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SKETCH OF CLIMATIC CONDITIONS IN SLOVAKIA

INTRODUCTION

In a relatively small area of the territory of Slovakia there occur very substantial differences in the weather and the climate caused chiefly by the complex orographic conditions of the country. The higher mountain zones situated mostly zonally in the northern and central parts of Slovakia influence the climatic conditions on the one hand immediately by the heterogeneous character of the surface, on the other, by the fact that, as a whole they modify the circulation of the atmosphere over a wider environment.

Generally there prevail over the inland Central European region, in agreement with the over-all baric field and with the position of action centres, western to north-western air currents, which in the winter season are turned, on the whole somewhat to the south. In connection with the cyclonic action over the Atlantic and over northern Europe, the over-all character of the weather, even over the inland territory, is determined by a relatively frequent alternation of air masses of different origin and as a result of this fact, it is marked by a considerable variability. Especially in the winter half of the year, and in the transitory seasons of the year, the atmospheric conditions are influenced in the Carpathian region by frequent cyclones arising in the Mediterranean frontal zone and advancing through Yugoslavia and Hungary in many cases immediately to the territory of Slovakia. These cyclones fed by a warm Mediterranean air bring an abundant precipitation, chiefly to the south-western and western Slovakia, while the cyclones of Atlantic origin influence above all the north-western and northern territory of the country, bordered by a continuous belt of frontier mountains.

For this reason it is possible, in the territory of Slovakia, to speak about a maritime influence of the climate of a double sort — Atlantic and Mediterranean. On the whole this maritime influence decreases from west towards the east, so that the region of East Slovakia, especially in the winter season, gets into the immediate action of continental anticyclones which often keep on for a long time over the East Carpathians. Under such meteorological conditions western Slovakia, especially however, the Danubian Lowland and the Ultramontane region (Záhorie) have relatively strong south-east air currents which, on the leeward slopes of the hilly belts vertical to this current, are considerably strengthened.

Besides the windy region in the Danubian Lowland, under certain meteorological situations, the valleys of the East Slovakian rivers Torysa, Topľa, Ondava and partly of Laborec are also windy. Here as a result of the configuration of the territory there occur relatively strong northern and in a lesser measure southern winds. Disregarding the very windy ridges and summit positions, the valleys and the basins, especially in the northern and north-western Slovakia, are on the contrary, considerably quiet. Especially

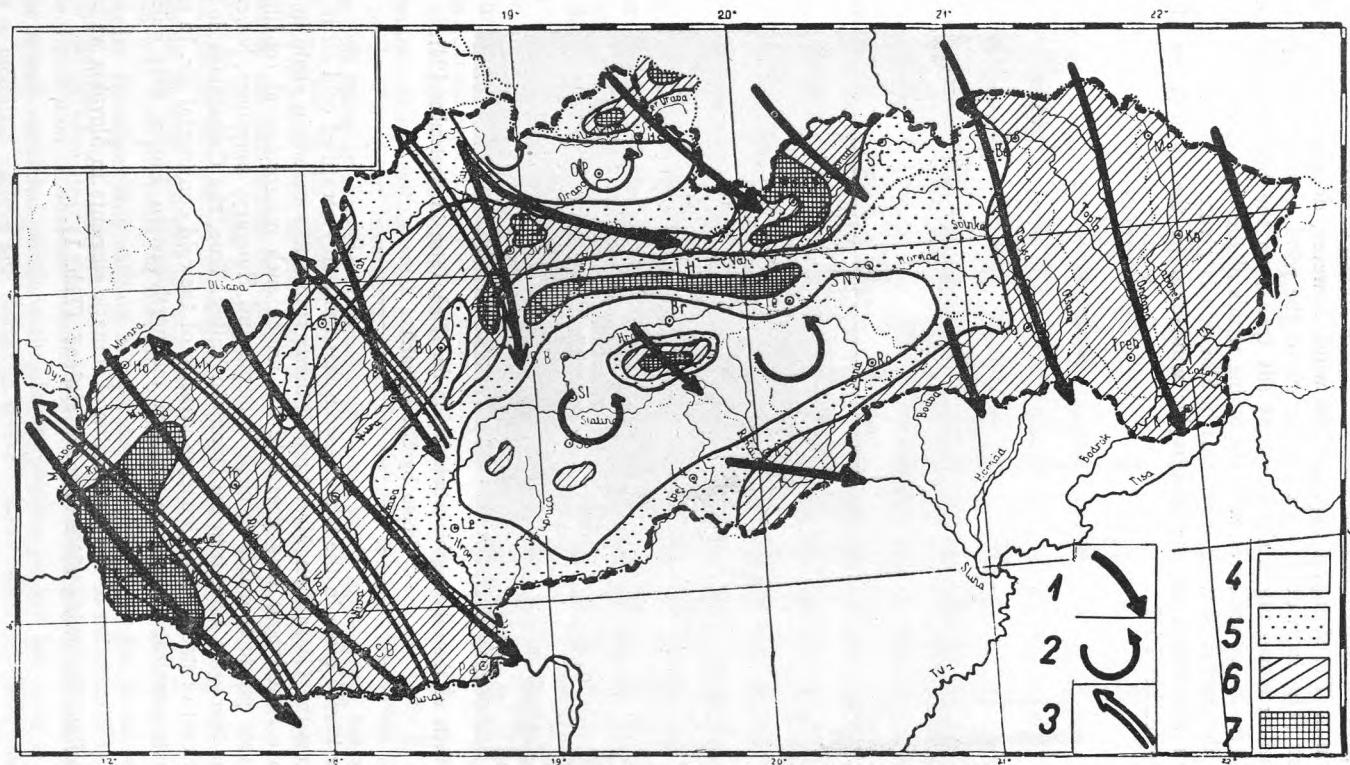


Fig. 1. Outline map of wind conditions in Slovakia. 1 — prevailing direction of the wind, 2 — weaker winds without expressive prevalence, 3 — relatively frequent and strong south-eastern winds, 4 — region of weak winds, 5 — region of moderate winds, 6 — region of fresh winds, 7 — Region of strong winds.

in the winter season the amount of calm in places reaches in such positions up to 50 % of all the cases. On the summits of the High Tatra there prevail expressively north-western and western winds. The strongest impact of the wind, however, does not occur in these highest positions. The individual strongest impacts of the wind about 250 km./h. occur in the south-eastern slopes under the Lomnický štít (peak) on the Skalnaté Pleso at an altitude of 1778 m. above sea level, with the falling winds of the type of bora.

The outline illustration of wind conditions in Slovakia is given in Fig. 1.

Fig. 2 shows the effects of the catastrophic windstorm in the High Tatra at the beginning of September 1941.



Fig. 2. Effects of the catastrophic windstorm in the High Tatra in September 1941.

(Photo by Dr. Bečvář.)

It happens relatively often in the winter season that the stably stratified cold air is not in a state to cross the Carpathian Massif and it blows round this mountain chain in the north. Only in a roundabout way does cold air, under such meteorological conditions in the lower layers, get to Slovakia through Rumania and Hungary, sometimes, however, also through the Moravian Gate into the Danubian Valley. True, the Carpathians do not present a significant obstacle to the immense invasion of the cold continental air. In such cases the cold air penetrates from the northern and north-eastern Europe very quickly into our region.

For the tabular illustration of the distribution of climatic elements in Slovakia we have used the data of the following meteorological stations (Tab. 1).

Table 1

Position	Station	Height above sea level in m.	Latitude N.	Longitude E.
Lowland region	Bratislava	206	48°10'	17°07'
	(Vajnory)	133	48°12'	17°12'
	Hurbanovo	115	47°52'	18°12'
	(Komárno)	112	47°47'	18°06'
	Lučenec	187	48°20'	19°40'
	(Rimavská Sobota)	208	48°24'	20°01'
Mountain zone and valleys basins	Košice	206	48°42'	21°16'
	Zvolen	299	48°35'	19°05'
	(Víglaš)	368	48°33'	19°19'
	Oravský Podzámok	493	49°15'	19°20'
	Liptovský Hrádok	618	49°02'	19°44'
	(Poprad)	683	49°03'	20°18'
High mountain region	Starý Smokovec	1018	49°08'	20°13'
	Skalná Pleso	1778	49°12'	20°14'
	Lomnický štít	2635	49°12'	20°13'

THERMAL CONDITIONS

The Danubian Lowland has the highest temperatures throughout the year. In the coldest month, in January, the temperatures here are within the range of -1° to -2° . The hottest in the whole of the Danubian Lowland is July with 20° to 21°C . This has been the average for many years not only here, but also in the East Slovakian Lowland. From there the temperatures decrease both in winter and summer in the direction of higher positions. In the East Slovakian Lowland the temperatures are somewhat lower than in the Danubian Lowland, which is connected in winter with a greater continentality, and in summer with sometimes a more intensive penetration of cold air from the northwest to the north, at the back of the cyclones over the European part of the U. S. S. R. In mountain valleys with a weak wind the winter temperatures are lower by some degrees as a result of frequent inversions. Thus for instance Spišská Nová Ves at the bottom of the Spiš Basin at a height of 466 m. above sea level, in January, has an average of -5.5°C ., while on the slopes of the High Tatra we meet with the same temperature at heights of about 1350 m. above sea level. In the summer season as a result of intensive convection, the distribution of temperatures is substantially more regular. In the highest positions of the High Tatra at an altitude of 2635 m. above sea level on the Lomnický štít the average temperature of the coldest month is -10.9°C ., and of the warmest 4.0°C .. Meanwhile in these positions the occurrence of extremes is shifted by one month in comparison with low positions, so that the minimum occurs in February and the maximum in August. In winter this shifting is more considerable. Even the month of March has still substantially low temperatures.

