

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

## **MONTHLY DATA REPORT**

**MARCH 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 March 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**

### **MARCH 2002**

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

Sea level data return this month was excellent at all stations. Calibration and maintenance visits were made to Broome, Darwin and Groote Eylandt this month.

The primary water temperature sensor at Portland remains faulty and as a result the backup water temperature was used. Filtered backup water temperature was used at Broome prior to the new primary sensor becoming operational. The Thevenard air temperature sensor remains faulty and the data has consequently been removed from the record.

The sea level anomalies (Figure 10) at Groote Eylandt, Darwin, Broome, Hillarys, Esperance, Thevenard, and Cape Ferguson show substantial, negative anomalies relative to the remainder of the sites where the anomalies are close to zero or positive.

Overall, the barometric pressure anomalies, presented in Figure 11, correlate reasonably well with the sea level anomalies for most stations. Strongly positive sea level anomalies correspond to strongly negative barometric pressure anomalies as would be expected. This correlation is apparent for March even though the sea level anomalies are generally quite small this month.

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 give the result of elevated or depressed sea level observations.

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

For most stations the mean air temperatures for March 2002 were consistent with the long term March means. Record maximum temperatures were recorded at Cocos Islands, Darwin, Esperance and Burnie. Record minimums were recorded at Esperance and Cape Ferguson. Failure of the sensor at Thevenard meant that no comparison could be made.

The water temperatures recorded at all sites for March 2002 were quite consistent with the long-term values. Groote Eylandt recorded a new maximum temperature. The backup water temperature for the entire month was used at Portland.

The barometric pressures were consistent with the long-term values at all sites for March 2002. All maximum and minimum pressures recorded this month fell between the long-term minimums and maximums.

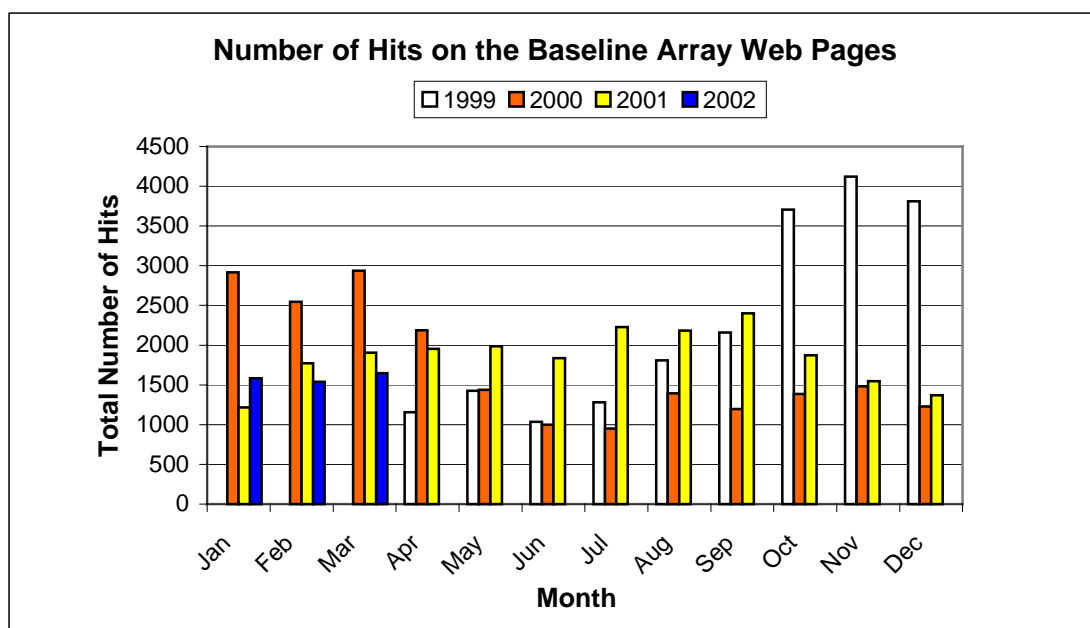
Figure 14 shows the short-term sea level trends for each SEAFRAME location included in the Australian Baseline Sea Level Monitoring Project. Table 1 lists the commencement of operation, the sea level trend for the entire record (plotted in Figure 14) and the change in trend with respect to the previous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

**Table 1: Installation dates and short-term sea level trends for the Baseline array.**

Station	Installation Date	Sea Level Trend (mm/yr)	Change from previous month
Cocos Islands	Sep 1992	+12.5	+0.2
Groote Eylandt	Sep 1993	+29.4	-1.4
Darwin	May 1990	+18.1	-0.3
Broome	Nov 1991	+23.3	-0.5
Hillarys	Nov 1991	+17.8	-0.3
Esperance	Mar 1992	+12.6	-0.3
Thevenard	Mar 1992	+10.5	-0.3
Port Stanvac	Jun 1992	+10.2	-0.2
Portland	Jul 1991	+5.8	-0.1
Lorne	Jan 1993	+5.0	-0.1
Stony Point	Jan 1993	+5.0	-0.2
Burnie	Sep 1992	+6.3	-0.1
Spring Bay	May 1991	+4.5	+0.1
Port Kembla	Jul 1991	+7.8	+0.1
Rossllyn Bay	Jun 1992	+7.0	-0.2
Cape Ferguson	Sep 1991	+8.3	0.0

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.

