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Department of Marine Sciences Presents a Seminar By

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Beyond the light: The biological production and biogeochemical impacts of dark reactive oxygen species in the ocean

Reactive oxygen species (ROS) are short-lived oxygen radicals that have the capacity to degrade carbon, cycle numerous metals, and impact the health of biotic systems. ROS are, in fact, both beneficial and detrimental to life. For instance, at low concentrations, the ROS superoxide (O_2^-) and hydrogen peroxide (H_2O_2) mediate a number of essential physiological processes, including cell signaling, cell differentiation, defense, and nutrient acquisition. At high concentrations, however, these same ROS degrade essential biomolecules and initiate programmed cell death. ROS production in the ocean has historically been attributed to primarily photochemical reactions and more recently phytoplankton activity, and thus ROS formation has been considered fundamentally constrained by light. Here, we will discuss new findings revealing that biogenic ROS production rates below the photic zone (in the dark) within marine and freshwater systems are much higher than predicted, and are at times even higher than surface (*i.e.*, sunlit) production rates. Even within sunlit waters, 'dark' biogenic ROS production is a dominant contributor to total ROS fluxes. This production is attributed to the enzymatic activity of heterotrophic bacteria and phytoplankton that is decoupled from photosynthesis and may in fact be required for cell growth and proliferation. Further, biogenic ROS production has been linked to the redox cycling of trace metals, including manganese and iron. Thus, this dark biological production represents an unappreciated source of strong oxidants and reductants to the dark ocean, with far reaching implications for marine biogeochemistry.

Host: Julie Granger
Time & Date: 11:00 am, Friday, April 1, 2016
Place: Marine Sciences Building, Seminar Room 103

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