The combined effect of solar radiation (UV-B (280-315 nm), UV-A (315-400 nm) and PAR (400-700 nm)) and vertical mixing (i.e., fluctuating radiation regimes) on the marine dinoflagellates *Gymnodinium chlorophorum*, *Heterocapsa triquetra* and *Prorocentrum micans* was investigated during the austral spring in Patagonia, Argentina. Photosynthesis, measured as radiocarbon incorporation, and accumulation of DNA damage, as cyclobutane pyrimidine dimers (CPDs), were investigated under simulated mixed and non-mixed water column conditions using 3 h incubations centered at local noon. Static samples had significant UVR-induced photoinhibition that was higher in *H. triquetra* as compared to the other two species. Increasing mixing speed significantly increased UVR-induced inhibition of carbon fixation in *G. chlorophorum* and *H. triquetra*. No significant UVR effect was observed in *P. micans* under any of the mixing regimes. Most of the loss in carbon fixation in *G. chlorophorum* was due to UV-B while in *H. triquetra* it was due to UV-A. Part of these responses may be associated to the presence of UV-absorbing compounds which were abundant in *P. micans*, and low in *H. triquetra* and in *G. chlorophorum*. However, other variables such as cell size and active repair might have also influenced our results. We did not detect CPD accumulation in any of the species, probably because of the low solar angle that resulted in very low levels of DNA effective UV-B dose. Our results indicate that exposure to solar UVR in the Patagonia area during spring time (even during ozone depletion events) has a clear impact on photosynthesis and much less or negligible on DNA in the three studied species.