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Variability of UV-B Radiation under Cloudiness Conditions

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Ultraviolet radiation plays an important role in many photochemical and biochemical processes occurred in the atmosphere of the Earth and its surface and, of course, in climate changes. The cloudiness is one of the factors, which determines the level and variations of UV radiation reached the ground surface.

In order to describe regional features of the incoming UV-B radiation and cloud cover the data of surface observations are required.

In this paper we present estimates of the cloudiness effect on UV-B radiation in the vicinity of Tomsk (56.5N, 85.1E). For this purpose we used surface observational data on cloudiness (total cloud amount N_{tot}, inferior cloud amount N_{low}, and cloud types) and intensity of the incoming UV-B radiation measured by means of UVB-1 pyranometer (Yankee Environmental Systems, Inc.) at TOR-Station of IAO SB RAS.

Analysis of initial data showed that variations of monthly UV-B income during 2003-2008 were about 25÷45%. Clear sky conditions occurred only in 10% of cases. In other ones the cloudiness of different amount was observed. More often the clouds of vertical development (*Cu* and *Cb*) and high thin ice crystal clouds (*Ci*) were identified.

In our estimates of the cloudiness effect on the incoming UV-B flux we used a ratio (C_{UVB}) of the total UV-B radiation in the presence of clouds to the one under cloudless conditions. These estimates showed that:

- the increase of C_{UVB} with cloud amount from 1 to 9 is less than 30%;
- cloud transmission of UV-B radiation has a seasonal trend, which weakly depends on cloud amount;
- when N_{tot} >5, inferior and middle clouds have the most effect on incoming UV-B;
- when N_{tot} varies from 1 to 4 the probability of the total UV-B increase can be less than 20%.

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