The following chart shows the number of hits on the Australian Baseline Sea Level Monitoring Project web pages over 1999, 2000, 2001 and 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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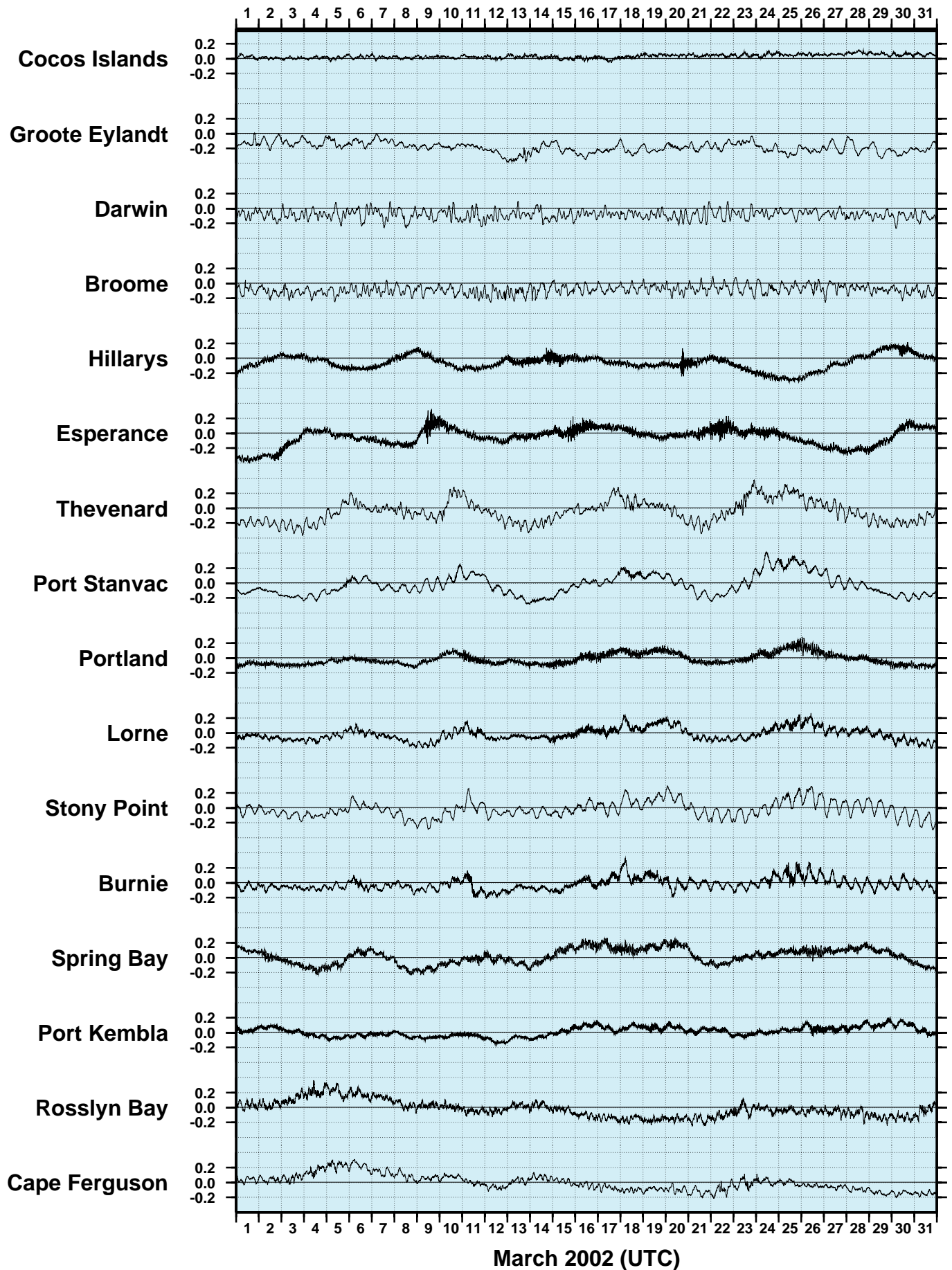
Individuals and organisations are advised that quality controlled six-minute or hourly data from these stations are available on request from NTF Australia. Some handling fees may be charged. For commercial agencies requesting data, some additional costs may be levied.

