

Hydrometeorological Service, R. N. Macedonia

Use of Climate Indices in R. N. Macedonia: ClimDex and ClimPACT

Aleksandar D. Prodanov aleksandar.d.prodanov@gmail.com

Daily report from stations

	А	В	С	D	E	F	G	Н	I.	J	K		L	М	N	0	Р	Q	- T
1		Берово			Станица	Дата	Tmax	Tmin	Tsr	RR	T -5cm	n 14h							
2	1	22.8489	41.7167	837	Berovo	20210901	24.8	6.6	15.1	0	2	28.2		Impo	rt Tx T		NV	- 0	
3	2	22.8489	41.7167	837	Berovo	20210902	21.7	6.1	14	0	2	29.3		iiiipo			IN V	- 0	
4	3	22.8489	41.7167		Berovo	20210903	24.2			0		29.5							
5	4	22.8489	41.7167		Berovo	20210904	24					27.6							
6	5	22.8489	41.7167		Berovo	20210905				0	2	26.9					·	>	
7	6	22.8489	41.7167		Berovo	20210906						25		Impo	rt CSV		1	<u> </u>	
8	7	22.8489	41.7167		Berovo	20210907	22.7					28.5							
9	8	22.8489	41.7167		Berovo	20210908						23.8							
10	9	22.8489	41.7167		Berovo	20210909	17				NP						Koor	linati	
11	10		41.7167		Berovo	20210910						28						man	
12	11	22.8489	41.7167		Berovo	20210911	25.5					27.7							
13	12		41.7167		Berovo	20210912						24.5							
14	13		41.7167		Berovo	20210913						26.4					Export	Tx T file	
15	14		41.7167		Berovo	20210914	26.7					28.5							
16	15		41.7167		Berovo	20210915					-	27.8							
17	16		41.7167		Berovo	20210916					-	28.7							
18	17	22.8489	41.7167		Berovo	20210917	28.5					25.4							
19	18		41.7167		Berovo	20210918	23.6	9.9	1/			19.8							_
20	19		41.7167		Berovo_2021	0901 - Notep	bad											_	
21	20			File	Edit For	mat View	Help												
22	21					7167;837;		20210901	24.8:6.6	5:15.1:N	V:28.2	2							
23	22				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	, 10, ,05, ,	,,		,2,	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	.,	-							
24	23																		
25	24																		
26	25																		
27	26																		
20	- 27	I I	1																

