

# **THE AUSTRALIAN BASELINE SEA LEVEL MONITORING PROJECT**

## **MONTHLY DATA REPORT**

**SEPTEMBER 2002**



This report was prepared under the Australian Greenhouse Science Program for the Australian Greenhouse Office, supported by NTF Australia at the Flinders University of South Australia.



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**Quality Certification:**

I authorise the issue of this Australian Baseline Sea Level Monitoring Project Monthly Data Report for September 2002 in accordance with National Tidal Facility Australia Quality Assurance procedures.

Wolfgang Scherer  
Director - National Tidal Facility Australia

# **The Australian Baseline Sea Level Monitoring Project**

## **Monthly Data Report**

**SEPTEMBER 2002**

### **NOTES ON THE DATA FOR SEPTEMBER 2002**

Sea level data return this month was excellent at most stations (Figures 1 and 15) with the exception of Stony Point where 24 hours of data was not recovered when a gauge component was replaced. The residuals (Figures 2 and 3), or 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 may result in elevated or depressed sea level observations.

The air temperature sensor at Thevenard remained faulty and the data has consequently been removed from the record. A tech visit in October should correct this problem.

The wind speed and wind gusts at Stony Point were recording zero values for relatively long periods throughout September despite the replacement of the above mentioned component. These erroneous values and the corresponding incident winds have been removed (Figures 4, 5 and 6). The wind data for Groote Eylandt was not recovered from the 2<sup>nd</sup> to the 12<sup>th</sup> of September due to an accident at the wharf, which disabled the wind sensor temporarily.

The sea level anomalies (Figure 10) changed from negative to slightly positive at Port Stanvac, Portland, Lorne, Stony Point and Spring Bay in September and changed from positive to slightly negative at Cocos Islands, Cape Ferguson and Rosslyn Bay. The sea level anomalies remained negative at all other sites in September. The barometric pressure anomalies (Figure 11) changed from positive to negative at Esperance, Thevenard, Port Stanvac, Portland, Burnie, Spring Bay and Port Kembla and remained positive for the remaining sites during September.

With regard to the water and air temperature anomalies in Figures 12 and 13 respectively, it must be noted that there are large gaps in the data for several stations, where the data collected appeared to be erroneous. Also note that for several stations there were no backup water temperature sensors in operation, so the quality of this data is unknown. Similarly, air temperatures are compared to the temperature recorded by a sensor located in the upper levels of the environmental housing of the tide gauge. These will not exactly agree, as in locations where the housing is in the sun, the housing temperature will be higher than the actual air temperature. The temperature fluctuations inside the housing will also be less pronounced compared to the actual temperature fluctuations. This is due to the smaller amount of ventilation within the environmental housing. This can be used as a rough guide in determining the quality of air temperature data, but it is not an exact measure, and so is not used to fill the gaps.

It is difficult to relate the water and air temperature anomalies directly to those of barometric pressure and sea level without considering other effects, such as localised currents, wind speeds and directions. However, the anomalies are very useful in controlling the quality of the water and air temperature data at the Baseline stations.

Figure 16 compares the mean, maximum and minimum values for air temperature, water temperature and barometric pressure for the current month with the long-term September values. Note that the long-term ranges are calculated using the historical sets of September data for each station *excluding* the current month of data.

For most stations the mean air temperatures for September 2002 were consistent with the long term September means. A record maximum air temperature of 30.3°C was recorded at Cocos Islands and a record minimum of 6.1°C was recorded at Hillarys. Failure of the air temperature sensor at Thevenard meant that no comparison could be made.

The mean water temperatures recorded at most sites for September 2002 were consistent with the long-term September values. A record maximum water temperature of 25.9°C was recorded at Rosslyn Bay. Record minimums of 11.1°C at Portland and 14.2°C at Port Kembla were recorded in September.

The mean barometric pressures were consistent with the long-term September values at most sites for September 2002 with the exception of Rosslyn Bay where a record maximum barometric pressure of 1026.8 hPa was recorded.

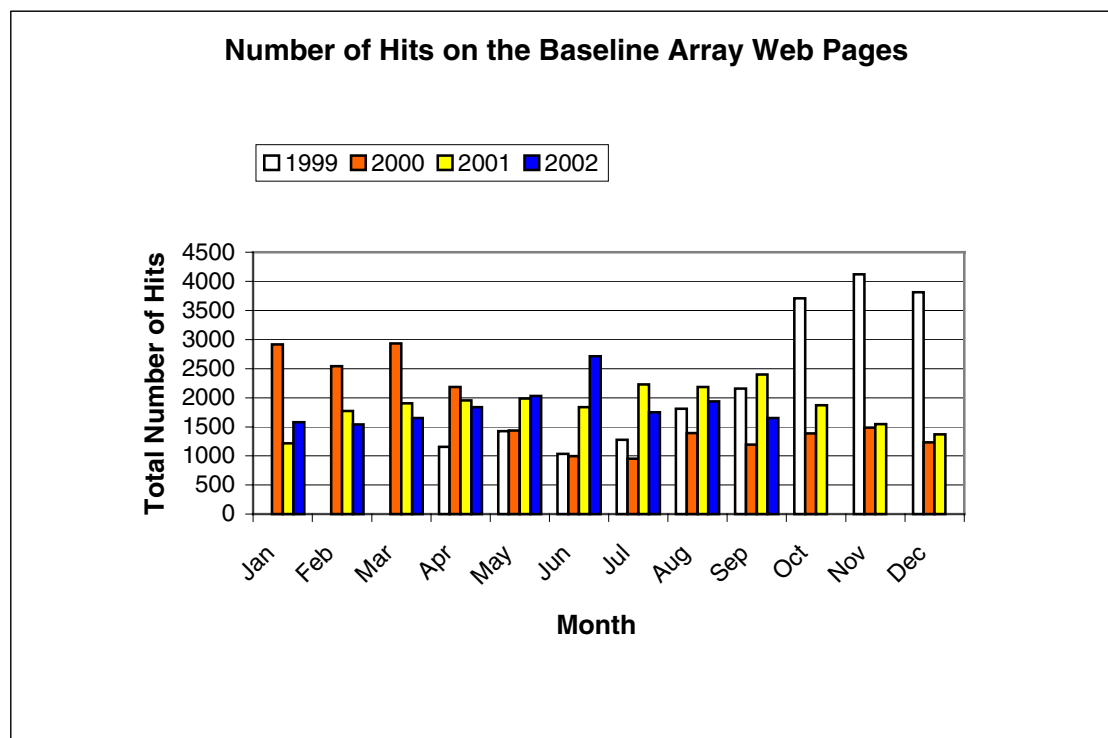
Figure 14 shows the short-term sea level trends for each SEAFRAME location included in the Australian Baseline Sea Level Monitoring Project. Table 1 lists the commencement of operation, the sea level trend for the entire record (plotted in Figure 14) and the change in trend with respect to the previous month's analysis.

**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 September 2002.**

Location	Installation Date	Sea Level Trend (mm/yr)	Change from previous month
Cocos Islands	Sep 1992	+14.0	-0.3
Groote Eylandt	Sep 1993	+23.6	-0.8
Darwin	May 1990	+15.7	-0.4
Broome	Nov 1991	+20.0	-0.6
Hillarys	Nov 1991	+15.3	-0.5
Esperance	Mar 1992	+11.1	-0.2
Thevenard	Mar 1992	+9.2	0.0
Port Stanvac	Jun 1992	+9.5	+0.3
Portland	Jul 1991	+5.2	+0.1
Lorne	Jan 1993	+4.8	+0.3
Stony Point	Jan 1993	+4.6	+0.3
Burnie	Sep 1992	+5.8	+0.1
Spring Bay	May 1991	+4.5	+0.2
Port Kembla	Jul 1991	+6.8	0.0
Rosslyn Bay	Jun 1992	+5.7	-0.2
Cape Ferguson	Sep 1991	+7.2	-0.3

Figure 17 shows the monthly mean sea levels with respect to an arbitrary fixed offset from the zero of the tide gauge. This plot clearly shows significant correlation in seasonal signals between stations, in contrast to the sea level anomalies plot, which has the seasonal signal removed from the data. Table 2 gives the number of hits to the Australian Baseline Sea Level Monitoring project web pages from 1999 to September 2002.

**Table 2: Number of hits on the Australian Baseline Sea Level Monitoring Project web pages from 1999 to 2002.**



*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.*

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

Further information on the *Monthly Data Report* and other projects conducted by NTF Australia can be obtained from the following address.

