

**THE AUSTRALIAN BASELINE SEA LEVEL  
MONITORING PROJECT**

**MONTHLY DATA REPORT**

**JULY 2007**



**Australian Government**

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**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 July 2007 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**

**JULY 2007**

### **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.

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 JULY 2007**

Sea level data return (Figures 1 and 17) in July 2007 was good for most stations. The station at Lorne has been temporarily de-commissioned for wharf refurbishment.

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. A storm surge passed across the Southern seaboard from the 2<sup>nd</sup> to the 4<sup>th</sup> of July. Extreme sea levels were reported at Hillarys, Esperance, Thevenard and Port Stanvac. A record maximum sea level (for the 1993 to July 2007 period) of 3.385m was seen at Port Stanvac. The surge reached 1.5m above the predicted sea level and caused considerable damage to jetties and private property along the Adelaide metropolitan coast.

Figure 10 compares the mean, maximum and minimum values for air temperature, water temperature and barometric pressure for July 2007 with the long-term values. Note that the long-term ranges are calculated using the previous sets of July data for each station *excluding* the current month of data.

The air temperatures in July 2007 were generally within the long-term July air temperature ranges. A record minimum July air temperature of 15.6°C was seen at Groote Eylandt and a record maximum of 18.7°C at Portland.

The water temperatures in July 2007 were generally within the long-term July temperature ranges. Record minimum water temperatures were seen at Rosslyn Bay (15.3°C), Cape Ferguson (17.5°C), Groote Eylandt (21.3°C) and Portland (11.1°C).

The barometric pressures in July 2007 were generally within the long-term July pressure ranges.

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) were negative at the Cocos Islands and near normal at all other 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) were positive at Spring Bay, negative at Port Kembla and Hillarys, and near normal 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.

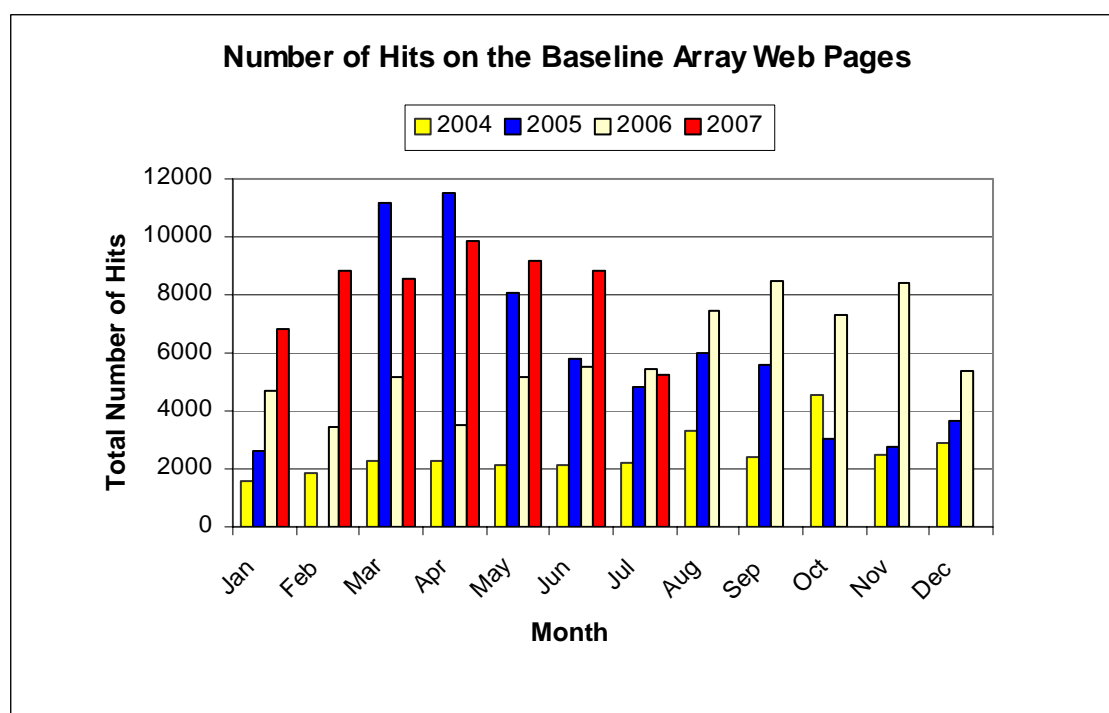
The number of hits to the Australian Baseline Sea Level Monitoring project web pages from 2004 to July 2007 are given in Figure A.

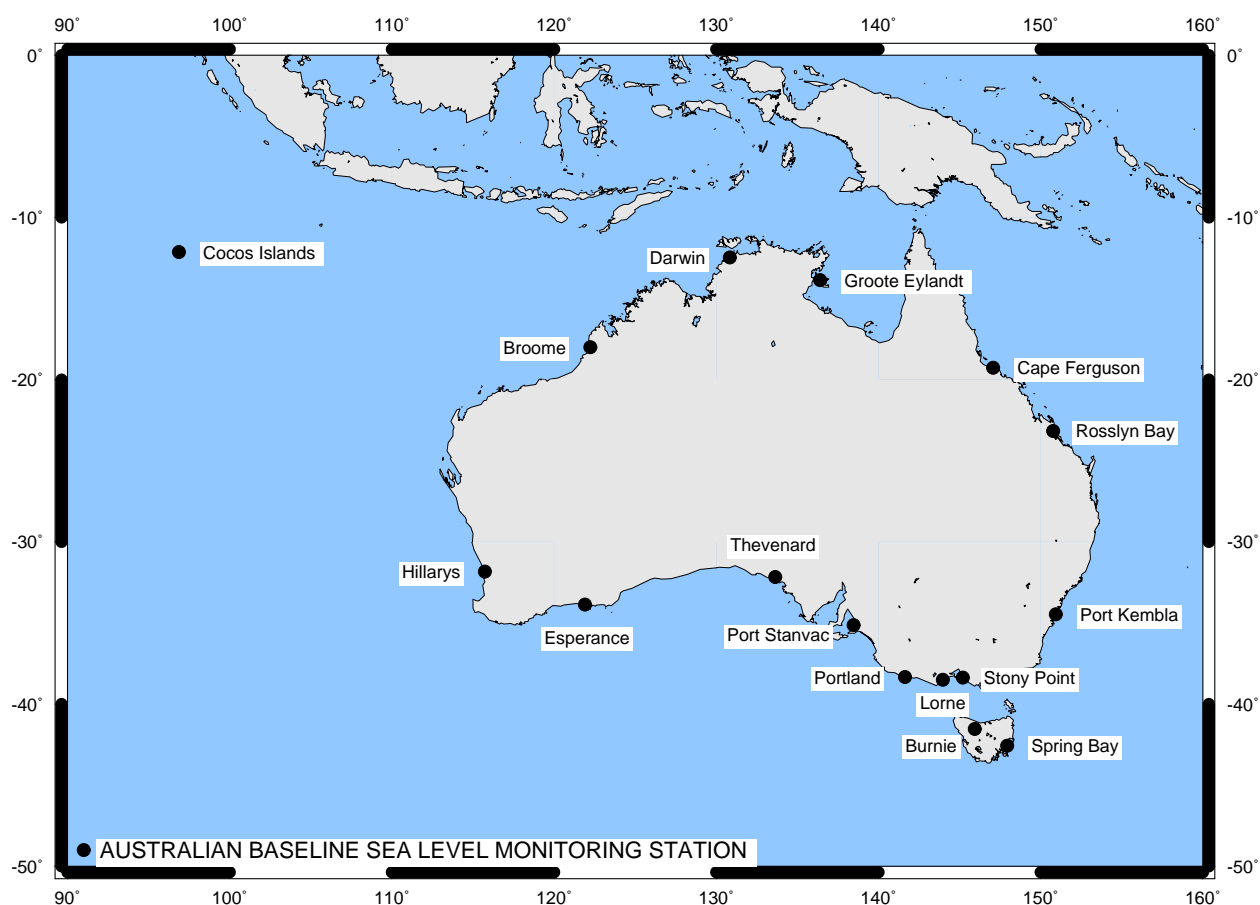
*Please note: Tide gauges at Stony Point and Lorne do not record air temperature, water temperature and barometric pressure data and are not present in Figures 3,7,8,9,11,12,13 and 16. The tide gauge at Lorne does not record wind data and is not present in Figures 4, 5 and 6.*

**Table 1: Tide gauge position, installation date, short-term sea level trends and change in trend from the previous month for the Australian Baseline array through July 2007. Note that the trend for Lorne has not been calculated due to lack of current sea level data.**

Location	Lat / Long	Installation Date	Trend (mm/yr)	Change from previous month
Cocos Islands	12°07'0.1"S / 96°53'30.9"E	Sep 1992	+7.8	-0.2
Groote Eylandt	13°51'36.2"S / 136°24'56.1"E	Sep 1993	+5.2	-0.2
Darwin	12°28'18.4"S / 130°50'45.1"E	May 1990	+6.5	-0.1
Broome	18°00'03.0"S / 122°13'07.1"E	Nov 1991	+8.2	-0.1
Hillarys	31°49'32.0"S / 115°44'18.9"E	Nov 1991	+7.2	+0.1
Esperance	33°52'15.2"S / 121°53'43.3"E	Mar 1992	+4.7	+0.1
Thevenard	32°08'56.2"S / 133°38'28.8"E	Mar 1992	+3.1	0.0
Port Stanvac	35°06'31.0"S / 138°28'1.3"E	Jun 1992	+4.5	+0.1
Portland	38°20'36.4"S / 141°36'47.4"E	Jul 1991	+2.2	0.0
Lorne	38°32'49.4"S / 143°59'19.8"E	Jan 1993	na	na
Stony Point	38°22'19.7"S / 145°13'28.9"E	Jan 1993	+1.1	+0.1
Burnie	41°03'0.3"S / 145°54'54.0"E	Sep 1992	+2.0	0.0
Spring Bay	42°32'45.1"S / 147°55'57.8"E	May 1991	+2.9	0.0
Port Kembla	34°28'25.5"S / 150°54'42.7"E	Jul 1991	+3.6	+0.1
Rosslyn Bay	23°09'39.7"S / 150°47'24.6"E	Jun 1992	+1.3	0.0
Cape Ferguson	19°16'38.4"S / 147°03'30.4"E	Sep 1991	+2.7	0.0

**Figure A: Number of hits on the Australian Baseline Sea Level Monitoring Project web pages from 2004 to July 2007.**



**Figure B: Australian Baseline Sea Level Monitoring Project sites.**

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.