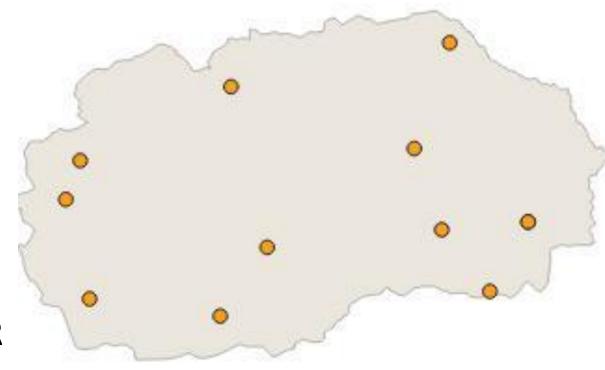
Daily report from AWS

2	DATA	SGS	IGD	HS	MS	TAVG	TMAX	TMIN	R24	T5AVG	
3											
4	20.09.2021	41.71872	22.84881	834	Berovo	16.9	27.2	7.3	0		
5	20.09.2021	41.04168	21.35368	589.01	Bitola	20.5	31.3	13.5	2		
6	20.09.2021	41.40928	22.23727	126.5	Demir Kap	22.6	33.8	14	0.2		
7	20.09.2021	41.14682	22.50302	57.8	Gevgelija	25.4	35.5	15.9	0		
8	20.09.2021	41.89875	21.83612	861.1	Gjurishte/	17.3	26.8	14.2	0		
9	20.09.2021	41.79222	20.90063	534	Gostivar	19.2	27.6	15.3	0.3	20.8	
10	20.09.2021	41.57227	21.94525	197	Gradsko	23.1	31.8	15.8	0.1	23.4	
11	20.09.2021	41.82563	21.24227	1423	Jasen	15.8	21.9	13	1		
12	20.09.2021	41.51771	21.72177	367	Jasenovo	22	31.9	12.5	0.8		
13	20.09.2021	42.16152	21.17567	784	Jazince	17.4	25.5	14.6	14.9		
14	20.09.2021	42.07306	21.12056	393	Jegunovce	19.4	28.1	11.1	3.4		
15	20.09.2021	41.82258	22.08574	272	Kargo/Sht	19.9	30.9	12.9	0.2	22.4	
16	20.09.2021	41.44223	22.01973	245.2	Kavadarci	22.8	31.9	14.9	0		
17	20.09.2021	41.90952	22.41207	338	Kochani	21.8	30.8	14.1	0	21.2	
18	20.09.2021	41.694	22.42284	920	Kodjalija/	19	25.2	16.7	0		
19	20.09.2021	41.80689	21.0231	1432	Korito	15.6	19	12.4	0.1		
20	20.09.2021	41.35668	22.60837	435	Kosturino	23.3	31.5	12.6	0.1		
21	20.09.2021	42.20358	22.33123	691.1	Kriva_Pala	17.1	26.4	11.5	2.4		
22	20.09.2021	41.37413	21.24444	1268	Krushevo	16.8	21	14	7.3		
23	20.09.2021	41.53744	20.69591	1331.9	Lazaropol	14.8	17.4	11.7	10.3		
24	20.09.2021	41.50927	21.21167	670	Makedons	19	27.6	12.3	3.5		
25	20.09.2021	41.70267	20.7574	1281	Mavrovi_A	15.6	19.6	13.3	5.3		
26	20.09.2021	42.05227	21.02178	496	Neproshte	21.6	26.8	15.1	4.4		
27	20.09.2021	41.41792	22.8878	280	Novo_Sel	23.4	31.4	14.5	0	25	
28	20.09.2021	41.11481	20.79736		Ohrid	19.9	25.8	14	0		
29	20.09.2021	42.03254	22.35625	1580	Ponikva/ I	13.7	18.6	10.4	0		
30	20.09.2021	42.01597	20.87913	1779.1	Popova_S	12.6	16.2	10.6	11.9		
31	20.09.2021	41.47079	22.4325	1037.6	Pozar/Rad			16			
32	20.09.2021	41.85081	20.87051	873.4	Pozharane	19	24.2	14.9	1.6		
33	20.09.2021	41.3339	21.55391		Prilep	19.8	27.5	13.5	1.2		
	20.09.2021		22.47329		Radovish	21.2	30.7	13.7		20	
35	20.09.2021				Resen	18.5		11.5	0		
36					Senokos	21.2	25.3	15.9	3.8		
37	20.09.2021	41.75364	22.18045	326.57	Shtip	22.1	31	14.7	0.2		

Reports from main station

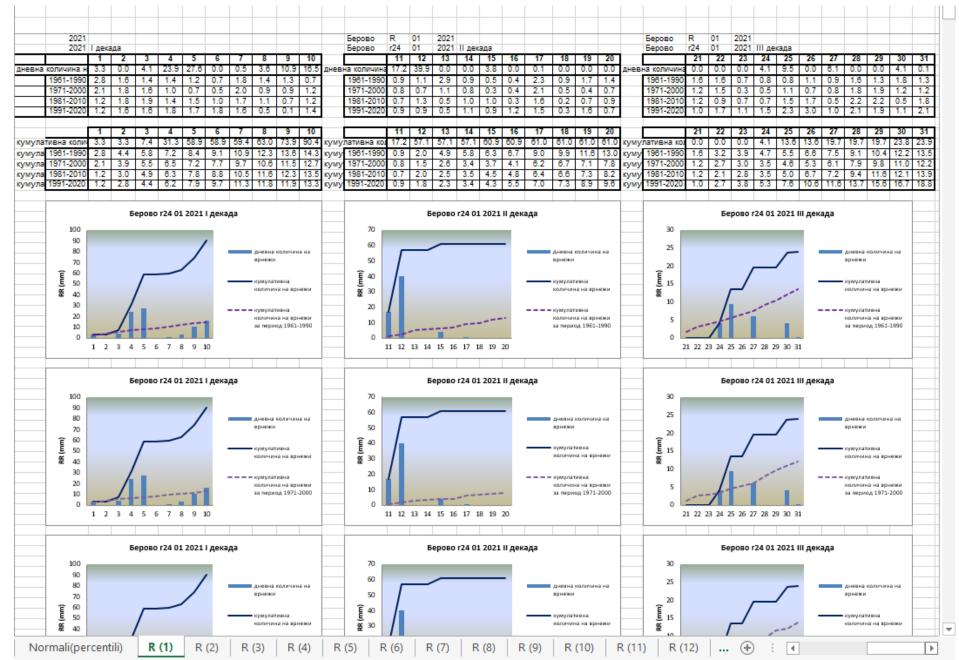
- Berovo
- Bitola
- D.Kapija
- Gevgelija
- K.Palanka
- Lazaropole
- Mavrovo
- Ohrid
- Prilep
- Skopje
- Stip
- Strumica

