THE AUSTRALIAN BASELINE SEA LEVEL MONITORING PROJECT

MONTHLY DATA REPORT

MAY 2012

Australian Government

Bureau of Meteorology

This report was prepared 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) 8366 2730
Fax: (+618) 8366 2651
Website: http://www.bom.gov.au/oceanography/

Quality Certification:

I authorise the issue of this Australian Baseline Sea Level Monitoring Project Monthly Data Report for May 2012 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

MAY 2012

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.

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.

NOTES ON THE DATA FOR MAY 2012

Sea level data return (Figures 1 and 17) was good for most operative stations during May 2012. Please note that no data exists for Port Stanvac since November 2010 as the station was removed to allow the former owners of the site (Mobil Refining Australia) to rehabilitate and vacate the Port Stanvac oil refinery precinct. Re-establishment of the gauge depends on the long-term future of the wharf. The Broome Port Authority's policy of switching off the power when fuel ships are in dock resulted in the loss of 40 hours of Broome sea level and ancillary data during May. The backup water level data has been used since the Broome primary water level sensor failed on the 1st of May. Erroneous wind data continues to be recorded at Broome, Esperance and Groote Eylandt. The water temperature module for Portland appears to be faulty, recording a constant value of 16.6 °C since the 26th of April. No water temperatures have been recorded at Darwin since the water temperature sensor failed in January 2011.

The residuals (Figures 2 and 3), being the difference between the observations and the tidal predictions, are the non-tidal components of the sea level. They are primarily the consequence of short-term meteorological effects shown in Figures 5 and 9, and can also indicate the passage of a tsunami. The meteorological convention is followed in Figure 5 where the vector indicates the direction from which the wind is blowing.

Figure 10 compares the mean, maximum and minimum values for air temperature, water temperature and barometric pressure for May 2012 with the long-term values. Note that the long-term ranges are calculated using the previous sets of May data for each station ***excluding*** the current month of data.

Record minimum May water temperatures were recorded at Groote Eylandt (23.4 °C), Broome (20.5 °C) and Cape Ferguson (18.1 °C), whilst a record maximum May barometric pressure of 1033 hPa was recorded at Hillarys.

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 and trends removed from the data. Sea level anomalies for all locations fell between +/- 5cm for May 2012.

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. It is important to stress that as the sea level record becomes longer, the short-term trend estimate becomes more stable and reliable. Observed trends in sea level include natural variability, for example, events such as El Niño and effects due to many other atmospheric, oceanographic and geological processes. Longer-term data sets for all stations are required in order to separate the effects of the different signals. ***Please exercise caution in interpreting the short-term trends in the table below –*** they will almost certainly change over the coming years as the data set increases in length.

Slightly positive barometric pressure anomalies (Figure 14) were observed at Hillarys (+2.0 hPa), Esperance (+3.1 hPa) and Thevenard (+2.0 hPa) during May. Barometric pressures were near normal at all other locations. 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. During May 2012 positive water temperature anomalies were observed at Cocos Islands (+0.5 °C), Hillarys (+0.6 °C), Esperance (+0.7 °C), Burnie (+0.5 °C) and Port Kembla (+0.7 °C) whilst negative water temperature anomalies were observed at Groote Eylandt (-0.7 °C), Broome (-1.2 °C) and Cape Ferguson (-1.0 °C). Near zero water temperature anomalies were observed at all other sites during May, whilst no water temperature anomalies were available for Darwin or Portland where faults existed with the sensors. A positive air temperature anomaly of +0.5 °C was observed at Cocos Island, whilst negative air temperature anomalies were observed at Darwin (-0.8 °C), Broome (-1.1 °C), Thevenard (-0.9 °C) and Rosslyn Bay (-0.6 °C) during May 2012.

The number of hits to the Australian Baseline Sea Level Monitoring Project (ABSLMP) web pages from January 2009 to May 2012 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 May 2012.

Recent short-term sea level trends in the project area based upon SEAFRAME data through May, 2012				
Location	**Lat / Long**	**Installation Date**	**Trend (mm/yr)**	**Change from previous month**
Cocos Islands	**12°07'07.1"S / 96°53'30.9"E**	**Sep 1992**	**+8.2**	**-0.1**
Groote Eylandt	**13°51'36.2"S / 136°24'56.1"E**	**Sep 1993**	**+9.3**	**0.0**
Darwin	**12°28'18.4"S / 130°50'45.1"E**	**May 1990**	**+8.9**	**0.0**
Broome	**18°00'03.0"S / 122°13'07.1"E**	**Nov 1991**	**+9.3**	**0.0**
Hillarys	**31°49'32.0"S / 115°44'18.9"E**	**Nov 1991**	**+10.1**	**0.0**
Esperance	**33°52'15.2"S / 121°53'43.3"E**	**Mar 1992**	**+6.6**	**0.0**
Thevenard	**32°08'56.2"S / 133°38'28.8"E**	**Mar 1992**	**+5.1**	**0.0**
Port Stanvac	**35°06'31.0"S / 138°28'1.3"E**	**Jun 1992**	**+4.7**	**0.0**
Portland	**38°20'36.4"S / 141°36'47.4"E**	**Jul 1991**	**+3.6**	**0.0**
Lorne	**38°32'49.4"S / 143°59'19.8"E**	**Jan 1993**	**+3.1**	**0.0**
Stony Point	**38°22'19.7"S / 145°13'28.9"E**	**Jan 1993**	**+3.0**	**0.0**
Burnie	**41°03'0.3"S / 145°54'54.0"E**	**Sep 1992**	**+3.4**	**0.0**
Spring Bay	**42°32'45.1"S / 147°55'57.8"E**	**May 1991**	**+3.6**	**0.0**
Port Kembla	**34°28'25.5"S / 150°54'42.7"E**	**Jul 1991**	**+3.2**	**0.0**
Rosslyn Bay	**23°09'39.7"S / 150°47'24.6"E**	**Jun 1992**	**+3.9**	**0.0**
Cape Ferguson	**19°16'38.4"S / 147°03'30.4"E**	**Sep 1991**	**+4.7**	**0.0**

***Port Stanvac decommissioned November 2010**

Figure A: Number of hits on the Australian Baseline Sea Level Monitoring Project web pages from 2009 to May 2012.

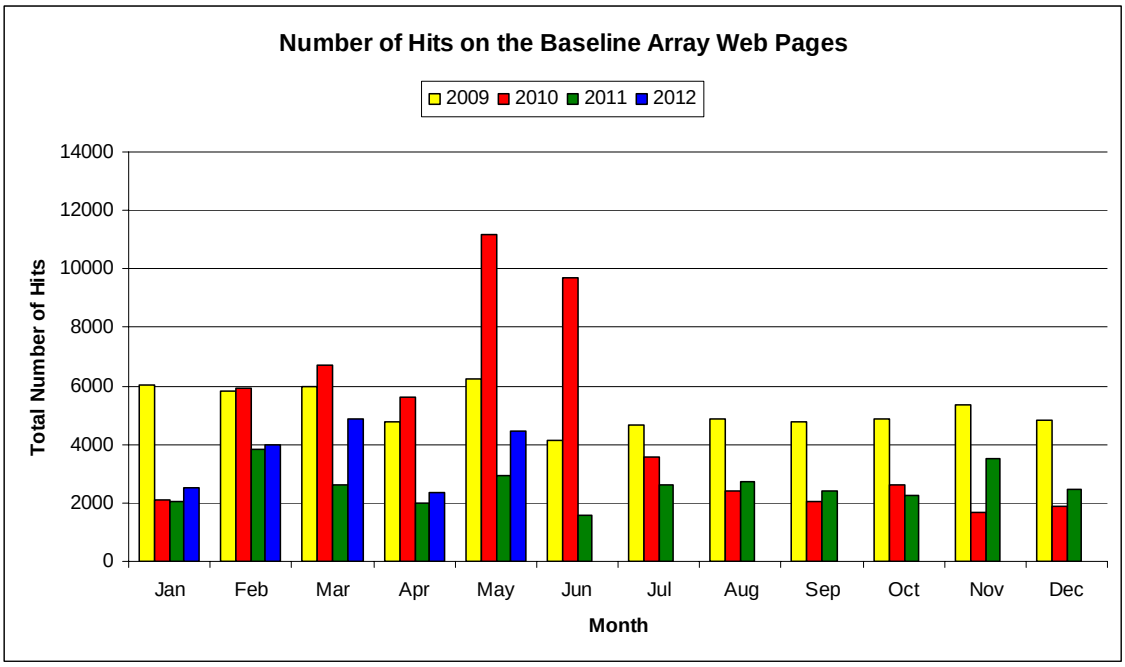
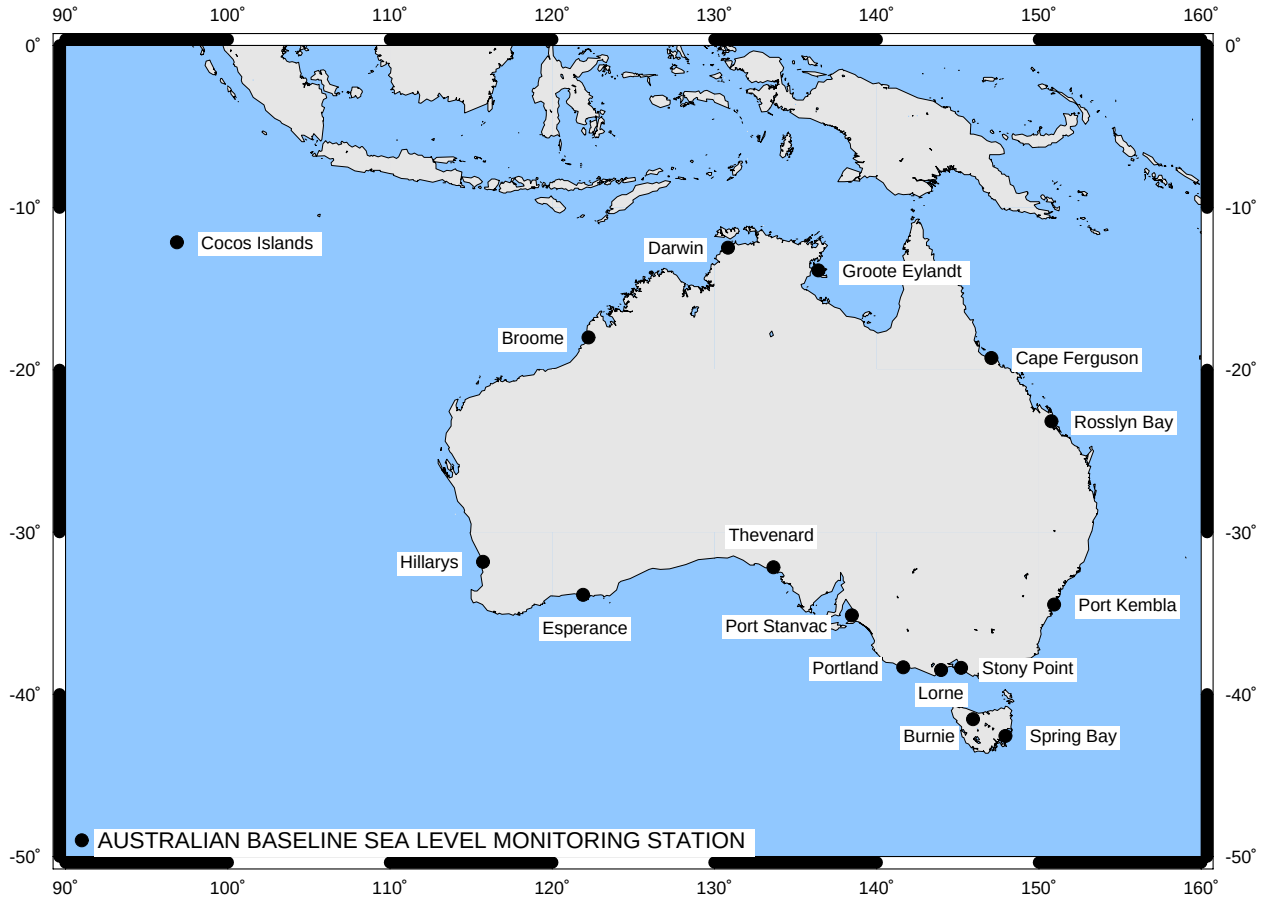


