Station	h, m	z_o , m	BWD, kg/m^3	$\underline{z}$, m	BWD, kg/m^3
b37	0.9	0.03	1590	0.29	1210
b38	1.1	0.03	1540	0.39	1420
b39	1.1	0.03	1530	0.24	1330
b40	1.2	0.03	1540	0.39	1260
b41	1.0	0.03	1550	0.28	1310
b42	1.1	0.03	1510	0.36	1270

Erosion Experiments

Laboratory erosion experiments were conducted on sediments to support numerical model predictions of short-term dredged-sediment dispersion. Sediments were undisturbed box-core samples and composites from Laguna Madre. Test sediments were generally cohesive and had substantial clay-, silt-, and sand-size fractions. Before erosion testing, channel sediments were slurried to simulate the effects of hydraulic dredging and disposal operations during which sediments would be sheared and mixed with water. Slurried sediments were mixed with site water to form 4-cm-thick layers, allowed to settle up to 27 days, and erosion tested without further disturbance. Test matrices of 3 to 4 initial slurry densities and 4 to 5 standing or resting times were performed on each channel sediment. Estimates of average layer densities at test times were based on layer thicknesses. Surface erodibility decreased most rapidly during the first days after slurrying and never reached the erosion resistance of the original channel sediments. A surprising result was that erodibility was more poorly correlated to average test density than to standing time. Some sediment samples were erosion tested at 10 °C and/or settled at 6 °C to gage the effect of temperature on these processes. Linear and nonlinear erosion models, with and without erosion thresholds, were fit to the data, and information was used in a multiple-grain class numerical sediment model.

Background

Cohesive dredged sediments disposed in open water settle and increase in density with time. Since hydraulic shear strength has been found to be a strong function of density (Owen 1970; Thorn and Parsons 1980; Nicholson and O'Connor 1986; Teeter 1987), erodibility can be expected to change with time as well. Cohesive sediment density is often used to characterize a given sediment's erodibility. The erosion rate E at a given shear stress or the threshold shear stress for erosion τ_{ce} are indicators of erodibility. For example, expressions are used in models in the form: $E \propto \rho^{n1}$ or $\tau_{ce} \propto \rho^{n2}$ in which $n1$ and $n2$ are empirical exponents and ρ is some deposit density parameter such as volume concentration, porosity, dry-solids content, etc.