Title: **Climate Variability and Phytoplankton in the Pacific Ocean**

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Abstract:

The effect of climate variability on phytoplankton communities was assessed for the tropical and sub-tropical Pacific Ocean between 1998 and 2005 using an established biogeochemical assimilation model. The phytoplankton communities exhibited wide range of responses to climate variability, from radical shifts in the Equatorial Pacific, to changes of only a couple of phytoplankton groups in the North Central Pacific, to no significant changes in the South Pacific. In the Equatorial Pacific, climate variability dominated the variability of phytoplankton. Here, nitrate, chlorophyll and all but one of the 4 phytoplankton types (diatoms, cyanobacteria and coccolithophores) were strongly correlated ($p<0.01$) with the Multivariate El Niño Southern Oscillation Index (MEI). In the North Central Pacific, MEI and chlorophyll were significantly ($p<0.01$) correlated along with two of the phytoplankton groups (chlorophytes and coccolithophores). Ocean biology in the South Pacific was not significantly correlated with MEI. During La Niña events, diatoms increased and expanded westward along the cold tongue (correlation with MEI, $r=-0.81$), while cyanobacteria concentrations decreased significantly ($r=0.78$). El Niño produced the reverse pattern, with cyanobacteria populations increasing while diatoms plummeted. The diverse response of phytoplankton in the different major basins of the Pacific suggests the different roles climate variability can play in ocean biology.