

**THE AUSTRALIAN BASELINE SEA LEVEL
MONITORING PROJECT**

MONTHLY DATA REPORT

APRIL 2008



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 April 2008 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

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INTRODUCTION

The mission of the Australian Baseline Sea Level Monitoring Project (ABSLMP) is to monitor changes in sea level around Australia. It involves the operation and maintenance of an array of high-resolution sea level gauges and associated meteorological instruments (see Figure B) and management of a quality controlled national database of observations that is made available to the scientific and wider communities.

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.

This report is one of a series of monthly data reports that provide tables and figures summarising the data collected to date. The accompanying text relates primarily to the quality of the data rather than its interpretation. Periodic scientific evaluation of the data in the context of climate variability and climate change is provided in an annual data report.

The trends are derived from the sea level record. However, readers are cautioned against drawing any conclusions from short duration records, particularly when used in isolation from other phenomena. The sea level record includes natural variability, such as El Niño events and the effects of atmospheric, oceanographic and geological processes. It is important to note that as the sea level record becomes longer, the short-term trend estimate becomes more stable and reliable. 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.

NOTES ON THE DATA FOR APRIL 2008

Sea level data return (Figures 1 and 17) in April 2008 was good for most stations. The station at Lorne was de-commissioned in December 2006 to allow for wharf refurbishment. A temporary tide gauge (Seamans Probe) was operated at the site from February 2007 until a new Aquatrak acoustic gauge was commissioned in a slightly different position from the original site in January this year. Data from the new gauge is now available and has been included (as well as data from the temporary gauge) in a re-analysis of the sea level trends. Due to occupational health and safety reasons the station at Broome is now being switched off when ships are being loaded and this resulted in several gaps in the data.

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) and can also indicate the passage of a tsunami.

Figure 10 compares the mean, maximum and minimum values for air temperature, water temperature and barometric pressure for April 2008 with the long-term values. Note that the long-term ranges are calculated using the previous sets of April data for each station **excluding** the current month of data.

Air temperatures in April 2008 were generally within the normal range of temperatures for April. A record minimum April air temperature of 7.0°C was seen at Esperance. The water temperatures in April 2008 were also within the normal range of temperatures for April. Barometric pressures in April 2008 were within the normal range of pressures for April at most sites. Record minima April pressures were seen at Portland (992.1hPa) and Spring Bay (983.4hPa).

Figure 11 shows the monthly mean sea levels with respect to an arbitrary fixed offset from the zero of the tide gauge. The monthly mean sea levels contain seasonal variations, in contrast to the sea level anomalies (Figure 12), which have the seasonal signals removed from the data.

The sea level anomalies (Figure 12) in April 2008 were near normal at Cocos Islands and on the eastern seaboard and positive at the other project sites.

Figure 13 shows the history of the short-term sea level trend for each site during the life of the Australian Baseline Sea Level Monitoring Project. Table 1 lists the commencement of operation, the latest sea level trend and the change in trend with respect to the previous month's analysis.

The barometric pressure anomalies (Figure 14) in April 2008 were slightly positive at Port Kembla and near normal to slightly negative at all other sites.

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 2004 to April 2008 are given in Figure A.

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 position, data start date, short-term sea level trends and change in trend from the previous month for the Australian Baseline array through April 2008. Note that the trend for Lorne has been updated using data from a temporary Seamans Probe acoustic gauge and a new Aquatrak acoustic gauge (see table 2).

Location	Lat / Long	Start Date	Trend (mm/yr)	Change from previous month
Cocos Islands	12°07'0.1"S / 96°53'30.9"E	Sep 1992	+7.7	-0.1
Groote Eylandt	13°51'36.2"S / 136°24'56.1"E	Sep 1993	+6.2	0.0
Darwin	12°28'18.4"S / 130°50'45.1"E	May 1990	+7.1	+0.1
Broome	18°00'03.0"S / 122°13'07.1"E	Nov 1991	+8.7	+0.1
Hillarys	31°49'32.0"S / 115°44'18.9"E	Nov 1991	+8.3	+0.2
Esperance	33°52'15.2"S / 121°53'43.3"E	Mar 1992	+5.3	+0.2
Thevenard	32°08'56.2"S / 133°38'28.8"E	Mar 1992	+3.7	+0.2
Port Stanvac	35°06'31.0"S / 138°28'1.3"E	Jun 1992	+4.9	+0.2
Portland	38°20'36.4"S / 141°36'47.4"E	Jul 1991	+2.7	+0.1
Lorne	38°32'49.4"S / 143°59'19.8"E	Jan 1993	+1.8	+0.1
Stony Point	38°22'19.7"S / 145°13'28.9"E	Jan 1993	+1.7	+0.1
Burnie	41°03'0.3"S / 145°54'54.0"E	Sep 1992	+1.9	0.0
Spring Bay	42°32'45.1"S / 147°55'57.8"E	May 1991	+3.3	0.0
Port Kembla	34°28'25.5"S / 150°54'42.7"E	Jul 1991	+3.4	0.0
Roslyn Bay	23°09'39.7"S / 150°47'24.6"E	Jun 1992	+1.8	0.0
Cape Ferguson	19°16'38.4"S / 147°03'30.4"E	Sep 1991	+3.1	-0.1

Figure A: Number of hits on the Australian Baseline Sea Level Monitoring Project web pages from 2004 to April 2008.

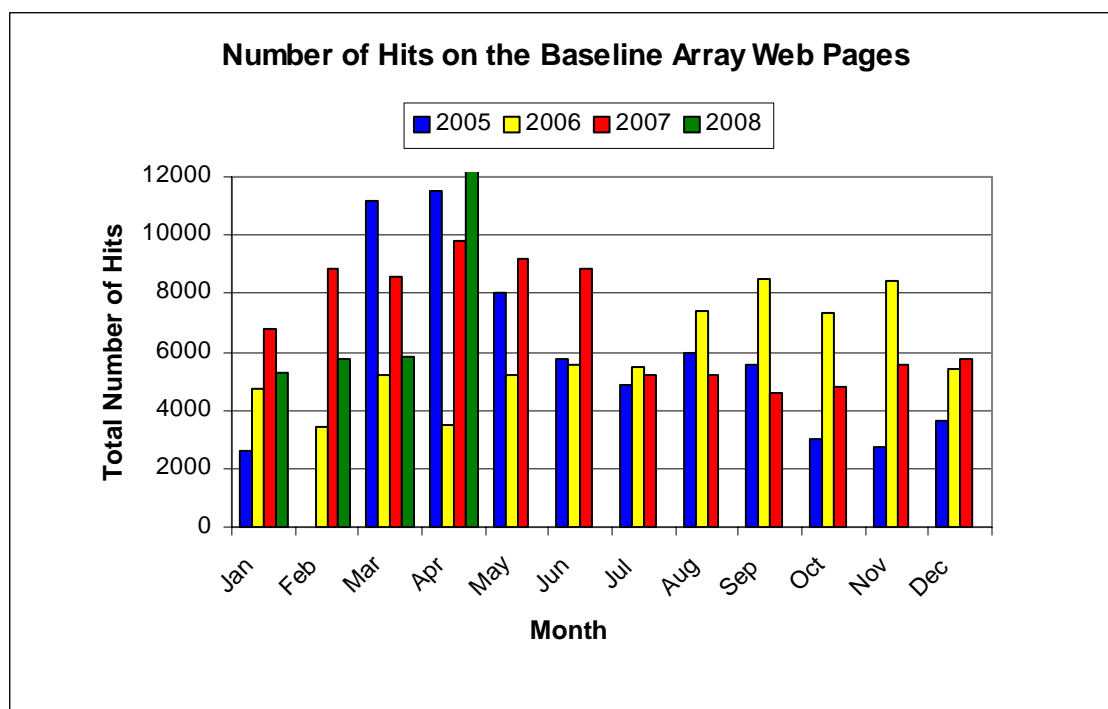
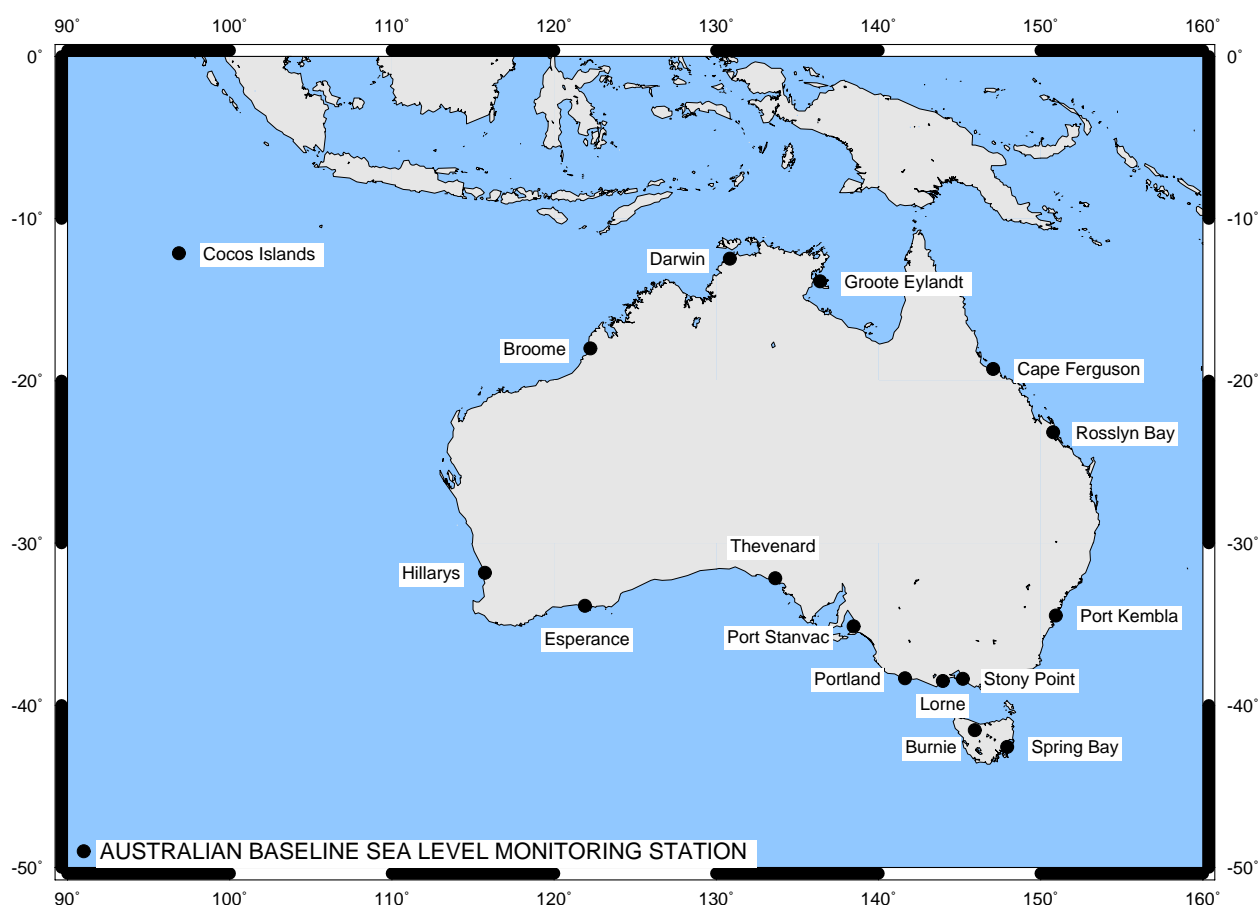


