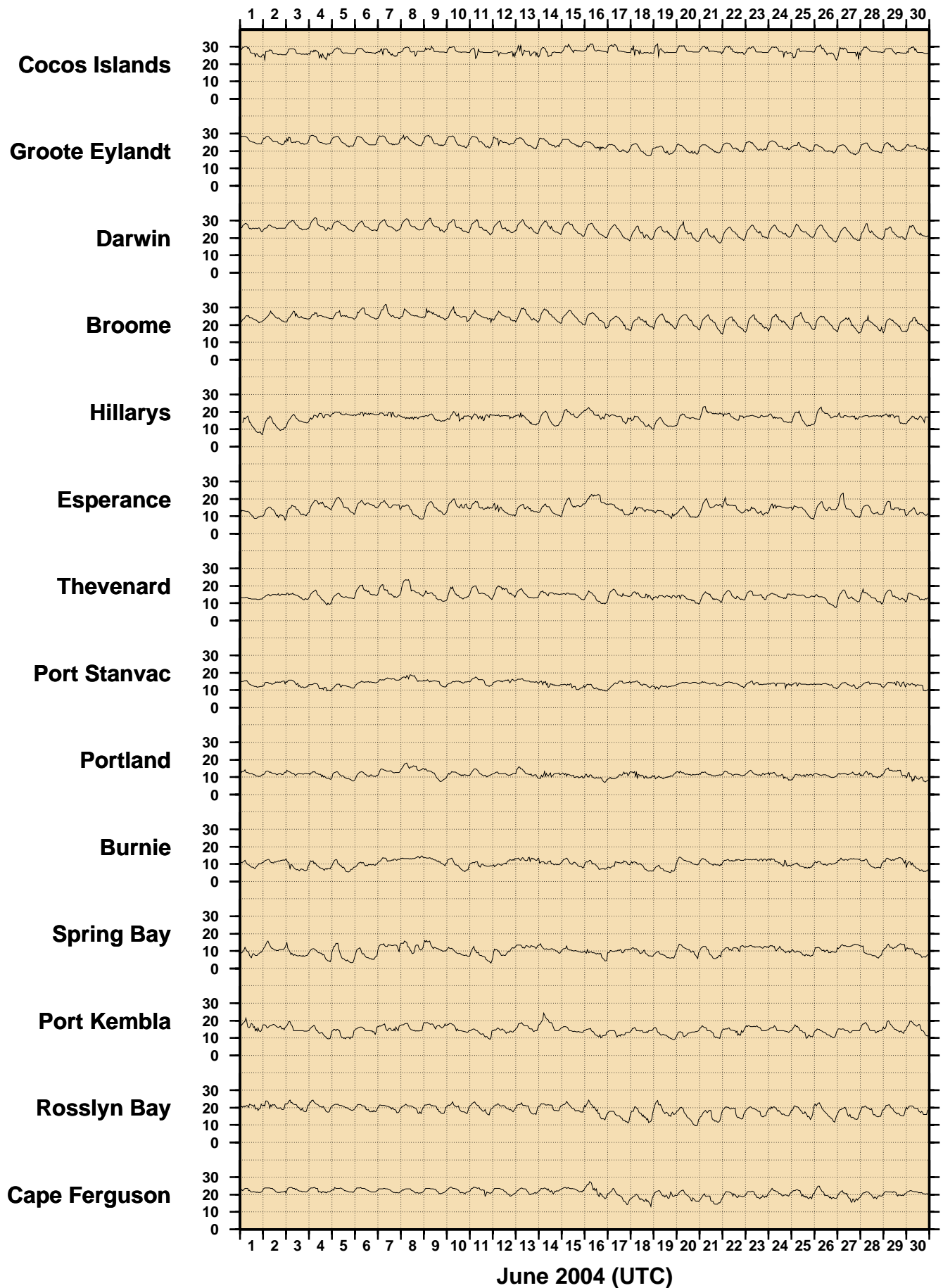


Figure 8

JUNE 2004

HOURLY WATER TEMPERATURES (°C)

