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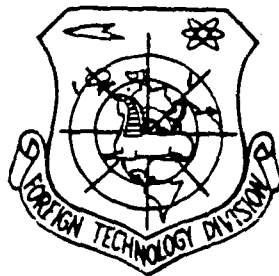
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USSR CLIMATE HANDBOOK

No. 27

Kamchatskaya Oblast'

Part 1. Solar Radiation, Radiation Balance and Sunshine



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USSR CLIMATE HANDBOOK, No. 27
Kamchatskaya Oblast'
Part 1. Solar Radiation, Radiation Balance and
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USSR CLIMATE HANDBOOK

No. 27

Kamchatskaya Oblast'

Part 1. Solar Radiation, Radiation Balance and Sunshine

Table II.

Широта, град. (2)	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
68	—	7.30	2.85	1.35	0.82	0.62	0.69	1.04	2.02	4.50	13.30	—
64	13.40	4.90	2.30	1.19	0.71	0.57	0.61	0.94	1.68	3.40	8.70	—
60	7.20	3.50	1.85	1.03	0.64	0.50	0.56	0.83	1.44	2.60	5.50	8.90
56	5.15	2.80	1.55	0.90	0.55	0.44	0.48	0.74	1.26	2.20	4.20	6.10
52	4.00	2.35	1.40	0.78	0.48	0.37	0.41	0.64	1.08	1.85	3.20	4.70
48	3.20	2.00	1.20	0.68	0.40	0.30	0.35	0.54	0.93	1.60	2.60	3.60

KEY: (1) Coefficient k. (2) Latitude, degrees.

Table III. Light equivalent of total radiation under a clear sky in kiloluxes per 1 cal/cm²·min.

(1) Высота солнца, град							
10	20	30	40	50	60	70	75
62 ± 5	66 ± 5	68 ± 4	70 ± 3	71 ± 3	71 ± 3	72 ± 2	72 ± 2

KEY: (1) Sun's elevation, degrees.

U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

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

*ye initially, after vowels, and after ъ, ь; e elsewhere.
When written as ѐ in Russian, transliterate as yë or ë.

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

GRAPHICS DISCLAIMER

All figures, graphics, tables, equations, etc. merged into this translation were extracted from the best quality copy available.

Accession For	
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Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution / _____	
Availability Codes	
Dist	Availability for Special
A-1	

... grass cover, Korf station - on a marine sand bar with sparse grass.

The solar radiation input is determined primarily by an astronomic factor - the length of the day and the sun's elevation.

The solar radiation that hits the Earth's surface is one of the basic climate-generating factors. It, in turn, greatly depends on the atmospheric circulation (manifested by cloud cover and atmospheric transparency) and the characteristics of the underlying surface (altitude above sea level, obscuration of the horizon, surface albedo).

The overall character of the circulation processes in the Kamchatka Oblast' is determined by its geographic position (the territory in question is located in the latitude zone between 65 and 51° NL). Its proximity to the cold Asiatic continent and the presence of large water surfaces cause monsoon circulation.

The annual input of direct solar radiation on a horizontal surface under a clear sky (i.e., the potential influx) is 105 kcal/cm² in the north (Korf station), increasing to 123 kcal/cm² toward the south. The annual amount of dispersed radiation under a cloudless (clear) sky is 27-28 kcal/cm².

The extensive cloud cover characteristic of the entire territory reduces the direct solar radiation influx in most of the regions to 65-75% of the potential level, while it increases the dispersed radiation to 65-100%. As a result, under actual cloud cover conditions, the total annual radiation input fluctuates within 84-95 kcal/cm², primarily increasing from north to south. The percentage of dispersed radiation is 50-60% for the majority of the territory. Since the decrease in direct solar radiation because of the cloud cover will be significantly greater on the south shore of Kamchatka (the Lopatka Cape region), as well as for the Komandorskiy Islands, the above data cannot be used to describe these regions.

The percentage of direct radiation (and, accordingly, dispersed) of the total radiation varies throughout the year (Table IV). In the northern and central regions of Kamchatka, the percentage of direct solar radiation during the period from November to February is low, 15-40%.

Table IV. Ratio of monthly amounts of direct radiation to total radiation (%).

Станция (1)	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
(2) Корф	30	38	43	43	46	47	44	46	49	49	29	17
(3) Ключи	18	31	42	38	41	43	44	46	42	48	35	27
(4) Петропавловск, город II	35	44	50	51	47	49	47	51	52	55	48	45

KEY: (1) Station. (2) Korf. (3) Klyuchi. (4) Petropavlovsk, city II.

It increases in the regions further south (Petropavlovsk-Kamchatskiy), being equal to 35-50%. The percentage of direct radiation in the total flux over the territory varies little from April to October, being equal to 40-55%.

In the annual variation, the maximum of the monthly amounts of total and direct radiation hitting a horizontal surface occurs in June-May (9-12 kcal/cm² - total radiation, 6-6.5 kcal/cm² - direct radiation). The minimum radiation input is observed in December: in the southern part of the territory, the total radiation per month is 2.0 kcal/cm, decreasing in the north to 0.6 kcal/cm² (Korf station).

Table V. Extreme amounts of total radiation over seven-year period (kcal/cm².month).

Станция (1)		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
(2) Корф	Макс. (5)	1.3	3.3	9.4	12.3	15.1	15.5	14.2	12.5	7.6	3.8	1.6	0.7
	Мин. (6)	0.8	2.3	6.4	10.6	11.8	12.0	9.6	7.3	6.5	3.3	1.2	0.6
(3) Ключи	Макс. (5)	2.9	4.6	9.7	14.4	16.3	16.3	17.0	13.3	10.1	5.2	2.7	1.4
	Мин. (6)	1.2	3.0	8.0	9.8	11.5	11.0	11.9	9.6	6.9	4.7	2.2	0.9
Петропавловск, (4) город II	Макс. (5)	2.7	5.8	9.5	12.2	13.6	16.2	13.9	12.8	9.6	6.1	3.5	2.2
	Мин. (6)	1.9	3.7	7.7	9.1	11.8	12.0	11.3	9.2	5.6	4.8	2.5	1.7

KEY: (1) Station. (2) Korf. (3) Klyuchi. (4) Petropavlovsk, city II. (5) Max. (6) Min.

In this case, the amount of direct radiation is 0.9 kcal/cm² in the south. This amount decreases northward, already being equal to 0.1 kcal/cm² at the Korf

station, and decreasing to zero further north. The annual variation of the direct and total radiation is characterized by an abrupt increase in the monthly amounts from February to March because of the increase in the sun's elevation and the length of the day.

Depending on the cloud cover, during certain years the ratio of the direct and dispersed radiation and overall total radiation input can differ greatly from the average values indicated above and given in the handbook tables. Thus, the difference between the maximum and minimum monthly total radiation input in the summertime can reach 4-5 kcal/cm²·months (Table V).

These differences in the dispersed radiation are 1-2 kcal/cm², and they are greater for direct solar radiation than for the total radiation (4-6 kcal/cm²).

There is a shift in the maximum direct and total radiation from May and June to July or even August because of the fluctuation of the radiation input during certain years.

When it reaches the Earth's surface, solar radiation (direct and dispersed) is absorbed by it to a given degree, depending on the surface albedo. The albedo of the natural surfaces occurring in the territory in question is extremely varied, fluctuating in the summertime from 10 to 25%.

The albedo changes somewhat during the warm part of the year, increasing up to September as a rule for most surfaces (when the grass cover and the tree tops turn yellow).

During the period when snow covers the ground (December-March), the albedo is steady and varies little over the territory in the open areas. However, considering the populated area, the albedo varies from 35-40% to 40-70% on the whole for the region. At the beginning of winter, the average albedo of the snow cover is 40-70%, although it increases to 70-80% in January-February. In the spring and autumn months, the values of the albedo vary greatly over the territory and through time (from day to day), primarily because of the presence or absence of snow cover and its condition. The first snow cover appears in October in the north, and at the beginning of November in the south. A stable

snow cover forms in November. Accordingly, the average monthly albedo in October is 34% in the north (Korf), and 25% in the south (Petropavlovsk, city II). In March, the average monthly albedo decreases somewhat from February (because of snow packing) in the southern regions, being equal to 50-60%. The albedo only decreases in April in the northern and central regions. The continuous snow cover is disrupted at the beginning of May over most of the territory, although it is present at the end of May in the north. The snow cover disappears completely after 5-10 days. Consequently, the average monthly albedo of the actual surface in May is much lower than in April, being 20-40%.

The albedo can differ greatly from the average values given above during certain years. Therefore, the values of the absorbed radiation fluctuate from year to year both because of the variation in the radiation input, and because of the variation in the surface reflection characteristics. Table VI shows the maximum and minimum monthly amounts of absorbed radiation observed during a 6-7-year period.

Table VI. Extreme amounts of absorbed radiation (kcal/cm².month).

Станция (1)		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
(2) Корф	Макс. (5)	0.3	0.8	1.7	3.2	10.7	13.0	11.4	9.9	6.1	2.5	0.2	0.3
	Мин. (6)	0.1	0.5	1.1	2.2	6.0	10.2	7.9	6.0	5.4	1.9	0.3	0.1
(3) Ключи	Макс. (5)	0.6	1.1	3.4	6.1	12.2	13.3	13.1	10.8	7.5	4.1	1.6	0.5
	Мин. (6)	0.2	0.7	1.8	3.5	8.6	8.8	9.9	7.9	5.4	2.9	0.7	0.4
(4) Петропавловск, город II	Макс. (5)	1.0	2.0	4.1	8.8	11.2	13.0	11.0	10.1	7.7	4.5	2.2	1.2
	Мин. (6)	0.6	1.0	2.8	4.6	9.8	9.9	8.6	7.3	4.4	3.4	1.3	0.4

KEY: (1) Station. (2) Korf. (3) Klyuch. (4) Petropavlovsk, city II. (5) Max. (6) Min.

For the year overall, the actual surface reflects from 30 to 40% of the arriving short-wave radiation in the territory in question. The effective emission is around 30% of the total radiation. Thus, 30-40% of the total radiation goes into the radiation balance in most of the territory. In absolute values, the annual radiation balance is 23 kcal/cm² in the north (Korf), with the amounts increasing to the south, being 35-36 kcal/cm².

The period with a positive radiation balance lasts six-seven months in the north and seven-eight months in the south. On the average, the radiation balance changes from negative to positive during the first ten days of March in the south and at the beginning of April in the north. In the fall, the sign of the radiation balance changes during the second ten days of October in the north and at the beginning of November in the south. The maximum total radiation balance in the northern and central regions of Kamchatka occurs in June, being 7.8-8.2 kcal/cm²·month, while it occurs in May in the vicinity of the city of Petropavlovsk-Kamchatka, being 8.0 kcal/cm²·month. The radiation balance is rather large from May to July in the south and central regions, and during June-July in the northern regions - it is not more than 1 kcal/cm²·month different from the maximum values. During these months, 55-60% of the monthly amount of the total radiation goes to the radiation balance. In the fall, the radiation balance percentage decreases as the solar radiation input decreases. Thus, in September it is 40-50%. Because of the increase in the surface albedo and the further decrease in the total radiation, there is an abrupt change in the ratio of the monthly sums of the balance in October - for most parts of the territory, it is a total of 15-20% of the entire short-wave radiation input, while the balance is equal to zero in the north (Korf station). The highest negative radiation balance occurs in December (-1.4-1.5 kcal/cm²·month at the Korf and Petropavlovsk, city II, stations), while it is somewhat higher at the Klyuchi station (-0.9 kcal/cm²·month). The average radiation balance of the territory throughout the period when it is negative is -3-4 kcal/cm², and even in the north (Korf) it does not exceed -6 kcal/cm².

During certain years and months, deviations from the above radiation balance conditions can occur because of the combination of the total radiation, the effective emission (determined primarily by the cloud cover) and the surface albedo. The maximum radiation balances can exceed the values indicated above, reaching 9-10 kcal/cm²·month in June. The minimum radiation balances can reach -1.2-2.0 kcal/cm²·month in December and January in the southern as well as the northern part of the territory.

The radiation balance can pass through zero in the fall and spring depending on how long the snow cover remains on. Table VII gives the maximum and

minimum radiation balances during the observation period of this element at the stations.