The distribution of absolute minima temperatures reveals very substantial differences. While in well ventilated positions the absolute minima do not fall even to -30°C ., the frosts in mountain valleys and basins in severe winters reach generally nearly -40°C ., as it happened in February 1929. The absolute maxima are much more uniformly distributed.

buted and reach in lowlands in extreme cases 38 to 39 °C.; in the medium heights of the mountain valleys they reach in very exceptional cases 35 °C.

CONDITIONS OF CLOUDINESS AND LENGTH OF SUNSHINE

As in every mountain region so also in Slovakia in the state of cloudiness there are considerable regional and local differences. Generally the least cloudiness occurs in lower positions at the end of summer and at the beginning of autumn, in August and September. The greatest cloudiness occurs here in November and December. In the high mountain positions there is, on the contrary, the least cloudiness in winter, the greatest in summer at the time of intensive convection. Fig. 3. shows the summer convective cloudiness in the High Tatra. In larger mountain chains there are substantial differences in cloudiness between the windward and the leeward positions.

Cloudiness is closely connected with sunshine. The region with most sunshine in Slovakia is a large part of the Danubian Lowland, with 2000 to 2100 hours of sunshine per year. In the lowlands of south-eastern Slovakia the yearly sunshine is somewhat shorter than in the Danubian Lowland. In the mountain valleys of central and northern Slovakia the period of sunshine decreases, partly as a result of shading by mountains, partly as a result of greater cloudiness, from 1600 to 1800 hours. At the summits of the High Tatra the period of sunshine is again longer and it is about 2100 hours. This is connected with the free horizon and with the little cloudiness in the high mountain positions in winter.

OCCURRENCE OF FOGS

The occurrence of fogs is, disregarding the higher mountain positions, bound chiefly with the thermal inversions. Most of the fogs arise under a quiet and otherwise clear weather, especially in mountain valleys and basins as a result of the cooling of the lower layers of air by night radiation and this chiefly in autumn and winter. On higher mountains fog arises when in the given altitude there is cloudiness. Hence high mountain positions have most fogs in summer in a cumulus cloudiness.

PRECIPITATION

The distribution of precipitation in Slovakia shows a varied picture. This is connected with the complex orographic conditions of the country and with the particular conditions of circulation in the individual regions. We must generally emphasize the relatively driest region in the Danubian Lowland where in the south-eastern part the yearly amount of precipitation reaches barely 550 mm. In the neighbourhood of mountains and in mountain regions themselves the amount of precipitation increases. At the boundary line between the Velká Fatra and the Low Tatra the total amount of precipitation already at the altitude of 700 m. above sea level amounts to more than 1000 mm per year. In the mountain valleys the amount of precipitation is, on the whole somewhat less, while there are considerable differences between the windward and the leeward sides. Thus for instance in the neighbourhood of the High Tatra on the leeward side in the Spiš Basin at the same altitude there is roughly 50 % less precipitation than at the same altitude on the windward side. At the highest altitudes in the High Tatra the total yearly amount of precipitation reaches 2000 mm.

The number of days with precipitation oscillates between 115 days in the year in the lowlands and 215 days in the year at the highest positions of the High Tatra. The absolute highest amount of precipitation measured in 24 hours oscillates mostly between 60 and 110 mm. Only in isolated cases, in local storms with cloud-bursts was the amount above 150 mm. Thus for instance on the 3rd June 1951 at Trnava there was 163 mm. rain, and on the 12th July 1957 at Skalka (Štúrovo district, about 10 km. from the place where the Ipel flows into the Danube) even 232 mm.

SNOW AND SNOW COVER

An important climatic factor is the winter precipitation in the form of snow. With increasing altitude the amount of snowfall increases. While in the low altitudes, especially in the Danubian Lowland, there occurs also winter precipitation often in the form of rain, as the height increases there is also an increase in the frequency and the abundance of snowfalls. In the lowlands snow falls about 25 % of all the days with precipitation in the year; in altitudes above 1000 m. above sea level the number of days reaches already 50 % of all the days with snowfall and on the summit of the High Tatra up to 75 %. With this is also connected the occurrence of the snow cover. In the lowlands of the south-west of Slovakia the stability of the snow cover is very small on account of the frequent thaw. In the period in which the snow cover here occurs at all, snow lies effectively only hardly 40 % of all the days. The stability of the snow cover increases with the height and exceeds 90 % in the higher positions of the High Tatra. In the lowlands of south-eastern Slovakia the stability of the winter snow cover is greater than in the Danubian Lowland, which is connected with the greater continentality of the climate of Eastern Slovakia, where the warm sea air does not penetrate in winter so often as to the region of south-western Slovakia.

OCCURRENCE OF HARD RIME

In the higher mountain positions, especially on the ridges and summits, there is often found abundant hard rime. An especially abundant hard rime is generally observed on the summits and ridges of the High Tatra and the Low Tatra in the transitory seasons, in the highest positions sometimes even in summer with the invasion of cold sea air from the high latitudes when the temperatures are little below 0 °C. In calculating the hard rime deposited on a given area on the wooden masts of the Lomnický štít amounts to more than 1000 kg per m² a year. The biggest amount of hard rime deposited for a single day on the Lomnický štít was on 24th June 1948, viz. 209 kg/m². Fig. 4 shows the abundant hard rime on the Lomnický štít.

OCCURRENCE OF THUNDER STORMS

With precipitation is connected, up to a certain degree, the occurrence of thunder storms in the summer season. On the whole it is possible to observe that the least number of days with thunderstorms has south-western Slovakia, about 25 days; the most, the mountain regions of northern and eastern Slovakia, 30 up to 35 days. The biggest number of thunderstorms falls generally in the warmest season viz. July and August.

Table 2

Survey of thermal conditions in Slovakia; °C

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year	Range
<i>Bratislava</i>														
Average temp.	-1,6	0,2	5,2	10,1	15,4	18,3	20,2	19,6	16,0	10,3	4,4	0,5	9,9	21,8
Absolute max.	13,9	17,2	22,0	27,6	31,2	36,6	36,4	35,8	33,0	28,3	20,5	15,0	27. VI. 1935	63,8
Absolute min.	-26,5	-27,2	-15,8	-6,5	-2,9	3,0	7,8	6,8	0,8	-5,0	-7,2	-20,7	10. II. 1929	
Absolute min. at Vajnory	-26,3	-31,8	-17,8	-8,0	-1,4	2,0	6,5	5,6	-1,2	-7,5	-10,3	-22,8	11. II. 1929	70,4
<i>Hurbanovo</i>														
Average temp.	-1,8	-0,1	4,9	10,1	15,3	18,1	20,1	19,2	15,3	9,9	4,4	0,4	9,7	21,9
Absolute max.	14,3	16,1	22,9	28,4	32,1	36,5	38,2	36,6	33,7	29,3	21,8	14,6	5. VII. 1950	73,2
Absolute min.	-30,5	-35,0	-18,7	-5,9	-2,9	0,2	6,2	5,4	-2,0	-8,4	-8,8	-22,3	11. II. 1929	
<i>Lučenec</i>														
Average temp.	-3,2	-1,2	4,2	9,7	15,1	18,1	20,1	19,1	14,8	9,2	3,6	-0,7	9,1	23,3
Absolute max.	11,2	14,2	22,8	29,0	31,4	36,7	37,2	38,0	33,8	28,7	19,5	13,8	27. VIII. 1950	72,0
Absolute min.	-32,0	-34,0	-20,0	-9,6	-5,5	0,6	4,6	2,6	-1,6	-11,0	-16,0	-27,6	18. II. 1940	
<i>Košice</i>														
Average temp.	-3,4	-1,7	3,3	8,8	14,3	17,2	19,1	18,2	14,2	8,7	3,4	-0,9	8,4	22,5
Absolute max.	11,0	13,6	21,5	28,6	31,0	34,0	35,2	37,0	32,7	28,4	21,0	14,4	21. VIII. 1943	67,5
Absolute min.	-25,0	-30,5	-18,5	-7,0	-3,4	0,0	4,5	3,9	-2,8	-10,0	-12,2	-22,2	16. II. 1940	
<i>Zvolen</i>														
Average temp.	-4,0	-1,8	3,3	8,6	13,9	17,0	18,8	17,7	13,7	8,4	3,0	-1,3	8,1	22,8
Absolute max.	11,4	12,5	22,0	28,8	30,1	35,1	36,2	36,8	34,0	28,5	22,4	12,2	5. VIII. 1947	75,3
Absolute min.	-30,2	-38,5	-25,0	-10,8	-6,2	-2,0	3,5	2,5	-3,6	-13,5	-15,0	-27,0	11. II. 1929	
<i>Oravský Podzámok</i>														
Average temp.	-4,6	-3,3	1,2	6,3	11,7	14,4	16,1	15,3	11,9	7,0	2,0	-2,0	6,3	20,7
Absolute max.	12,2	12,6	19,6	28,6	29,5	32,6	33,0	33,7	31,0	25,6	20,0	13,9	21. VIII. 1943	70,2
Absolute min.	-34,0	-36,5	-26,9	-14,0	-5,0	-1,0	2,0	0,5	-5,8	-13,2	-13,4	-31,8	11. II. 1929	

