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Cloud effects on erythemal UV from a 9-years, 1-minute resolution, dataset from Lauder, New Zealand

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Clouds are the most important atmospheric factor affecting the solar radiation reaching the ground; they can both enhance and reduce the radiation flux. These effects strongly depend on cloud characteristics, the solar zenith angle (SZA), and the radiation wavelength.
In this work we study the effect of clouds on erythemal UV radiation (UVE) by using cloud output products from a commercial sky camera. Specifically, a 9-years dataset (2000-2008), taken from the NIWA site in Lauder, New Zealand, is used. UVE measurements and the standard output from a Yankee Environmental Systems Total Sky Imager (TSI) camera (cloud fraction, cloud type, and sun visibility) are available at 1-minute resolution. Total ozone column and aerosol optical depth are also available to model the cloudless UV. The ratios between the measured and the modeled UVE (the so called cloud modification factors CMF) are studied as a function of cloud fraction, cloud type, sun visibility, and SZA. Based upon these analyses, UVE CMF functions are proposed to model UVE for all cloudiness conditions and the method is validated using an independent dataset. The methodology is applied on the original 1-minute resolution, but also for downgraded 1-hour resolutions. Differences between results at both time resolutions are explored and discussed.