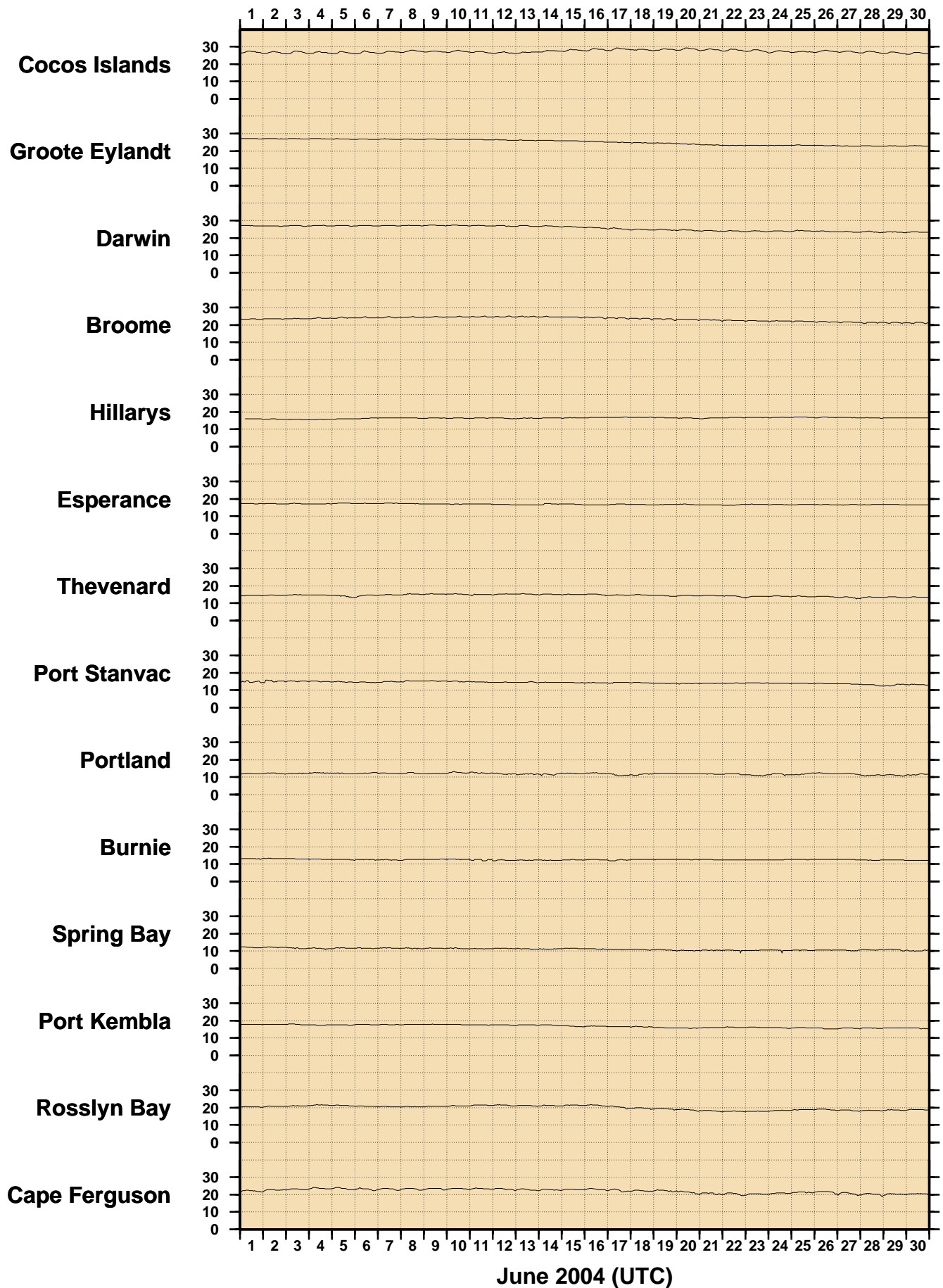


Figure 9

JUNE 2004
HOURLY ATMOSPHERIC PRESSURE (hPa)

