

<<全球气候变化中的紫外线辐射>>

图书基本信息

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前言

Over the past three decades, the scientific community has realized the urgency of obtaining a better understanding of the interaction between the earth's atmosphere/biosphere and the sun's radiant energy. Most of the research has focused on the radiant energy balances in the solar and infrared regions of the spectrum, and the way these energy flows affect the climate. During this same time frame, in a related arena, a smaller group of dedicated individuals has concentrated on the role of ultraviolet (UV) radiation as it affects the overall welfare of the planet. Although comprising only a small fraction of the radiation balance that may play a role in global climate change over the next centuries, UV radiation has the capacity to cause direct and more immediate harm to virtually all living organisms and especially to human health. Cumulative high doses of UV radiation are considered a major causal factor in the development of skin cancer and cataracts. Ultraviolet radiation can weaken the human immune system, and can also affect crop production and ocean bio-productivity. Concerns about the increased levels of UV-B radiation reaching the earth's surface have led to the development of ground- and space-based measurement programs to provide long-term records of its levels. Accurate long-term measurements are difficult to obtain, especially when limited to the bandwidth regions that contain the most harmful solar photons. A core of concerned scientists from across the globe realizes that much work is needed in quantifying the harmful radiation levels and defining their adverse effects. In assessing the effects of UV-B radiation, it is important to realize the complexity of the interactions of living organisms that cause adverse responses with radiant energy directly, as well as in combination with other climate stressors, such as drought, increased temperatures, and CO₂.

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内容概要

大量研究指出紫外线（UV）辐射对生物有机体有害，并且危害人类健康。

对地表UV-B辐射强度增加的研究极大地促进了地基和空基相关观测项目的发展；人们还需要进一步对UV辐射的观测、建模和影响进行深入研究。

本书各章描述了过去30年来世界范围内与UV辐射相关的研究工作，涉及的领域有：UV辐射的当前与预测水平及其对生态系统、人类健康、经济与社会的影响；UV辐射观测仪器的最新发展，地基和空基观测仪器定标进展情况以及观测方法，建模与有关应用；全球气候变化对紫外线辐射的影响。

对于涉及全球气候变化、气象学、气候学、环境科学、生物学和农林科学的大专院校高年级本科生、研究生和教师，本书是一本很有价值的参考书。

相关领域的科学家、决策者和普通公众亦能受益于此书。

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插图：Measurements of solar UV irradiance performed during the last 18 years at six high-latitude locations and San Diego have revealed large differences of the sites' UV climates. The ozone hole has a large effect on the UV Index at the three Antarctic sites, and to a lesser extent at Ushuaia. UV Indices measured at South Pole during the ozone hole period are on average 20%-80% larger than measurements at comparable solar elevations during summer months. When the ozone hole passed over Palmer Station late in the year, the UV Index was as high as 14.8 and exceeded the maximum UV Index of 12.0 observed at San Diego. The maximum UV Index at Ushuaia was 11.5, which is comparable with summer-time measurements at San Diego. UV Indices at the two Arctic sites Barrow and Summit are lower than at southern-hemisphere sites as ozone columns are generally larger in the northern hemisphere, and ozone depletion is less severe. A comparison of UV levels at the network sites revealed that differences between sites depend greatly on the data product used. Average noontime UV Indices at San Diego during summer are considerably larger than at Antarctic sites under ozone-hole conditions, but the difference disappears when daily doses are compared. This contradicts the common notion that UV levels at high latitudes are small because of small solar elevations. Reconstructions of historical UV Indices based on long-term ozone records and climatological cloud and aerosol patterns indicate that contemporary UV Indices measured during the ozone hole period at Antarctic sites are on average 30%-85% larger than estimates for the past. These reconstructions were based on the assumption that cloud, albedo, and aerosol conditions have not changed over the last 40 years.

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