

# Selected Translated Abstracts of Russian-Language Climate-Change Publications

## II. Clouds

Research Institute of Hydrometeorological Information  
Carbon Dioxide Information Analysis Center

# GLOBAL CHANGE



# ГЛОБАЛЬНЫЕ ИЗМЕНЕНИЯ

Выборочные аннотации  
русскоязычных публикаций по изменениям климата

## II. Облачность

Научно-исследовательский институт гидрометеорологической информации  
Центр анализа информации по углекислому газу



January 1994  
Январь 1994

ОРНЛ/ЦАИ-64  
Труды ВНИИГМИ/МЦД.  
Выпуск 159

7/11/64

DK 551.583  
551.576

ORNL/CDIAC-64  
Proceedings of RIHMI-WDC,  
Issue 159

## Selected Translated Abstracts of Russian-Language Climate-Change Publications

### II. Clouds

Translated by

Carolina B. Ravina  
All-Russian Research Institute of Hydrometeorological Information—  
World Data Center  
Obninsk, Kaluga Region, Russia

Compiled by

Marvel D. Burtis  
Carbon Dioxide Information Analysis Center  
Environmental Sciences Division  
Oak Ridge National Laboratory

Environmental Sciences Division  
Publication No. 4129  
January 1994

Prepared for the  
Global Change Research Program  
Environmental Sciences Division  
Office of Health and Environmental Research  
U.S. Department of Energy  
Budget Activity Number KP 05 00 00 0

Prepared by the  
Carbon Dioxide Information Analysis Center  
OAK RIDGE NATIONAL LABORATORY  
Oak Ridge, Tennessee 37831-6335  
managed by  
MARTIN MARIETTA ENERGY SYSTEMS, INC.  
for the  
U.S. DEPARTMENT OF ENERGY  
under Contract No. DE-AC05-84OR21400

## Table of Contents

	<u>Page</u>
Abstract .....	v
Introduction .....	vii
Acknowledgments .....	xi
Bibliography .....	1
Author Index .....	81
Title Index .....	99

## Title Index

	Page
The albedo and angular reflectance characteristics of clouds and underlying surfaces. (Kondratyev, K. Ya., V. I. Binenko, L. N. Dyachenko, V. I. Korzov, and V. V. Muchenberg) . . . . .	34
Analysis of correlations in the Northern Hemisphere total cloudiness fields. (Kachurina, L. R.) . . . . .	29
Application of numerical experiment design methods to constructing the dependence of widespread precipitation on cloud parameters. (Volosyuk, A. I. and A. V. Zinchenko) . . . . .	72
Assessing the probability of continuous cloud fields completely covering long stretches of land surface. (Shuster, L. G.) . . . . .	61
Assessment of the effect of cloud layer optical properties on the underlying surface radiation balance. (Krupchatnikov, V. N. and L. I. Kurbatskaya) . . . . .	39
On calculating rain intensity for the Yerevan area. (Sarkisyan, V. O.) . . . . .	57
Calculation of a flat cloud layer transmission taking absorption into account. (Gresukh, V. N. and I. M. Levin) . . . . .	26
Calculation of major cloud type frequency of occurrence from data of combined visual and radar observations. (Balbutsky, I. M.) . . . . .	10
The calculation of precipitation amount formed in the boundary layer in cold season. (Taran, I. V.) . . . . .	65
On changes in the atmospheric boundary layer conditions with cloud dissipation over large areas. (Bondarenko, V. G. and V. I. Khvorostyanov) . . . . .	13
Character and nature of cloud anomalies over broken lithosphere discontinuities. (Morozova, L. I.) . . . . .	52
Characteristics of the Northern Hemisphere cloud cover from meteorological satellite data. (Vorobyov, V. I. and V. S. Fadeev) . . . . .	75
The choice of distribution law for approximating the total cloud amount. (Shuster, L. G.) . . . . .	61
On the cirrus solar radiation transmission. (Anikin, P. P. and A. H. Shukurov) . . . . .	6
Classification of cloud types using satellite imagery spectra. (Arzhenenko, N. I. and V. G. Bondur) . . . . .	9
Cloud amount distribution functions. (Matveyev, Yu. L.) . . . . .	45

	Page
Clouds, cloud structure, and physics of formation. (Mazin, I. P. and S. M. Shmeter) . . . . .	49
Clouds and the cloudy atmosphere. (Mazin, I. P. and A. Ch. Khrgian) . . . . .	49
Cloud data analysis using the Lagrangian model of cloud. (Nosar, S. V. and M. V. Buikov) . . . . .	54
On cloud and fog formation in a horizontally non-uniform atmospheric boundary layer with heat advection. (Bondarenko, V. G. and V. I. Khvorostyanov) . . . . .	14
Cloud phase structure in the Kashka Darya basin from radar and aircraft data. (Nazirov, Z. N. and L. S. Rasulova) . . . . .	52
Cloud radiating power. (Binenko, V. I.) . . . . .	12
Cloud structure from thermal sounding data. (Aleksandrova, T. V. and I. T. Bubukin) . . . . .	2
Cloud systems in maximum wind zones. (Nickolayeva, S. I. and N. N. Romanova) . . . . .	53
On cloud temporal variability. (Budovy, V. D., Z. M. Makhover, and N. P. Nechayev) . . . . .	17
Cloudiness characteristics from satellite outgoing radiation data and the parameterization method. (Belov, P. N. and A. Ye. Bakhmatov) . . . . .	11
Cloudiness over the North Atlantic from satellite and surface-based data. (Mirvis, V. M. and I. P. Guseva) . . . . .	51
Comparison of calculations of convective cloud models and with observed data from GATE 261st day. (Zinchenko, A. V.) . . . . .	80
A computerized method of forecasting air mass and frontal cloud system motion. (Prokopyeva, I. P. and V. G. Tokarev) . . . . .	56
On the contribution of scattered radiation to spectral transmission of semi-translucent clouds. (Anikin, P. P.) . . . . .	4
Convective cloud heterogeneity research. (Dracheva, V. P., A. A. Sinkevich, and Ye. V. Chubarina) . . . . .	19
Dependence of the height of the radio echo top of convective and stratiform clouds on the 0°C isotherm level. (Balbutsky, I. M., G. B. Brilev, and G. I. Kulikova) . . . . .	10
On the determinacy of deep convection in the atmosphere. (Zhelnin, A. A.) . . . . .	79
Determination of cloudiness characteristics from thermal radiation measurements in the 10 to 12 $\mu$ m spectral region. (Gorodetsky, A. K.) . . . . .	23

Determination of optical characteristics of clouds from experiment results. (Malkova, V. S. and L. G. Istomina) . . . . .	42
On determining cloud velocity on the basis of their 8–13 $\mu$ m spectrum range data. (Allenov, M. I. and V. G. Bulgakov) . . . . .	3
Determining water content of convective clouds on the basis of primary/secondary radiolocation. (Popova, N. D.) . . . . .	56
On distinctive characteristics of the cloud distribution over tropical Africa. (Budovy, V. D., N. P. Nechayev, L. A. Nudelman, and A. A. Radchenko) . . . . .	18
On diurnal variations and time stability of clouds over Tropical Africa. (Budovy, V. D., Z. M. Makhover, N. P. Nechayev, and A. A. Radchenko) . . . . .	16
The dynamic aspect of evaluating the stages of the lifetime of a cumulonimbus cloud. (Dovgalyuk, Yu. A. and Ye. N. Stankova) . . . . .	19
On the effect of cloud breaking degree on the radiation balance in the atmosphere. (Goryachev, B. V., V. V. Larionov, S. B. Mogilnitsky, and B. A. Savelyev) . . . . .	26
On the effect of the cloud microstructure and water content on the radiation regime at different latitudes. (Kondratyev, K. Ya., V. I. Khvorostyanov, and V. G. Bondarenok) . . . . .	33
The effect of microstructure on the Doppler radar characteristics of hail clouds. (Marchenko, P. Ye. and B. Kh. Thamokov) . . . . .	43
On the effect of obstacle size, temperature and humidity on meso- and microstructure of orographic clouds. (Toroyan, G. R.) . . . . .	68
The effect of radiation heat transfer on cloud formation in the atmospheric boundary layer dynamics model. (Isayev, G. I.) . . . . .	27
The effect of upper-air clouds on solar radiation in different parts of the spectrum on the basis of surface-based observations. (Abakumova, G. M., T. V. Yevnevich, Ye. I. Nezval, N. Ye. Chubarova, and O. A. Shilovtseva) . . . . .	1
An empirical model of mid-latitude upper-air cloud structure. (Kosarev, A. L. and I. P. Mazin) . . . . .	37
Energy method and its application to the conditions of the development of convective clouds. (Woolfson, A. N.) . . . . .	77
On estimating cloud resources in individual geographical areas of the USSR. (Brylyov, G. B., Yu. A. Dovgalyuk, Ye. V. Orenburgskaya, V. D. Stepanenko, and T. L. Uglanova) . . . . .	14

