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Simulation of mixed frontal cloud microstructure effect on satellite signal

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The paper is devoted to extracting stratiform cloud microphysical characteristics from multispectral radiometric measurements or more exactly to the relationship between the satellite signal (cloud albedo in visible and near infrared channels of a satellite radometer)and the optical thickness and microphysical characteristics of a cloudiness. We have realized the consecutive numerical simulation of the NOAA satellite signal (SS, albedo of frontal mixed stratiform clouds) for 1-3-th channels of AVHRR (more exactly for wave lengths: 0.55;1.6; 3.6 mkm). The simulation is based on the next models: 1)The realistic time-dependent model of a stratiform mixed cloud with detailed microphysics (dimension spectra for water droplets and 3 forms of ice crystals:needles,plates,columns). 2)Models of computation of scattering characteristics of drops (based on the Mie theory) and crystals (based on the geometric optic approximation). 3)The Discrete Ordinate Method (DOM) for simulation of solar radiative transfer in a not uniform cloud. The simulation shows that SS-s for wave lengths 0.55 mkm and 1.6 mkm change sinchronously with the cloud optical thickness which is determined basically with the liquid water content (LWC). The channel 3.6 mkm is less sensible to the optical thickness. The simulation shows that the comparison of SS-s for mentioned three waves gives the new possibility to distinguish regions with thick LWC layers and regions of highly crystallization and precipitation.