Liptovský Hrádok														
Average temp.	-5,3	-3,8	0,9	6,0	11,4	14,2	16,0	15,2	11,5	6,5	1,3	-2,6	5,9	21,3
Absolute max.	11,1	14,4	19,0	27,8	30,0	32,0	33,9	33,5	31,6	28,0	20,0	14,5	24. VII. 1929	71,9
Absolute min.	-32,2	-38,0	-28,0	-12,8	-5,1	-2,2	1,2	-0,4	-6,3	-13,9	-19,0	-28,0	11. II. 1929	
Starý Smokovec														
Average temp.	-5,2	-4,0	-0,6	4,1	9,6	12,3	14,3	13,5	10,1	5,4	0,2	-3,1	4,7	19,5
Absolute max.	12,2	12,4	16,0	24,8	26,0	29,2	30,0	31,3	28,2	22,0	18,3	15,0	20. VIII. 1943	65,8
Absolute min.	-25,2	-34,5	-20,9	-14,9	-6,2	-4,1	1,8	1,3	-3,1	-12,1	-13,6	-24,6	11. II. 1929	
Skalnaté Pleso														
Average temp.	-6,2	-6,1	-4,1	-0,2	4,8	7,7	9,8	9,5	6,3	2,7	-1,9	-4,4	1,5	16,0
Absolute max.	12,5	11,6	12,9	17,0	19,2	23,4	25,0	24,5	23,6	17,3	13,4	13,2	5. VII. 1957	51,4
Absolute min.	-26,4	-25,3	-23,2	-18,3	-11,5	-5,5	-1,2	-3,5	-6,4	-11,0	-21,1	-23,2	26. I. 1954	
Lomnický štít														
Average temp.	-10,6	-10,9	-9,1	-5,5	-0,7	1,8	3,8	4,0	1,2	-2,1	-6,7	-9,2	-3,7	14,9
Absolute max.	5,4	2,7	5,7	9,3	12,5	15,6	17,8	19,4	14,8	12,7	8,8	6,8	20. VIII. 1943	49,9
Absolute min.	-30,5*)	-30,1	-28,2	-22,8	-18,3	-11,4	-7,6	-7,9	-13,1	-18,4	-28,7	-29,2	31. I. 1956	

*) 17. I. 1963 -31,5°

Table 3

Cloudiness in Slovakia; cover of sky in tenths

Station	Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year	
Bratislava		7,2	6,4	5,5	5,2	4,9	4,7	4,5	4,2	4,2	5,6	7,4	7,6	5,6	
Hurbanovo		7,2	6,6	5,9	5,8	5,7	5,4	4,8	4,7	4,7	5,9	7,4	7,6	6,0	
Lučenec		6,9	6,2	5,3	5,5	5,3	4,8	4,3	4,2	4,3	5,6	7,3	7,4	5,6	
Košice		7,3	6,9	5,9	5,9	5,5	5,5	5,1	4,9	4,7	5,8	7,6	7,6	6,0	
Zvolen		7,1	6,7	5,8	5,7	5,7	5,4	5,0	5,0	5,2	6,4	7,6	7,6	6,1	
Oravský Podzámok		7,1	7,2	6,3	6,4	6,2	6,0	5,8	5,8	5,7	6,5	7,8	7,5	6,5	
Liptovský Hrádok		6,3	6,4	5,6	6,0	6,0	5,7	5,4	5,4	5,0	5,7	7,2	6,7	6,0	
Starý Smokovec		6,2	6,5	5,9	6,5	6,5	6,4	6,0	6,0	5,5	6,1	6,8	6,8	6,3	
Skalnaté Pleso		5,9	5,8	6,0	6,7	6,7	6,8	6,6	5,7	5,4	6,2	6,4	5,9	6,1	
Lomnický štít		5,7	5,7	5,8	6,7	6,7	7,4	7,0	6,0	5,6	5,2	6,0	5,6	6,1	

Table 4
Average number of clear and overcast days

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
<i>Bratislava</i>													
Clear days	2,2	4,2	5,5	4,6	6,2	6,2	6,2	8,4	8,5	5,4	1,7	1,6	60,7
Overcast days	15,0	11,2	8,0	5,2	5,5	4,6	3,6	3,5	3,8	8,9	15,4	17,0	101,7
<i>Hurbanovo</i>													
Clear days	2,7	3,6	5,0	4,0	3,7	3,8	6,0	6,8	7,4	5,4	1,9	2,1	52,4
Overcast days	15,2	11,6	9,6	7,9	7,7	5,9	4,7	4,7	4,6	10,4	15,3	17,8	115,4
<i>Lučenec</i>													
Clear days	4,1	4,6	7,3	5,1	5,4	6,0	6,8	8,7	9,0	6,3	2,7	3,1	69,1
Overcast days	14,6	10,8	9,0	7,5	7,2	4,9	3,0	4,2	4,4	9,6	15,9	17,4	108,5
<i>Košice</i>													
Clear days	3,4	2,8	5,9	3,7	3,8	3,7	5,8	5,7	7,1	4,7	2,1	2,2	50,9
Overcast days	18,2	14,2	10,5	8,8	7,3	7,2	5,6	5,6	5,4	11,1	16,9	18,5	129,3
<i>Zvolen</i>													
Clear days	3,6	4,0	6,4	5,4	4,9	4,7	5,8	5,9	6,4	3,8	1,5	2,5	54,9
Overcast days	16,8	12,7	11,8	8,8	7,8	6,7	5,3	5,4	5,6	12,4	17,7	19,2	130,2
<i>Oravský Podzámok</i>													
Clear days	3,8	3,0	5,0	3,2	3,6	3,9	3,9	4,2	4,3	3,6	1,7	2,8	43,0
Overcast days	16,6	15,3	12,4	11,4	11,1	9,3	8,0	8,4	8,7	13,5	18,3	17,1	150,1
<i>Liptovský Hrádok</i>													
Clear days	4,1	2,7	4,7	2,8	2,3	2,2	2,6	3,6	5,2	4,8	2,3	3,3	40,6
Overcast days	13,6	11,9	10,4	9,5	8,6	8,0	6,9	7,0	7,1	9,7	15,4	15,1	123,2
<i>Starý Smokovec</i>													
Clear days	5,0	3,6	5,3	2,2	2,3	1,8	2,7	3,2	4,5	4,8	3,3	3,7	42,5
Overcast days	11,3	11,6	10,2	10,6	10,5	9,0	8,0	8,5	7,1	11,2	12,9	13,7	124,6

Skalnaté Pleso														
Clear days	4,9	4,0	4,2	2,5	2,1	1,5	2,0	3,5	3,9	5,5	2,2	4,7	41,0	
Overcast days	10,5	11,0	10,9	11,1	12,3	12,2	11,2	8,7	7,6	9,1	13,6	10,6	128,8	
Lomnický štít														
Clear days	5,0	5,2	6,2	2,5	1,5	1,1	1,5	3,9	4,9	7,5	3,4	5,5	48,2	
Overcast days	12,0	11,0	11,1	12,0	12,0	15,2	13,2	9,8	8,0	8,5	11,9	9,4	134,1	

