

Biological Monitoring of Solar UV Radiation at 17 Sites in Asia, Europe and South America from 1999 to 2004

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Abstract

A small and robust dosimeter for determining the biologically effective dose of ambient UV radiation has been developed using UV-sensitive mutant spores of *Bacillus subtilis* strain TKJ6312. A membrane filter with four spots of the spores was snapped to a slide mount. The slide was wrapped and covered with two or more layers of polyethylene sheet to protect the sample from rain and snow and to reduce monthly-cumulative doses within the measurable range. From 1999, monthly data were collected at 17 sites for more than 1 year, and data for 4 to 6 consecutive years were obtained from 12 sites. Yearly total values of the spore inactivation dose (SID) ranged from 3200 at subarctic Oulu to 96000 at tropical Denpasar, and the mean yearly values of SID exhibited an exponential dependence on latitude in both hemispheres with a doubling for about every 14 degrees of change. During the observation period, increasing trends of UV doses have been observed at all sites with more than 5 years of data available. Year-to-year variations at high and middle latitude sites are considered due mostly to climatic variation. At three tropical sites, negative correlations between the yearly doses and the column ozone amounts were observed. The results verified the applicability of spore dosimetry for global and long-time monitoring of solar UV radiation, in particular at tropical sites where no monitoring is taking place.

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