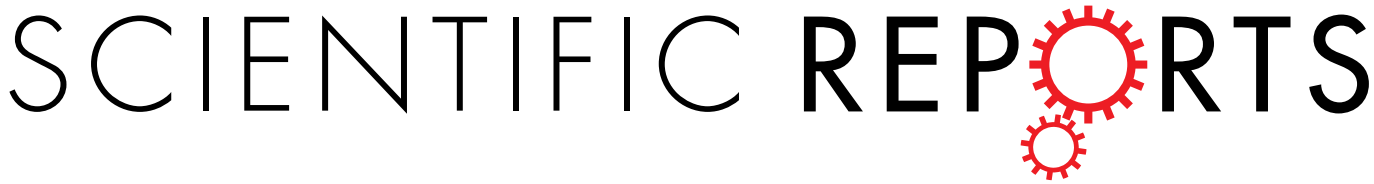

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Connecting marine productivity to sea-spray *via* nanoscale biological processes: Phytoplankton Dance or Death Disco?

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Bursting bubbles at the ocean-surface produce airborne salt-water spray-droplets, in turn, forming climate-cooling marine haze and cloud layers. The reflectance and ultimate cooling effect of these layers is determined by the spray's water-uptake properties that are modified through entrainment of ocean-surface organic matter (*OM*) into the airborne droplets. We present new results illustrating a clear dependence of *OM* mass-fraction enrichment in sea spray (OM_{ss}) on both phytoplankton-biomass, determined from Chlorophyll-a (*Chl-a*) and Net Primary Productivity (*NPP*). The correlation coefficient for OM_{ss} as a function of *Chl-a* increased form 0.67 on a daily timescale to 0.85 on a monthly timescale. An even stronger correlation was found as a function of *NPP*, increasing to 0.93 on a monthly timescale. We suggest the observed dependence is through the demise of the bloom, driven by nanoscale biological processes (such as viral infections), releasing large quantities of transferable *OM* comprising cell debris, exudates and other colloidal materials. This *OM*, through aggregation processes, leads to enrichment in sea-spray, thus demonstrating an important coupling between biologically-driven plankton bloom termination, marine productivity and sea-spray modification with potentially significant climate impacts.

The marine aerosol produces haze and cloud layers overlying an immense ocean covering >70% of the Earth's surface. Small changes even in low-albedo layers superimposing this relatively dark surface can have profound effects on the global radiation budget and climate change. Organic matter mass-fraction enrichment in sea spray aerosol (OM_{ss}, defined here as the percentage *OM* mass in sea spray relative to the total *OM plus* sea salt mass) influences the global albedo through altering the reflectance of marine haze[1] and cloud layers[2]. Recent results[3] assert that a relatively constant sea surface carbon pool controls

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