one in Georgia (Savannah R.) the remaining data points are confined within a relatively narrow domain bounded by a range of 0.9 to 3.9 mm/yr for sea level rise and 2.5 to 6.1 mm/yr for marsh accretion. The corresponding mean values are 2.3 mm/yr and 4.3 mm/yr, respectively. Thus overall marshes seem to have accreted at almost twice the rate of sea level rise.

The apparent discrepancy between sea level rise rate and accretion rate is most likely to be due to the effect of compaction. The rate of accretion can be thought of as the initial rate of sediment deposition, which depends on the ambient suspended sediment concentration and the sediment settling velocity. In the absence of compaction, and noting that usually in the long run marsh level can at most keep pace with sea level but not rise faster, the maximum marsh accretion rate must equal sea level rise rate. This is indicated by the 45° dashed line (no compaction) in Fig. 10.5. In general, however, compaction cannot be ignored. Laboratory tests on the deposition of relatively thin fine-grained sediment beds (Dixit, 1982) show that the density of the initial deposit (dry sediment mass per unit volume) tends to increase from about 0.05 - 0.1 g/cm^3 to between 0.2 - 0.3 g/cm^3 after a few days of relatively rapid consolidation. Beyond this period, further increase in density is very slow. Although there would be a significant difference between these test results and marsh compaction in the field, it is worthwhile to examine the implications of compaction based on the laboratory evidence, qualitatively. Thus, if we assume a two-fold increase in density, the line shown in Fig. 10.5 (compaction) will result. Several data points tend to corroborate the observed linear trend. It can thus be surmised that compaction effects are significant in marshes.

Tidal freshwater marshes are located in the upper reaches of estuaries and other areas where ambient salinities are less than about 5 ppt. The effects of rising sea levels will be saltwater intrusion and the eventual dominance of higher salt-tolerant plants. However, the effects of canalization on tidal freshwater marshes in the Mississippi delta demonstrate that dramatic increases in salinity over a comparatively short period exceed the capability of these marshes to adjust so that rapid losses ensue (National Research Council, 1987b).

The complexity of marsh response to water level and associated factors has meant that predictive modeling effort has been limited. Most modeling