Figure B: Australian Baseline Sea Level Monitoring Project sites.**Table 2 Short term sea level trend, change in sea level trend from the previous month and the type of tide gauge for Lorne from December 2006 through April 2008.**

Date (months from start)	Trend (mm/yr)	Change from previous month	Tide gauge type
December 2006 (204)	+1.5	-0.1	Aquatrak acoustic
January 2007 (205)	+3.11.5	-0.1	Seamans Probe acoustic
February 2007 (206)	+3.11.4	-0.10	Seamans Probe acoustic
March 2007 (207)	+1.5	-0.1	Seamans Probe acoustic
April 2007 (208)	+1.4	-0.11	Seamans Probe acoustic
May 2007 (209)	+3.11.8	-0.14	Seamans Probe acoustic
June 2007 (210)	+3.11.5	-0.13	Seamans Probe acoustic
July 2007 (211)	+3.11.6	-0.11	Seamans Probe acoustic
August 2007 (212)	+3.11.6	0.0	Seamans Probe acoustic
September (213)	+3.17	-0.1	Seamans Probe acoustic
October 2007 (214)	+3.18	-0.1	Seamans Probe acoustic
November 2007 (215)	+3.17	--0.1	Seamans Probe acoustic
December 2007 (216)	+3.11.8	+0.1	Seamans Probe acoustic
January 2008 (217)	+3.11.8	-0.1	Aquatrak acoustic
February 2008 (218)	+1.7	--0.11	Aquatrak acoustic
March 2008 (219)	+3.11.7	-0.10	Aquatrak acoustic
April 2008 (220)	+1.8	+0.1	Aquatrak acoustic

The *Monthly Data Report* is prepared by the NTC, Bureau of Meteorology for the Australian Greenhouse Office. 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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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

**APRIL 2008
SIX MINUTE SEA LEVEL OBSERVATIONS (m)**

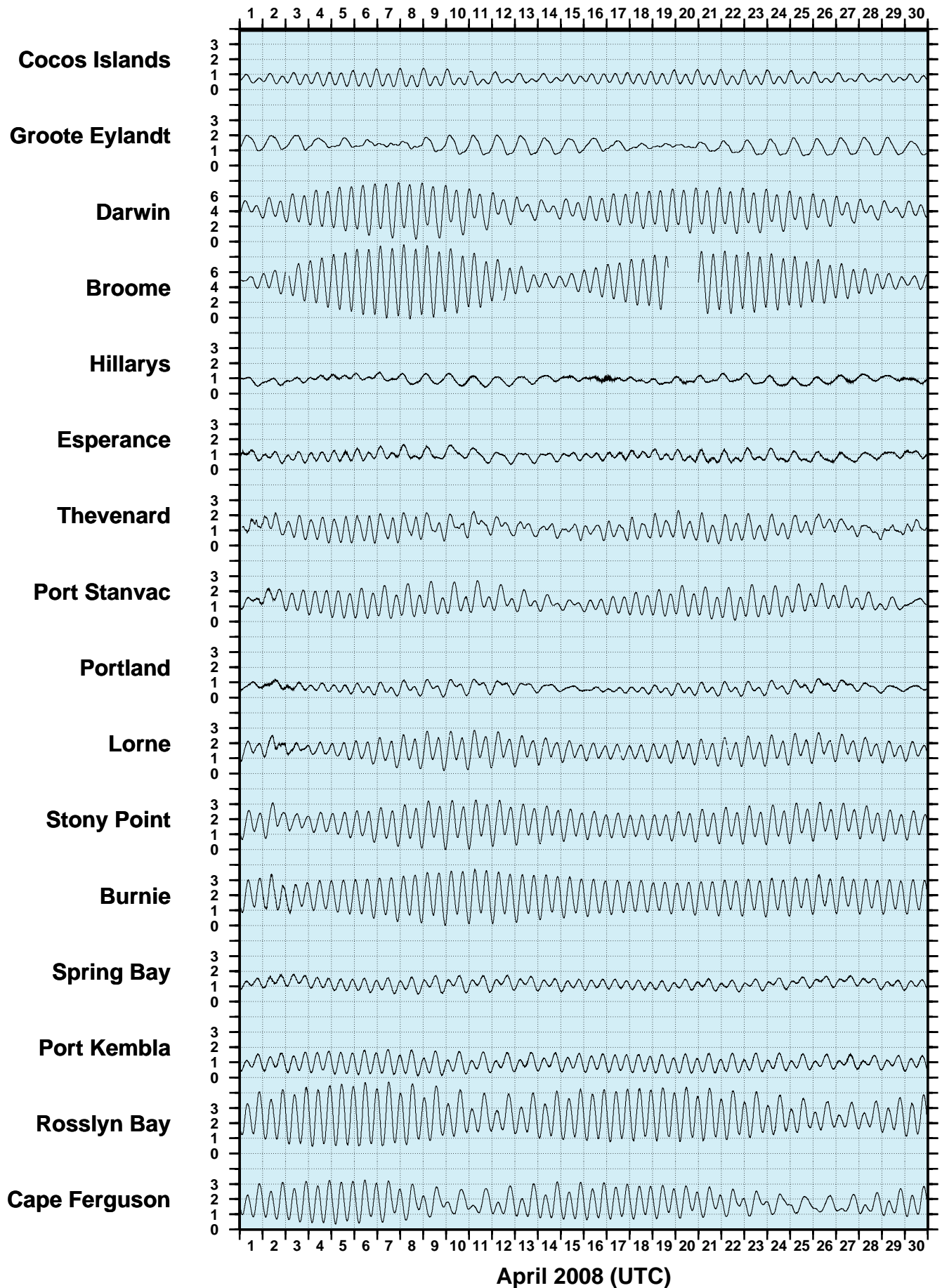


Figure 2
APRIL 2008
SIX MINUTE RESIDUAL WATER LEVELS (m)

