

Mapping of the solar ultraviolet exposures to the human face

N. J. Downs & A.V. Parisi

Centre for Rural and Remote Area Health
University of Southern Queensland
Toowoomba, Queensland

Keywords: dosimetry, ultraviolet, 3D model, erythema

A three dimensional facial model that utilises an x-y-z wireframe to represent measured dosimeter exposures under low cloud conditions and various solar zenith angles has been developed from laser scans of a human manikin headform. The technique used to plot frontal ultraviolet facial exposures improves upon a previously employed technique which utilised a two dimensional photograph and linear interpolation across fewer viable dosimeter locations. The headform used in this research was scanned at 709 individual locations to make a wireframe mesh consisting of 18 vertical contours and 50 horizontal contours covering half the manikin's frontal facial topography. Each scanned location has been used as a viable dosimeter location on the manikin and represents a grid intersection point on the developed computer grid model. Polysulphone dosimeters have been developed with a clear aperture of 6 mm to record UV exposures to these locations. Exposures recorded by dosimeters have been translated into three dimensional exposure ratio maps to represent the ambient solar ultraviolet exposure. The technique employs a higher density of dosimeters than has been used previously to develop individual topographic contour models which allow for complex variation in the face and improves upon techniques which utilise fewer dosimeters to interpolate exposures across facial contours. Three dimensional images of UV exposures have been developed for solar zenith angle ranges of 0°-30°; 30°-50°; and 50°-80°.

Abstract of paper :

Downs, Nathan and Parisi, Alfio (2006) *Mapping of the solar ultraviolet exposures to the human face*. In: 31st Annual Conference Australasian Radiation Protection Society, 27-29 Nov 2006, Coogee, NSW, Australia.