National Tidal Centre  
Bureau of Meteorology  
GPO BOX 421, Kent Town SA 5071  
Tel: [+61 8] 8366 2730  
Fax: [+61 8] 8366 2651  
Website: <http://www.bom.gov.au/oceanography/>

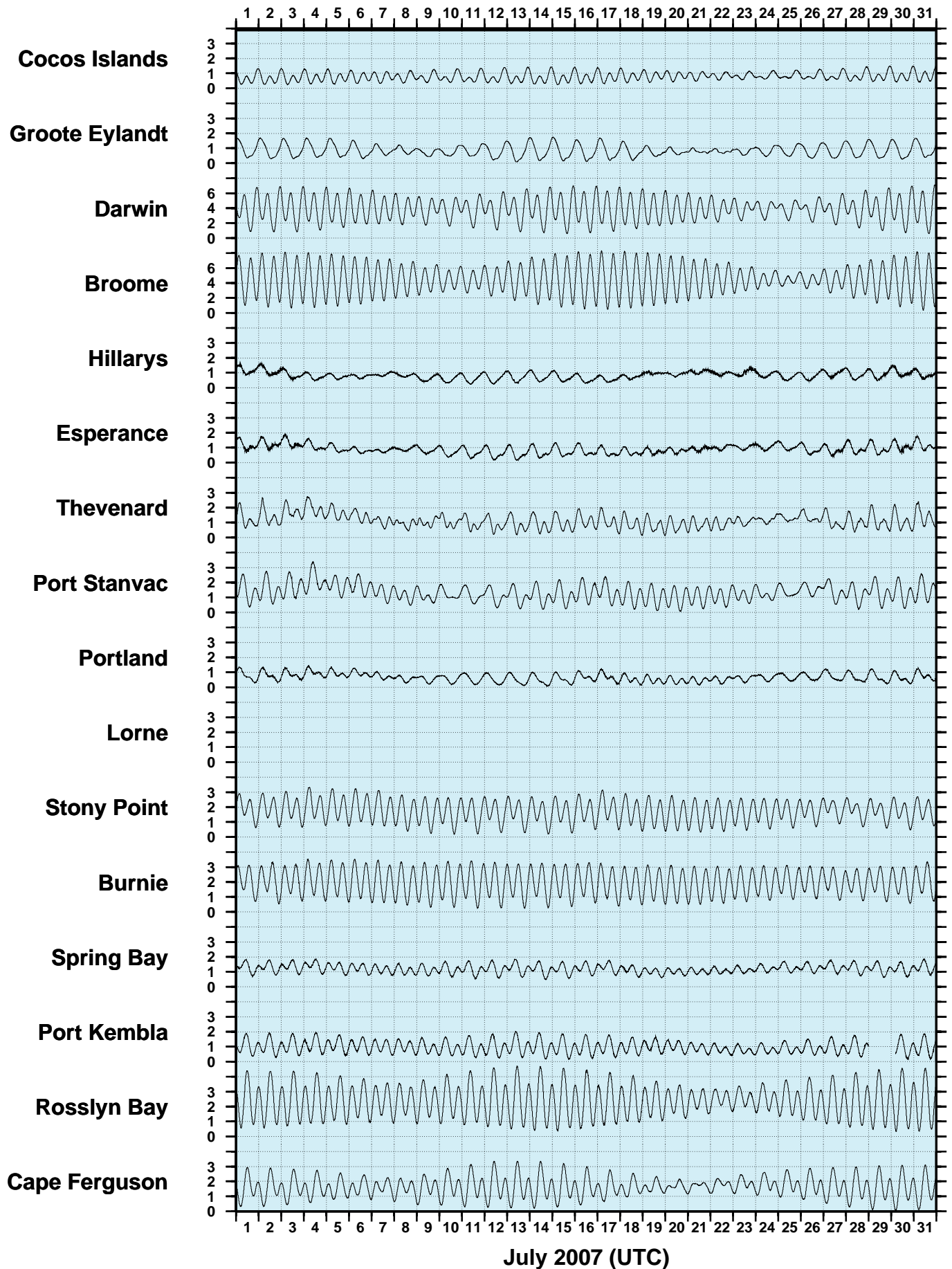
Please note the following:

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.