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

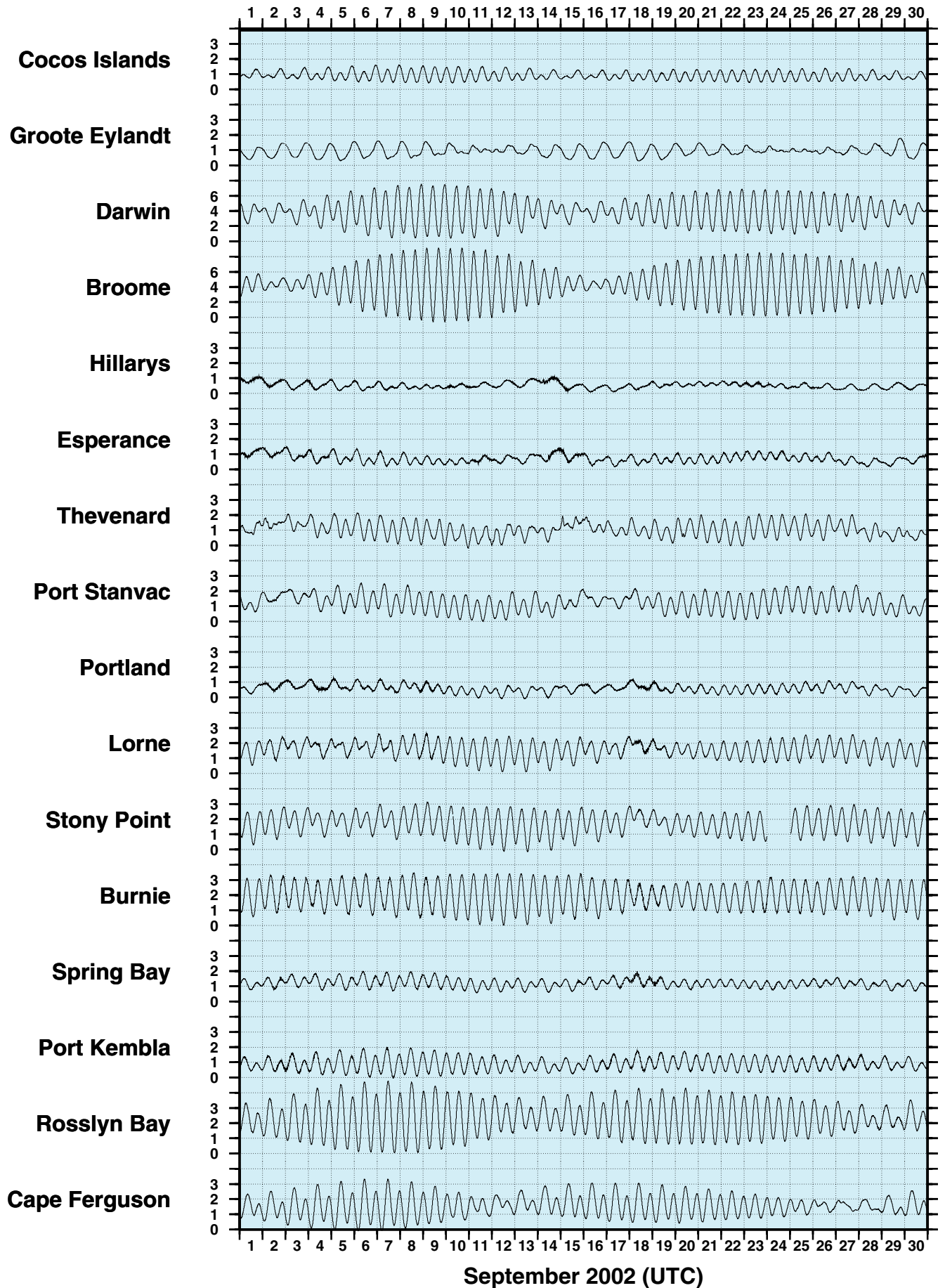
Please note the following:

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 *NTF Australia* 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 NTF Australia. Some handling fees may be charged. For commercial agencies requesting data, some additional costs may be levied.

**Figure 1**

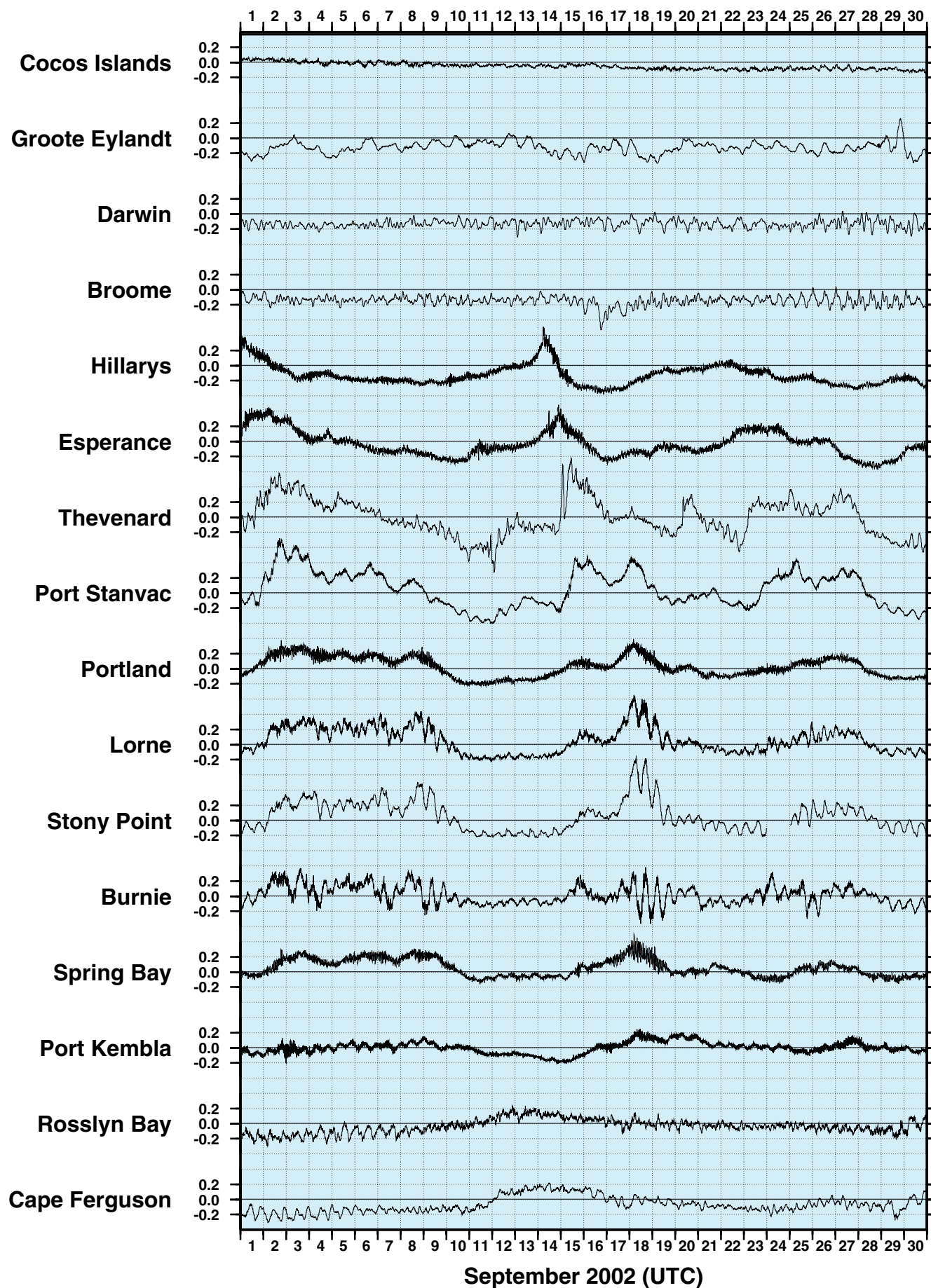
**SEPTEMBER 2002  
SIX MINUTE OBSERVATIONS (m)**