Figure B: Australian Baseline Sea Level Monitoring Project sites.



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

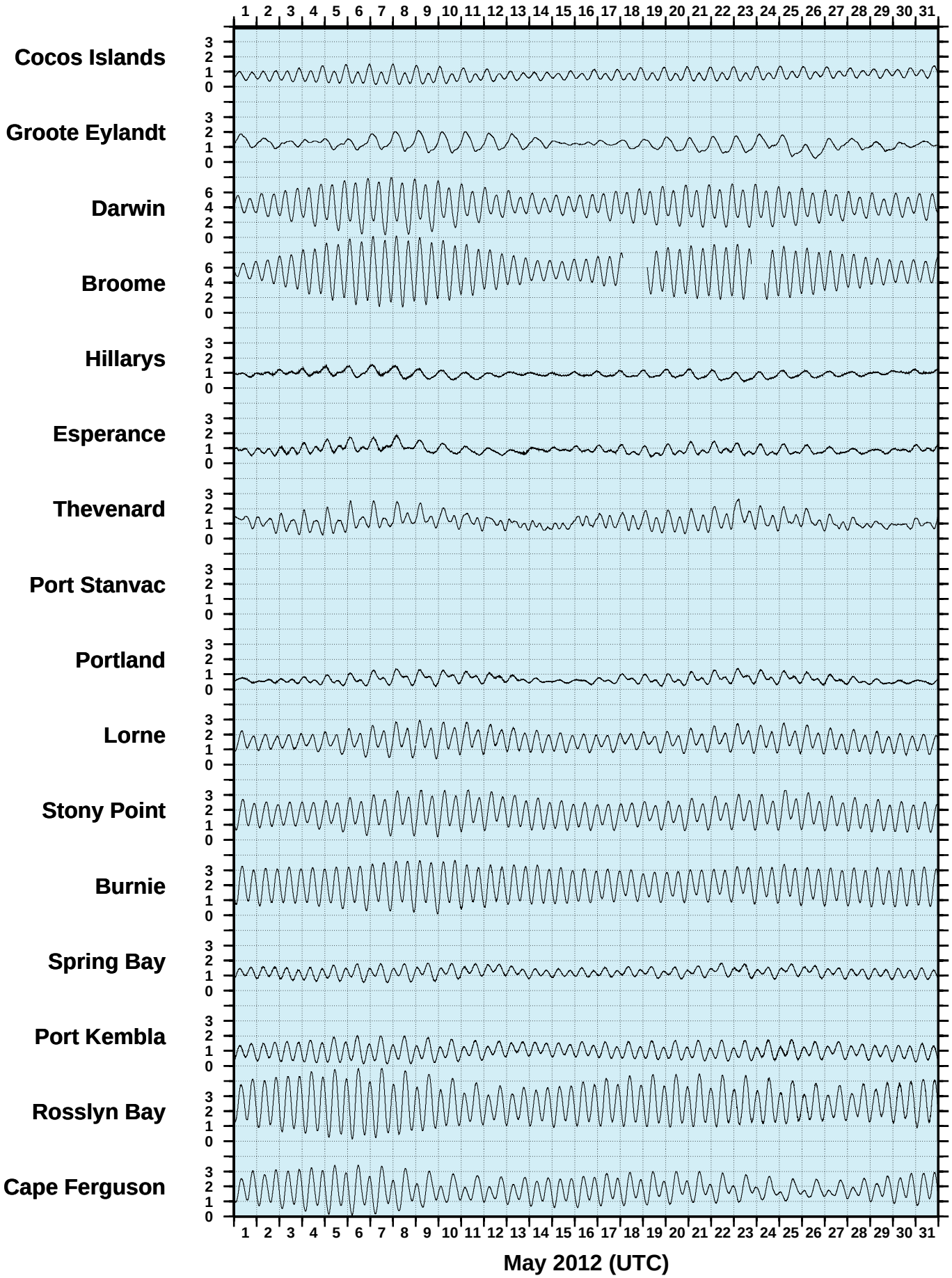
Further information on the *Monthly Data Report* and other projects conducted by the NTC, Bureau of Meteorology can be obtained from the following address.

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:

Figure 1

MAY 2012
SIX MINUTE SEA LEVEL OBSERVATIONS (m)



National Tidal Centre, Bureau of Meteorology

Figure 2

MAY 2012
SIX MINUTE RESIDUAL WATER LEVELS (m)

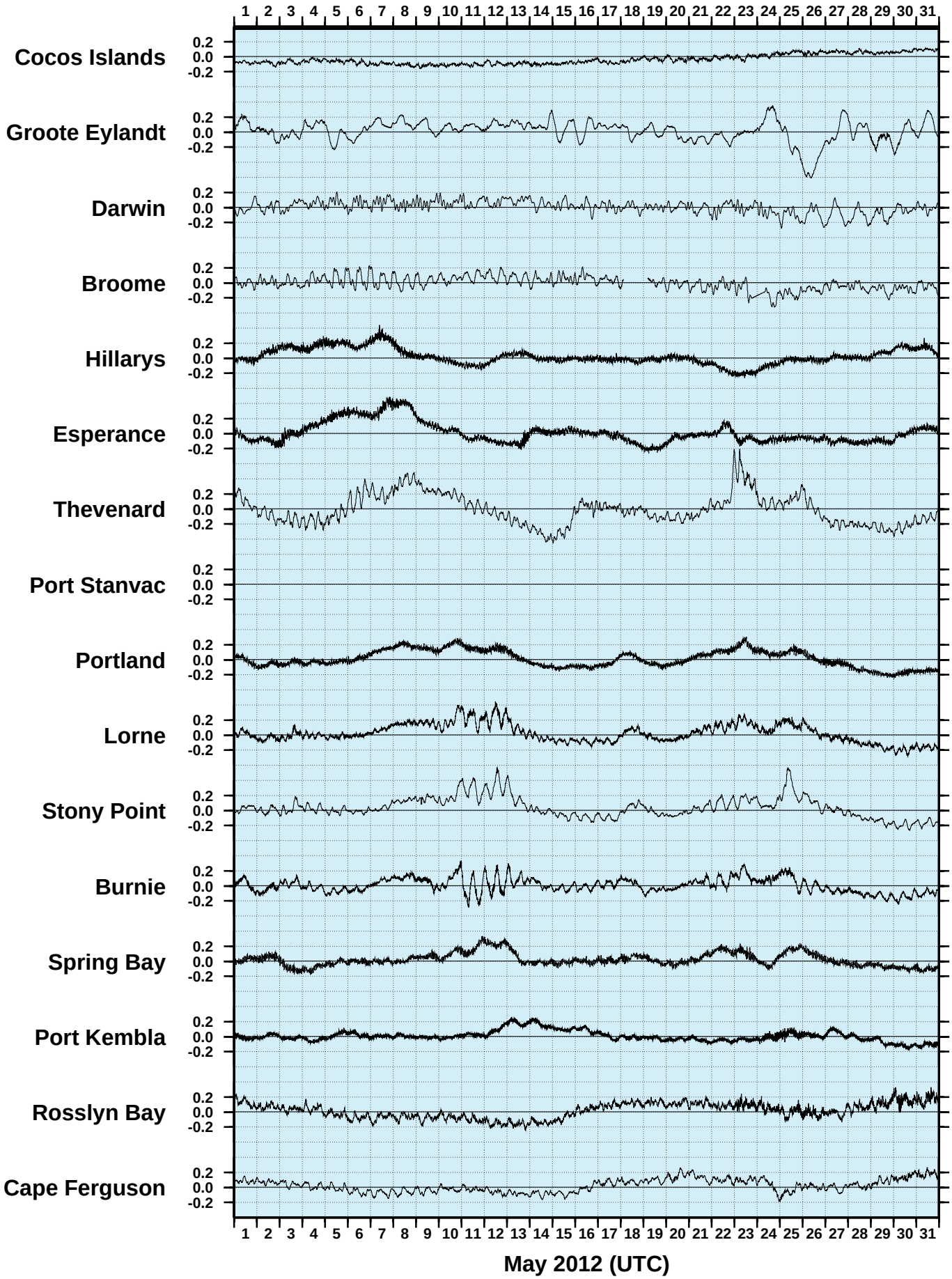


Figure 3

MAY 2012
SIX MINUTE RESIDUALS
ADJUSTED FOR ATMOSPHERIC PRESSURE (m)