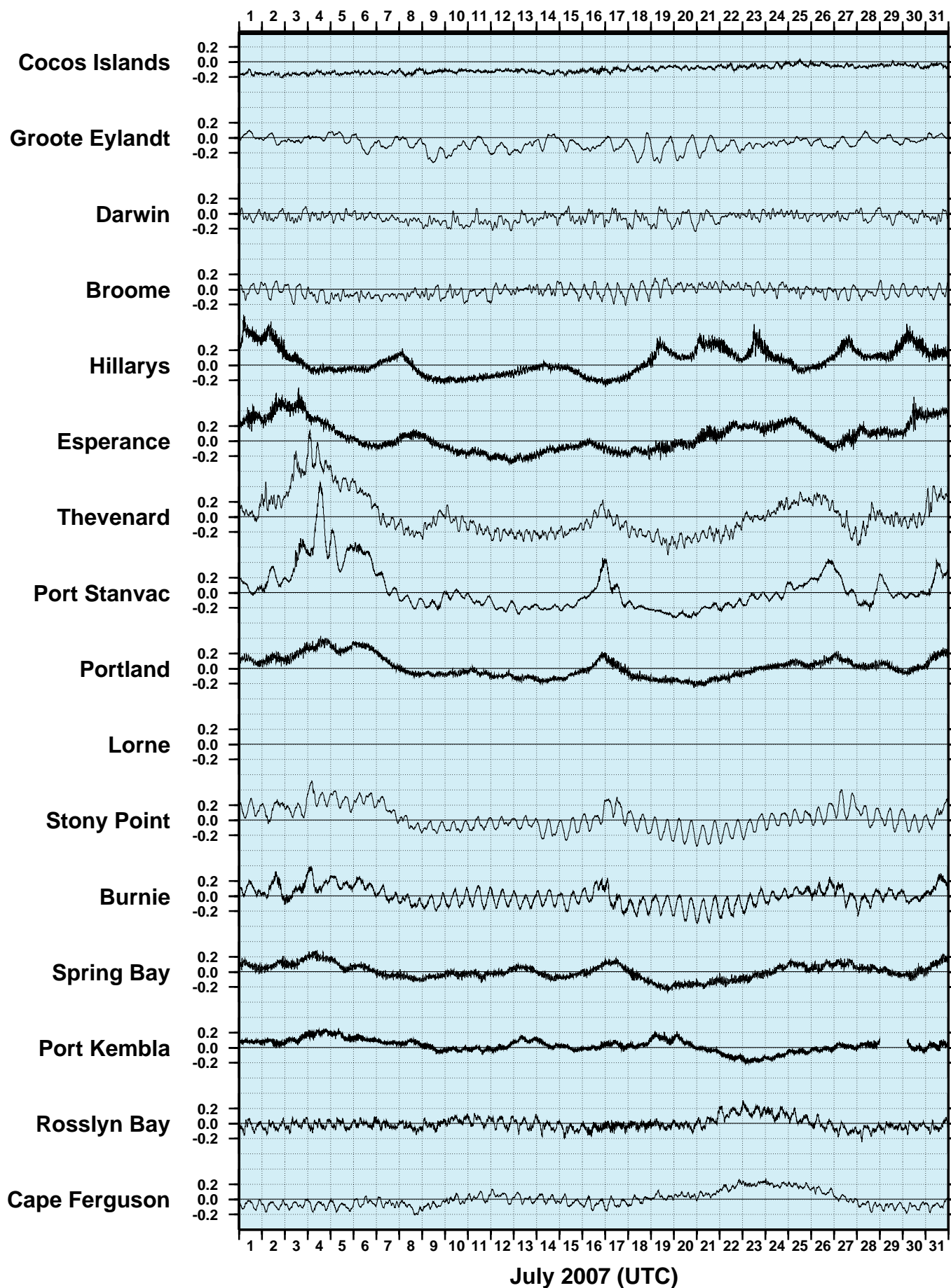
**Figure 1**

**JULY 2007  
SIX MINUTE SEA LEVEL OBSERVATIONS (m)**





**Figure 2**  
**JULY 2007**  
**SIX MINUTE RESIDUAL WATER LEVELS (m)**



**Figure 3**  
**JULY 2007**  
**SIX MINUTE RESIDUALS**  
**ADJUSTED FOR ATMOSPHERIC PRESSURE (m)**

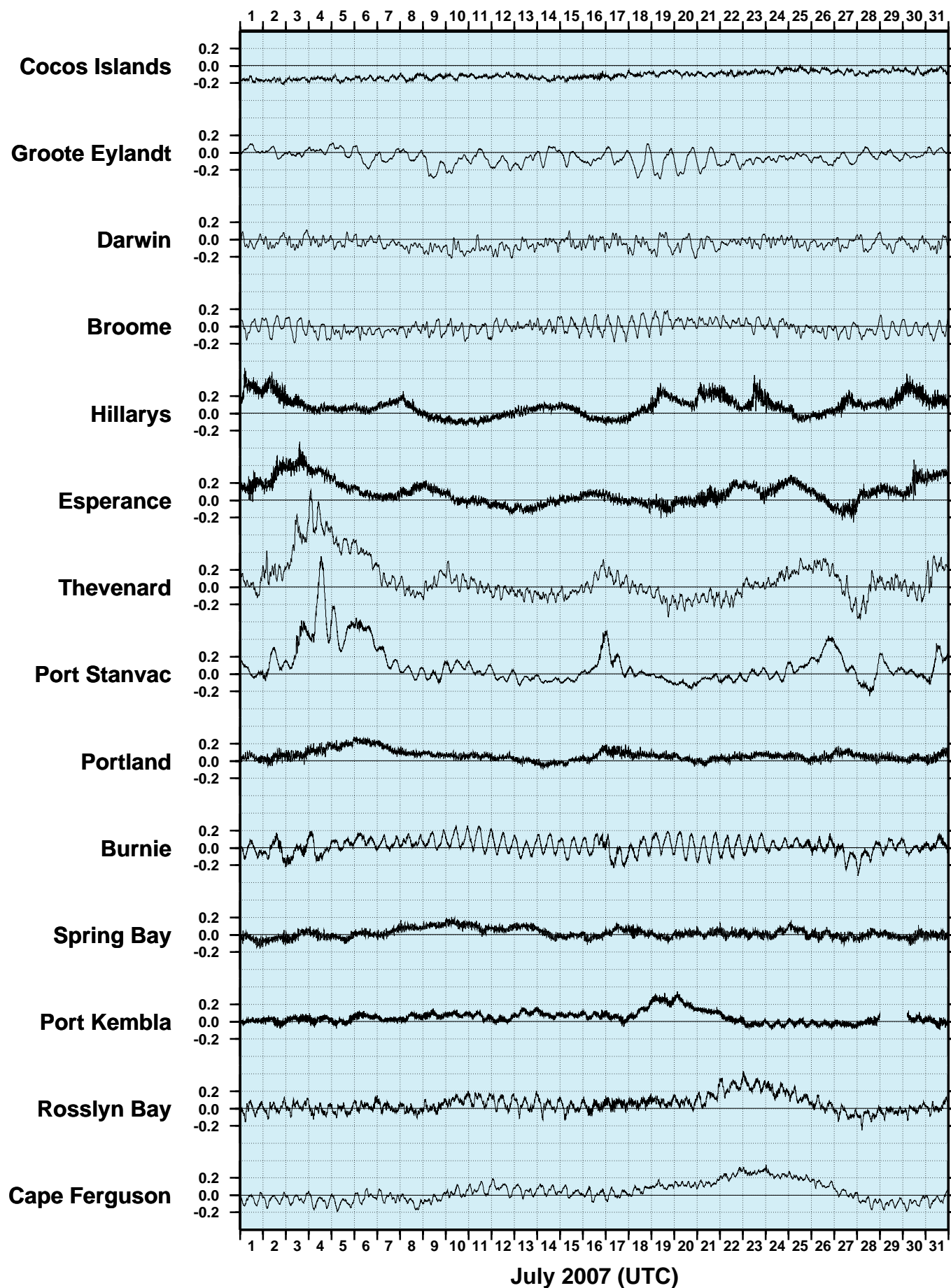


Figure 4

**JULY 2007**  
**HOURLY WIND SPEEDS (m/s)**

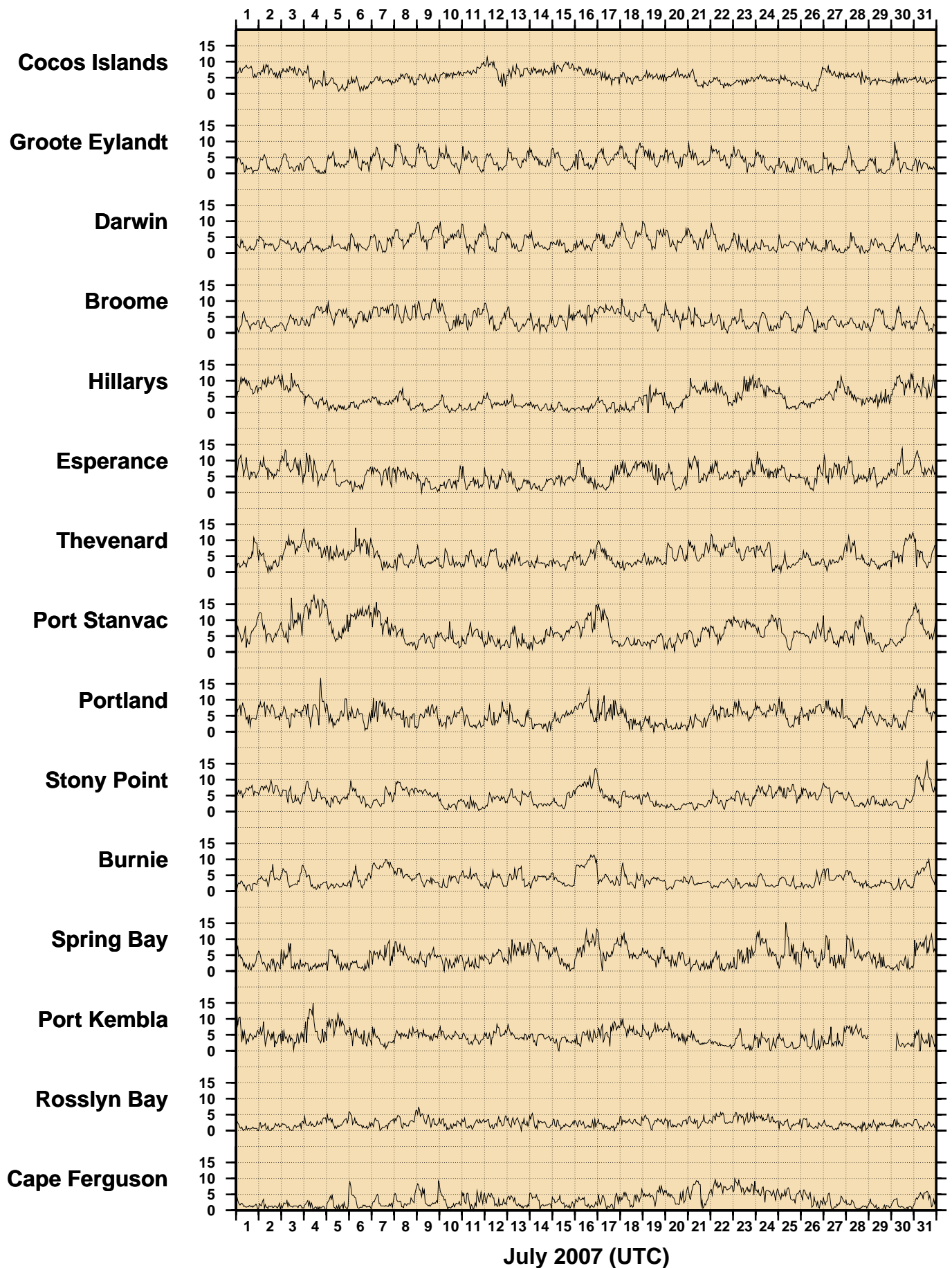


