The impact of solar radiation upon potentially protective compounds (i.e., UV-absorbing compounds and carotenoids) was assessed in four Rhodophyte species from Patagonia (i.e., *Ceramium* sp. Lyngbye, *Corallina officinalis* Linnaeus, *Callithamnion gaudichaudii* Agardh and *Porphyra columbina* Montagne) during short-term (i.e., 46 h) experiments. Algae were exposed to solar radiation under two treatments (PAR only: 400–700 nm, and PAR + UVR: 280–700 nm) and sub-samples were taken every 3 h (or longer periods at night) to determine the spectral absorption characteristics and concentration of UV-absorbing compounds, carotenoids and photosynthetic pigments. Except for *C. gaudichaudii* which displayed a decrease in chl-a concentration throughout the experiment, photosynthetic pigments had small variations in all species. UV-absorbing compounds concentration had species-specific responses: *Ceramium* sp. was the only species in which UV-absorbing compounds concentration varied as a function of solar irradiance, with maximum values around local noon. In *C. officinalis* and *P. columbina* UV-absorbing compounds concentration increased as compared to that of chl-a; in *Ceramium* sp. and *C. gaudichaudii*, however, there was no relationship between UV-absorbing compounds content and chl-a concentration. Carotenoids, on the other hand, did co-vary with chl-a in all species. Our data suggest that, with the exception of *C. gaudichaudii*, the differential responses of UV-absorbing compounds concentrations are more associated to the previous light history of the algae (i.e., in turn due to their position in the intertidal zone) rather than to the radiation treatment imposed to the samples. Based on our results, the variable impact of solar radiation upon productivity (and eventually biodiversity) of macroalgae from Patagonia might consequently differentially affect higher trophic levels of the aquatic food web.