INFLUENCE OF SUSPENDED PARTICLE PROPERTIES ON OPTICAL PROPERTIES AND RESULTANT WATER CLARITY ALONG A PARTIALLY-MIXED ESTUARY, YORK RIVER, VIRGINIA, USA.

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The Chesapeake Bay and its associated tidal tributaries are among the many coastal systems where degraded water clarity is a major concern. Despite long-term decreases in sediment input, water clarity has continued to deteriorate, especially in the southern Bay. Here it is proposed that the disconnect between water clarity and sediment input is related to the dynamic nature of locally suspended estuarine particles, as well as the interaction between suspended organic particles and inorganic solids. Typical estuarine particles are not single solid particles, but clusters of inorganic and organic particles and water (i.e., flocs). Floc properties (such as size, composition, density and settling rate) are challenging to observe in-situ, so their influence on the optical properties of the system are not well-defined. By measuring important floc properties, the influence of organic particles and local hydrodynamics on those properties was investigated, and the influence of suspended flocs on light propagation was evaluated. This presentation focuses on observations collected along the York River estuary, a major tidal tributary in the lower Chesapeake Bay. Observations of estuarine particle properties and physical parameters were collected utilizing a combination of optical and acoustic instrumentation with transmissometers and irradiance meters. Light attenuation was more strongly correlated to total particle area than total mass concentration. Near the mouth, at low mass concentrations, smaller, compact, organic particles were observed. Particles became larger, less organic, and less dense up-estuary as mass concentrations increased. Results indicate the importance of organic material on suspended estuarine particle properties and resultant water clarity.

Key words: flocculation, estuarine optics