Aggregates are delicate aquatic particles comprised of primary particles held together by polymers. A large fraction of an aggregate (>90% by volume) is often water and hence its physical (e.g. settling speed) and optical properties could be significantly different from the constituent particle comprising it. When mechanically disturbed (e.g. due to pumping through an instrument, sampling through the spigot of a Niskin bottle, or in the wake of a rosette) fragile aggregates may break.

It is expected that aggregates differ in optical properties from the particles that comprise them and from a solid particle of the same size for two primary reasons: First, the packing of particles within aggregates is often dense enough that coherent interactions between scattered waves emanating from individual particles within the aggregate will cause a different scattering pattern than the simple superposition of scattering by the individual particles in suspension. Second, aggregate porosity is observed to grow with increasing aggregate size, so the cross-sectional areas of aggregates can be significantly larger than that derived by assuming that the solid mass is packed into a sphere of the same density as the component particles.

Indeed aggregates have been found to contribute significantly to backscattering with little change in backscattering/mass as they formed in lab or field (Hou et al. 1997, Hatcher et al. 2001, Folly et al. 2004). In a recent study (Boss et al. 2009c) we find aggregation to help explain the relative constancy of scattering/mass or attenuation/mass found in coastal areas. These observation are inconsistent with traditional modeling of marine particles (e.g. using Mie theory), which assumes particles are solid, that predicts a decrease in scattering efficiency per mass with size.

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