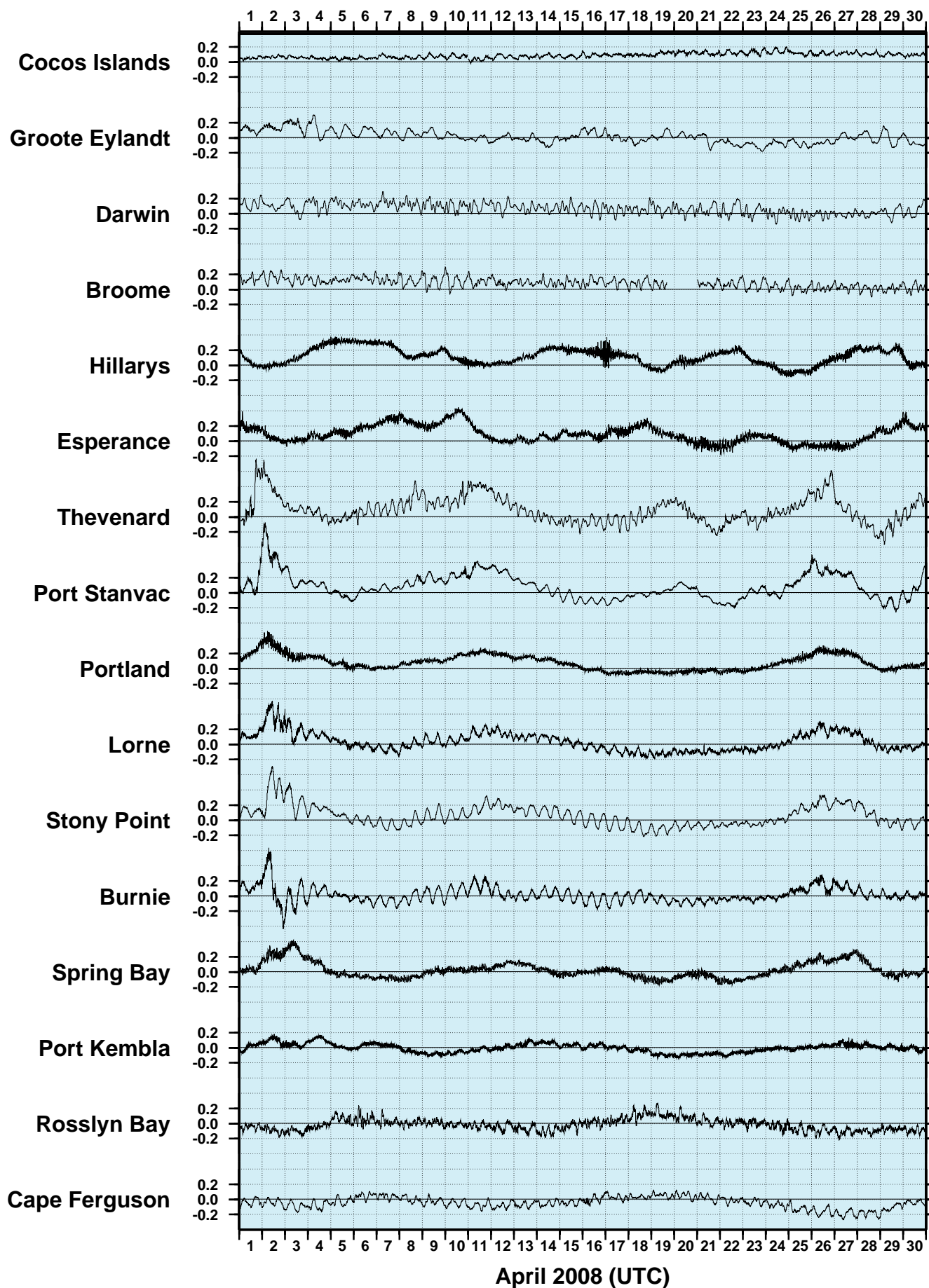


Figure 3
APRIL 2008
SIX MINUTE RESIDUALS
ADJUSTED FOR ATMOSPHERIC PRESSURE (m)

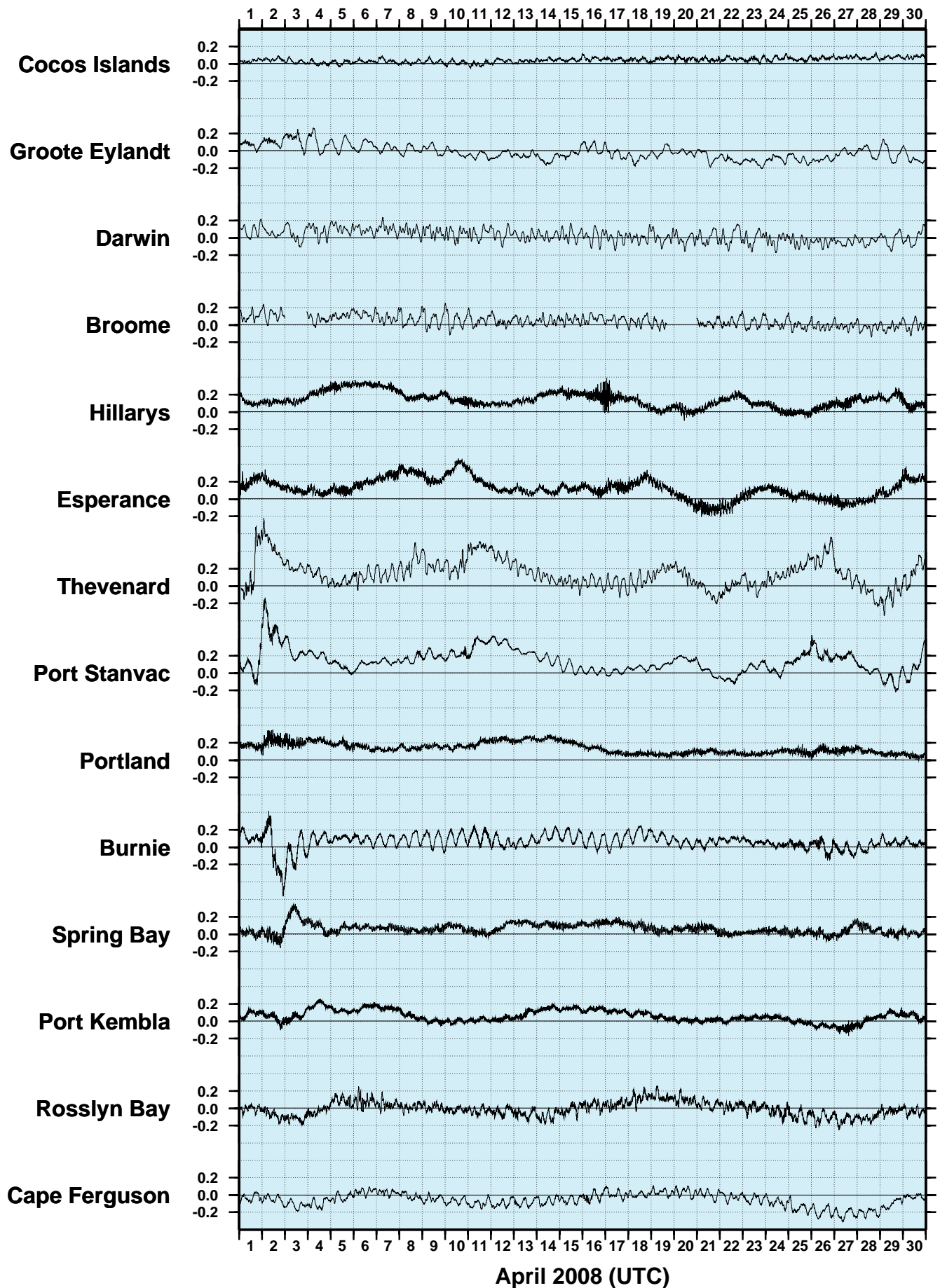


Figure 4

APRIL 2008
HOURLY WIND SPEEDS (m/s)

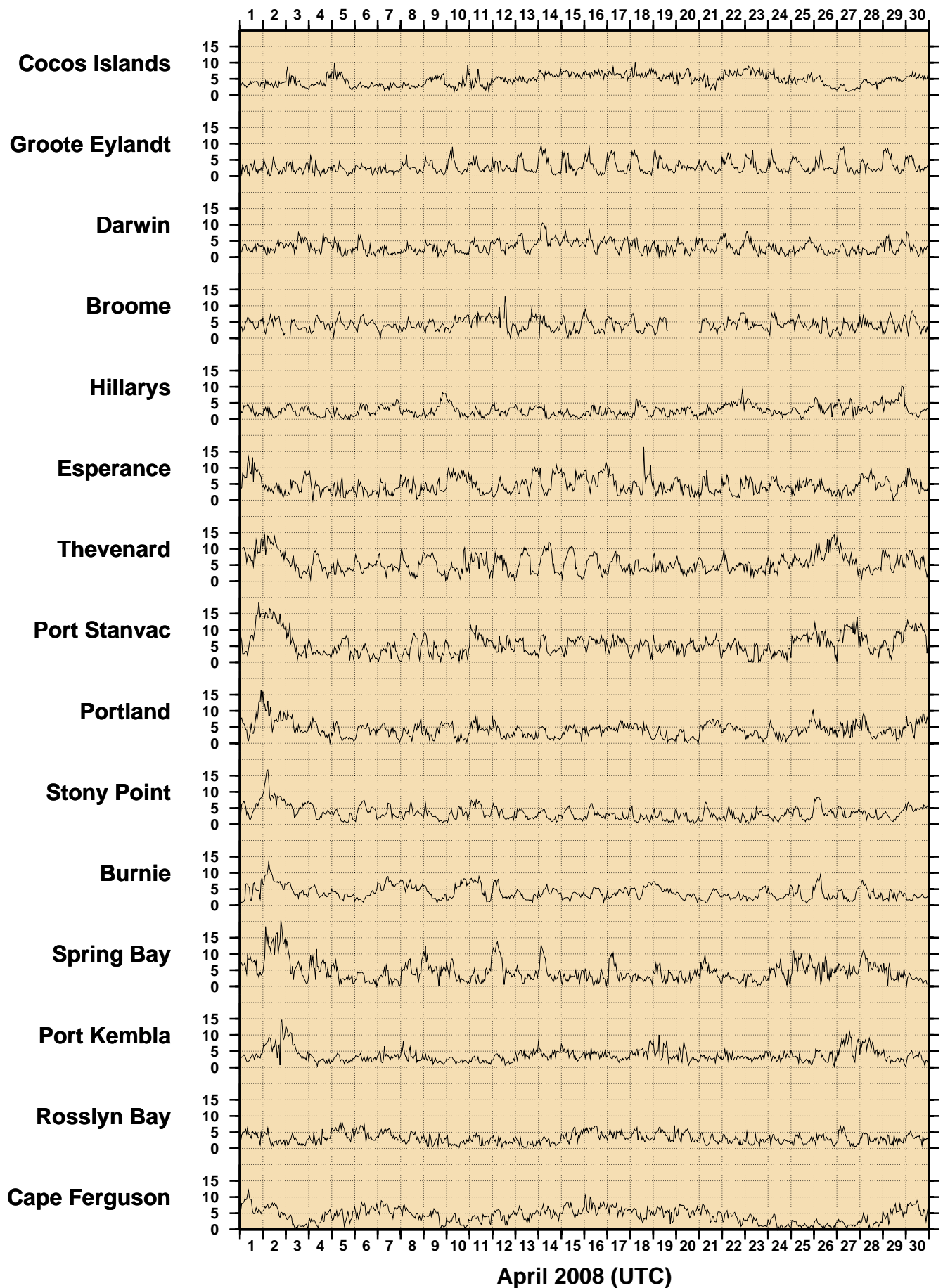


Figure 5

APRIL 2008
HOURLY INCIDENT WINDS (m/s, deg True)

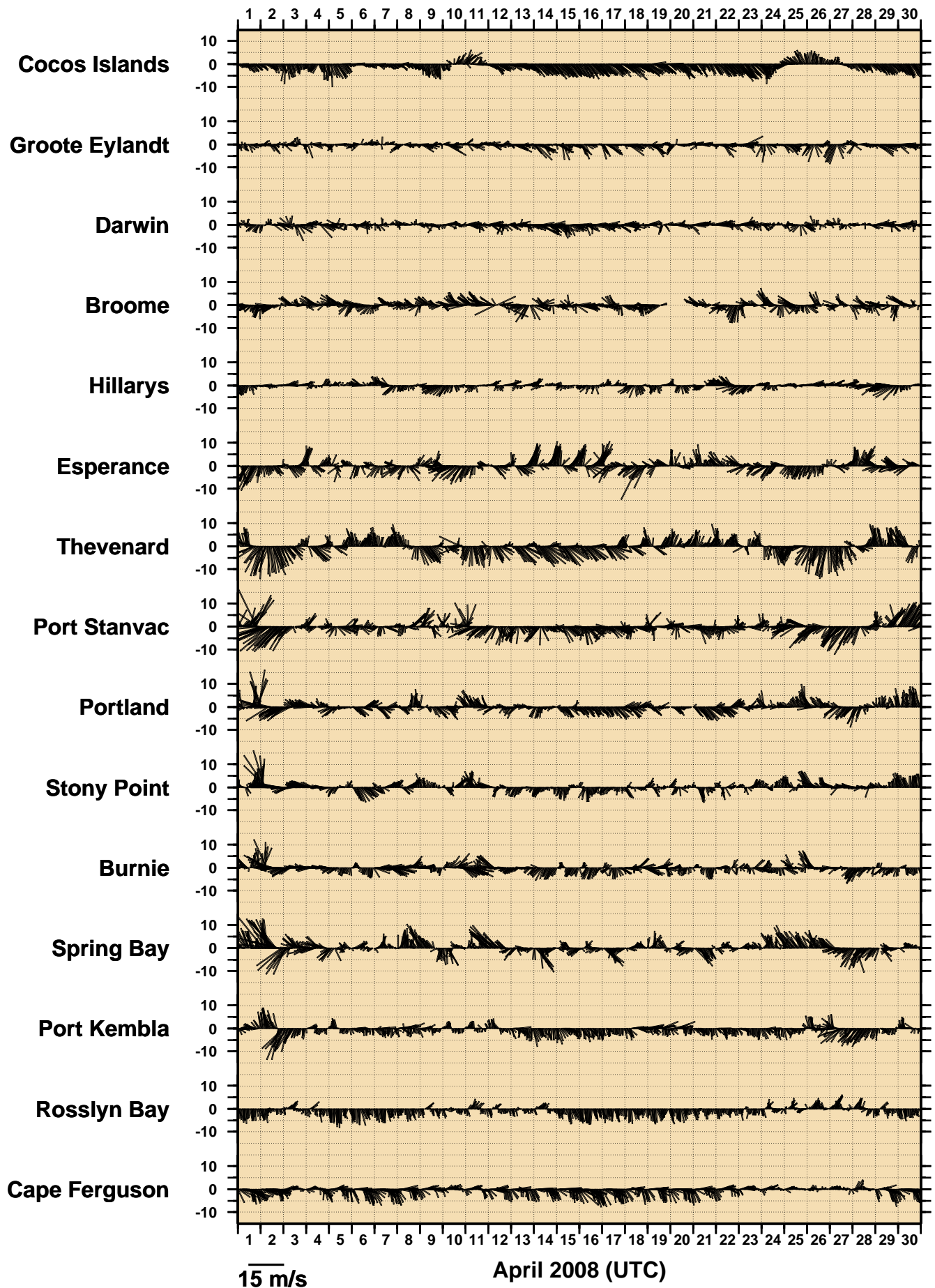


Figure 6

APRIL 2008
HOURLY MAXIMUM WIND GUSTS (m/s)

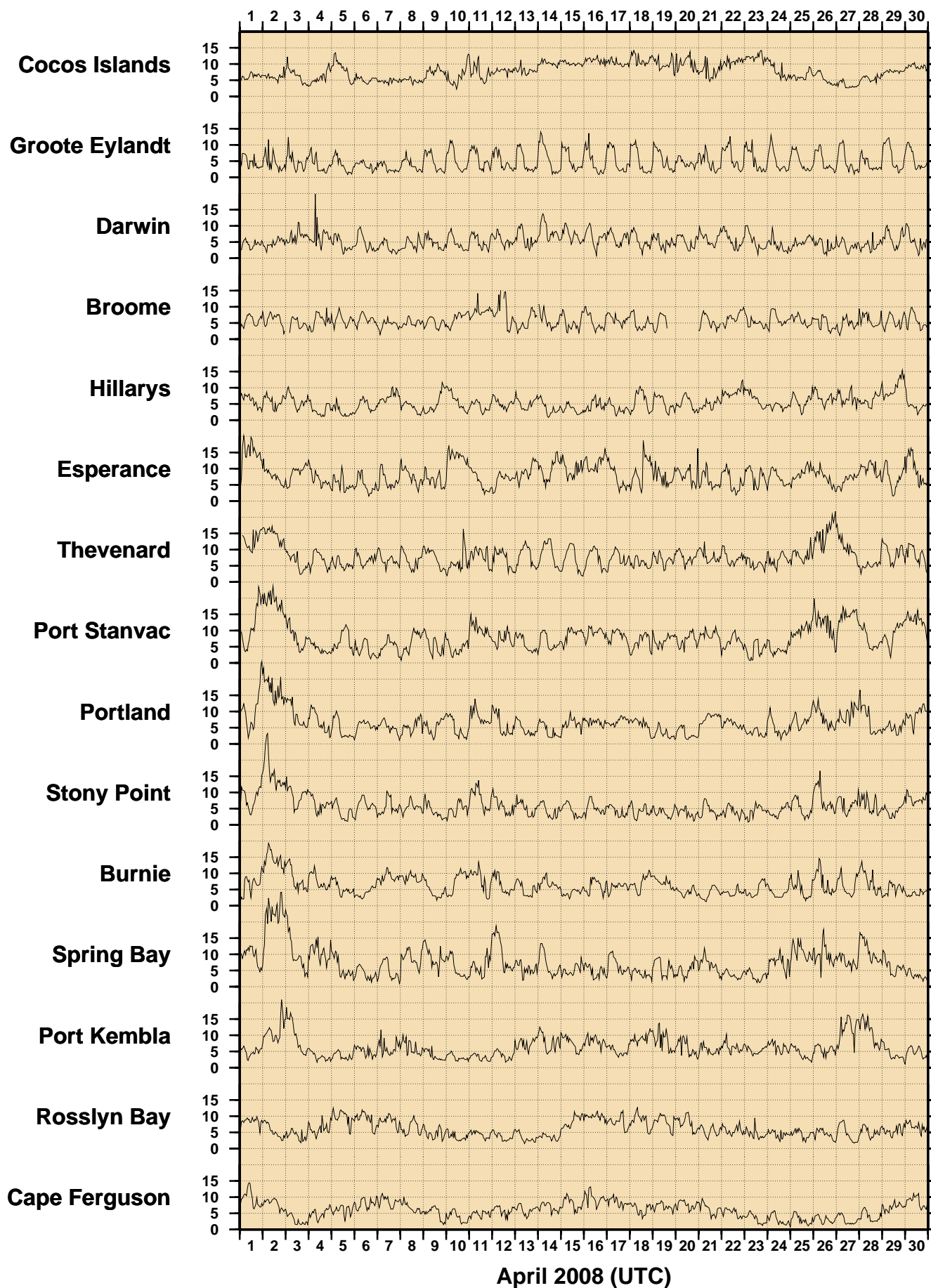


Figure 7

APRIL 2008
HOURLY AIR TEMPERATURES (°C)