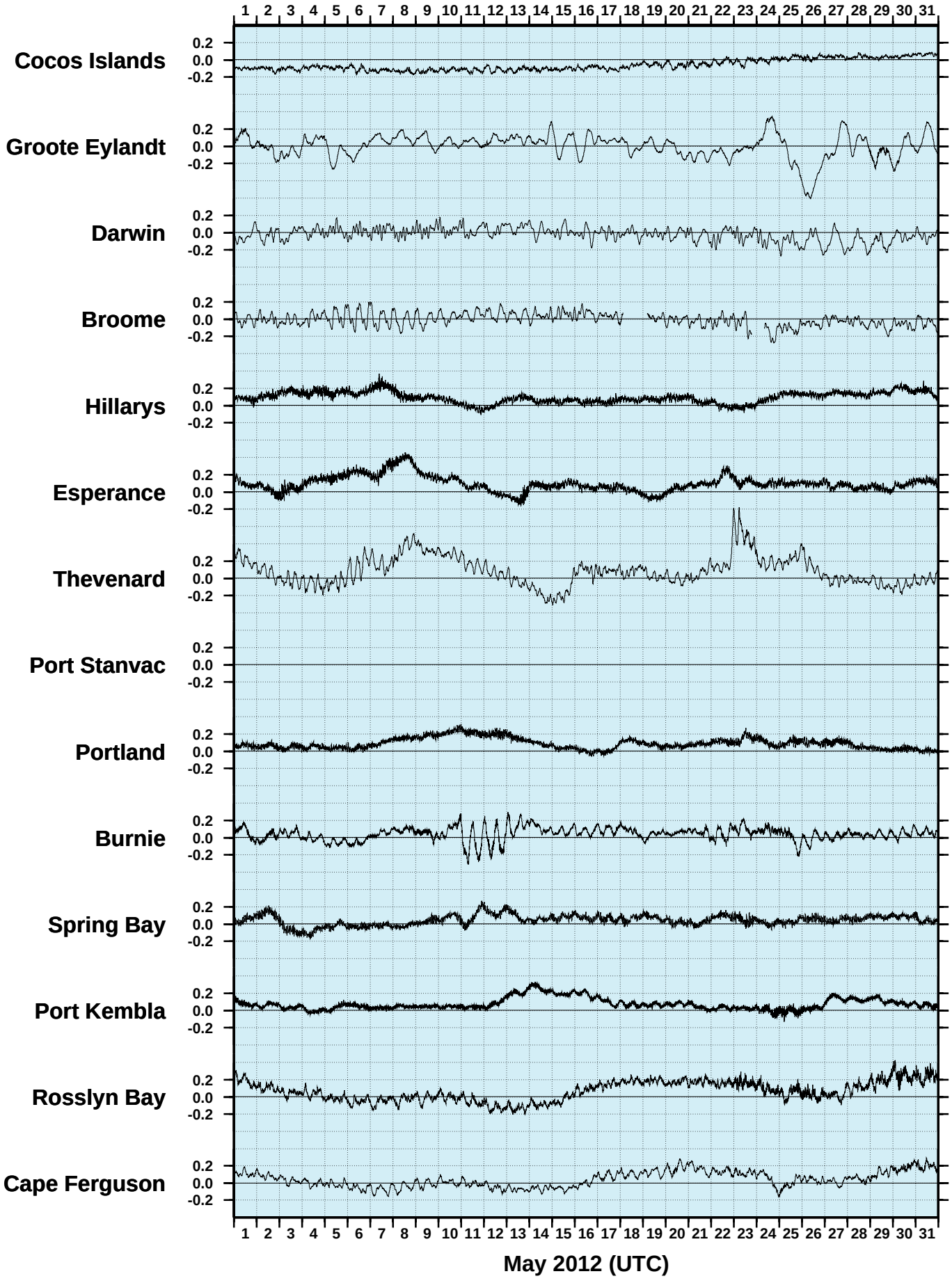


Figure 4

MAY 2012
HOURLY WIND SPEEDS (m/s)

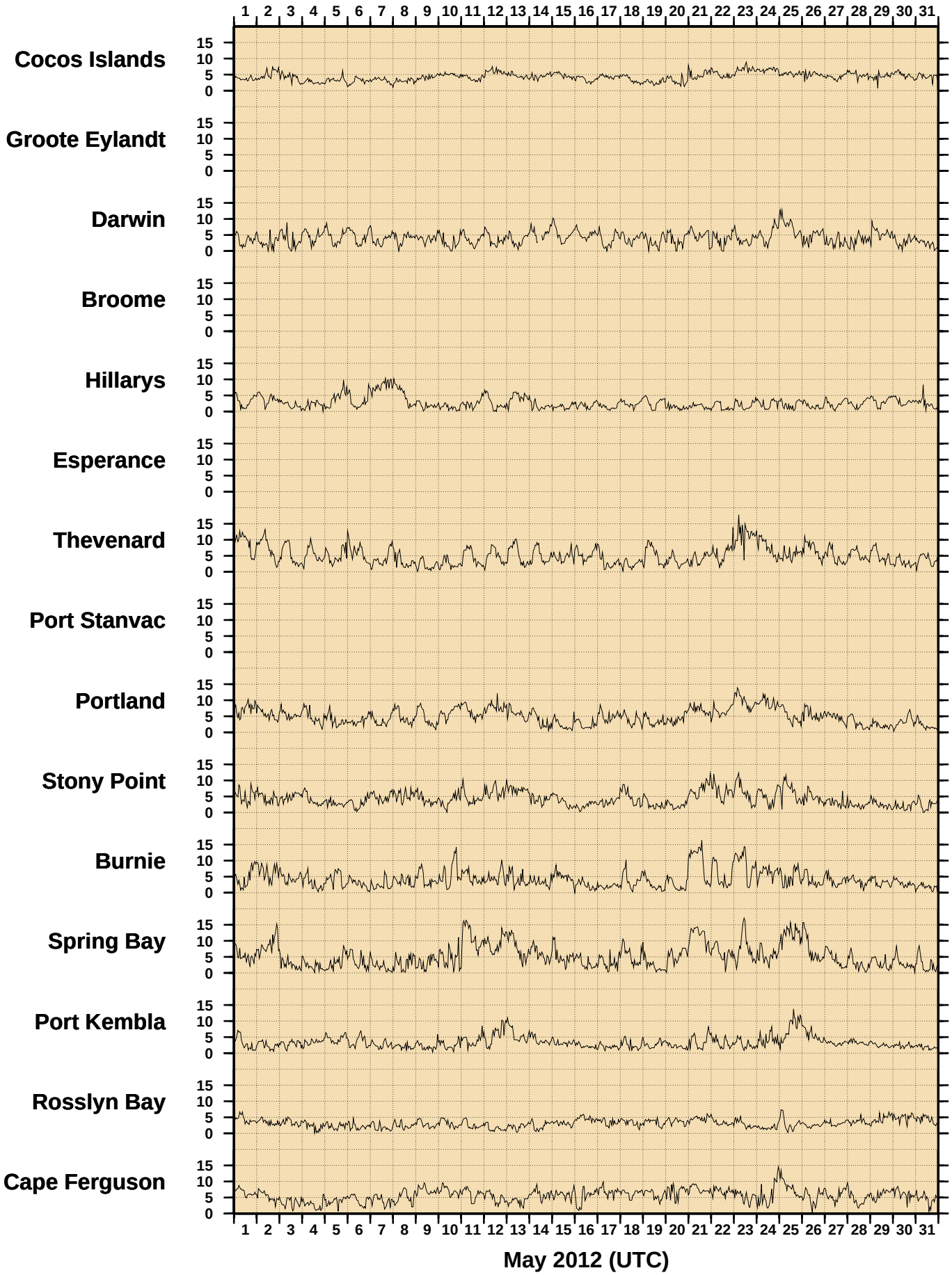


Figure 5

MAY 2012
HOURLY INCIDENT WINDS (m/s, deg True)