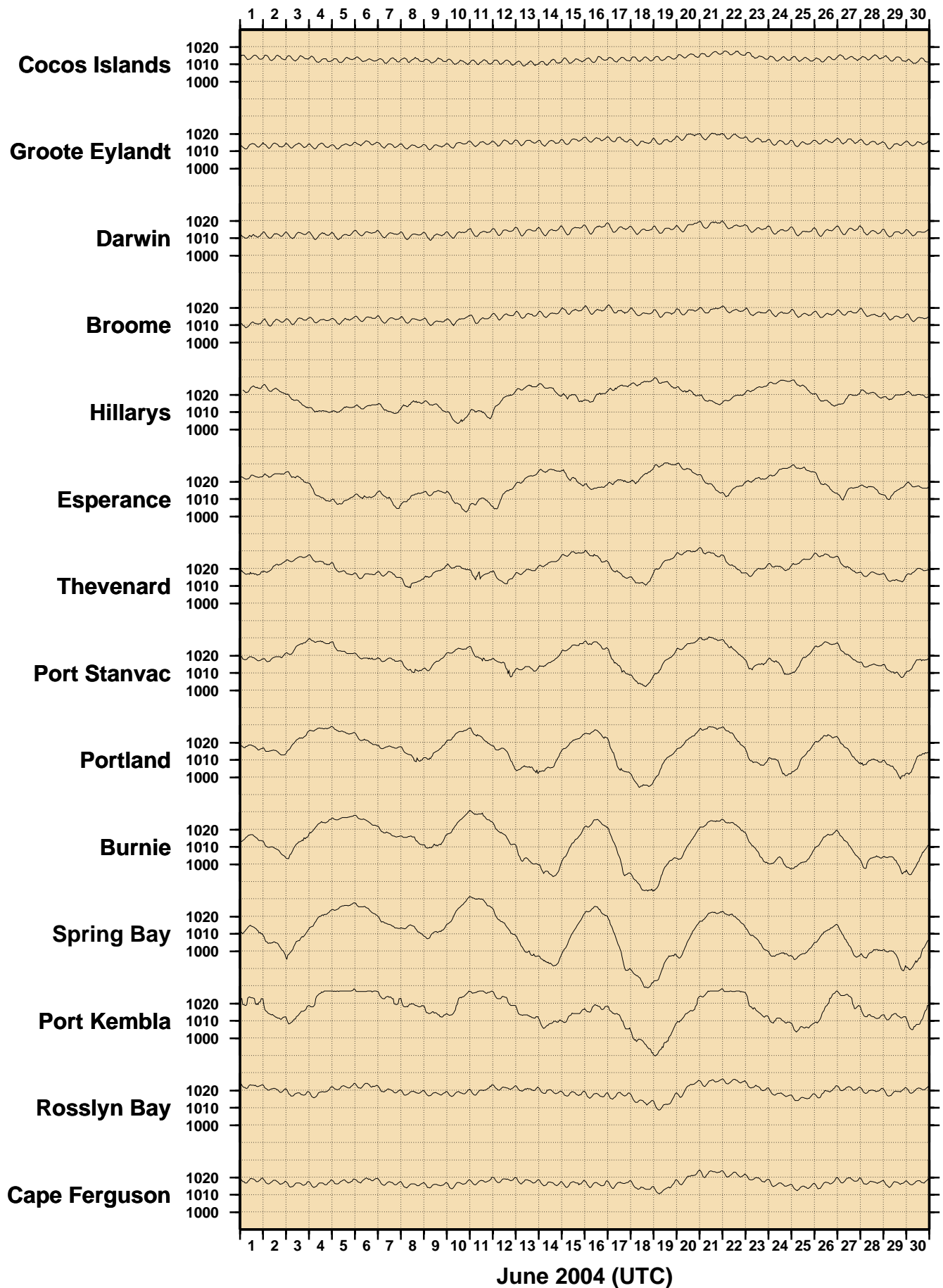
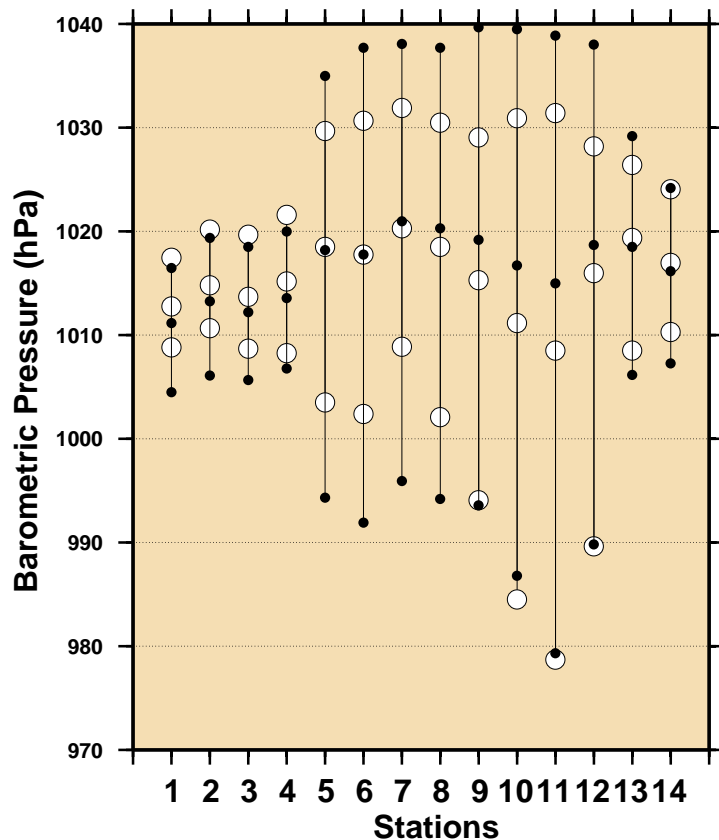
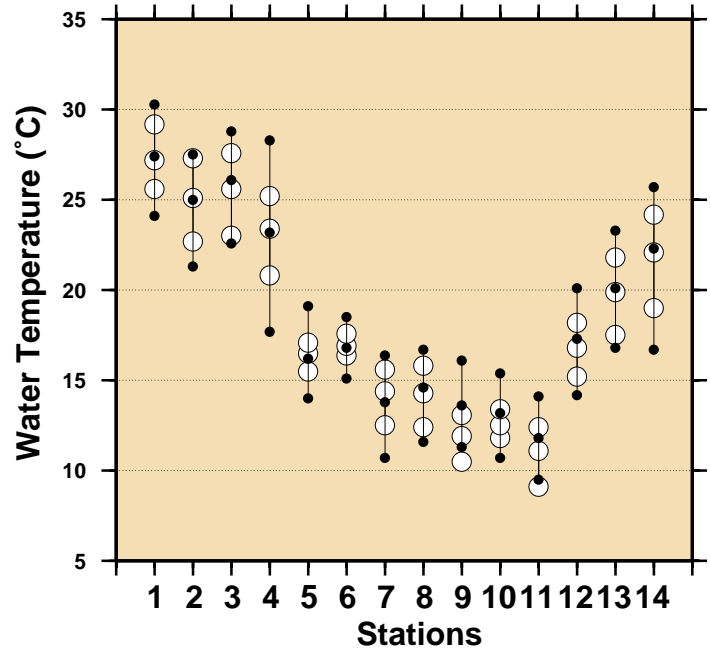
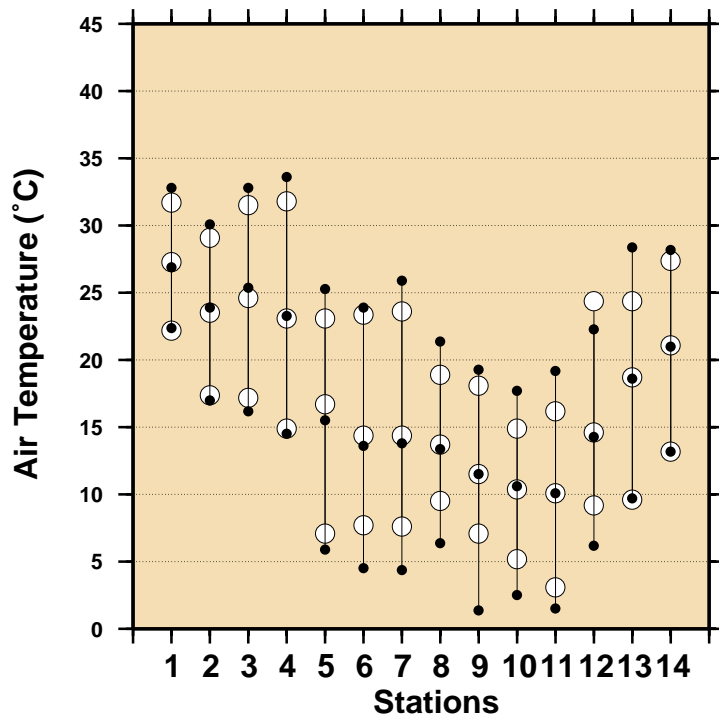