**September 2002 (UTC)**

**Figure 2**

**SEPTEMBER 2002  
SIX MINUTE RESIDUAL WATER LEVELS (m)**





**Figure 3**  
**SEPTEMBER 2002**  
**SIX MINUTE RESIDUALS**  
**ADJUSTED FOR ATMOSPHERIC PRESSURE (m)**

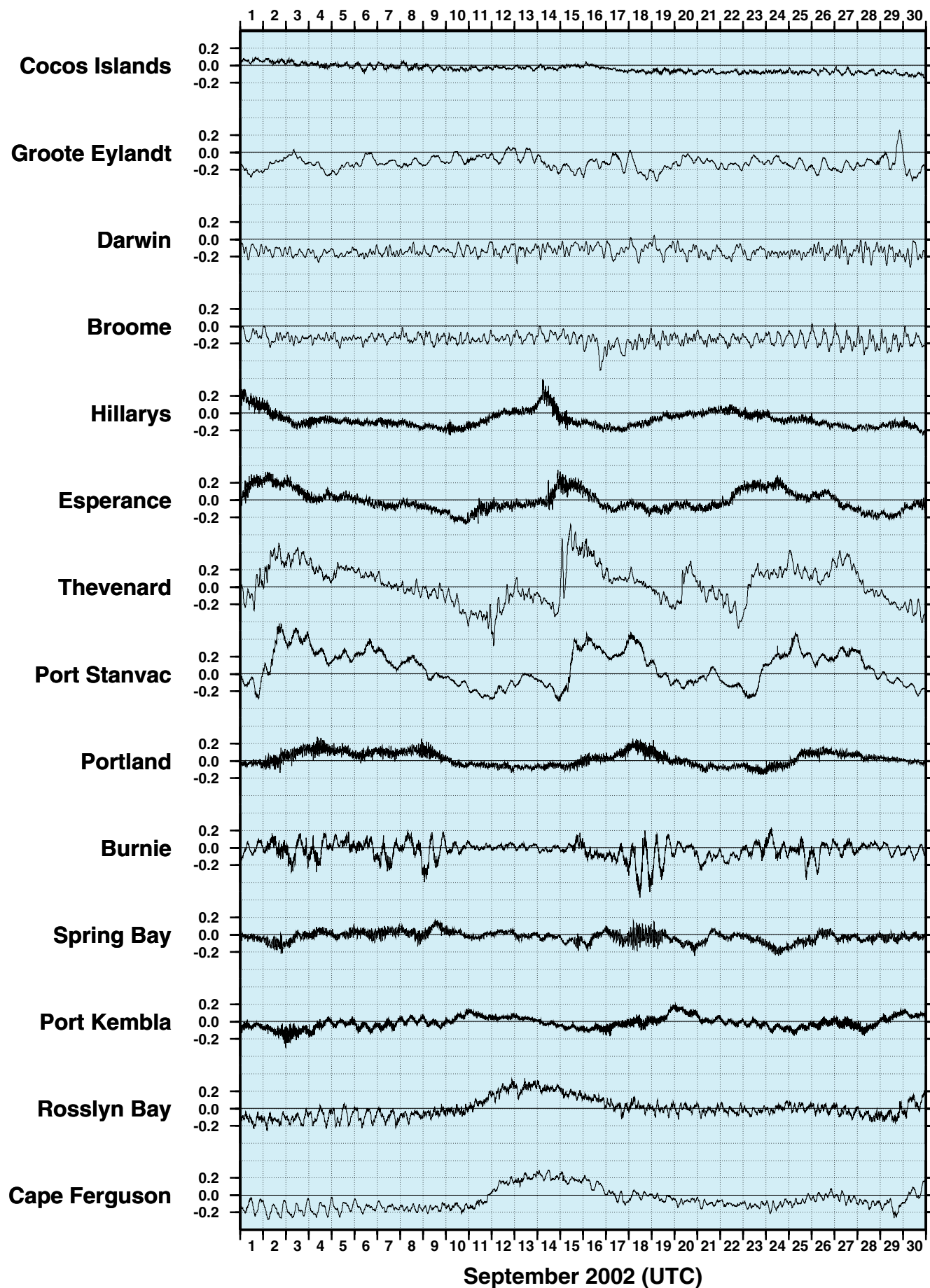


Figure 4

**SEPTEMBER 2002**  
**HOURLY WIND SPEEDS (m/s)**

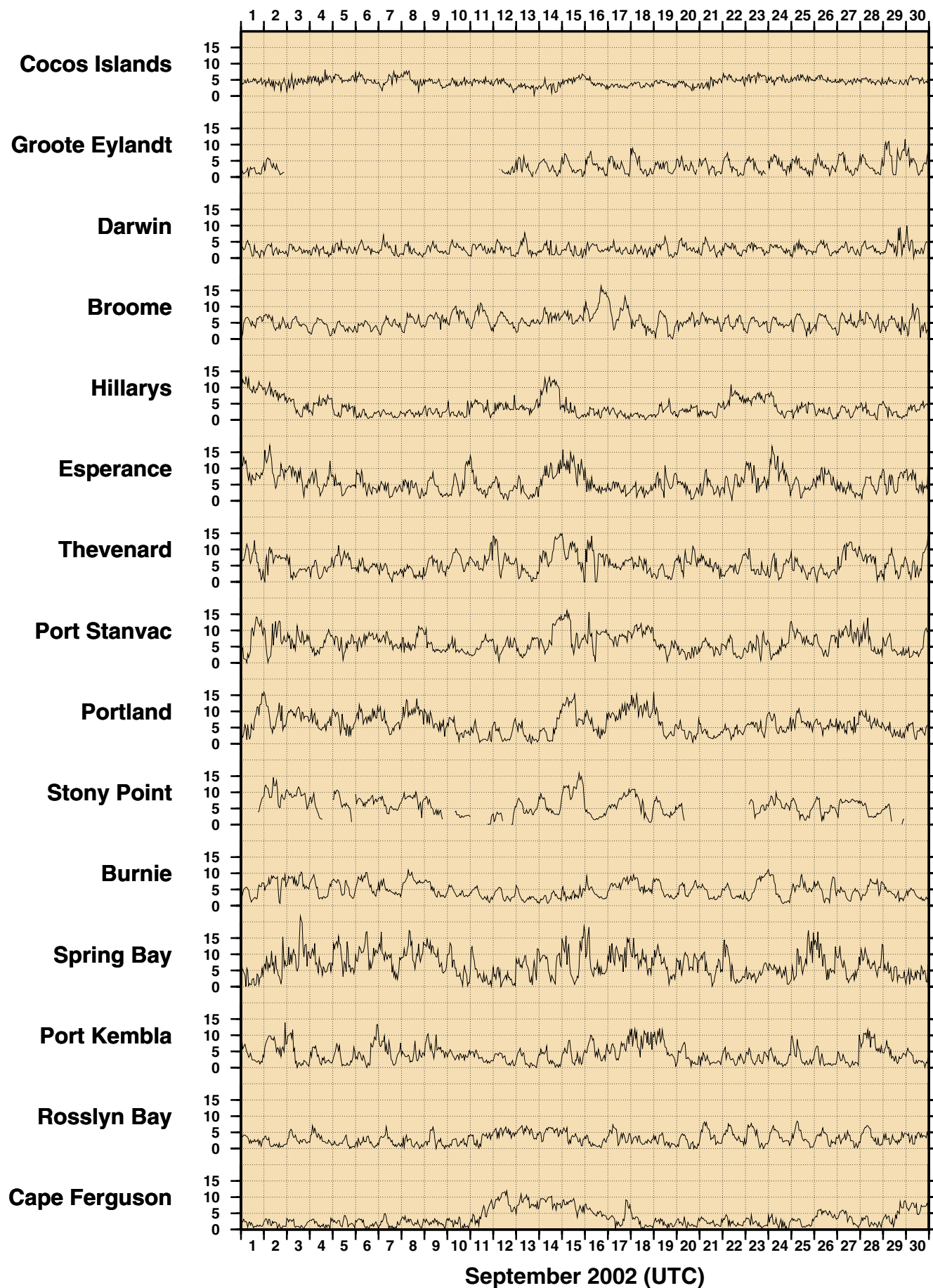


Figure 5

SEPTEMBER 2002  
HOURLY INCIDENT WINDS (m/s, deg True)

