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(62. (Geological time)

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在1990年的报<mark>识[1] 图1861] 图1761] 图1762] 图1762 图1762</mark>

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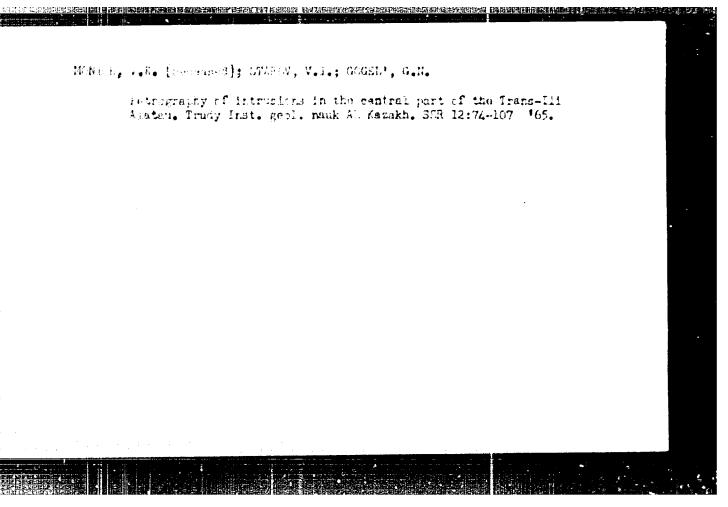
BEDRIN, G.I. [deceased]; (Mullish, V.E. [deceased]) EULIKOUSAIY, K.T.; BRAZIEDITSZVA, A.F.; PZTRUVA, M.P.; BRIG ZHINA, A.G.

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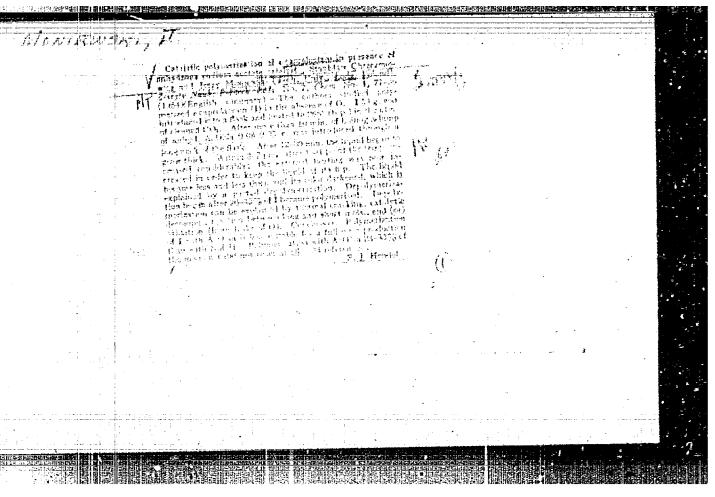
Potassium feldspar of some of the different age intrusions.
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(MIRA 18:9)



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Tkachenko, th. V., Pyakonova, V. S.; Popov, Sosipatrov, V. T.	P. I.; Pakuo	lin, V. P.; i	hirinakaya, S. A.;		
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ORG: none			49		
TITLE: Production testing of 08Yu cold rol	led low carbo	m steel	\mathcal{B}		
SOURCE: Metallurg, no. 3, 1966, 27-28					
TOPIC TAGS: low carbon steel, deoxidation,	cold rolling	, quality co	ntrol / 08Yu steel		
ABSTRACT: Production testing was carried or	ut on nonagin	g OAYu steel	chapte at the		
Cherepovetsky Metallurgical Plant and the m	esults were c	ompared to the	ne norms set hu		
GOST 90%5-59. (Melting was carried out in a capacity; deoxidation by ferromanganese was	ingle-grooved :done in sten	Martens fur	naces of average		. /
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Al=0.02-0.05%). Ingots weighing 14T were h	ot tolled Th	15-18 passes	into slabs of		
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cold rolled to -1430 mm width and cooling wa tion. Tests m	American of 68 Annealing was at 60/hr. The lade on the sheet nonaging. The s	reduction into done at 550°C fo final operation after aging at heets performed b	a 1150 bloom. These sheets of 2.5-3.5 mm or 10 hrs at a heating was a finishing pass 200°C for 30 min subsection stamping tests Automotive Plant. Or	thickness and 1040- rate of 150/hr at 1.0-1.3% reduc- tantiated that Which were run un-	
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FORTKOWSKI, EDWARD

POLAND/Chemical Technology. Chemical Products and Their I-9

Application - Silicates. Glass. Caramics. Binders.

Abs Jour : Referat Zhur - Miniya, No 4, 1957, 12681

Author : Monikovski Edward

Title : Experience with and Conclusions Derived from Accelerated

Aging of Concrete at the Building Site

Orig Pub : Poswiadczenia i wniocki z przyspieszonego dojrzewania

betonow na placu budowy. Busown. przemysl., 1956, 5,

No 7-8, 29-33 (Polish)

Abstract : For the purpose of speeding up building operations it is

recommended to produce the structural component parts directly at the building site on condition of careful selection of raterials, addition of CaCl₂ (in winter) and

heat treatments at temperatures up to 750.

Card 1/1 - 129 -

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Conclusions and generalizations concerning the construction of a carbarn in Warsaw. Pt. 1. p.13.

(RUDOMITIONO PRZEMYSLOWE. Vol. 6, No. 6, June 1957. Warstawa, Foland)

So: Monthly List of East European Accessions (EEAL) IC. Vol. 6, No. 10, October 1957. Uncl.

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PERIODICAL: BUDOWNICTWO PRZEMISLOME. Vol. 7, no. 8, Aug. 1958

MCNIKOWSKI, E. Experience acquired in constructing warehouses and industrial multisectional buildings from prefabricated parts. p. 1.

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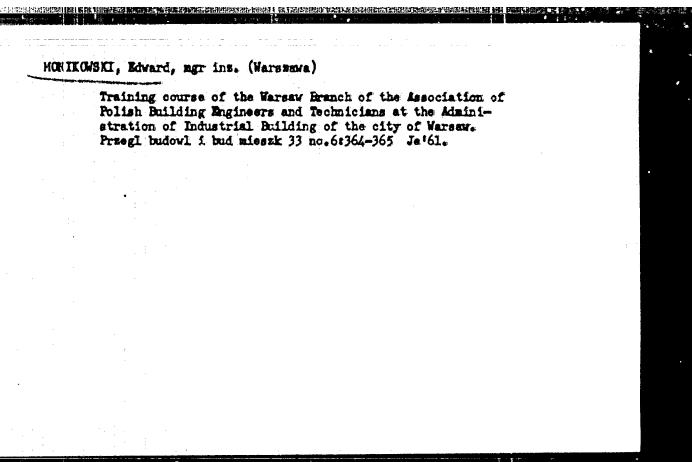
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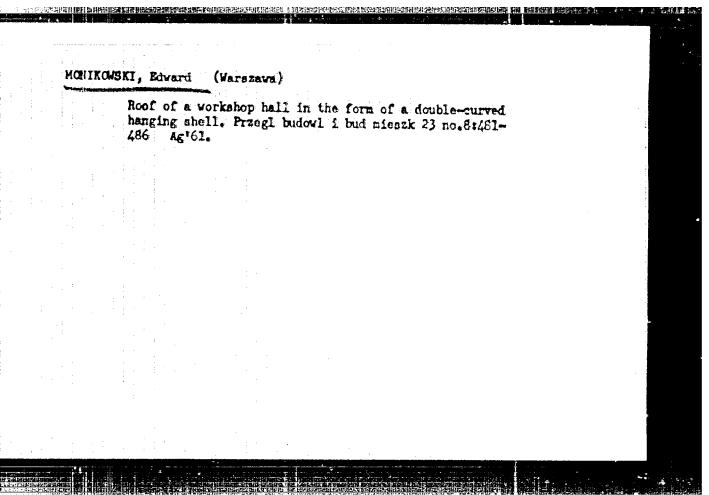
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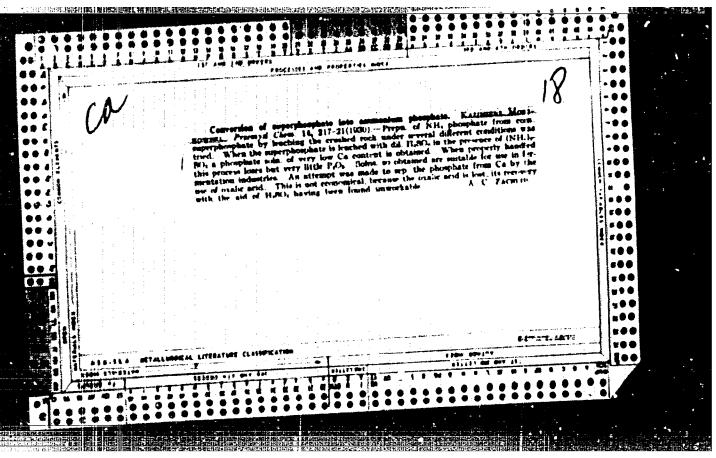
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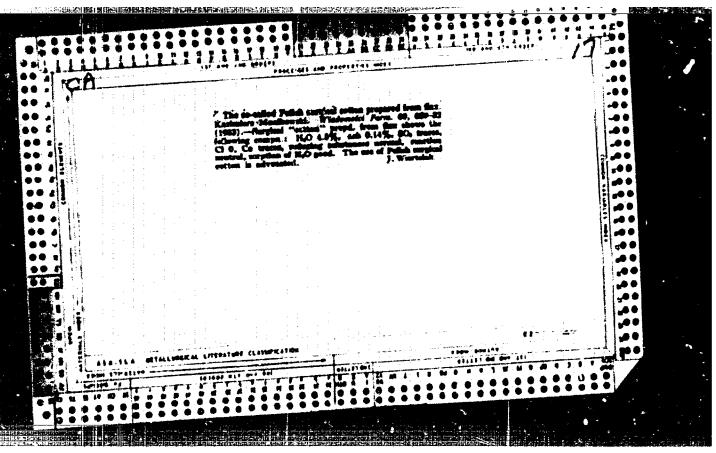
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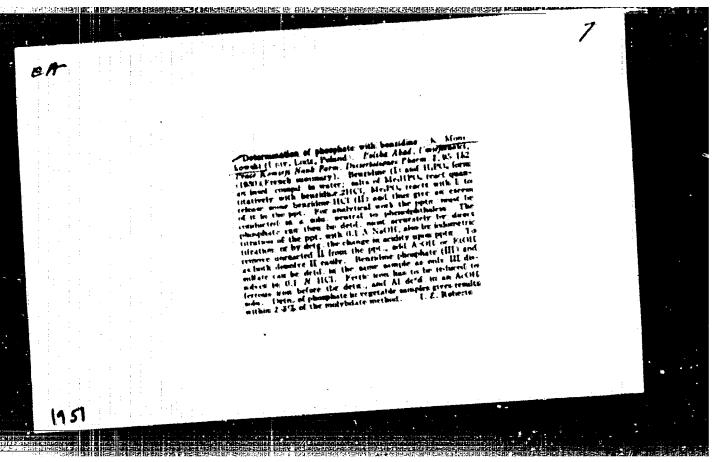
April 1959, Unclass