Table VII. Maximum and minimum amounts of radiation balance (kcal/cm² month).

Станция (1)		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
(2) Корф . . .	Макс. (5)	-0.6	-0.4	-0.3	0.9	7.3	8.9	8.0	6.1	3.1	0.2	-1.3	-1.1
	Мин. (6)	-1.8	-2.1	-1.4	0.3	3.8	7.0	5.9	3.8	2.2	-0.4	-1.6	-1.8
(3) Ключи . . .	Макс. (5)	-0.1	-0.1	0.4	4.2	8.4	9.2	8.6	7.5	4.0	1.1	-0.4	-0.7
	Мин. (6)	-0.7	-0.7	0.0	3.1	6.2	6.7	7.2	5.7	3.1	0.0	-1.1	-1.2
Петропавловск (7) город II . . .	Макс. (5)	-0.5	0.2	1.5	6.4	8.0	10.0	8.0	7.4	5.0	1.8	-0.2	-0.9
	Мин. (6)	-2.0	-1.4	-0.1	2.5	7.0	7.3	6.5	5.3	2.8	0.8	-1.6	-2.4

KEY: (1) Station. (2) Korf. (3) Klyuchi. (4) Petropavlovsk, city II. (5) Max. (6) min.

The diurnal variation of solar radiation and the radiation balance is determined primarily by the variation in the sun's elevation throughout the day. Therefore, the maximum solar radiation when clouds are present or under a clear sky is observed at noon. Along with this, the diurnal variation in radiation affects the transparency of the atmosphere, which is clearly evident when the sky is clear. In the summertime, the atmosphere at the Korf and Klyuchi stations is more transparent during the first half of the day than the second because of the increased dust content of the atmosphere (caused by the development of convection) and the higher absolute humidity in the second half of the day. Because of the effect of urban conditions, the transparency in Petropavlovsk is lower during the first half of the day than the second in the winter and in April. During these months, the variation in radiation during the day is asymmetric relative to midday.

In the winter, the average atmospheric transparency coefficient over the territory fluctuates within 0.80-0.82, while the atmospheric transparency is lower in the summer because of the increased humidity and dust content of the atmosphere, being 0.75-0.77 (Table VIII)

Table VIII. Atmospheric transparency coefficients P_2
(calculated for mass 2 with a solar constant of 1.98).

Станция (1)	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
(2) Корф	0.81	0.80	0.78	0.77	0.77	0.77	0.76	0.78	0.80	0.81	0.81	0.81
(3) Ключи	0.80	0.80	0.79	0.78	0.78	0.76	0.75	0.77	0.79	0.81	0.82	0.82
(4) Петропавловск, city II	0.81	0.80	0.79	0.77	0.75	0.75	0.76	0.75	0.78	0.80	0.82	0.81

KEY: (1) Station. (2) Korf. (3) Klyuchi. (4) Petropavlovsk, city II.

The maximum values of direct solar radiation hitting a perpendicular surface averaged over the observation period with average transparency vary from 1.22 to 1.33 cal/cm²·min for the territory in question. These radiation values are typical of the spring months, when high transparency is combined with high elevations of the sun, as well as in the summer when the sun is the highest. On certain days when the atmospheric transparency is exceptionally good, the direct radiation falling on a perpendicular surface at ground level can reach 1.40-1.46 cal/cm²·min.

The minimum values of direct radiation are observed in December because of the low elevation of the sun: at noon they vary over the territory from north to south from 0.72 cal/cm²·min (Korf station) to 1.04 cal/cm²·min (Petropavlovsk, city II station).

The diurnal variation of the total radiation under a clear sky is generally not asymmetric relative to midday, since compensation by dispersed radiation occurs to a certain extent. The maximum intensity of the total radiation for the average atmospheric transparency observed at midday in June increases from 1.19 cal/cm²·min to 1.28 cal/cm²·min from north to south.

The percentage of dispersed radiation in the total radiation under a clear sky is low, being 11-14% at midday in the summer and 25-40% in the winter. Under these conditions, in the summer 60-70% of the total radiation goes to the radiation balance, which corresponds to 0.75-0.81 cal/cm²·min in absolute values for

a grass-covered surface. These are the maximum values of the average monthly intensities of the balance of a grass-covered surface in the region in question. In the winter, the average monthly radiation balance is negative in the daytime in the northern regions (Korf station), while during the hours around noon, the radiation balance in the regions around the Klyuchi and Petropavlovsk stations is positive throughout the year around midday. The sign of the balance in the diurnal variation changes from negative to positive after sunrise (at an elevation of around 7°) and from positive to negative before sunset (at an elevation of $9-10^\circ$). The intensity of the radiation balance in the nighttime under a clear sky, i.e., under the most favorable conditions for emission (cooling off), is -0.06 , -0.08 cal/cm²·min in the wintertime for the coastal regions, while it is somewhat higher (-0.04 , -0.06 cal/cm²·min) for the more continental regions. It is somewhat lower ($-0.07-0.10$ cal/cm²·min) almost everywhere in the summer; this goes along with the higher actual surface temperature in the summer months.

The cloud cover lowers the intensity of the direct solar and total radiation and the radiation balance while increasing the dispersed radiation.

There are two maximums in the annual variation of the intensity of direct radiation falling on a perpendicular surface under average conditions of cloud cover:-- in February-March, when the intensity fluctuates from 0.56 to 0.66 cal/cm²·min over the territory, and in August-September, when the intensity fluctuates from 0.47 to 0.60 cal/cm²·min, i.e., during the months when a high possible radiation input is coupled with relatively low cloud obscuration.

The intensity of direct radiation on a horizontal surface is determined primarily by the effect of the astronomic factor, and its maximum occurs in the months when the sun has the greatest elevation, i.e., June-July. The maximum direct radiation values fluctuate from 0.41 to 0.49 cal/cm²·min over the territory. The percentage of direct radiation in the total radiation intensity in the daytime increases from winter to summer, being $25-33\%$ in January-December and $47-57\%$ in the summertime around the Korf and the Klyuchi stations. The percentage of direct solar radiation of the total radiation during the year varies somewhat less around the Petropavlovsk-Kamchatka station, being $40-45\%$ in the winter and increasing to $57-60\%$ in August-October.

The maximum total radiation intensities are observed in June, varying from 0.78 to 0.87 cal/cm²·min on the average over the territory.

On certain days and under certain conditions of clouds that do not obscure the sun, the total radiation can reach 1.50-1.65 cal/cm²·min.

The radiation balance decreases from that of a clear sky when clouds are present, but to a lesser extent than the direct and total radiation, since the cloud cover also decreases the expended portion of the radiation balance - the effective emission and reflected radiation.

The relative value of the radiation balance of the grass-covered surface compared to the total input (the total radiation) fluctuates from 50 to 70% during the warm period from May to October (Table IX).

Table IX. Ratio of radiation balance intensity to total radiation during 12 hour 30 min. period.

Станция (1)	V	VI	VII	VIII	IX	X
(2) Корф	51	64	65	64	57	40
(3) Ключи	64	69	64	67	62	54
(4) Петропавловск, город II	67	70	66	66	65	57

KEY: (1) Station. (2) Korf. (3) Klyuchi. (4) Petropavlovsk, city II.

The average maximum intensity of the radiation balance is observed in June (like for the total radiation) and varies over the territory from 0.50 to 0.61 cal/cm²·min. At night, the radiation balance under average cloud obscuration conditions is higher than the balance for a clear sky because of the increased effective emission. Its average over the territory varies from -0.02 to -0.06 cal/cm²·min.

EXPLANATIONS OF TABLES

Table 1. *Time of sunrise (B) and sunset (3) (mean solar, hr. min.).* The table gives the time of sunrise and sunset for each station on the 15th of the month (in February - on the 14th) in mean solar time.

In meteorology, the time of sunrise (sunset) is considered to be the moment when the upper edge of the solar disk appears above the horizon (disappears below the horizon). The actual time of the appearance or disappearance of the solar disk depends on the profile of the line of the horizon at a given station. The sunrise may occur later when considerable obscuration occurs at the sunrise azimuths, while the sunset may occur earlier when obscuration of the horizon occurs at the sunset azimuths. In the mountains or on the shore (and in the ocean), the line of the horizon can lie below the level of the station, and the actual sunrise will be observed before the calculated (theoretical) time and the sunset, accordingly - after the calculated time.

The visible diurnal movement of the sun over the canopy of the sky is the basis for determining the time. The moment when the sun is precisely to the south, i.e., on the meridian of the given location, is called true midday. The period of time between the true middays of two adjacent days is called the true solar day. The length of the true solar days varies because of the irregular visible movement of the sun during the year; therefore, it is more convenient to use mean solar time at meteorological stations.

In *mean solar time*, the day is the same length throughout the year.

The duration of these days is equal to the average duration of the true days during the year and serves as the basic unit, which is divided into hours, minutes and seconds. The difference between the mean solar time and the true time (the time equation) varies during the year, but is not greater than 16 minutes.

Twelve o'clock is considered to be midday. Midday (or any other time of day) occurs simultaneously at all points located on the same meridian. Each meridian has its own local mean solar time. The mean solar time is later on meridians located further east at the very same physical moment.

In everyday life, the time zone system is used to simplify keeping time. In this system, the entire Earth is divided by meridional planes into 24 equal zone of 15° each. The zones are designated by numbers from 0 to XXIII. The meridian passing through the Greenwich Observatory near London is used as the mean meridian of the zeroth time zone, and its limiting meridians are 7.5° WL and 7.5° EL from Greenwich. The mean meridian in the first zone is 15° from Greenwich, and its limiting meridians are 7.5° WL and 22.5° EL, etc. The mean meridians for the zones are given in Table X.

Table X. Mean meridians for time zones.

№ пояса (1)	0	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
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(2) Восточная долгота

(3) Средний меридиан, град.	0	15	30	45	60	75	90	105	120	135	150	165	180
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KEY: (1) Zone No. (2) West longitude. (3) Mean meridian, degrees.

The time of the mean meridian of a particular zone is used at the points located inside each time zone. This time is called *standard time*. The difference in the times of two adjacent zones is one hour. The time in each zone differs from the zero standard time (Greenwich time) by the number of hours equal to the zone number.

Greenwich meridian time is also called universal time; the synoptic observation periods at stations, in particular, are set by it.

Because of the great breadth of the territory of the USSR with respect to latitude, on 16 June 1930 the government decreed that the clock would be set one hour forward from the zone time for economic reasons. This time was called

daylight savings time. Consequently, daylight savings time does not correspond to the mean meridian of the zone, but to the meridian 15° to the east, i.e., the mean meridian of the next time zone. For example, in the second zone, in which Moscow and Leningrad are located, the time of the 45° WL meridian is used rather than 30° WL.

Table XI. Time of sunrise (B) and sunset (3) on the 15th of the month (mean solar, hours, minutes).

Широта, град (1)		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
66	B	9 55	8 11	6 22	4 22	2 24	п. д. ²	1 33	3 35	5 18	6 54	8 45	10 26
	3	14 23	16 17	17 56	19 38	21 28		22 39	20 35	18 32	16 38	14 43	13 24
64	B	9 27	8 00	6 20	4 31	2 49	1 33	2 13	3 50	5 21	6 48	8 26	9 46
	3	14 51	16 28	17 58	19 29	21 03	22 27	21 59	20 20	18 29	16 44	15 02	14 04
62	B	9 06	7 51	6 19	4 38	3 08	2 10	2 41	4 02	5 24	6 43	8 09	9 18
	3	15 12	16 37	17 59	19 22	20 44	21 50	21 31	20 08	18 26	16 49	15 19	14 32
60	B	8 49	7 43	6 19	4 45	3 24	2 36	3 02	4 12	5 26	6 38	7 57	8 57
	3	15 29	16 45	17 59	19 15	20 28	21 24	21 10	19 58	18 24	16 54	15 31	14 53
58	B	8 35	7 35	6 18	4 51	3 37	2 56	3 19	4 21	5 28	6 33	7 45	8 40
	3	15 43	16 53	18 00	19 09	20 15	21 04	20 53	19 49	18 22	16 59	15 43	15 10
56	B	8 22	7 29	6 17	4 56	3 44	3 13	3 33	4 29	5 30	6 30	7 36	8 25
	3	15 56	16 59	18 01	19 04	20 03	20 47	20 39	19 41	18 20	17 02	15 52	15 25
54	B	8 12	7 22	6 17	5 01	3 58	3 27	3 47	4 36	5 32	6 27	7 27	8 12
	3	16 06	17 06	18 01	18 59	19 54	20 33	20 25	19 34	18 18	17 05	16 01	15 38
52	B	8 02	7 17	6 16	5 05	4 07	3 39	3 57	4 43	5 33	6 23	7 19	8 01
	3	16 16	17 11	18 02	18 55	19 44	20 21	20 15	19 27	18 17	17 09	16 09	15 49
50	B	7 53	7 12	6 15	5 09	4 15	3 50	4 07	4 48	5 34	6 20	7 13	7 53
	3	16 25	17 16	18 03	18 51	19 37	20 10	20 05	19 22	18 16	17 12	16 15	15 59

¹For February, the time refers to the 14th of the month.