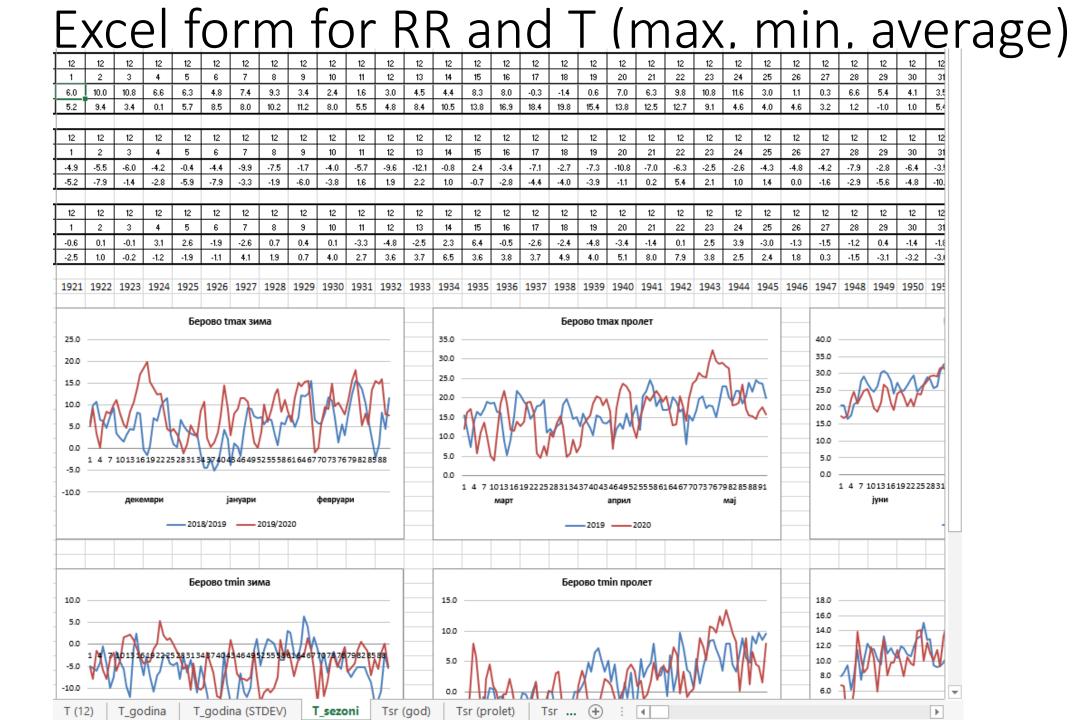
- r24
- Tmax
- Tmin
- Tavg
- daily value
- from 1951
- excel form for RR and T