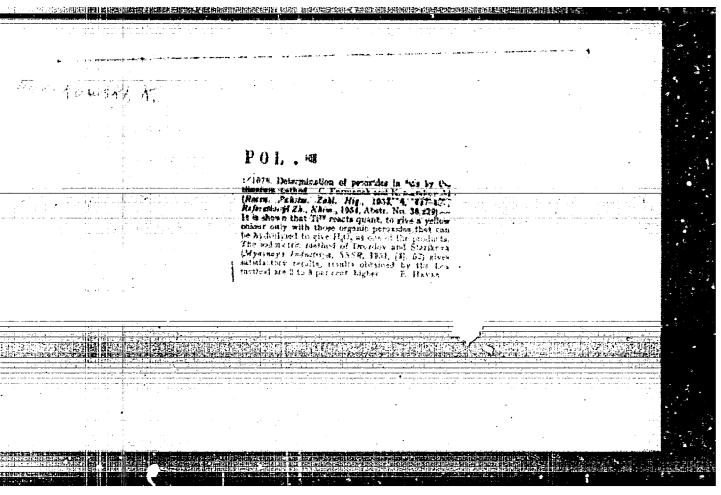


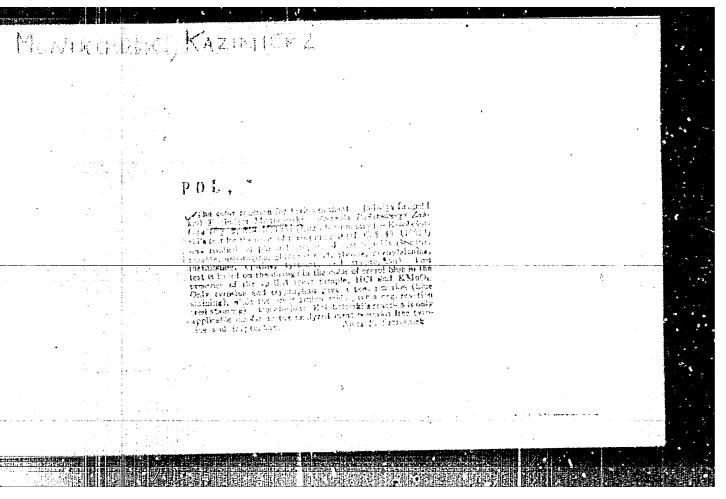












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Their Uses, Part III, Food Industry.

Abs Jour : Ref Zhur-Khiniya, No 15, 1958, 51944

Author : Wickowska, Elzbieta; Honikowski, Kazimierz
Inst : Title : Phosphatase Tost for Heat and Heat Products.

Orig Pub : Roczn. Panstw. zakl. hig., 1955, 7, No 1,

79-88

Abstract: Application of the alkaline phosphatase (I) titration as an indicator of degree (sufficiency) of thermal treatment of meat and meat products has been explained. It was established that no I was present in meat products heated to > 70° (positive reaction for I could be induced by bacteria).

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1. Bromatologicky ustav Lekarske akademie v Ludzi a Vyskumne ustavy pro potirani obilnich skudeu v Lodzi. 2. M.Monikovski's address: Lodz, ul. Kilinskiego 93.

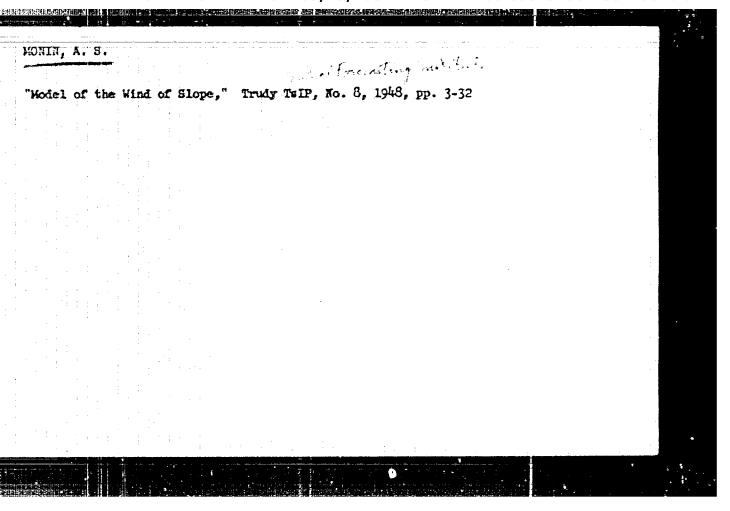
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Translation M-602, 5 Jul 55

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Vertical Structure of Monsoons. Met. 1. giarcl. No. 6, Translation of contents available in U-3213, 3 Apr 53	1947 (pp. 29-30)	•		
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101111, A. S.

"On the Theory of Atmospheric Turbulence." Thesis for degree of Cand. Physicomathematical Sci. Sub 11 Kay 19. Koscow Order of Lenin State U ineni E. V. Lomonosow.

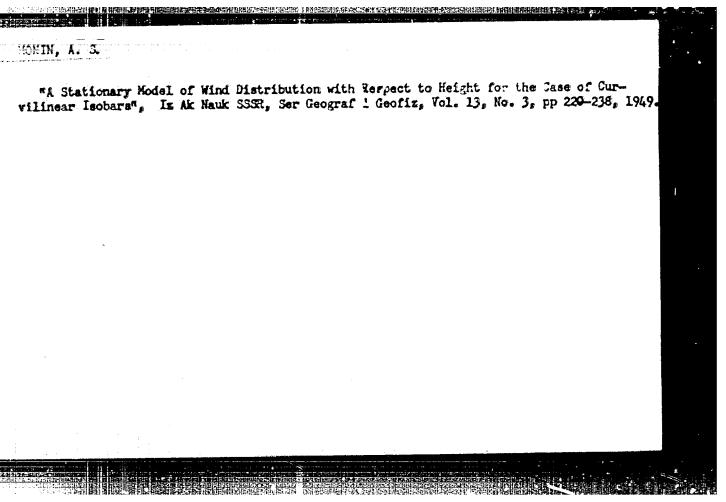
Surmary 82, 18 Dec 52, Dissertations Presented for Degrees in Science and Engineering in Moscow in 1949. From Vechernvaya Moskya, Jan-Dec 1949.

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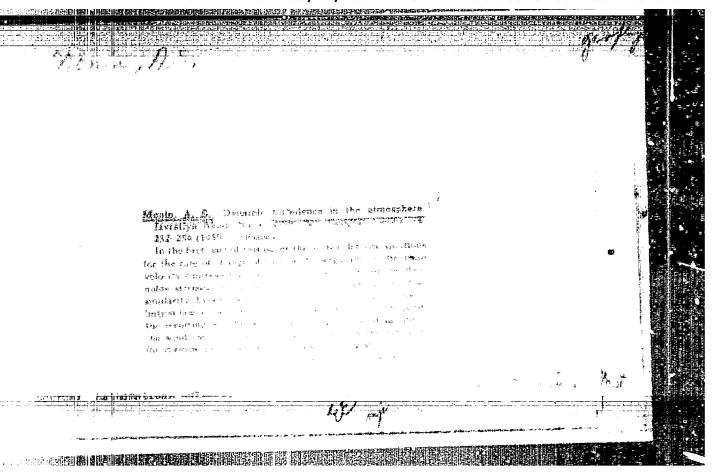
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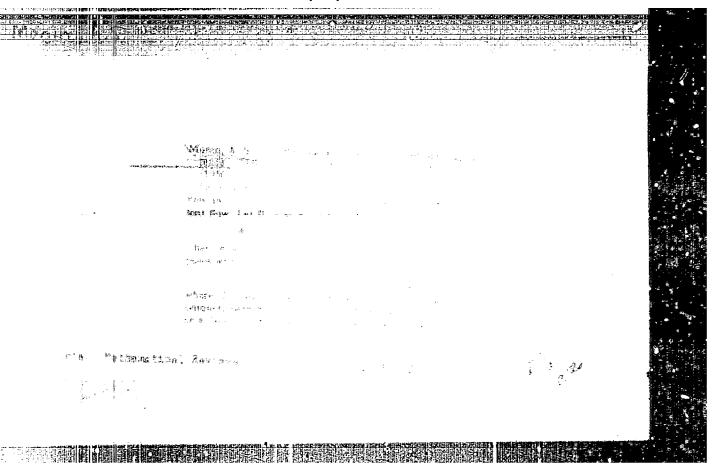
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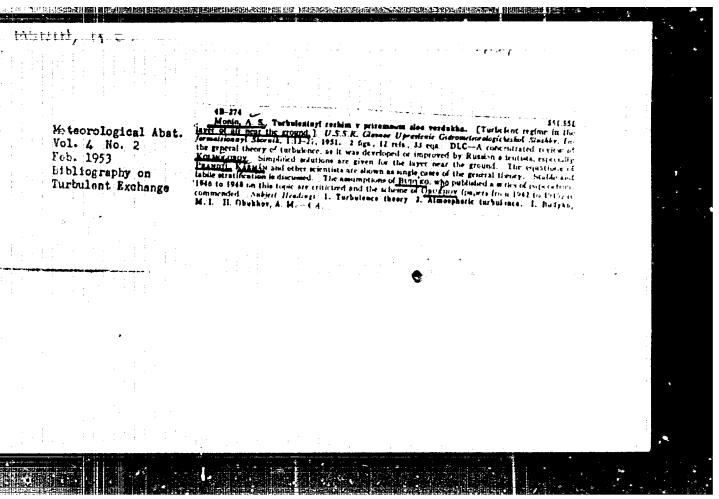