²p.d. = polar day.

KEY: (1) Latitude, degrees.

It is necessary to apply a constant correction to the official time in order to change from daylight savings time to mean solar time. The correction is calculated as the difference in the longitude of the point and the longitude of the mean meridian of the given zone plus 15° and is converted from angular units into time units considering that 15° corresponds to 1 hour, 1° corresponds to 4 minutes, and 1' (angular minute) corresponds to 4 seconds. The correction can be determined using the following formula:

$$4(\lambda - 15N) - 60 \text{ min.},$$

where λ - the longitude of the point in degrees, N - the sequence number of the given time zone.

It is possible to calculate the length of the day on the 15th of the month for the stations in question based on the sunrise and sunset time data given in Table 1. The data in Table XII can be used to determine the length of the day or the sunrise and sunset times at any point in the territory in question.

Table 2. *Elevation of Sun on 15th of the Month (Degrees).* The table gives the elevation of the sun above the horizon on the 15th of the month (on the 14th in February) calculated for the observation periods at actinometric stations. The first column of the table indicates the beginning of the observation periods in mean solar time. The sun's elevation corresponds to the middle observation time, usually 4 minutes after the period begins, and the radiation intensity given in Table 3 of the handbook.

A table of midday elevations of the sun (Table XII) is provided in order to describe the maximum elevations of the sun on the 15th.

Table XII. Elevation of sun at midday on the 15th.

Широта: (градусы)	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
56	2.8	10.9	21.8	33.7	42.8	47.3	45.6	38.2	27.1	15.6	5.6	0.7
54	4.8	12.9	23.8	35.7	44.8	49.3	47.6	40.2	29.1	17.6	7.6	2.7
52	6.8	14.9	25.8	37.7	46.8	51.3	49.6	42.2	31.1	19.6	9.6	4.7
50	8.8	16.9	27.8	39.7	48.8	53.3	51.6	44.2	33.1	21.6	11.6	6.7
48	10.8	18.9	29.8	41.7	50.8	55.3	53.6	46.2	35.1	23.6	13.6	8.7
46	12.8	20.9	31.8	43.7	52.8	57.3	55.6	48.2	37.1	25.6	15.6	10.7
44	14.8	22.9	33.8	45.7	54.8	59.3	57.6	50.2	39.1	27.6	17.6	12.7
42	16.8	24.9	35.8	47.7	56.8	61.3	59.6	52.2	41.1	29.6	19.6	14.7
40	18.8	26.9	37.8	49.7	58.8	63.3	61.6	54.2	43.1	31.6	21.6	16.7

¹Elevation of the sun for February refers to the 14th.

KEY: (1) Latitude, degrees.

Table 3. *Radiation Intensity, Standard Observations (cal/cm²·min).* The table gives the average intensities of solar radiation (direct, dispersed, total) and the radiation balance during the observation periods at actinometric stations. The average values are directly computed during the observation period indicated in the alphabetic index of stations.

The radiation intensities given in Table 3 characterize average conditions of cloud obscuration. Because of the cloud cover, in some years the average monthly intensities can differ from those given in Table 3. The upper limit (under average conditions of atmospheric transparency) for the direct radiation, the total radiation and the radiation balance are the intensities under a clear sky given in Table 5. (This does not preclude the possibility that on certain days under certain cloud conditions and with a bright sun, the total radiation intensity and the radiation balance can be greater than under a clear sky).

The data in Table 3 give one an idea of the diurnal variation in short-wave radiation and the radiation balance when there are no automatic recorders at the observation point (and, accordingly, Tables 7-11 are not available). In this case, at the beginning and end of the diurnal variation in the short-wave radiation (i.e., during sunrise and sunset - Table 1), the radiation value can be equal to zero and the distribution of the radiation intensity during the 12 hour 30 minute period can be symmetrical relative to midday. The times when the sign changes, i.e., when the balance passes through zero, are considered in order to determine the diurnal variation of the radiation balance. The radiation balance changes from negative to positive after sunrise, and back (from positive to negative) - before sunset. The time shift is roughly equal to one hour in the morning, while it is somewhat longer in the evening (around 1 hour, 10 minutes). In the wintertime in regions with a continuous snow cover, the difference in the amount of time between the passage of the balance through zero and sunrise (sunset) increases, being around an hour and a half in the morning and the evening. In certain regions, the sign of the radiation balance (average monthly values) does not change and remains negative for entire days.

The direct solar radiation on vertical and inclined surfaces (walls of buildings and slopes) can be obtained using the data in Tables 3 and 2 and formulae (7) and (8).

Table 4. *Monthly and Annual Radiation Amounts (kcal/cm²) and Average Albedo (%)*. The table gives the average monthly and annual ... [pages 23-27 missing].

... sea level, the average long-term duration of sunshine is 1452 hours. At the Kamchatka agrometeorological station, which is located 315 km to the south of Nachiki, the average long-term sunshine duration is 1711 hours. Because of its natural protection, in the mountainous regions the sunshine duration increases with altitude only at the stations which are out in the open. The high obscuration of the horizon at Nachiki and the higher recurrence of total cloud cover than that of the Kamchatka agrometeorological station cause the sunshine at Nachiki to drop to 250 hours per year.

2. The Klyuchi and Ust'-Kamchatka stations are located on the same latitude and are 100 km apart. However, the average long-term sunshine duration per year at the Ust'-Kamchatka station is 180 hours, which is lower than at Klyuchi because Ust'-Kamchatka has a higher frequency of cloudy days and a higher number of foggy days, especially in the summertime.

Sunshine depends on a number of variables. In some years, the number of hours of sunshine can differ greatly from the average long-term value (Table 1).

As an example, Table 1 gives the average, largest and smallest numbers of hours of sunshine at the Lopatka cape and Mil'kovo stations.

As the table shows, during the hot part of the year, the amount of sunshine at the Lopatka cape station varies from 55 to 110 hours. However, in some years the maximum time reaches 195 h, and the minimum - 2 h. The average and extreme numbers of hours of sunshine are much higher at Mil'kovo than at Cape Lopatka.

Table I.

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Год
(1) Лопатка, мыс													
Средн. (3)	55	82	101	101	83	56	66	73	111	106	64	46	944
Наиб. (4)	93	138	139	195	164	104	108	145	193	154	91	73	1277
Наим. (5)	30	49	30	57	28	2	11	35	68	58	30	25	782
(2) Мильково													
Средн. (3)	64	96	166	186	195	199	209	197	161	134	81	53	1741
Наиб. (4)	98	173	221	282	288	294	270	282	228	195	156	97	2055
Наим. (5)	11	60	88	126	96	100	129	130	99	78	26	11	1324

KEY: (1) Lopatka, cape. (2) Mil'kovo. (3) Average. (4) Max. (5) Min.

As we indicated earlier, there are two types of annual variation in the duration of sunshine at "amchatka - with one and two maximums. Consequently, the greatest sunshine durations occur in different months (March - October).

The largest number of hours of sunshine in the annual variation on the west coast and in the interior of Kamchatka is observed in June-July, varying from 250 h in the northern part of the peninsula to 180 h in the south. On the east coast, the maximum duration of sunshine occurs in May-June, being equal to 160-205 hours. The greatest amount of sunshine at the Komandorskiy islands and Cape Lopatka occurs in April and September-October, being equal to 100-110 h.

In the wintertime, the shortest duration of sunshine generally occurs in December, and less often - in January. During these months, ... [remaining text missing].

SECTION I

SOLAR RADIATION AND RADIATION BALANCE

Table 1. Time of sunrise (6) and sunset (7) (mean solar, hours, minutes).

(1) № стан-ции	Станция (2)		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
3	Корф (3)	(6)	8 52	7 41	6 18	4 13	3 20	2 31	2 59	4 11	5 26	6 39	7 59	9 01
		(7)	15 26	16 47	18 00	19 17	20 32	21 29	21 13	19 59	18 24	16 53	15 29	14 19
7	Ключи (4)	(6)	8 24	7 28	6 17	4 55	3 46	3 10	3 31	4 29	5 30	6 31	7 38	8 27
		(7)	15 54	17 00	18 01	19 05	20 06	20 50	20 41	19 41	18 20	17 01	15 50	15 23
19	Петропавловск, город II (5)	(6)	8 07	7 19	6 16	5 03	4 01	3 33	3 53	4 41	5 33	6 25	7 23	8 06
		(7)	16 11	17 09	18 02	18 57	19 51	20 27	20 19	19 29	18 17	17 07	16 05	15 44

KEY: (1) Station No. (2) Station. (3) Korf. (4) Klyuchi.
(5) Petropavlovsk, city II. (6) Sunrise. (7) Sunset.

Table 2. Elevation of sun on 15th of the month (degrees).

(1) № стан-ции	Станция (2)	(3) Время, час. мин.	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
3	Корф (4)	6 30			1.5	12.6	20.9	24.2	22.1	15.8	7.5			
		9 30	2.7	9.9	20.6	32.6	41.4	45.2	43.0	36.2	26.8	16.4	6.9	1.8
		12 30	8.2	16.4	27.2	38.9	47.8	52.5	50.9	43.5	32.3	20.6	10.5	5.9
		15 30		6.4	16.0	25.8	33.5	37.9	37.1	30.4	19.4	8.0		
7	Ключи (4)	18 30			4.5	11.7	16.1	15.3	8.8					
		6 30			1.9	12.8	20.8	23.8	21.6	15.8	8.0	0.1		
		9 30	5.8	13.0	23.6	35.4	44.1	47.6	45.5	39.0	29.8	19.9	10.4	5.2
		12 30	12.3	20.4	31.3	42.9	51.8	56.4	54.9	47.5	36.3	24.6	14.5	10.0
19	Петропавловск, город II (6)	15 30	1.6	9.1	18.4	27.8	35.0	39.2	38.6	32.2	21.4	10.2	1.5	
		18 30			3.6	10.4	14.7	14.0	7.8					
		6 30			2.4	12.8	20.5	23.4	21.2	15.6	8.3	0.8		
		9 30	8.5	15.5	26.0	37.7	46.1	49.5	47.3	41.1	32.3	22.5	13.3	7.4
		12 30	15.6	23.8	34.6	46.1	55.0	59.6	58.2	50.8	39.5	27.7	17.8	11.3
		15 30	3.7	11.3	20.3	29.2	36.0	40.2	39.7	33.6	23.0	12.0	3.4	0.9
		18 30			2.9	9.4	13.6	13.1	7.1					

KEY: (1) Station No. (2) Station. (3) Time, hours, minutes.
(4) Korf. (5) Klyuchi. (6) Petropavlovsk, city II.

Table 3. Radiation intensity, standard observations (cal/cm²·min).