Figure 10
Comparison of June 2004 Max, Min & Mean with
Long Term June Values.



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

- June 2004 Maximum
- June 2004 Mean
- June 2004 Minimum
- Long Term June Maximum
- Long Term June Mean
- Long Term June Minimum

Figure 11

MONTHLY MEAN SEA LEVELS TO JUNE 2004 (m)

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

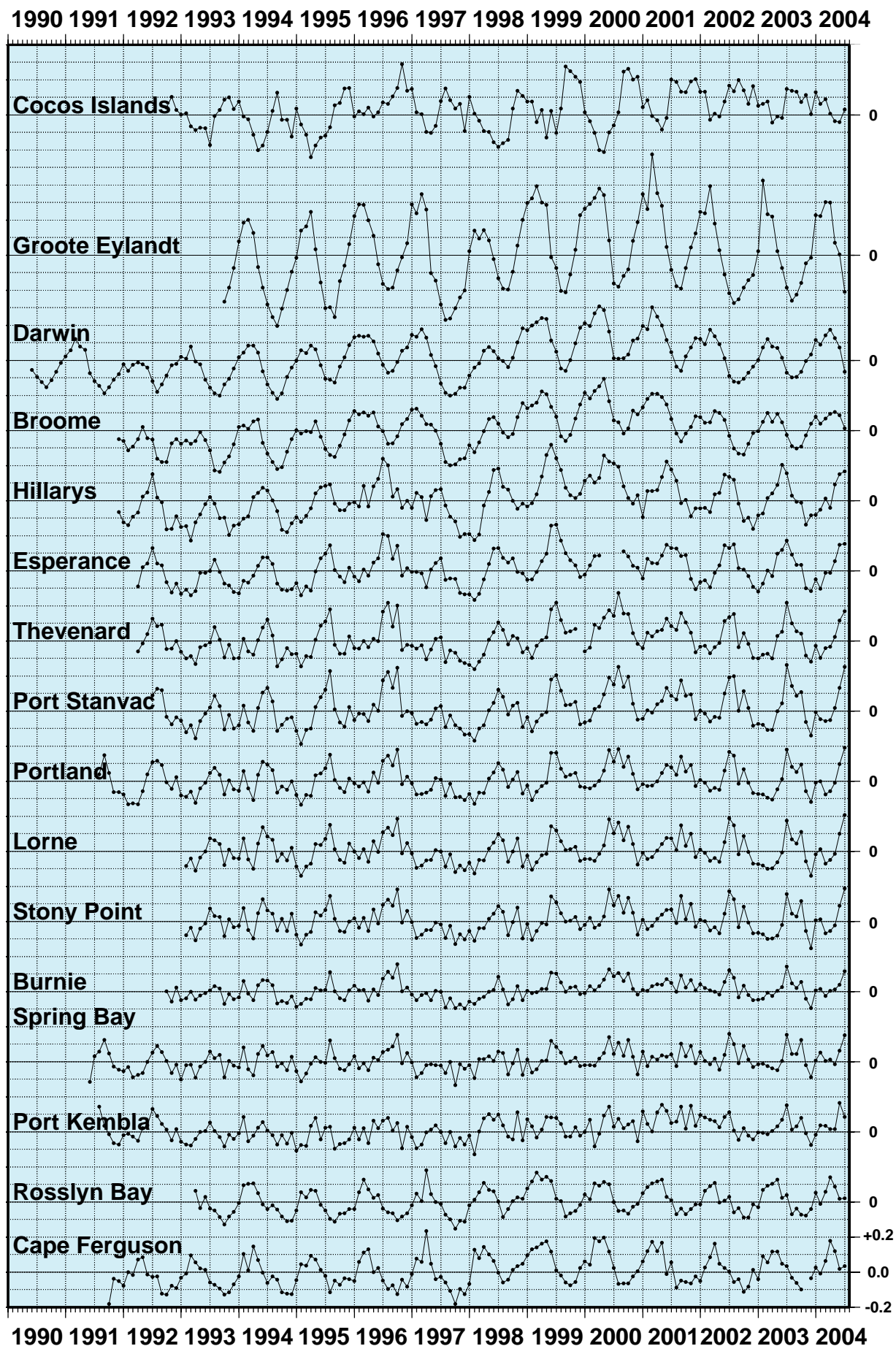


Figure 12
SEA LEVEL ANOMALIES THROUGH JUNE 2004 (m)

