Mediterranean water is more dense, in spite of its relatively high temperature (~13° C), than water found in any of the major ocean basins. As this warm, highly saline water flows out across the Straits of Gibraltar, it begins to sink; but as it sinks, it mixes with the colder, less saline, and lighter water of the Eastern North Atlantic. This mixture finds its equilibrium depth at about 1000 m, and the core of high-salinity water begins to spread across the North Atlantic (Figure 8.1).

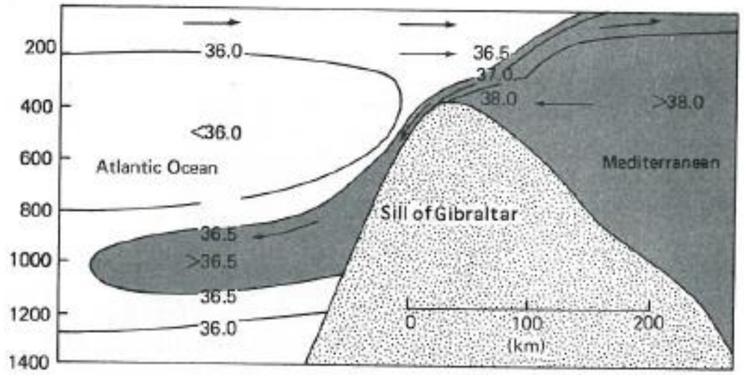

Figure 8.1 Dense, highly saline water of the Mediterranean flows into the North Atlantic over the sill of the Straits of Gibraltar. As it sinks, it mixes with the surrounding lighter water and reaches a density equilibrium at about 1000 m.

To know more about the spreading (e.g., if the sinking water tends to curve north or south as it leaves the Mediterranean), one must compare a number of vertical profiles radiating from the Straits of Gibraltar at different angles, or a single horizontal cross section drawn along the density surface along which the water appears to be spreading most rapidly. The high-salinity water of the Mediterranean is so clearly represented in the North Atlantic that it can be easily traced in a variety of ways (Figure 8.2). However, one must be cautious in inferring water motion even from plots as seemingly obvious as Figure 8.2. In the absence of other information, one could argue equally well for the hypothesis that the high-salinity Mediterranean core is a stagnant pool flanked on either side by eastward-flowing fresher water.

A more subtle analysis concerns the flow of the cold, dense water that flows into the North and South Atlantic. Most of that from the Norwegian Sea comes through the various passages in the Denmark Strait and across the ridges running from Iceland to Scotland. The origin of the Antarctic Bottom Water flowing into the South Atlantic is the Weddell Sea. Figure 8.3 is a plot of salinity on a surface of constant potential temperature ($\theta = 1.3°$). The flow from the Norwegian Sea is evident, as is the Antarctic Bottom Water, whose origin is in the Weddell Sea and which moves up the western basin of the South Atlantic.

As shown in Figure 8.3, the Norwegian overflow water and that from Antarctica appear almost as obvious as the Mediterranean overflow of Figure 8.2. However, the salinity anomaly range involved in the latter analysis is only 0.02 psu, whereas for the Mediter-

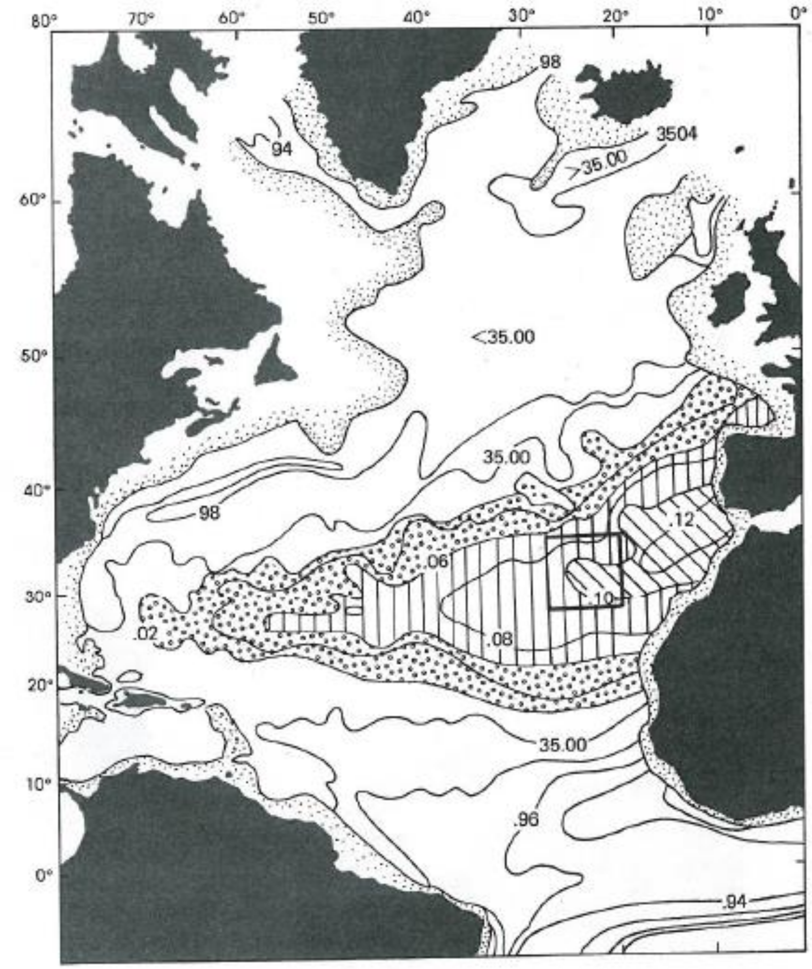

Figure 8.2 Spreading of high-salinity Mediterranean water can be traced across the entire North Atlantic. This figure is a plot of salinity on the $\theta = 4°$ surface. The area of the detailed salinity struc ture of Figure 8.4 is outlined. (After Worthington and Wright, *North Atlantic Atlas*, Woods Hole Oceanographic Institution Atlas Series, Vol.II, 1970.)

ranean the range is 0.1 psu. When trying to infer flow patterns from anomalous values o temperature, salinity, or some other conservative or semiconservative property, such a dissolved oxygen, silicon, and the like, one must be very careful. A single two-dimen sional plot can be misleading, and if the method of presentation is poorly chosen, errone ous conclusions are possible. The Mediterranean outflow signal is large, but, as notec more than one interpretation is possible, even in this example.