4.2 Montevideo – Ascension

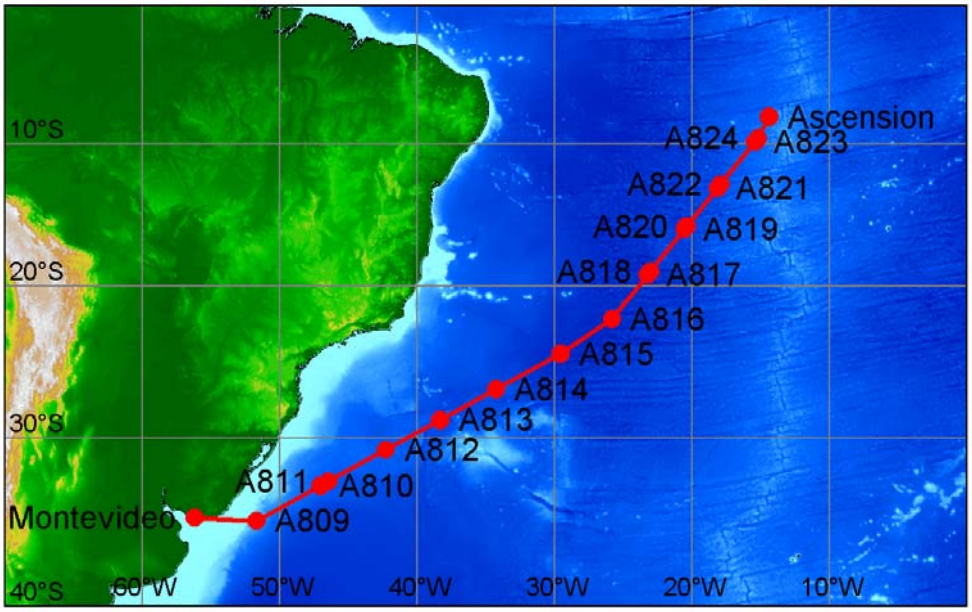

Figure 8. Leg II Montevideo to Ascension

The subtropical gyre of the South Atlantic (SATL) is one of the least well-researched regions of the oceans. The SATL province comprises the anticyclonic circulation of the South Atlantic. The province, as defined by Longhurst 1998, is bounded to the east by the Bengula Current, to the west by the Brazil Current, to the north by the southern limb of the westward flowing South Equatorial Current, and to the south by the Subtropical Convergence Zone.

4.2.1 Cruise Track

The JCR sailed from Montevideo on 2 May 1999 (Sday 122), on course for Ascension Island. A deviation to the direct route was required to avoided sampling Brazilian territorial waters (circa 20°S, 30°W). The ship arrived off Ascension on the evening of the 13 May (Sday 122). Figure 8 shows the cruise track and the location of station for leg II.

4.2.2 Current Systems

The southwestwardly flowing Brazil current is relatively shallow and closely confined to the S. American continental shelf. South of approximately 30°S, the current intensifies, this appears to be linked to a distinct anticyclonic re-circulation cell south of the Rio-Grande rise (30°S, 37°W), Stramma and Peterson 1989.

The Bengula current begins to separate from the African coast near 30°S with most of its flow turning northwest. At 28°S, Stramma and Peterson 1989, describe the current flowing mainly westward across the Atlantic. The current crosses the Atlantic to the south of Ascension Island, between 15°S and 25°S, the southern component of the current becomes entrapped within the subtropical gyre, and the northern band forms a southerly component of the South Equatorial Current.

4.2.3 AVHRR Imagery

An AVHRR image of the South Atlantic is shown in figure 9, with the cruise track overlaid.

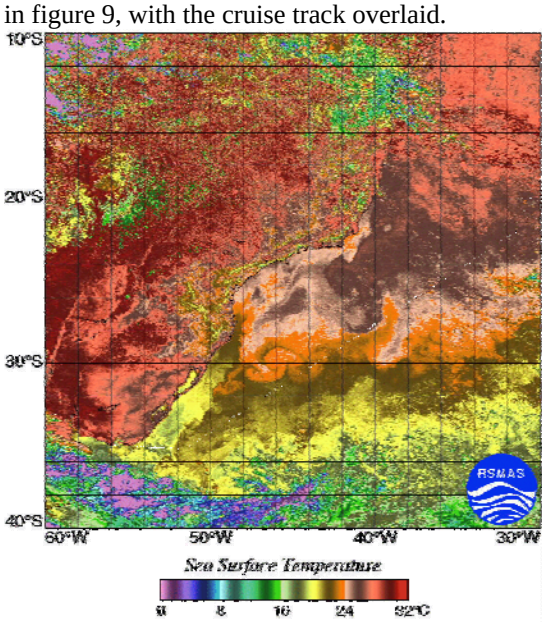

Figure 9. AVHRR image of the Brazil Current from days 122 and 123.

Warm tropical waters are evident to the north west of the image (reddish-brown), at a temperature of 25°C (and above). South of 32°S

are the cooler waters of the South Atlantic Current (SAC) (20°C yellow band) lying on an east-west axis. The Sub Tropical front (STF) is a band of up to 350 km width, between the tropical waters and the SAC.