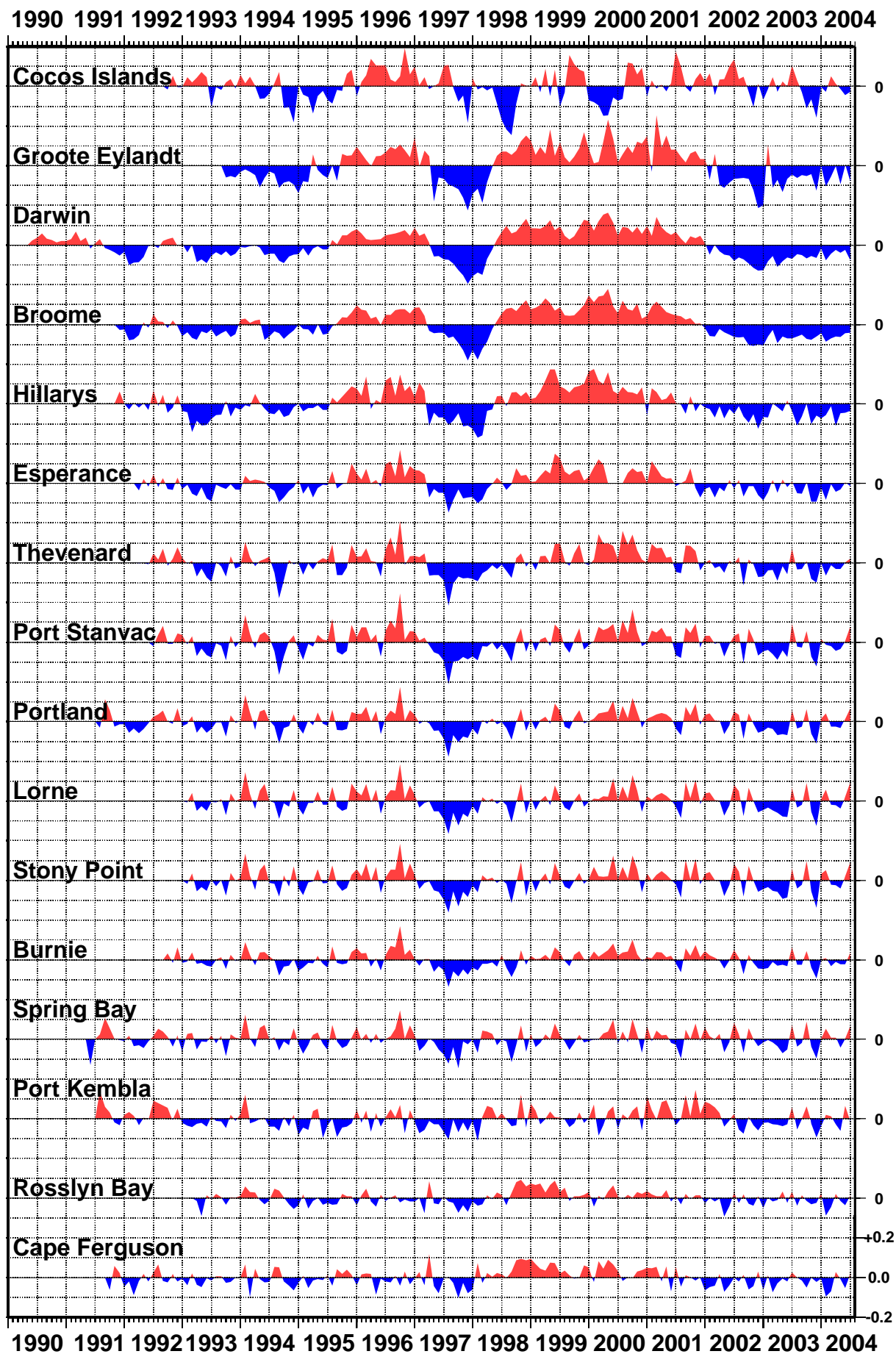


Figure 13

SEA LEVEL TRENDS THROUGH JUNE 2004 (mm/year)

