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Reconstruction techniques of erythemal UV-radiation and future UV predictions

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Since the discovery of anthropogenic ozone depletion more than 30 year ago, the scientific community has shown an increasing interest in UV-B radiation and started to monitor UV-radiation. However, difficulties involved in the routine operation and maintenance of the instruments have limited the length of reliable data records to about two decades. Further the number of places where they were measured, resulting in a set of observations too short and too sparse for a good understanding of past UV changes. Moreover state of the art climate models do not calculate future scenarios of UV-doses. Therefore detailed information about past and future UV-trends are lacking. Reconstruction techniques are indispensable to derive long-term time series of UV-radiation and fill this gap.

Apart from the astronomical parameters, like solar zenith angle and sun-earth-distance, UV radiation is strongly influenced by clouds, ozone and surface albedo. We developed and evaluated a reconstruction technique for UV-doses that first calculates the UV-doses under clear-sky condition and afterwards applies corrections in order to take cloud effects into account. Since the input parameters cloud cover, total ozone column and surface albedo are available from the Regional Climate Model (REMO), we applied our reconstruction technique also for future scenarios using REMO data as input. Hence we are able to derive a seamless UV long-term time series from the past to the future. Our method was applied for the high alpine station Hoher Sonnblick (3108m) situated in Austrian Alps.