Estimating the contribution of stratus clouds to the average total cloud amount over the Northern Hemisphere. (Vorobyov, V. I.) . . . . .	73
Evaluating the effect of scattering on radiothermal radiation transfer in clouds and precipitation. (Bobylev, L. P., Ye. V. Dorofeyev, S. Yu. Matrosov, and G. G. Shchukin) . . . . .	13
Evaluation of cloud thickness using satellite data. (Dubrovina, L. S. and V. D. Verzunova) . . . . .	21
Global cloud field. (Matveyev, Yu. L., L. T. Matveyev, and S. A. Soldatenko) . . . . .	46
Interannual variability of cloud amount distribution. (Kondratyev, K. Ya., V. V. Kozodyorov, O. Yu. Kyarner, and S. Ch. Keevallik) . . . . .	32
Interseasonal variability of the Northern Hemisphere total cloud amount zonal characteristics. (Vorobyov, V. I.) . . . . .	74
Investigating statistical characteristics of clouds from the North Atlantic Ocean Weather Station data. (Yegorov, B. N. and I. I. Ivanova) . . . . .	78
Investigation of cloud formation factors and calculation of cloud amount. (Lev, T. D.) . . . . .	40
Investigation of the space-time distribution of some convective cloud radar characteristics in East Georgia. (Apriamashvili, N. Sh. and M. R. Vatyan) . . . . .	8
IR-radiometer data based research of cirrus clouds. (Tochilkina, T. A.) . . . . .	67
Lidar measurements of cloud velocity. (Matviyenko, G. G., I. N. Kolev, and O. P. Parvanov) . . . . .	48
Lifetime and height of different cloud types in the West Arctic. (Letunovsky, V. A.) . . . . .	39
On the location of cloud formations in different regions of the spectrum. (Goryachev, B. V., V. V. Larionov, S. B. Mogilnitsky, B. A. Savelyev, and G. G. Shchukin) . . . . .	24
On the methods of experimental and theoretical research carried out on radiation properties of cirrus. (Feigelson, Ye. M.) . . . . .	22
Microstructure of cirrus clouds. (Kosarev, A. L., I. P. Mazin, A. N. Nevezorov, and V. F. Shugayev) . . . . .	37
Microstructure of clouds and precipitation. (Smirnov, V. I.) . . . . .	63
On the microstructure of ice crystal clouds. (Mazin, I. P. and A. N. Nevezorov) . . . . .	48
Modelling of artificial crystallization and clearance zone in the cloud with changes in the wind shear and turbulence coefficient with height. (Khvorostyanov, V. I.) . . . . .	30

