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## Wave induced turbulence effect on oceanic biogeochemistry and study of ocean color response to changing wave climate

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The role of surface ocean waves becomes substantial in the upper ocean layer mixing. Due to turbulence induced by the surface waves (both broken and unbroken waves), the upper ocean mixing is enhanced, and important upper ocean parameters are affected such as lowering of sea surface temperature (SST), deepening of mixed layer depth (MLD) and most interestingly, the changes in oceanic biogeochemistry. The main objective of this study is to analyze the effect of wave induced turbulence on oceanic biogeochemistry such as the supply and distribution of nutrients to tiny plants in the ocean called phytoplanktons, and how it affects their concentrations. Marine phytoplanktons formed the basis of marine ecosystem which accounts for about 45 percent of global net primary productivity and play an important part in global carbon cycle. The population of phytoplanktons depends mainly on nutrients (both micro and macro), availability of sunlight and grazing organisms. For this study, we use global coupled ocean-sea ice model ACCESS-OM2 with biogeochemical module called WOMBAT to estimate the effect of wave induced turbulence and study the difference between 'with waves' and 'without waves' effect on oceanic biogeochemistry. The same effect of wave induced turbulence on oceanic biogeochemistry are also studied by incorporating the change in wave climate such as increase in significant wave height and wind speed. From the investigation of merged satellite ocean color data from ESA's GlobColour project for the period of 23 years between 1997 and 2019, it was found that chlorophyll-a (Chl-a, an index of phytoplankton biomass) concentration showed increasing trend of 0.015 mg/m<sup>3</sup> globally and 0.062 mg/m<sup>3</sup> in the Southern Ocean (SO) for the study period with p-value less than 0.01. It was also found that most of the increasing trends are shown spatially in the open ocean and decreasing trend in the coastal regions during the study period.