Figure 5

**JULY 2007**  
**HOURLY INCIDENT WINDS (m/s, deg True)**

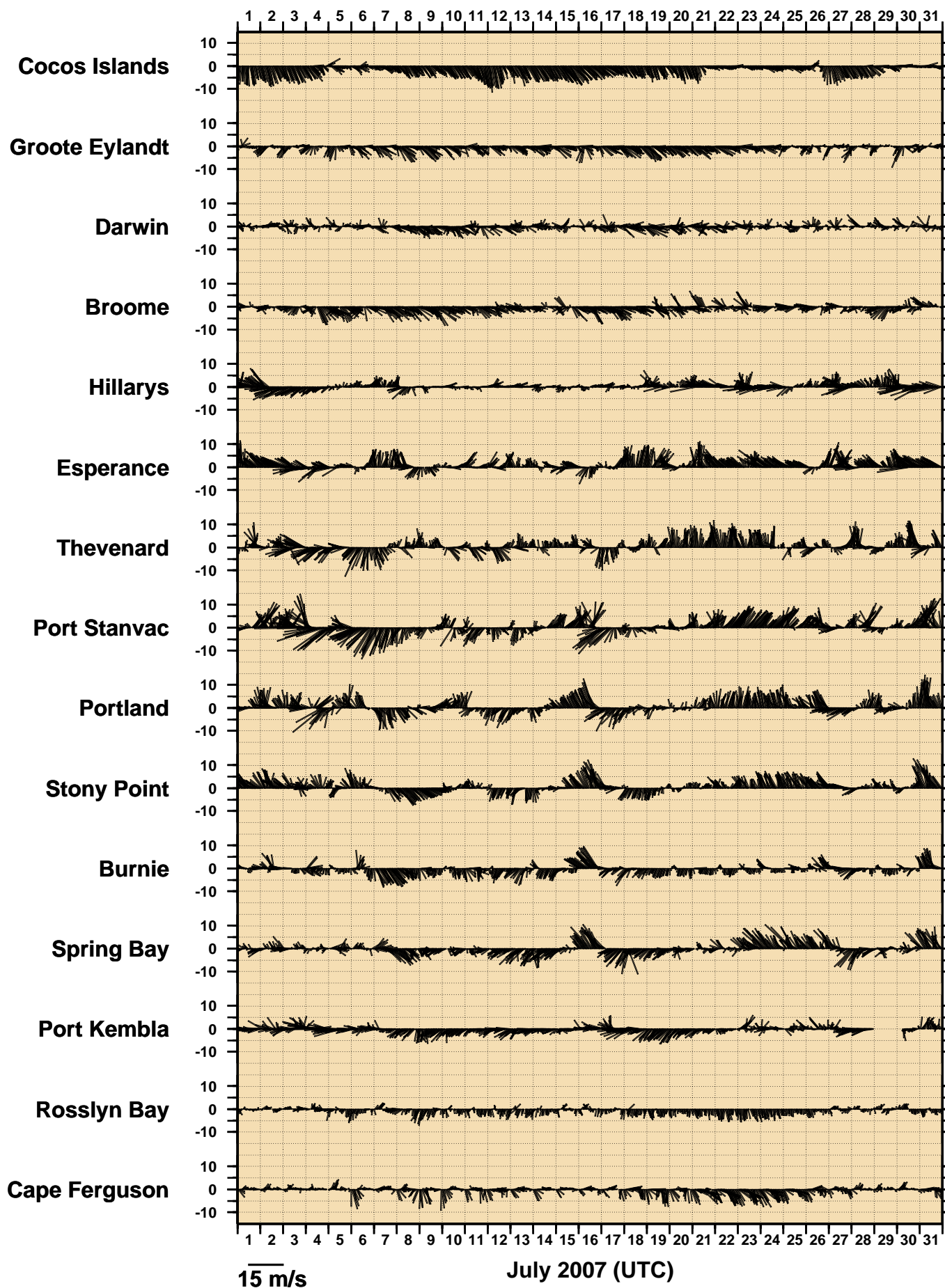




Figure 6

**JULY 2007**  
**HOURLY MAXIMUM WIND GUSTS (m/s)**

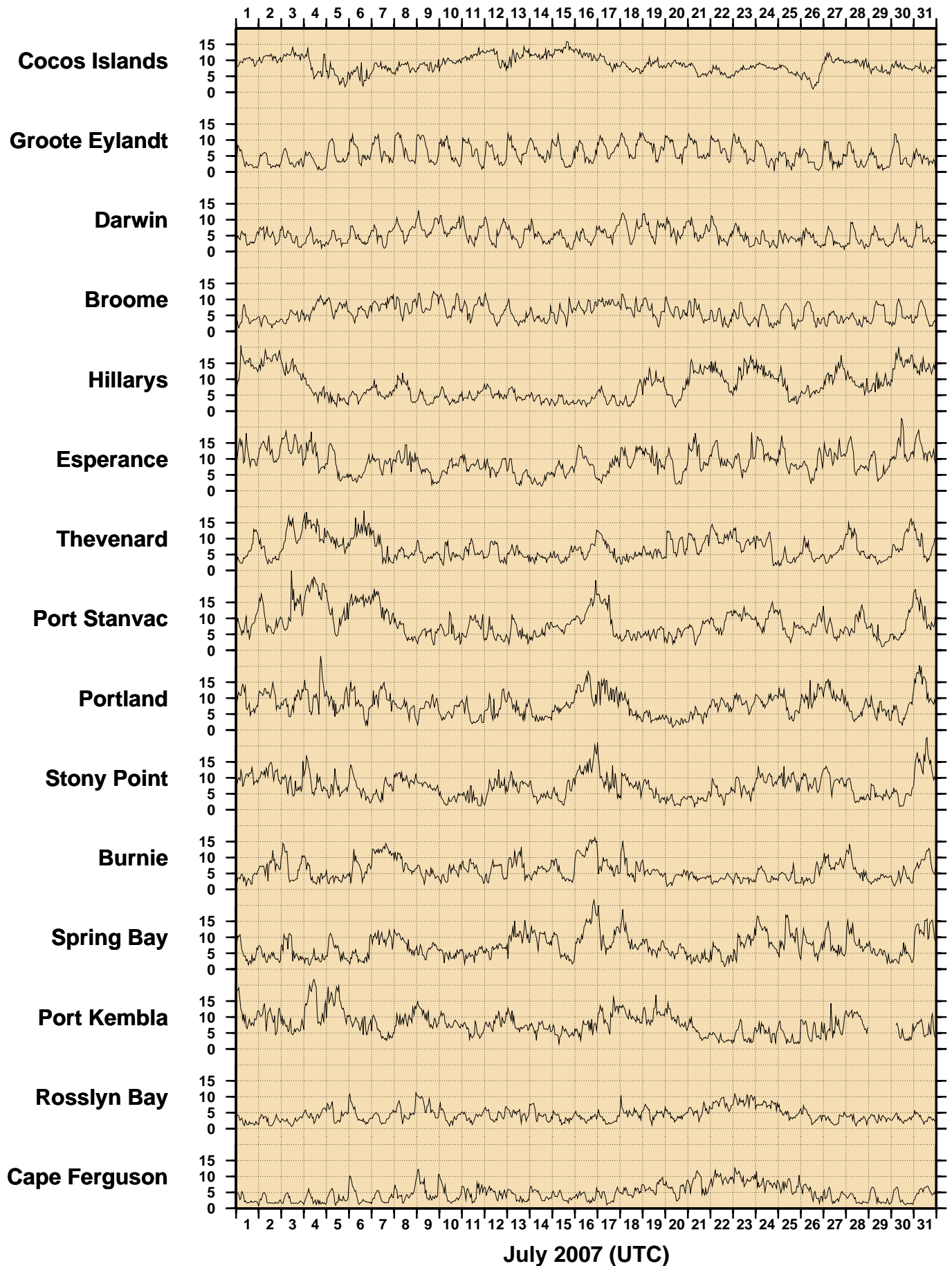


Figure 7

JULY 2007

HOURLY AIR TEMPERATURES (°C)

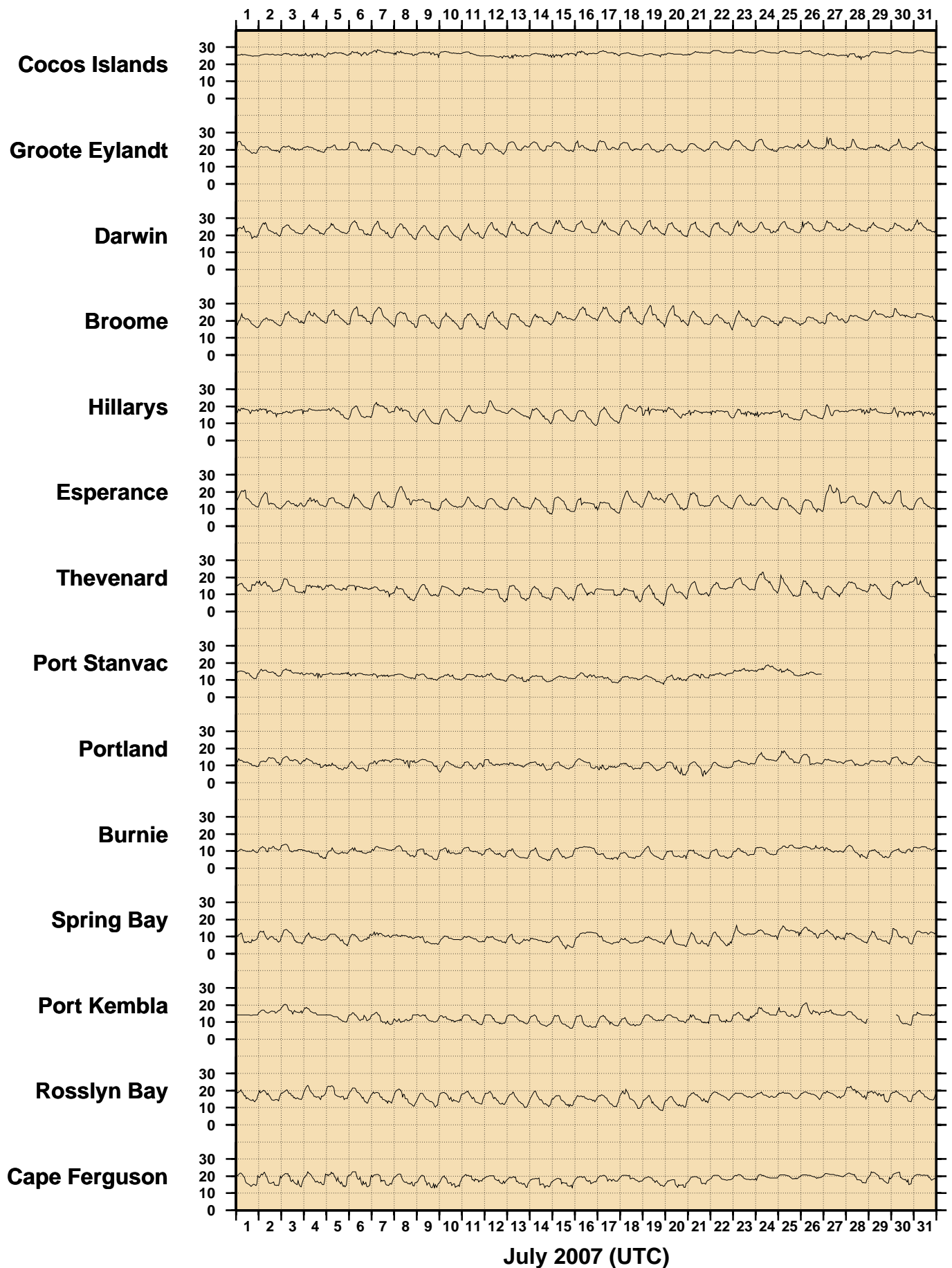


Figure 8

JULY 2007

HOURLY WATER TEMPERATURES (°C)