	Page
Modelling large-scale fields of vertical motion and clouds from FGGE data. (Shneidman, V. A., G. V. Khomenko, and I. E. Tereshchenko) . . . . .	60
Modelling of orographic clouds taking into account droplet and crystal phase microstructure. (Toroyan, G. R. and V. I. Khvorostyanov) . . . . .	67
Numerical experiments on forecasting cloud field using models. (Tsankova-Ilkova, D. S.) . . . . .	69
Numerical models of cloud formation and forecasting. (Matveyev, L. T. and S. A. Soldatenko) . . . . .	45
A numerical model of non-precipitating convective cloud development. (Woolfson, A. N.) . . . . .	76
Numerical modelling of radiothermal radiation transfer in convective clouds. (Baranov, V. G., L. P. Bobylev, Yu. A. Dovgalyuk, Ye. V. Dorofeyev, and G. G. Shchukin) . . . . .	11
Optical characteristics of clouds. (Malkevich, M. S., V. S. Malkova, and V. I. Syachinov) . . . . .	42
Optical properties of cirrus clouds. (Anikin, P. P., A. G. Petrushin, and T. A. Tarasova) . . . . .	5
Optical properties of ice crystal clouds. (Volkovitsky, O. A., L. N. Pavlova, and A. G. Petrushin)	72
The parameterization and dependence of cloud amount distribution functions on the averaging area. (Matveyev, Yu. L.) . . . . .	47
On the polarization of electromagnetic waves by electrically active clouds. The physics of hail formation processes and physics of hail active modification. (Bachshyan, G. G.) . . . . .	9
On the possibility of using multiple scattering for measuring cloud height. (Milenky, M. N., V. I. Kozintsev, B. A. Konstantinov, and G. N. Baldenkov) . . . . .	50
Propagation of short light pulses in clouds. (Pavlova, L. N.) . . . . .	54
Radiation balance of the cloud layer in the course of its fragmentation. (Goryachev, B. V., V. V. Larionov, S. B. Mogilnitsky, B. A. Savelyev, and G. G. Shchukin) . . . . .	25
Radiation characteristics of clouds. (Gorodetsky, A. K. and A. P. Orlova) . . . . .	24
Recovery of broken cloud albedo from satellite observation data. (Titov, G. A. and T. B. Zhuravlyova) . . . . .	66
On the regional climatic model of clouds as applied to problems of operating opto-electronic systems. (Tudry, V. D.) . . . . .	71

Regression model of cloud top over the continents from FGGE data. (Aldoshina, O. I., V. V. Bacherikov, Ye. Ye. Limar, and V. A. Fabrikov) . . . . .	2
Relationship between cloud thickness and their top and base heights. (Dubrovina, L. S.) . . . . .	20
Research on the spatial structure and optical parameters of clouds using satellites. (Istomina, L. G. and V. S. Malkova) . . . . .	28
Seasonal characteristics of cloud type distribution in the Northern Hemisphere on the basis of satellite data. (Vorobyov, V. I.) . . . . .	74
Sensitivity of a convective cloud and precipitation model to microphysical processes parameterization methods. (Polezhayev, A. A.) . . . . .	55
Small-angle light scattering by cirrus cloud particles. (Mikulinsky, I. A. and K. S. Shifrin) . . . . .	50
On some problems of microphysics of atmospheric clouds. (Voloshchuk, V. M. and Yu. S. Sedunov) . . . . .	73
Some results of studying strata base characteristics using lidar and other methods. (Korshunov, V. A., N. P. Romanov, and A. S. Drofa) . . . . .	35
Some specific features of cloud base height distribution of different cloud types ( <b>St</b> , <b>Frnb</b> , <b>Sc</b> , and <b>Cb</b> ) (Chernykh, I. V., A. P. Trishchenko, and B. G. Sherstyukov) . . . . .	18
Space structure of the global cloud field. (Matveyev, Yu. L.) . . . . .	47
On space summarization of climatic data on cloud amount for solving problems of remote sounding of the natural environment. (Remenson, V. A. and L. G. Shuster) . . . . .	57
Space-time structure of precipitation particle spectra from cumulonimbus clouds. (Budak, I. V., V. A. Dyachuck, N. N. Mikhailenko, and Yu. S. Rudko) . . . . .	15
Specific features of spectral radiation characteristics of strata over the city. (Kondratyev, K. Ya. and V. I. Binenko) . . . . .	31
On the spectral attenuation of 0.3–12 $\mu\text{m}$ radiation by clouds on the basis of ground based observations. (Anikin, P. P. and A. Ch. Shukurov) . . . . .	7
Spectral distribution of solar radiation in the 290–560 nm range with continuous upper-air clouds. (Nezval, Ye. I. and N. Ye. Chubarova) . . . . .	53
The spectral structure of meteorological fields and interannual fluctuations of cloud cover relating to El Niño. (Kislov, A. V. and Ye. K. Semyonov) . . . . .	31

