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Revision of basic principles for parameterization of cloud/aerosol radiation in GCMs

B. Fomin

Russian Research Center "Kurchatov Institute" (b.fomin@mail.ru)

The majority of geophysicists suppose that it is not scientific but only boring technical problem to parameterize the cloud/aerosol optical properties in radiation codes for GCMs, where for a long time the correlated-k method is used. So they focus their attention on the 3-D radiative transfer and other problems. Unfortunately it is by no means true: intercomparison of the 1-D radiation codes and measurements still reveals essential disagreements. E.g., as shown by R.N. Halthore et al. (2005),“a comparison of atmospheric absorptance, computed from components of SW radiation, shows that agreement among models is understandably much worth at 3% and 10% for dry and humid atmospheres, respectively. Inclusion of aerosols generally makes the agreement among models worth than when no aerosols are present.” So in this report basic principles for parameterization of cloud/aerosol radiation in GCMs will be considered and fatal shortcomings of the correlated-k method will be exposed, which lead to quasi-random and, consequently, rather guileful errors in the radiation blocks of GCMs. Moreover it will be explained why by means of this commonly used method adequate treatment of clouds and aerosols is practically impossible and, consequently, valuable information obtained due to recent full-scale experiments hardly used in GCMs. Then a new effective method for radiation code development will be demonstrated. Since it gives a possibility to treat any detail of cloud/aerosol optical properties a complicated problem of representative cloud/aerosol models for GCMs based on recent vast experimental information has arisen, which also plans to be discussed as a subject of interdisciplinary cooperation. Financial support is provided by the Russian Foundation for Basic Research (project 08-01-00024).