(1) время, час. мин.	(2) Радиация	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
3. Корф (3)													
0 30	B	-0.03	-0.04	-0.04	-0.04	-0.03	-0.04	-0.02	-0.03	-0.04	-0.05	0.05	0.03
6 30	S			0.08	0.26	0.32	0.28	0.19	0.21	0.23	0.02		
	S'			0.01	0.06	0.13	0.12	0.07	0.05	0.03	0.00		
	D			0.03	0.13	0.17	0.18	0.15	0.11	0.06	0.01		
	Q			0.04	0.19	0.30	0.30	0.22	0.16	0.09	0.01		
	B	-0.03	-0.03	-0.04	-0.01	0.10	0.16	0.12	0.07	0.01	-0.04	-0.04	-0.03
9 30	S	0.07	0.35	0.49	0.53	0.49	0.45	0.33	0.41	0.47	0.36	0.28	0.01
	S'	0.01	0.06	0.18	0.30	0.33	0.32	0.23	0.25	0.23	0.11	0.04	0.00
	D	0.03	0.10	0.23	0.35	0.36	0.35	0.32	0.26	0.21	0.13	0.06	0.02
	Q	0.04	0.16	0.41	0.65	0.69	0.67	0.55	0.51	0.44	0.24	0.10	0.02
	B	-0.02	-0.02	0.02	0.07	0.31	0.43	0.36	0.32	0.24	0.08	-0.01	-0.03
12 30	S	0.26	0.48	0.56	0.56	0.47	0.42	0.42	0.38	0.47	0.39	0.37	0.22
	S'	0.04	0.14	0.25	0.36	0.34	0.41	0.33	0.26	0.25	0.14	0.08	0.03
	D	0.09	0.17	0.31	0.39	0.41	0.37	0.35	0.30	0.25	0.16	0.09	0.06
	Q	0.13	0.31	0.56	0.75	0.75	0.78	0.68	0.56	0.51	0.30	0.17	0.09
	B	-0.02	0.00	0.04	0.11	0.38	0.50	0.44	0.36	0.29	0.12	0.01	0.02
15 30	S	0.01	0.29	0.43	0.45	0.43	0.47	0.34	0.37	0.37	0.19	0.02	
	S'	0.00	0.04	0.12	0.20	0.25	0.28	0.21	0.18	0.13	0.03	0.00	
	D	0.01	0.06	0.18	0.28	0.29	0.28	0.25	0.21	0.15	0.06	0.01	
	Q	0.01	0.10	0.30	0.48	0.54	0.56	0.46	0.39	0.28	0.09	0.01	
	B	-0.03	-0.03	0.00	0.06	0.24	0.34	0.29	0.23	0.13	0.01	-0.01	-0.01
18 30	S				0.10	0.25	0.33	0.20	0.12	0.02			
	S'				0.01	0.06	0.09	0.05	0.02	0.00			
	D				0.04	0.09	0.11	0.10	0.06	0.01			
	Q				0.05	0.15	0.20	0.15	0.08	0.01			
	B	-0.03	-0.01	-0.01	-0.03	0.02	0.08	0.06	0.01	-0.05	-0.05	-0.04	0.04

KEY: (1) Time, hours, minutes. (2) Radiation. (3) 3. Korf.

Table 3 (cont'd).

(1) Время час. мин.	(2) Радиация	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
7. Ключи(3)													
0 30	B	-0.02	-0.02	-0.03	-0.04	-0.04	-0.05	-0.04	-0.05	-0.05	-0.05	-0.04	-0.03
6 30	S S'			0.04 0.00	0.22 0.04	0.31 0.12	0.32 0.13	0.25 0.10	0.22 0.06	0.15 0.02	0.02 0.00		
6 30	D Q B			0.03 0.03	0.14 0.18	0.18 0.30	0.19 0.32	0.16 0.26	0.12 0.18	0.07 0.09	0.01 0.01	-0.05	-0.03
9 30	S S' D Q B	0.08 0.01 0.07 0.08 0.00	0.25 0.06 0.16 0.22 0.00	0.52 0.20 0.28 0.18 0.07	0.16 0.27 0.11 0.68 0.24	0.49 0.35 0.38 0.73 0.44	0.45 0.35 0.39 0.74 0.49	0.47 0.34 0.34 0.68 0.43	0.56 0.35 0.28 0.63 0.41	0.48 0.24 0.26 0.50 0.30	0.47 0.16 0.17 0.33 0.17	0.34 0.07 0.10 0.17 0.03	0.12 0.01 0.05 0.06 -0.01
12 30	S S' D Q B	0.28 0.05 0.15 0.20 0.02	0.46 0.17 0.24 0.41 0.04	0.66 0.36 0.34 0.70 0.12	0.52 0.35 0.48 0.83 0.34	0.48 0.38 0.16 0.84 0.54	0.52 0.43 0.43 0.86 0.59	0.55 0.45 0.38 0.83 0.53	0.58 0.43 0.33 0.76 0.51	0.53 0.32 0.28 0.60 0.37	0.50 0.21 0.20 0.11 0.22	0.41 0.11 0.14 0.25 0.07	0.20 0.04 0.10 0.14 0.01
15 30	S S' D Q B	0.00 0.00 0.02 0.02 -0.02	0.27 0.05 0.10 0.15 0.01	0.47 0.15 0.20 0.35 0.03	0.43 0.20 0.30 0.50 0.19	0.40 0.24 0.32 0.56 0.31	0.40 0.25 0.32 0.57 0.35	0.16 0.29 0.28 0.57 0.34	0.45 0.24 0.24 0.48 0.29	0.37 0.14 0.17 0.31 0.16	0.23 0.05 0.08 0.13 0.03	0.02 0.00 0.02 0.02 -0.04	-0.03
18 30	S S' D Q B				0.07 0.00 0.04 0.04	0.19 0.04 0.09 0.13	0.23 0.06 0.11 0.17	0.24 0.06 0.10 0.16	0.16 0.02 0.06 0.08				0.01
		-0.02	-0.03	-0.05	-0.04	0.03	0.07	0.06	0.00	0.05	-0.06	-0.04	0.01

KEY: (1) Time, hours, minutes. (2) Radiation. (3) 7. Klyuchi.

Table 3 (cont'd).

(1) Время час. мин.	(2) Радиация	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
(3) 19. Петропавловск, город II													
0 30	B	-0.04	-0.05	-0.05	-0.05	-0.05	-0.04	0.03	-0.03	-0.04	-0.06	0.06	0.05
6 30	S			0.01	0.19	0.26	0.22	0.19	0.25	0.19	0.00		
	S'			0.00	0.04	0.09	0.09	0.06	0.06	0.03	0.00		
	D			0.02	0.10	0.15	0.16	0.14	0.10	0.05	0.01		
	Q			0.02	0.14	0.24	0.25	0.20	0.16	0.08	0.01		
	B	-0.04	-0.05	-0.04	0.03	0.12	0.14	0.10	0.07	0.01	-0.05	0.06	0.05
9 30	S	0.21	0.45	0.48	0.46	0.48	0.39	0.34	0.47	0.52	0.55	0.48	0.28
	S'	0.03	0.13	0.23	0.29	0.34	0.30	0.25	0.30	0.27	0.22	0.11	0.05
	D	0.09	0.14	0.21	0.30	0.33	0.33	0.33	0.28	0.21	0.15	0.11	0.07
	Q	0.12	0.27	0.47	0.59	0.67	0.63	0.58	0.58	0.48	0.37	0.22	0.12
	B	-0.01	0.03	0.11	0.28	0.43	0.42	0.38	0.38	0.29	0.20	0.05	0.00
12 30	S	0.38	0.62	0.60	0.53	0.52	0.57	0.46	0.56	0.60	0.59	0.59	0.43
	S'	0.11	0.25	0.36	0.41	0.41	0.49	0.40	0.44	0.38	0.27	0.18	0.10
	D	0.16	0.22	0.30	0.37	0.40	0.38	0.36	0.33	0.25	0.19	0.14	0.12
	Q	0.27	0.47	0.66	0.78	0.81	0.87	0.76	0.77	0.63	0.46	0.32	0.22
	B	0.02	0.08	0.20	0.42	0.54	0.61	0.50	0.51	0.41	0.26	0.11	0.04
15 30	S	0.08	0.42	0.45	0.46	0.43	0.51	0.39	0.49	0.47	0.36	0.15	0.00
	S'	0.01	0.10	0.17	0.23	0.24	0.33	0.24	0.27	0.18	0.07	0.01	0.00
	D	0.04	0.10	0.19	0.23	0.27	0.28	0.25	0.23	0.16	0.09	0.03	0.02
	Q	0.05	0.20	0.36	0.46	0.51	0.61	0.49	0.50	0.34	0.16	0.04	0.02
	B	-0.02	0.00	0.08	0.22	0.41	0.40	0.32	0.32	0.19	0.05	-0.03	-0.05
18 30	S				0.05	0.18	0.22	0.21	0.14				
	S'				0.01	0.03	0.05	0.04	0.01				
	D				0.02	0.07	0.10	0.08	0.05				
	Q				0.03	0.10	0.15	0.12	0.06				
	B	-0.04	-0.05	-0.06	-0.03	0.02	0.06	0.05	0.01	0.05	0.06	0.06	0.05

KEY: (1) Time, hours, minutes. (2) Radiation.
(3) 19. Petropavlovsk, city II.

Table 4. Monthly and annual radiation totals (kcal/cm²) and average albedo (%).

Радиация (1)	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Год
3. Корф (3)													
S	20	42	90	98	114	107	92	89	86	63	28	16	845
S'	03	10	31	46	64	64	54	46	35	17	04	01	375
D	07	16	41	62	74	72	68	53	36	18	10	05	462
Q	10	26	72	108	138	136	122	99	71	35	14	06	837
R	08	20	59	84	51	22	21	19	13	12	03	04	321
B ₊	02	06	13	24	87	114	101	80	58	23	06	02	516
B	-11	-12	-08	06	54	78	69	54	30	00	-14	-14	232
B ₋	00	00	03	12	57	81	71	57	39	11	00	00	331
B ₋	11	12	11	06	03	03	02	03	09	11	14	14	99
A	76	78	82	78	37	16	17	19	19	34	59	72	38
7. Ключи (+)													
S	16	37	94	87	94	97	97	90	73	72	25	16	798
S'	03	11	37	45	56	61	60	50	33	23	07	03	389
D	14	25	51	72	82	80	77	59	46	25	13	08	552
Q	17	36	88	117	138	141	137	109	79	48	20	11	941
R	13	27	64	68	33	27	27	23	17	12	10	07	328
B ₊	04	09	24	49	105	114	110	86	62	36	10	04	613
B	-05	-04	02	35	76	82	79	62	39	08	-08	-09	357
B ₋	01	02	11	41	80	85	82	67	47	22	04	01	413
B ₋	56	05	09	06	04	03	03	05	08	14	12	10	86
A	78	76	73	58	24	19	20	21	21	25	52	67	35
19. Петропавловск, город II (5)													
S	49	45	78	59	91	92	83	88	71	66	39	38	819
S'	09	13	41	56	62	65	58	58	41	31	14	09	463
D	17	24	41	54	69	68	66	55	38	25	15	11	483
Q	26	43	82	110	131	133	124	113	79	56	29	20	946
R	18	29	48	42	24	27	27	24	17	14	13	11	294
B ₊	08	14	34	68	107	106	97	89	62	42	16	09	652
B	-12	-06	06	45	80	79	70	63	37	11	-09	-15	349
B ₋	01	06	19	51	85	82	73	67	45	25	07	01	452
B ₋	13	12	13	06	05	03	03	04	08	14	16	16	113
A	69	67	59	38	18	20	22	21	21	25	44	57	31

KEY: (1) Radiation. (2) Annual. (3) 3. Korf.
(4) 7. Klyuchi. (5) 19. Petropavlovsk, city II.

Table 5. Radiation intensity under a clear sky (cal/cm²·min).