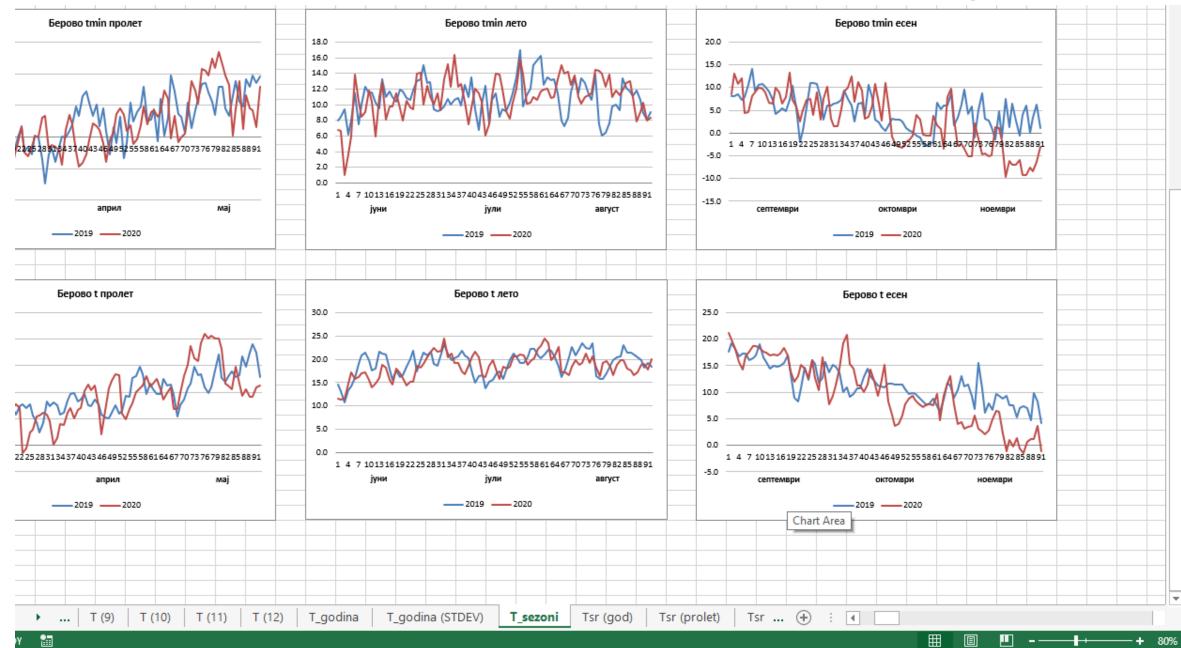


LWC	Елемент	Mec	Год	5	6	7	8	9	10	11	42	42	44	45	16	47	19	49	20	24	22	23	24	25	26	27	28	29	20	24	Год.	lau.	nevan:			Rmax	V 8373
			1921		0	'	•	3	10	<u> </u>	12	13	14	10	10		10	13	20	21	~~	2.5	24	23	20	21	20	23	30	91		Jan	і декада	ат декад	п декад	NIIIdA	л_дата
Берово	r24 r24	01	1921	-				 	<u> </u>		<u> </u>																				1921 1922						
Берово				-				—		 																							· · · ·				
Берово	r24	01	1923	-				—	<u> </u>	<u> </u>	<u> </u>																				1923						
Берово	r24	01	1924					 		 																					1924		<u> </u>	L	<u> </u>		
Берово	r24	01	1925																												1925	<u> </u>	<u> </u>		<u> </u>		
Берово	r24	01	1926																												1926						
Берово	r24	01	1927																												1927						
Берово	r24	01	1928																												1928						
Берово	r24	01	1929																												1929						
Берово	r24	01	1930																												1930						
Берово	r24	01	1931																												1931						
берово	r24	01	1932																												1932						
ерово	r24	01	1933					<u> </u>		<u> </u>																					1933						
ерово	r24	01	1934					<u> </u>	<u> </u>	<u> </u>																					1934			<u> </u>			
берово	r24	01	1935					<u> </u>		<u> </u>																					1935			<u> </u>			
	r24	01	1936					<u> </u>	<u> </u>	<u> </u>	<u> </u>																				1936			<u> </u>			
ерово	r24	01	1936					 	<u> </u>		<u> </u>														<u> </u>						1936						
ерово				-				 	<u> </u>		<u> </u>																										
ерово	r24	01	1938				<u> </u>	I	<u> </u>	<u> </u>	<u> </u>										<u> </u>										1938			 			
ерово	r24	01	1939					 		 																					1939		[[
ерово	r24	01	1940					L																							1940		<u> </u>	L	<u> </u>		
Берово	r24	01	1941																												1941	<u> </u>	<u> </u>		r	[]	
ерово	r24	01	1942																												1942						
Берово	r24	01	1943																												1943						
Берово	r24	01	1944																												1944						
ерово	r24	01	1945																												1945						
ерово	r24	01	1946																												1946						
берово	r24	01	1947																												1947						
Берово	r24	01	1948					<u> </u>		<u> </u>																					1948						
Берово	r24	01	1949					<u> </u>	<u> </u>	<u> </u>	<u> </u>																				1949			<u> </u>			
ерово	r24	01	1950	05	0.0	0.0	4.6	0.0	0.0	1 0 0	43	0.0	0.0	0.0	0.9	0.0	0.0	0.0	14.7	112	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10	3.6	25	1950	45.8	7.6	19.9	18.3	14.7	20
Берово	r24	01	1951			0.0			0.0	0.0				6.1		0.0	2.0			3.6		0.0		0.0	0.0		0.0		8.1		1951	60.4	0.3	16.4	43.7	25.6	31
	r24	01	1952			0.0			0.0	0.0	0.0			5.4		0.0	1.7	0.0			0.0		0.0	4.0	3.1		0.0	0.4	0.0		1952	36.7	7.2	22.4	7.1	15.3	20
ерово			1953																												1953						