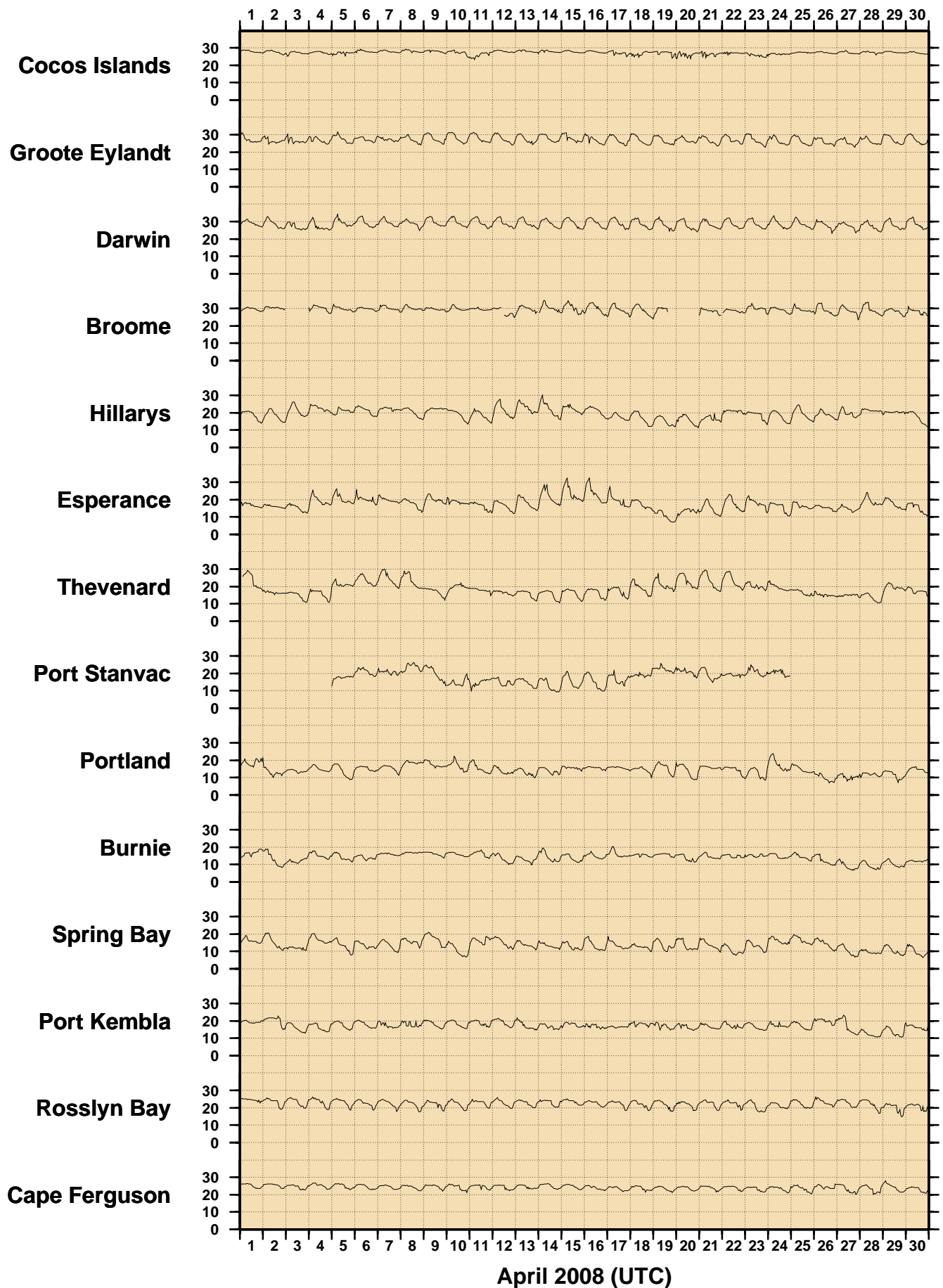


Figure 8

APRIL 2008
HOURLY WATER TEMPERATURES (°C)

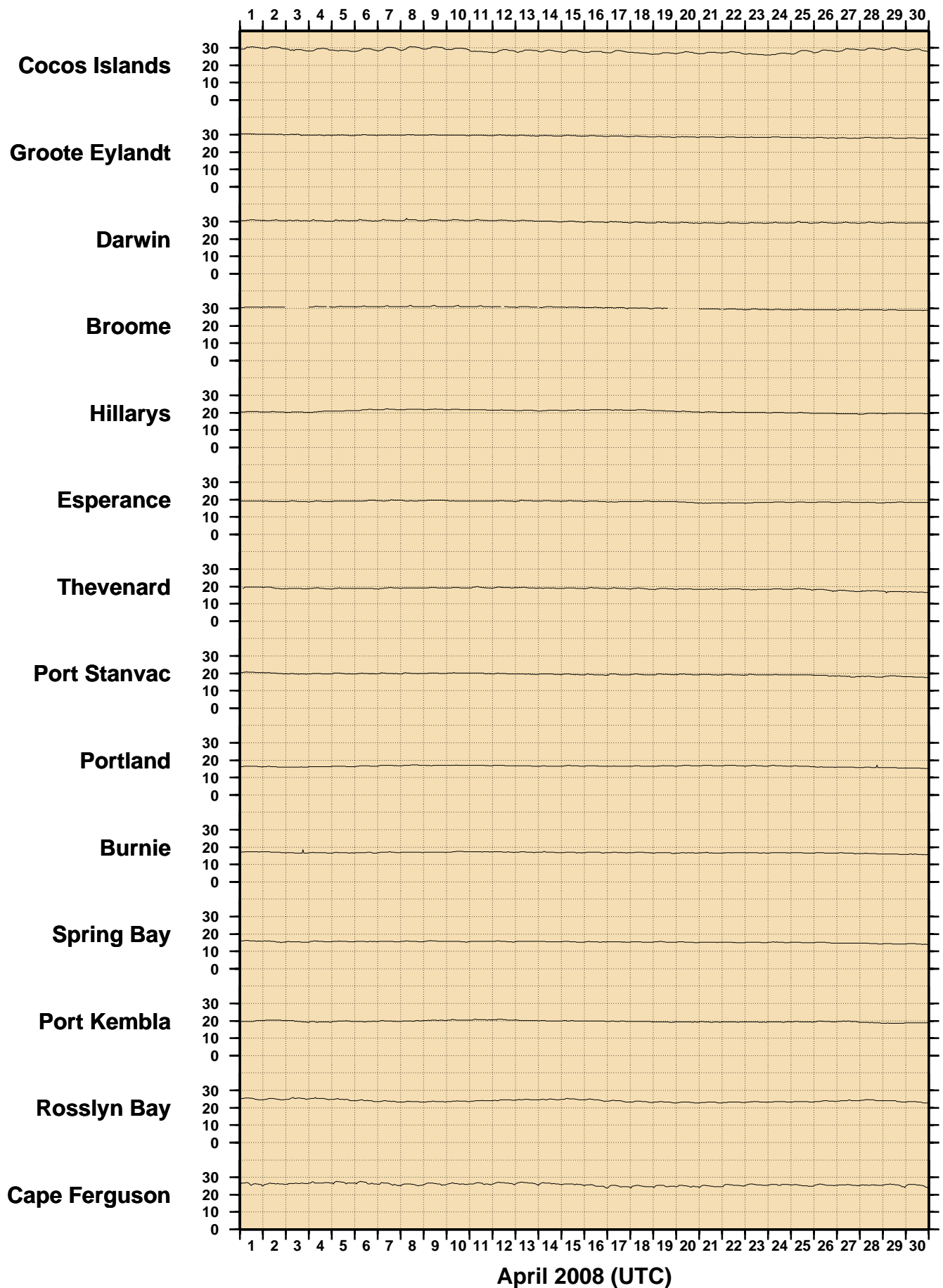


Figure 9

APRIL 2008
HOURLY ATMOSPHERIC PRESSURE (hPa)