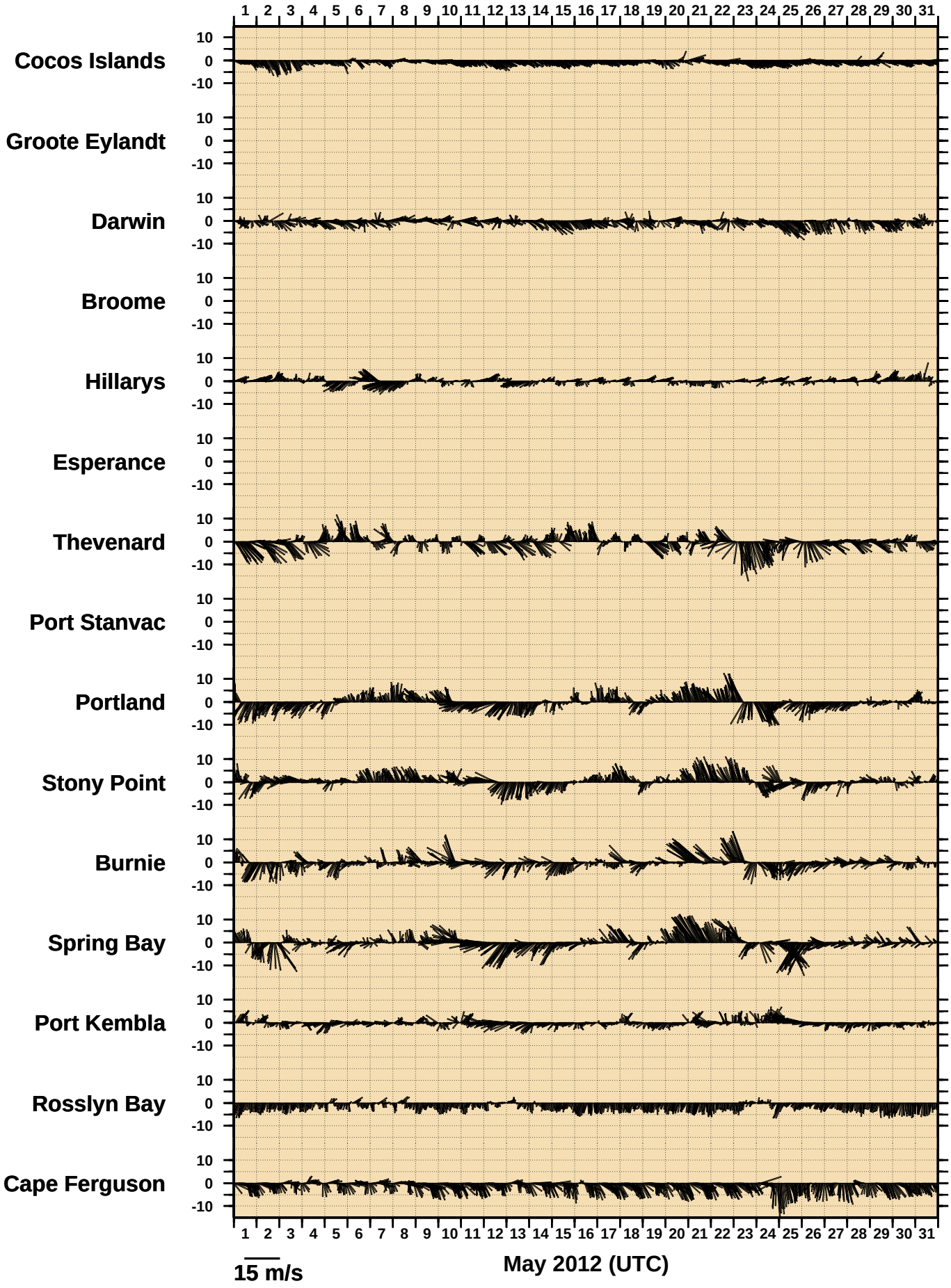


Figure 6

MAY 2012
HOURLY MAXIMUM WIND GUSTS (m/s)

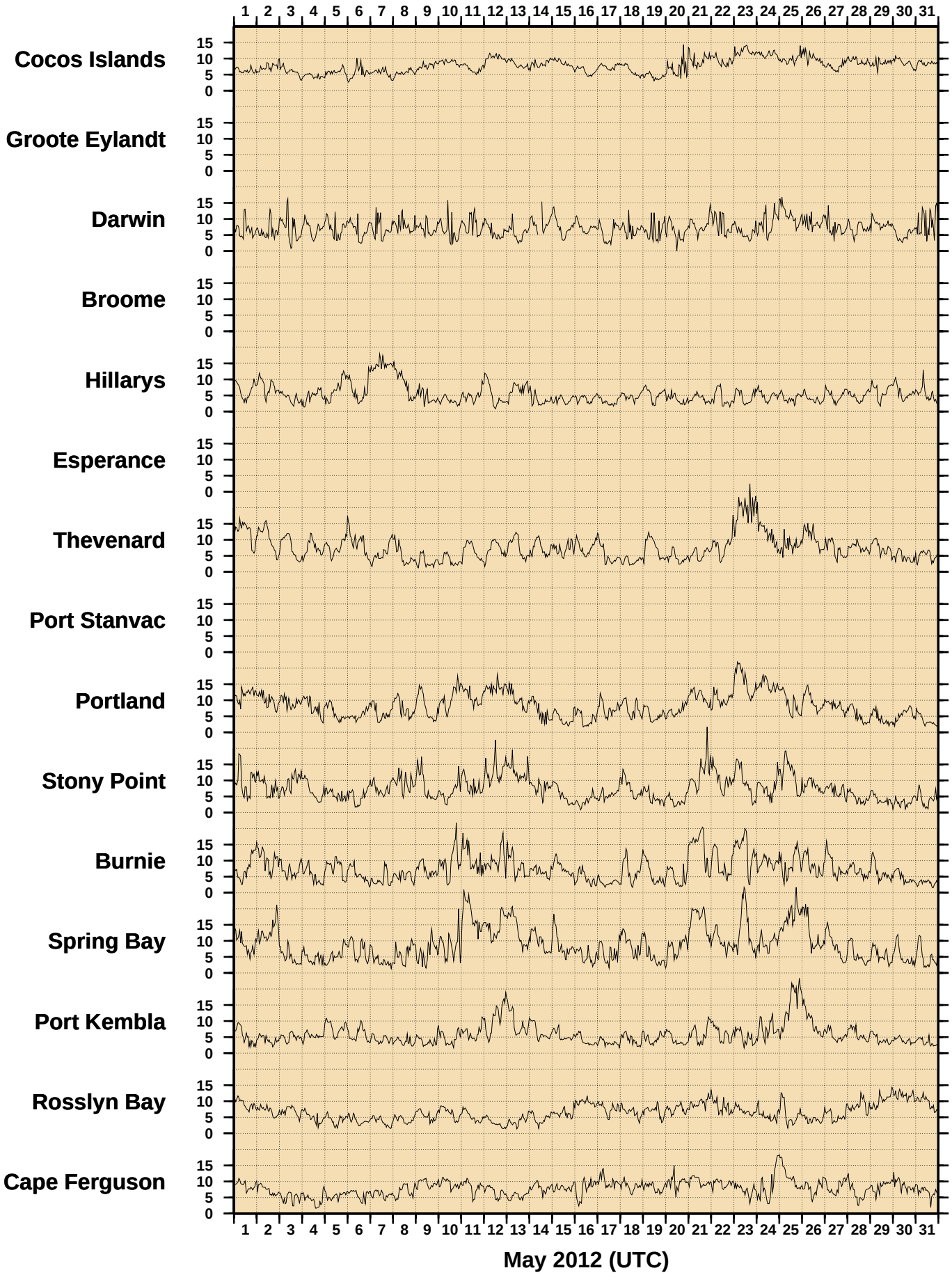


Figure 7

MAY 2012
HOURLY AIR TEMPERATURES (°C)

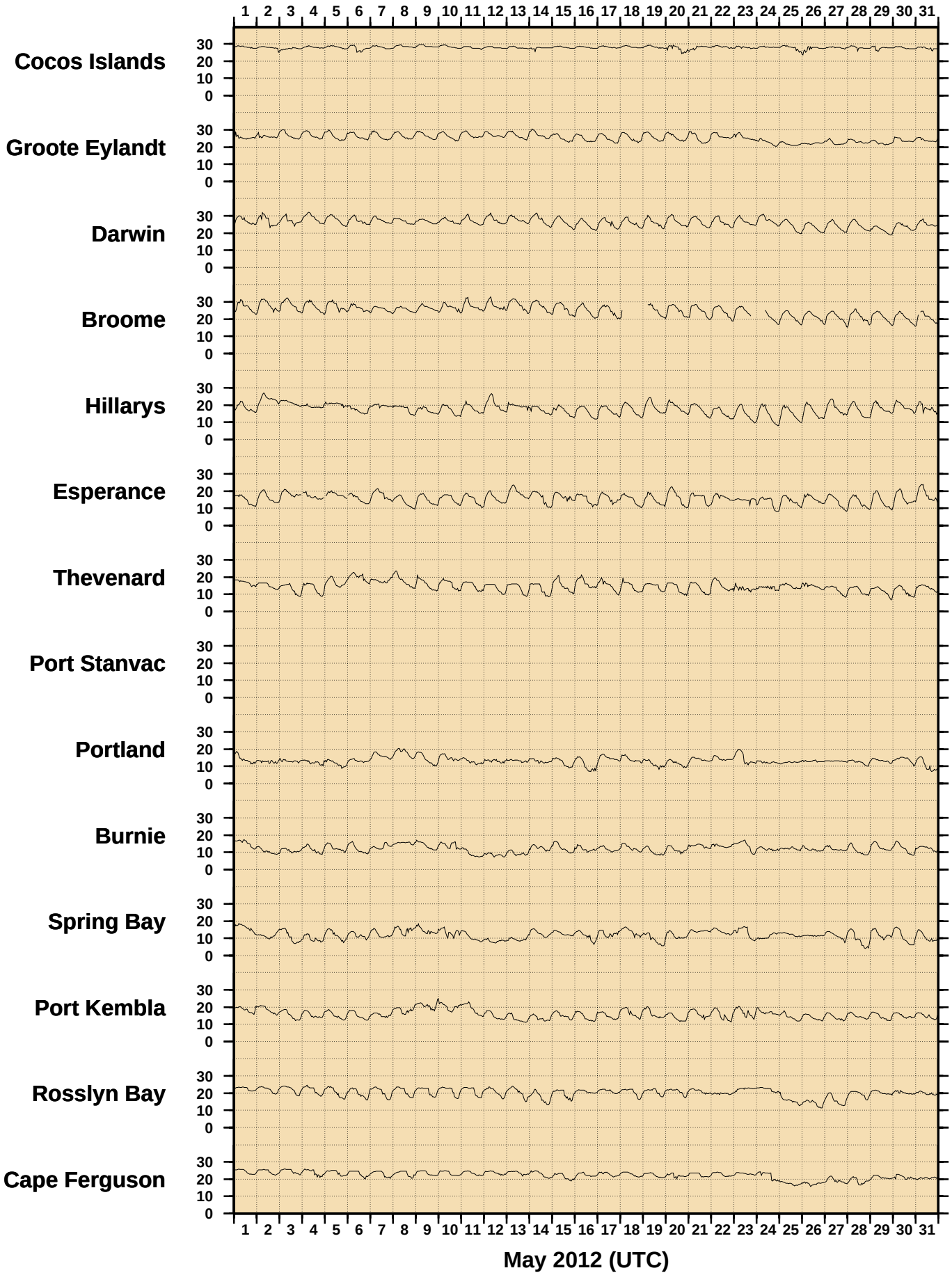


Figure 8

MAY 2012
HOURLY WATER TEMPERATURES (˚C)