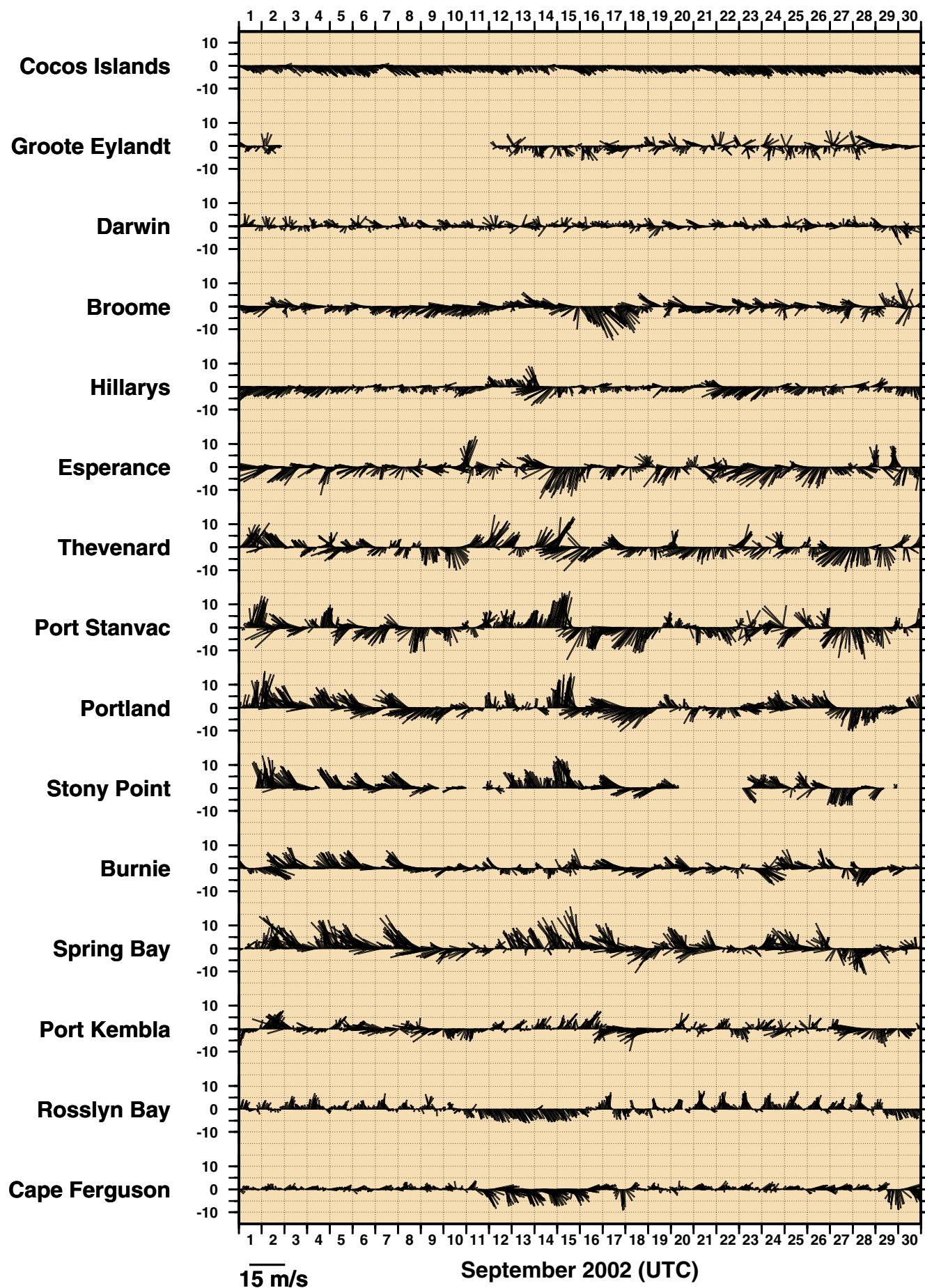


Figure 6

**SEPTEMBER 2002**  
**HOURLY MAXIMUM WIND GUSTS (m/s)**

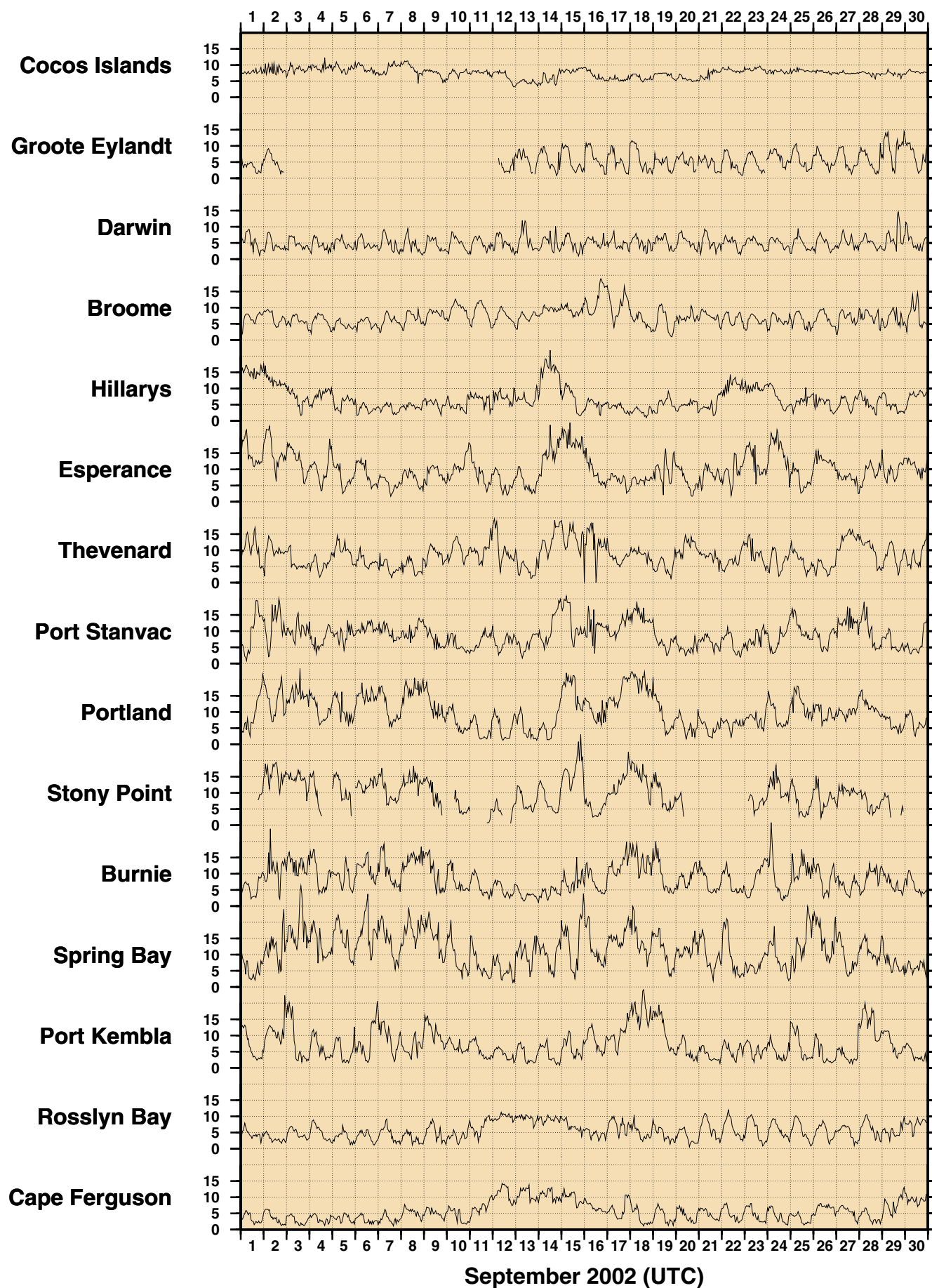


Figure 7

SEPTEMBER 2002  
HOURLY AIR TEMPERATURES (°C)

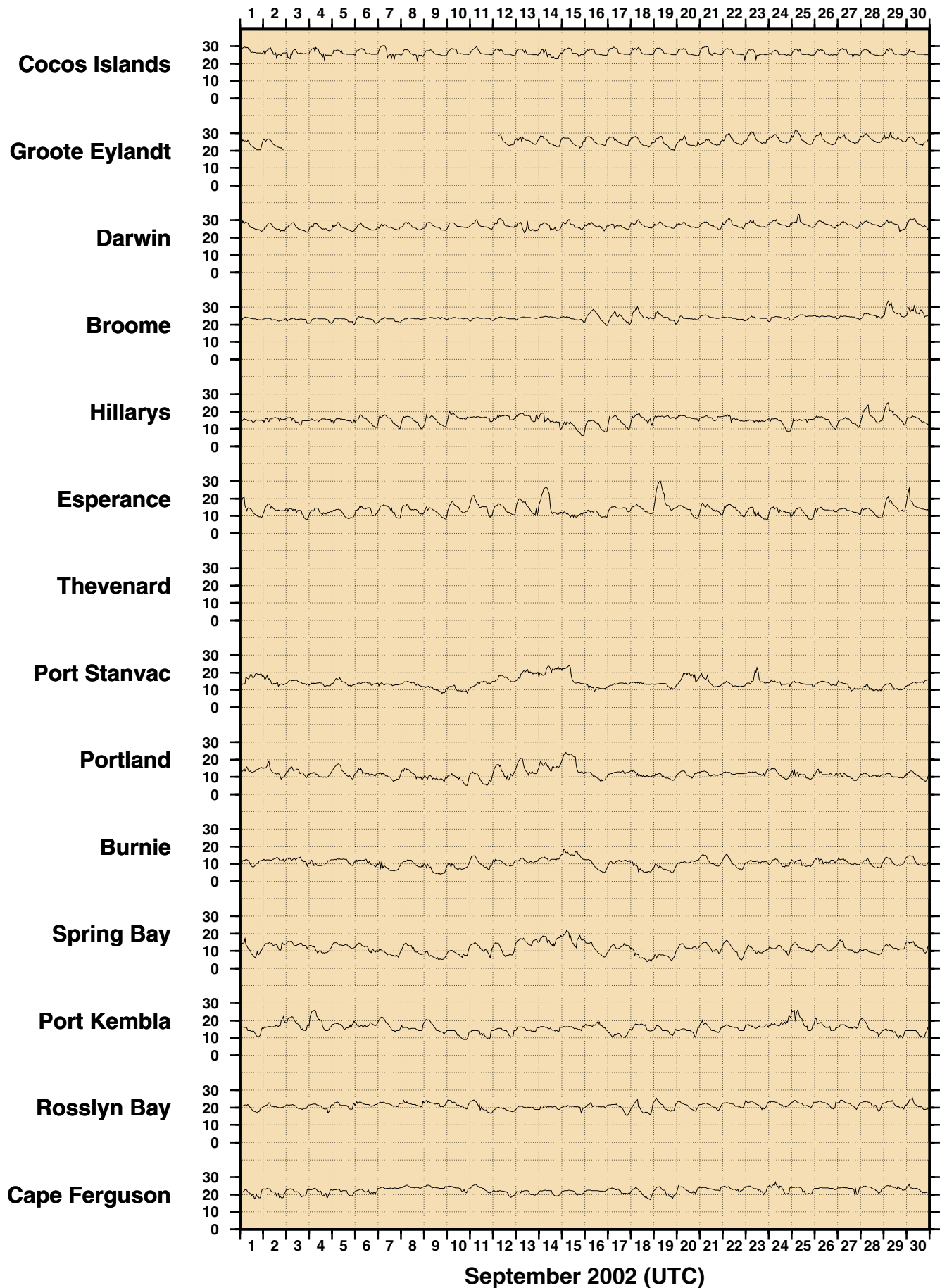




Figure 8

SEPTEMBER 2002  
HOURLY WATER TEMPERATURES (°C)