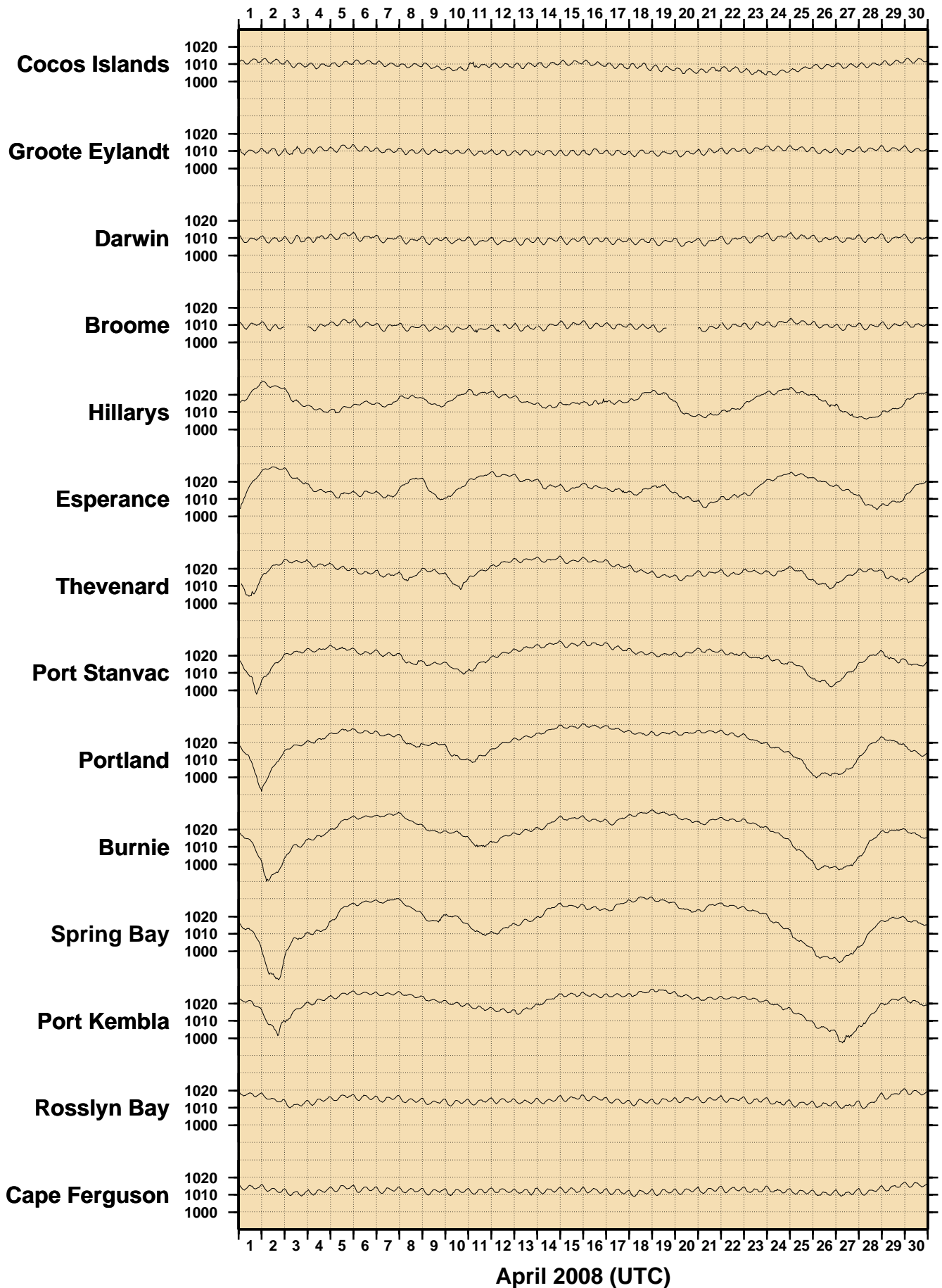
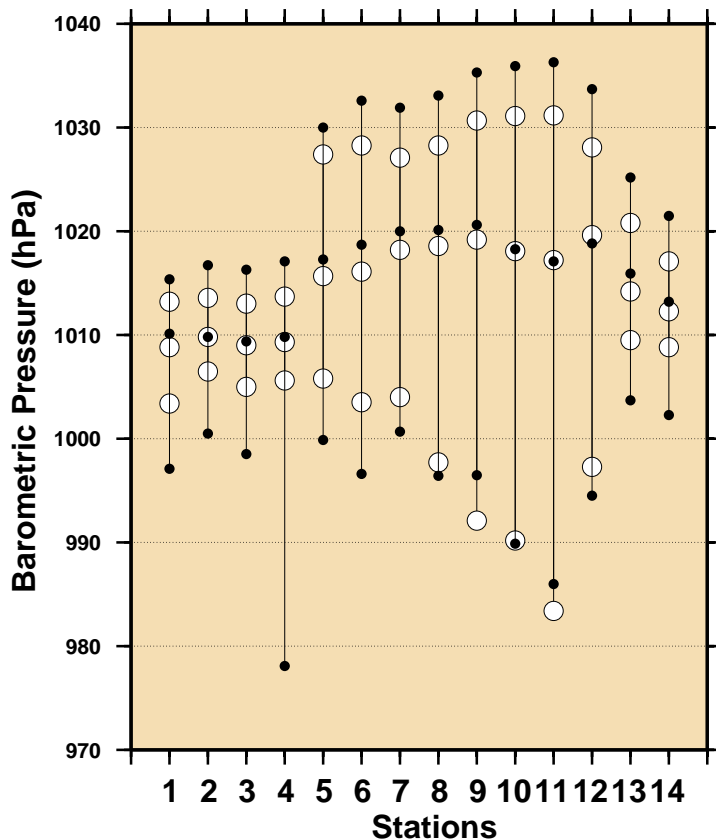
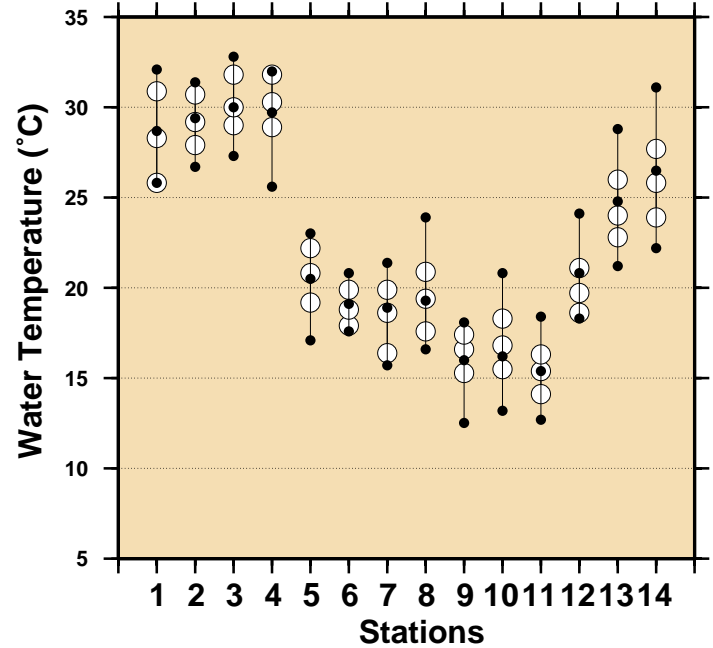
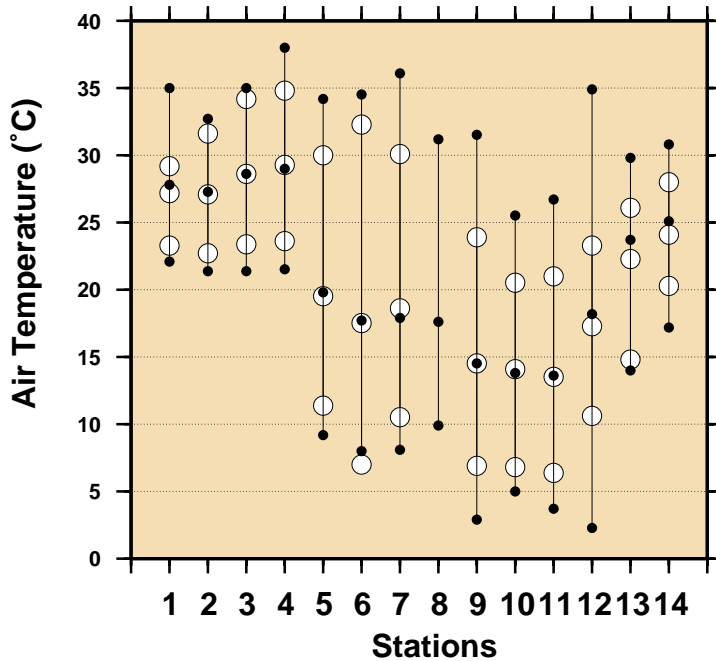


Figure 10
Comparison of April 2008 Max, Min & Mean with
Long Term April Values.



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

- April 2008 Maximum
- April 2008 Mean
- April 2008 Minimum
- Long Term April Maximum
- Long Term April Mean
- Long Term April Minimum

Figure 11

MONTHLY MEAN SEA LEVELS TO APRIL 2008 (m)

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

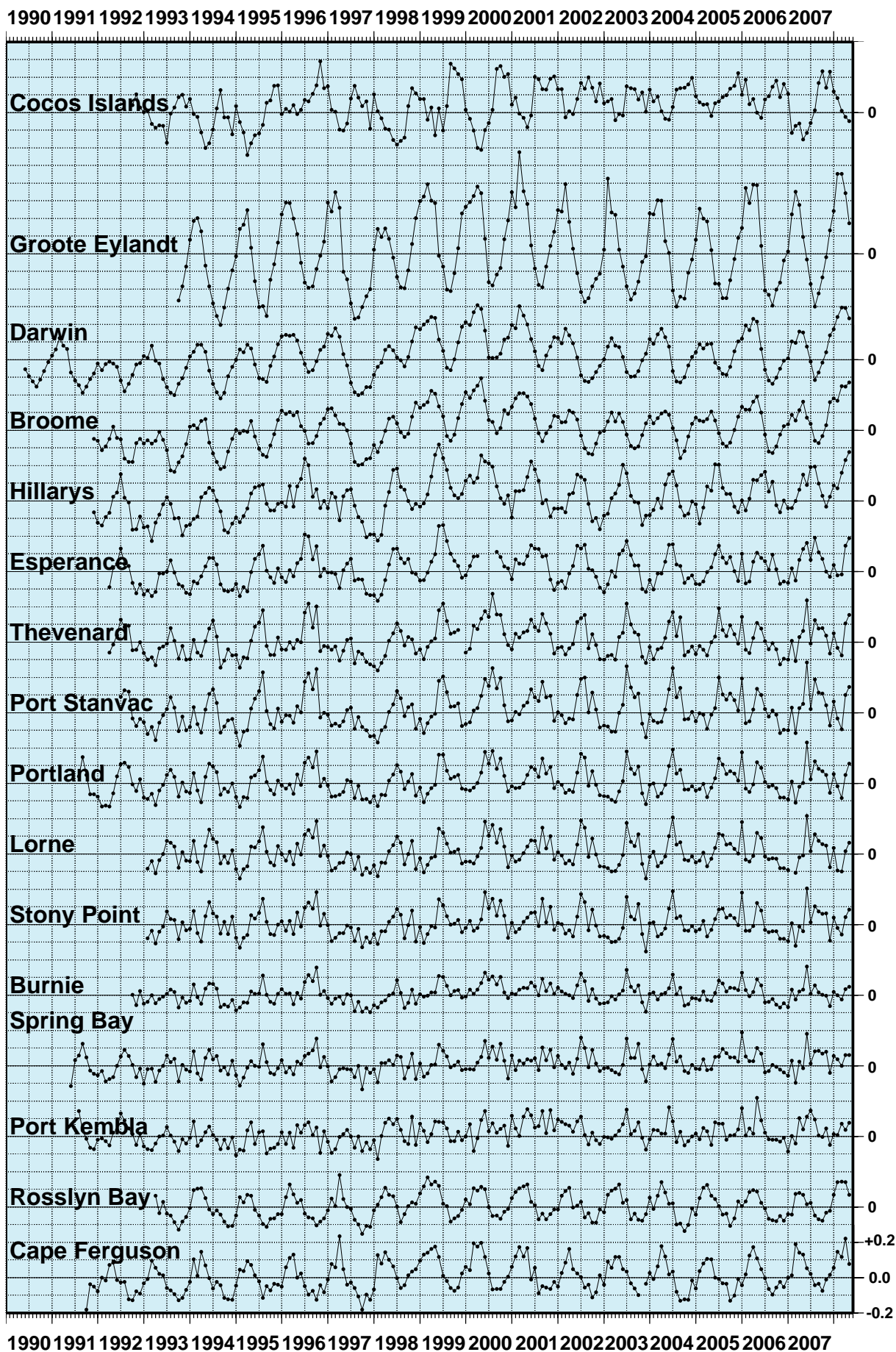


Figure 12
SEA LEVEL ANOMALIES THROUGH APRIL 2008 (m)

