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Cloud effect on the Ultraviolet index

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Ultraviolet (UV) radiation is essential for many biological processes even its intensity near the surface is weak in comparison with visible and infrared sun radiation. Plants, animals and humans adopted to common UV radiation intensity. However higher doses pose an increased risk for all organisms. The UV index (UVI) defined in early 90s is recently used to express possible harm to the human body.

The UVI is computed from the spectral intensity of UV-B radiation. Its magnitude is thus related to sun elevation, cloud cover, stratospheric ozone concentration, altitude and air pollution. Important factor is also snow cover which increases the UVI due to high reflectivity. The UVI usually attains values between 0 and 9 in middle latitudes; the higher value of the UVI indicates a higher risk of the human body harm. The highest values are generally reached in sunny days around the noon in June and July in mid-latitudes. The cloudiness usually decreases the UVI and the Cloud modification factor defined for the UV-B radiation reduction is usually applied for the UVI forecast.

The aim of the contribution is to quantify effect of clouds on the UVI and revise the values of the CMF for the UVI. Different types of clouds, the base height and cloud structure are considered. The study is based on station measurement of the UVI, global radiation and sun duration in 10 minutes intervals from four stations in the Czechia during the period 2011–2017. The parameters of clouds were extracted from the SYNOP reports from the nearest stations. The results show a weak effect of high-level clouds on the UVI (decrease of 15 %) even under cover 8/8. The mid- and low-level clouds reduce the UVI with factor 0,7 to 0,35 according to its amount. However, clouds with vertical evolution (cumulus and cumulonimbus) cause in specific cases even increase of the UVI. Complete table of cloud effect on the UVI for the sun elevation between 35° and 50° will be introduced in presentation.