The Brazil Current (BC) is seen transporting warm waters (22°C) southward, parallel to the South American coast, to the mouth of the River Plate. The Brazil Current front is formed at the boundary of the BC and SAC below 30°S and is the western extension of the STF

The image contains cloud contamination evident as purple patches off the River Plate

4.2.4 In-situ surface Measurements

The near-surface (7m) measurements of temperature (T), salinity (S) and raw fluorescence (F) voltage between Stanley and Montevideo are shown in Figure 10. The data shows the track leaving the River Plate, crossing the core of the southward flowing BC, denoted by a slight rise in temperature and an increase in salinity after station A809. Station A813 is performed within a jet from the STF. The front is crossed at approximately 28°S. To the north of the front there are a series of 'step' like increase in both T and S due to mixing of the frontal zone. At approx. 20°S there is salinity maximum for the Southern Hemisphere (37.25). Within the tropics precipitation exceeds evaporation and leads to a decrease in surface salinity. Whilst temperature remains relatively stable, S decreases towards the equator.

The surface F values are at the lower limit of the Turner Fluorometer detection capabilities. Chl*a* recorded by HPLC at station A815 was 0.025 mg m^{-3}.

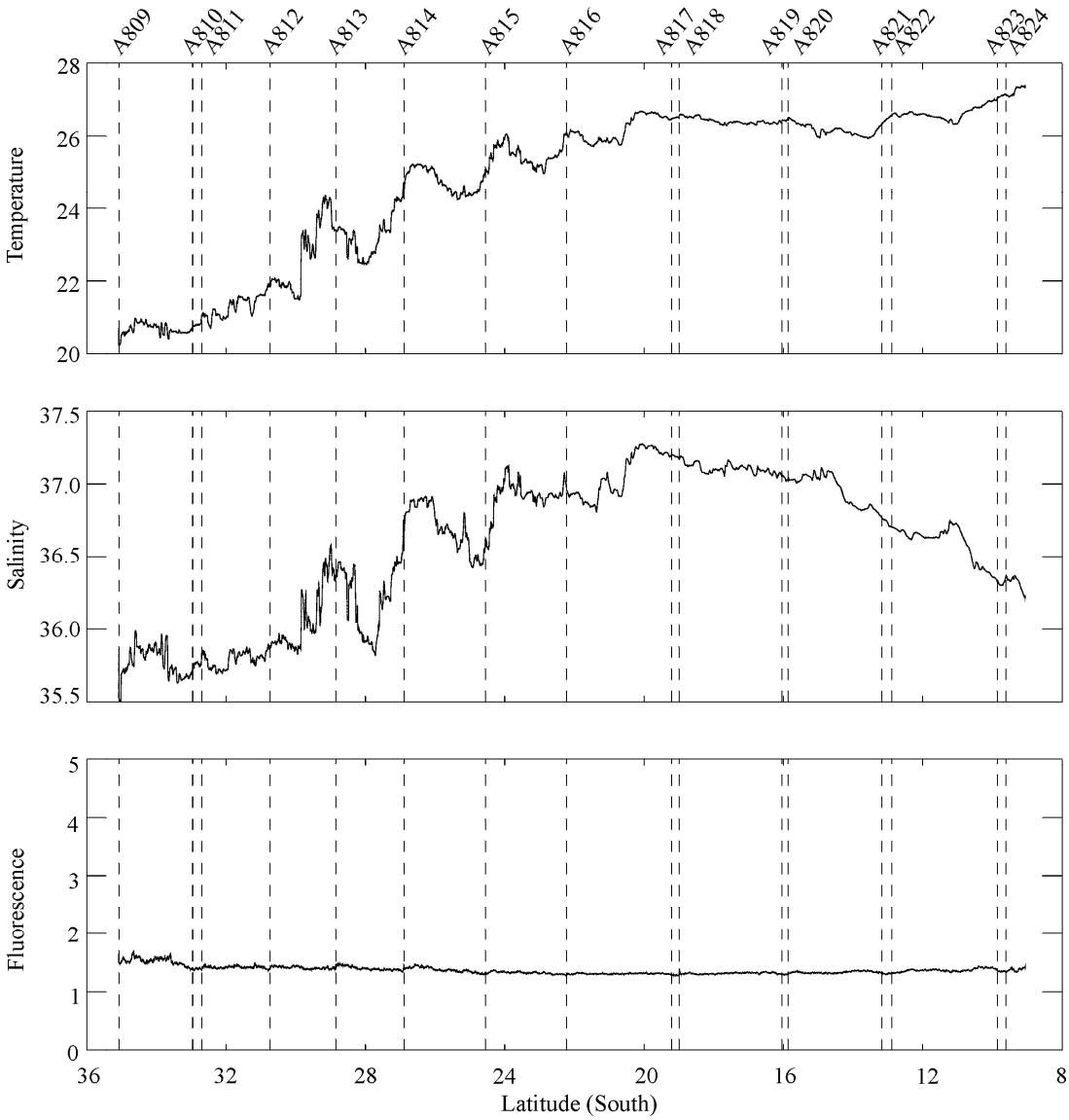

Figure 10. Surface temperature, salinity and fluorescence for leg II plotted against latitude, with the location of the stations overlaid