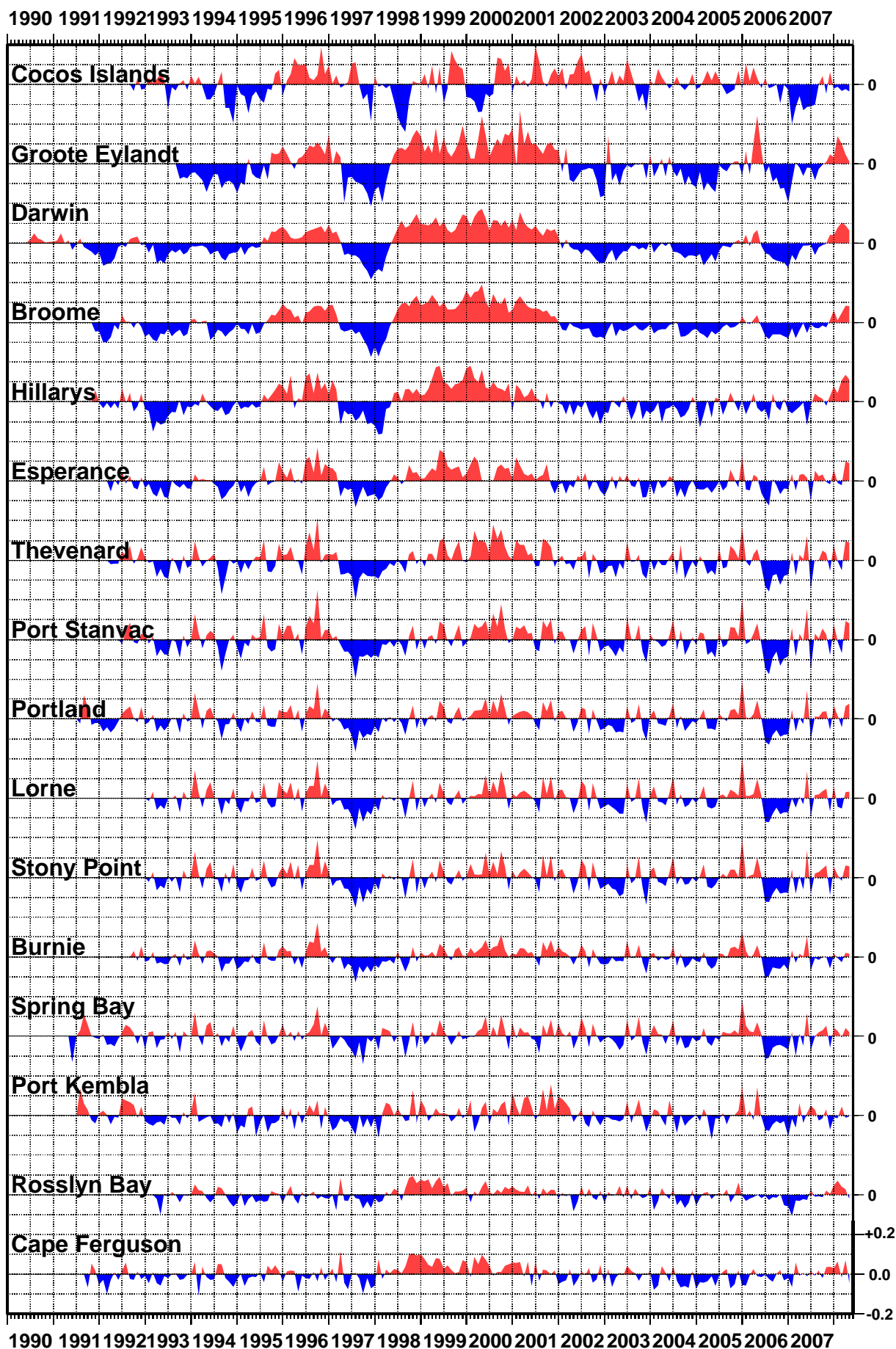


Figure 13

SEA LEVEL TRENDS THROUGH APRIL 2008 (mm/year)

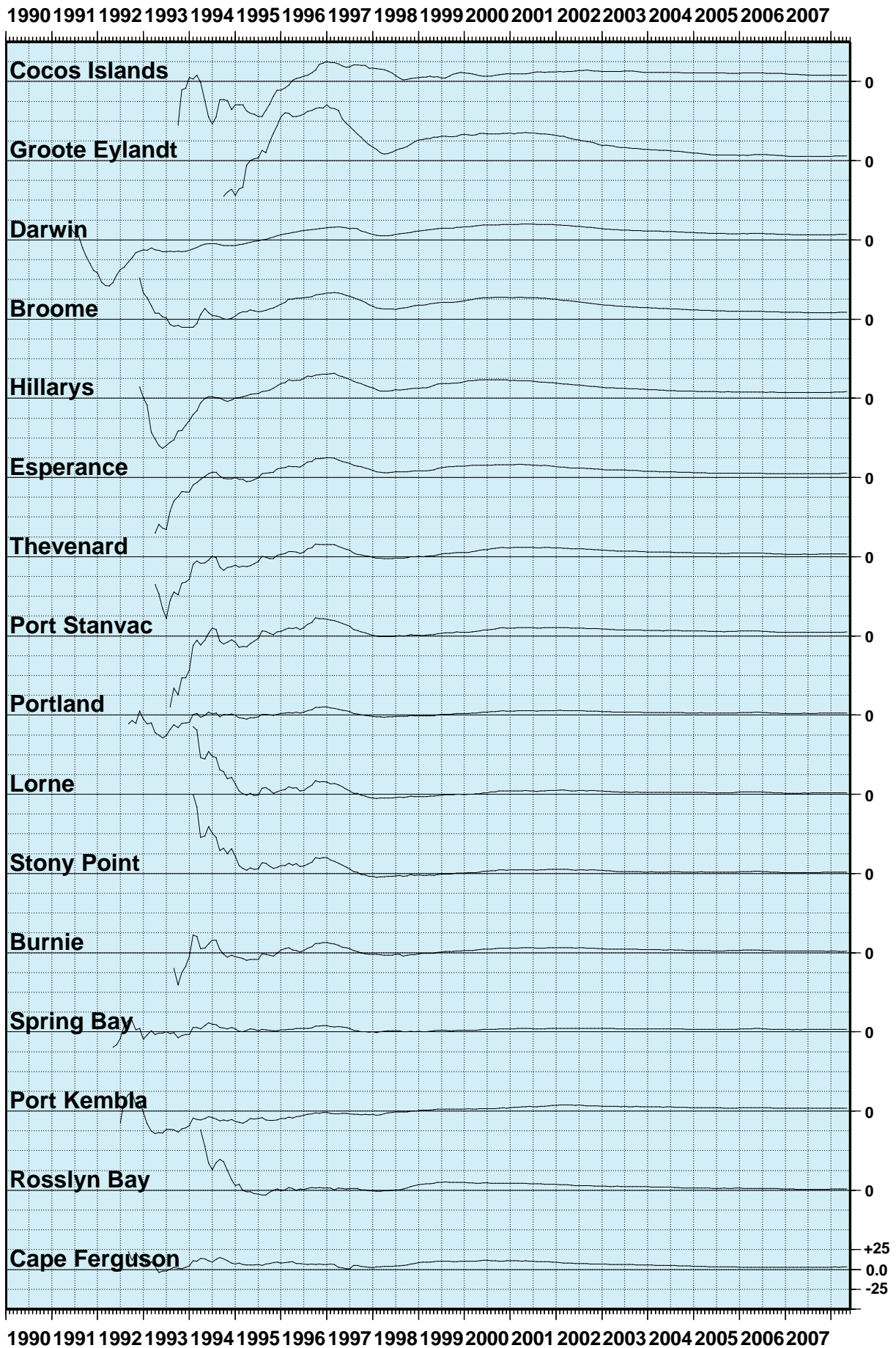


Figure 14

BAROMETRIC PRESSURE ANOMALIES THROUGH APRIL 2008 (hPa)

