

finer portions offshore. In some cases the beach profile includes the presence of a "step" feature at the base of the beach face. The coarsest material in the beach profile tends to collect at the base of the step which is a high energy environment due to the energy dissipation associated with the backwash. In cases where shell is present, the base of the step may be composed almost entirely of shell hash. Bars tend to contain the finer fraction of material available with the coarser fraction remaining as a lag product on the beaches. Winter bars form offshore of many California beaches leaving a cobble beach surface. During the milder summer months, the bars migrate ashore and a sand beach is formed again.

Effect of Water Level Changes

Many storms are accompanied by increases in mean water level due to storm surge and/or wave set-up. Additionally, some historically damaging storms have coincided with extreme astronomical tides. The effect of an increased water level is to cause the beach profile to be out of equilibrium and to increase the erosional potential of the storm waves. The increased water level affects the beach, on a short-term basis, in the same manner as sea level rise does on a long-term basis.

IV. EQUILIBRIUM BEACH PROFILES AND APPLICATIONS

A number of theories have been advanced attempting to describe the properties of and mechanisms associated with equilibrium beach profiles.

In the early phases of this study, a data set was located which consisted of more than 500 beach profiles ranging from the eastern tip of Long Island to the Texas-Mexico border, see Figure 1. Three fairly simple possible mechanisms were investigated relating the depth, h , to the distance offshore, x . Each of these three models predicted a profile of the following form

$$h(x) = Ax^m \quad (7)$$

in which A and m are scale and shape parameters, respectively. Figure 2 presents normalized beach profiles for various m values. It is seen that for $m < 1$, the profile is concave upward as commonly found in nature. Figure 3 demonstrates the effect of the scale parameter, A .