Table 5
Length of sunshine in Slovakia in hours

Station /	Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Bratislava		62	93	157	214	271	286	307	284	226	147	71	50	2168
Hurbanovo		71	95	162	207	260	283	305	275	218	146	71	53	2146
Rimavská Sobota		66	102	169	202	251	259	292	249	206	138	61	55	2050
Košice		66	89	156	192	257	264	280	255	206	146	66	55	2024
Zvolen		62	89	143	170	203	218	242	225	174	111	47	38	1722
Oravský Podzámok		48	62	116	142	180	198	210	176	143	98	41	36	1450
Liptovský Hrádok		63	89	150	170	203	223	245	216	179	128	56	45	1766
Starý Smokovec		96	107	162	172	201	205	220	207	186	148	86	75	1865
Skalnaté Pleso		104	117	153	162	197	158	173	189	155	152	90	98	1748
Lomnický štít		137	155	199	187	219	191	199	216	206	191	131	129	2159

Table 6
Number of foggy days in Slovakia

Station /	Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Bratislava		6,2	2,2	2,4	0,4	.	.	.	.	0,8	3,1	6,8	8,8	30,7
Hurbanovo		3,4	2,3	1,3	.	0,9	0,7	0,5	1,2	1,7	3,1	3,7	6,4	25,2
Lučenec		7,9	5,9	3,5	1,3	1,2	0,9	1,2	2,2	3,8	7,7	7,7	10,1	53,4
Košice		7,1	3,5	2,1	0,4	.	.	.	0,1	0,4	1,7	5,8	8,4	29,5
Víglaš		6,3	5,6	5,5	3,9	3,5	3,6	4,3	6,6	9,0	10,0	8,0	11,1	77,4
Oravský Podzámok		2,6	1,4	3,2	2,0	2,0	2,0	4,2	6,4	9,3	6,8	2,1	3,2	45,2
Liptovský Hrádok		5,6	5,2	3,9	3,0	2,0	1,1	1,3	2,5	3,5	5,3	7,3	5,9	46,6
Starý Smokovec		4,9	3,7	3,4	3,4	3,1	3,4	3,8	3,0	3,3	4,6	10,3	7,8	54,7
Skalnaté Pleso		16,4	17,0	16,0	16,1	15,6	16,9	16,6	15,2	17,3	15,8	20,3	17,3	200,5
Lomnický štít		21,7	20,6	21,6	23,0	25,9	26,3	25,8	25,0	21,2	19,3	23,3	20,6	274,3

Table 7

Precipitation in Slovakia; amount in mm

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
<i>Bratislava</i>													
Average	43	40	44	50	70	58	72	62	54	59	60	58	670
Maximum	107	116	146	137	179	112	153	151	175	195	209	140	981
Minimum	9	2	1	1	7	8	10	8	4	1	2	6	535
<i>Hurbanovo</i>													
Average	37	34	39	45	63	58	59	50	45	51	52	49	582
Maximum	95	107	138	128	152	146	143	153	147	151	123	102	863
Minimum	5	4	2	4	3	4	11	1	1	3	3	7	370
<i>Lučenec</i>													
Average	36	34	39	46	69	64	61	55	49	53	63	50	619
Maximum	100	101	158	101	198	198	163	216	158	175	127	137	938
Minimum	2	0	2	7	12	12	7	6	1	3	1	11	390
<i>Košice</i>													
Average	31	30	36	49	72	82	80	77	58	52	56	40	663
Maximum	114	84	141	118	168	157	168	222	154	131	148	93	969
Minimum	3	6	1	8	13	24	28	13	2	1	2	11	412
<i>Zvolen</i>													
Average	44	41	44	49	80	78	75	64	59	57	66	57	714
Maximum	110	105	131	115	165	182	148	156	168	167	139	123	995
Minimum	7	1	7	8	10	23	14	3	8	2	4	16	452
<i>Oravský Podzámok</i>													
Average	52	47	47	55	81	100	108	102	73	65	60	50	840
Maximum	140	162	105	169	212	192	279	228	194	137	197	114	1158
Minimum	5	3	2	10	14	30	15	26	10	3	4	5	559

<i>Liptovský Hrádok</i>														
Average	41	36	43	51	83	88	95	83	65	57	57	45	744	
Maximum	110	107	151	96	173	172	232	173	167	142	148	96	997	
Minimum	6	7	0	13	15	24	15	23	8	4	2	6	522	
<i>Starý Smokovec</i>														
Average	50	43	60	65	94	120	126	111	84	70	67	54	944	
Maximum	146	120	162	150	201	220	308	226	202	157	154	124	1196	
Minimum	3	8	5	16	35	37	28	41	9	11	4	14	528	
<i>Skalnaté Pleso</i>														
Average	88	76	88	102	128	162	186	135	120	105	124	98	1412	
Maximum	160	148	235	370	232	381	340	297	190	208	183	230	2155	
Minimum	30	7	21	39	50	94	73	66	15	1	27	26	893	
<i>Lomnický štít</i>														
Average	145	137	111	145	154	173	212	174	128	137	163	176	1855	
Maximum	228	303	175	198	300	335	376	280	189	243	305	299	2303	
Minimum	66	42	39	55	47	106	69	69	46	2	52	51	1571	

Table 8

Number of days with precipitation in Slovakia

Station /	Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Bratislava		11,6	10,2	10,1	11,2	10,9	10,1	11,4	10,2	8,6	10,4	12,2	13,5	130,4
Komárno		10,5	9,0	9,4	9,6	10,6	9,5	9,1	8,2	8,1	9,4	11,3	12,0	116,7
Lučenec		11,4	10,2	10,5	11,6	13,1	12,1	11,2	9,7	9,2	11,3	12,8	13,2	136,3
Košice		10,8	9,8	10,1	11,2	12,1	12,8	12,1	11,4	9,0	10,4	12,0	12,0	133,7
Zvolen		10,7	9,7	9,7	10,8	12,5	11,4	10,1	10,3	10,0	10,8	12,6	12,3	130,9
Oravský Podzámok		13,1	12,5	12,6	13,4	15,1	15,9	15,5	15,5	13,7	13,3	13,9	13,9	168,4
Liptovský Hrádok		12,6	11,7	11,8	12,5	14,3	14,9	13,9	13,0	10,2	11,8	13,4	13,5	153,6
Starý Smokovec		14,3	14,3	15,2	16,5	16,9	16,8	17,3	15,8	12,9	13,4	14,9	16,5	184,8
Skalnaté Pleso		17,0	17,7	17,3	18,2	19,3	19,8	20,0	17,0	12,0	13,5	19,0	18,1	208,9
Lomnický štít		19,3	17,2	18,9	19,4	19,8	19,9	19,1	16,1	14,7	13,5	19,8	18,1	215,8

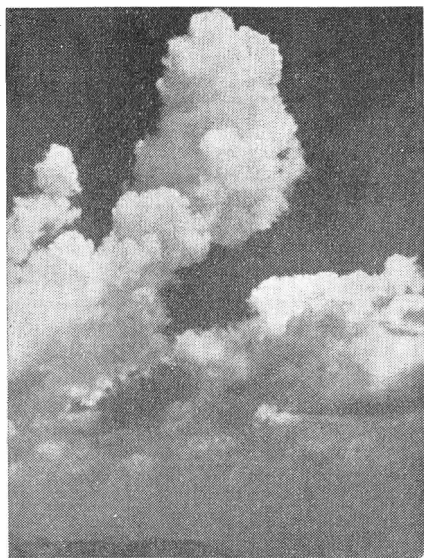


Fig. 3. Convective cloudiness of the summer season above the High Tatra. (Photo by Dr. A. Bečvář.)

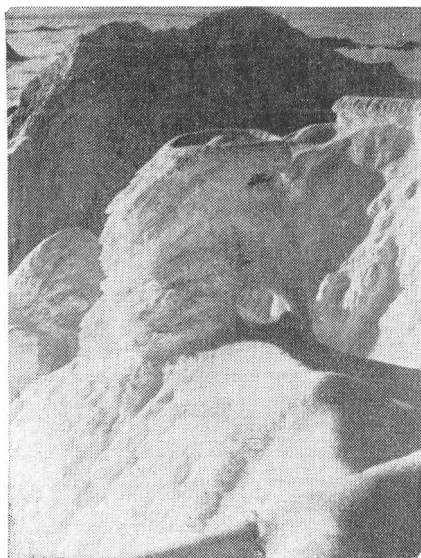


Fig. 4. Totalizer on the Lomnický štít (peak) covered by hard rime. (Photo by Dr. A. Bečvář.)

