

# Phytosociological Research Center

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## Worldwide Bioclimatic Classification System

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(Adapted to Synoptical Table 30/08/2017)

KUSTANAY (KAZAKHSTAN)

Altitude: 171 m.

Latitude: 53°13'N Longitude: 63°37'E

Temperature observation period.: 1945-1994 (50)

Rainfall observation period....: 1985-1994 (10)

(C/mm)	Ti	Mi	mi	M'i	m'i	Pi	EPi
Jan.	-17.78	-12.78	-22.78	6.11	-51.11	23.1	0.00
Feb.	-17.22	-12.22	-22.22	2.22	-47.78	18.0	0.00
Mar.	-10.84	-5.00	-16.67	12.78	-37.22	17.5	0.00
Apr.	2.78	8.33	-2.78	31.11	-28.33	18.5	16.93
May.	12.50	19.44	5.56	37.22	-8.89	26.2	87.23
Jun.	18.06	25.00	11.11	40.00	-3.89	54.6	128.35
Jul.	20.00	26.67	13.33	42.22	2.78	61.0	143.02
Aug.	18.06	25.00	11.11	38.89	0.00	25.7	116.35
Sep.	11.94	18.33	5.56	33.89	-8.89	34.0	64.97
Oct.	3.06	8.33	-2.22	27.78	-22.22	29.5	14.48
Nov.	-6.67	-2.22	-11.11	17.78	-37.78	19.1	0.00
Dec.	-14.72	-10.00	-19.44	5.00	-43.89	10.4	0.00
Year	1.60	7.41	-4.21	24.58	-23.93	338	571.35

### BIOCLIMATIC INDICES AND DIAGNOSIS

Thermicity index.....(It):	-340
Compensated thermicity index.....(Itc):	25
Simple continentality index.....(Ic):	37.8
Diurnality index.....(Id):	13.9
Annual ombrothermic index.....(Io):	2.89
Monthly estival ombrothermic index.....(Ios1):	1.42
Bimonthly estival ombrothermic index.....(Ios2):	2.28
Three monthly estival ombrothermic index.....(Ios3):	2.52
Four monthly estival ombrothermic index.....(Ios4):	2.44
Annual ombro-evaporation index.....(Ioe):	2.17
Annual positive temperature.....(Tp):	864
Annual negative temperature.....(Tn):	672
Estival temperature.....(Ts):	561
Positive precipitation.....(Pp):	250

N. of	P>4T	P:2T-4T	PT-2T	P<T	T<0
Months	2	4	1	0	5

Latitudinal Belt...: Low subtemperate

Continentality.....: Continental - High Eucontinental

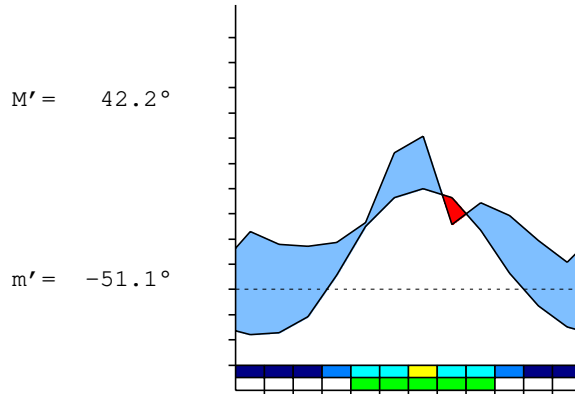
Bioclimate(Variant): TEMPERATE XERIC (STEPPIC)

Bioclimatic Belt...: UPPER SUPRATERMATE (HEMIBOREAL) UPPER DRY

KUSTANAY (KAZAKHSTAN)

171 m

P= 338 53° 13'N 63° 37'E 50/10 y.  
 T= 1.6° Ic= 37.8 Tp= 864 Tn= 672  
 m= -22.8° M= -12.8° Itc= 25 Io= 2.9