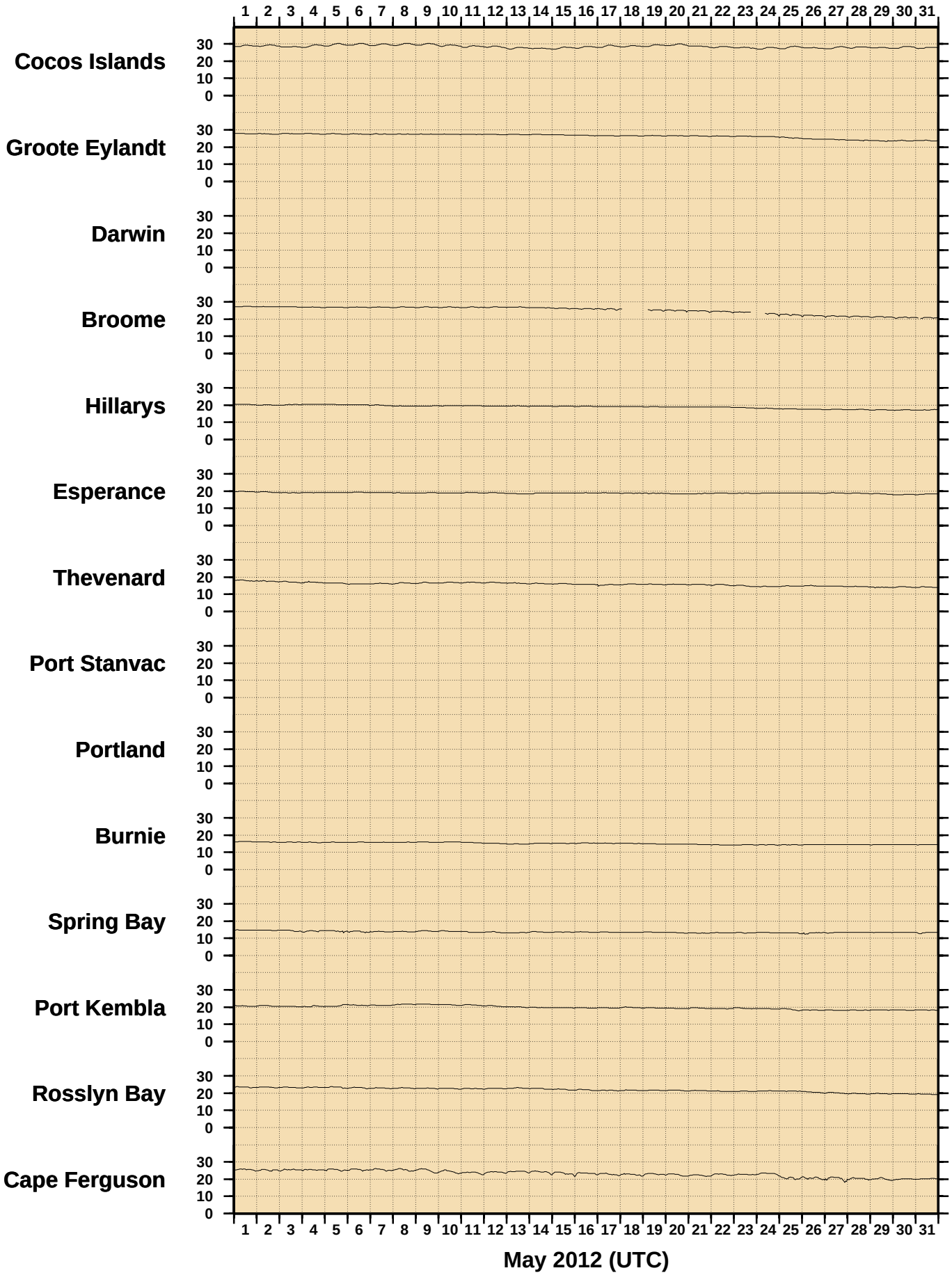


Figure 9

MAY 2012
HOURLY ATMOSPHERIC PRESSURE (hPa)

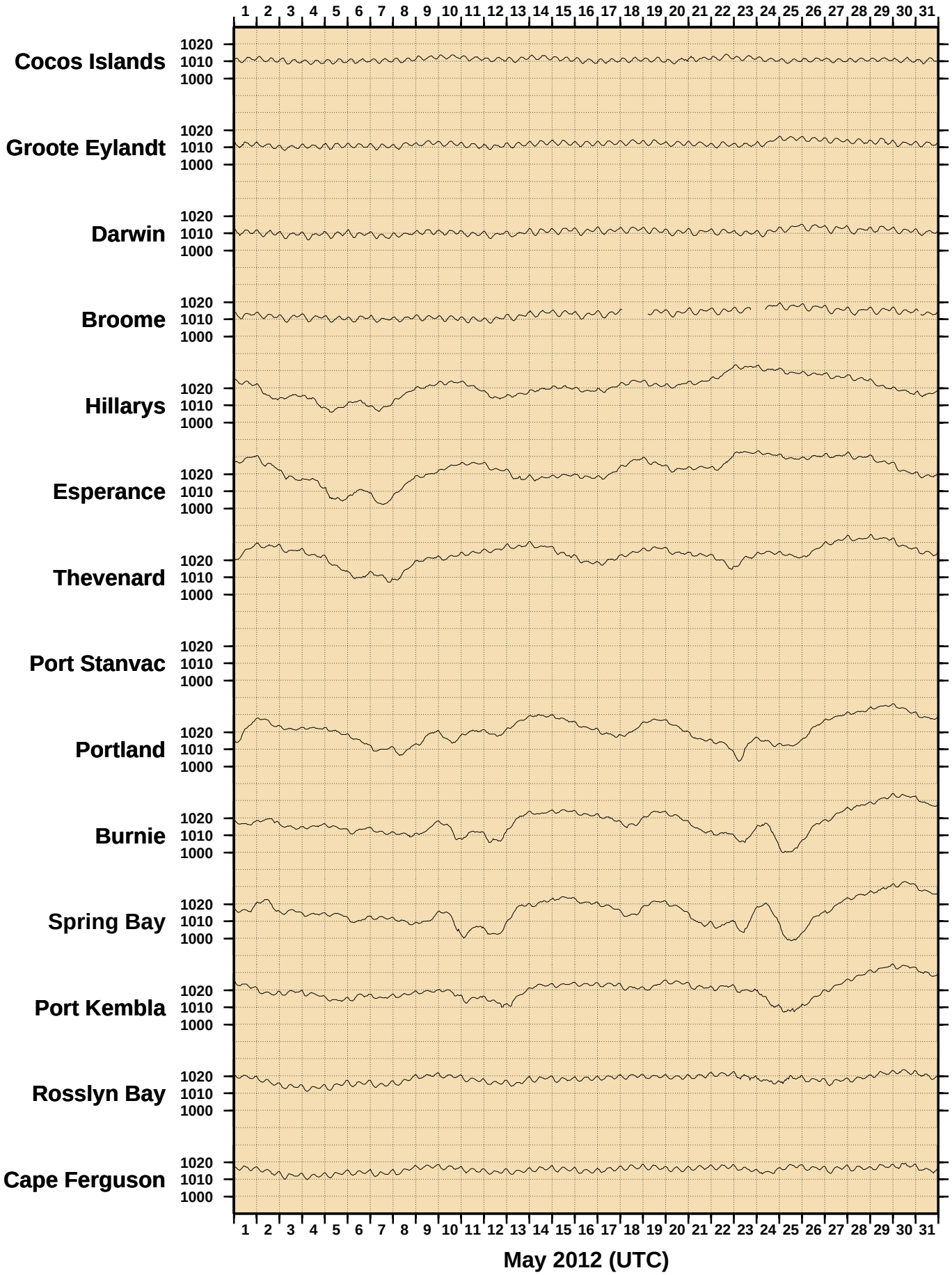
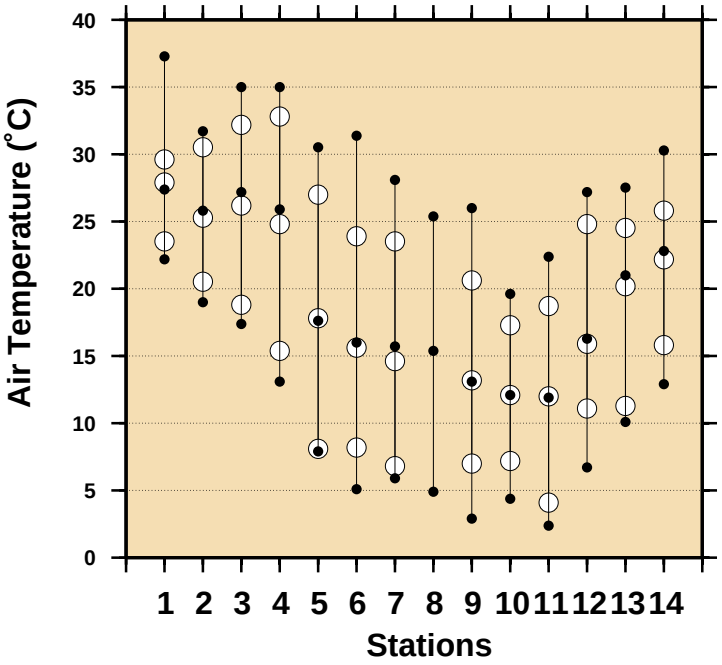
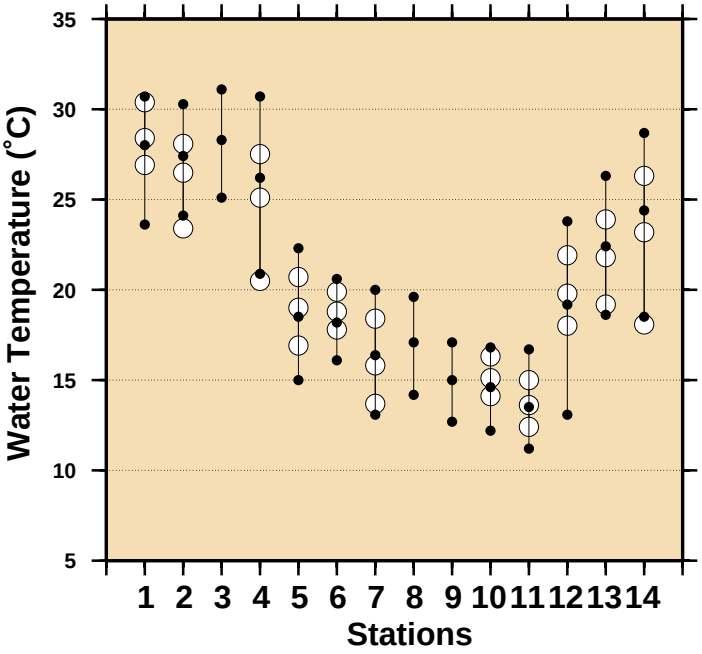
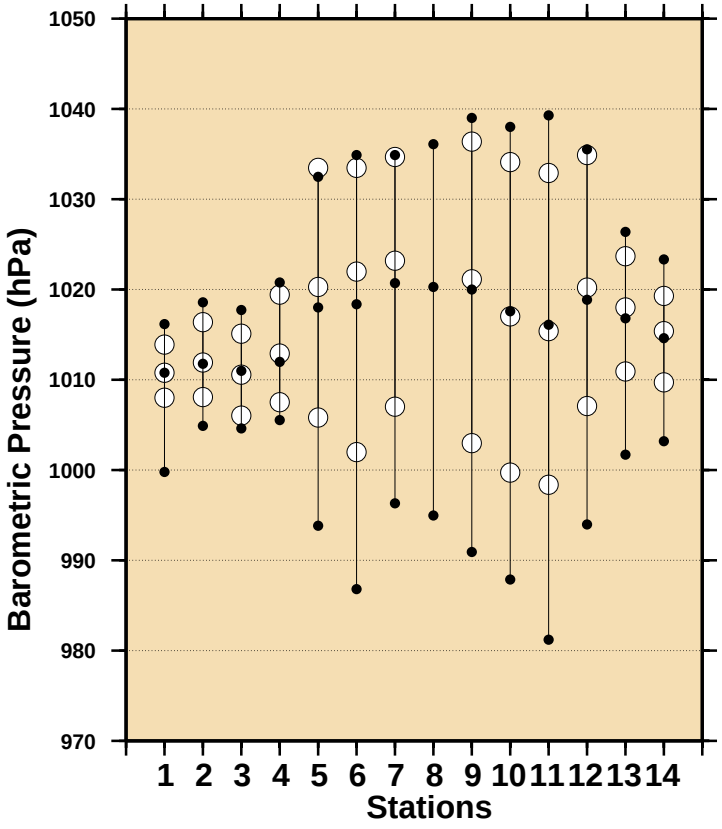