DISTRIBUTION OF RELATIVE HUMIDITY

The relative humidity of air is the least in the lower positions in spring and at the beginning of summer, the greatest in autumn and in winter, in November and December. As against this in the mountains as a result of thermal convection, the greatest relative humidity is in summer and the least in winter, when there often occur cases of subsidence of air in the stable winter anticyclones.

CLIMATIC REGIONS IN SLOVAKIA

In the cartographic illustration of the climatic conditions of a certain region it is advantageous to use some customary classification of climates. There are several such classifications. In our country the one most used is Köppen's classification which is very suitable for illustrating climatic conditions of a large region, for instance of a whole continent. In a small territory such as Slovakia there come to the fore, according to Köppen's division, chiefly the differences in the thermal conditions in harmony with altitude above sea level. Köppen's classification cannot fully do justice to the details of the regime of precipitation which are a very essential climatic factor. Fig. 5 shows the delimitation of climatic zones in Slovakia according to Köppen's classification. The region marked Cfbx on the map shows the so-called maize climate, i. e. moderate climate with the coldest months between 18° and $-3^{\circ}\text{C}.$, with the temperature of the warmest month under 22° and with at least 4 months above 10° , sufficient precipitation in all the months, the maximum precipitation at the beginning of summer, clearer weather in the later part of summer. Cfb is the so-called beech climate, i. e. moderate climate with thermal conditions as for Cfbx with sufficient precipitation in all the months. Dfb is

the so-called oak climate, i. e. with a cold winter and the January temperature under -3° , with the warmest month under 22°C. , at least 4 months above 10° and sufficient precipitation in all the months. Dfc is the so-called birch climate with climatic characteristics as those of Dfb, but only with 1 up to 4 months above 10°C. , the coldest months above -38° . ETG is a mountain tundra climate with the warmest month between 0 and 10°C. Since Köppen's classification has a great range for the thermal characteristics, the necessary details cannot be well distinguished by using it in a small territory.

In order to bring out better the climatic differences in the territory of Czechoslovakia our meteorologists have elaborated their own system of delimitation of the climatic regions. According to thermal criterions the whole territory has been divided into 3 chief regions, namely the warm region, the moderately warm and the cold regions.

The warm region is delimited by the isoline of the number of 50 summer days, i. e. days with a maximum temperature of 25°C. and more, according to the observations for the period 1926–1950. This region is suitable for the growing of our cultivated plants which require most heat such as maize and tobacco. This isoline coincides roughly with the isoline of the harvest of winter rye up to the 15th July. The moderately warm region is on the one hand delimited by the isoline mentioned of 50 summer days, on the other hand, in Slovakia it is delimited by the July isotherm 16° . In this region all cereals especially thrive well. The cold region is there where the July temperatures are below 16° .

For a further division of regions into smaller sub-regions the moisture index suggested by Konček was used. The formula for the calculation of the moisture index is

$$I_z = \frac{R}{2} + \Delta r - 10t - (30 + v^2),$$

where R is the total amount of precipitation in mm. for the whole vegetative period April to September, Δr is the positive deviation of the amount of precipitation in three winter months December to February from the amount 105 mm. (while the negative deviations are not taken into account), t is the average temperature of the whole vegetative period in Centigrade degrees, v is the average velocity of the wind in m/sec. at 2 p. m. during the whole vegetative period. Fig. 6 illustrates the distribution of the moisture index in Slovakia.

According to the moisture index, it was possible to delimit the sub-regions with a varied amount of humidity. The moisture index gives an entirely identical picture with Thornthwaite's moisture index, while the numerical values of Konček's moisture index are three times greater and the method of calculation is very simple.

In their suggestion for a map of climatic regions the Czechoslovak meteorologists have tried especially to show the relatively dry regions. Hence they have marked the territory with the moisture index below -20 as a dry sub-region, from -20 to 0 as moderately dry, from 0 to 60 as moderately humid, from 60 to 120 as humid, and with the moisture index above 120 as a very humid sub-region.

The warm region characterized by an average of 50 and more summer days, or by the beginning of the harvest of winter rye up to 15th July shows the values of climatic elements which are the result of a good warming of the country. The big number of summer days and the relatively early harvest are the result of favourable thermal conditions.

In Slovakia the warm region includes the Ultramontane district, the Danubian Lowland, the Váh Valley up to Púchov, the Nitra Valley up to Prievidza, the Hron Valley

Table 9
Number of days with snow cover in Slovakia

Station /	Month	VIII	IX	X	XI	XII	I	II	III	IV	V	VI	VII	Year
Bratislava	.	.	0,0	1,3	9,6	15,9	11,7	3,5	0,1	.	.	.	.	42,1
Hurbanovo	.	.	.	1,1	8,5	14,3	10,6	2,9	0,3	.	.	.	.	37,7
Lučenec	.	.	0,1	1,6	12,7	20,5	15,6	5,0	0,2	.	.	.	.	55,7
Košice	.	.	0,1	2,5	11,0	19,4	15,3	4,7	0,3	.	.	.	.	53,3
Zvolen	.	.	0,2	2,1	11,7	22,5	15,7	4,6	0,6	.	.	.	.	57,4
Oravský Podzámok	.	0,0	0,7	5,3	17,7	27,9	24,2	15,3	1,8	0,0	.	.	.	92,9
Liptovský Hrádok	.	0,1	1,0	5,4	17,1	25,9	22,6	13,1	1,6	0,0	.	.	.	86,8
Starý Smokovec	.	0,2	2,7	11,4	24,5	30,1	27,2	23,4	6,0	0,3	.	.	.	125,8
Skalnaté Pleso	0,5	2,0	10,5	19,9	27,8	31,0	28,3	29,4	26,6	10,8	0,3	0,0	.	187,1
Lomnický štít	2,5	6,2	14,7	27,9	30,4	31,0	28,3	30,4	29,4	23,9	8,1	3,4	.	236,2

Table 10
Number of thunder stormy days in Slovakia

Station /	Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Vajnory	.	.	0,1	2,6	6,3	6,4	7,1	2,9	1,2	0,1	.	.	0,1	26,8
Hurbanovo	0,1	.	0,1	2,2	6,9	7,4	6,6	3,7	1,5	0,4	.	.	.	28,9
Lučenec	0,1	.	0,2	1,5	5,7	5,9	5,5	3,6	1,6	0,1	0,1	.	.	24,3
Košice	.	.	.	2,1	7,2	8,9	8,1	6,2	2,0	0,3	0,1	.	.	34,9
Zvolen	.	.	0,1	2,3	8,1	7,7	8,0	5,3	2,0	0,3	0,1	.	.	33,9
Oravský Podzámok	.	.	0,1	1,4	5,9	6,1	6,4	4,7	1,1	0,3	0,1	.	.	26,1
Poprad	.	.	0,1	1,3	4,1	6,9	7,8	5,1	1,4	0,2	.	.	0,0	26,9
Starý Smokovec	.	.	0,1	1,6	6,0	7,4	8,3	6,8	1,4	.	.	.	.	31,6
Skalnaté Pleso	.	.	.	1,6	5,9	6,7	8,1	6,8	1,8	.	.	.	.	30,9
Lomnický štít	.	.	.	1,6	6,2	7,5	8,5	5,8	1,9	.	.	.	.	31,5

Table 11
Relative humidity in % in Slovakia

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
<i>Bratislava</i>													
Daily average	84	79	71	63	65	64	64	65	67	76	84	86	72
Average at 2 p. m.	81	72	60	50	52	51	50	52	53	65	78	82	62

Hurbanovo

Daily average	85	81	74	68	70	69	68	70	74	80	86	88	76
Average at 2 p. m.	78	70	58	50	53	52	50	51	52	62	77	82	61

Lučenec

Daily average	85	81	73	67	70	70	67	69	73	80	86	88	76
Average at 2 p. m.	79	72	58	50	53	53	50	51	53	63	78	83	62

Košice

Daily average	84	82	75	69	68	70	70	71	74	80	85	85	76
Average at 2 p. m.	80	73	61	54	53	55	54	54	55	64	79	81	64

Zvolen

Daily average	85	80	75	68	70	69	70	72	75	79	85	86	76
Average at 2 p. m.	79	71	60	51	52	51	50	50	63	61	76	82	61

Oravský Podzámok

Daily average	81	79	76	72	71	72	73	75	77	79	83	84	77
Average at 2 p. m.	74	68	60	54	54	55	53	55	55	62	74	78	62