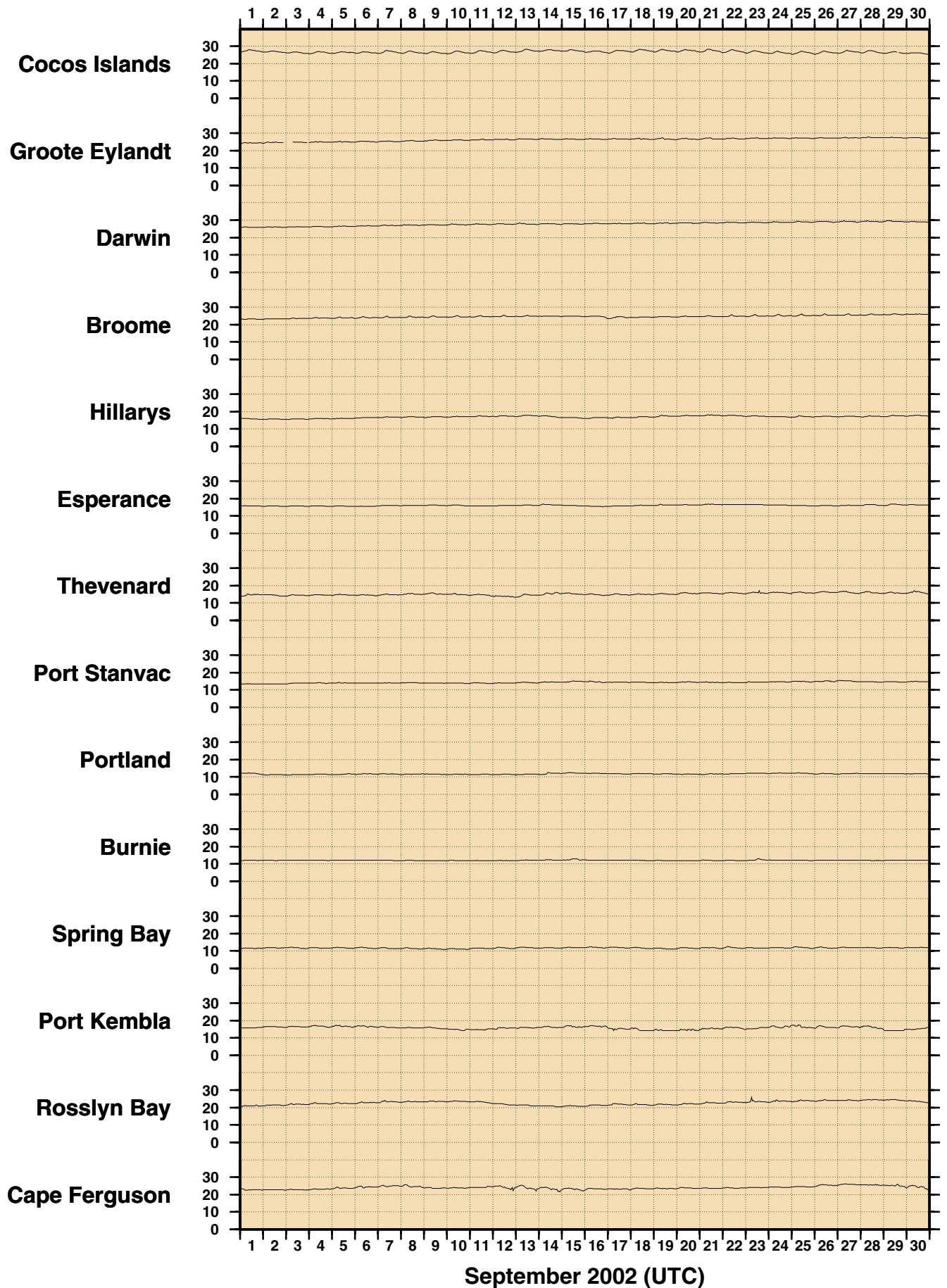
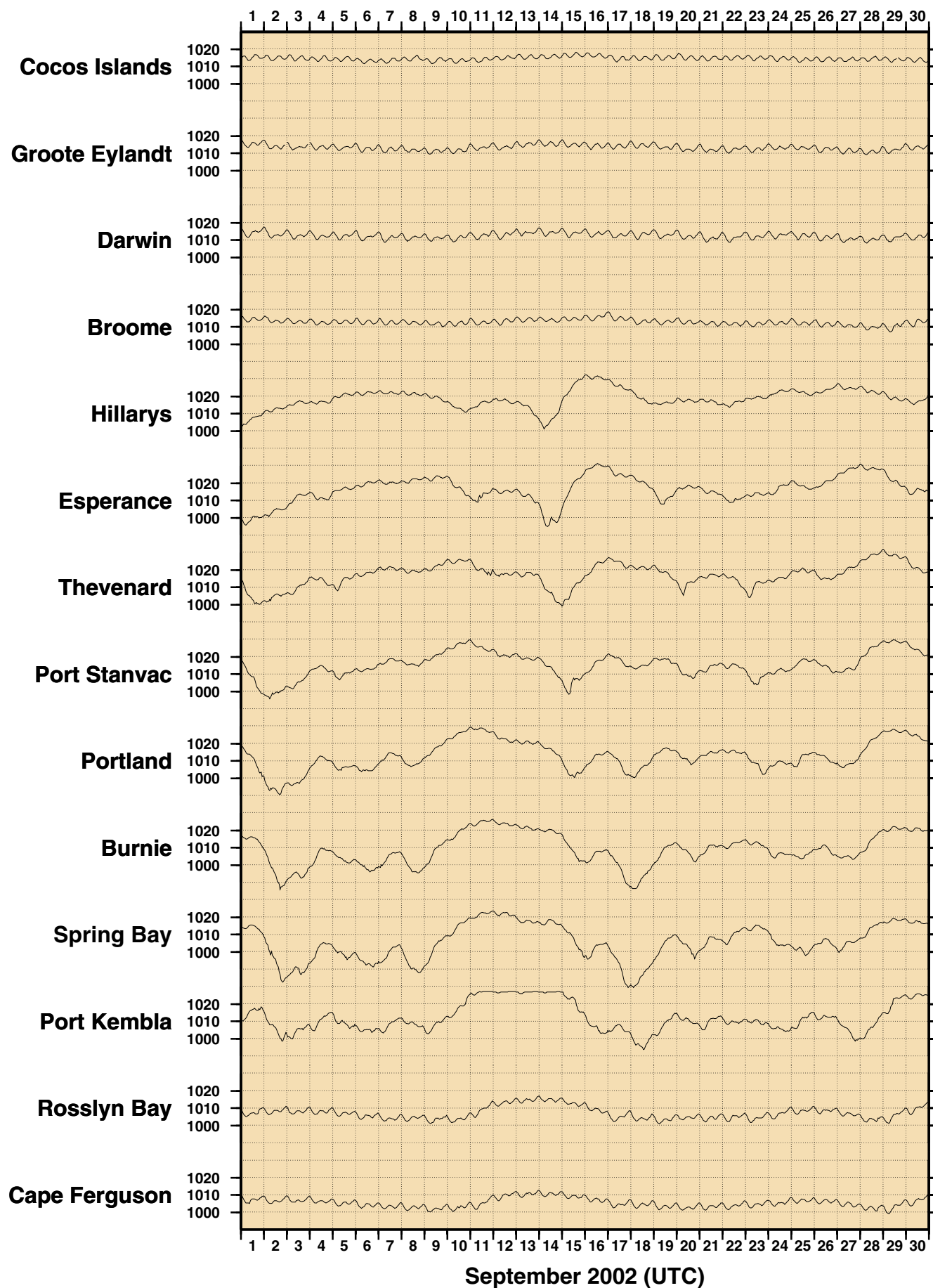


