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Cruise Project Write Up

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Ocean Circulation in Santa Cruz Basin

Initial Observations

Figure 1 illustrates the initial observations of temperature and salinity for all measurements taken in Santa Cruz Basin. The plot showed two distinct watermasses within the basin. Between roughly 11-16 degrees Celcius, one watermass demonstrated salinities centered on 33.6. The other watermass centered around 33.9. In addition, a split in the graph occurred between 4-6 degrees Celcius. While the salinities continue to change at a similar rate, one watermass is slightly warmer and saltier than the other.

Figure 2 is a plot of the observations of salinity and density. This plot was consistent with the observations of temperature and salinity. Once again, two distinct watermasses appear centered around salinities of 33.6 and 33.9. The other split in the graph at higher salinities also occurs on this graph, however the observations are tighter than on the temperature and salinity plot.

Figure 3 shows the relationship between density and pressure within the basin. This plot shows rapid density changes within the first 200db. After that, the density begins to change less rapidly, and eventually reaches a maximum value around 27.4 kg/m^3.

Figures 4 and 5 illustrate density and salinity values on a 50dB pressure field. This showed that the western basin was more dense and saltier than the eastern basin. Figures 6 and 7 illustrate these characteristics on a 600dB pressure field. The findings are the opposite at this depth. The eastern basin is more dense and saltier than the western basin.

Circulation and Watermass Analysis

Based on the density observations, correlated with CTD station locations, several conclusions were reached regarding circulation within Santa Cruz Basin. The analysis showed an onshore advection of the water in the southern portion of the basin derived from the isopicnals. In the northern portion of the basin, offshore advection was observed.

The observed watermasses at depth were concluded to be two differing types of bottom waters. The upper slope of this break in the graph came from the eastern basin. The lower slope represented the western basin. The rise in the topography in the center of the basin was most likely responsible for the separation of these bottom waters.

The opposite profiles on the 50dB and 600dB pressure fields are consistent with predicted outcomes. The western basin is an upwelling region, thus explaining the dense and salty water at 50dB. The eastern basin's Southern California Bight waters are less dense and fresher at that pressure. At 600dB, the opposite is true because the eastern basin contains Equatorial water, which makes it saltier and more dense than the eastern basin. The ridge in the center of the basin keeps the Equatorial water to the east at that pressure.