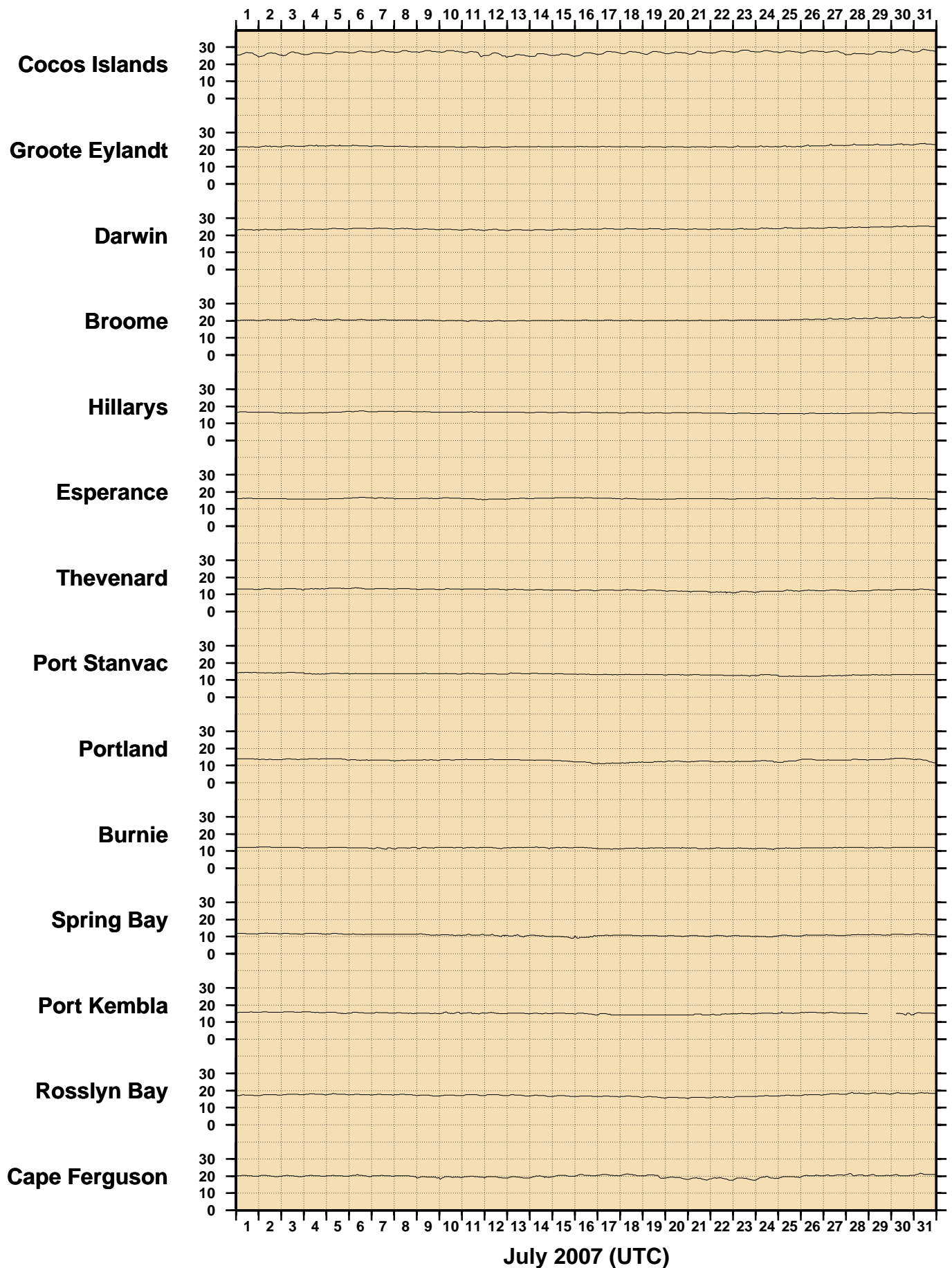
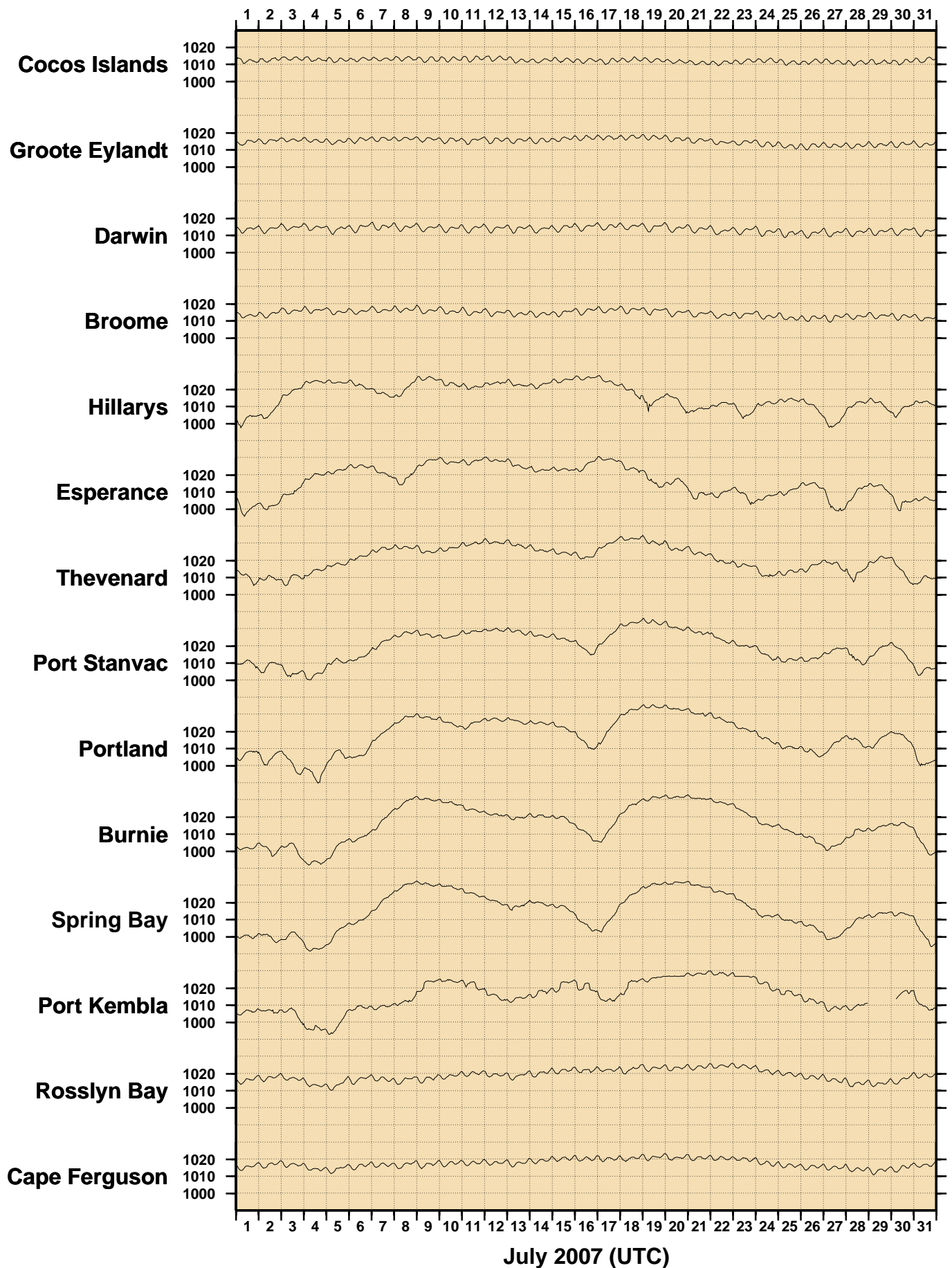