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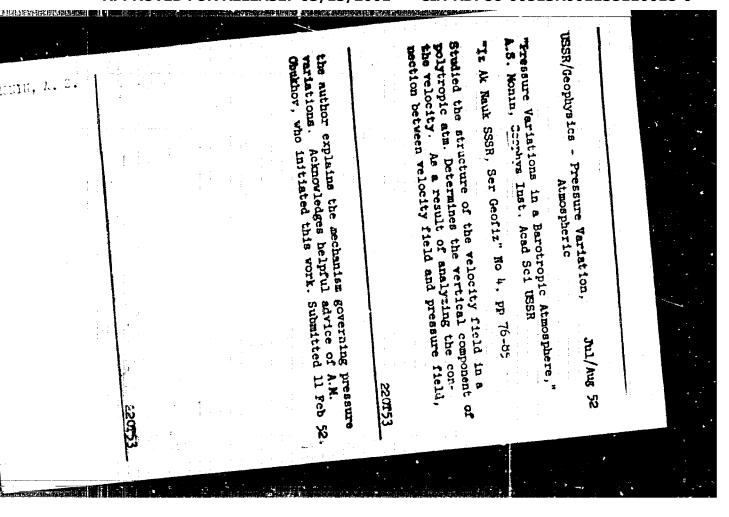


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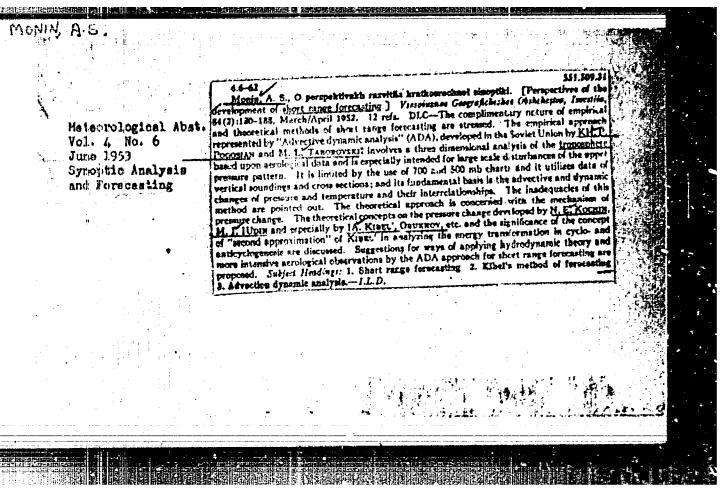
MCHIN, A. J.

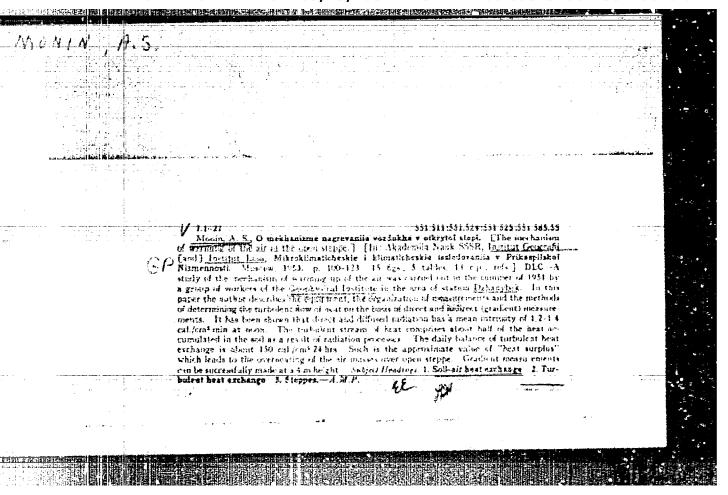
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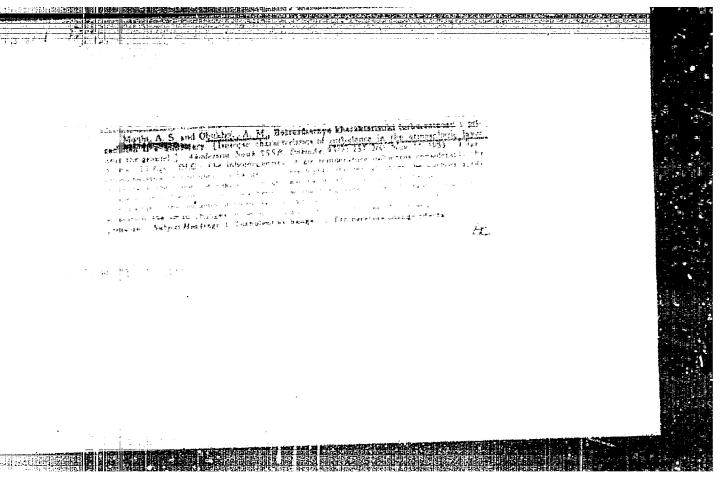
50: Summary-D-69993, 29 July 1954.



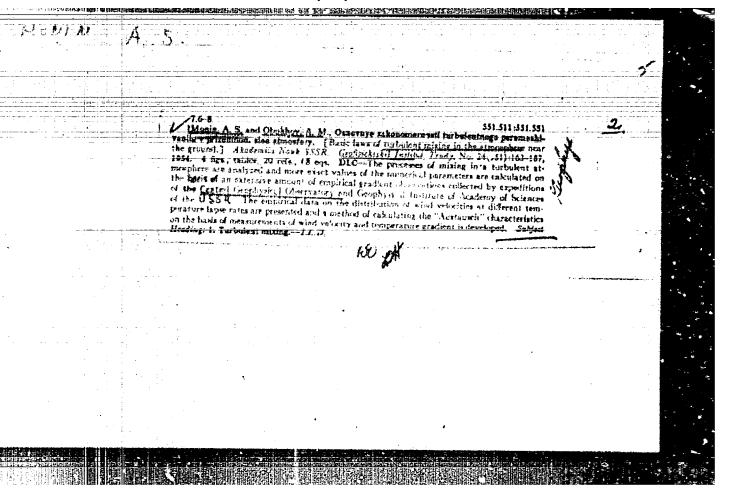
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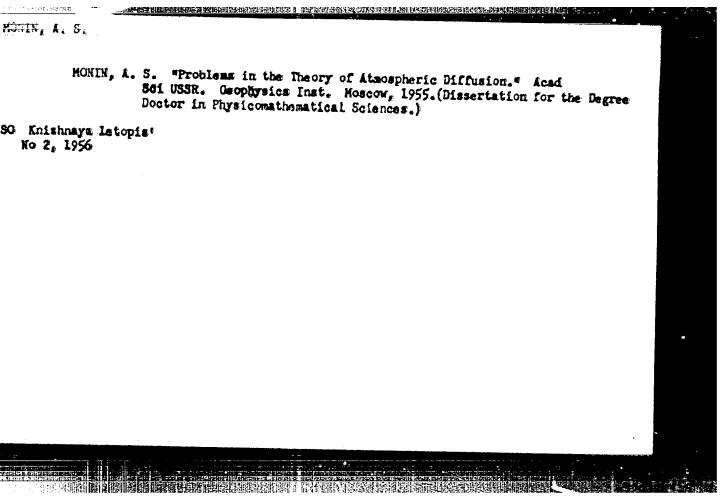






maind, n. t. PD-1195 USSR/Geophysics - Atmosphere's Circulation Pub. 45-6/8 Card 1/1 : Dzerdzeyevskiy, B. L., and Monin, A. S. Author : Standard schemes for the general circulation of the atmosphere in Title: the Morthern Hemisphere and the index of circulation t IEV. AN SSSR, ser. geofiz., No 6, 1954, pp 562-574 Periodical : The authors describe indices of circulation calculated along the Abstract parallels of latitude of the Northern Hemisphere at heights corresponding to 500 and 700 mb pressure. They analyze their connection with the elementary circulatory mechanisms. They establish a close dependence of the values of the index of circulation upon a shift of the elementary circulatory mechanisms. Institution : Geography Institute and Geophysics Institute, Acad. Sci. USSR Submitted t February 2, 1954





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Wast/Geophysios - Diffusion Card 1/1 Pub 45-6/18

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Author

: Monin, A. S.