(1) Время. час. мин.	Раднация (2)	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
3. Корф(3)													
0 30	B	-0.06	-0.06	-0.07	-0.07	-0.08	-0.08	-0.07	-0.08	-0.08	-0.09	-0.07	-0.06
6 30	S			0.55	0.76	1.02	1.05	1.04	0.98	0.79	0.40		
	S'			0.06	0.17	0.37	0.43	0.40	0.26	0.12	0.02		
	D			0.06	0.11	0.14	0.14	0.11	0.08	0.07	0.2		
	Q			0.12	0.28	0.51	0.57	0.51	0.34	0.19	0.04		
	B	-0.06	-0.07	-0.06	-0.01	0.16	0.28	0.26	0.14	0.03	-0.08	-0.08	-0.06
9 30	S	0.54	0.38	1.10	1.20	1.26	1.26	1.24	1.24	1.23	1.07	0.77	0.16
	S'	0.04	0.16	0.40	0.65	0.84	0.89	0.85	0.72	0.57	0.30	0.10	0.02
	D	0.03	0.08	0.16	0.21	0.18	0.16	0.14	0.12	0.11	0.08	0.06	0.03
	Q	0.07	0.24	0.56	0.86	1.02	1.05	0.99	0.84	0.68	0.38	0.16	0.05
	B	-0.06	-0.04	0.01	0.08	0.31	0.66	0.64	0.50	0.37	0.12	-0.01	-0.06
12 30	S	0.88	1.08	1.20	1.26	1.29	1.29	1.27	1.27	1.28	1.14	0.96	0.72
	S'	0.14	0.31	0.56	0.80	0.96	1.02	0.98	0.85	0.70	0.37	0.18	0.08
	D	0.06	0.11	0.17	0.23	0.19	0.17	0.15	0.14	0.11	0.10	0.07	0.05
	Q	0.20	0.42	0.73	1.03	1.15	1.19	1.13	0.99	0.81	0.47	0.25	0.13
	B	-0.04	-0.02	0.06	0.15	0.61	0.75	0.74	0.62	0.44	0.16	0.00	-0.05
15 30	S	—	0.71	1.00	1.12	1.19	1.20	1.17	1.15	1.09	0.71	0.40	
	S'	—	0.09	0.28	0.50	0.66	0.73	0.70	0.56	0.37	0.09	0.03	
	D	—	0.05	0.12	0.17	0.16	0.15	0.13	0.12	0.09	0.04	0.02	
	Q	—	0.14	0.40	0.67	0.82	0.88	0.83	0.68	0.46	0.11	0.05	
	B	-0.06	-0.06	-0.02	0.07	0.37	0.53	0.50	0.39	0.20	-0.02	-0.07	-0.06
18 30	S				0.41	0.81	0.88	0.86	0.67	—			
	S'				0.04	0.17	0.24	0.23	0.12	—			
	D				0.05	0.09	0.09	0.08	0.06	—			
	Q				0.09	0.26	0.33	0.31	0.18	—			
	B	-0.06	-0.07	-0.08	-0.07	0.05	0.12	0.11	0.01	-0.10	-0.09	0.07	0.05

KEY: (1) Time, hours, minutes. (2) Radiation. (3) 3. Korf.

Table 5 (cont'd).

(1) Время час. мин.	(2) Радиация	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
7. Ключи (3)													
0 30	B	-0.04	-0.05	-0.06	-0.08	-0.09	-0.09	-0.08	-0.08	-0.08	0.09	0.08	0.06
6 30	S			0.56	0.86	0.98	1.06	0.97	0.91	0.78	0.18		
	S'			0.06	0.18	0.34	0.43	0.36	0.24	0.12	0.00		
	D			0.05	0.10	0.13	0.12	0.12	0.09	0.05	0.02		
	Q			0.11	0.28	0.47	0.55	0.48	0.33	0.17	0.02		
	B	-0.05	-0.05	0.05	0.04	0.26	0.28	0.24	0.14	0.05	-0.10	-0.08	-0.07
9 30	S	0.68	1.01	1.19	1.24	1.26	1.24	1.21	1.22	1.22	1.15	1.01	0.98
	S'	0.06	0.26	0.48	0.70	0.87	0.91	0.86	0.77	0.60	0.39	0.20	0.07
	D	0.05	0.10	0.14	0.18	0.18	0.16	0.15	0.13	0.11	0.10	0.07	0.05
	Q	0.11	0.36	0.62	0.88	1.05	1.07	1.01	0.90	0.71	0.49	0.27	0.12
	B	-0.04	0.02	0.08	0.28	0.65	0.70	0.66	0.39	0.15	0.27	0.10	-0.03
12 30	S	1.01	1.16	1.27	1.30	1.29	1.29	1.26	1.29	1.27	1.21	1.13	0.98
	S'	0.21	0.41	0.66	0.86	1.01	1.06	1.02	0.94	0.74	0.48	0.30	0.18
	D	0.09	0.13	0.17	0.20	0.18	0.16	0.15	0.14	0.12	0.10	0.08	0.07
	Q	0.30	0.54	0.83	1.06	1.19	1.22	1.17	1.08	0.86	0.58	0.38	0.25
	B	0.04	0.08	0.14	0.36	0.77	0.80	0.81	0.76	0.57	0.34	0.15	0.04
15 30	S	-	0.81	1.06	1.13	1.18	1.18	1.14	1.17	1.09	0.86	0.62	
	S'	-	0.11	0.34	0.52	0.68	0.74	0.71	0.61	0.39	0.16	0.04	
	D	+	0.07	0.12	0.16	0.15	0.14	0.14	0.11	0.09	0.06	0.04	
	Q	-	0.21	0.46	0.68	0.83	0.88	0.85	0.72	0.48	0.22	0.08	
	B	-0.05	-0.02	0.04	0.27	0.50	0.53	0.55	0.43	0.25	0.05	-0.07	-0.07
18 30	S				0.41	0.69	0.81	0.76	0.62				
	S'				0.04	0.13	0.20	0.19	0.09				
	D				0.03	0.07	0.08	0.09	0.05				
	Q				0.07	0.20	0.28	0.28	0.14				
	B	-0.05	-0.05	-0.08	-0.08	0.02	0.08	0.10	-0.02	-0.09	-0.09	-0.09	-0.06

KEY: (1) Time, hours, minutes. (2) Radiation. (3) 7. Klyuchi.

Table 5 (cont'd).

(1) Время, час. мин.	Радиация (2)	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
19. Петропавловск, город II (3)													
0 30	B	-0.08	-0.08	-0.10	-0.10	-0.10	-0.09	-0.07	-0.08	-0.08	-0.10	-0.09	-0.08
6 30	S			—	0.80	0.96	1.02	0.95	0.86	0.71	—		
	S'			—	0.19	0.34	0.40	0.34	0.22	0.11	—		
	D			—	0.08	0.11	0.11	0.10	0.08	0.06	—		
	Q			—	0.27	0.45	0.51	0.44	0.30	0.17	—		
	B	-0.08	-0.08	-0.09	0.08	0.21	0.28	0.23	0.13	0.03	-0.09	-0.09	-0.08
9 30	S	0.80	1.04	1.21	1.23	1.27	1.25	1.23	1.22	1.23	1.18	1.03	0.76
	S'	0.12	0.29	0.54	0.74	0.91	0.95	0.90	0.79	0.64	0.45	0.24	0.11
	D	0.07	0.10	0.14	0.16	0.15	0.15	0.14	0.12	0.12	0.10	0.08	0.07
	Q	0.19	0.39	0.68	0.90	1.06	1.10	1.04	0.91	0.76	0.55	0.32	0.18
	B	-0.01	0.03	0.18	0.52	0.70	0.74	0.71	0.61	0.47	0.29	0.09	0.01
12 30	S	1.10	1.24	1.31	1.33	1.30	1.30	1.30	1.27	1.29	1.25	1.17	1.04
	S'	0.30	0.51	0.74	0.95	1.06	1.12	1.09	0.99	0.80	0.58	0.36	0.24
	D	0.10	0.12	0.16	0.18	0.17	0.16	0.14	0.14	0.12	0.11	0.10	0.09
	Q	0.40	0.63	0.90	1.13	0.86	1.28	1.23	1.13	0.92	0.69	0.46	0.33
	B	0.05	0.10	0.30	0.67	1.23	0.89	0.88	0.76	0.61	0.39	0.17	0.07
15 30	S	0.64	0.92	1.11	1.18	1.18	1.17	1.18	1.13	1.11	0.90	0.59	—
	S'	0.07	0.20	0.39	0.57	0.69	0.75	0.74	0.62	0.42	0.19	0.04	—
	D	0.05	0.08	0.12	0.14	0.15	0.15	0.12	0.12	0.09	0.07	0.04	—
	Q	0.12	0.28	0.51	0.71	0.84	0.90	0.86	0.74	0.51	0.26	0.08	—
	B	-0.01	0.00	0.11	0.40	0.53	0.59	0.63	0.48	0.28	0.08	-0.04	-0.09
18 30	S				0.36	0.67	0.79	0.74	0.49				
	S'				0.03	0.11	0.18	0.16	0.07				
	D				0.04	0.07	0.08	0.07	0.05				
	Q				0.07	0.18	0.26	0.23	0.12				
	B	-0.08	-0.08	-0.11	-0.10	0.01	0.10	0.10	0.01	0.10	-0.10	-0.09	-0.09

KEY: (1) Time, hours, minutes. (2) Radiation.
(3) 19. Petropavlovsk, city II.

Table 6. Monthly and annual amounts of radiation under a clear sky (kcal/cm²).

Раднация (1)	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Год (2)
3. Корф (3)													
S	7.5	12.5	20.2	24.5	31.1	31.9	31.4	28.3	22.7	16.8	10.5	6.0	243.4
S'	1.0	2.8	7.2	11.6	17.0	18.4	17.7	13.7	9.4	4.3	1.7	0.6	105.4
D	0.6	1.3	2.8	4.0	4.3	4.0	3.7	2.8	1.9	1.4	0.8	0.4	28.0
Q	1.6	4.1	10.0	15.6	21.3	22.4	21.4	16.5	11.3	5.7	2.5	1.0	133.4
7. Ключи (4)													
S	9.5	14.4	21.4	24.9	29.6	30.6	29.4	28.0	22.5	17.8	13.7	9.2	251.1
S'	1.7	4.0	8.5	12.2	16.9	18.5	17.6	14.3	10.0	5.8	2.9	1.4	114.3
D	0.9	1.5	2.3	3.6	3.9	3.6	3.8	2.9	1.9	1.5	1.1	0.7	27.7
Q	2.6	5.5	10.8	15.8	20.8	22.1	21.4	17.7	11.9	7.3	4.0	2.1	142.0
19. Петропавловск, город II (5)													
S	13.0	15.4	20.6	25.0	29.1	29.7	29.3	26.7	22.6	18.2	14.4	10.6	254.6
S'	2.7	4.9	9.6	13.4	17.3	18.6	17.9	15.9	10.7	6.8	3.6	2.2	122.7
D	1.3	1.5	2.3	3.1	3.6	3.4	3.2	2.8	2.1	1.6	1.1	1.0	27.9
Q	4.0	6.4	11.9	16.5	20.9	22.0	21.1	17.8	12.8	8.4	4.7	3.2	199.7

KEY: (1) Radiation. (2) Annual. (3) 3. Korf. (4) 7. Klyuchi.
(5) 19. Petropavlovsk, city II.

SECTION 2

SUNSHINE

Table 1. Sunshine duration (hours).

(a) № станции	(b) Станция	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	(c)
1	Верхне-Пенжинно													1635
2	Алука	32	84	159	160	182	136	125	142	157	107	53	45	1392
3	Корф	59	89	133	159	203	200	173	188	161	121	60	44	1583
4	Усть-Лесная	46	97	156	165	199	254	207	186	149	69	41	40	1606
5	Карагинский остров	37	97	125	152	195	205	183	172	160	93	37	27	1473
6	Ука	43	80	130	154	165	184	178	170	160	117	48	27	1456
7	Ключи	30	71	142	167	181	197	194	185	152	129	58	34	1530
8	Усть-Камчатск	46	79	130	144	158	147	130	144	142	124	79	17	1363
9	Эссо	86	110	174	175	170	178	173	170	123	91	59	46	1565
10	Ича	79	106	160	152	153	158	165	163	115	81	51	39	1445
11	Никольское (о. Беринга)	24	52	83	106	103	72	77	82	106	105	47	24	881
12, 13	Мильково	64	96	166	186	195	199	209	197	161	134	81	53	1711
14	Соболево	82	118	172	149	157	167	129	134	126	77	63	50	1421
15	Семлячки	74	88	135	159	163	140	141	159	151	154	102	72	1538
16	Начики	76	101	146	151	169	181	148	140	121	103	52	61	1452
17	Камчатская, агро	97	126	150	162	171	184	170	163	158	149	101	80	1711
18	Петропавловск, город I	83	103	154	182	191	177	179	175	158	149	103	80	1734
19	Петропавловск, город II	92	109	151	180	169	184	171	186	163	164	116	92	1797
20	Усть-Большерецк													1198
21	Лопатка, мыс	55	82	101	101	83	56	66	73	111	106	64	16	914

KEY: (a) Station No. (b) Station. (c) Annual. (1) Verkhne-Penzhino. (2) Apuka. (3) Korf. (4) Ust'-Lesnaya. (5) Karaginskiy Island (Ostrov). (6) Uka. (7) Klyuchi. (8) Ust'-Kamchatsk. (9) Esso. (10) Icha. (11) Nikol'skoye (Bering Island [o. Beringa]). (12, 13) Mil'kovo. (14) Sobolevo. (15) Semlyachiki. (16) Nachiki. (17) Kamchatskaya agro. st. (18) Petropavlovsk, city I. (19) Petropavlovsk, city II. (20) Ust'-Bol'sheretsk. (21) Lopatka, cape [mys].

