

# Remote Sensing Analysis of Phytoplankton Blooms Following Volcanic Eruptions

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Surface-dwelling phytoplankton in Earth's oceans have access to abundant sunlight but are typically nutrient limited in their growth. Volcanic eruptions release nutrients such as iron, nitrate, and phosphate onto the ocean's surface, allowing for an increased growth rate of phytoplankton, and often a visible surface phytoplankton bloom. The size, duration, and composition of these blooms varies significantly for different eruptions, and we attempt to constrain this variation to strength of the eruption, and summit height of the volcano. We use the volcanic explosivity index (VEI) as a marker for eruption strength, and analyze four volcanic eruptions. We also examine the composition of the blooms, attempting to differentiate between phytoplankton, and suspended sediments/dissolved organic matter (CDOM). Our results show that the size and duration of a phytoplankton bloom are directly related to the VEI of the eruption they result from. We determine that suspended sediments and CDOM are not a major component in the blooms caused by eruptions of a VEI of 2 or less, as well as continuous volcanic eruptions. Our results also show that the two products used from the MODIS Aqua satellite can be effectively used to track and observe these phytoplankton blooms, and differentiate between chlorophyll, and suspended sediments and CDOM.