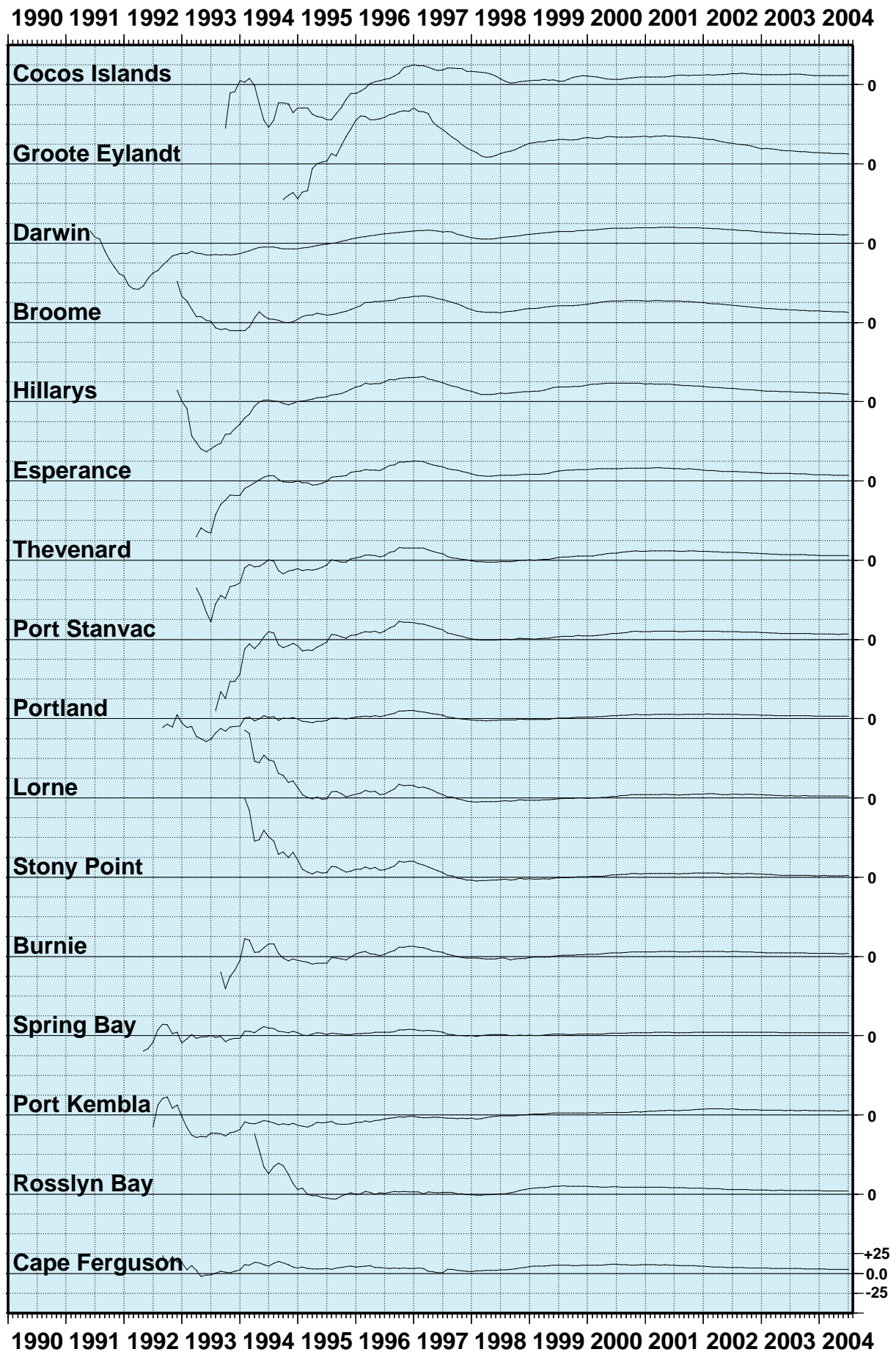


Figure 14

BAROMETRIC PRESSURE ANOMALIES THROUGH JUNE 2004 (hPa)