Figure 10

Comparison of May 2012 Max, Min & Mean with Long Term May 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

May 2012 Maximum
May 2012 Mean
May 2012 Minimum

Long Term May Maximum
Long Term May Mean
Long Term May Minimum

Figure 11
MONTHLY MEAN SEA LEVELS TO MAY 2012 (m)

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

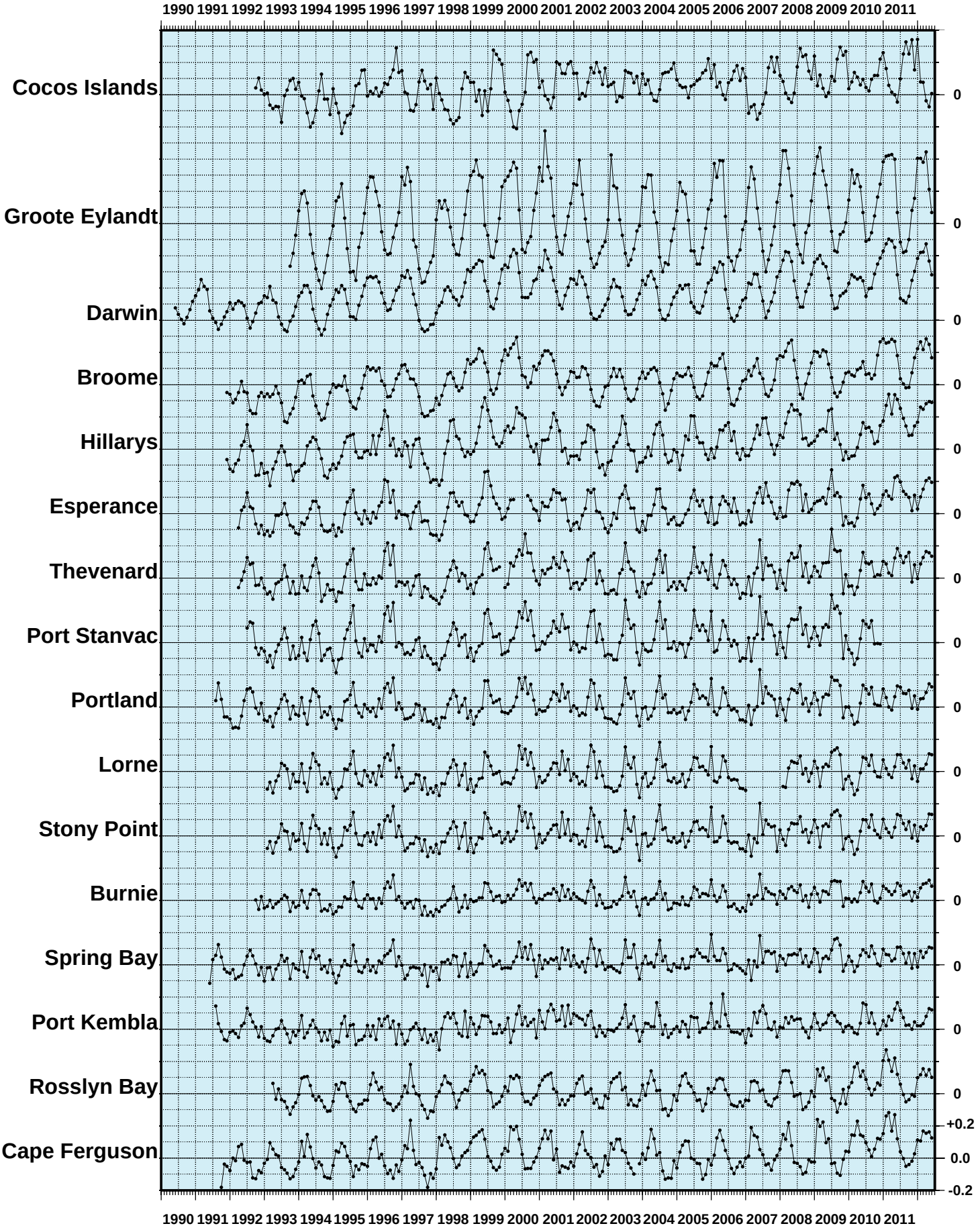


Figure 12

SEA LEVEL ANOMALIES THROUGH MAY 2012 (m)

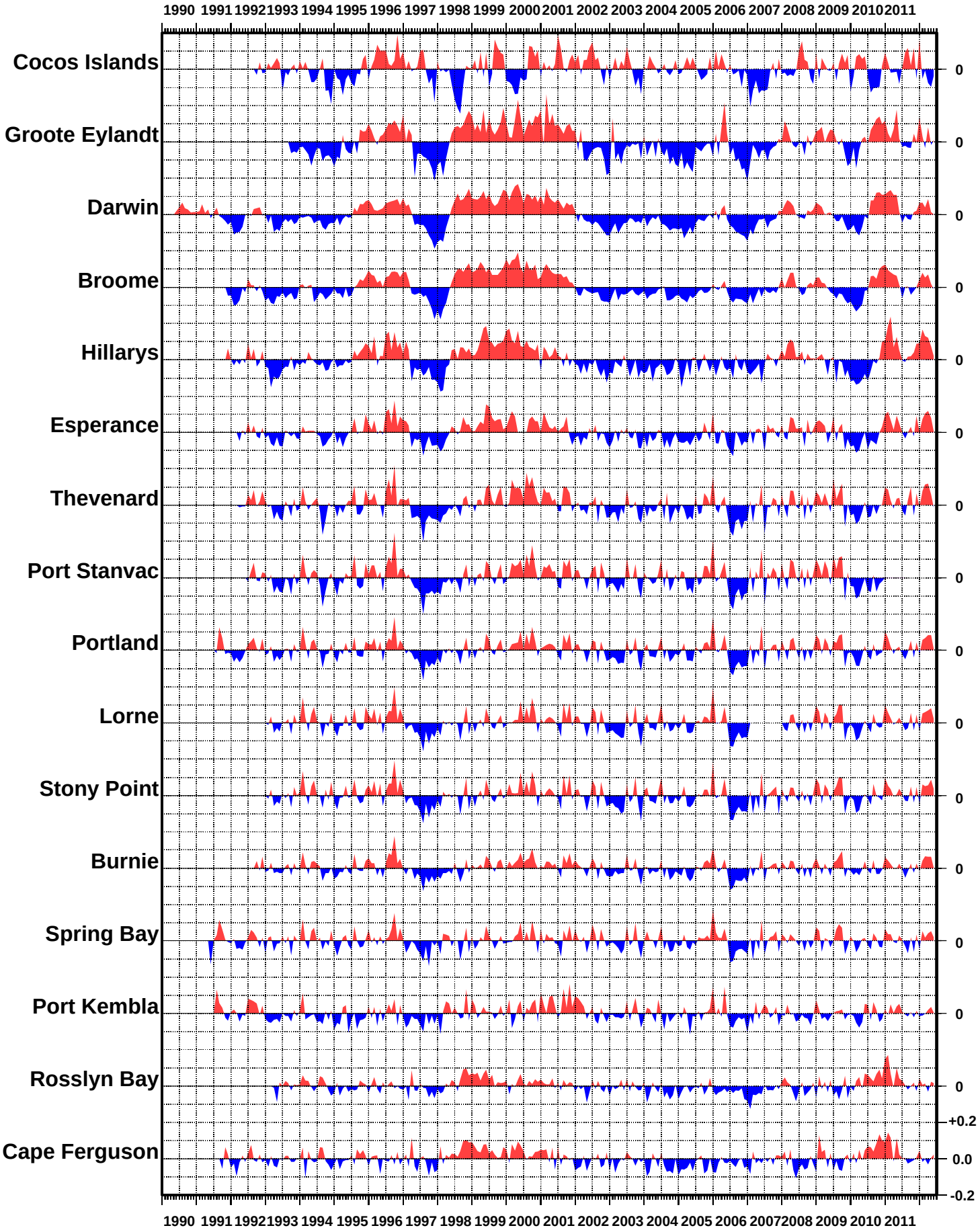


Figure 13

SEA LEVEL TRENDS THROUGH MAY 2012 (mm/year)

