Factors Affecting the Surface Radiation Trends over China Between 1960-2000

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In this paper, the surface solar radiation data from 1960-2000 gathered from 40 weather stations over China were reexamined, and the results indicate that the solar radiation arriving at the surface begins to increase after 1990. In all 8 climate regions of China, the relationship of long-term trends of the solar radiation and climate factors were analyzed. It is found that cirrus and cirrostratus account for a larger percentage of total cloud amounts over China, both cirrus and cirrostratus trends match the global radiation trends. An analysis of long-term time series of cirrus and cirrostratus clouds indicates that cirrus and cirrostratus have a significant influence on the solar radiation reaching the surface. Further examination of the surface temperature and diurnal temperature ranges (DTR) data reveals that the surface solar radiation positively correlates with the DTR. The analysis also suggests that the correlation between the global radiation (GR) and the DTR changes are closely related to the changes in the atmospheric water vapor and alto-clouds. The combined effect of the increasing water vapor and decreasing alto-clouds will make the surface maximum temperatures change less significantly at day than the changes in the surface minimum temperatures at night. The decreasing trend of DTR reflects that alto-clouds also play an important role in the GR trend in the recent years.

Key words: Cirrus and Cirrostratus Cloud; Trend of radiation; Climatic variations