On spectral transmission of cumulus and cirrus clouds from surface-based observations. (Anikin, P. P. and A. Ch. Shukurov) . . . . .	7
On stages of cloud cluster development and moist convection parameterization. (Falkovich, A. I.) . . . . .	22
On the statistical characteristics of cloud top heights in different synoptic systems. (Tudry, V. D. and F. I. Shakirova) . . . . .	70
Statistical characteristics of morphometric parameters of clouds in various meso-structure formations. (Tudry, V. D., A. A. Feshchenko, T. Ya. Belousova, A. N. Blinov, and V. S. Yatsik) . . . . .	70
The statistical description of convective cloud mesoscale fields with the help of the Weibull distribution. (Gulyayev, Yu. N.) . . . . .	27
On statistical parameters of cloud top temperature distribution. (Dubrovina, L. S.) . . . . .	20
The statistical structure of effective thicknesses of a cumulus cloud field. (Allenov, M. I. and V. G. Bulgakov) . . . . .	4
A study of cloud base height variability. (Aniskin, L. V., A. A. Borovikov, and S. M. Persin) . . . . .	7
On studying cloud dynamics. (Matveyev, L. T.) . . . . .	44
Studying convective clouds using chemical tracers. (Shalaveyus, S. S. and R. V. Leskauskas) . . . . .	58
On the sufficiency conditions of strata stability with respect to finite amplitude disturbances. (Woolfson, A. N.) . . . . .	75
Surface electric properties of nuclei as an important parameter determining the development of processes in clouds. (Morachevsky, V. G., N. A. Dubrovich, and A. N. Potanin) . . . . .	51
Surface measurements of radiating power and some other parameters of cirrus. (Zhuravlyova, V. A.) . . . . .	79
Synoptic processes resulting in the formation of low clouds in the Alma-Ata area. (Kan, K. A.) . . . . .	29
A technique for approximating cloud amount for different cloud types. (Alekseyeva-Obukhova, I. A.) . . . . .	3

Techniques of cloud field classification according to the frequency of cloud base height occurrence. (Maltsev, E. V. and V. S. Fadeyev) . . . . .	43
Thermodynamic characteristics of tropical convective clouds. (Martines, D., K. Peres, V. P. Belyayev, and V. V. Petrov) . . . . .	44
Three-dimensional numerical model of an isolated cloud. (Koryakov, T. A. and T. N. Lebedev) . . . . .	36
On the time structure of the zonal cloudiness field. (Vasiliev, V. A. and Yu. L. Matveyev) . . . . .	71
On time variability of clouds. (Makhover, Z. M.) . . . . .	41
Upper-air conditions for the development of inter-mass convective clouds in the Leningrad area. (Belov, N. F., B. M. Vorobyov, V. A. Kamishanova, and T. V. Khotenova) . . . . .	12
The use of cloud fields in evaluating and forecasting vertical motions in the lower troposphere. (Tereshchenko, I. E. and V. A. Shneidman) . . . . .	66
On the use of radar observation data for estimating cloud resources (Stepanenko, V. D., Yu. A. Dovgalyuk, Ye. V. Orenburgskaya, Ye. V. Rozhkova, and V. Ya. Khairullina) . . . . .	65
Variability of meso-scale radar characteristics of clouds over tropical oceans. (Korotkov, A. I.) . . . . .	35
On the variability of microstructure parameters in the cumulus cloud field. (Skhirtladze, G. I.) . . . . .	62
Vertical distribution of visible light extinction coefficient in upper-level clouds. (Kravets, L. V.) . . . . .	38
Vertical profiles of atmospheric temperature and humidity under different cloudiness and circulation conditions. (Sherstyukov, B. G. and R. H. Reitenbach) . . . . .	58
On water content calculation in convective clouds over large areas. (Shishkin, N. S.) . . . . .	60
Water content and phase state of different cloud types. (Zabolotskaya, T. N., S. A. Krochak, and Yu. S. Rudko) . . . . .	78
On zonal characteristics of global cloud field statistical structure. (Aristova, L. N., G. V. Gruza, and L. R. Kachurina) . . . . .	8