Table 2. Ratio of observed duration of sunshine to potential (%).

(a) Станция	(b) Станция	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	(c) %
2	Алука	18	35	40	38	36	26	24	31	43	36	26	28	32
3	Корф	28	38	39	38	40	38	33	41	44	41	29	27	37
4	Усть-Лесная	26	41	46	39	39	47	39	40	41	23	20	26	38
5	Карагинский остров	21	42	38	38	38	40	36	39	45	33	18	16	36
6	Ука	23	34	39	38	35	38	36	38	45	39	22	14	35
7	Ключи	15	28	41	41	37	39	39	42	42	43	27	20	37
8	Усть-Камчатск	21	29	38	35	33	29	26	32	39	41	34	23	32
9	Эссо	48	49	55	46	41	38	37	40	38	34	31	30	41
		36	41	47	41	36	34	33	36	32	28	23	22	34
10	Ича	38	43	48	38	32	33	30	38	40	27	24	20	35
11	Никольское (о Беринга)	12	22	25	27	22	15	15	19	30	35	22	12	21
12, 13	Мильково	30	39	48	47	42	41	44	46	46	45	36	27	42
14	Соболево	33	35	39	40	35	29	29	37	42	51	43	33	37
15	Семлячки	36	46	50	38	33	35	27	31	35	25	26	23	34
16	Начики	34	42	44	40	39	41	33	34	36	35	23	29	36
		31	36	40	37	34	36	29	31	32	31	20	26	32
17	Камчатская, агро	42	50	44	44	40	43	37	40	41	50	42	39	43
18	Петропавловск-Камчатский, город I	40	46	51	52	48	43	43	46	50	56	50	41	47
19	Петропавловск-Камчатский, город II	39	43	45	47	43	41	38	45	47	53	48	41	44
21	Лопатка, мыс	24	33	31	27	19	12	11	17	31	35	26	22	24

KEY: (a) Station No. (b) Station. (c) Annual. (1) No key. (2) Apuka. (3) Korf. (4) Ust'-Lesnaya. (5) Karaginskiy Islands. (6) Uka. (7) Klyuchi. (8) Ust'-Kamchatsk. (9) Esso. (10) Icha. (11) Nikol'skoye (Bering Island). (12, 13) Mil'kovo. (14) Sobolevo. (15) Semlyachiki. (16) Nachiki. (17) Kamchatskaya agro. st. (18) Petropavlovsk-Kamchatskiy, city I. (19) Petropavlovsk-Kamchatskiy, city II. (21) Lopatka, cape.

Table 3. Number of sunless days.

(a) № станции	(b) Станция	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	(c) Год
1	Верхне-Пенжинно													132
2	Алука	19	9	6	7	7	7	9	9	6	10	14	16	119
3	Корф	17	12	9	8	6	6	6	7	7	9	12	17	116
4	Усть-Лесная	14	8	4	3	4	4	7	6	7	11	16	18	102
5	Карагинский остров	17	11	9	8	7	4	5	5	6	11	19	20	122
6	Ука	19	11	10	8	10	7	5	6	7	7	15	19	119
7	Ключи	20	12	8	6	7	5	5	6	5	7	12	18	111
8	Усть-Камчатск	17	11	9	8	9	7	8	8	8	7	11	15	118
9	Эссо	10	7	4	3	3	4	2	2	4	6	11	14	70
10	Ича	10	5	4	6	6	6	7	6	6	7	12	17	92
11	Никольское (о. Беринга)	18	12	10	10	12	13	14	14	8	9	11	16	117
12, 13	Мильково	15	19	6	4	4	3	4	4	5	6	11	16	87
14	Соболево	8	6	5	7	7	7	9	8	7	9	10	13	96
15	Семлячки	14	11	10	9	9	9	10	9	8	7	9	14	119
16	Начики	12	9	7	7	5	4	5	5	5	9	13	14	95
17	Камчатская, агро	10	9	8	8	8	5	10	8	6	7	10	12	101
18, 19	Петропавловск, город I и II	10	8	7	6	6	6	7	6	6	5	8	10	85
20	Усть-Большерецк													111
21	Лопатка, мыс	11	8	10	9	12	15	14	13	9	7	9	12	129

KEY: (a) Station No. (b) Station. (c) Annual. (1) Verkhne-Penzhino. (2) Apukha. (3) Korf. (4) Ust'-Lesnaya. (5) Karaginskiy Island. (6) Uka. (7) Klyuchi. (8) Ust'-Kamchatsk. (9) Esso. (10) Icha. (11) Nikol'skoye (Bering Island). (12, 13) Mil'kovo. (14) Sobolevo. (15) Semlyachiki. (16) Nachiki. (17) Kamchatskaya agro. st. (18, 19) Petropavlovsk, city I and II. (20) Ust'-Bol'sheretsk. (21) Lopatka, cape.

Table 4. Diurnal variation of sunshine duration.

(1) Месяц	Время суток (2)																	
	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21
	2. Алука (3)																	
I						0.5	3.4	5.0	5.9	6.3	6.2	4.2	0.5					
II					1.9	6.8	9.3	10.8	11.2	11.5	11.0	10.7	8.2	2.6				
III			0.2	4.3	11.6	13.4	14.7	16.1	16.1	15.5	15.5	15.7	14.9	12.4	6.6	0.5		
IV		0.1	4.7	10.0	11.5	11.5	13.1	14.0	13.9	14.2	14.4	14.5	13.8	12.8	10.8	7.1	0.8	
V	0.4	3.8	8.1	10.0	11.1	12.3	12.8	13.2	13.2	13.1	13.8	14.0	12.0	13.0	11.9	9.8	7.0	0.8
VI	1.1	3.1	5.3	6.1	7.7	8.8	9.8	9.9	9.9	10.2	9.8	10.0	9.8	9.6	9.6	7.7	6.0	1.9
VII	1.1	3.2	5.0	5.0	7.2	8.0	8.6	9.0	8.6	9.5	9.6	8.6	8.6	8.1	7.9	7.6	5.9	1.6
VIII	0.04	1.0	4.5	6.0	8.3	9.8	10.7	10.9	10.8	11.6	12.0	12.6	11.6	10.2	8.1	6.4	1.3	
IX			1.3	6.3	10.2	12.5	14.1	15.1	15.2	15.2	14.9	14.6	14.3	12.3	8.7	2.2	0.01	
X				1.1	5.8	9.8	11.0	12.1	12.3	12.7	12.4	12.0	10.9	6.5	0.5			
XI					0.01	2.2	7.8	9.8	10.8	11.2	9.5	9.0	3.7	0.1				
XII							3.6	8.6	9.7	9.8	9.3	3.8						
Год	2.6	11	29	49	75	96	119	135	138	141	138	130	108	88	61	41	21	4
	3. Корф (4)																	
I						0.6	5.4	8.5	9.8	9.7	9.7	6.0	1.1					
II					2.3	7.8	10.2	11.4	11.8	12.0	11.6	11.3	8.8	1.9	0.02			
III			0.2	4.7	11.8	14.7	16.2	16.2	16.8	16.5	16.1	15.2	14.5	12.0	5.1	0.1		
IV		0.3	4.0	8.6	11.0	12.5	13.6	14.3	14.4	14.6	14.5	13.9	13.1	11.9	9.4	5.2	0.3	
V	0.7	5.3	9.5	11.4	12.7	13.5	13.9	14.8	14.8	15.2	15.2	14.1	14.1	13.7	12.8	12.1	8.5	1.0
VI	2.8	6.8	8.4	9.2	10.5	11.7	12.9	13.9	14.1	14.7	14.6	14.3	14.2	13.8	12.5	11.6	9.6	1.0
VII	1.4	5.6	6.6	7.4	9.3	9.9	11.3	12.2	13.3	13.7	13.4	13.7	13.5	12.3	11.3	9.8	7.4	2.2
VIII	0.3	2.6	8.0	10.3	11.7	13.2	14.3	15.1	15.1	14.5	14.8	13.7	12.9	12.6	10.9	8.8	2.3	
IX			1.8	8.1	12.5	14.3	15.1	15.1	15.6	15.7	14.9	13.9	13.8	12.6	9.6	2.7		
X				0.5	6.6	11.0	12.6	14.2	14.4	15.0	14.2	13.6	12.1	6.1	0.7			
XI					0.1	4.2	10.1	11.5	11.8	11.6	11.6	10.0	3.8	0.02				
XII							3.6	7.9	9.9	10.2	9.0	3.9	0.01					
Год	5	21	38	60	88	113	139	155	162	163	160	144	123	97	72	50	28	7

1 За 2-3 часа 0.02. (5)

KEY: (1) Month. (2) Time of day. (3) 2. Алука.
(4) 3. Корф. (5) 1 For 2-3 hours, 0.02.

Table 4 (cont'd).

Месяц (1)	(2) Время суток																			
	3	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21		
4. Усть-Лесная (4)																				
I						0.3	5.1	8.0	7.8	8.3	7.7	5.3	0.9							
II					1.2	7.5	11.2	12.9	13.6	13.6	13.5	12.1	9.1	2.2						
III			0.1	2.5	9.1	14.7	17.5	18.6	18.5	18.8	17.8	17.8	16.3	12.6	4.7	0.2				
IV		0.1	2.7	7.1	10.0	12.5	13.8	15.3	15.7	15.6	15.3	14.2	13.5	12.4	11.0	5.5	0.3			
V	0.7	4.2	8.5	11.4	12.6	14.1	15.0	15.8	16.7	16.8	15.9	15.8	15.3	14.8	13.7	12.9	8.3	0.6		
VI	4.2	8.9	11.7	12.6	13.9	14.7	16.4	17.7	17.1	17.4	17.4	17.2	16.4	16.3	16.5	16.1	15.0	4.9		
VII	2.3	6.1	8.7	9.8	11.6	12.6	13.6	14.3	14.9	15.8	15.8	14.8	14.0	13.9	13.5	12.9	10.5	1.8		
VIII	0.02	1.5	6.1	9.2	11.4	12.7	14.1	14.4	15.2	15.3	15.7	15.0	14.5	13.6	12.9	10.8	3.8	0.04		
IX			1.1	5.3	9.2	11.4	12.3	13.6	14.0	14.7	14.6	14.4	13.7	12.5	9.5	2.3				
X				0.6	3.2	5.8	7.2	8.3	9.1	9.3	8.7	7.6	6.5	3.1	0.2					
XI						1.3	5.5	6.6	6.7	7.4	6.5	5.6	1.8							
XII							2.8	7.0	9.1	9.4	7.8	3.1								
Год (3)	7	21	39	58	82	108	134	152	158	162	157	143	122	101	82	61	38	7		
7. Ключи (5)																				
I						1.1	4.0	6.0	6.9	6.9	6.7	3.4	0.1							
II					1.9	4.8	7.2	9.0	10.2	11.2	11.6	10.9	8.4	2.3						
III			0.1	3.2	9.1	13.3	15.7	16.8	17.4	18.1	18.0	17.0	15.3	12.5	4.8	0.1				
IV		0.2	5.2	9.7	11.8	13.0	14.2	15.2	16.0	16.1	15.4	14.2	13.0	12.1	9.8	4.4	0.1			
V	0.1	5.1	9.3	11.2	12.4	13.9	14.2	15.2	15.3	15.6	15.1	14.2	13.5	13.3	12.0	10.3	4.3	0.1		
VI	1.5	8.8	10.5	11.8	12.9	13.6	15.0	15.6	16.2	16.3	15.7	14.8	13.9	13.3	12.2	10.8	7.8	1.1		
VII	0.6	6.7	9.0	10.4	12.3	13.8	14.7	14.8	15.5	15.8	16.2	15.7	14.9	13.8	11.8	11.0	6.1	0.3		
VIII		1.9	7.2	9.5	11.9	14.7	16.5	16.9	16.9	17.2	17.4	16.7	16.0	14.9	13.0	9.2	2.0	0.2		
IX			1.3	6.0	9.0	11.9	14.2	15.6	16.3	16.4	16.2	15.5	13.9	12.6	7.9	1.1				
X				1.0	8.3	12.5	14.7	15.5	16.4	15.9	14.7	13.4	10.9	5.4	0.6					
XI					0.6	5.3	9.7	11.8	12.5	12.3	11.4	7.8	2.4	0.1						
XII						0.7	4.0	6.1	7.3	7.8	6.8	1.7	0.03							
Год (3)	2	23	43	63	90	119	144	158	167	170	165	145	122	100	72	47	20	2		
8. Усть-Камчатск (6)																				
I						1.0	5.2	7.4	8.7	9.8	9.0	7.7	2.6							
II					1.1	5.0	8.0	10.1	11.3	11.4	11.2	10.2	8.9	3.3	0.02					
III				1.6	7.5	12.0	14.6	16.7	16.9	16.6	16.0	16.1	14.7	12.5	5.6	0.1				

KEY: (1) Month. (2) Time of day. (3) Annual. (4) Ust'-Lesnaya.
(5) 7. Klyuchi. (6) 8. Ust'-Kamchatsk.

