

## CLIMATE PROPERTIES OF THE TOPLICA REGION

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Here are presented the main climate properties and weather conditions of Toplica region. The particular emphasis is given to astroclimate characteristics in the surrounding of the mountain Vidojevica, where should be situated the astronomical station (ASV) of the Astronomical Observatory in Belgrade (AOB) in the near future. This presentation is based on various data, some of them, collected since 1900. The data include temperature, rainfall, relative humidity, insolation, haze, cloudiness and number of days with clear sky.

The mountain of Vidojevica belongs to the system of Rodops, together with the group of Arbanaska, Sokolovica, Pasjača, and Rgajska mountains. The peak Bandera (1154m) of Vidojevica is about 20km by road, and about 10km in straight line to the South-East from the town of Prokuplje.

### 1. MACROCLIMATE CHARACTERISTICS OF TOPLICA REGION

#### 1. 1. TEMPERATURE

For computing the average temperature, we used data collected at meteorological stations in Prokuplje, Kuršumlja and Blace. The period covered is 1925-2003.

Table 1: The average monthly temperature of the air in Toplica region

month	1	2	3	4	5	6	7	8	9	10	11	12	Year average	ampl
Prokuplje	-0,4	-0,6	5,7	11,6	16,1	19,8	22,6	21,7	18,2	12,3	7,4	1,3	11,3	23,2
Vidojevica	-0,8	-0,7	5,6	10,4	15,0	17,8	20,3	19,8	15,7	10,8	5,3	2,7	10,2	21,1

The average temperature in the following table is computed according to the data collected at the meteorological station "Tvrđjava Niš". The period covered is 1900-2004.

Table 2: The average temperature of the air by seasons

season	winter	spring	summer	autumn
<b>Prokuplje</b>	1,5	11,1	21,4	12,6
<b>Vidojevica</b>	1,7	8,3	17,5	11,7

Seasons are sharply distinctive with fast transitions. Temperature may rise up to 40°C, and in the winter time it may be under -20°C. Sometimes may appear on Vidojevica a temperature inversion.

1. 2. RELATIVE HUMIDITY OF THE AIR

With the change of the temperature, the relative humidity is also accordingly altered. The average humidity in the following table is computed according to the data collected in the period 1950-2004.

Table 3: The relative humidity, monthly average

month	1	2	3	4	5	6	7	8	9	10	11	12
<b>Prokuplje</b>	84%	81%	76%	72%	71%	68%	63%	65%	69%	75%	82%	85%
<b>Kuršumlija</b>	85%	83%	79%	76%	76%	70%	65%	66%	71%	79%	83%	87%
<b>Blace</b>	86%	84%	78%	75%	75%	71%	64%	67%	70%	80%	85%	88%
<b>Vidojevica</b>	82%	81%	73%	72%	71%	64%	60%	65%	69%	75%	82%	84%

As we see, the relative humidity in June, July, August and September is under 70%.

1. 3. CLOUDINESS AND INSOLATION

According to the following table, the cloudiness is greatest in January (7.4 i.e. 74%), December, while it is lowest in July, August (2.9 i.e. 29%), and September. Observe that the cloudiness is inversely proportional to the rise of the temperature.

