



Atmospheric and surface sounding from Meteor satellite (numerical simulation)

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Principal characteristics of the instruments mounted onboard «Meteor-3M» satellite (IRFS-2, MTVZA-GYa, MSU-MR) measuring the outgoing radiation in visible, NIR, IR and microwave spectral ranges are presented. A number of characteristics of the informativity of outgoing radiation measurements (degrees of freedom, the number of independent parameters, the Kozlov information volume, and the Shannon information content) are analyzed under cloudless and cloudy conditions. Various techniques and software for interpreting the outgoing radiation measurements made by these instruments separately or in combination are developed and described. Mathematical basis of techniques is the Multiple Linear Regression (MLR) analysis and a nonlinear generalization of a method of statistical regularization.

Numerical simulation of remote measurements is performed using the ensemble of realizations of the atmosphere and underlying surface state. As a result, potential errors of retrieving the atmospheric and surface parameters are estimated and analyzed under cloudless and cloudy conditions: temperature, humidity and ozone vertical profiles, greenhouse gas total columns, cloud water content, sea and land temperature, land emissivity and near-water wind speed. The analysis was performed using global and regional ensembles of realizations of profiles of atmospheric parameters and surface characteristics. Results of the estimation of the vertical resolution of atmospheric parameter profiles obtained by satellite sounding are given. Developed specialized software has been tested using satellite measurements by IASI instrument in JAIVEx experiment.

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