Figure 9

**SEPTEMBER 2002**  
**HOURLY ATMOSPHERIC PRESSURE (hPa)**



**Figure 10**  
**SEA LEVEL ANOMALIES THROUGH SEPTEMBER 2002 (m)**

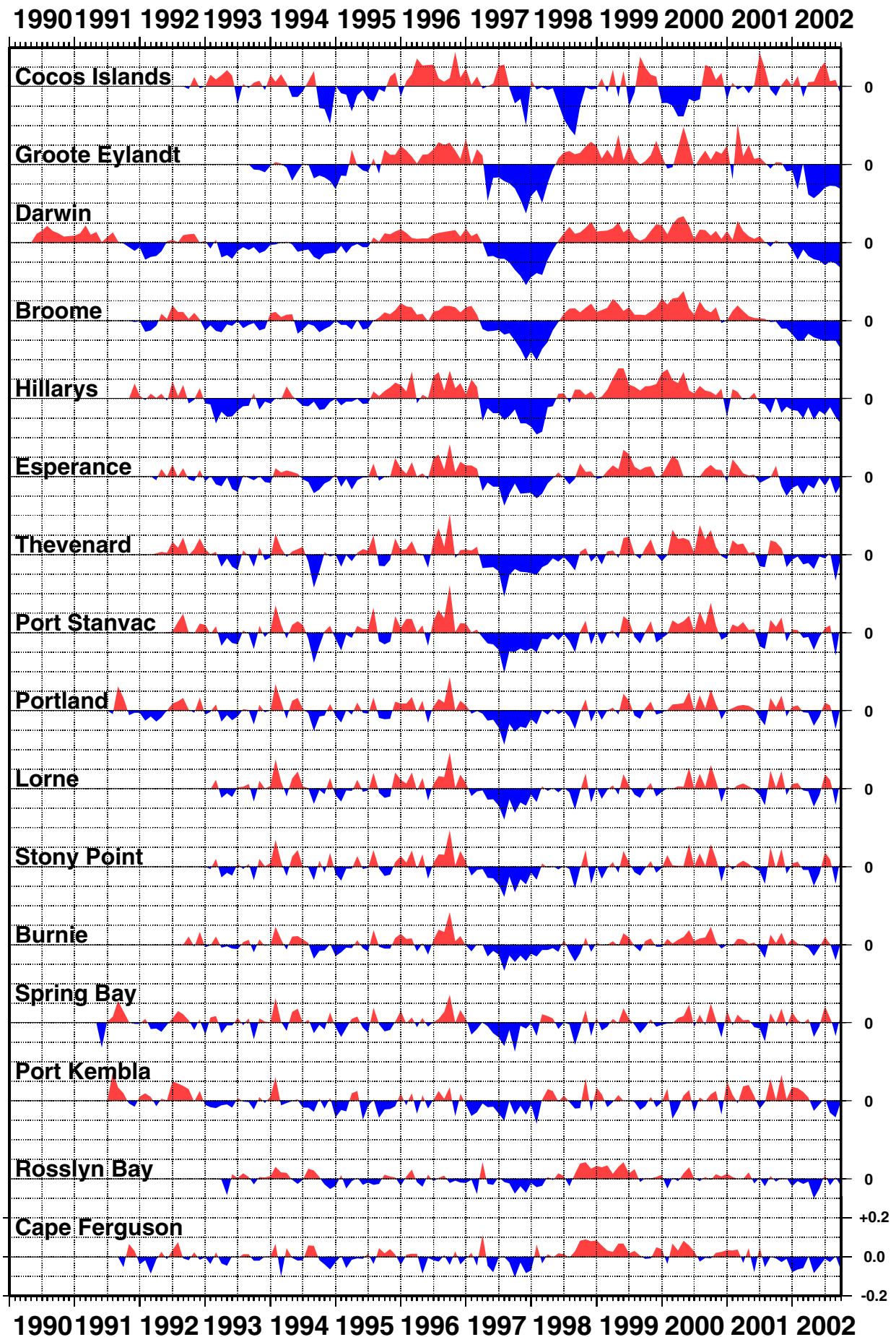




Figure 11

**BAROMETRIC PRESSURE ANOMALIES  
THROUGH SEPTEMBER 2002 (hPa)**

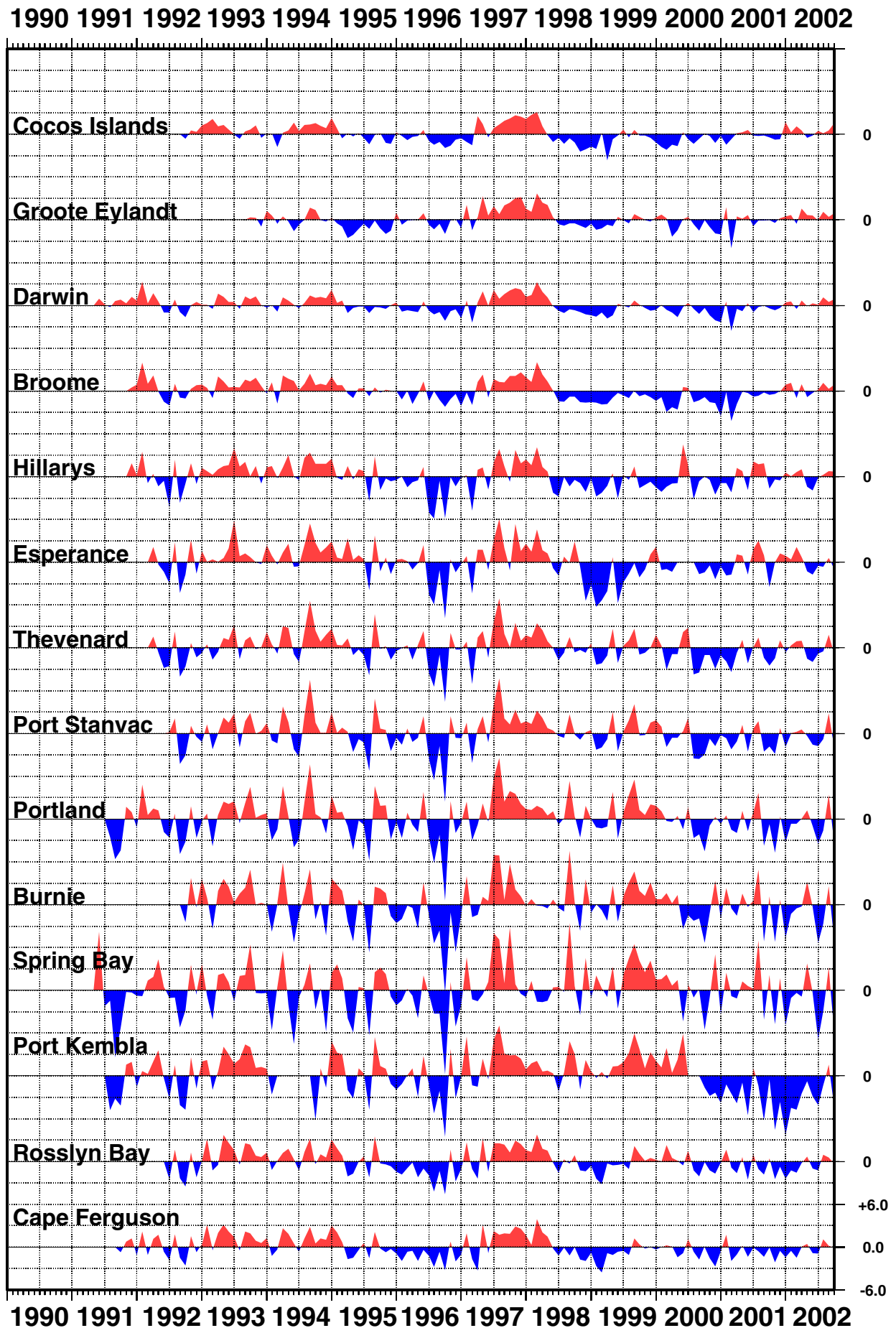