TEMPERATE XERIC (STEPPIC)  
 UPPER SUPRATEMPERATE (HEMIBOREAL) UPPER DRY

WATER INDEX CARD KUSTANAY (KAZAKHSTAN)  
 Altitude: 171 m. Latitude: 53° 13'N

(C/mm)	T	PE	P	VR	R	RE	DF	SP	DR	HC
Jan.	-17.8	0	23	23	68	0	0	0	0	*
Feb.	-17.2	0	18	18	86	0	0	0	0	*
Mar.	-10.8	0	18	14	100	0	0	3	2	*
Apr.	2.8	17	19	0	100	17	0	2	2	0.0
May.	12.5	87	26	-61	39	87	0	0	1	-0.6
Jun.	18.1	128	55	-39	0	94	35	0	0	-0.5
Jul.	20.0	143	61	0	0	61	82	0	0	-0.5
Aug.	18.1	116	26	0	0	26	91	0	0	-0.7
Sep.	11.9	65	34	0	0	34	31	0	0	-0.4
Oct.	3.1	14	30	15	15	14	0	0	0	1.0
Nov.	-6.7	0	19	19	34	0	0	0	0	*
Dec.	-14.7	0	10	10	45	0	0	0	0	*
Year	1.6	571	338	*	*	333	238	5	5	*

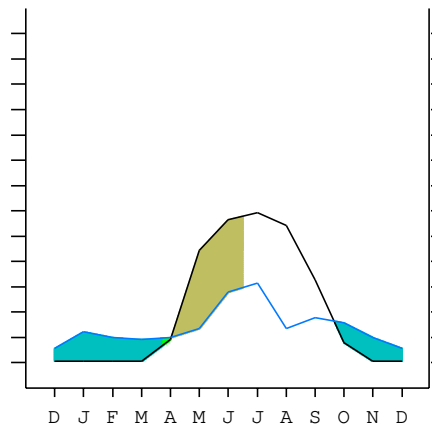
R = Reserve VR = Variation of the reserve RE = Real evapotranspiration  
 DR = Drainage HC = Humidity coefficient DF = Deficit SP = Superavit

KUSTANAY (KAZAKHSTAN)

53°13'N 63°37'E 171 m 50/10 y.

T= 1.6 Ic= 37.8 TEMPERATE XERIC (STEPPIC)  
 m= -22.8 Tp= 864 UPPER SUPRATEMPERATE (HEMIBOREAL)  
 M= -12.8 Tn= 672 UPPER DRY  
 M' = 42.2 Itc= 25  
 m' = -51.1 Io= 2.9  
 P= 338 mm ———  
 PE= 571 mm ———

Imbibing	21 Sep.
Saturation	25 Mar.
Reserve Use	1 Apr.
Deficit	16 Jun.



KUSTANAY (KAZAKHSTAN)

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SUMMARY OF RIVAS-MARTINEZ CLASSIFICATION

Continental Index [C3b]  
 + Type .....: C. Continental  
 + Subtype .....: 3. Eucontinental  
 + Variant .....: b. High  
 Thermic types [B2.C7]  
 + Latitudinal zone .....: B. Temperate  
 + Latitudinal belt .....: 2. Low subtemperate  
 + Thermic type .....: C. Cold  
 + Thermic subtype .....: 7. Cold  
 Bioclimatic types [C1a.4a.5a]  
 + Macrobioclimate .....: C. TEMPERATE  
 + Bioclimate .....: 1. XERIC  
 + Bioclimatic variant .: a. STEPPIC  
 + Thermic type.....: 4. SUPRATEMPERATE (HEMIBOREAL)  
 + Thermic subtype.....: a. UPPER  
 + Ombrothermic type ...: 5. DRY  
 + Ombrothermic subtype : a. UPPER  
 Bioclimatic Classification .....: Teho(Stp).Ste.Dry