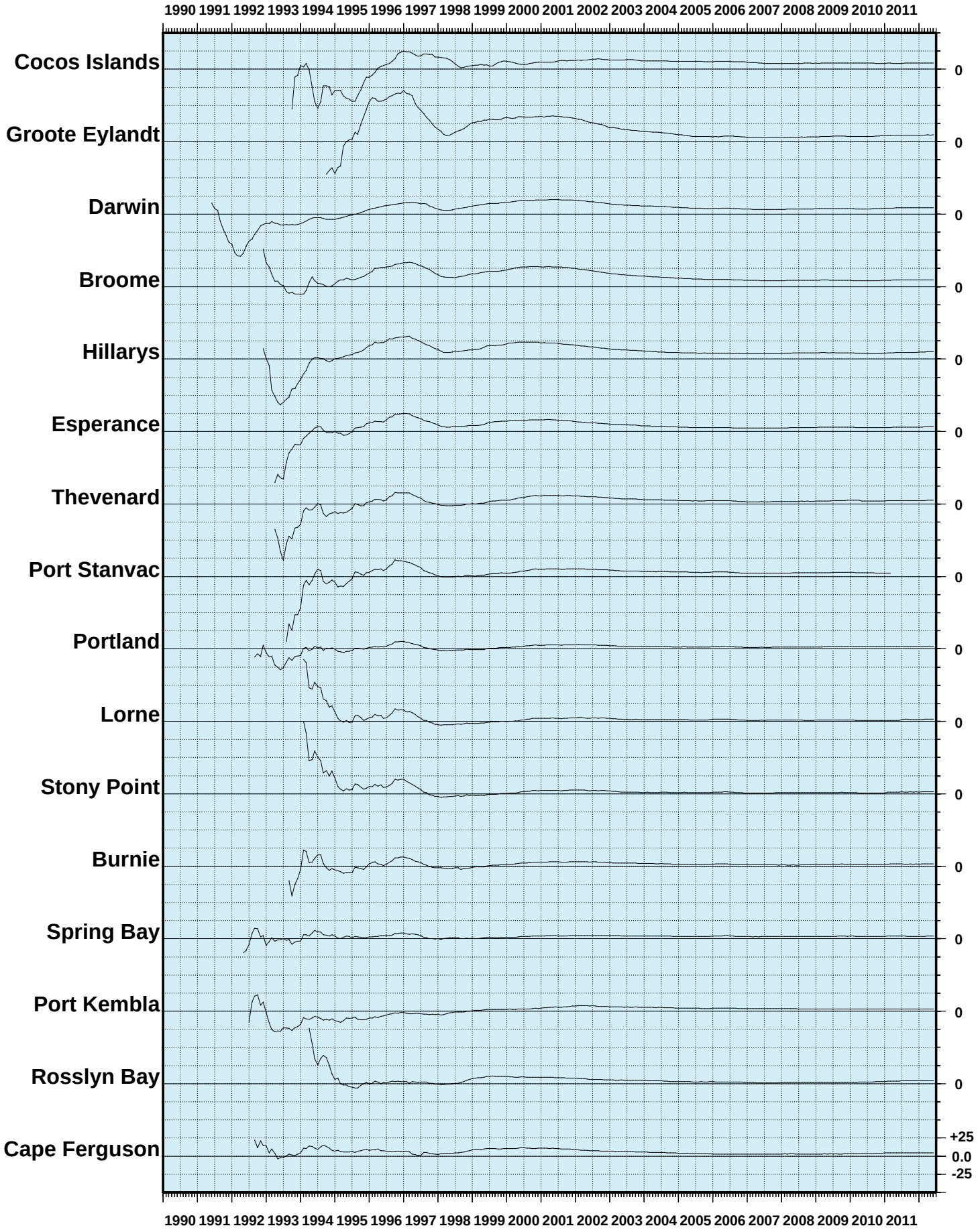


Figure 14

BAROMETRIC PRESSURE ANOMALIES THROUGH MAY 2012 (hPa)

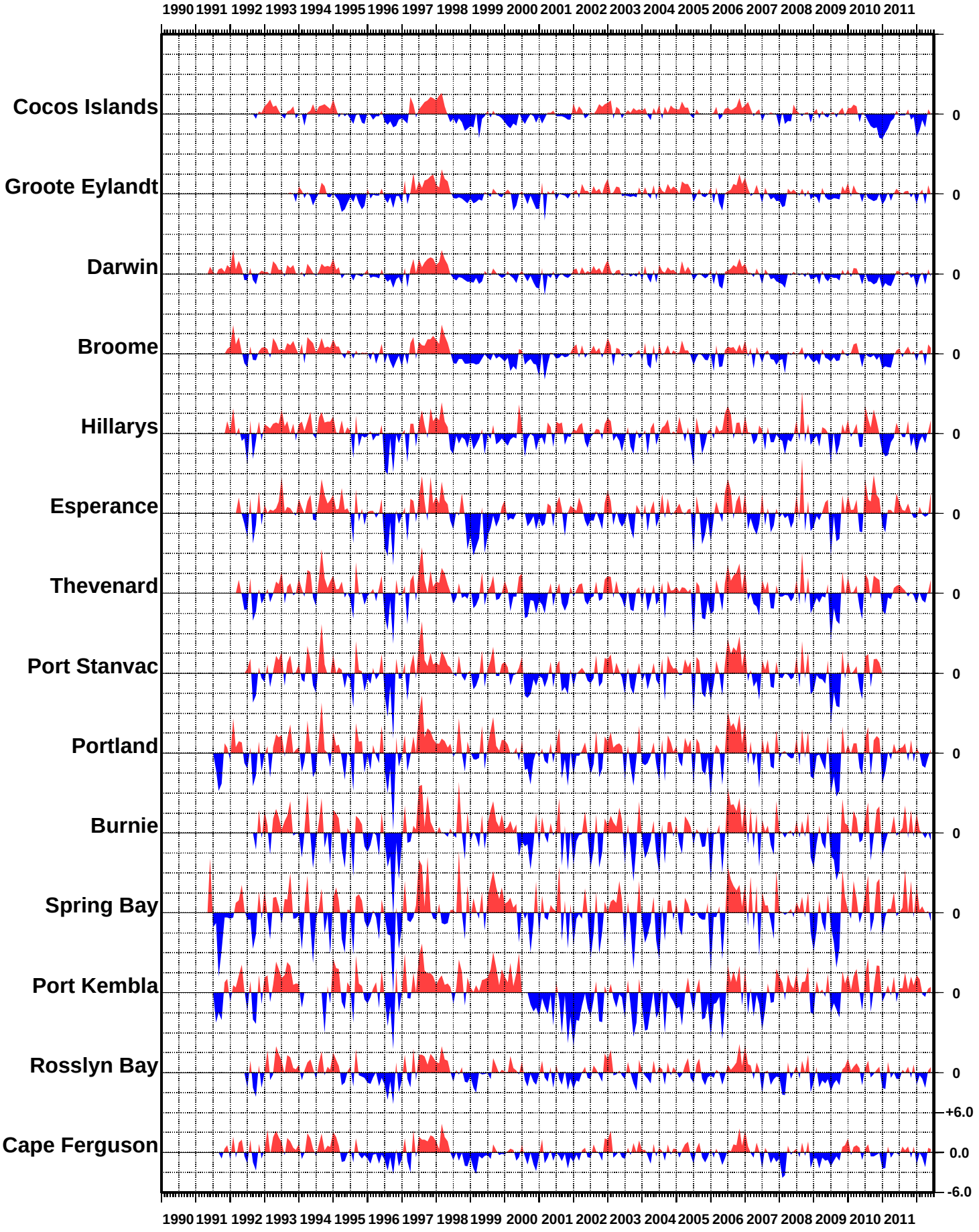


Figure 15

WATER TEMPERATURE ANOMALIES THROUGH MAY 2012 (˚C)