Table 4 (cont'd).

IV		0.1	2.6	6.6	9.8	12.3	12.7	13.1	13.6	14.2	14.2	13.6	12.1	10.6	8.8	3.7	0.2		
V	0.02	2.6	6.3	8.6	10.8	11.8	12.1	12.8	13.3	13.7	14.1	13.8	13.9	12.5	11.3	9.0	1.7	0.2	
VI	0.5	5.5	5.4	6.6	7.6	8.6	9.3	10.1	11.6	11.9	12.6	12.8	11.9	11.0	9.6	7.3	5.6	1.0	
VII	0.2	2.6	4.6	6.5	7.4	8.9	9.5	10.4	11.1	11.2	12.0	11.7	11.1	10.1	8.6	7.5	1.9	0.6	
VIII	0.6	5.0		8.2	9.9	11.6	12.6	13.3	14.3	14.5	14.3	14.1	13.0	11.0	10.1	7.6	1.2		
IX		0.8		5.3	9.0	11.9	13.1	13.6	13.8	14.3	14.2	14.0	13.3	11.1	7.0	1.1			
X				0.5	6.5	12.0	14.3	15.0	16.2	16.5	16.0	15.0	12.7	7.9	0.6				
XI					0.3	4.6	9.2	11.7	12.2	12.6	12.7	11.4	7.6	0.1					
XII						0.8	6.0	8.4	9.2	10.2	10.2	8.5	2.0						
Год (3)	1	9	25	44	70	100	127	144	152	157	156	149	124	90	62	36	17	2	

11. Никольское (о. Беринга) (1)

I						0.5	2.4	4.0	4.2	4.4	4.7	3.1	0.4						
II					0.9	4.3	6.3	7.0	6.9	7.5	7.0	5.9	4.2	0.9					
III				0.8	4.4	7.2	10.2	11.2	11.0	10.9	11.4	9.8	8.1	5.1	1.9	0.05			
IV		0.1	1.3	1.2	7.0	8.5	9.0	10.2	10.3	10.1	10.6	9.6	9.0	7.8	5.6	1.7	0.1		
V	0.01	1.3	3.8	5.6	6.4	7.3	8.5	8.5	9.0	8.8	9.3	8.9	8.6	7.7	7.0	5.8	1.8	0.07	
VI	0.1	1.6	2.5	3.1	4.0	4.7	5.5	5.8	5.9	5.1	6.0	6.0	5.9	5.3	4.8	3.5	1.9	0.02	
VII	0.1	1.2	2.3	3.2	4.2	4.7	5.7	6.0	5.9	5.6	6.2	6.0	5.3	5.0	6.3	3.4	2.2	0.05	
VIII		0.4	2.8	3.1	1.0	5.7	6.5	7.1	6.9	7.3	7.1	7.3	6.8	4.6	5.1	3.6	0.5		
IX			0.3	2.7	7.3	9.0	9.8	10.6	10.8	10.7	10.7	10.5	9.3	8.5	5.1	0.6			
X				0.2	4.6	9.6	11.8	13.1	13.6	12.7	12.5	11.7	9.7	4.9	0.5				
XI					0.1	2.1	5.5	7.8	9.1	8.6	7.9	5.9	2.6	0.05					
XII						0.3	2.4	4.5	4.9	4.1	4.9	2.6	0.2						
Год (3)	0.2	5	13	23	43	64	84	96	98	97	99	87	70	50	37	19	6	0.1	

12, 13. Мильково (2)

I						1.5	6.1	8.5	10.7	11.8	11.4	10.1	4.0						
II					0.01	1.5	6.2	9.5	11.3	12.7	13.1	13.2	13.2	10.8	4.3	0.01			
III			0.1		2.5	8.8	13.4	16.5	17.7	18.3	18.7	18.5	17.7	15.7	12.9	5.3	0.1		
IV		0.03	2.4		7.6	12.3	14.9	16.6	17.6	18.1	18.1	17.7	16.7	15.8	13.9	10.3	1.2	0.1	
V		2.6	7.1	11.3	13.8	14.6	15.9	16.4	16.2	16.0	16.2	15.3	14.5	12.8	10.8	8.8	2.8	0.01	
VI	0.1	3.8	8.7	11.4	13.9	15.2	16.6	17.1	16.9	16.3	15.8	14.4	13.2	12.4	10.1	8.2	1.6	0.1	
VII	4.03	2.9	8.1	10.9	12.7	14.4	15.9	16.8	17.3	17.4	17.7	17.2	15.9	14.6	12.6	10.3	4.6	0.1	
VIII		0.2	3.3	8.4	12.1	14.9	16.8	17.5	18.3	18.2	17.9	17.2	16.5	15.3	12.6	7.1	0.7		
IX			0.2	3.7	9.1	12.4	15.5	16.5	16.8	16.6	15.6	16.0	14.6	13.5	8.9	0.9			
X				0.3	5.5	10.9	14.4	15.9	16.7	16.6	15.9	15.0	11.0	7.9	0.9				
XI					0.1	3.1	8.0	11.0	12.9	13.1	12.3	12.1	7.1	0.4					
XII					0.0	0.1	4.4	7.7	9.1	10.0	10.0	8.6	1.9						
Год (3)	0.1	10	30	56	90	122	156	174	181	186	184	174	111	108	72	10	13	0.2	

KEY: (1) 11. Nikol'skoye (Bering Island).
(2) 12, 13. Mil'kovo. (3) Annual.

Table 4 (cont'd).

(1) Месяц	(2) Время суток																			
	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21	
14. Соболево (4)																				
I					0.03	2.6	8.5	12.6	11.0	13.9	13.3	11.0	5.5	0.02						
II				0.02	2.3	9.2	13.3	15.2	15.5	15.0	14.9	13.7	11.9	5.2	0.04					
III			0.06	3.3	10.8	15.2	17.5	18.1	18.4	18.1	18.5	17.4	16.7	14.2	6.8		0.3			
IV		0.02	1.8	7.5	11.0	12.6	13.6	13.9	14.3	13.8	14.7	14.2	13.2	12.0	10.2	3.7	0.02			
V			4.4	6.5	8.3	9.8	11.2	13.0	13.5	14.3	14.5	14.7	14.0	12.6	11.1	8.4	3.3			
VI	0.06	2.5	4.1	5.4	7.1	8.6	11.9	13.3	14.5	14.3	14.9	15.3	14.7	13.4	11.2	8.7	5.8	0.3		
VII		1.0	2.4	3.5	4.8	6.5	8.7	10.0	11.5	11.6	12.7	12.8	11.8	10.6	8.9	7.7	4.3	0.1		
VIII		0.2	2.5	4.1	5.8	7.2	8.7	10.2	12.2	13.0	14.3	14.6	14.1	13.2	11.5	7.8	0.8			
IX			0.3	3.3	6.6	8.6	9.6	11.6	11.6	12.2	13.3	13.3	13.0	12.2	8.8	1.3				
X				0.2	2.9	5.9	7.8	9.5	9.2	9.4	9.9	8.9	7.3	4.8	0.6					
XI					0.2	3.3	7.4	9.0	9.8	9.5	9.5	8.0	4.8	0.3						
XII						0.8	5.5	8.5	9.7	9.4	8.4	6.2	1.6							
Год (3)	0.1	5	16	34	60	90	124	145	154	154	159	150	129	99	69	38	11	0.1		
15. Семлячки (5)																				
I					0.03	4.2	9.8	10.9	11.2	11.4	11.5	10.3	4.7	0.03						
II				0.02	2.7	8.1	9.9	10.8	11.2	11.4	11.2	10.7	9.3	2.8	0.02					
III					2.6	9.0	12.6	14.0	14.5	14.5	14.4	13.6	12.4	9.8	3.0	0.0				
IV		0.05	2.6	7.6	11.9	13.3	14.0	14.7	15.0	15.2	14.7	14.6	13.6	11.6	7.5	2.1	0.03			
V			6.0	8.7	9.9	11.3	12.5	13.3	13.7	13.6	13.3	13.5	12.8	11.4	9.7	8.2	2.7			
VI	0.03	2.6	5.3	7.2	8.4	9.6	10.4	11.1	11.5	11.9	12.0	11.5	10.6	9.5	8.2	6.3	3.6	0.1		
VII	0.03	2.7	5.9	8.2	9.3	9.8	10.6	10.9	11.5	11.6	11.4	11.5	10.1	9.3	8.2	6.6	3.3	0.0		
VIII		0.7	5.6	9.8	11.4	12.1	13.1	13.4	13.9	13.8	13.3	13.0	12.3	11.0	9.2	5.3	0.5			
IX			0.8	6.6	12.2	13.8	14.6	15.0	15.5	15.0	14.8	14.2	12.7	10.4	5.2	0.4				
X				1.3	9.9	15.3	17.0	17.7	17.3	17.2	16.3	16.3	15.1	9.3	0.8					
XI					1.3	8.8	12.8	13.8	14.2	14.1	14.0	13.0	9.4	0.6						
XII						3.0	9.7	11.4	12.0	11.8	11.4	9.7	2.8							
Год (3)	0.1	8	26	52	86	122	148	158	162	162	159	152	126	86	52	29	10	0.1		
16. Начики (6)																				
I						2.2	7.6	10.3	12.1	12.7	12.4	11.0	5.5							
II					2.2	9.9	14.4	16.1	16.8	16.3	15.7	15.4	11.6	3.6						
III				1.6	9.0	14.9	16.7	17.9	18.4	18.1	17.3	16.1	11.1	11.8	3.9	0.03				

KEY: (1) Month. (2) Time of day. (3) Annual. (4) 14. Sobolevo. (5) 15. Semlyachiki. (6) 16. Nachiki.

Table 4 (cont'd).