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



Figure 2

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





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

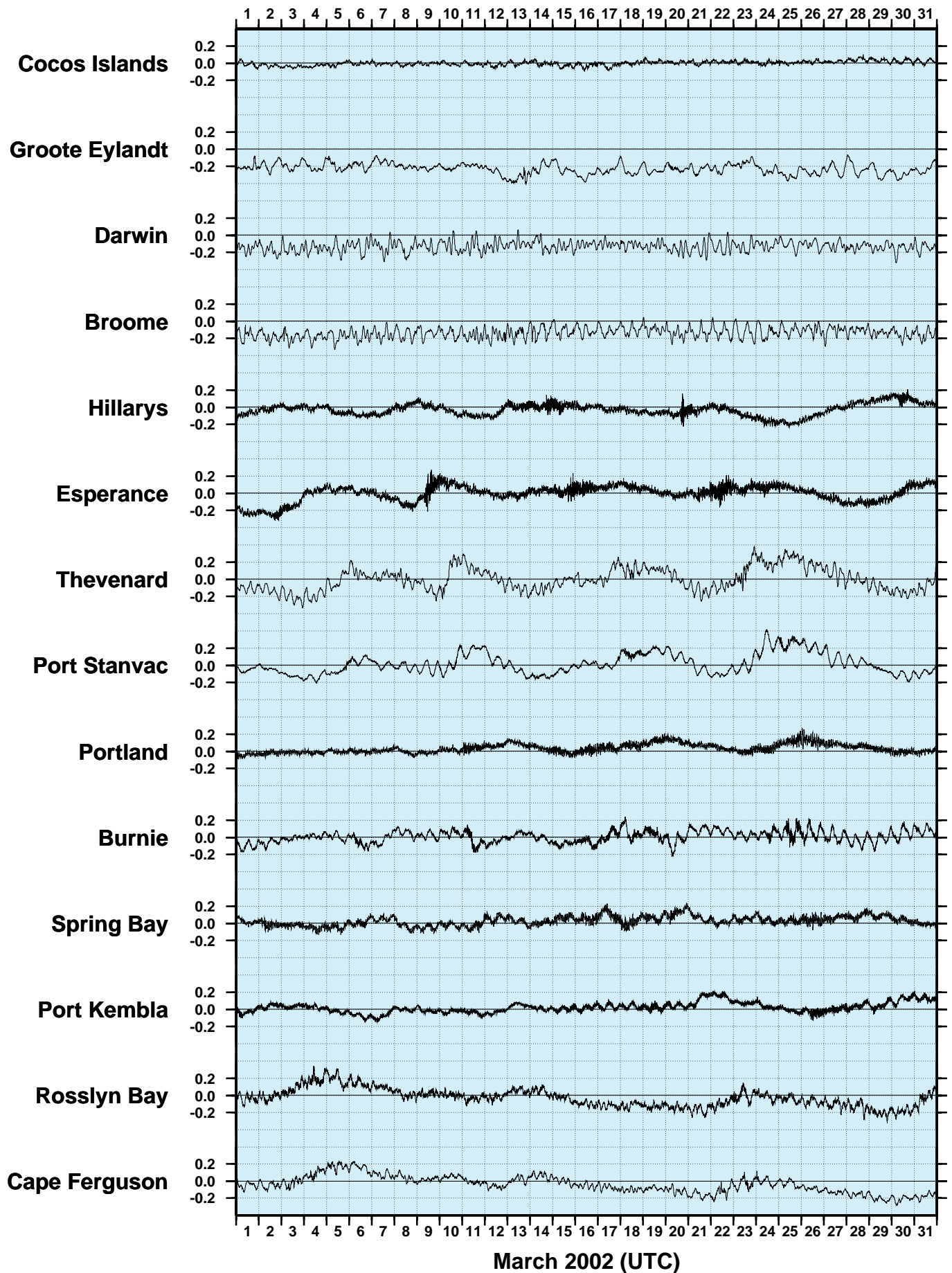


Figure 4

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

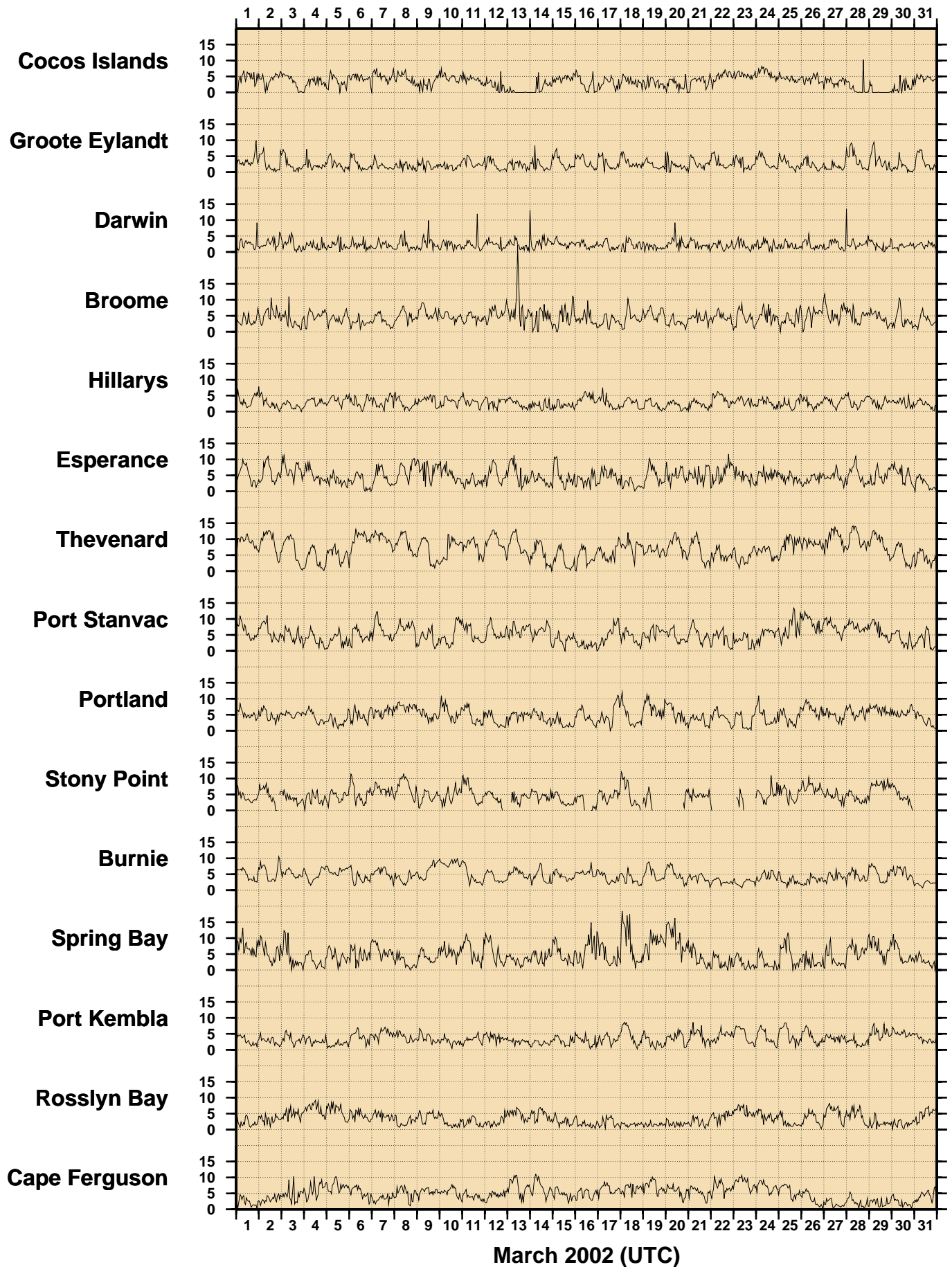
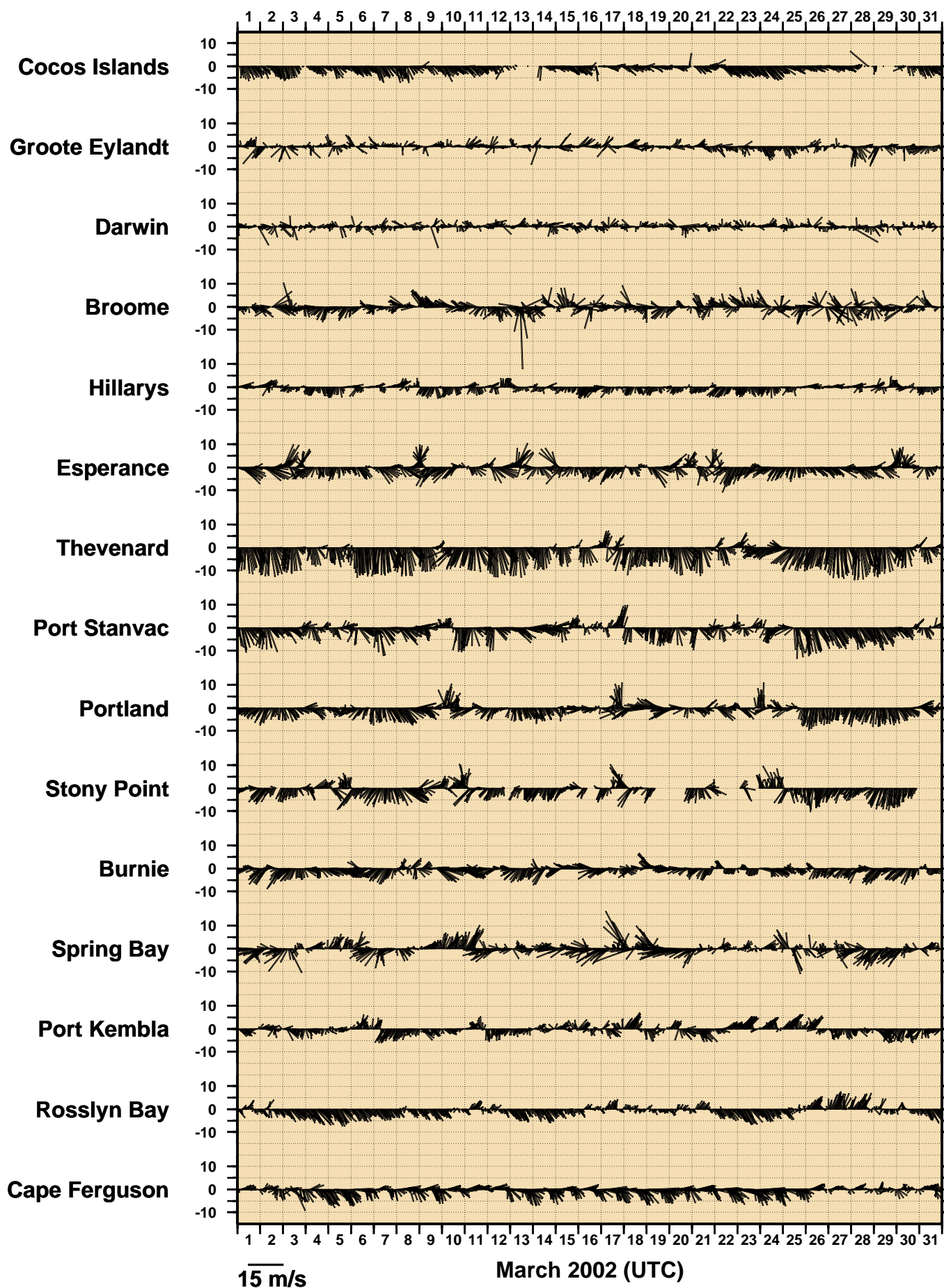