Берово	r24	01				12.8				0.0		0.0		0.0		0.0	0.0		0.0			0.0		0.0		0.2	1.8		0.0			66.6	57.8	6.4	2.4	19.6	8
Берово	r24	01	1954			0.0			4.9	1.3		0.8				0.0		0.1				10.2		1.2		0.0					1954	50.4	16.1	7.5	26.8	10.2	23
Берово	r24	01	1955			0.0			19.5		0.0			0.0			0.0		6.9			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		1955	88.7	53.3	12.6	22.8	22.8	22
Берово	r24	01	1956					4.4				0.0				0.0						2.2					0.9		0.0		1956	22.1	10.9	0.0	11.2	4.7	26
ерово	r24	01	1957			0.0			0.0	0.0	0.2	0.9		5.8	2.7	0.6	8.6	0.0	0.0	0.0	0.0	0.0	0.0	3.5	0.0	0.0	0.0	2.0	0.0	0.0	1957	24.7	0.0	19.2	5.5	8.6	18
Берово	r24	01	1958			0.0			0.0	0.0		22.4				0.0				0.0		0.0		0.0	0.0		0.0		0.0		1958	86.7	31.8	52.3	2.6	26.0	1
Берово	r24	01	1959	8.8	1.1	0.0	0.0	0.0	8.4	2.8	0.0	3.2	4.8	0.0	0.0	10.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	0.0	0.0	0.0	0.1	0.8	1959	47.8	21.5	21.2	5.1	10.4	17
ерово	r24	01	1960			2.9	1.2	0.2	6.8	4.6	12.0	18.4	0.6	3.4	0.0	2.4	4.7	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1960	59.4	11.1	48.3	0.0	18.4	13
ерово	r24	01	1961	0.0	7.1	1.8	0.0	0.0	1.1	0.3	0.0	0.0	0.2	0.0	2.4	1.2	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	4.8	0.0	0.0	0.0	1961	22.5	10.0	4.5	8.0	7.1	6
ерово	r24	01	1962	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.0	7.6	1962	29.1	0.0	5.5	23.6	16.0	30
Берово	r24	01	1963			0.0				6.4		15.3						25.6				6.8	2.7	0.0		0.0	0.7	4.0			1963	130.8	26.3	65.9	38.6	25.6	19
берово	r24	01	1964			0.0			0.0	0.0	0.0			0.0		0.0	0.0		0.0			0.0	0.0	0.0	0.0	0.0	0.0		5.6		1964	7.7	1.4	0.1	6.2	5.6	30
берово	r24	01	1965			0.0				0.0												12.6						0.0			1965	68.0	12.4	15.0	40.6	17.0	21
ерово	r24	01	1966			0.0			0.6	0.0		15.2		0.0		2.7	1.4	14.0			4.0		6.2	0.8	0.2	0.2	2.8	0.0	0.0		1966	100.5	39.9	46.4	14.2	23.6	1
ерово	r24	01	1967			2.8			4.2			17.6								0.0				0.4			0.4		0.0		1967	53.3	24.6	25.0	3.7	17.6	13
ерово	r24	01	1968			0.6			0.0	2.2	8.2			0.0			0.0	0.0		0.0	0.0			0.4	5.0	2.3	0.4	0.0	0.0		1968	50.8	24.0	23.0	8.2	8.2	13
	r24	01	1969			0.6			5.0	6.2	0.2		0.0			0.0	0.0	0.0	1.7	0.4	0.0		0.0		0.4	0.0	0.2	0.0			1969	55.9	35.1	11.6	9.2	0.2 16.6	12
ерово																								0.0					0.0								•
ерово	r24	01	1970			2.4			0.0	0.0		0.0		0.0		2.2	8.3			0.0	0.0		0.0	0.0	3.8	0.0	0.0	0.0	0.2		1970	29.1	12.6	11.5	5.0	8.3	18
ерово	r24	01	1971			0.0								0.0		0.0	0.0		0.0		0.6		0.0	1.6	0.0	1.8	4.3	0.0	0.0		1971	38.8	26.3	3.2	9.3	12.7	1
Берово	r24	01	1972			4.1			3.0	0.0		0.0				1.4	1.4		1.1			0.0	1.0	0.0	0.2			2.2	1.8		1972	20.3	8.7	6.3	5.3	4.1	7
Берово	r24	01	1973			0.0			0.0	0.0		0.0					0.0	2.2				0.2	0.4	0.0	0.0	0.0	0.0		3.4		1973	36.1	6.4	9.2	20.5	10.0	29
Берово	r24	01	1974					0.8												2.8								0.0			1974	50.1	33.5	7.9	8.7	20.2	2
Белава	r24	01	1975	0.01	0.0	0.0	0.0	0.6	0.0	1 0 0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34	0.0	0.0	1975	19.8	16.4	0.0	34	10.4	1
			9)TOT				ercen			(1)		(2)	R				R									9)	R ((11)	R (12)	G					