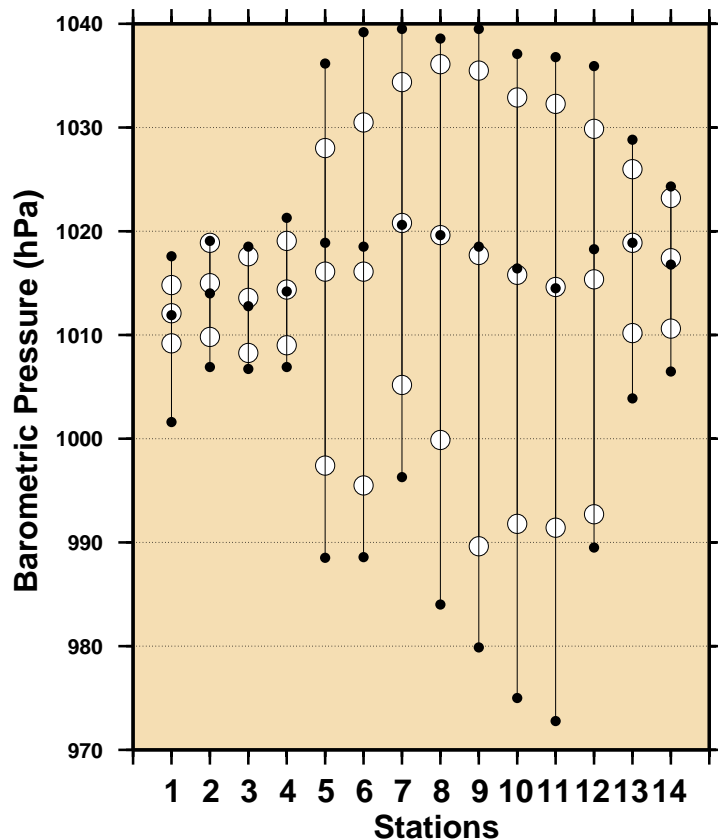
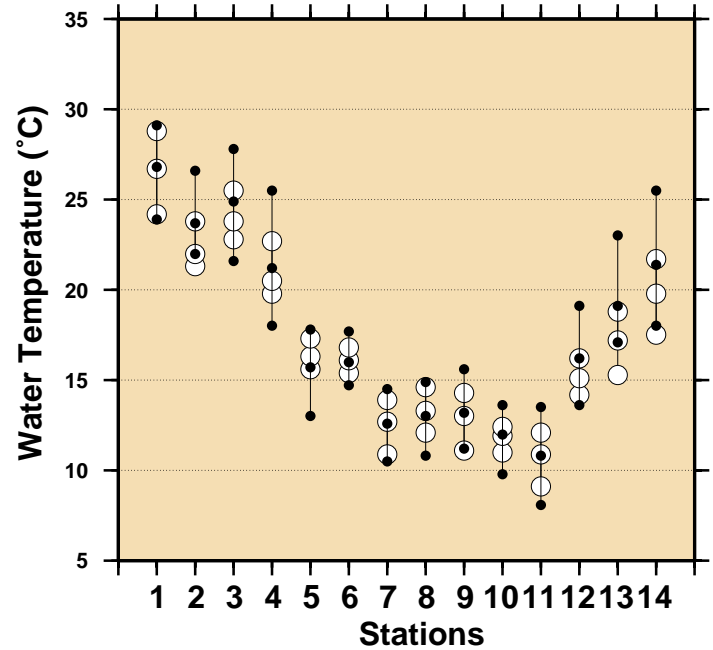
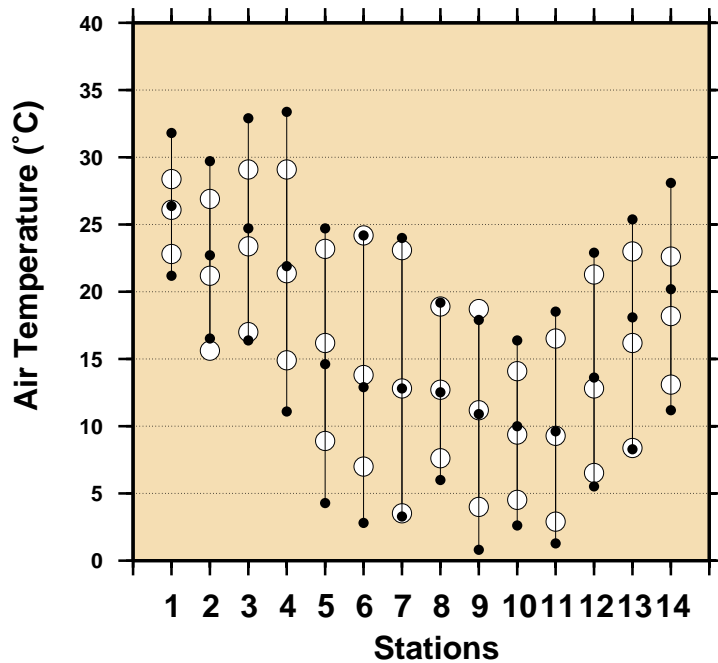
Figure 9

**JULY 2007**  
**HOURLY ATMOSPHERIC PRESSURE (hPa)**





**Figure 10**  
**Comparison of July 2007 Max, Min & Mean with**  
**Long Term July Values.**



### Stations

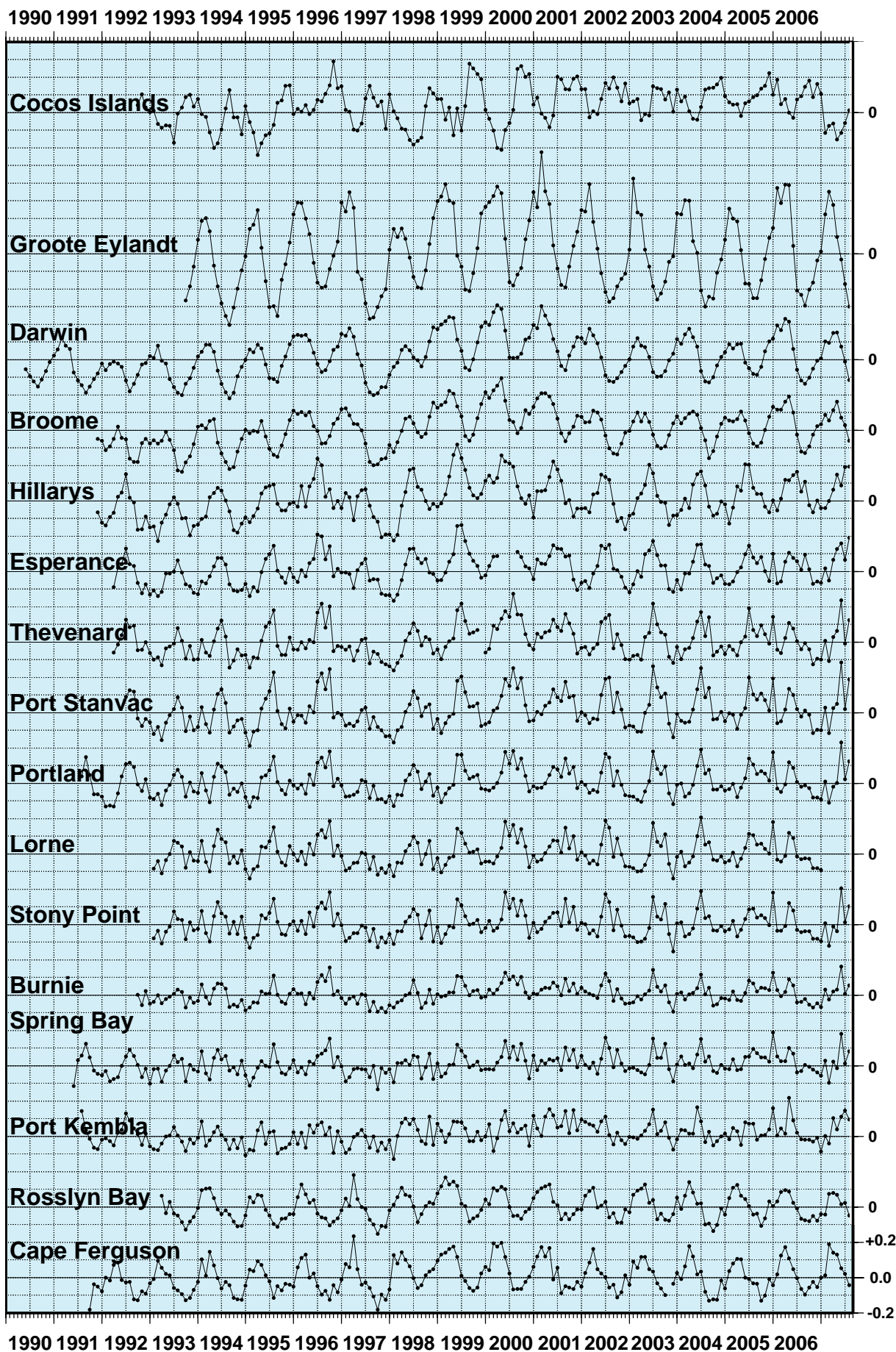
- 1 - Cocos Islands
- 2 - Groote Eylandt
- 3 - Darwin
- 4 - Broome
- 5 - Hillarys
- 6 - Esperance
- 7 - Thevenard
- 8 - Port Stanvac
- 9 - Portland
- 10 - Burnie
- 11 - Spring Bay
- 12 - Port Kembla
- 13 - Rosslyn Bay
- 14 - Cape Ferguson

- July 2007 Maximum
- July 2007 Mean
- July 2007 Minimum
- Long Term July Maximum
- Long Term July Mean
- Long Term July Minimum