IV	0.5	6.1	10.4	13.1	14.3	14.9	14.6	14.3	13.5	13.6	13.7	13.0	10.4	3.9	0.03		
V	2.6	8.4	12.1	14.8	15.4	15.6	15.1	14.5	14.3	14.1	13.4	13.5	13.5	9.9	4.4		
VI	2.0	6.3	9.9	13.5	15.2	17.5	17.1	16.7	17.1	15.9	15.7	15.0	14.2	12.2	7.9	0.3	
VII	0.7	3.0	6.1	11.1	12.3	14.0	13.9	13.8	13.6	13.0	11.9	11.0	10.6	9.5	5.0	0.04	
VIII	0.2	1.4	4.7	8.6	13.1	15.6	16.8	16.8	17.0	16.4	15.2	13.4	12.3	8.0	1.0		
IX		0.7	3.7	6.9	10.3	12.8	14.5	15.1	14.6	14.2	13.7	12.9	8.4	0.5			
X		0.1	2.7	6.3	10.9	12.4	13.4	13.6	12.8	12.3	11.3	5.9	0.6				
XI			0.05	2.5	7.6	10.8	12.2	11.9	12.0	9.9	5.8	0.2					
XII				1.1	5.8	9.3	11.1	11.7	10.6	8.8	2.5						
Год (3)	6	28	61	106	145	167	176	176	171	161	134	100	74	44	18	0.3	
19. Петропавловск, город II (1)																	
I			0.1	5.4	12.0	14.0	14.7	14.3	14.3	13.2	8.2	0.4					
II			2.6	9.9	12.3	13.7	14.3	14.5	14.2	13.5	11.8	6.1	0.1				
III		2.4	10.4	14.6	16.0	16.4	17.2	17.2	16.7	16.1	15.2	12.6	6.3	0.1			
IV	0.2	9.0	13.3	14.5	15.6	16.3	16.7	16.8	17.0	16.7	15.9	15.0	12.3	5.0	0.04		
V	4.8	11.2	13.0	14.1	15.1	16.1	16.3	16.5	16.7	16.3	15.5	14.5	13.3	10.7	3.9		
VI	0.04	5.3	8.6	9.9	11.5	13.2	15.4	16.1	16.1	16.5	16.8	16.5	15.4	14.0	11.3	5.3	0.1
VII		4.2	8.7	10.3	12.0	13.4	14.6	14.8	15.2	15.9	15.4	14.7	13.4	12.5	10.9	5.2	
VIII		1.0	9.1	12.3	13.3	14.6	15.8	17.0	17.2	17.7	17.1	16.6	15.4	13.5	8.6	0.6	
IX	0.02		4.8	12.5	13.7	14.7	15.9	16.0	16.4	16.3	15.9	15.3	13.7	9.4	1.2		
X			0.4	10.5	16.7	18.1	19.0	19.1	18.9	18.7	18.3	17.2	11.9	1.7			
XI				0.8	9.8	15.0	16.2	17.0	16.3	16.3	15.2	11.5	1.2				
XII					3.2	12.0	14.2	15.0	14.9	14.6	13.1	5.1					
Год (3)	0.04	16	54	96	139	172	188	194	194	195	188	164	120	83	48	15	0.1
21. Лопатка, мыс (2)																	
I			0.1	2.4	6.4	8.4	9.7	9.6	8.5	6.8	3.2	0.1					
II		0.01	1.5	6.0	9.0	10.8	11.6	11.3	11.4	10.5	7.5	2.1	0.03				
III		0.4	3.1	4.8	8.5	10.6	11.7	11.8	12.1	11.8	11.2	9.5	6.6	1.4	0.03		
IV	0.1	1.7	3.8	6.4	8.3	9.4	10.0	10.0	10.4	11.0	11.0	9.6	7.3	3.8	0.6		
V	0.2	1.0	2.2	4.9	5.5	6.4	7.6	7.9	7.8	8.5	8.3	7.5	6.0	4.6	2.4	0.3	
VI	0.2	1.2	2.2	3.0	4.0	5.4	6.2	6.8	6.7	6.8	6.6	5.7	4.4	3.3	2.2	0.8	
VII	0.2	0.6	2.5	3.5	4.3	5.6	7.2	7.7	7.5	8.2	8.1	7.1	5.5	3.6	2.1	0.5	
VIII		0.1	2.8	7.3	9.5	10.5	11.1	11.7	11.7	11.7	11.4	10.8	8.3	4.1	0.3		
IX			0.4	4.5	9.3	12.1	13.1	12.7	12.8	13.3	12.3	10.4	4.6	0.2			
X			0.02	0.3	3.9	7.2	9.2	10.2	10.1	10.1	8.1	4.4	0.3				
XI			0.05	1.2	5.6	7.9	9.0	8.5	8.0	5.5	1.4	0.05					
XII				66	92	108	114	114	115	105	82	50	25	9	2		
Год (3)	0.5	5	18	38	66	92	108	114	114	115	105	82	50	25	9	2	

KEY: (1) 19. Petropavlovsk, city II. (2) 21. Lopatka, cape. (3) Annual.

Table 5. Recurrence of uninterrupted sunshine duration by gradations (in % of the total number of cases).

(1) Продолжи- тельность (часы)	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	(2) Тот
10. Усть-Лесная (3)													
2	2	0.8	1		1	2	0.6	0.7	3	1	2	3	1
2-4	51	26	26	23	21	24	25	20	20	31	33	57	27
4-6	40	25	16	20	13	16	15	18	19	23	42	40	21
6-8	7	35	21	15	12	9	5	16	16	18	23		15
8-10		13	24	13		9	10	10	16	21			12
10-12			11	15	5	11	6		18	6			10
12-14			1	14	14	7	13	23	8				8
14-16					11	11	10	6					1
16-18					1	11	8						2
12. 13. Мильково (4)													
2	2	1	0.6	1	0.6	0.9	1	3	1	2	2	2	2
2-4	30	23	18	26	24	30	31	28	29	35	32	38	28
4-6	48	20	13	15	20	18	18	15	20	22	40	56	22
6-8	20	36	20	15	15	13	12	13	14	22	25	4	17
8-10	0.0	20	33	20	13	10	10	13	19	17	0.6		14
10-12	0.4		15	16	10	11	12	16	16	2			10
12-14				7	13	8	8	11	0.6				5
14-16					4	9	8	0.5					2
15. Семлячки (5)													
2	2	0.0	0.3	1	0.9	0.9	0.3	1	1	3	1	2	0.9
2-4	24	22	21	20	27	29	30	25	22	25	27	24	25
4-6	29	19	13	16	19	17	24	22	21	20	22	42	20
6-8	45	35	16	12	14	14		13	19	21	46	32	20
8-10		24	33	20	11	12		12	20	29	4		15
10-12			17	20	10	8	9	13	17	2			10
12-14				11	12	10	5	12	1	0.2			6
14-16					6	9	8	2					3
19. Петропавловск, город II (6)													
2	2	0.3	2	0.6	0.9	0.6	2	1	0.3	0.6	0.7	0.8	0.8
2-4	22	20	17	21	23	25	24	18	22	22	21	25	22
4-6	26	15	15	13	17	13	18	20	20	20	19	38	19
6-8	50	38	13	14	14	16	14	15	16	20	53	36	24
8-10	0.3	27	30	15	10	12	11	14	15	34	6		15
10-12		0.8	22	26	10	13	14	16	27	3			11
12-14				10	22	14	15	14	0.3				7
14-16					2	6	2						0.9
21. Лопатка, мыс (7)													
2	3	3	1	1	1	0.8	2	3	2	3	2	1	2
2-4	43	42	36	36	40	42	35	42	32	16	44	46	31
4-6	30	22	19	22	27	24	27	26	24	18	33	36	22
6-8	24	22	15	17	19	13	19	13	16	18	19	17	21
8-10		10	22	18	9	8	9	9	14	14	2		14
10-12		0.6	7	5	7	8	5	7	10	1			6
12-14				1	5	2	1		0.4				1
14-16					1	2	2						0.5

KEY: (1) Duration (hours). (2) Annual. (3) 10. Ust'-Lesnaya. (4) 12, 13. Mil'kovo. (5) 15. Semlyachiki. (6) 19. Petropavlovsk, city II. (7) 21. Lopatka, cape.

ALPHABETICAL INDEX OF STATIONS

SOLAR RADIATION AND RADIATION BALANCE

(1) № стан- ции	Станция (2)	(3) Высота, м	S, S', D, Q, R	
			(4) B _ж , A (табл. A, 4, 5, 6)	(4) R (табл. A, 4)
(5) годы наблюдений				
7	(6) Ключи	28	1957—1964	1960—1964
3	(7) Корф	2	1959—1964	1960—1964
19	(8) Петропавловск, город II	32	1957—1963	1957—1964

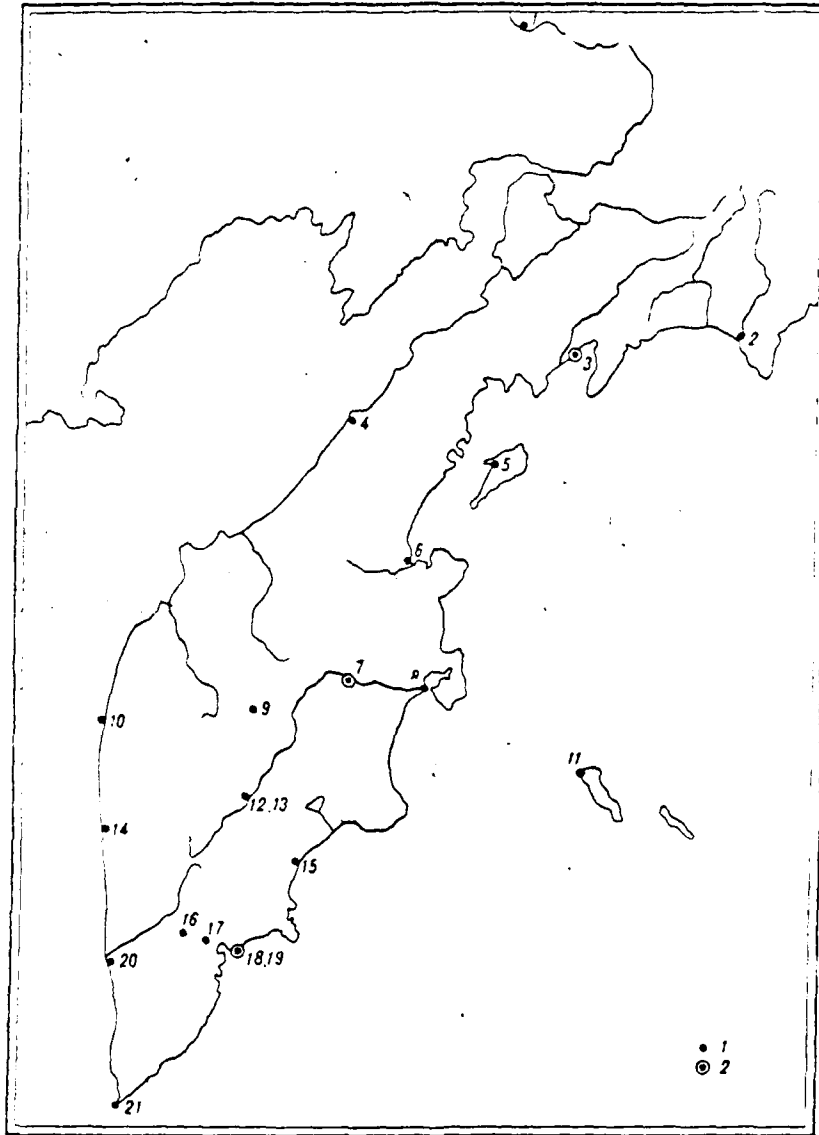
KEY: (1) Station No. (2) Station. (3) Altitude, m. (4) Tables.
 (5) Years of observation. (6) Klyuchi. (7) Korf.
 (8) Petropavlovsk, city II.

LIST OF METEOROLOGICAL STATIONS

- | | |
|--------------------------------|---------------------------------|
| 1. Verkhne-Penzhino | 11. Nikol'skoye (Bering Island) |
| 2. Apuka | 12, 13. Mil'kovo |
| 3. Korf (A) | 14. Sobolevo |
| 4. Ust'-Lesnaya | 15. Semlyachiki |
| 5. Karaginskiy Island [ostrov] | 16. Nachiki |
| 6. Uka | 17. Kamchatskaya, agro. st. |
| 7. Klyuchi (A) | 18. Petropavlovsk, city I |
| 8. Ust'-Kamchatsk | 19. Petropavlovsk, city II (A) |
| 9. Esso | 20. Ust'Bol'sheretsk |
| 10. Icha | 21. Lopatka, cape |

NOTE: (A) - station with accinometric observations

MAP OF METEOROLOGICAL STATION NETWORK



- 1 - meteorological stations,
2 - meteorological stations with actinometric observations.

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DISTRIBUTION DIRECT TO RECIPIENT

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E408 AFWL	1
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FSL	1