Берово	Берово Јан		Фев		Мар		A	Апр		Maj		Јун		л	A	вг	Ce	еп	0	кт	Н	be	Л	ек	Г	од	Авг	39.2	1949	2	1 T	
Aps. min.	-13.0		-10.5		-7.1		0.4		5.7		7.8		11.4		10.4		7.9		-1.3	1	-3.0		-9.6		-13.0		Јул	39.0	2007	24		-11
Година/дата	1963	23	1991	1	1987	6	1956	8	1991	25	1994	7	1971	1	1965	27	1964	23	1997	29	1975	24	1957	1	1963	23	Јун	35.2	2007	26		-11
Aps. max.	17.7		21.7	-	27.2	-	27.6	-	32.4		35.2		39.0	-	39.2		33.5		31.5		26.6		20.2	-	39.2	Авг	Сеп	33.5	2015	18		-
Година/дата	2007	21	2016	23	1952	30	1950	21	2020	15	2007	26	2007	24	1949	2	2015	18	1993	15	2004	2	1985	4	1949	2	Maj	32.4	2020	15		-
104ma/4ara	2007		2010	20	1000		2000	~~	2020		2007	20	2007		2010	-	2025	10	1000		2001	~	1000		2010	~	Окт	31.5	1993	15		-
																											Апр	27.6	1950	21		-11
tmin																											Мар	27.2	1952	30		
Берово	Jar	1	Φ	ев	M	ар	A	пр	N	laj	J	ун	Jy	л	A	вг	Ce	еп	0	кт	Но	be	Д	ек	Гс	од	Hoe	26.6	2004	2		
Aps. min.	-31.5		-26.2		-23.7	Ľ.	-18.0		-4.0	Ĺ	-1.8		1.7		0.2		-6.0		-12.2		-19.0		-24.6		-31.5	Јан	Фев	21.7	2016	23		
Година/дата	1954	27	1950	4	1955	5	2003	8	1952	19	1962	8	1968	23	1949	21	1977	30	1988	_	1995	6	2001	19	1954	27	Дек	20.2	1985	4		
Aps. max.	8.8		10.2		10.4		14.3		16.4		19.4		17.6		17.6		16.0		14.5		13.5		11.5		19.4	Јун	Јан	17.7	2007	21		
Година/дата	2009	22	1955	18	1970	27	1989	6	1990	26	1996	26	1978	14	2016	7	1952	12	2003	22	2009	7	2008	4	1996	26						
																											tmax	Aps. max				
																											Јан	17.7	2007	21	I F	
t																											Фев	21.7	2016	23		
Берово	Jar	1	Φ	ев	M	ар	A	пр	N	laj	J	ун	Jy	л	A	вг	Ce	еп	0	кт	He	be	Д	ек	Г	рд	Map	27.2	1952	30		-
Aps. min.	-23.3		-17.7		-14.2		-7.1		1.5		6.1		9.4		7.5		2.0		-2.5		-11.5		-17.1		-23.3	Јан	Апр	27.6	1950	21		-
Година/дата	1954	26	1985	19	1955	5	2003	7	1991	25	1994	7	1971	1	1965	28	1977	29	1997	29	1955	27	2001	19	1954	26	Maj	32.4	2020	15		
Aps. max.	10.9		12.6		19.3		20.1		23.1		25.8		28.0		26.0		23.8		20.8		16.4		14.7		28.0	Јул	Јун	35.2	2007	26		1
Година/дата	1970	7	1977	12	1952	30	1998	9	1950	28	1982	27	2007	23	1994	11	1952	7	2020	5	1961	14	1963	21	2007	23	Јул	39.0	2007	24		
																											Авг	39.2	1949	2		
																											Сеп	33.5	2015	18		
																											Окт	31.5	1993	15		
2021																											Hoe	26.6	2004	2		
tmax/tmin																											Дек	20.2	1985	4		_
Берово	Јан	Фев	Map	Апр	Maj	Јун	Јул	Авг	Сеп	Окт	Hoe	Лек	aps. max/	neu	месец	голина																
Берове	San		map	Anp			240	101		0		Ac.,	min	Act	me o e e	одина																
Aps. max.	13.9	19.5	17.3	26.5	28.6	32.7	36.7	36.1					36.7																			
2021	3	6	4	30	24	24	29	5						29	Јул	2021																
Aps. min.	-18.2	-23.0		-8.7	-1.8	1.3	7.2	5.0					-23.0																			
2021	19	15	25	9	9	3	4	31						15	Фев	2021																
	Јан	Фев	Map	Апр	Maj	Јун	Јул	Авг	Сеп	Окт	Hoe	Дек																				
																																_
2021																															ļ	_
tmin_avg																																_
tmax_avg																																_
Берово	Јан	Фев	<u> </u>	Апр	Maj	Јун			Сеп	Окт	Hoe	Дек	2021																			_
tmax_avg	6.6	10.4	8.9	14.6									18.5																			_
tmin_avg	-4.3	-5.3	-4.1	0.2	5.4	8.2	12.3	10.4					2.9								<u> </u>											
1														Г		1					I			~								
• • …	Tmax (12)	Т_р	rolet	T.	leto	T_	esen	T_	zima	T	max_r	nin_a	٧g	T >5	T	<5	Tn	<-10	F	D (Tn	<0)		(+)	1						Þ	·