# Figure 11

## MONTHLY MEAN SEA LEVELS TO JULY 2007 (m)

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



**Figure 12**  
**SEA LEVEL ANOMALIES THROUGH JULY 2007 (m)**

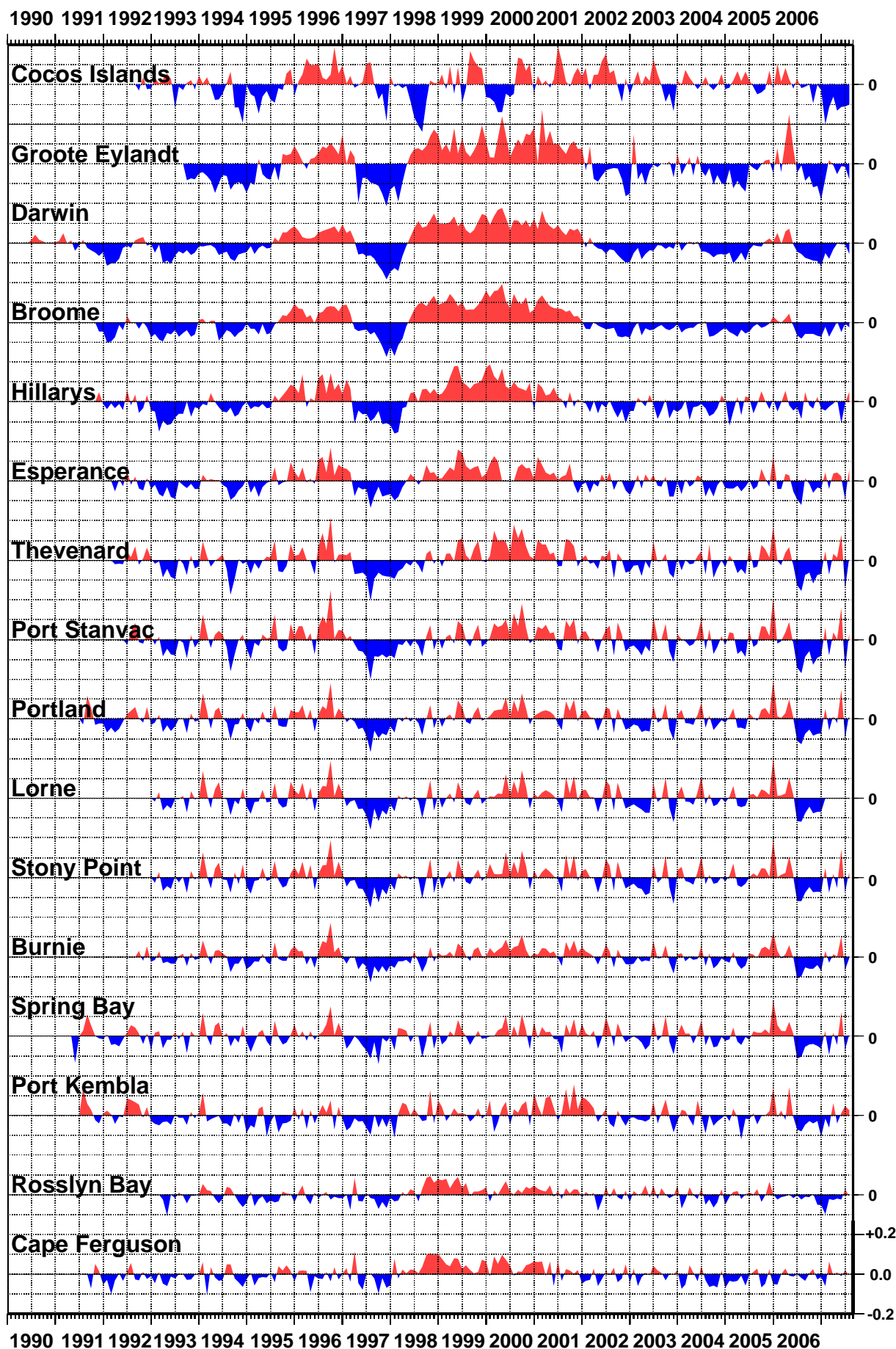


Figure 13

## SEA LEVEL TRENDS THROUGH JULY 2007 (mm/year)

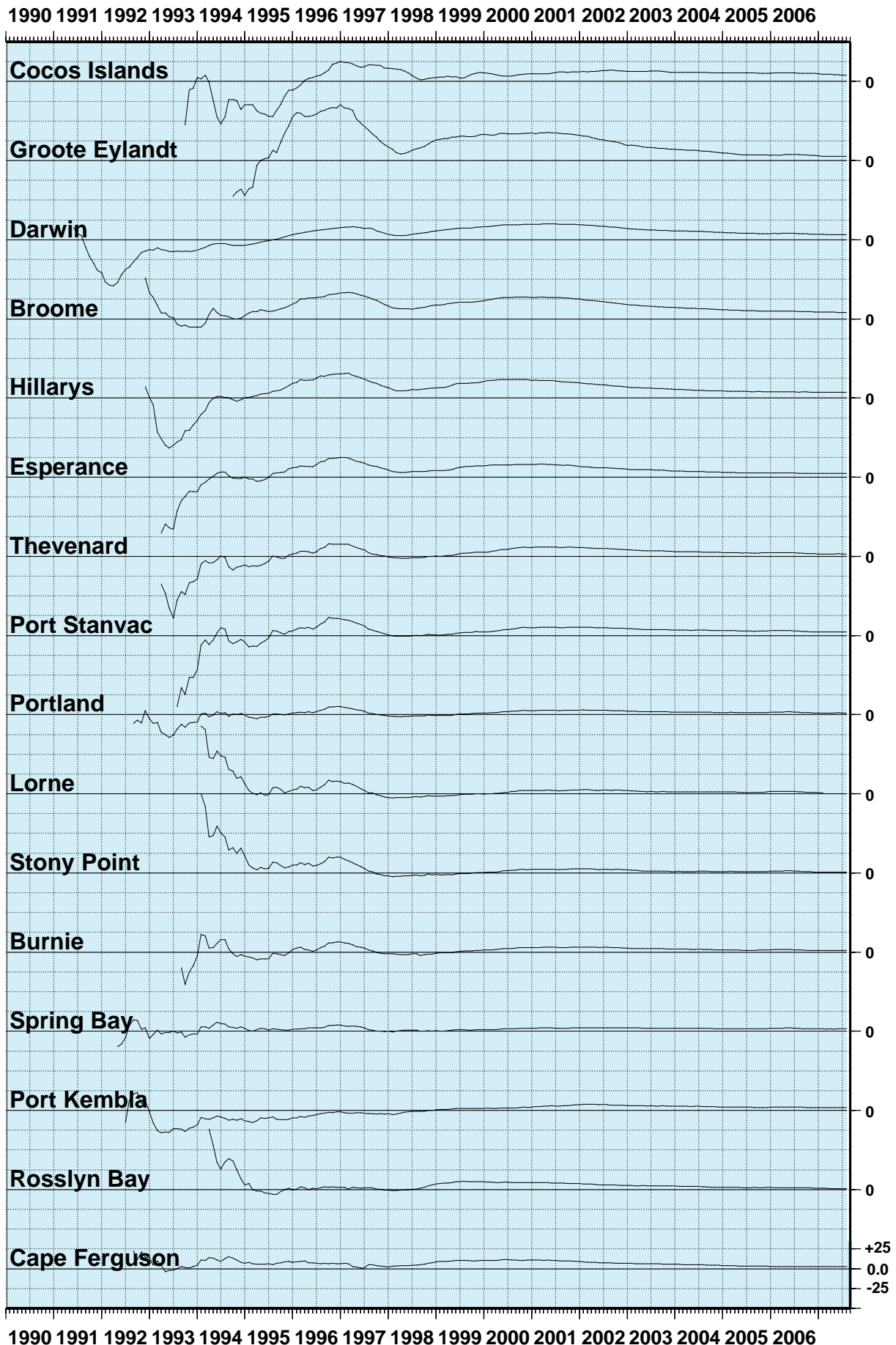


Figure 14

