Climate properties of the Toplica region

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

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

Macroclimate characteristics of Toplica region

1. Temperature

For computing the average temperature, we used data collected by meteorological stations in Prokuplje, Kuršumlija 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 data collected in the meteorological station „Tvrđava Niš". The period covered is 1900-2004.

Table 2. The average temperature of the air by seasons

season	**winter**	**spring**	**summer**	**autumn**
Prokuplje	1,5	11,1	21,4	12,6
Vidojevica	1,7	8,3	17,5	11,7

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

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 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
Prokuplje	84%	81%	76%	72%	71%	68%	63%	65%	69%	75%	82%	85%
Kuršumlija	85%	83%	79%	76%	76%	70%	65%	66%	71%	79%	83%	87%
Blace	86%	84%	78%	75%	75%	71%	64%	67%	70%	80%	85%	88%
Vidojevica	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 bellow 70%, and on the mountain Vidojevica bellow 60%.

3. Cloudiness and Insulation

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.

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
Kuršumlija	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

Total yearly insulation in Prokuplje amounts 1841h, it is the 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 correspondents to the change 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

4. Rainfall

According to the following table, we see that this region is one of the driest area in Serbia. In Prokuplje the total rainfall is 580mm, while on Vidojevica it amounts only 533mm. 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 and October. This is the characteristic of continental pluviometer regime with small modification. In general summer months are deficient in rainfall. Rainfall in this period appear as short showers.

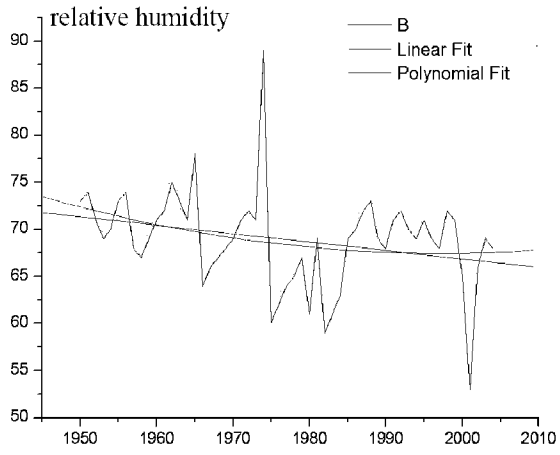
Microclimate characteristics of the mountain Vidojevica

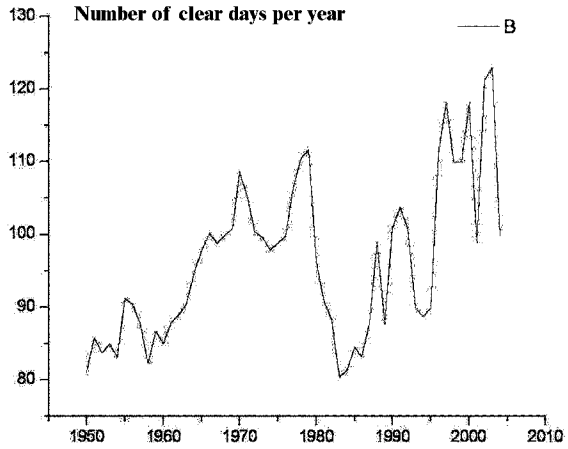
Vidojevica is deeply extended into the continental climate, therefore there is the influence of this type of climate in this region. Vidojevica is under snow 1-2.5 months. The temperature on the peak of Vidojevica is lower about 4ºC in comparison to the temperature of Toplica valley, in accordance to the temperature gradient principle. However, in wintertime, temperature inversions often appear. It is interesting that the river Toplica which crosses Toplica valley is the coldest hydrological object in the region in summertime. It could be colder up to 7ºC than objects on the land. This produces the following interesting phenomena. The colder air along the river keeps under the worm air along the mountain, and on the peak of Vidojevica (nearly flat, area about 4ha) appears the stream. There it splits into two parts, one directed to the Toplica valley, 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 10ºC. For better understanding of this phenomena, we present the following table.

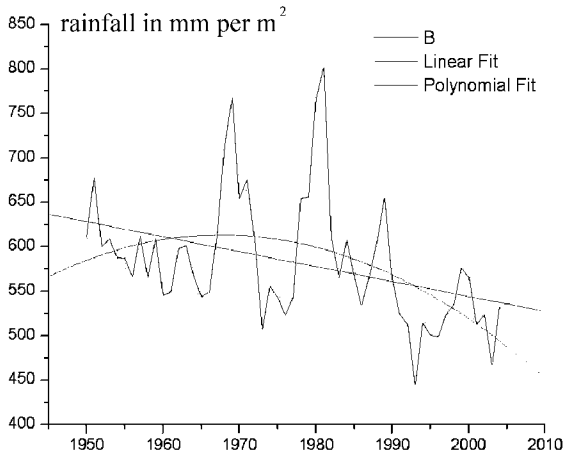
Table 7. Climate data measured on the peak of m. Vidojevica

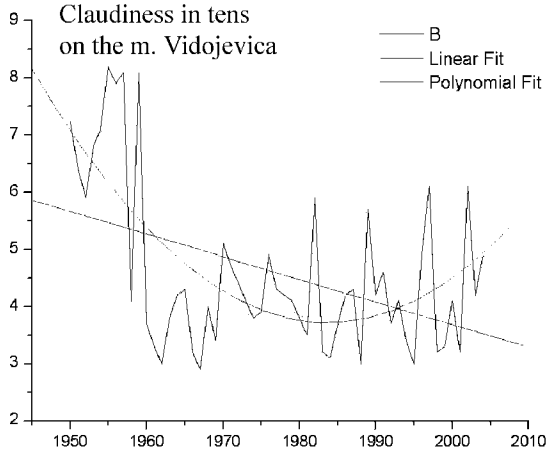
Date	Peak Bandera	height of snow	rainfall	max. tempºC Min. tempºC	Air preasure	Relative humidity
15.01.2004	/	14,5 cm	Jan39 ml	-9,0 -1,0	1016 mb	79%
02.04.2004	/		Apr29 ml	- 4,1 14,0	1010 mb	70%
09.06.2004	/		Jun 21 ml	+8,0 +31,0	1009 mb	64%
10.10.2004	/		Okt 47 ml	+6,0 +13,0	1013 mb	73%

Mountain Vidojevica: climate data









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