Figure 5

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



**Figure 6**

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

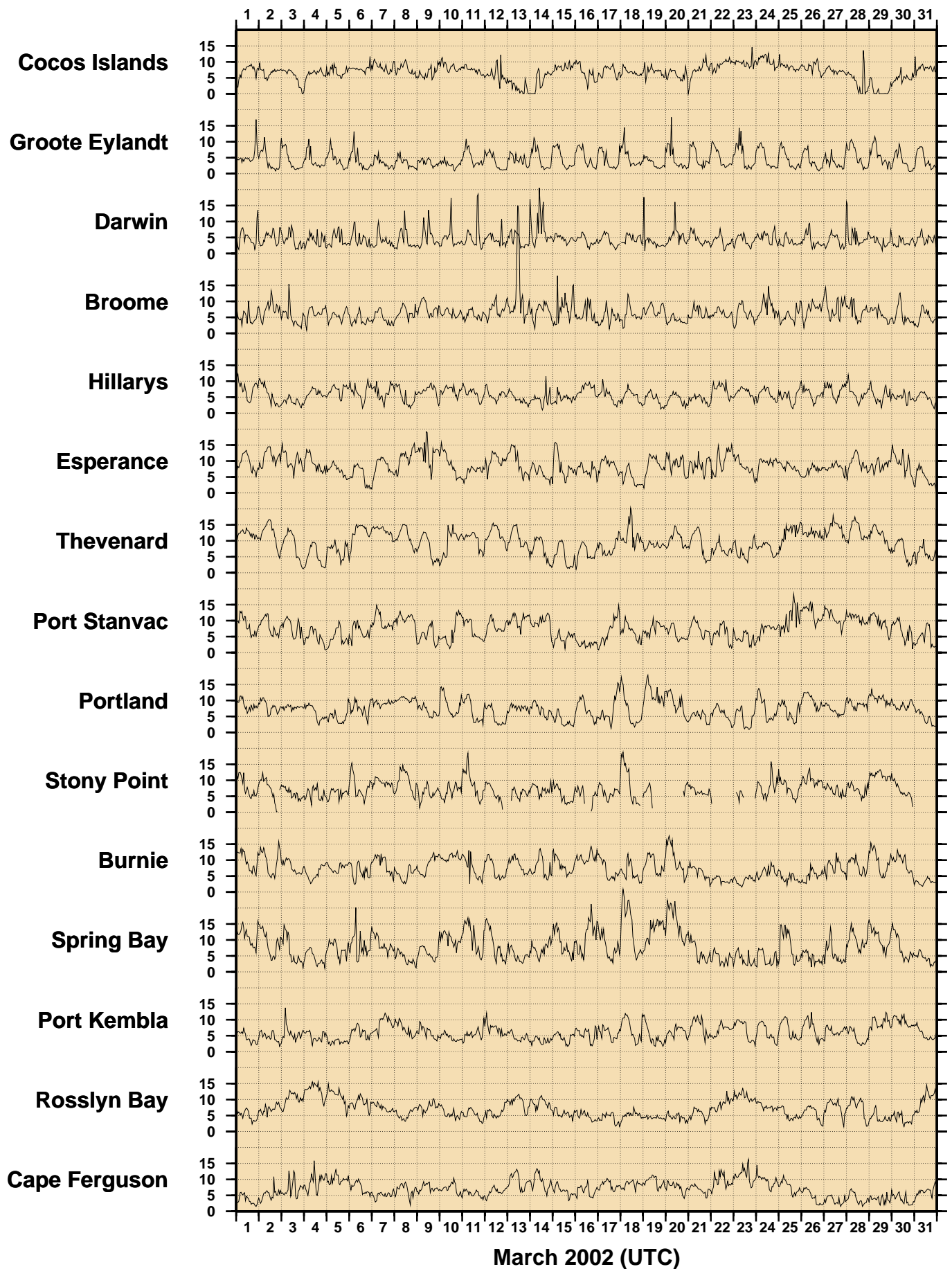




Figure 7

**MARCH 2002**  
**HOURLY AIR TEMPERATURES (°C)**

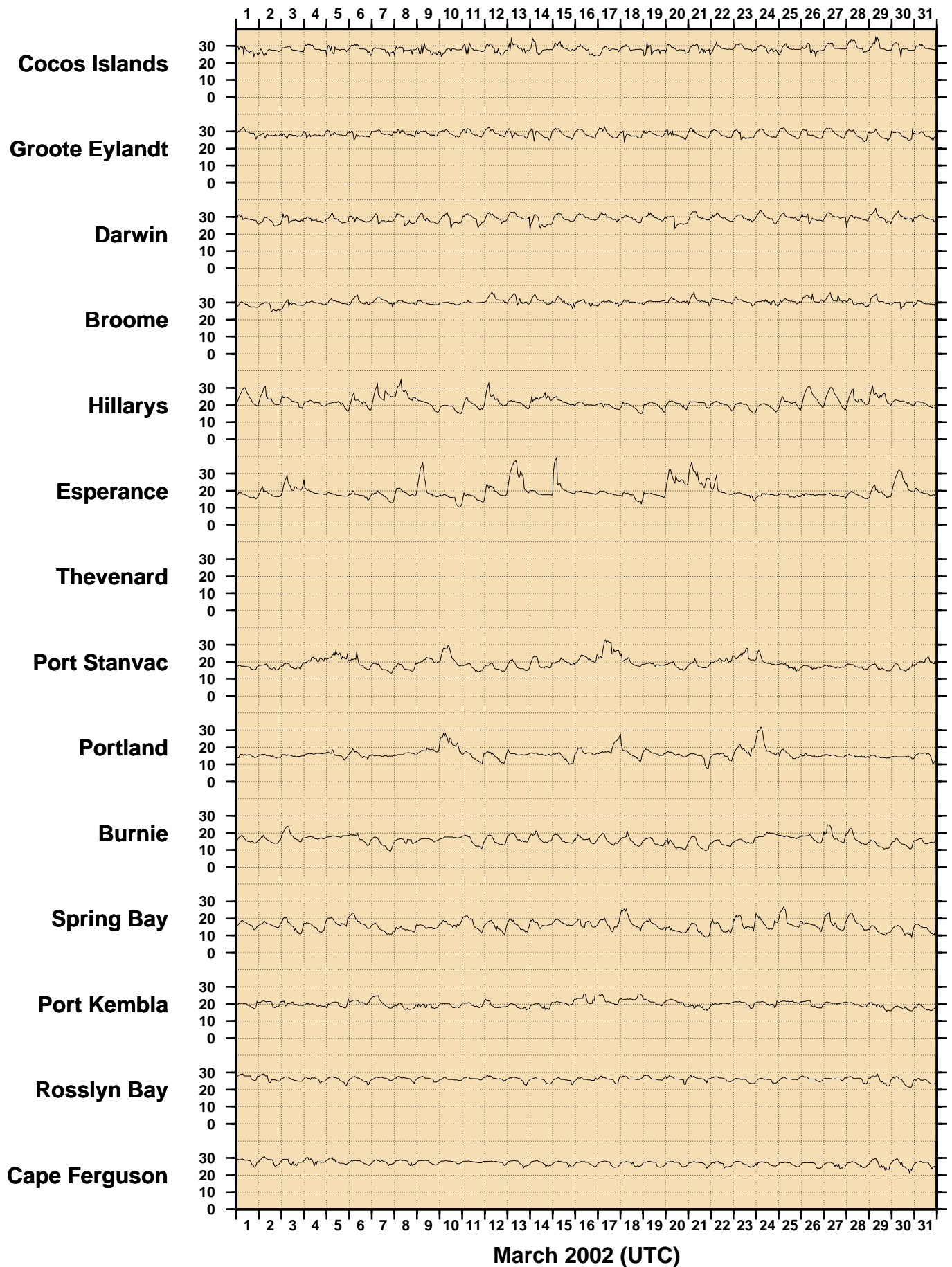


Figure 8