# BAROMETRIC PRESSURE ANOMALIES THROUGH JULY 2007 (hPa)

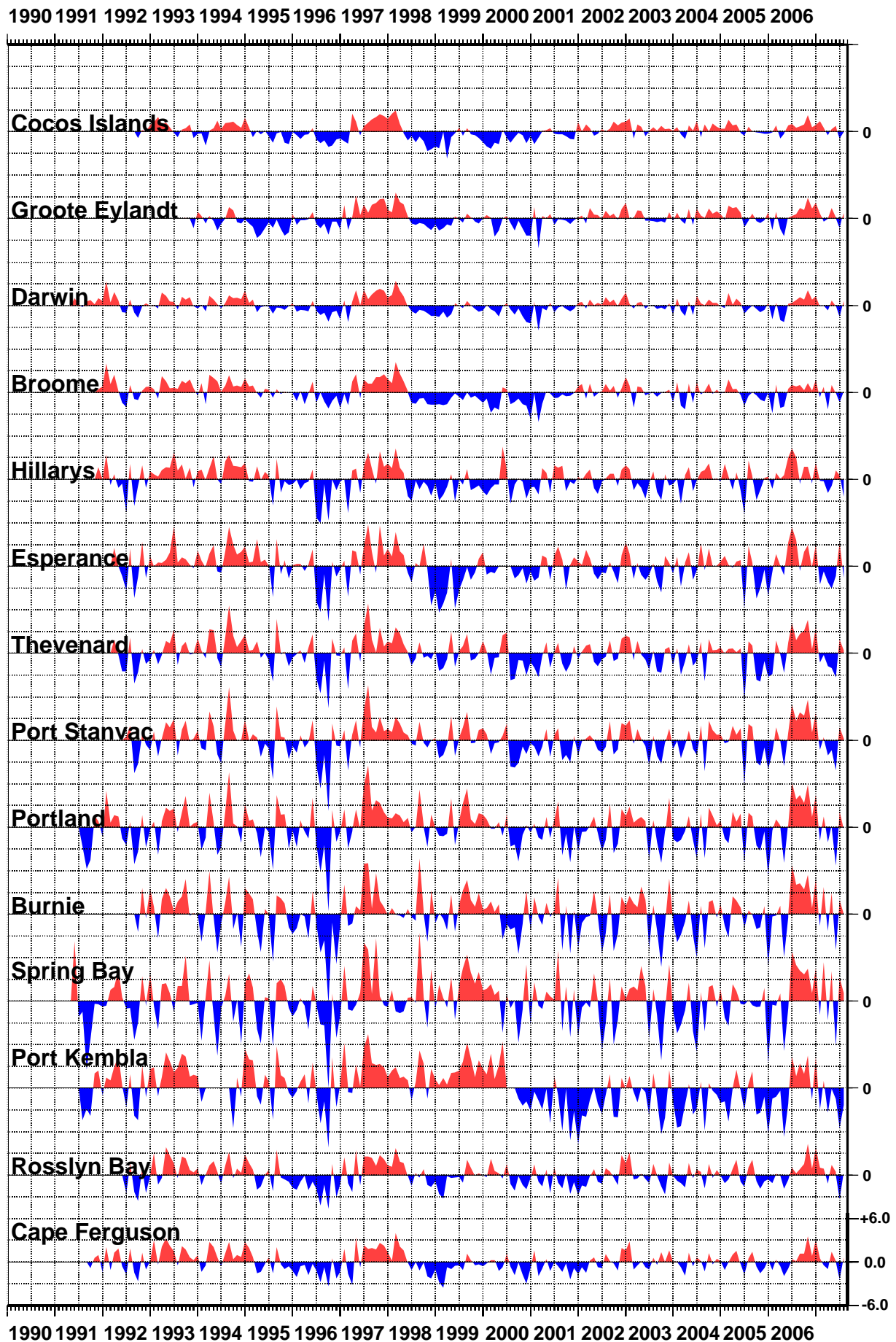
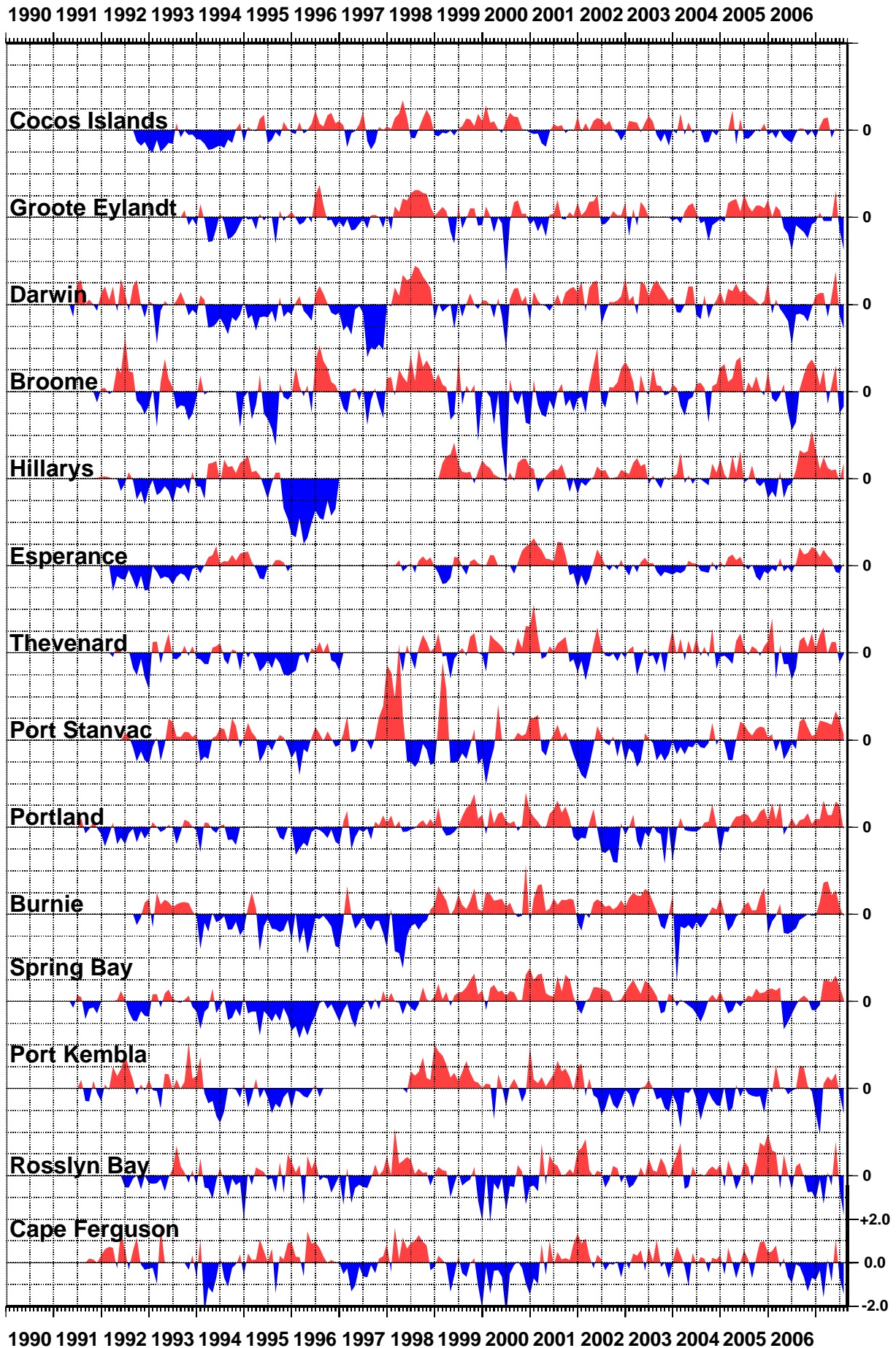


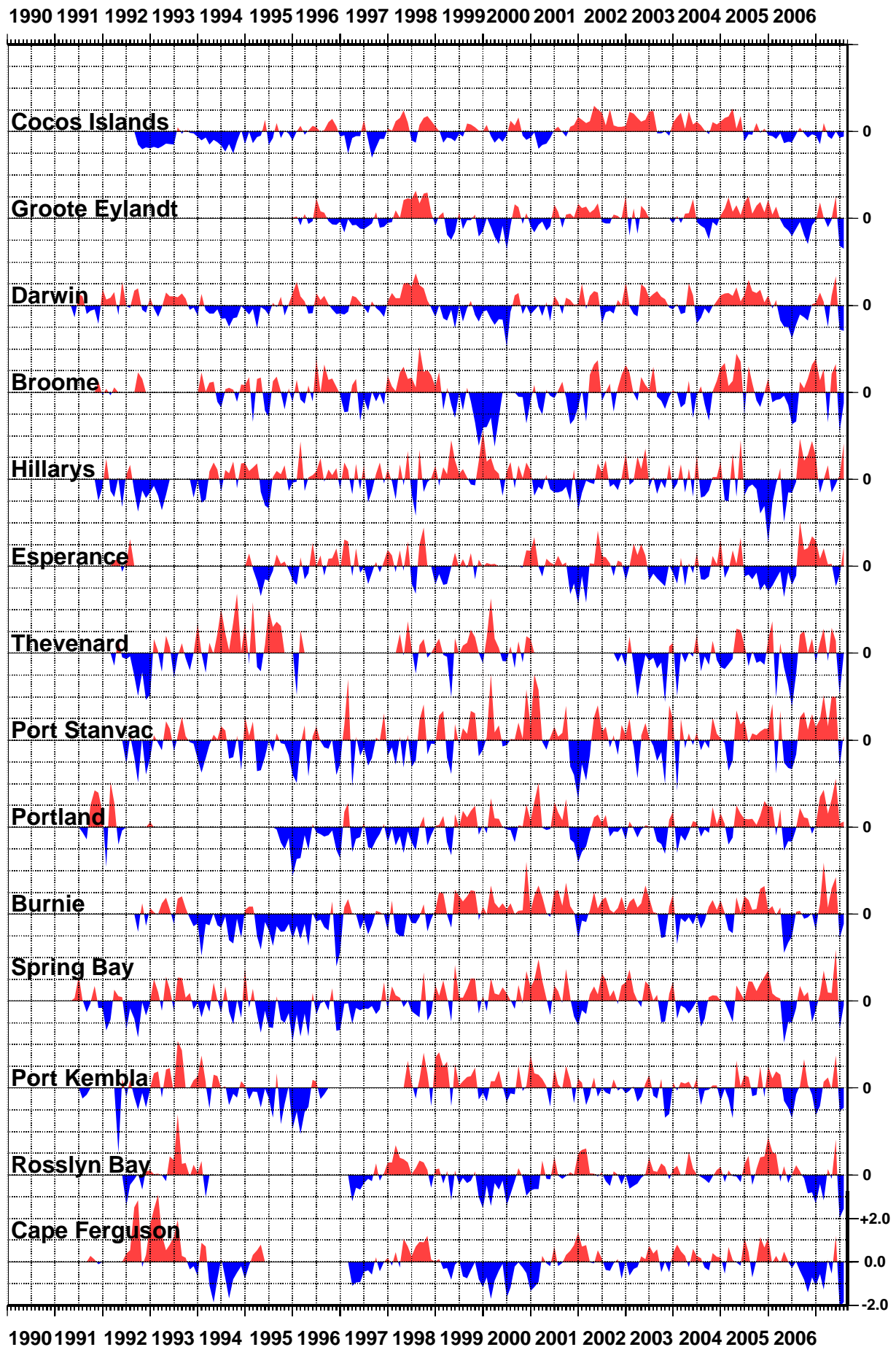
Figure 15

## WATER TEMPERATURE ANOMALIES THROUGH JULY 2007 (°C)





**Figure 16**  
**AIR TEMPERATURE ANOMALIES**  
**THROUGH JULY 2007 (°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