4.2.5 In-situ CTD sections

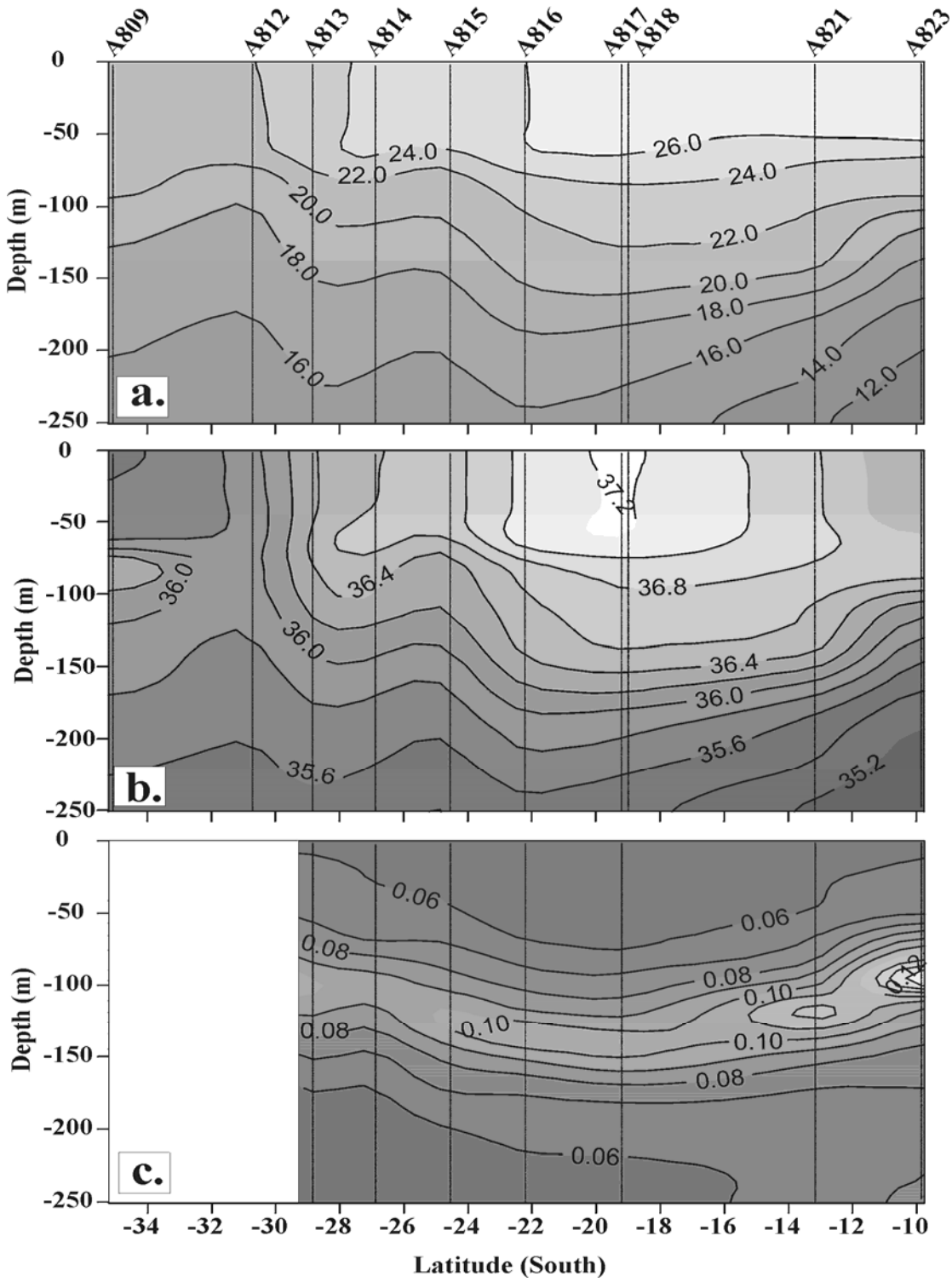

Figure 11. CTD sections for temperature (a), salinity (b), (uncalibrated) fluorescence (c) for leg II, plotted against latitude, with the location of the stations overlaid.

The surface waters at A809 are under the influence of discharge from the River Plate waters (low S) to 80 m. (Station A809 was performed without the benefit of a fluorometer). Stations A812, A813 and A814 straddle the BCF/STF, with the surface 50m shows a south to north increase in the T and S fields. North of the front the T, S fields stabilise, and a mixed layer develops between 100 and 130m. Surface S reaches a maximum at stations A817, A818.

The deep Chlorophyll maximum lies beneath the mixed layer through out the region. HPLC analysis at station A817 recorded chlorophyll *a* concentration of 0.14 mgm^{-3} at a depth of 140 m.