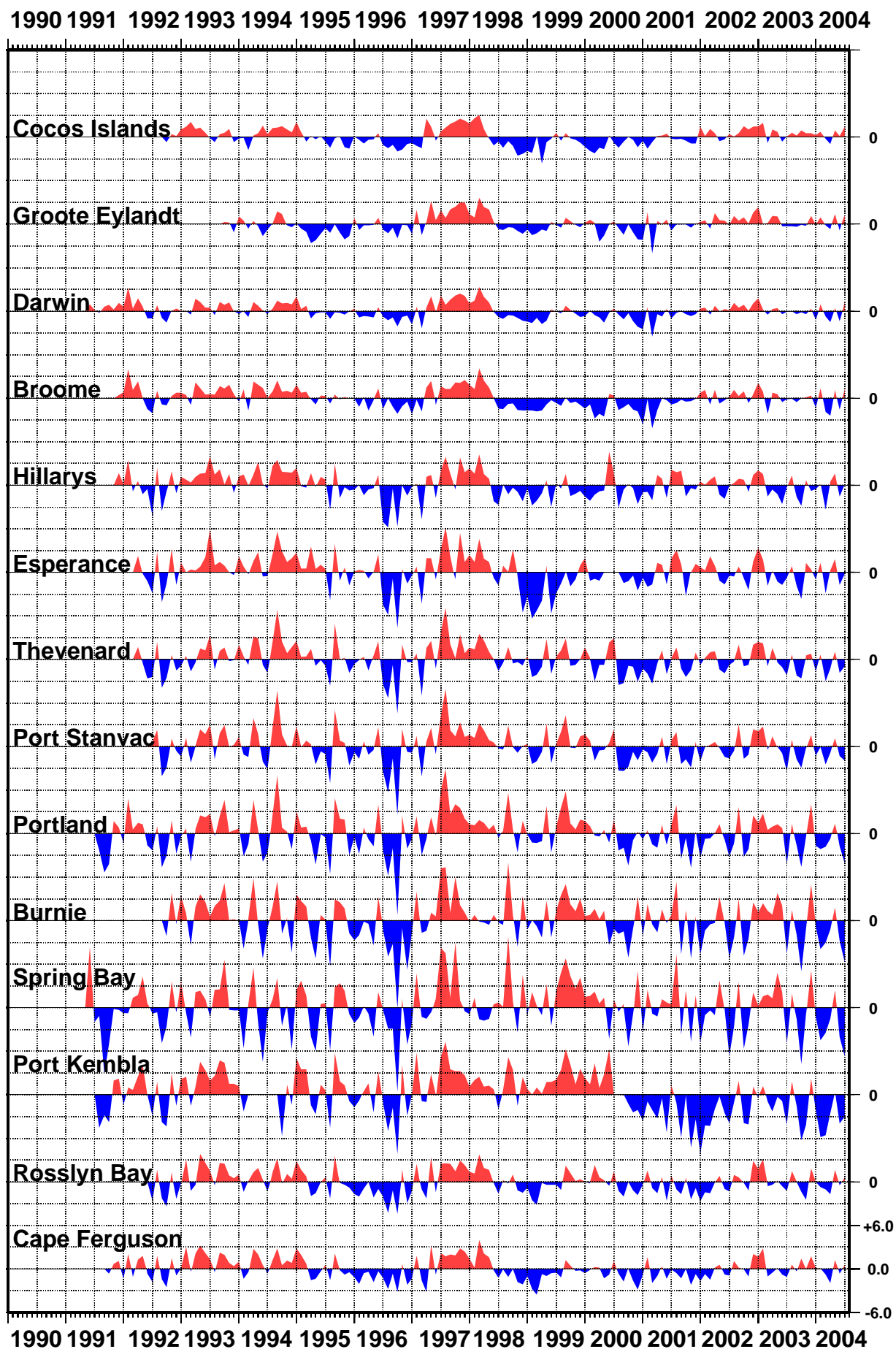


Figure 15

WATER TEMPERATURE ANOMALIES THROUGH JUNE 2004 (°C)