**MARCH 2002**  
**HOURLY WATER TEMPERATURES (°C)**

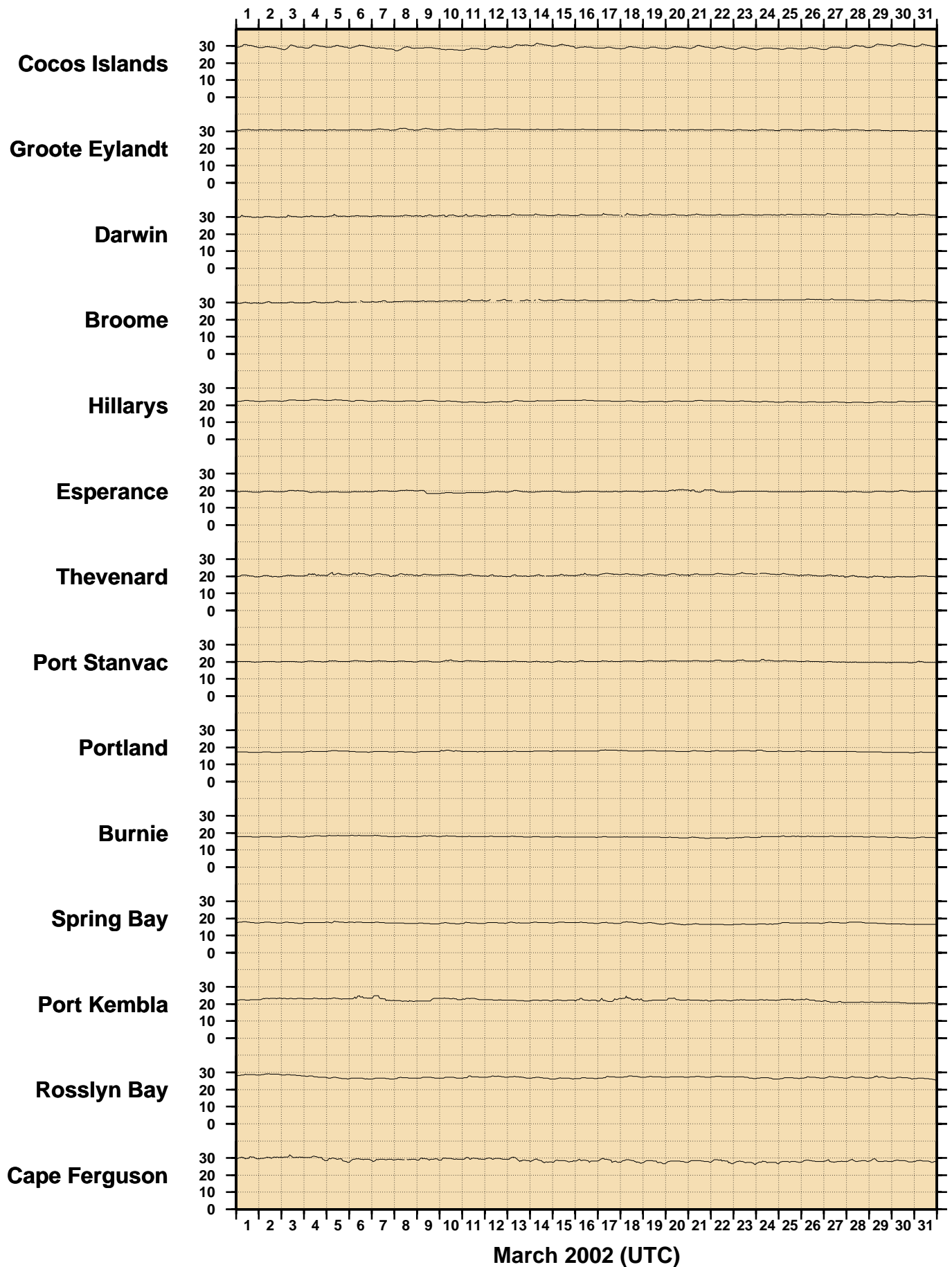
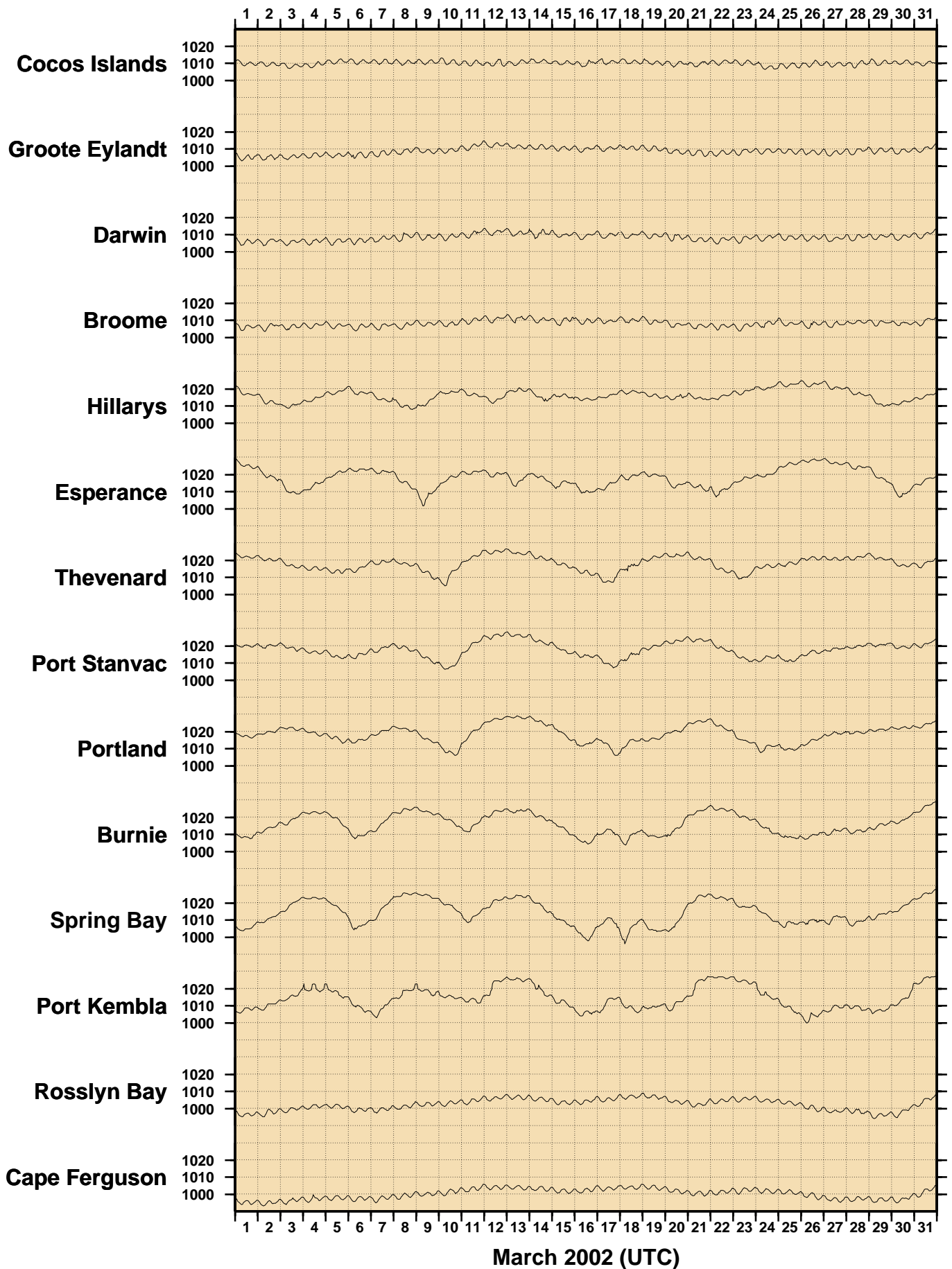
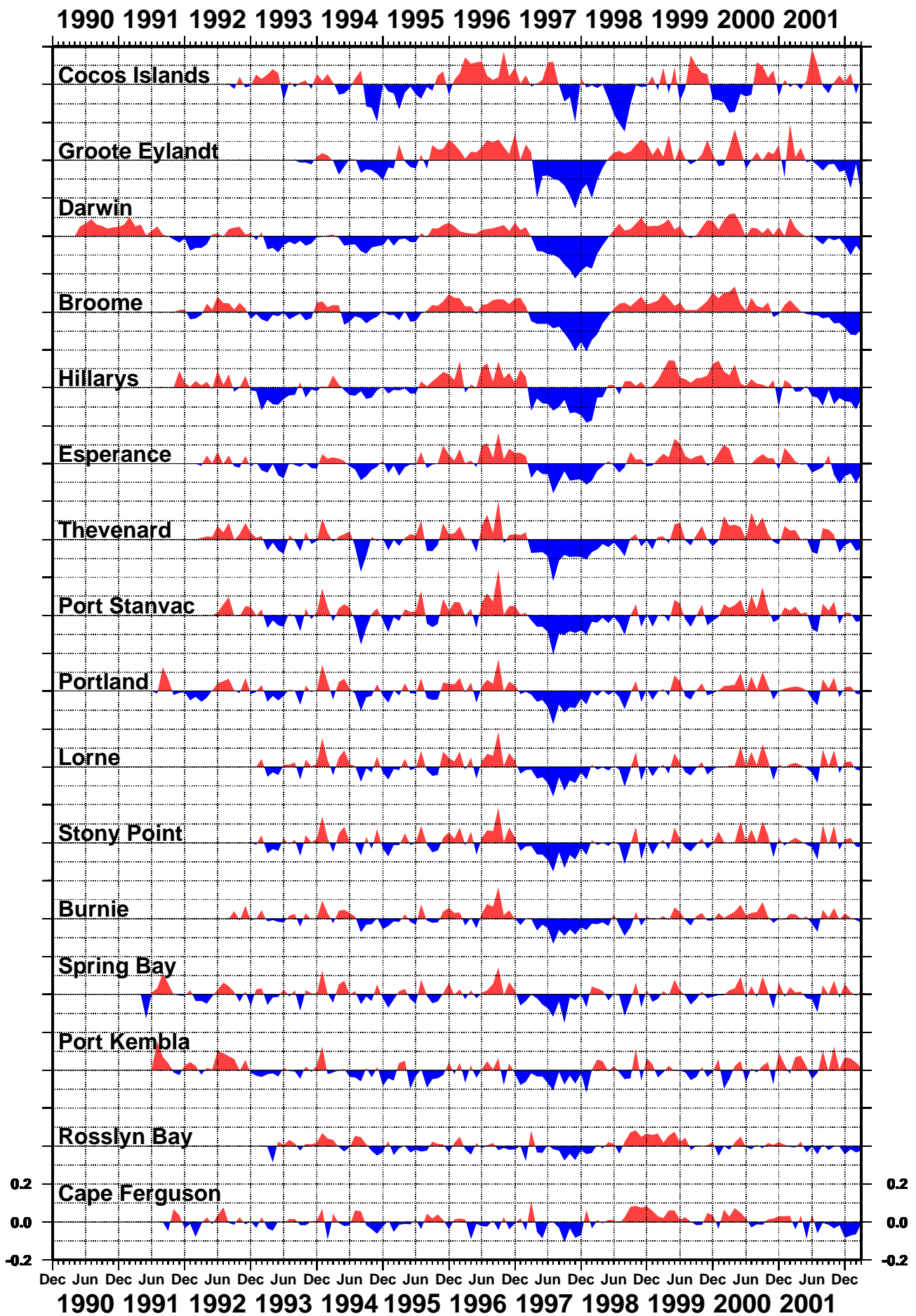


