REVIEW TO THE MONOGRAPH BY K.A. TAVARTKILADZE "SIMULATIONOF SOLAR EXTINCTION BY AEROSOLS AND METHODS FOR ATMOSPHERIC POLLUTION MONITORING"

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This monograph describes methods used in a great number of investigations of optical properties of the Transcaucasian atmosphere including the IR spectral region and the results obtained thereupon . In particular, the data from two special experiments carried out there in 1969—1971 and 1979—1981 are discussed. The Transcaucasian region was an excellent proving ground that allowed the specific features of marine, continental and mountain atmospheres to be studied (up to a height of 3600 m where the Kazbegi observatory is situated). In addition to the aerosol extinction the book also deals with numerous related problems such as the radiation absorption by water vapor and ozone, etc. Of great use are certain comparisons with the observed data for the middle zone in the Urals and Ryl'sk.

Chapter I and a great part of Chapter III are devoted to the optical density evaluation technique. Chapter II examines the experimental results available. Chapter IV considers representative examples illustrating the use of optical data, i.e., for estimating the pollution trends and radiative losses due to contamination.

The author made use of very detailed filter-based spectral observations of solar radiation in 27 spectral intervals ranging from 341 to 1067 nm, which contributes to the originality and is one of the advantages of his approach. The proposed technique made it possible to determine the water vapor content from the near IR radiation intensity as shown in Fig. 2 on page 27.

The basic formula used „ by the author for calculating, the aerosol extinction was the Angstrom formula ((1.17), p. 22, (3.4), p. 102, etc.) which was used to calculate the coefficient a. Thus, aerosol was regarded as a "colored" medium with its scattering being slightly dependent on the wavelength. The data on coefficient were tabulated (pp. 33, 83, 175) and shown to vary with geophysical conditions, season, etc. Importantly, it was concluded that the marine atmosphere was generally characterized by a lower turbidity and a coarser aerosol fraction (up to a particle radius of 0.8—1.0 μm. as illustrated in Fig. 11 on page 76).

Now a-coefficients found for Kazbegi proved to be representative for this kind of observations (see Table 23A, p. 175) though the optical density decreased there but not so dramatically as it generally does with the altitude in the atmosphere (p. 178). Obviously, the region of the high mountain ridge is in itself an additional source of the tropospheric dust loading. This is one the important general conclusions arrived at in the monograph. It is analogous to the conclusion drawn earlier also on the basis of the Caucasian observations that the specific humidity increased over mountains.

Of great importance are data on the increasing dust, loading of the atmosphere (pp. 148, 151) particularly the results obtained from long-term observation of the basin over Tbilisi. It seems to affect the entire spectrum of solar radiation. Note that the dust loading trend is more pronounced in the southern regions of the USSR than, for example, in Siberia.

The author also investigated a very important problem of the $P_w - 0$ absorption function for water vapor in a wide spectral range (up to 357 μm). The function determines a number of thermal and climatic properties of the atmosphere Eq. (3.55) and Table 13 (p. 131) show that the "square root" assumption of the absorption proportional to $W^{1/2}$ used in radiation calculations is inaccurate. Instead, the values for the fractional exponent ranging from 0.80 to 0. 17 are to be used depending on the wavelength.

The monograph, on the whole, provides extensive and useful information on the optical properties of the atmosphere and their variation with various geophysical conditions. It is to be noted that a number of techniques used by the author (detailed spectral observations, classification of geographic conditions for studying the optical thickness, calculation of the P_w function for water vapor, etc.) can prove to be of great value in other cases as well where the data on the atmospheric aerosol, pollution, humidity and composition are to be obtained.