Figure 12

# WATER TEMPERATURE ANOMALIES THROUGH SEPTEMBER 2002 (°C)

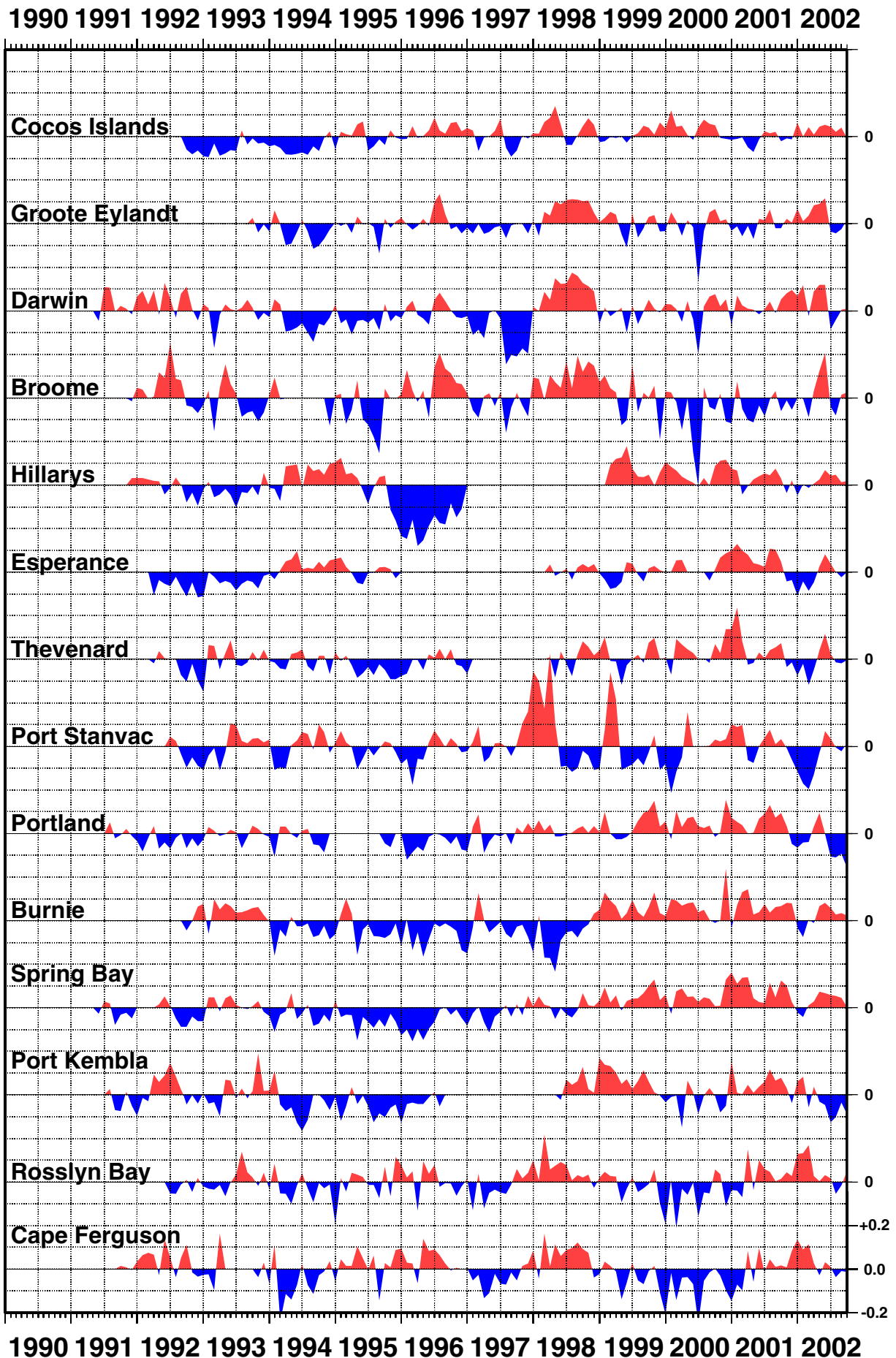


Figure 13

**AIR TEMPERATURE ANOMALIES  
THROUGH SEPTEMBER 2002 (°C)**

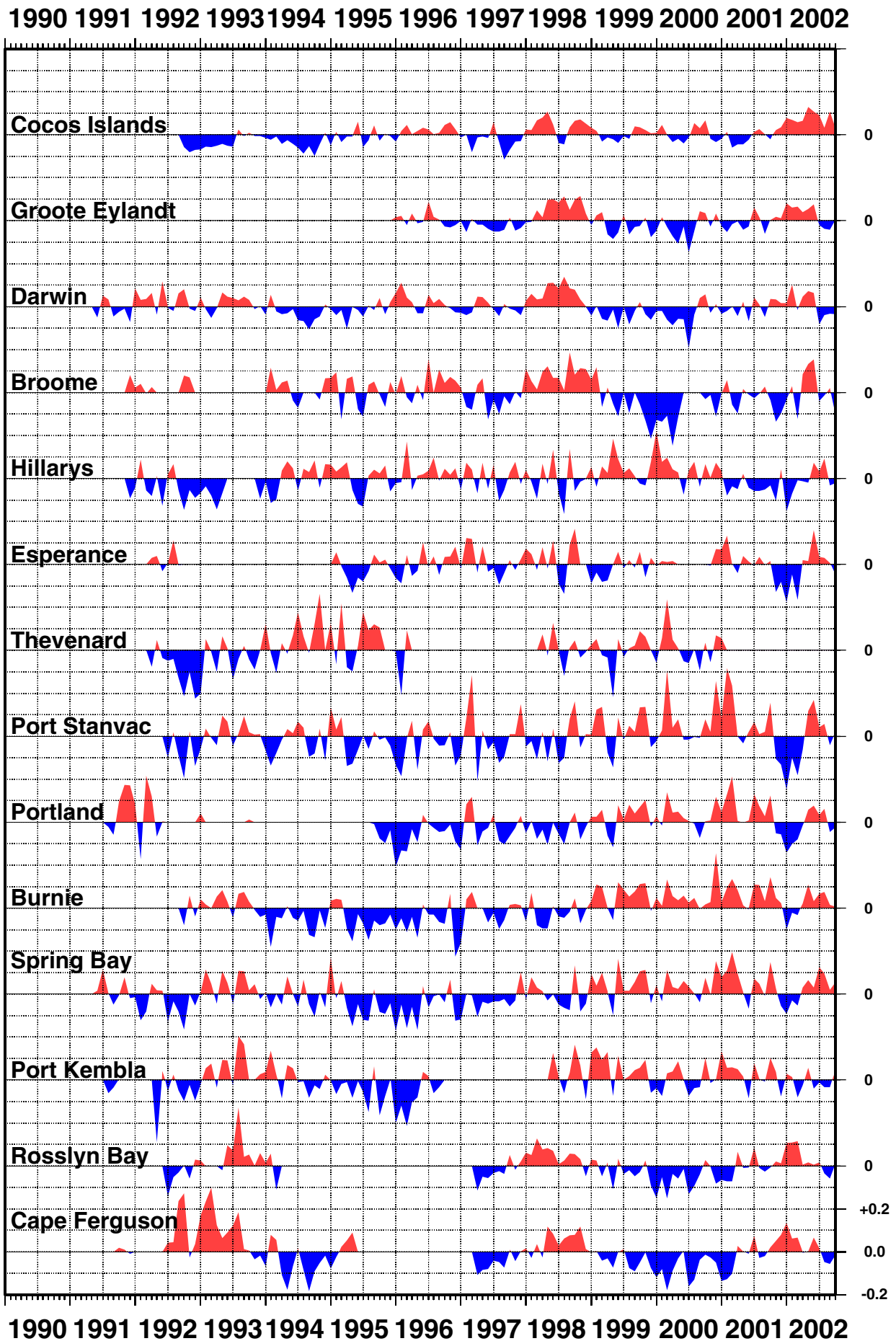
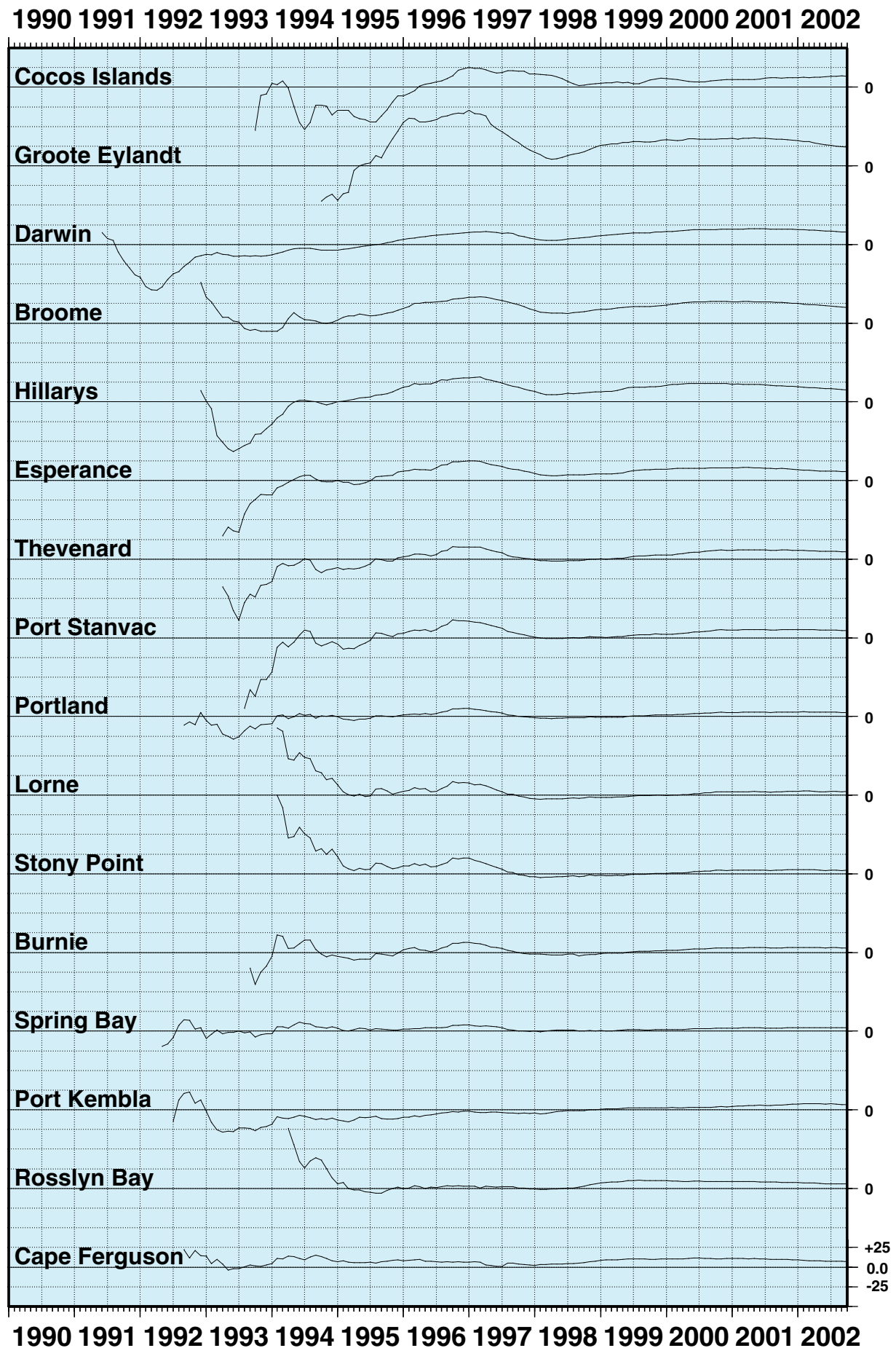