Title

t Diffusion with finite velocity

Periodical: Izv. AN SSSR, Ser. geofiz. 234-248, May-Jun 1955

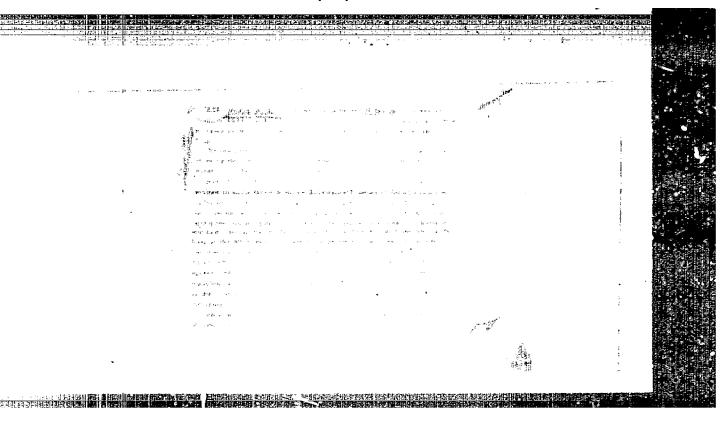
Abstract

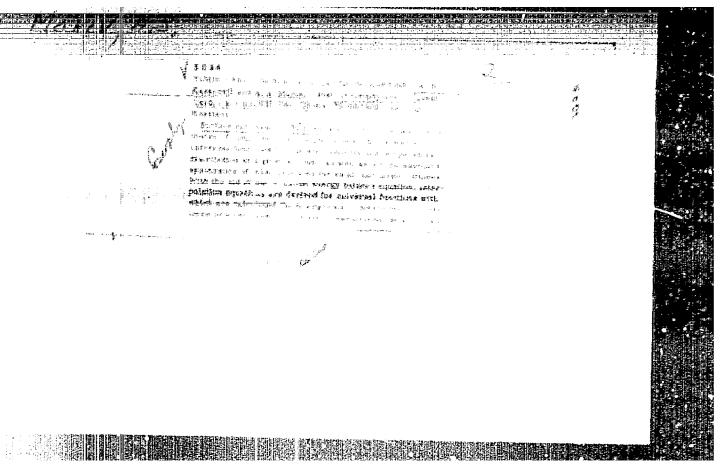
: The author considers turbulent diffusion to be the result of the action of currents and jets chaotically distributed in the medium. He distinguishes several types of jet currents differing in magnitude and direction of velocity of the current. He assumes that the coordinate of a diffusing particle and the number of the jet type in which it is found form a Markov random process. In the presence of jet currents of just two types differing in the direction of velocity of the current, the diffusion is described by means of the telegraph equation. The author thanks A. M. Obukhov. Seven references; e.g. A. S. Monin and A. M. Obukhov, "Dimensionless characteristics of turbulence in the ground layer of the atmosphere," DAN SSSR, 93, No 2, 1993.

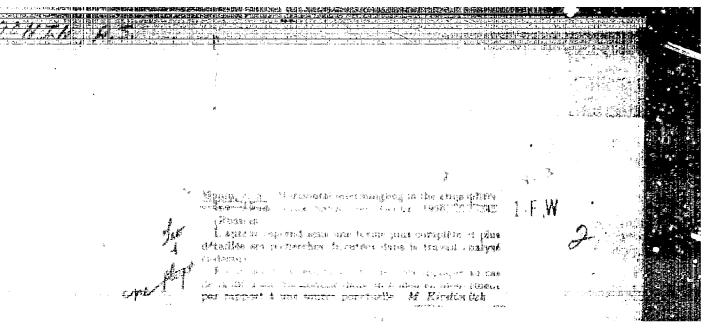
Institution: Geophysical Institute, Academy of Sciences USSR

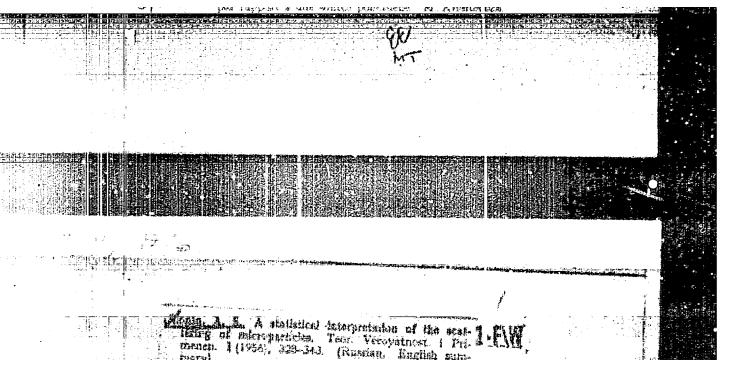
Submitted: June 15, 1954

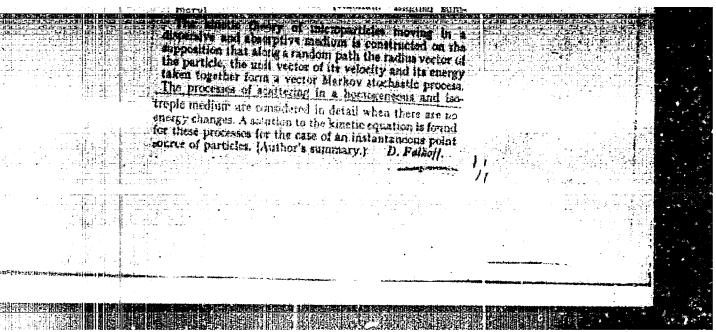
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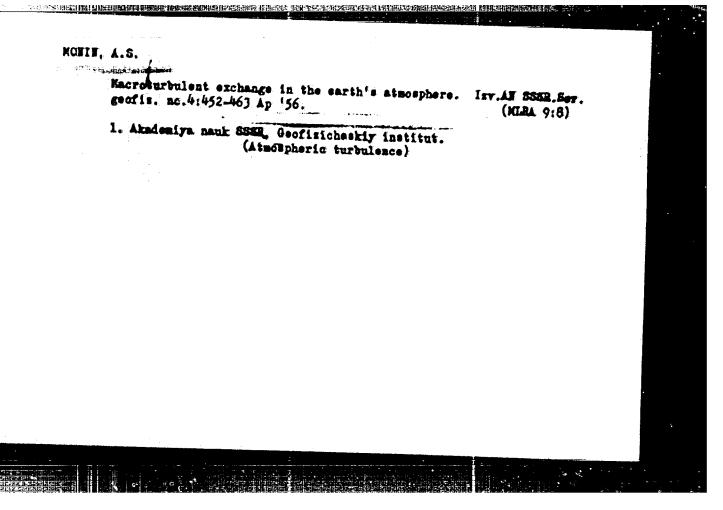












HOWIN, A. S.

by A. S. Monin, Institute of the Physics of the Atmosphere, Academy of Sciences USSR, Izvestiya Akademii Mauk SSSR, Seriya Geofizicheskaya, No 12, Dec 56, pp 1461-1473

The author studies the solution of a hyperbolic equation of turbulent diffusion in the surface layer of air with neutral stratification. The diffusion of smoke of neutral temperature from a smokestack was studied as an example. An equation of diffusion generalized for cases with an arbitrary temperature of air stratification is presented.

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CIA-RDP86-00513R001135110018-0 "APPROVED FOR RELEASE: 03/13/2001

MONIN, A.S

60-33-1/3

AUTHOR:

Monin, A.S.

A Semi-Empirical Theory of Turbulent Diffusion (Poluempiricheskaya teoriya turbulentnov diffuzil)

Akademii nauk SSSR
Akademii nauk SSSR
PERIODICAL: Trudy Geofizicheskogo instituta/, 1956, Nr 33 (160),

是实际的上面上**对现实中国产品的国际人,不然的政治和企**识,并不是不是不是不是不是,他们就是这个人,他们就是这个人,我们是这个人,我们是这个人,我们是这个人,我们是这个人

pp. 3-47 (USSR)

ABSTRACT:

This is an analysis of solutions of a parabolic equation for diffusion describing the distribution of concentration of diffusing admixtures when several admixture sources are present. A number of schemes for determining the coefficient of turbulent diffusion in the troposphere and the near-surface layer of air are examined. The author draws an analogy between turbulence and molecular diffusion and discusses a suitable equation for diffusion in the atmosphere, diffusion in a field of homogeneous turbulence, diffusion in the case of a nearsurface layer of a non-stratified nature, diffusion in a thermally non-homogeneous near-surface layer of air, and the variations in velocity of the wind with altitude.
There are Il figures, I table, and 13 references, of which
Il are Russian, I English and I German.

AVAILABLE: Card 1/1

Library of Congress

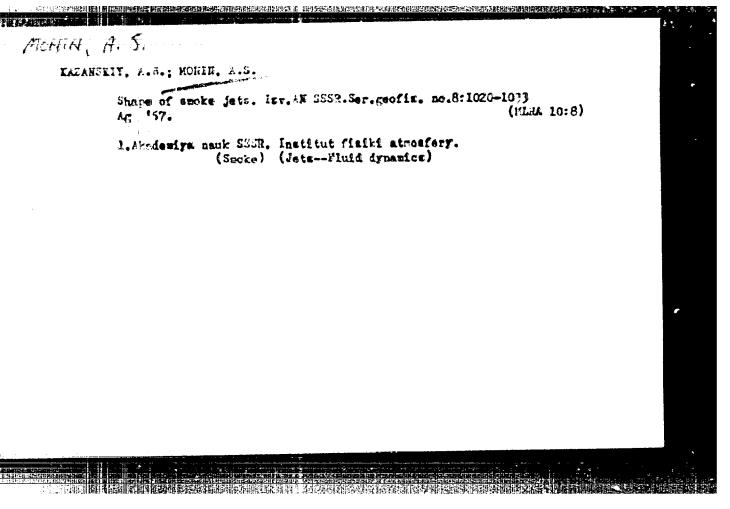
APPROVED FOR RELEASE: 03/13/2001 CIA-RDP86-00513R001135110018-0"

MONIH, A. S.

"Problems of turbulent diffusion," paper subsitted at International Assoc, of Meteorology Meetings, Toronto, Canafa, 3-14 Sep 57

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"Smoke Propagation in the Surface Layer of Atmosphere."

papers submitted for Intl. Symposium on Atmospheric Diffusion and Air-Pollution (NUTAM) (NUCC) 24-29 Aug 58, Oxford, UK.

MONIN, A.S.

13(7) P 2 PHASE I BOOK EXPLOITATION

sov/1837

Akademiya nauk SSSR. Institut fiziki atmosfery

Raboty po dinamicheskoy meteorologii (Works on Dynamic Meteorology)
Moscow, Izd-vo AN SSSR, 1958. 186 p. (Series: <u>Its:</u> Trudy, vyp. 2)
1,500 copies printed.

Resp. Ed.: I.A. Kibel', Corresponding Member, USSR Academy of Sciences; Ed. of Publishing Rouse: K.P. Gurov.

PURPOSE: The issue of the Institutes Trudy[Transactions] is intended for scientists and research workers engaged in weather forecasting and climatology.

COVERAGE: This collection of articles represents the results of 12 studies in dynamic meteorology, carried out from 1951 through 1954. They treat weather forecasting techniques using the methods of dynamic meteorology as well as general theoretical questions in the study of climate. All authors,

Card 1/4

SOV/1837 Works on Dynamic Meteorology except N.I. Buleyev and A.D. Christyakov, are associated with the Geofizicheskiy institut (Geophysical Institute of the Academy of Sciences). A.D. Christyakov and N.I. Buleyev are associated with the Tsentral 'nyy institut prognozov (Central Institute of Forecasts), QUOMS. References accompany each article. TABLE OF CONTENTS: 3 Foreword Blinova, Ye.N. The Theory of the Annual Rate of Non-zonal 5 Circulation of the Barth's Atmosphere Obukhov, A.M., and A.S. Chaplygina. Change in the Baric Field in the Middle Troposphere 23 Monin, A.S. Transformations of Energy in the Zonal Circu-50 lation of the Atmosphere Card 2/4

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AUTHOR: Monin, A. S.

TITLE: The Structure of Turbulence in the Atmosphere (Struktura atmosfernoy turbulentnosti)

。 《大學集集》(1911年11月11日), 《大學集集》(1911年)(1911年)(1911年)(1911年)(1911年)(1911年)(1911年)(1911年)(1911年)(1911年)(1911年)(1911年)

PERIODICAL: Teoriya veroyatnostey i yeye primeneniya, 1958, Vol 3, Nr 3, pp 285-317 (USSR)

ABSTRACT: The theoretical and experimental data are given for the statistical characteristics of random fields of wind velocity and turbulent fluctuations of temperature in the lowest layer of the atmosphere. Components of wind velocity u, v, w, along the Descartes coordinates x, y, z and temperature T are considered as the random functions of the coordinates x, y, z and time t . The fluctuations are considered on one and two space points so that the values of u, v, w and T can be considered as stationary. Therefore, when the mean direction of wind is represented by the axis x , the expression (1) can be formulated. The relation of the turbulent friction T to the turbulent heat flow q can be defined as Eq.(2). The expressions "speed of friction" v = (t/p) and

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"temperature flow" $q/c_p\rho$ are introduced in order to define the distance L (Eq.3, where κ and α are constants). The mean values of the wind velocity and temperature are expressed as Eq.(4) where z_0 - "degree of roughness" of the ground surface. Two conditions of the stratification are expressed by: q<0, L>0, T>0 - stable, q>0, L<0, T<0 - unstable. The universal function $f(\zeta)$ is related to the Richardson No. as shown in Eq.(5) and its properties are shown in Fig.1. The turbulence coefficient (7) can be found from the formula (6) by substitution of the formulae (2-5). The probability distribution of the values of fluctuation:

 $\frac{u'}{v}$, $\frac{v'}{v}$, $\frac{w'}{v}$ and $\frac{T'}{v}$ at a point in the space depends only on the vertical coordinate at the point $\frac{z}{v}$. As the distributions of $\frac{v'}{v}$ and $\frac{u'}{v}$ are symmetrical, their standard deviations $\frac{\sigma_u}{v}$, $\frac{\sigma_v}{v}$, can be defined. The Card 2/10

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relations of $\frac{\sigma}{v_{s}}$ to Ri are shown in Fig.2. The examples of

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the probability distribution of w in the unstable (a), indifferent (b) and stable (6), stratifications are shown in Fig.3. As can be seen from the graphs and table on p 292, the asymmetry of distribution of w increases with an increase of the unstable conditions. The kinetic energy of the turbulence can be calculated from Eq.(3). Some of the results are shown in Figs.4 and 5. The second moments of u', v', w' and T' can be taken as in Eq.(2). The correlation coefficients $r_{u,w}$ and $r_{w,T}$ can be expressed as the function ζ (or Ri) (Fig.2, d, e). The third moment can be written as Eq.(9) and is related to the z' component of the turbulent energy flow. The third moment is included in the equation of equilibrium of the turbulent energy into heat.

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From Eqs. (2-4, and 9) the Eq. (11) can be formed, showing that the determination of vertical diffusion of turbulent energy, the values $D'(\zeta)$ and $1/\kappa$ $f'(\zeta)$ should be equal. In order to facilitate the calculations the 2-point method is introduced. Thus, between the two points of flow the difference of wind velocities and temperature can be shown as Eq. (12) or Eq. (13). The mean squares of the Eqs. (12) and (13) are given in Eq. (14), where ΔT_i , Δ

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The parameters of turbulence in relation to the inert interval, ϵ and N , depend on the height z . These parameters are defined in Eqs.(16) and (17) (N - the molecular the differences in space can be found by considering the

 $\frac{\Delta_{\rm U}}{(5\varepsilon)^{1/4}}$, $\frac{\Delta_{\rm T}}{({\rm N}^2/{\rm E}^{-1})^{1/4}}$, which represent the

isotropic functions of the argument r/η , The spatial differences of wind velocity are represented by the components Card 4/10

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Au₁ = Au₁, Au₂ = Au_n, Au₃ = Au_p are the coordinates. The mathematical expectation of Au₁, Au_n, Au_p are equal to 0 and their 2nd, 3rd and 4th moment can be calculated from Eqs.(18), (19) and (20) where D_u and D_{nn} = D_{pp}, D_{lll} and D_{lnn} = D_{pp}, D_{lll} and D_{lnn} = D_{lpp}, D_{lll} and D_{lnn} = D_{lpp}, D_{lll} and D_{lpp} and D_{nnnn} = D_{ppp} = 3D_{lnpp} are not equal to zero (Eqs.21, 22 and 23). Due to isotropy, all the odd moments of the bi-dimensional distribution of Au_p and Au_p are equal to zero and from among even ones only the type (24) of moment is not zero. Therefore, Au_p and Au_p are not independent, i.e. their distribution is normal. The function (18) can be solved by the application of the formula (25) derived from the Eqs.(21) and (22). The

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value $D_{nr}(r)$ can be found from Eq.(26) which becomes Eq.(27) in the case of the indifferent stratification, i.e. small $|\zeta|$. Fig.7 shows graphs based on the formula (27) for the distances r=2-60 cm and height z=3/2, 3 and 15 m. Similarly, the spatial difference of temperature can be determined. The case of the values of Δ_u and ΔT being not independent can be seen from the formula (28). The difference of temperatures is calculated from Eq.(31) which becomes Eq.(32) for the indifferent stratification (small $|\zeta|$). The solution of the structural functions (the 2nd moments of the differences (13)) can be found from Eqs.(33) and (34). However, it is possible to replace them with the correlation functions of the type $b_{ww}(0) = w'(t)w'(t+0)$ when the relation (35) is considered. An example of the function $R_{ww}(0)$ is shown in Fig.9. The magnitude of the turbulence f can be calculated from the formula f = f(x), where f(x) = f(x) universal function. It was found that it is possible to consider the various characteristics of turbulence from its spectral

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properties. Thus the spectral horizontal separation can be determined from the formula (36), where p - horizontal vector of waving, A₁(P; z, t), A_T(P; z, t) - spectral measurements as defined by the expressions (37). The formula (38) can be derived from Eqs.(36) and (37) where S_{ij}(p, z) is waving density. The spectral functions S_{TT}(p, z) are continuous on p, as shown in the relation (39) for the horizontal vector r. The formulae (40) and (42) are derived for r = (r₁, 0, 0). The spectrum of the locally isotropic turbulence can be found from the formulae (43-45) and (48) where the structural functions D_{ij}(r) and D_{TT}(r) are expressed in terms of spectral density E(p) and G(p) in the formulae (46) and (47). The values of spectral densities can be found from Eq.(49). It can be added that the formula (50) which is derived from the Eqs.(48) and (49)

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知是計**時,但此例用30月的時期的經濟時,最新海流域的**認識的影響的影響的影響的影響。如何是現場的學可與

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represents a detailed form of the expression (42). spectral separation of time can be derived from the formulae (51) and (55). The Eq. (56) is the detailed form of the Eq. (55). Notations are: $\alpha_i(\Lambda, X)$ and $\alpha_T(\Lambda, X)$ - spectral measurements, $\sigma_{i,j}$ - time spectral tensor, $\sigma_{TT}(\geq 0)$ spectral density of the temperature field. σ_{iT} - spectral density of U_i and T . The spectral analysis can be performed experimentally by means of a device (e.g. thermoansmometer) which could express the meteorological data as the fluctuations of the electric current. The frequency Al could be obtained and thus the expressions (59) and (60) evaluated. The spectral functions could be calculated from Eqs. (62). Some results of the latter formulae for the low, medium and high winds are shown in the table on p 311, where - energy of vertical fluctuation, q - heat flow, t - friction. The method of spectral analysis can be employed for the determination of the dispersion, the 2nd moment (i.e. spectral function) and the various other characteristics such as anisotropy of spectral components

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$$\frac{\sigma_{v}(\Delta \lambda)}{\sigma_{u}(\Delta \lambda)}$$
 and $\frac{\sigma_{w}(\Delta \lambda)}{\sigma_{u}(\Delta \lambda)}$

字的"公<mark>日基本的对抗国用控制和特别的运输,这么可能要</mark>有效的运输和影响。""在大约之间,这个特别,这个时间,这个人可以是一个人的一个人的一个人的一个人的一个人的一个人的

or the vertical turbulent flow of the energy q, i.e. the calculation of the 3rd moment of spectral component of the velocity (Eq.63). The problem of structure of the atmospheric turbulence cannot be solved without considering other factors such as pressure, turbulent acceleration and diffusion or the waving fluctuations. The structure of the pressure field can be expressed by the formula (64), while the turbulent acceleration can be found from the formula (65). The turbulent diffusion can be expressed as the coefficient k~14/3 (Ref.54) or from the formula (66) (Refs.56, 59), where the intensity G of concentration is taken into account. This concentration can be defined as the function (67) (Ref. 60). Changes in the atmosphere due to turbulence, cause fluctuations of the amplitude of the acoustic or electro-

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magnetic waves. The propagation of waves in these circumstres can be calculated from the expressions (68) or (69) and (70). The last formula allows the finding of the statistical characteristics $\phi(r)$ when the characteristics $\mu(r)$ are known. Then the function of the refraction coefficient can be found from Eqs.(71) and (72). The correlation between the refraction coefficient and the fluctuation of temperature or humidity can be calculated similarly (Ref.83). There are 9 figures, 1 table and 85 references, of which 45 are Soviet.

SUBMITTED: March 28, 1958.

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49-58-4-7/18

AUTHOR: Monin, A. S.

TITLE: The Change of Pressure in a Baroclinic Atmosphere (Izmeneniya davleniya v baroklinnoy atmosfere)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, 1958, Nr 4, PP 497-514 (USSR)

ABSTRACT: Electronic computers have made it possible to integrate the hydrodynamic and thermodynamic equations numerically to obtain values for the pressure, temperature and wind. Attempts have been made in many countries to simplify the dynamical equations of the atmosphere by the quasigeostrophic approximation. This uses the fact that the pressure gradient and the Coriolis force almost balance so that the relative acceleration of the air particles is small compared with the Coriolis acceleration. In this case, the wind is close to the geostrophic. The author reviews the main progress in the theory of pressure changes. I. A. Kibel put forward the idea of a quasi-geostrophic approximation in 1940. In 1949, A M. Obukhov gave a much fuller account connecting the pressure field and the wind field. Obukhov showed, in the simplest case of a barotropic atmosphere, that, at the break-

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down of geostrophic conditions, high-velocity waves are generated. As a result, the pressure field adapts itself to the velocity field. The transfer of velocity vortices seems to be a basic factor in the change of velocity and presque with time. The basic results for the geostrophic approximation in a baroclinic atmosphere were obtained in the USSR by Obukhov and also, independently, by N. I. Buleyev and G. I. Marchuk. They were also derived in other countries. The author now gives the baroclinic work in detail, starting with the dynamical equations of the atmosphere in the quasistatic approximation. There are many problems (slow synoptic processes, high frequency perturbation processes, etc.) in which vertical motion of the air particles can be represented by static equations. In the quasi-static approximation the vertical velocity of the disturbance is infinite. In this system a change of coordinates is possible - a non-stationary set given by the x- and y-planes and the isobaric p-plane. p is now the independent variable and the new function in the dynamical equations is the height of the isobaric surface, i.e., z = z(x, y, p, t). The author gives the equations in this system. They include an Card 2/11 important coefficient, α^2 , the baroclinic parameter, which

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is considered constant in subsequent work (in the troposphere α^2 changes slowly and is approximately equal to 0.1). The Coriolis coefficient is taken to be constant. Five equations are derived: (1) projected motion on the x and y coordinate axes, (2) the equation of continuity (the simple form obtained is one of the advantages of the non-stationary coordinate system), (3) heat flow equation, (4) the hydrostatic equation, and (5) the Chapeyron equation. There is a simple transition in the limiting case from the baroclinic to the barotropic atmospheres. This occurs when $\alpha = 0$ and the density and the pressure are related adiabatically. The greatest use of the non-stationary coordinate system is the reduction from six equations in u. v. w, p. and T to four in u. v. w*(= dp/dt) and z . Also, w* can be easily eliminated by integrating the continuity equation with the boundary conditions, w*-) 0 as p \rightarrow 0 and w \rightarrow 0 as $z\rightarrow$ 0. Substitution is made in the resultant expression not for z=0, but for a nearby isobaric surface p=p at height z^4 . The fact that it is impossible to use the boundary condition z=0 (at the Earth's surface) is the major drawback of the stationary method. The boundary

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expression thus obtained, together with the dynamic (with we eliminated) are the basic equations for a baroclinic atmosphere. The author next introduces dimensionless quantities which we dependent on a characteristic horizontal length and velocity. In high-frequency perturbation processes, the length used is that introduced by A. M. Obukhov and the velocity is that of sound. In synoptic processes, the length ~100km and the velocity ~10m/sec. The author introduces two ratios expressed in terms of these quantities — and β — ε represents the ratio of the characteristic relative vortex motion and the transfer motion and β represents the influence of the two-dimensional compressibility of the medium (i.e., the deformability in the horizontal plane). In synoptic processes, ε~10-1 and β<1; for high-frequency perturbations, ε = β = 1. The equations for a baroclinic atmosphere in a dimensionless form are next used to obtain expressions for the vertical component of the relative turbulent velocities and for the horizontal divergence of the velocity. An expression is then derived for the change of 3z/3p with time. This is referred to as the change of pressure equation. High velocity perturbations generated in the atmosphere are due to differences b tween

出生的是用用作用用的。如果这种是一种形式的表现是不是一种,但是一种形式的,但是一种形式的,但是一种形式的一种形式的一种形式的一种形式的一种形式的一种形式的一种形式

49-58-4-7/18 The Change of Pressure in a Baroclinic Atmosphere. case will have $\varepsilon = \beta = 1$. It is assumed that the waves are of small amplitude so that non-linear terms can be ignored and the total differential can be replaced by the partial differential. An integral expression for 82/8t is then derived. At this point, stream and potential functions, ϕ and ϕ are introduced, equations in terms of ϕ , ϕ and z (all as functions of x , y and p) are obtained. The equations are not altered by adding an arbitrary function of p hence they are so chosen that z(x, y, p, t) represents deviation of height of isovario surface from standard corresponding to hydrostatic equilibrium. The equations have a family of stationary solutions for each of which $\overline{\phi}\equiv 0$ and $\overline{\phi}\equiv \overline{z}$:- equivalent to a theorem by Jeffreys that in the field of a geostrophic wind the pressure does not change. It is sufficient, for stationary solutions to fulfil the condition $\phi = 0$. The author shows that this condition together with ϕ z need only be fulfilled at one fixed moment of time. There ere also non-stationary solutions for which the potential turbulence is identically equal to zero - this is called. Det 1 5/11

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after Obukhov, the wave solution. The solutions of the equations for arbitrary initial values can be written as a sum of stationary solutions. The conditions under which high velocity perturbations will not be generated are expressed by the formula for the geostrophic wind. On the other hand, deviations of the wind from the geostrophic must generate these perturbations. If at the initial moment of time, the wind, in a limited region of space, deviates from the geostrophic, then the resultant perturbations will die away with time, so that the initial energy is dispersed throughout all the volume. This provides a mechanism for the pressure to adjust itself to the wind. Obukhov gave the solution for a barotropic atmosphere while I. A. Kibel considered the case of a baroclinic atmosphere. The latter ignored, however, the waves which arose most rapidly. The author describes the limiting stationary state which the atmosphere approaches under the given initial conditions. This is characterized by a stream function ϕ which is defined in terms of $\overline{\phi}$ an integral function of $\overline{\phi}$ and p. This integral is then transformed by the introduction of a source function in the same variables. Next, the high velocity waves are described Gord 6/11in terms of a perturbed velocity potential. A function Q

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similar to $\overline{\phi}$ (and a function of p and the perturbed velocity potential) - is defined and ther transformed into an integral of the same source function. The expression in this case describes two types of waves - the first arises in a barotropic atmosphere during the breakdown of the geostrophic balance, whilst the second corresponds to a slower wave which does not occur in a barotropic atmosphere. The author then takes the limiting case, $\alpha \rightarrow 0$, in the formula for the barotropic atmosphere. Φ and Φ go in the limit to the stream and velocity potentials, and the source function becomes a cylindrical function. The equation for the waves becomes in the limit the usual wave equation together with a factor representing the effect of gyroscopic rigidity. (The simplifications made by I. A. Kibel were such that, when a->0, the corresponding functions tended to zero rather than their values in a barotropic atmosphere). During the adjustment of pressure to wind, the velocity changes relatively little whilst the press distribution changes quickly, approaching that connected with the geostrophic wind. With given values of the parameters it is calculated that the kinetic

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energy in the process of adjustment decreases by 3% due to wave formation and creation of non-uniform pressure. It has been shown that in the linear approximation the atmospheric motion, corresponding to fixed initial conditions, consists of two components (stationary and wave motion). In the real atmosphere, inertia (corresponding to non-linear terms) constantly causes a deviation of the wind from the geostrophic, leading to a generation of waves and, hence, energy dissipation, i.e. corresponding to the stationary solutions of the linearized equations are the quasi-stationary solutions of the non-linear equations which describe the slow change of the corresponding velocity and pressure fields. Unly such slow processes ere of interest for synoptic meteorology. In order to separate the quasi-stationary solution of the non-linear equations, use is made of the fact that the velocity field of this solution must be close to the geostrophic wind field and, in particular, the potential component of the velccity field must be small in comparison with the solenoidal component. This is defined more precisely using the dimensionless equations L and U which characterize synoptic processes. The velocity Sard 8/11 functions are of the order of unity. This gives small dimen-

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sionless deviations of the wind from the geostrophic and provides a criterion for the separation of the quasi-stationary solution from other solutions. The quasistationary solution (u, v, z) can be found in terms of an asymptotic series in E the chief members of which are connected by the relationships of the gecstrophic wind. Such series are called the quasi-geostrophic resolution. From this, the wind field can be calculated from the pressure field with an accuracy of we'. The author obtains an equation for ϕ in terms of z and ε , which he calls the balance equation. The determination of the wind field from the pressure field, with the help of the balance equation, is considerably more accurate than from the formula for the geostrophic wind. If we assume $\varepsilon = 0$, the system of dynamical equations for the atmosphere simplify. This is called the quasi-geostrophic approximation. Equations are obtained for $\frac{\partial z_0}{\partial t}$ in the case of a barotropic atmosphere $(\alpha = 0)$ when the partial differentials of z with respect to x, y and t are independent. The equation is linear Lahomogeneous of an elliptic type. In the case of a baro-clinic atmosphere the equation for \$20/0t shows that the

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rate of change of \$20/8t with pressure depends on the turbuleut eddy transfer and also the temperature transfer. This is expressed in two equations containing the source function. This consists of two factors, one, the solution of an inhomogeneous equation with homogeneous boundary conditions and the second a solution of a homogeneous equation with inhomogeneous boundary conditions. To obtain further accuracy an analysis is made of the divergences in the calculations: (1) An insufficiency and inaccuracy of data on the pressure, temperature and wind fields, which necessitates interpolation between data from neighbouring meteorological stations and correcting of dubious data. For this end, a method of conjective analysis has been worked out. In this the neceasary data at each fixed point are determined by a statistical method from the data supplied from surrounding stations and known from previous periods of time. (2) Errors connected with the mathematics, e.g., exchange of

integrals by finite sums and of differential operators by

differences.

(3) The physical limitations of the theoretical work. These include increases of accuracy due to introducing: a correct-Gord 10/11an to the quasi-geostrophic approximation (e.g. more numbers

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in the series), a change of the baroclinic parameter, a with space and time, and a consideration of non-adiabatic factors - turbulent friction, thermal conductivity and radiational energy sources (including the screening action of clouds, the consequences of phase changes in the water the pour and the influence of the Earth's relief). There is I

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vapour and the influence of the Earth's relief). There is I is like and 12 Soviet. 4 English references.

ASSOCIATION: Akademiya nauk SSSR, Institut Fiziki Atmosfery (Academy of Sciences USSR, Institute of Physics of the Atmosphere).

SUBMITTED: April 26, 1957,

1. Atmosphere—Pressure 2. Atmosphere—Mathematical analysis 3. Mathematical computers—Performance 4. Atmosphere—Mateorological factors

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807-49-58-6-4/12

AUTHORS: Kazanskiy, A. B. and Monin, A. S.

TITLE: Turbulence in the Surface Layers of the Atmosphere and in the Presence of Unstable Stratification (O turbulentnom reshime v prizemnom sloye vozdukha pri neustoychivoy stratifikatsii)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, 1953, Nr 6, pp 741-751 (USSR)

ABSTRACT: It is important in many practical cases to determine the basic properties of turbulence from changes in gradients (e.g. of air temperature). A. M. Obukhov and A. S. Monin have put forward a suitable representation (Refs.1-5) based on similarity theory. In their theory a stationary turbulent regime is represented by the following parameters: v, - the frictional velocity; q - the turbulent heat flow (or q/cp; where c and p are the specific heat and air density, which can be considered standard) and g/To, where g is the acceleration due to gravity and To is the average air temperature in the surface layers. From these parameters, a scale length, velocity and temperature can be defined:

$$L = -\frac{\sqrt{2}}{\kappa \frac{\sigma}{T_0}} , \quad V = \frac{\sqrt{\kappa}}{\kappa} , \quad T_{\infty} = -\frac{1}{\kappa v_{\infty}} \frac{\sigma}{\alpha c_p \rho}$$
 (1)

where κ is the Karman constant; $\alpha = K_T/K$ is a universal dimensionless constant; K_T is the turbulent heat conductivity coefficient and K is the turbulent viscosity coefficient. For wind velocity ν and air temperature τ as functions of height τ and thermal stratification of the atmosphere, Eqs.(2) and (3) result. Where τ is the roughness height, τ is a universal function with an undefined constant term (since it only enters as a difference). Eqs.(2) and (3) give Eq.(4) for the Richardson number. For small values of the argument, τ is the form Eq.(5). The existence of a universal function τ is the form obtained). The form of τ in cases of stable stratification was studied in (Ref.6). This article studies the form of τ in unstable stratifications

(q>0 and, hence, L<0 and $\xi = z/L < 0$)

1. Free Convection. From Refs.1-5, it follows that consideration of the asymptotic form of the wind velocity profile at great heights in an unstable stratification (i.e. determination of the asymptotic form of f(E) for large negative

values of \$\forall \text{ is equivalent to consideration with fixed z and q>0. y>0. Thus in an unstable stratification, the turbulent regime at great heights approximates to that of purely thermal turbulence without wind (i.e. free convection). For free convection, y = 0 and the turbulence characterised by the parameters \(\begin{align*} \frac{1}{2} \\ \end{align*}, \quad \frac{1}{2} \\ \end{align*}, \quad \text{q/c}_p \end{align*} \(\text{turbulence} \) obtains energy only from the thermal stratification instablished parameters. It is impossible to form a scale length from

obtains energy only from the thormal stratification instablished parameters. It is impossible to form a scale length from binations of q/c_pP, p/m_o and n. In particular Eq.(6) is obtained for T(z) there are the second of th

Eq.(6) is obtained for T(z): where c is a universal dimensionless constant (>0); T_{∞} is a constant with dimensions of temperature and the factor $\frac{1}{|t|^2}$ is

introduced for convenience in future calculation Eq.(6) can be rewritten in the form shown:

$$\frac{T(z)-T(z_0)}{T_{\infty}} = c\left(\frac{z}{L}\right)^{-1/3} - c\left(\frac{z_0}{L}\right)^{-1/3}$$

which, on comparison with Eq.(3), gives the asymptotic form Eq.(7) for $f(\xi)$ as $\xi \to -\infty$. Eq.(6) shows that, as the height increases, the temperature distribution approaches the isothermal. This is natural since, for an unstable

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tratification, the turbulent elements reach a great size at large heights, producing mixing which levels out the temperature profile. Differentiating Eq.(6) with respect to z gives Eq.(8), which gives Eq.(9) for the turbulent heat flow, q, in free convection. It follows from Eq.(8), that, in such conditions, the turbulence coefficient (Eq.10) grows rapidly with height, due to the increase in the turbulent lements and the increase in the intensity of the pulsations (proportional to z''). The turbulence scale length, fis distinguished from z only by a numerical factor, which is denoted by κk_{∞} . Putting $f = \kappa k_{\infty} z$ and assuming that in free convection $f = \kappa k_{\infty} z$ and assuming that in free convection $f = \kappa k_{\infty} z$ and assuming that in free convection $f = \kappa k_{\infty} z$ are a discrete spectrum of turbulent scale lengths, whereas the authors use a continuous spectrum. To determine the turbulent heat flow q and the exchange coefficient $f = \kappa k_{\infty} z$ and $f = \kappa k_{\infty} z$ and the exchange coefficient $f = \kappa k_{\infty} z$ and $f = \kappa k_{\infty} z$ and the exchange coefficient $f = \kappa k_{\infty} z$ and $f = \kappa k_{\infty} z$ and

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Eq.(5) an expression for ΔT is obtained which gives Eq.(11) for q. Thus q is differentiated from

H*[ΔT]* only by a constant, universal (but not dimensionaless) factor. Substituting in Eq.(10) z = H and the value of q from Eq.(11), Eq.(12) is obtained. Hence K(H) is distinguished from H*[ΔT]* only by a constant universal factor. Taking κ = 0.43; α = 0.8; c = 1 from the experimental data given below, and putting T₀ = 300°C (ΔT in °C, H in metres) Eqs.(13) are obtained.

2. The general case of an unstable stratification. In considering the form of f(f) in this case, it is convenient to consider the function F(Ri) - Eq.(14) - introduced by Priestley (Ref.9) and constructed on the basis of measurements made by Swinbank (Ref.10). These results were confirmed by

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Farior (Ref.11) and Priestley (Ref.12). Using Eqs.(1) and (3), F(Ri) and f(ξ) are found to be connected by Eq.(15). Yormula (4) and (5) indicate that, for small |ξ| f'(ξ) ≈ 21/ξ and Ri≈ξ/α. If the asymptotic formula (7) for f(ξ) at large |ξ| , Eq.(16) is obtained for F(Ri) at small and large |Ri| . The first of these asymptotic formulae corresponds to a logarithmic law for the wind relocity and temperature profiles (i.e. acts at a fixed LO for small heights z). If function F(Ri) is plotted on a graph with |ξ|Ri| as the abscissa and |Lξ|F(Ri) as the ordinate the asymptotes of F(Ri) in terms of Eq.(16) will be two intersecting straight lines: for small |Ri| with slope -1/2 and for large |Ri| parallel to the axis with an ordinate F_m.

F(Ri) must decrease monotonically as |Ri| increases since |F(Ri) > F_m . The asymptotes of F(Ri) intersect at a point given by Eq.(17). Empirical data indicate that |Ri| is of the order of several hundredths; but the empirical graph siven by Obukhov-Monin indicates that f(ξ) at e.g.

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[Ri] is practically given by a logarithmic law. Hence for [Ri] [Ri] . F(Ri) practically coincides with its asymptote $F(Ri) = \kappa^2 \alpha [Ri] T$. If $[Ri] \setminus [Ri]$ it follows further, that $F(Ri) = F_{co}$, i.e. practically coincides with the second asymptote. Hence, the transitional zone between the two regions must be negligible. If:

for unstable stratification with z<L, the profiles of wind velocity and temperature are described by a logarithmic law and with z L, the mixing mechanism is almost the same as in free convection. Neglecting any transitional region between the two limiting conditions and changing from Card 8/16-25

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F(11) to f(ξ) (considered continuous), the interpolation include (Eq.18) are put forward. Fig.1 gives an empirical pulph of F(Ri) according to Taylor (Ref.11). The mean square deviation (indicated by the lines) is quite large. (Priestley stated the pulsational method of measuring the turbulent heat flow was insufficiently sensitive at high frequencies). Nevertheless, the points define the two regions quite accurately. The parameters on the graph are [Ri] and For from which, knowing κ, the constants α and c can be calculated from Eqs.(16) and (17). Priestley (Ref.9) obtained the value 0.68 for For (which he considered too low), whilst Taylor obtained 0.79 ± 0.04. In (Ref.12), Priestley estimated a value 0.8 - 1.0. The value of [Ri] lies in the interval 0.025-0.04. The authors find a value for α of 0.82 (the accuracy being small, however) and they use values c = 1, α = 0.8, κ = 0.45, which gives results in Eq.(18) agreeing with the empirical graph for f(ξ) of Obahov and Monin. Calculation of the straight lines in the method outlined above was carried out by several authors before

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Priestley. Thus Pasquill (Ref.13) published graphs of the function (19), where R is the evaporation rate, χ the absolute humidity and α_1 the ratio of the exchange and

motion coefficients. Pasquill's measurements were repeated by Rider (Ref.14), who also drew graphs of the function (20). Values for the turbulent frictional stress, $\tau = \rho v^2$,

were determined by Rider, using a direct, dynamometric method, first suggested by Sheppard. Finally, Deacon (Ref. 15) drew graphs of the function (21), where χ_{k} is deter-

mined by a pulsational method. (The functions $F_1(Ri) - F_4(Ri)$ are connected with Priestley's function as shown). Although all this experimental material could be collated it is in such poor agreement that further experimental data is required. Functions $F_3(Ri)$ and $F_4(Ri)$ are particularly suitable for determing $\kappa - F_2(0) = \kappa^2$;

 $F_4(0) = \kappa$. The value $\kappa = 0.4$ seems to be in good agreement Card 10/15/5

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在全种中**国生物的共和国企业的 医感觉的 BBB或用的中国**对于特殊的企业的主任的主体。大学不同心的主体定用的国际,大学的自然的原则的大型的主义。如果**在工程的中国的特别的企业**的

Interpretation of gradient measurements. To determine L_s V_k and q, a method similar to that in Ref.6, for stable stratification, is used. Suppose v(H) and $\Delta T = T(2H) - T(H/2)$ have been measured and z_0 is known. (The latter is sormally obtained by extrapolation to zero of the velocity of the wind velocity profile). The Richardson number (Eq.22) is first calculated from the gradient measurements. Futting $L_1 = L/H$ and using Eqs.(1)-(3), Eq.(22) can be written in the form Eq.(23). Substituting Eq.(18) in this equation, L_1 can be determined from B and C_0 . Fig.2 gives a nomogram for determining L_1 from B and C_0 as derived from Eqs.(23) and (18). For large negative values of L_1 .

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$$G = -\frac{2^{\frac{1}{3}} - 2^{-\frac{1}{3}}}{c(1 - (0^{-\frac{1}{3}})^2)} L_1^{-\frac{1}{3}}$$
. In determining the

frictional velocity v_{χ} , Eq.(24) (derived from Eq.2) can be used, and a nonogram for v_{χ}/v can be derived from b and b0, using Eq.(18) (Fig.3). For large negative values

of L $\frac{v_{\kappa}}{v} \sim \frac{\kappa}{\ln 1/\zeta_0}$ and for small negative values

$$\frac{v_{\perp}}{v} \sim \frac{\kappa}{c(1-\zeta_0\sqrt{\epsilon})} \quad L^{-\sqrt{\epsilon}} \quad . \quad \text{Using Eqs.(1)-(3), Eq.(25)}$$

is obtained for the turbulent heat flow. Fig.4 gives the Card 12/16/4-

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honogram for q/ανΔ . For heights of measurement higher than the dynamical turbulence layer. Eq.(13) can be used for determining q and K if the condition Eq.(26) holds. Values of Eq.(26) are given in a table. Swinbank's results confirm Eq.(13) and the numerical coefficient (0.14) therein used. Fig.5 gives a nomogram for calculating Eq.(13) (the obscissa is [ΔΤ] in degrees and the ordinates, q in [Δ1/cm/min and K m²/sec). The continuous line represents neasurements of q at H = 1 and 2 m, and the dotted line represents K(H) at these heights.

4. Scale of turbulence. As shown above L = κλ z.

According to similarity theory, in the case considered.

L = κλ(3/L)z (where λ(0) = 1 and λ(-∞) = λ...). To determine λ(ξ) and in particular λ..., Eq.(27) (used in Refs.1, 2 and 6) is employed. Deleting K , using Eqs.(1).

(3) and substituting L = κλ(ξ)z , gives Eq.(26). For small negative values of ξ , it is found from Eq.(5) with β = 0.5

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that:

$$\ell = \kappa z \left[1 - \frac{2}{20} - \frac{z}{L} + o\left(\frac{z^2}{L^2}\right) \right]$$

For large negative values of ξ , it is found from Eqs.(7) and (28) that:

$$\lambda(\xi) = \left(\frac{3}{c}\right)^{\frac{3}{4}} \left(1 + \frac{c}{3} \xi^{-\frac{4}{3}}\right)^{-\frac{1}{4}}$$

Thus $\lambda_{\infty} = (\frac{5}{2})^{\frac{5}{4}}$. If c is close to unity λ_{∞} is close

to 1/k and, hence, in free convection, L is asymptotically equal to z. Substituting in Eq.(28);
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$$f'(\xi) = \begin{cases} \frac{1+\beta\xi}{\xi} & (\xi_1 \leq \xi \leq 0) \\ -\frac{c}{3} \xi^{-\frac{c}{3}} & (\xi \leq \xi_1) \end{cases}$$

where ξ_1 is determined from the fact that $f'(\xi)$ must be continuous), Fig.6 is obtained for the function $\mathcal{L}/z = \kappa\lambda(\xi)$. This represents the growth of turbulent elements with height for unstable stratification. There are 6 figures, 1 table and 15 references, 8 of which are Soviet and 7 English.

28, USSR - Last of atmosphere Physics

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AUTHOR: Soin A 3

TITIE: The Bre-calculation of Zonal Circulation Characteristics of the atmosphere (o predvychislenii kharakteristik zonal'noy tsirkulyatsii atmosfery)

PERIODICAL: Investiya Akademii Hauk SSSR, seriya geofizicheskaya, 1958, Nr 10, pp 1250-1253 (USSR)

ABSTRACT: The evolution of atmospheric processes depends on the energy sources and currents rather than on the initial conditions. If the scale is large enough, however, these energy sources can be ignored. Although the inaccuracy in the initial data leads to errors increasing with time, these inaccuracies usually concern small-scale processes. Hence, long-range forecasts just be based mainly on the large-scale processes, although the small-scale processes must still be considered as fluctuations on the main process. It is considered as fluctuations on the main process. It is possible, in principle, to obtain equations from the dynamic equations for the macrocomponents (analogous to Reynold's equations in turbulence theory) together with subsidiary equations for the microcomponents (analogous to the Friedman-keller equations in turbulence theory). This approach is applied to the prediction of sonal circulation characteristics. This requires simultaneous examination of the zonal

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streaming characteristics (Ref.1) and the statistical characteristics of azonal disturbances (Ref.2). The author writes the dynamical equations in the idealized forms Eqs. (1), (2) and (3) (the symbols have their normal significance—u, V being the velocity components along latitude and longitude). The monal circulation provides the macrocomponents of the atmospheric processes. Then the azonal (varying with longitude) processes form the microcomponents. The macrocomponent characteristics can be obtained by averaging over a circle of latitude (denoted by a bar). The microcomponents (denoted by a dash) are considered as accidental fluctuations. Using these definitions in the dynamic equations gives (I) and (2) as the macrocomponent equations and (1'), (2') and (3') as the microcomponent equations. The circulation index a(= u/R sin & is now introduced. For ease of calculation, Eqs.(1')-(3') are used only for determining the statistical characteristics of the microcomponents

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