Liptovský Hrádok

Daily average	82	81	77	71	70	72	72	74	76	80	84	84	77
Average at 2 p. m.	76	73	64	55	56	57	56	57	57	65	76	80	64

Starý Smokovec

Daily average	77	78	72	71	70	71	71	74	75	78	82	81	75
Average at 2 p. m.	72	71	62	60	59	61	60	61	62	67	77	78	66

Skalnaté Pleso

Daily average	74	74	71	76	76	77	76	76	75	72	78	72	75
Average at 2 p. m.	73	75	71	75	74	75	75	75	77	78	79	72	75

Lomnický štít

Daily average	78	77	75	80	83	87	86	82	78	73	80	77	80
Average at 2 p. m.	78	78	75	82	85	91	90	88	83	77	80	75	82

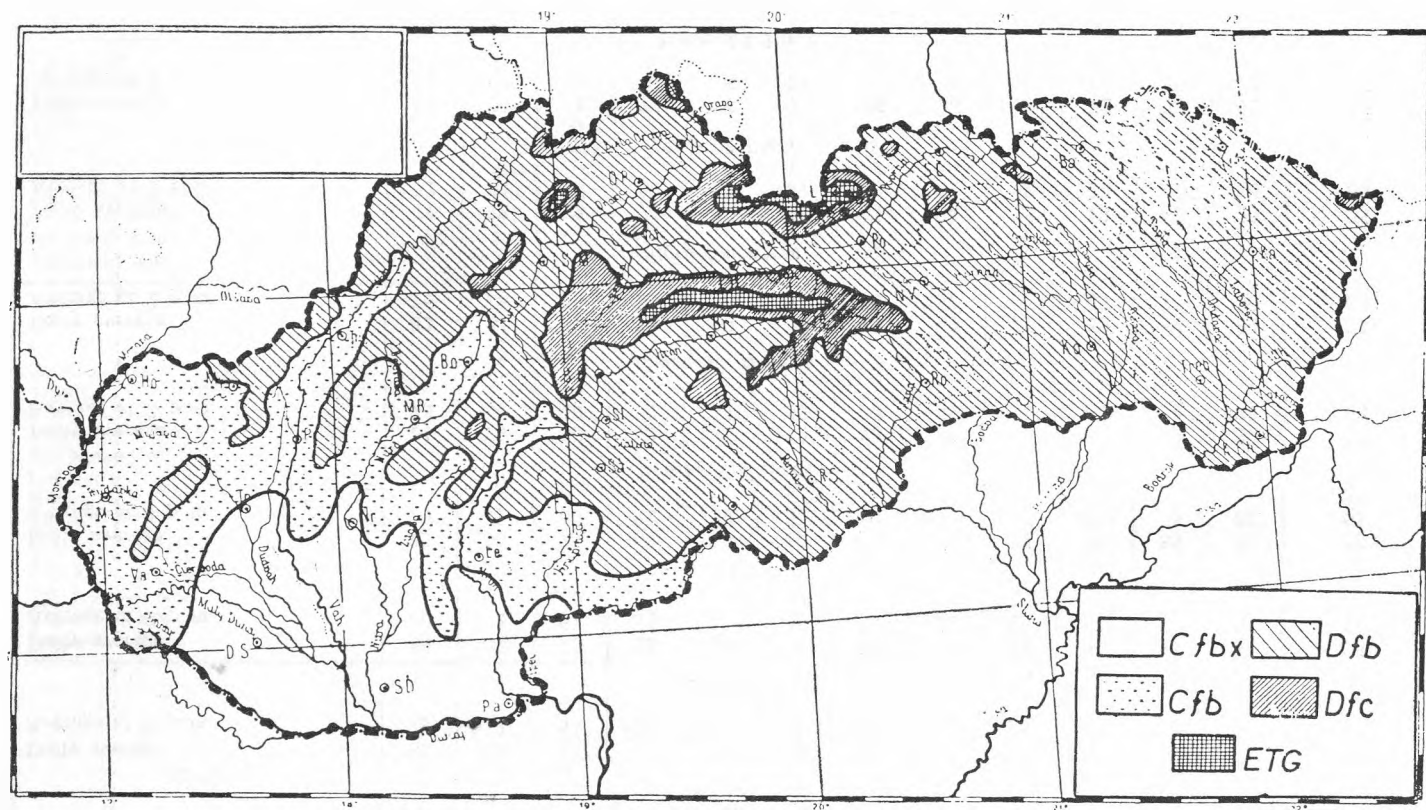


Fig. 5. Climatic zones in Slovakia according to Köppen's classification.

Table 12

Survey of climatic regions in Czechoslovakia

A. Warm region

Fundamental characteristics: Number of summer days (with max. 25 °C. and more) in the year over 50, beginning of harvest of winter rye before 15th July

Sub-region		District		
Characteristic	I _z	Symbol	Characteristic	Other climatic or terrain characteristics
dry	< -20	A ₁	warm, dry, with moderate winter, with longer sunshine	January temp. above -3°, sunshine in the vegetative period over 1500 hours
		A ₂ *	warm, dry, with moderate winter, shorter period of sunshine	January temp. above -3°, sunshine in the vegetative period under 1500 hours
moderately dry	-20 to 0	A ₃	warm, moderately dry, with moderate winter	January temperature above -3°
		A ₄	warm, moderately dry, with cold winter	January temperature from -3° to -5°
moderately humid	0 to 60	A ₅	warm, moderately humid, with a moderate winter	January temperature above -3°
		A ₆	warm, moderately humid, with cold winter	January temperature from -3° to -5°

* Does not occur in Slovakia.

up to Banská Bystrica, the valley of the Ipel' up to Malinec, the valley of the Slaná up to Rožňava, the south of eastern Slovakia in the valleys of the Torysa up to Sabinov, of the Topľa up to Bardejov, of the Ondava up to Svidník, of the Laborec up to Medzila-borce. On the whole the warm region in Slovakia includes the country up to nearly an altitude of 400 m. above sea level. According to further criteria in the warm region 6 climatic districts have been delimited in 3 sub-regions. According to the moisture index in the sub-region where the value of the moisture index is below - 20, there have been delimited 2 dry districts. In Slovakia under the symbol A₁ there is a warm, dry district with a moderate winter (average January temperature above -3°), with a longer sunshine (more than 1500 hours in the vegetative period). It is the driest part of Slovakia from Šamorín to the lower Ipel'.

Gradually from the dry region nearer the mountains the precipitation increases and with the same thermal conditions the moisture index, too. In the moderately dry region (the moisture index between 0 and -20) there are 2 climatic districts differing by their winter. The district A₃ characterized as warm, moderately dry, with a moderate winter is found in the Ultramontane region (Záhorie), nearly up to the mouth of the Morava, in the Danubian Lowlands it is a narrow strip above the dry region nearer the moun-

B. Moderately warm region

Fundamental characteristics: Number of summer days in the year under 50, beginning of harvest of winter rye after 15th July, July temperature above 15° in Bohemia and Moravia, above 16° in the Beskids and in Slovakia

Sub-region		District		
Characteristic	I _z	Symbol	Characteristic	Other climatic or terrain characteristics
dry	< -20	B ₁ *	moderately warm, dry, with moderate winter	January temperature above -3°
moderately dry	-20 to 0	B ₂ *	moderately warm, moderately dry, mostly moderate winter	January temperature above -3°, in isolated cases to -4°
moderately humid	0 to 60	B ₃	moderately warm, moderately humid, moderate winter, hilly type	January temperature above -3°, height up to 500 m. above sea level
		B ₄	moderately warm, moderately humid, cold winter, valley type	January temperature below -5°
		B ₅	moderately warm, moderately humid, highland type	height over 500 m. above sea level
humid	60 to 120	B ₆	moderately warm, humid, moderate winter, hilly and plain type	January temperature above -3°, height up to 500 m. above sea level
		B ₇	moderately warm, humid, cool or cold winter, valley type	January temperature below -3°
		B ₈ *	moderately warm, humid, highland type	height over 500 m. above sea level
very humid	120 and more	B ₉ *	moderately warm, moderate winter, very humid, hilly type	height up to 500 m. above sea level
		B ₁₀	moderately warm, very humid, highland type	height over 500 m. above sea level

* Does not occur in Slovakia.

tains. The district A₄ is found only in eastern Slovakia and differs from the district A₃ only by a cold winter, because on account of the influence of greater continentality the January temperatures are there under -3°. To this region belongs the district south of Sečovice and Michalovce and the basin near Lučenec and Rimavská Sobota. The climatic differentiation of eastern Slovakia is substantiated because there are many climatic marks there, typical of the greater continentality (longer period with average day temperatures below 0°, longer period of snow cover).

