

Changes in calcification of coccolithophores may affect their photosynthetic responses to both, ultraviolet radiation (UVR, 280–400 nm) and temperature. We operated semi-continuous cultures of *Emiliania huxleyi* (strain CS-369) at reduced (0.1 mM, LCa) and ambient (10 mM, HCa) Ca^{2+} concentrations and, after 148 generations, we exposed cells to six radiation treatments (>280, >295, >305, >320, >350 and >395 nm by using Schott filters) and two temperatures (20 and 25 °C) to examine photosynthesis and calcification responses. Overall, our study demonstrated that: (1) decreased calcification resulted in a down regulation of photoprotective mechanisms (i.e., as estimated via non-photochemical quenching, NPQ), pigments contents and photosynthetic carbon fixation; (2) calcification (*C*) and photosynthesis (*P*) (as well as their ratio) have different responses related to UVR with cells grown under the high Ca^{2+} concentration being more resistant to UVR than those grown under the low Ca^{2+} level; (3) elevated temperature increased photosynthesis and calcification of *E. huxleyi* grown at high Ca^{2+} concentrations whereas decreased both processes in low Ca^{2+} grown cells. Therefore, a decrease in calcification rates in *E. huxleyi* is expected to decrease photosynthesis rates, resulting in a negative feedback that further reduces calcification.