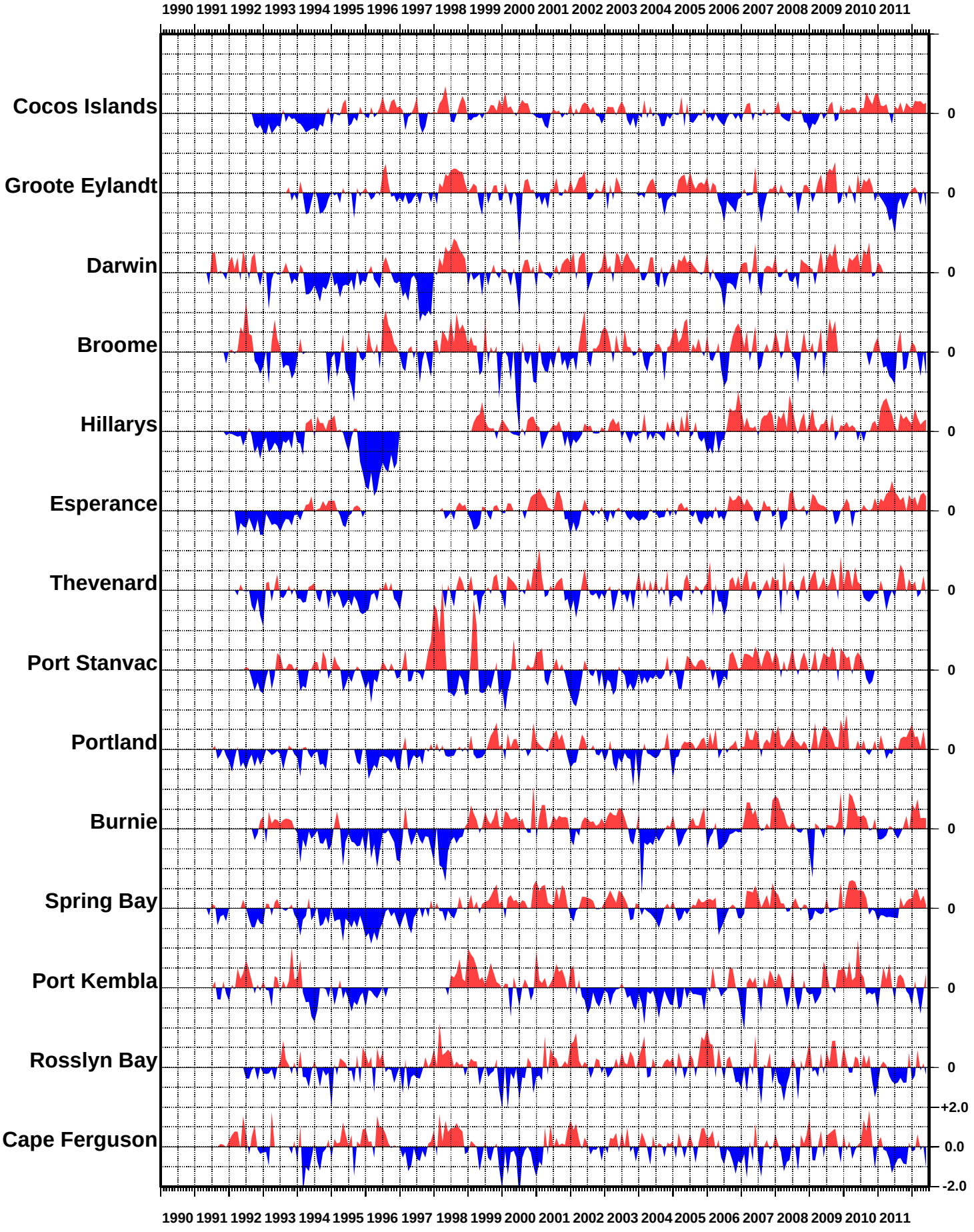


Figure 16

AIR TEMPERATURE ANOMALIES THROUGH MAY 2012 (°C)

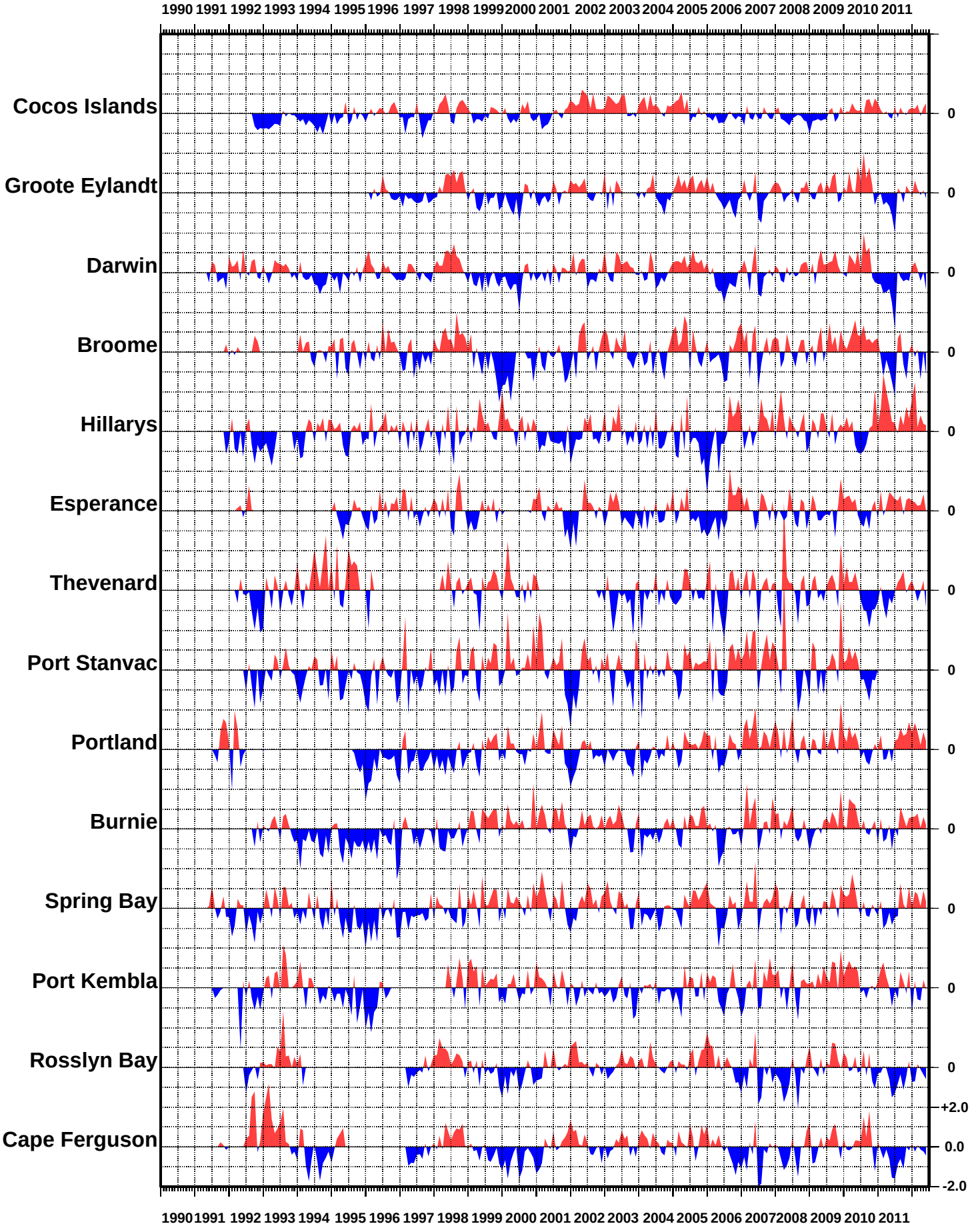
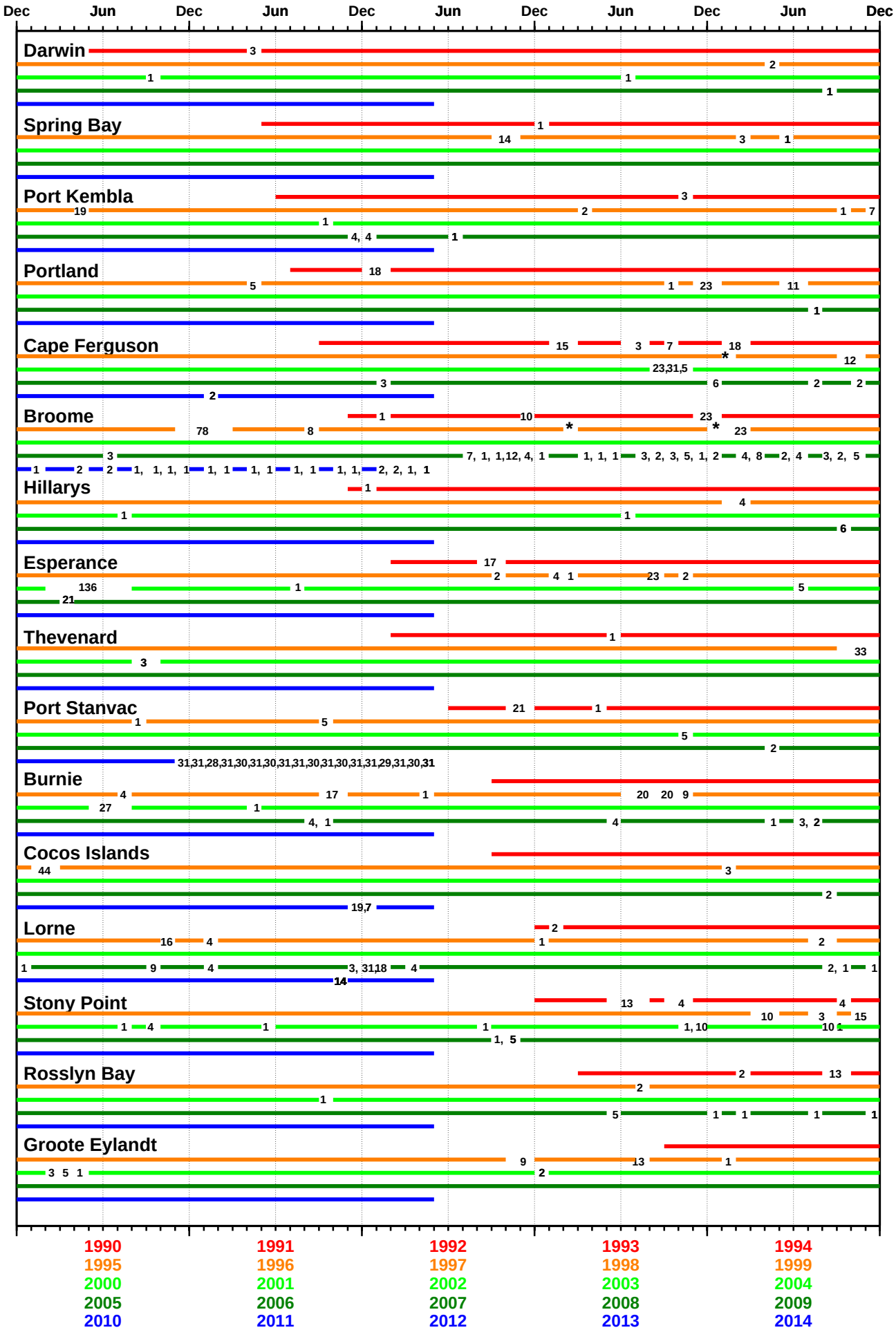


Figure 17

SEA LEVEL DATA RETURN

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



National Tidal Centre, Bureau of Meteorology