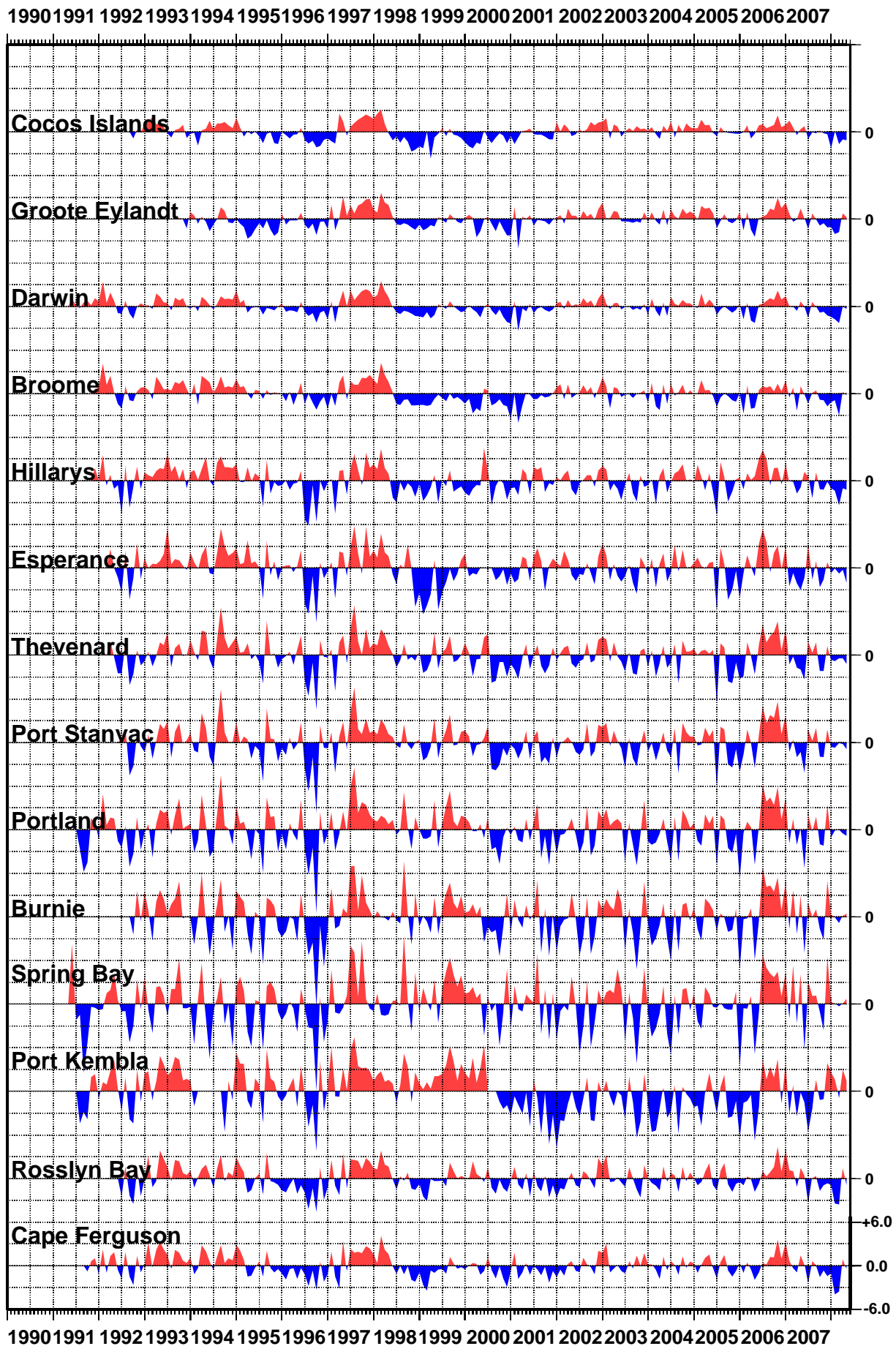


Figure 15

WATER TEMPERATURE ANOMALIES THROUGH APRIL 2008 (°C)

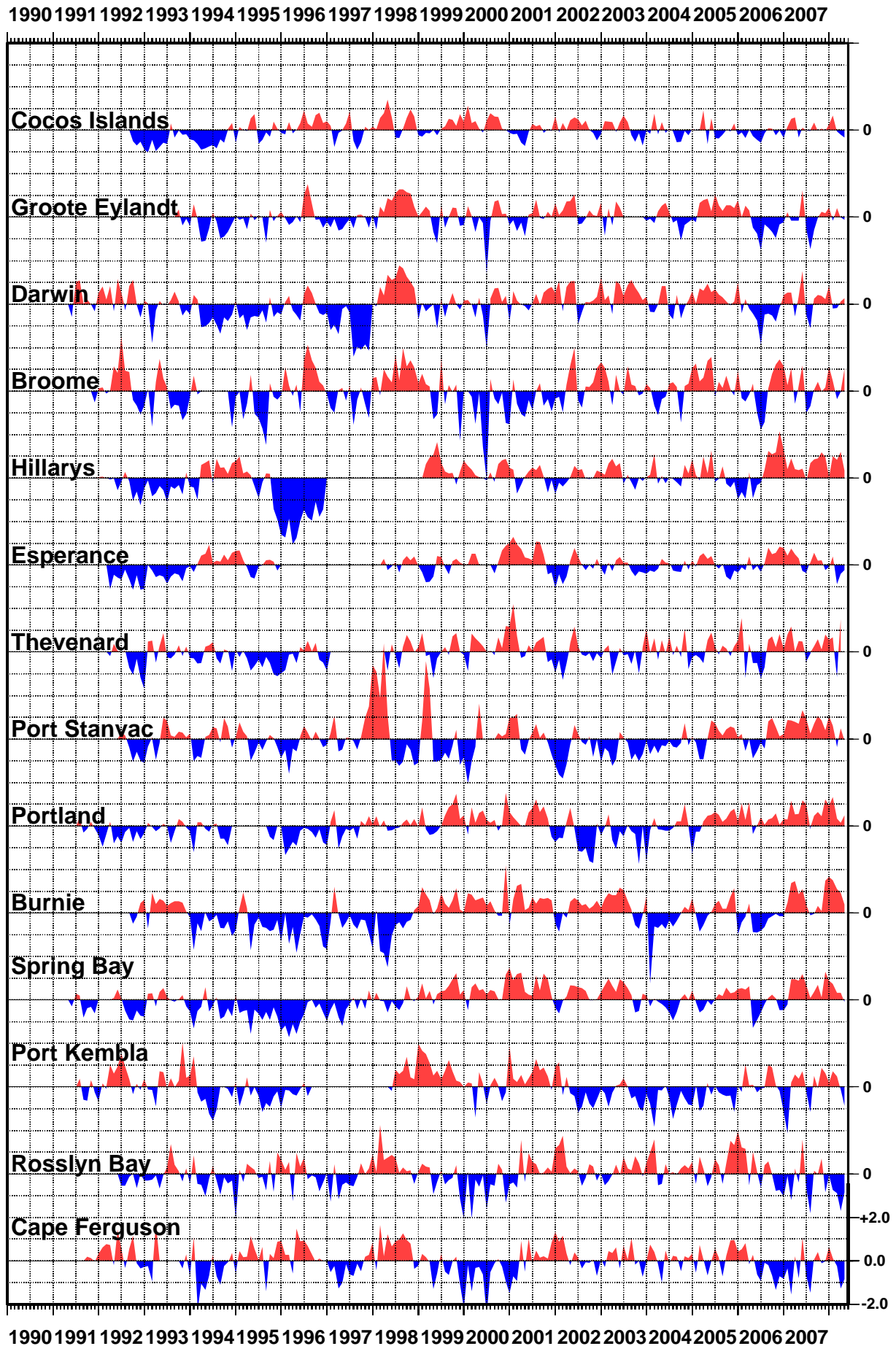


Figure 16
AIR TEMPERATURE ANOMALIES
THROUGH APRIL 2008 (°C)

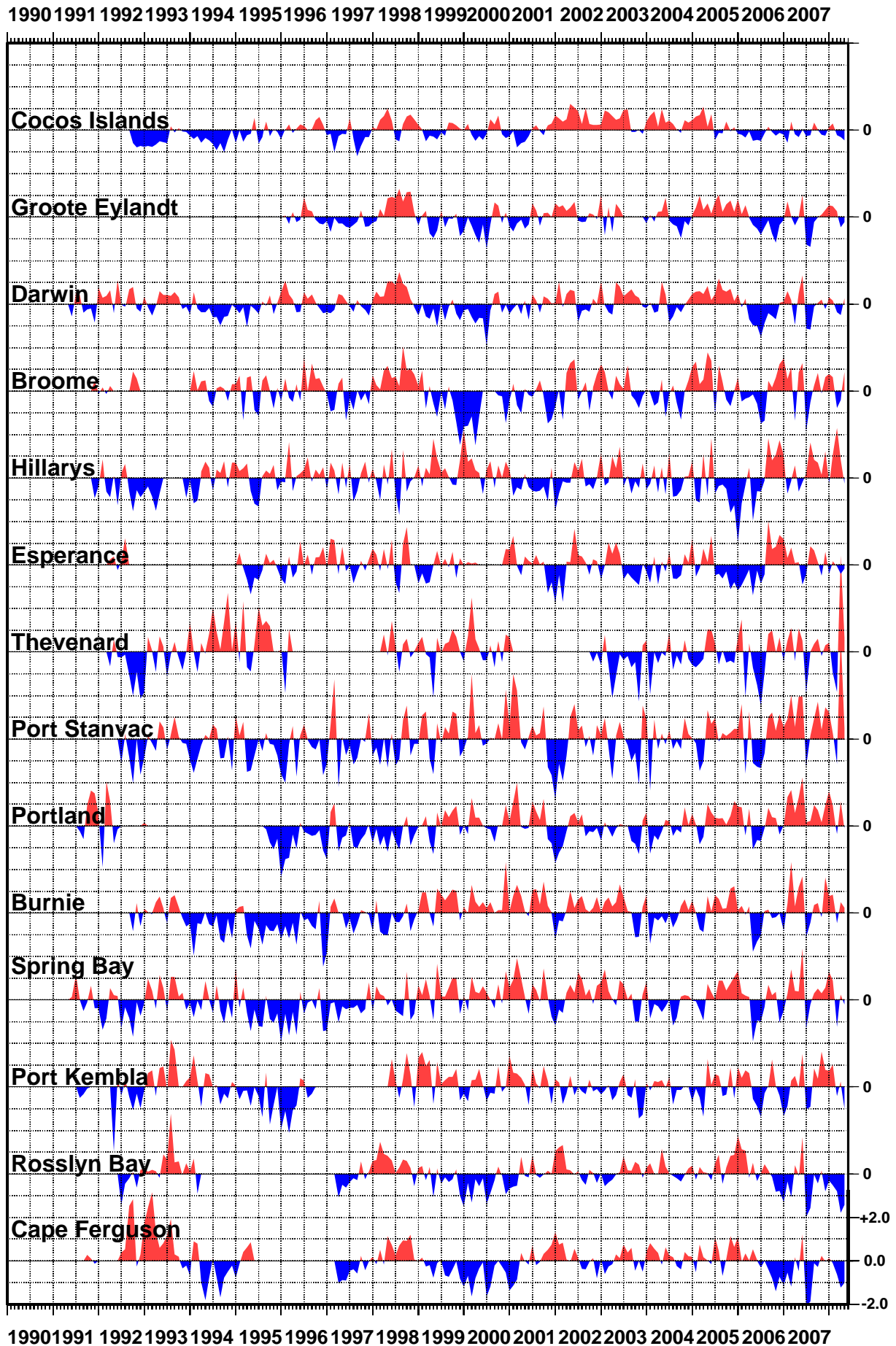


Figure 17 SEA LEVEL DATA RETURN

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

* Patchy record

