Characterising the influence on human UV exposures due to reflective vertical surfaces

Joanna Turner, Alfio V Parisi

Human UV exposure is influenced by many factors. Localised human UV exposure is particularly influenced by the surfaces surrounding humans, such as the reflectivity of UV radiation of these surfaces. Albedo is the classical characteristic to express reflectivity, however, this is somewhat limited to surfaces at which the incident and reflected radiation is broadly defined as “up-welling” and “down-welling” UV radiation. Where large solar zenith angles allow, albedo can be used for vertical surfaces, where the incident radiation is striking the surface close to the normal of the surface, however, for other solar zenith angles, albedo either over-estimates, or under-estimates the reflective capacity of a vertical surface, particularly in direct UV environments. An alternative characteristic of the reflective capacity that takes into account surface orientation has been proposed and used: reflected global irradiance. This characteristic is a non-specific unit ratio of the reflected irradiance to the global irradiance present in the atmosphere. The reflected global irradiance is dependent on solar zenith angle, orientation, position, and surface type.

In this study, the impact of reflected global irradiance on UV exposures of humans working near vertical surfaces has been explored. Metal sheeting is often used in an urban environment for walls and fences as well as roofing. Metal sheeting is UV reflective and this study concentrates on the impact of working near vertical metal sheeting surfaces, by considering erythemal and vitamin D_3 weighted exposures.

Abstract of presentation:

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