WHAT CONTROLS BED ERODIBILITY IN MUDDY, PARTIALLY-MIXED ESTUARIES? INSIGHTS FROM THE YORK RIVER, VIRGINIA.

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Appropriate parameterization of time-dependent erodibility of muddy seabeds is a significant barrier to improved understanding and accurate modeling of sediment dynamics in estuaries and other coastal regions. In an effort to better understand controls on muddy seabed erodibility, bed erodibility and associated bed sediment properties have been measured by our group on cores collected on dozens of cruises over the last decade in the York Estuary. We have also inferred time-varying erodibility indirectly in the York Estuary over several years by vertically integrating observations of tidally-varying suspended sediment concentration. This presentation synthesizes the results of these long-term observations in this partially-mixed estuary, whose seabed is similar to that of many other moderately energetic, muddy estuaries. Key instrumentation/techniques applied in these studies have included Gust erodibility microcosms, digital x-radiography, measurement of Be-7 activity, acoustic Doppler velocimeters, a “worm camera”, and analysis of cores for water content, organic content, disaggregated grain size, and the size and concentration of resilient muddy pellets. Our main conclusions are (1) large increases/decreases in erodibility are due to major deposition/erosion of muddy flocs, (2) gradual decreases in erodibility are due to armoring by muddy pellets and consolidation, and (3) short-term increases in erodibility follow short-term resuspension (e.g., by tides or storms).