C. Cool region

Fundamental characteristics: Average July temperature in Bohemia and in Moravia below 15°, in the Beskids and in Slovakia below 16°

Sub-region		District		
humidity	I _z	Symbol	Characteristic	Further climatic or terrain characteristics
not taken into account		C ₁	moderately cool	July temperature 12° to 15°, or 16°
		C ₂	cool mountain	July temperature 10° to 12°
		C ₃	cold mountain	July temperature below 10°

Remark: I_z denotes moisture index according to Konček.

Another warm sub-region in Slovakia is moderately humid with the moisture index from 0 to 60. It is divided into two districts, differing only by the course of winter temperatures. The district A₅ marked as warm, moderately humid, with a mild winter, surrounds the foot of the Little Carpathians, reaches the north along the Váh and the Nitra, up to the warm region, along the Hron up to Hronska Dúbrava. The district A₆ is characterized as having a cold winter and a warm summer; it is found in the valleys of central and eastern Slovakia; here the range of temperature is more expressive.

In the warm region on the map, the humid sub-region has not been marked, where the moisture index is from 60 to 120. Such are only small districts in the warm region where the moisture index exceeds 60 as is the case for Smolenice, Banská Bystrica, Michalovce and Snina.

The moderately warm region is, on the one hand, in the direction of the lowlands, delimited by the number of 50 summer days, or by the beginning of harvest of winter rye up to 15th July, on the other hand in the direction of the mountains, in Slovakia it is delimited by an average July temperature of 16°. The moderately warm region is divided into 5 sub-regions and on the whole into 10 climatic districts. In Slovakia there does not occur in the moderately warm region either a dry or a moderately dry sub-region. The moderately humid climatic district marked as B₃ occurs only in western Slovakia; in central and eastern Slovakia there is no district B₃ as here the winters are already colder. A further climatic district B₄ belongs to the valleys; it is moderately warm, moderately humid, with a cold winter (average temperature for January below -5°). It is found only in the Spiš along the Poprad from Podolíneć through Kežmarok to Poprad, from here to the south-east through Kežmarok to Poprad, from here to the south-east through Spišská Nová Ves up to Krompachy. It is a typical moderately humid district with a cold winter where lakes of cold air are formed at this season, lasting several days during inversions. There is here a comparatively dry winter half-year which causes in this mountain region only a relatively low moisture index. A further climatic district B₅ is moderately warm, moderately humid, including the summits and occurs in a territory rich in hills and highest over 500 m. above sea level. In this climate there is everywhere a cold winter, with an average January temperature under -3°. To this district belong

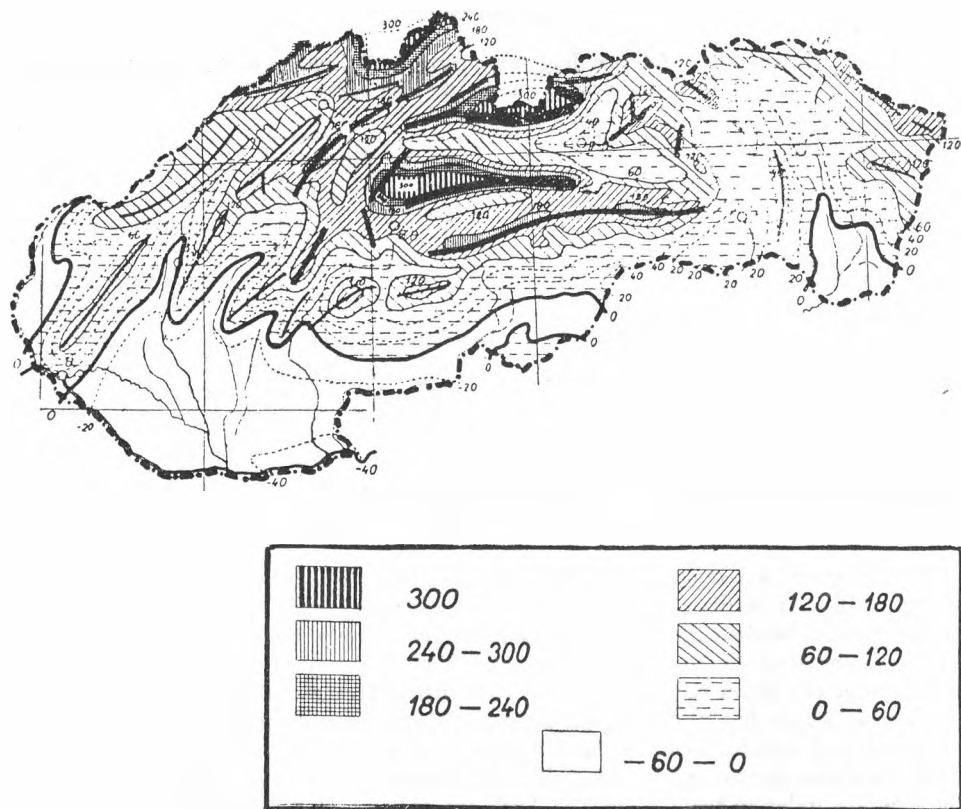


Fig. 6. Distribution of the moisture index in Slovakia.

the slope positions of the Little Carpathians and White Carpathians, the western and eastern slopes of Tribeč and Vtáčnik, the southern slopes of the Štiavnica highland and the Slovak Ore Mountains, the eastern slopes of Čergovské chain and the lower positions of the Slánske Mountains.

In another sub-region, a humid one, with a moisture index from 60 to 120 there are also 3 climatic districts. The district B₆ moderately warm, humid, with a mild winter, with hillocks or plains is found in Slovakia only as small spurs into the valleys along the mountain passes in the Moravian — Slovakian boundary as at Vlára, Vrbovce. The climatic district B₇ moderately warm, humid, with a cold or cool winter, including valleys, is typical to positions in the valleys. To this type belongs the valley in the environs of Žilina, the districts of Turiec, Liptov and the valleys of the Hron from Slovenská Lupča to Polomka. The climatic district B₈ moderately warm, humid, including hills, is the continuation to the mountains of a similar climatic district, namely B₅ and differs from it only by a greater moisture. It is found in Slovakia in the highest positions of the Little Carpathians and the White Carpathians; to this type belong the higher slopes of the Inovec, Strážovská highland, Tribeč, Vtáčnik, Štiavnica chain, Slovak Ore Mountains, the eastern slopes of the Levoča chain, the southern slopes of the eastern Beskids and of the Vihorlát.

sented in the highlands of central and northern Slovakia. It is the zone in which there is practically a continuous forest, as it is generally delimited in climatic classifications. The highest climatic district marked as C₃, cold, mountainous, delimited by the July isotherm 10° as the lower limit, is found only in the high mountain positions especially of the High and Low Tatra. It is the zone above the boundary of forests, the zone of ridges and rocks.

The outline map Fig. 7 illustrates the distribution of climatic regions and districts in Slovakia.

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NÁČRT KLIMATICKÝCH PODMIENOK SLOVENSKA

V súlade s celkovým barickým poľom a s polohou akčných centier prevláda nad stredoeurópskym vnútrozemím západné až severozápadné prúdenie vzduchu. Cyklonálna činnosť nad Atlantikom a nad severnou Európou zapríčiňuje pomerne časté striedanie vzduchových hmôt rôzneho pôvodu, v dôsledku čoho je tu počasie značne premenlivé. V chladnej polovici roka ovplyvňujú počasie na Slovensku pomerne často cyklóny vznikajúce nad Stredomorím a postupujúce do oblasti Karpát.

Z tohto dôvodu možno hovoriť na území Slovenska o maritimnom ovplyvnení klímy dvojakého druhu — atlantického a stredomorského. Vcelku ubúda tento maritimný vplyv od západu k východu; preto sa dostáva východné Slovensko najmä v zimnom období do bezprostrednej pôsobnosti kontinentálnych anticyklón, často stabilizovaných nad Východnými Karpatmi. Pritom vzniká nad západným Slovenskom pomerne silné juhovýchodné prúdenie vzduchu, miestami orograficky ešte značne zesilnené.

Okrem všeobecne veternej oblasti v Podunajskej nížine bývajú za určitých poveternostných situácií v dôsledku konfigurácie terénu dosť veterné aj doliny východoslovenských riek, tečúcich v meridionálnom smere. Odhliadnuc od veľmi veterných hrebeňových a vrcholových polôh sú naopak doliny a kotliny, najmä na severozápadnom a strednom Slovensku, značne pokojné. Schematické znázornenie veterných pomerov na Slovensku podáva obr. 1, kým obr. 2 ukazuje účinky katastrofálnej víchrice vo Vysokých Tatrách na začiatku septembra 1941.

