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Sky Erythema Ultraviolet Radiace and UV Shade Chart

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Shade is required to protect the skin from ultraviolet radiation damage. In order to determine the shape and dimensions for the design of a sun shade, it is important to know the strength of the UV radiation and the direction at which it is coming from. Therefore, it is necessary to know the sky's ultraviolet radiation distribution. Conventionally, in order for it to be measured, the sky radiance distribution has been generally swept in the altitudes and directions using a vertical and horizontal axis rotating machine equipped with a radiance sensor.(Kawanishi 2007,2009) Therefore, it has taken several minutes to measure the all sky. This mechanical sweeping method has the problems that cloud conditions change during several minutes.
Electronically sweep-type measurement equipment for sky erythema ultraviolet radiation equipped with 145 ea. of erythema ultraviolet sensors was developed, and it has become possible to measure the all sky in only two seconds, that is, only a fraction of the time required in the conventional way.(Kawanishi 2011) This research aims to measure the erythema ultraviolet radiance distribution under conditions of clear skies. UVPD-300T046BS-AlGaN is used as a sensor. From the spectral sensitivity characteristic, the sensor is in excellent agreement with the human skin's sensitivity to erythema action. These sensors are calibrated under xenon source for cross reference.
Based on the measurement values recorded summer, 2011, under clear sky conditions at 60 to 90 degree sun elevations, the UV Shade Chart was developed expressing sky erythema radiance as point density. About 50% of the dots were at and near the sun and about 50% in other sky areas. Following the development of the UV Shade Chart, a photograph is taken under a beach shade using a fisheye lens and superposed on the UV Shade Chart. The number of dots in the visible sky area is counted, and the total number of dots divided by the number of dots in the sky area is defined as the architectural sun protection factor (ASPF). ASPF can be obtained by the UVindex outside of the sunshade divided by the UVindex measured under the sunshade. ASPF shows how many times it can delay the occurrence of erythema in comparison with the case where there is no shade.

ASPF= UVindex out of shade÷ UVindex under shade [U+3000]
=Total points ÷ Points of sky part

As for the shade evaluation, ASPF=1 and 2 are Bad. ASPF=3-5 is good. ASPF=6 - 9 is good protection. ASPF equals above 10 is excellent protection.

References
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