Particle dynamics in marine environments: processes, patterns, and applications

Dr. Brent A. Law
Department of Fisheries and Oceans, Bedford Institute of Oceanography, NS, Canada

Floc size and abundance in the ocean are controlled by five basic mechanisms: advection, resuspension, aggregation, disaggregation, and deposition. Changes in floc size or abundance due to advection are recognizable when these parameters are decoupled from bottom stress. Resuspension is distinguishable by coupling between floc abundance and seabed stress. Aggregation occurs when turbulence is low to moderate and particle concentration is large. This co-occurrence occurs most often in a tidally dominated system during slack water, allowing flocs to grow. Disaggregation is the process of floc destruction and occurs under energetic conditions. Its signature is an inverse correlation between floc size and turbulence. Deposition occurs when stress is low enough for flocs to settle from the water column. It is associated with decreases in concentration and overall particle size. This talk will examine water column and seabed particle dynamics to look at these five basic mechanisms. Water column and seabed particle dynamics will be investigated using data from Floc Cameras, a Sequoia Scientific LISST 100X, Size versus Settling Velocity Cameras, current meters, and a process based inverse model that directly uses the seabed grain size. The goal of the talk is to describe the particle dynamics knowledge in a range of applications, including finfish aquaculture in coastal and offshore waters, the interaction of sediment with spilled oil, and studies of meso- and macro-tidal flats.