Pre tabelárne znázornenie rozdelenia klimatických prvkov na Slovensku sa použili údaje meteorologických staníc uvedených v tab. 1.

Najvyššie teploty po celý rok má Podunajská nížina, a to v januári -1 až -2° , v júli 20 až 21° . Vo Východoslovenskej nížine sú teploty vcelku o niečo nižšie ako v Podunajskej nížine. V horských dolinách a kotlinách sa vyskytujú v zime často výrazné inverzie. V najvyšších polohách Vysokých Tatier vo výške 2635 m n. m. na Lomnickom štíte je najnižšia teplota vo februári $-10,9^{\circ}$, najvyššia v auguste $4,0^{\circ}$. Kým v dobre ventilovaných polohách neklesajú absolútne minimá ani na -30° , bývajú v horských dolinách a kotlinách zaznamenávané za mimoriadne tuhých zím mrazy až takmer -40° (napr. vo februári 1929). Absolútne maximá v lete sú podstatne rovnomernejšie rozdelené a dosahujú v nížinách v extrémnych prípadoch 38 až 39° . Prehľad teplotných pomerov na Slovensku podáva tab. 2.

Najmenšia oblačnosť pripadá v nižších polohách na koniec leta a na začiatok jesene; najväčšia oblačnosť sa tu vyskytuje v novembri — decembri. Vo vysokých horských polohách je naproti tomu najmenšia oblačnosť v zime a najväčšia v lete, v čase intenzívnej konvekcie. Obráz 3 ukazuje typickú letnú konvekčnú oblačnosť vo Vysokých Tatrách. Tabuľka 3 udáva pomery oblačnosti v desatinách pokrytia oblohy. V tabuľke 4 je uvedený priemerný počet jasných a zamračených dní. S oblačnosťou súvisí aj slnečný svit. Najslnečnejšou oblasťou Slovenska je veľká časť Podunajskej nížiny s 2000 — 2100 hod. slnečného svitu za rok. Značnú dĺžku doby slnečného svitu majú tiež vrcholy Vysokých Tatier, a to okružle 2000 hod. do roka. To súvisí s voľným obzorom a s malou oblačnosťou v zime. V horských dolinách klesá naproti tomu doba slnečného svitu čiastočne v dôsledku zatienenia, čiastočne v dôsledku väčšej oblačnosti zväčša na 1600 — 1800 hod. Prehľad dĺžky slnečného svitu na Slovensku v hodinách podáva tab. 5.

Výskyt hmľí je odhliadnuc od vyšších horských polôh viazaný predovšetkým na teplotné inverzie. Väčšina hmľí vzniká za pokojného a ináč jasného počasia najmä v horských dolinách a kotlinách v dôsledku ochladenia prízemných vrstiev vzduchu nočným vyžarovaním, najmä na jeseň a v zime. Na horách vzniká hmľa vtedy, keď sa v danej výške nachádza oblačnosť. Tabuľka 6 prináša prehľad počtu dní s hmlou na Slovensku. Vo vyšších horských polohách, najmä na hrebeňoch a vrcholoch sa vyskytuje často výdatná námraza, najmä za teplôt málo pod nulou. Obráz 4 ukazuje výdatnú námrazu na Lomnickom štíte.

Rozdelenie zrážok vykazuje na Slovensku dosť pestrý obraz, čo súvisí so zložitými orografickými pomermi krajiny. Všeobecne treba spomenúť relatívne najsuchšiu oblasť v Podunajskej nížine, kde v jej juhovýchodnej časti dosahuje ročný úhrn zrážok sotva 550 mm. S výškou zrážok všeobecne pribúda, najmä na náveterných svahoch hôr. V najvyšších polohách Vysokých Tatier dosahuje ročný úhrn zrážok až 2000 mm. Prehľad množstva zrážok na Slovensku podáva tab. 7; počet dní so zrážkami $0,1$ mm a viac je uvedený v tab. 8.

Dôležitým klimatickým činiteľom je výskyt snehovej pokrývky. V nížinách juhozápadného Slovenska je stabilita snehovej pokrývky pre častý odmäk veľmi malá; s výškou stabilita snehovej pokrývky v horách vzrastá. V nížinách juhovýchodného Slovenska je stabilita zimnej snehovej pokrývky väčšia ako v Podunajskej nížine, čo súvisí s väčšou kontinentalitou klímy východného Slovenska. Tabuľka 9 podáva prehľad počtu dní so snehovou pokrývkou na Slovensku.

So zrážkami súvisí do istej miery aj výskyt búrok v letnom období. Vcelku môžeme konštatovať, že najmenej dní s búrkou do roka, okolo 25 dní, má juhozápadné Slovensko, najviac horské oblasti severného a východného Slovenska, a to 30 — 35 dní. Najväčší počet búrok pripadá vše-

obecne na najteplejšie obdobie roka, na júl a august. V tabuľke 10 je uvedený počet dní s búrkou na Slovensku.

Pomeraná vlhkosť vzduchu je v nízkych polohách najmenšia na jar a na začiatku leta, najväčšia v neskorej jeseni a v zime — v novembri a decembri. Naproti tomu je na horách v dôsledku termickej konvekcie najväčšia relatívna vlhkosť v lete a najmenšia v zime, keď sa často vyskytujú prípady zostupných pohybov vzduchu v stabilných zimných anticyklónach. Tabuľka 11 podáva rozdelenie pomernej vlhkosti vzduchu v % na Slovensku.

Na obraze 5 je znázornené vymedzenie klimatických pásem podľa Köppenovej klasifikácie. Na Slovensku sa vyskytujú klimatické pásma Cfbx (kukuričná klíma), Cfb (buková klíma), Dfb (dubová klíma), Dfc (brezová klíma) a ETG (horská tundrová klíma).

Pomocou indexu zavlaženia navrhnutého Končekom československí meteorológovia detailnejšie vymedzili klimatické oblasti ČSSR. Index zavlaženia, rozdelenie ktorého je znázornené na obr. 6, dáva predstavu o vlhovej bilancii, pričom pomerne suché oblasti sú charakterizované zápornými hodnotami indexu. Čím sú väčšie kladné hodnoty indexu zavlaženia, tým je daná oblasť lepšie zavlažovaná vo vegetačnom období; hodnoty nad 60 charakterizujú vlhké oblasti.

Prehľad klimatických oblastí v ČSSR podáva tab. 12. Podľa vhodne volených teplotných kritérií rozlišujeme teplú oblasť (A), v ktorej je viac ako 50 letných dní (s maximom teploty 25° a viac). S teplou oblasťou hraničí mierne teplá oblasť (B), ktorú na Slovensku oddeľuje od chladnej oblasti (C) izoterma priemernej júlovej teploty 16°. Delením teplej a mierne teplej oblasti pomocou indexu zavlaženia vznikli klimatické okrsky s rôznou vlhovou bilanciou. V studenej oblasti, všeobecne dobre zavlažovanej, sú okrsky vymedzené len podľa teploty najteplejšieho letného mesiaca júla. Schematická mapa na obr. 7 znázorňuje rozdelenie klimatických oblastí a okrskov na Slovensku.

Obr. 1. Schematická mapa veterných pomerov na Slovensku. 1 — prevládajúci smer vetra, 2 — slabšie vetry bez výrazného prevládania, 3 — pomerne časté a silné juhovýchodné vetry, 4 — oblasť slabých vetrov, 5 — oblasť miernych vetrov, 6 — oblasť čerstvých vetrov, 7 — oblasť silne veterná.

Obr. 2. Účinky katastrofálnej víchrice vo Vysokých Tatrách v septembri 1941. (Foto dr. A. Bečvář.)

Obr. 3. Konvekčná oblačnosť letného obdobia nad Vysokými Tatrami. (Foto dr. A. Bečvář.)

Obr. 4. Totalizátor na Lomnickom štíte pokrytý námrazou. (Foto dr. A. Bečvář.)

Obr. 5. Klimatické pásma na Slovensku podľa Köppenovej klasifikácie.

Obr. 6. Rozdelenie indexu zavlaženia na Slovensku.

Obr. 7. Klimatické oblasti na Slovensku podľa klasifikácie československých meteorológov.

1. Index zavlaženia	2. Teplá oblasť	3. Mierne teplá oblasť	4. Studená oblasť
< -20	A ₁ A ₂	B ₁	
-20 — 0	A ₃ A ₄	B ₂	
0 — 60	A ₅ A ₆	B ₃ B ₄ B ₅	
60 — 120	—	B ₆ B ₇ B ₈	
> 120	—	B ₉ B ₁₀	
—	—	—	C ₁ C ₂ C ₃