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## Modeling the effect of ultraviolet radiation on the photosynthetic potential of *Prochlorococcus* and *Synechococcus* cyanobacteria

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**ABSTRACT:** We used mathematical models of photosynthesis to quantify the effects of ultraviolet (UV) radiation on the photosynthetic potential of *Prochlorococcus* and *Synechococcus* marine cyanobacteria living at 0° and 40°N/S latitude. We show that UV is an environmental stressor for these organisms near the ocean surface, accounting for roughly two-thirds of the potential photosynthetic inhibition. *Prochlorococcus* showed a higher inhibition and integrated photosynthetic potential throughout the water column than *Synechococcus*, since the former is more vulnerable to UV damage at the surface and more successful at greater depths compared to the latter. The maximum photosynthetic activity was reached beneath the photoactive zone, largely due to the harmful effects of UVA. UV inhibition varies with latitude, due to variability in repair capacity for *Synechococcus*, and the existence of more diverse mechanisms of acclimation to irradiance and temperature for *Prochlorococcus*. The lowest photoinhibition is estimated to occur at 0° latitude, since the interactive effects of high temperature and irradiance have a positive effect on photoacclimation to UV damage.

**KEY WORDS:** Photosynthetic potential · Photosynthesis model · *Prochlorococcus* · *Synechococcus* · Ultraviolet radiation

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