IRS2012-368-1
International Radiation Symposium 2012
Dahlem Cube, Berlin, Germany, 06 – 10 August 2012

Results of processing airborne NASA and Russian cloud data

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Data from airborne experiments with NASA′s Cloud Absorption Radiometer and old airborne spectral data obtained in the USSR is analyzed. In the past different approaches have been proposed for processing and interpreting experimental data of different origin (satellite, ground and airborne). Mainly all approaches are based on simulations and comparing results with observational data by choosing optical parameters that best satisfy all the measured radiative characteristics. Observations in one or in several spectral channels were used. Often certain links between optical parameters in different wavelength are suggested. However, these assumptions and a priori restrictions on desired parameters prevent the realization of true values. In this study the analytical approach of inverse asymptotic formulas of the transfer theory will be used for processing airborne observational data above, within and below cloud with retrieving optical thickness, single scattering albedo, and scattering and absorption coefficients at every available wavelength independently. The method is free from a priori restrictions and there are no links put to unknown parameters. The instability of the inverse problem is found and the solution is regularized taking into account observational errors. Results obtained are compared with values retrieved from old Russian airborne observation. The cloud optical model is constructed on the basis of obtained result from NASA and Russian data and radiative cloud characteristics: reflection, transmission and radiative divergence are calculated. The set of numerical experiment loops is planned to accomplish testing the effectiveness of considered approach. The results obtained are compared with initial parameters used for model intensity calculation. Thus, uncertainties and restrictions of the analytical method of the inverse problem solution are elucidated.