- FD0, SU25, ID0, TR20, GSL, TXx, TNx, TXn, TNn, TN10p, TX10p, TN90p, TX90p, WSDI, CSDI, DTR
- RX1day, Rx5day, SDII, CDD, CWD, R95p, R99p, PRCPTOT
- R10, R20, Rnn: <1,0 and >= from: 0,1; 1,0; 5,0; 10; 20; 30; 40 and 50 mm

ClimPACT

- FD2, FDm2, FDm20, TX50p, TX95t, TM5a, TM5b, TM10a, TM10b, SU30, SU35
- WSDI (ClimDex, 6 days)
- WSDIn, n=2 to 10
- CSDI (ClimDex, 6 days)
- CSDIn, n=2 to 10
- nTXnTN, n=2 to 10
- $nTX_b nTN_b$, n=2 to 10
- RXnday, n=2 to 10
- SPIflex, everyday value for SPI=1, 2, 3, 6, 9, 12
- Another formular

Differents between Excel and RClimDex

- WSDI (Warm spell duration) (and CSDI-Cold spell duration)
 - Different number of days between Excel and ClimDex
- Excel: start, end, duration every warm (cold) spell, and frequency
 - Proposal: to be include in WSDI and CSDI indices
- How is solved when WSDI (or CSDI) start in December and finished next year (in January)? Where will be calculated number of days (in December or January)?

- How is solved calculation of percentile for 29th of February?
- SPI and SPEI, how to calculate (with example)
 - different place -> different results
- CDD (and CWD): it should have start, end, duration
- One file with: RR, Tmax, Tmin, and products from ClimDex (ClimPACT) indices for comparation

Thank you