Figure 9

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



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





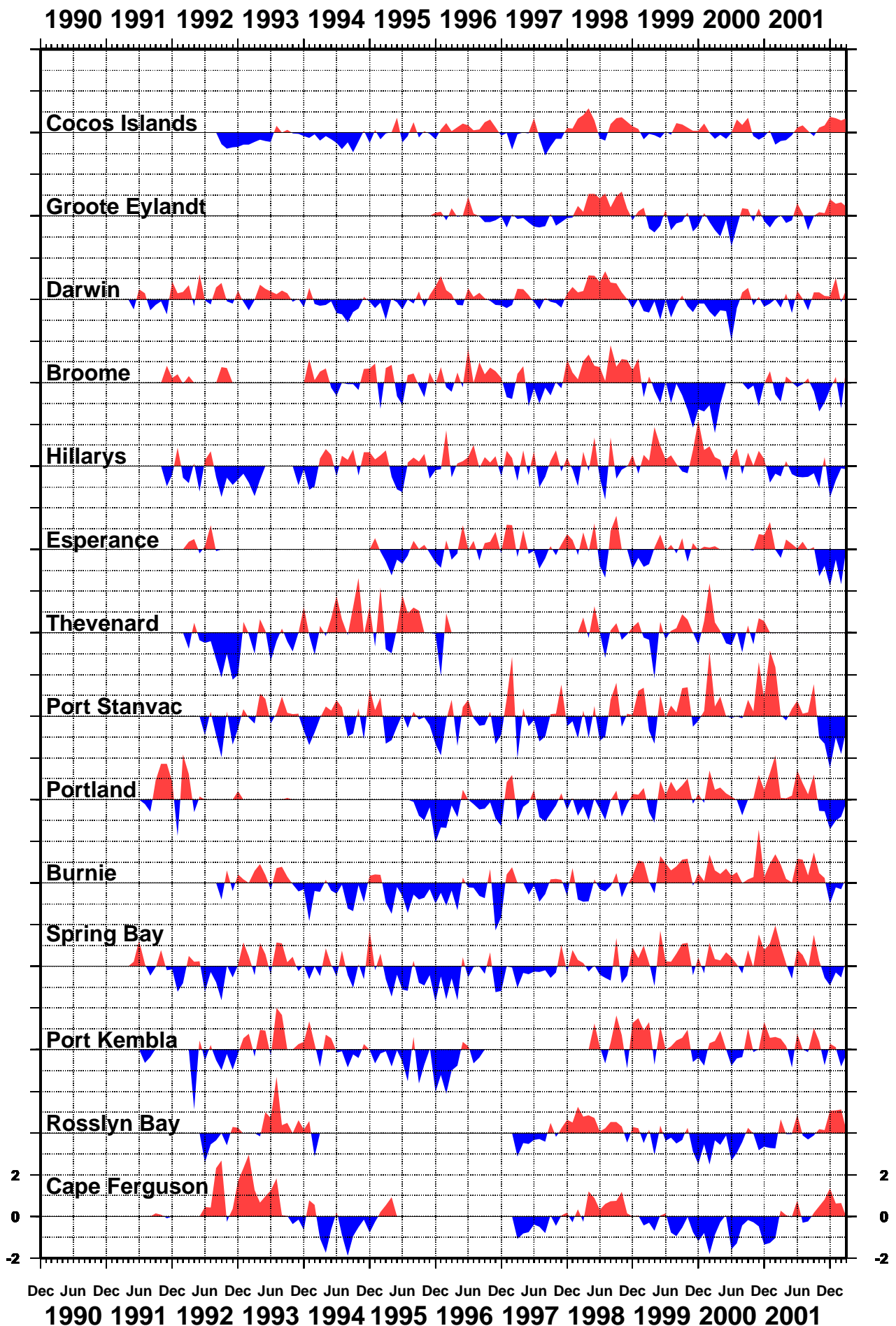
## BAROMETRIC PRESSURE ANOMALIES THROUGH MARCH 2002 (hPa)