Figure 14

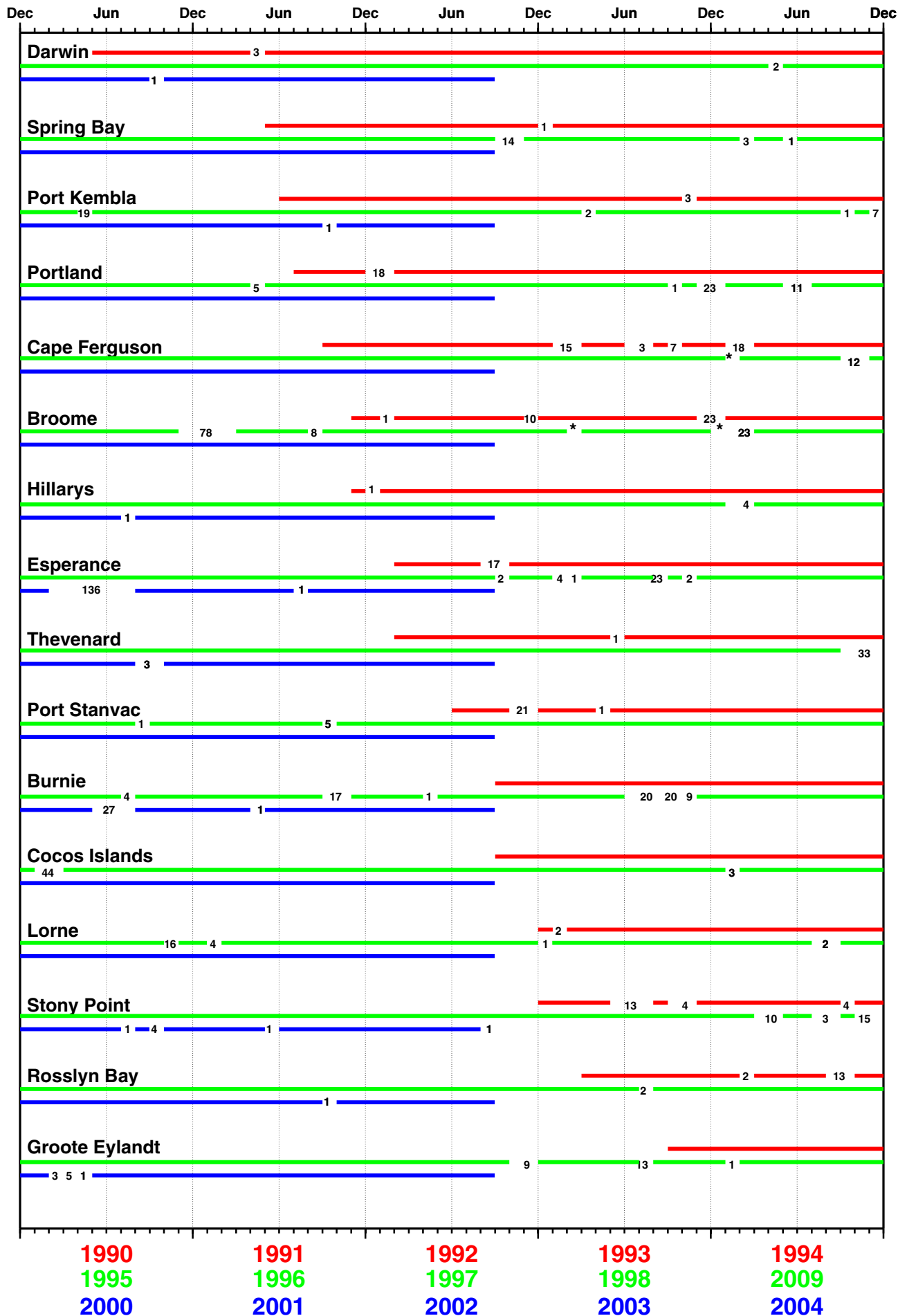
SEA LEVEL TRENDS THROUGH SEPTEMBER 2002 (mm/year)



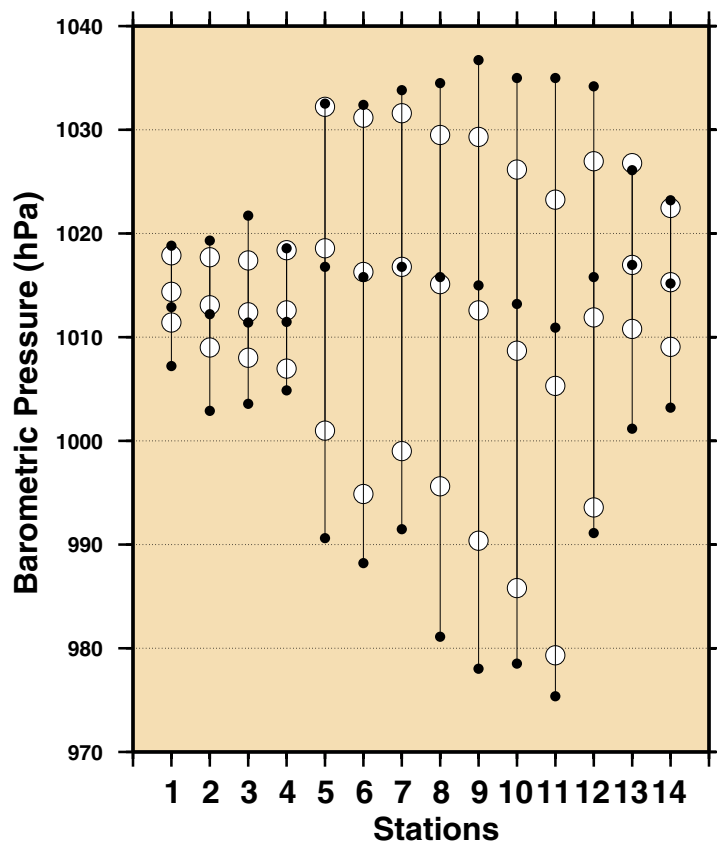
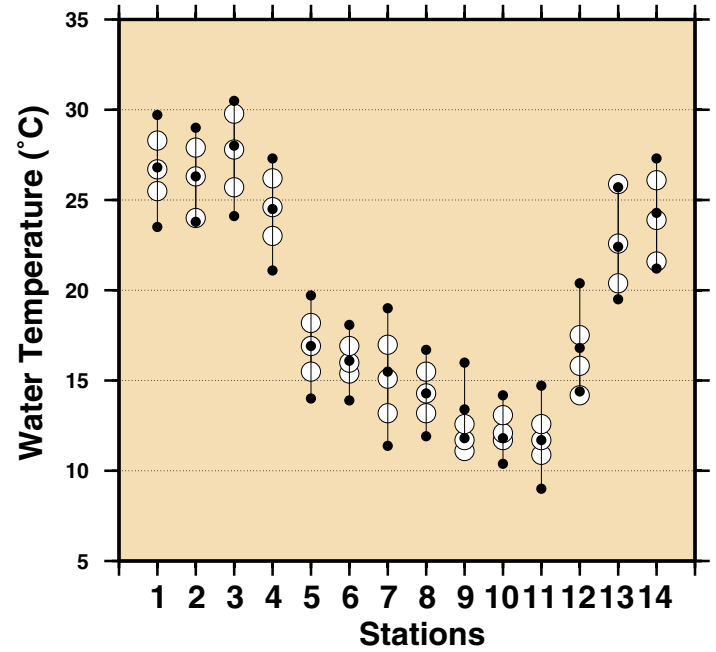
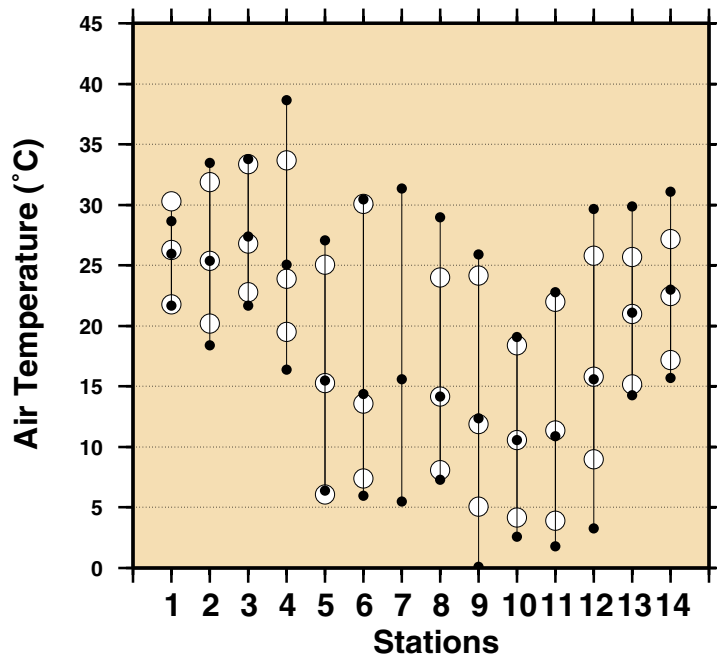
# Figure 15 SEA LEVEL DATA RETURN

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

\* Patchy record



**Figure 16**  
**Comparison of September 2002 Max, Min & Mean with**  
**Long Term September 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

- September 2002 Maximum
- September 2002 Mean
- September 2002 Minimum
- Long Term September Maximum
- Long Term September Mean
- Long Term September Minimum

**Figure 17**

**MONTHLY MEAN SEA LEVELS TO SEPTEMBER 2002 (m)**

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