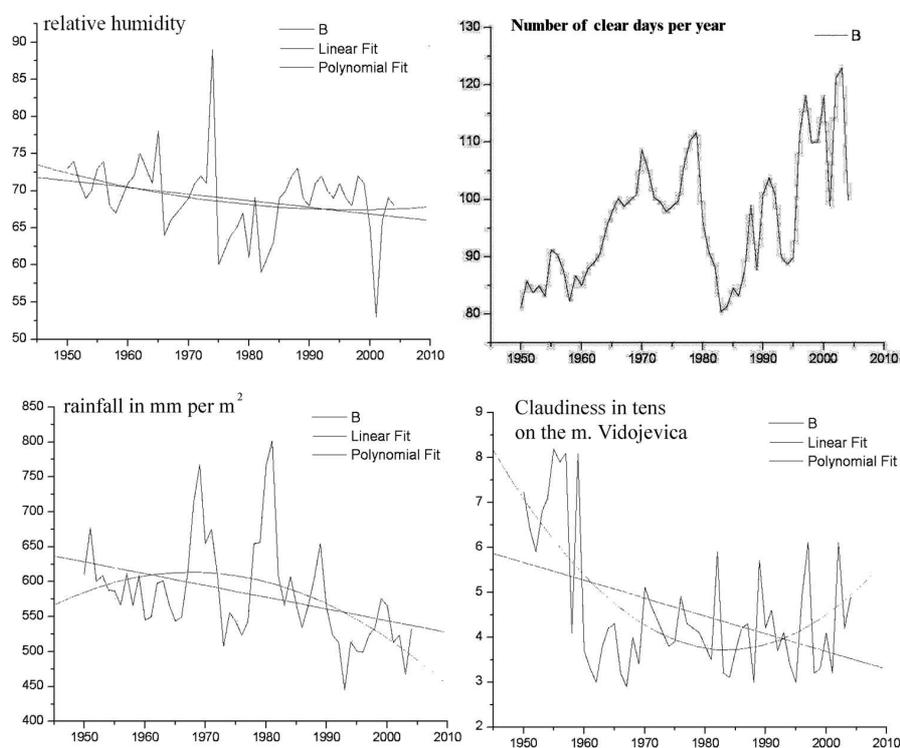


Figure 1: Mountain Vidojevica: climate data.

Table 4: The average monthly cloudiness expressed in tens. The period covered 1950-2004.

month	1	2	3	4	5	6	7	8	9	10	11	12	Year. av.
Prokuplje	7,3	6,2	5,4	5,2	5,1	4,0	2,9	2,8	3,0	4,8	6,0	7,1	4,9
Kuršumlja	7,4	6,4	5,6	5,3	5,4	4,3	3,0	2,9	3,3	5,0	6,4	7,4	5,2
Blace	7,5	6,3	5,5	5,4	5,6	4,4	3,1	3,0	3,2	4,9	6,2	7,5	5,2
Vidojevica	7,0	6,0	4,9	5,0	5,0	3,1	2,8	2,9	3,1	4,4	5,9	5,8	4,9

The total yearly insolation in Prokuplje amounts 1841h, it is lowest in December (45.5h, ave. 1.4h) and in January (75.3h, ave. 2.4h). The greatest is in August (358h, ave. 8.3h) and in July (249,h, ave. 8.2h). Obviously it corresponds to the changes of temperature and the relative humidity.

Table 5: Total monthly and yearly insulation

month	1	2	3	4	5	6	7	8	9	10	11	12	god.
Prokuplje	75,3	77,2	107,4	155,2	203,9	210,8	248,7	258,1	229,6	152,2	76,1	45,5	1841

#### 1. 4. RAINFALL

According to the following table, we see that this region is one of the driest areas in Serbia. In Prokuplje the total rainfall is 580mm, while on Vidojevica it amounts only 533mm. The data for nearby places Niš and Leskovac are given for comparison.

Table 6: Average monthly rainfall (in mm), period covered 1950- 2004.

month	1	2	3	4	5	6	7	8	9	10	11	12	year
Prokuplje	41	31	36	40	60	45	33	37	26	64	49	54	516
Kuršumlija	44	40	37	48	71	68	39	41	30	68	51	60	597
Blace	44	40	40	55	74	72	55	42	31	64	60	51	628
Vidojevica	39	33	34	41	58	59	40	39	27	63	49	51	533
Niš	49	42	39	50	70	69	42	43	33	70	54	62	624
Leskovac	47	41	40	51	71	72	43	44	32	68	55	58	622

As can be seen, the highest rainfall is in May and October, and the least one is in September. This is a characteristic of the continental pluviometer regime with small modification. In general the summer months are deficient in rainfall. Rainfall in this period appears as short showers.

## 2. MICROCLIMATE CHARACTERISTICS OF THE MOUNTAIN VIDOJEVICA

Vidojevica is deeply extended into the continental climate, therefore there is the influence of this type of climate in this region. Vidojevica is under snow 1-3 months. The temperature on the peak of Vidojevica is lower about 4°C in comparison to the temperature of Toplica valley, in accordance to the temperature gradient principle. However, in the wintertime, temperature inversions often appear. It is interesting that the river Toplica which crosses the Toplica valley is the coldest hydrological object in the region in the summertime. It could be colder up to 7°C than objects on the land.

This produces the following interesting phenomena. The colder air along the river keeps under the warm air along the mountain, and on the peak of Vidojevica (nearly flat, area about 4ha) appears a stream. There it splits into parts, one directed to the Toplica valley, the other goes to the atmosphere. This streaming on the peak can be sensed on the human body, as the temperature difference can amount up to 10°C. For better understanding of this phenomenon, we present the following table.

Table 7: Climate data measured on the peak of m. Vidojevica

Date	Peak Bandera	height of snow	rainfall	max. temp°C Min. temp°C	Air pressure	Relative humidity
15.01.2004	/	14,5 cm	Jan39 ml	-9,0 -1,0	1016 mb	79%
02.04.2004	/		Apr29 ml	- 4,1 14,0	1010 mb	70%
09.06.2004	/		Jun 21 ml	+8,0 +31,0	1009 mb	64%
10.10.2004	/		Okt 47 ml	+6,0 +13,0	1013 mb	73%

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