## WATER TEMPERATURE ANOMALIES THROUGH MARCH 2002 (°C)



**Figure 13**  
**AIR TEMPERATURE ANOMALIES**  
**THROUGH MARCH 2002 (°C)**



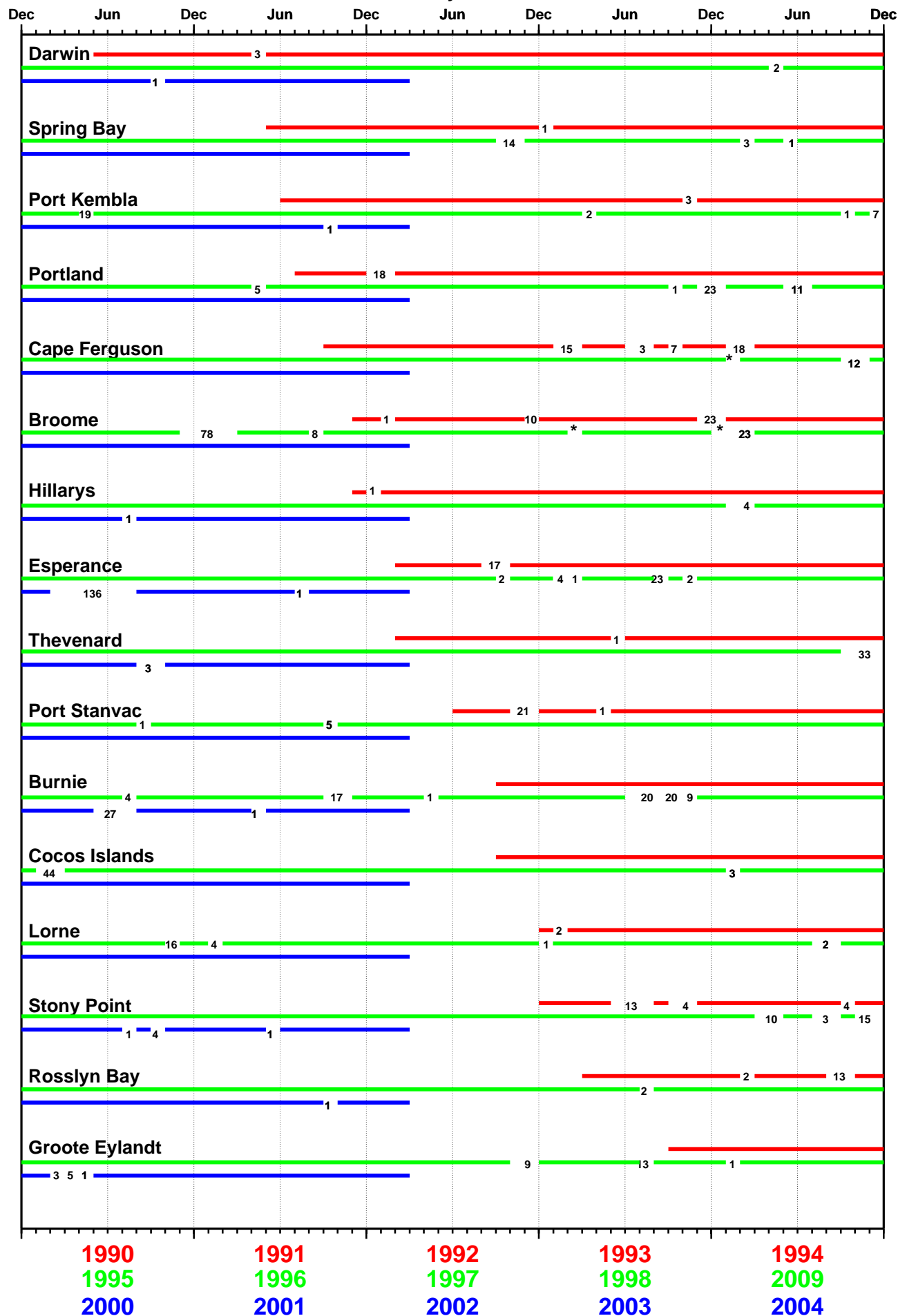
## SEA LEVEL TRENDS THROUGH MARCH 2002 (mm/year)



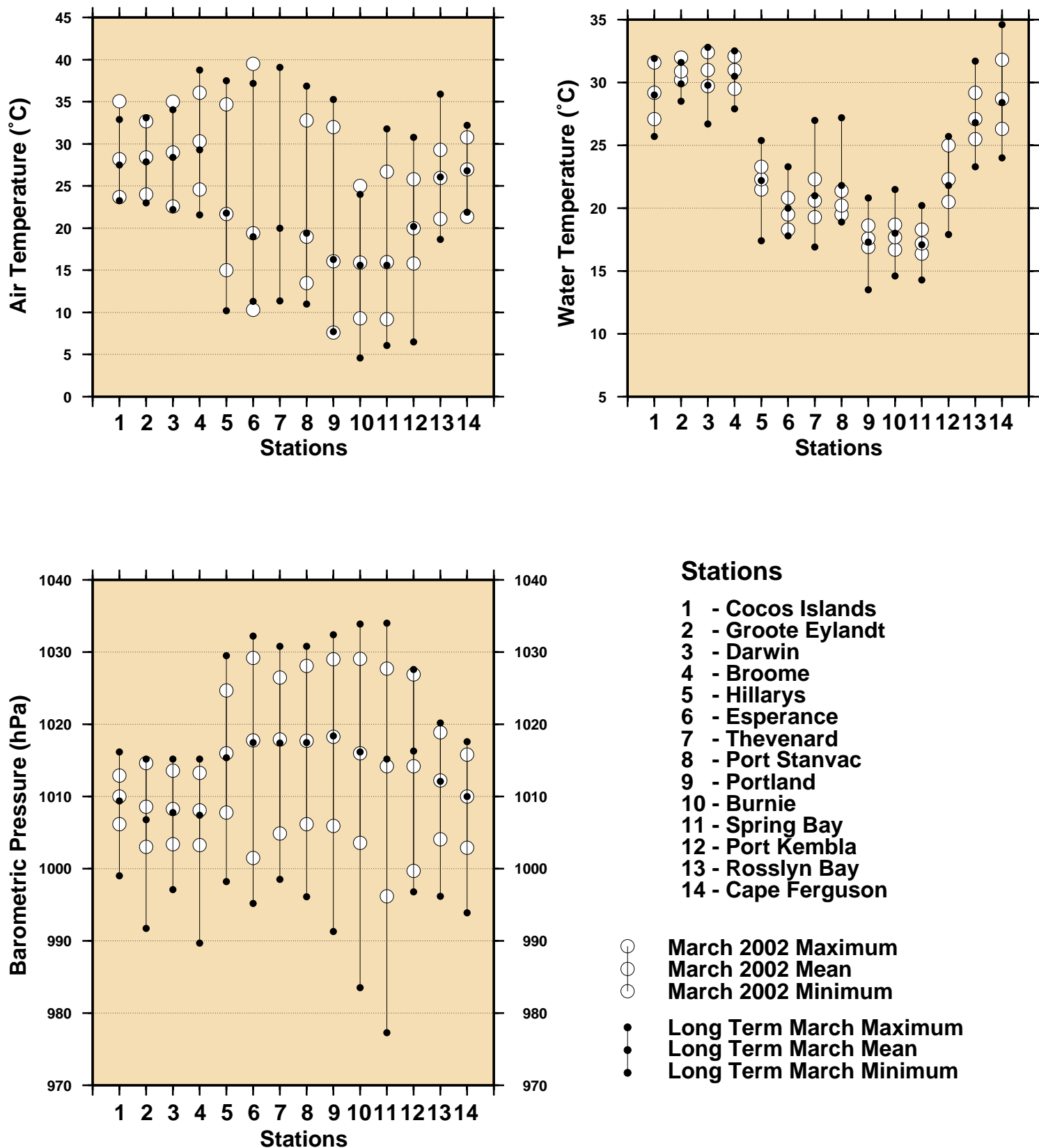
# Figure 15 SEA LEVEL DATA RETURN

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

\* Patchy record



**Figure 16**  
**Comparison of March 2002 Max, Min & Mean with**  
**Long Term March Values.**



# Figure 17

## MONTHLY MEAN SEA LEVELS TO MARCH 2002 (m)

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