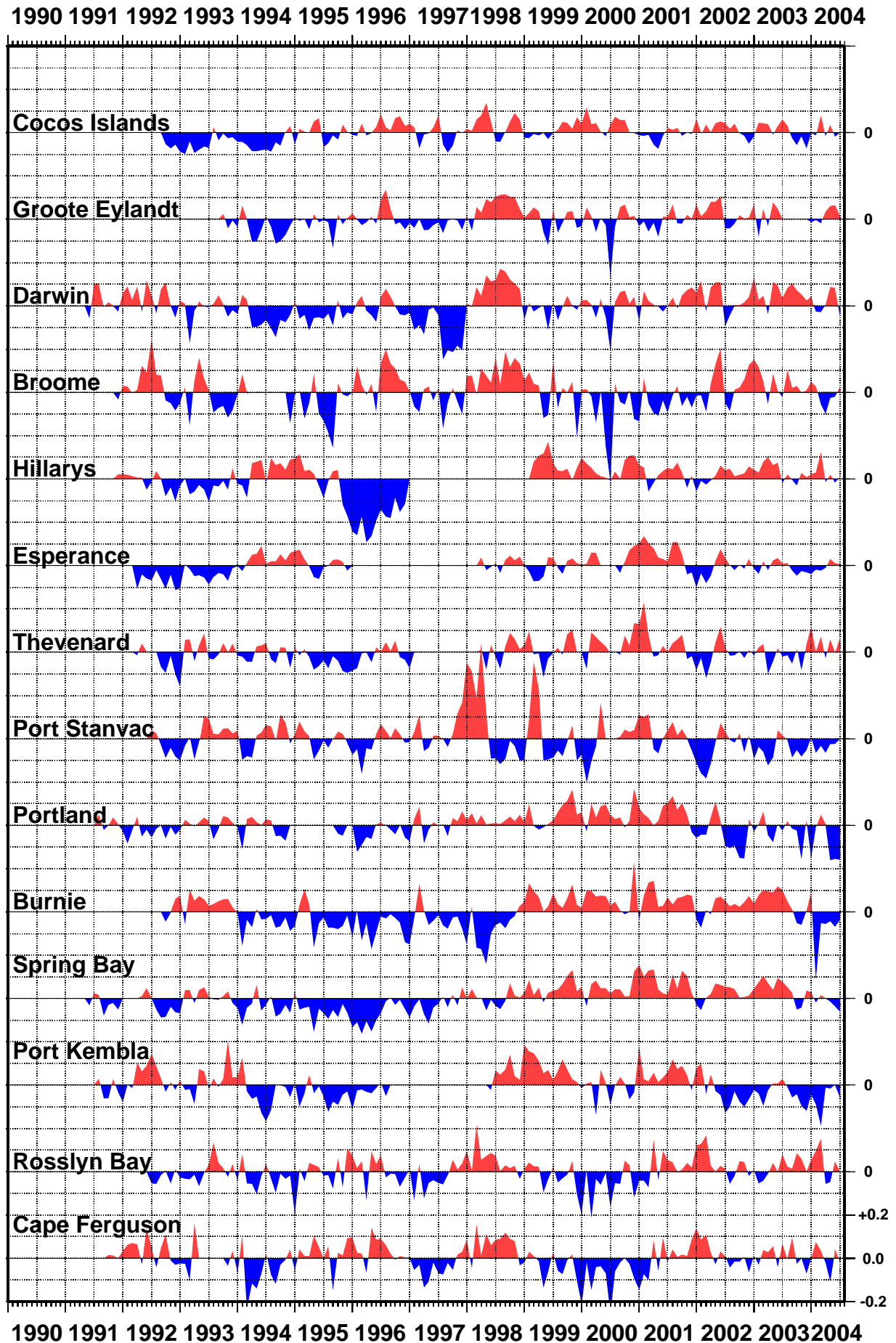


Figure 16
AIR TEMPERATURE ANOMALIES
THROUGH JUNE 2004 (°C)

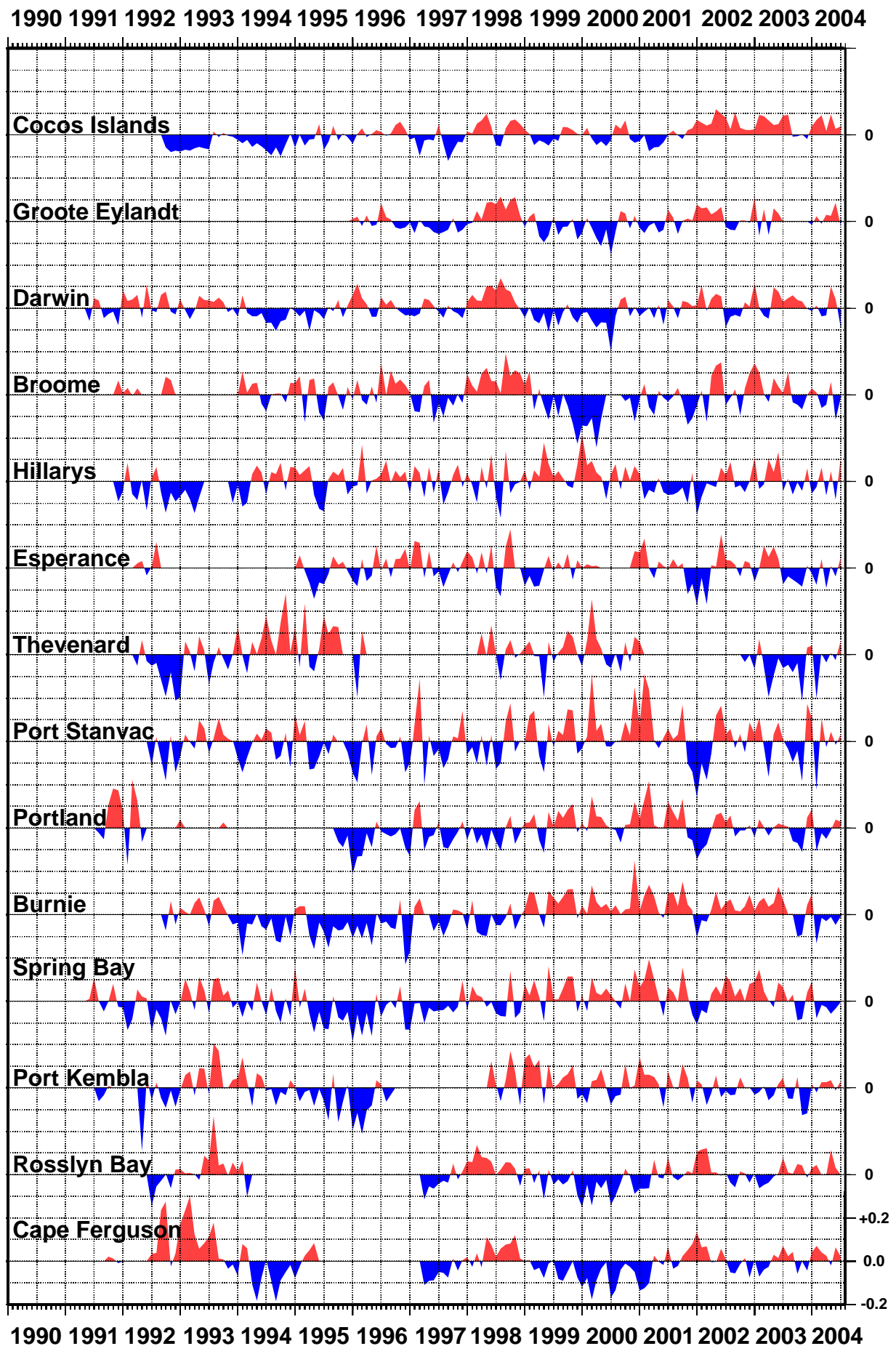


Figure 17 SEA LEVEL DATA RETURN

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

* Patchy record

