Phytoplankton Diversity in the Arabian Sea

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Due to climate change and a shift in monsoon weather patterns over India, the phytoplankton *Noctiluca scintillans* has been overtaking phytoplankton blooms in the Arabian Sea and producing massive low dissolved oxygen zones when it dies that can lead to wide spread fish kills. Identifying *N. scintillans* distributions and natural abundances during these blooms will provide a better indication of the environmental conditions that favor this species. This in turn may provide insight into its recent appearance in the Arabian Sea. One way to assess phytoplankton composition in the ocean is through pigment-based taxonomic differences. These pigment differences can be quantified using multi-excitation chlorophyll fluorescence (measured with the custom made ECO 3X1M sensor – 3 wavelength eXcitation, 1 wavelength eMission). The absence of factory calibrations to the utility requires (1) routine calibrations of each sensor with a standard culture; (2) calibration with multiple species of diverse pigmentation to define species-specific response; (3) a means to quantify a transfer function in order to calculate the species-specific fluorescence response between sensors. Fluorescence ratios among the three emitted wavelengths can then be compared and used to assess pigment ratios as a taxonomic tool. By isolating zones of uniform fluorescence ratios at three stations measured in the Arabian Sea, seven different phytoplankton populations of different pigmentation have been discovered. These populations will be evaluated for specific pigment analysis and the taxonomic composition identified.

Figures 1 and 2. To identify different species of phytoplankton, fluorescence measured from the 3X1M was plotted vs. depth at each wavelength. Areas of uniform fluorescence ratios, represented in figure 2, were indications of different species of phytoplankton within the depth sample.

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References: