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NOVOROSSIYSK BORA DURING THE WARM TIME OF THE YEAR,(U)
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FOREIGN TECHNOLOGY DIVISION

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by

M.A. Masterskikh

EDITED TRANSLATION

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U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	*А а*	A, a	Р р	*Р р*	R, r
Б б	*Б б*	B, b	С с	*С с*	S, s
В в	*В в*	V, v	Т т	*Т т*	T, t
Г г	*Г г*	G, g	У у	*У у*	U, u
Д д	*Д д*	D, d	Ф ф	*Ф ф*	F, f
Е е	*Е е*	Ye, ye; E, e*	Х х	*Х х*	Kh, kh
Ж ж	*Ж ж*	Zh, zh	Ц ц	*Ц ц*	Ts, ts
З з	*З з*	Z, z	Ч ч	*Ч ч*	Ch, ch
И и	*И и*	I, i	Ш ш	*Ш ш*	Sh, sh
Й й	*Й й*	Y, y	Щ щ	*Щ щ*	Shch, shch
К к	*К к*	K, k	Ъ ъ	*Ъ ъ*	"
Л л	*Л л*	L, l	Ы ы	*Ы ы*	Y, y
М м	*М м*	M, m	Ь ь	*Ь ь*	'
Н н	*Н н*	N, n	Э э	*Э э*	E, e
О о	*О о*	O, o	Ю ю	*Ю ю*	Yu, yu
П п	*П п*	P, p	Я я	*Я я*	Ya, ya

*ye initially, after vowels, and after ъ, ь, й elsewhere.
When written as ё in Russian, transliterate as yё or ё.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	sinh^{-1}
cos	cos	ch	cosh	arc ch	cosh^{-1}
tg	tan	th	tanh	arc th	tanh^{-1}
ctg	cot	cth	coth	arc cth	coth^{-1}
sec	sec	sch	sech	arc sch	sech^{-1}
cosec	csc	csch	csch	arc csch	csch^{-1}

Russian	English
rot	curl
lg	log

NOVOROSSIYSK BORA DURING THE WARM
TIME OF THE YEAR

M. A. Masterskikh

Local hurricane wind - Novorossiysk bora - is observed most often during the cold months of the year (form October to March). The distructive nature of winter bora and the synoptic conditions of its development are described in detail in [1-3]. The scientific literature is virtually devoid of the information on the Novorossiysk bora during the warm part of the year (from April to September), even though, in its intensity, sometimes it is just as ferocious as the winter hurricanes. For example, between 15 and 17 of May 1966, the gusts of wind during bora reached 35-40 m/s in Anapa, Novorossiysk, Gelendzhik, and Tuapse. Damage was inflicted to the fruit trees, vineyards, lines of electrical communication were down, roofs were torn off, etc. Storm wind and waves beached a Greek merchant ship, which did not take the necessary precautions, at the Tsemesskaya Bay. The same hurricane bora hit the Black Sea shoreline in Caucasus (from Anapa to Gelendzhik at the end of May 1968. During this period, a cement plant in Novorossiysk did not operate and the loading of vessels at the sea port virtually stopped. Thus, even during the warm part of the year, the Novorossiysk bora can result in a considerable loss to national economy and endangers the small vessels sailing close to the shores.

This article examines the synoptic conditions under which boras develop during the warm part of the year; and, also, the method used to forecast this wind [4] is refined.

Nine cases of bora were recorded in the Novorossiysk region for six warm seasons (1966–1971), when the velocity of northeasterly wind was 30 m/s and higher (Table 1).

As one can see, bora did not occur only in 1970. It was observed once in 1966, twice during the other periods, and three times in 1967. Bora occurred also during the spring months (April-May), early fall (September), and in the middle of summer (July-August).

The analysis of the synoptic processes has shown that, in all nine cases, the Novorossiysk bora intensified to the level of hurricane when cold fronts passed through the indicated area of the Black Sea coast from the northeast. In this case, just as in winter, cold air shifted to the foothills of Caucasus from the regions of Western Siberia, Kazakhstan, or eastern regions of the European territory of the USSR.

Table 1

Data on hurricane bora in the Novorossiysk area

(a)	(b)	(c)	(d)	(e)	(f)	(g)
[illegible]		[illegible]				
[illegible]		[illegible]		[illegible]		[illegible]
[illegible]		[illegible]				[illegible]
[illegible]				31	1	
[illegible]						
1971	8.17		[illegible]		[illegible]	

KEY: (a) Year (b) April (c) May (d) June (e) July (f) August (g) September

We note that during the cold half of the year, frontal bora was observed only in 73% of the cases. The other cases of catastrophic bora are connected with the action of southern cyclones.

In order to predict the velocity of bora by the method proposed in [4], it is necessary to know the air temperature at the surface of 850 mb in Novorossiysk and behind the cold front as it passes through the area under the consideration. The speed of the thermal wind over

the mountains and the speed of the frontal bora on the coast depend on this difference in temperatures.

The air temperature in a homogeneous air mass over the Novorossiysk at the surface of 850 mb varies insignificantly over a 24-hour period, 1–2° on the average.

The cold air mass, which shifts to the spurs of the Caucasus Range, also undergoes small transformational changes at this level in the winter. Thus, during the cold part of the year, actual temperature values on the map AT_{850} in the Novorossiysk region and behind the cold front at a certain initial (prior to hurricane) observation period can be used to forecast bora for up to 24 h.

During the warm part of the year, transformation of cold air during its movement to the south is more noticeable than during the winter months (Table 2).

As can be seen from Table 2, the temperature of cold air, as it moves to the Black Sea coast of the Caucasus, rises by 5–7° in 24 h. The analysis has shown that the mean temperature difference at this surface is 14° twenty-four hours before the start of the storm. However, it drops to 8° when the cold front begins to pass through the Novorossiysk, in all cases examined by us. But even at these values, the velocity of bora increases to 30–35 m/s at the coast.

Thus, Novorossiysk bora attains the force of a hurricane not only in the winter but also in any month of the warm part of the year. It occurs primarily as the cold fronts from the northeast pass through the Novorossiysk region. To predict the velocity of bora by the method given in [4], it is necessary to take into account the transformation of cold air. The the surface of 850 mb the temperature of the cold air mass moving south rises by 5–7° in twenty-four hours on the average.

Table 2. Transformational temperature variation (in degrees) of cold air ($\Delta T_{тр}$) in 24 hours at AT_{850}.

Temperature	1966 г.	1967 г.			1968 г.		1969 г.	1971 г.	
	15 V	31 IV	7 и 15 IX	19 X	27 V	10 IX	31 VII	4 IV	17 IV
$T_{г.п.}$	0	−5	−3	−3	−1	−3	−1	−10	−4
$T_{конв.}$	7	−9	−4	−3	+5	−3	+6	−5	2
$\Delta T_{тр} = T_{конв.} - T_{г.п.}$	+7	−6	+7	−6	−6	+6	+5	−5	−6

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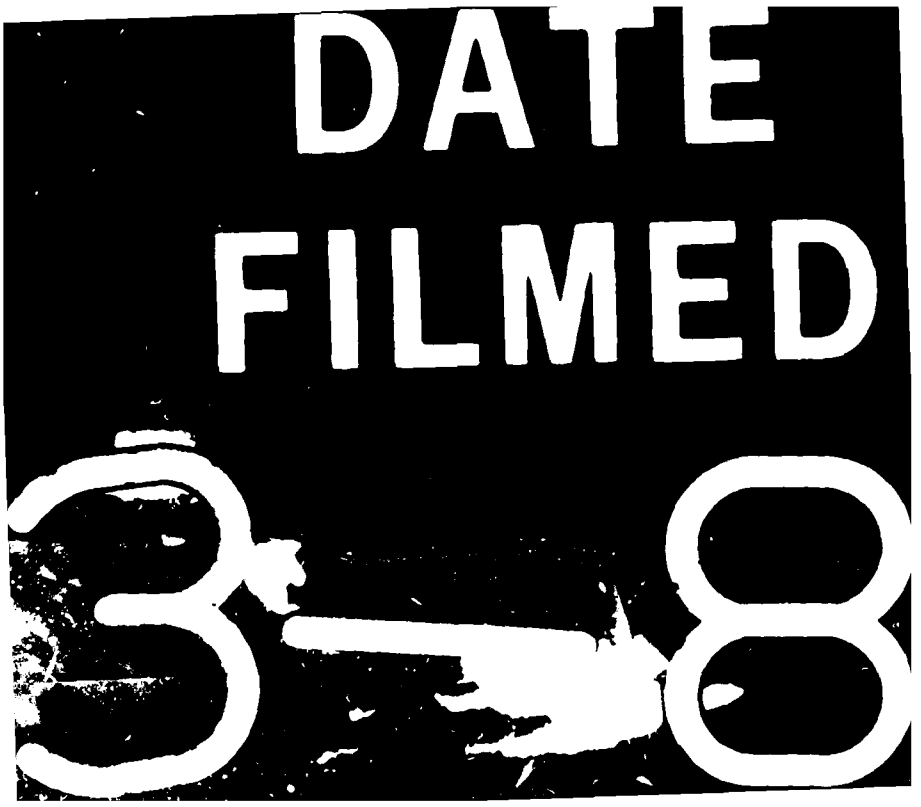
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