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PRECIPITATION PARAMETERS

Warmest semester of the year.....(Pss): 231  
 Coldest semester of the year.....(Psw): 107  
 Warmest four months period of the year.....(Pcm1): 168  
 Following warmest four months period.....(Pcm2): 93  
 Positive precipitation dryest 3 months.....(Ppd): 0  
 Positive precipitation dryest 2 months.....(Ppd2): 0  
 Positive precipitation dryest 1 month.....(Ppd1): 0  
 Positive precipitation warmest 3 months.....(Pps): 141  
 Positive precipitation warmest 2 months.....(Pps2): 116  
 Positive precipitation warmest 1 month.....(Pps1): 61  
 Positive precipitation coldest 3 months.....(Ppw): 0  
 Positive precipitation coldest 2 months.....(Ppw2): 0  
 Positive precipitation coldest 1 month.....(Ppw1): 0

Seasons	Winter Tr1-W	Spring Tr2-P	Summer Tr3-S	Automn Tr4-F
Rainfall	51	62	141	82

Seasonal rainfall rhythms: S > F > P > W

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TEMPERATURE PARAMETERS

Average warmest month [T].....(Tmax): 20.0  
 Average coldest month [T].....(Tmin): -17.8  
 Maximum temp. warmest month [M].....(Tmmax): 26.7  
 Minimum temp. coldest month [m].....(Tmmin): -22.8  
 Absolute Max.temp. warmest month [M'].....(Tamax): 42.2  
 Absolute Min.temp. coldest month [m'].....(Tamin): -51.1  
 First warmest contrasted month [M].....(Tcmax): 25.0 (6)  
 First coldest contrasted month [m].....(Tcmin): 11.1 (6)  
 Estival temperature.....(Ts): 561  
 Positive temperature dryest 3 months.....(Tpd): 0  
 Positive temperature dryest 2 months.....(Tpd2): 0  
 Positive temperature dryest 1 month.....(Tpd1): 0  
 Positive temperature warmest 3 months.....(Tps): 561  
 Positive temperature warmest 2 months.....(Tps2): 381  
 Positive temperature warmest 1 month.....(Tps1): 200  
 Positive temperature coldest 3 months.....(Tpw): 0  
 Positive temperature coldest 2 months.....(Tpw2): 0  
 Positive temperature coldest 1 month.....(Tpw1): 0

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SEASONAL PARAMETERS

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Warmest semester...(Sms)					o	o	o	o	o	o		
Dryest semester....(Smd)	o	o	o	o							o	o
Warmest 4 months...(Cm1)					o	o	o	o				
Dryest 4 months....(Cmd)	o	o	o									o
Vegetation Activity(Pav)					o	o	o	o	o			
Ultragelid...[M' <=0] (Pf)												
Hypergelid...[M <=0] (Pf)	o	o	o								o	o
Gelid.....[T <=0] (Pf)	o	o	o								o	o
Subgelid.....[m <=0] (Pf)	o	o	o	o						o	o	o
Pregelid.....[m' <=0] (Pf)	o	o	o	o	o	o		o	o	o	o	o
Agelid.....[m' > 0] (Pf)							o					
HiperAgelid..[all>0] (Pf)							o					

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OMBROTHERMIC PARAMETERS

Annual aridity index.[PE/P].....(Iar): 1.69  
 Mediterranean index of July.[PE/P].....(Im1): 2.34  
 Mediterranean index of July & August.....(Im2): 2.99  
 Mediterranean index of June, July & August....(Im3): 2.74

Months	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.
Pp(x10)	*	*	*	*	185	262	546	610	257	340	295	*
Tp	*	*	*	*	28	125	181	200	181	119	31	*
Io (Iom)	*	*	*	*	6.65	2.10	3.02	3.05	1.42	2.85	9.64	*
Seasons	Winter			Spring			Summer			Autumn		
Pp(x10)/Tp	*/*			*/*			1413 / 561			*/*		
Io (Iot)	*			*			2.518			*		
Semesters	December-May						June-November					
Pp(x10)/Tp	*/*						*/*					
Io (Iosm)	*						*					

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Aridity Value Index (AVI)

[10xPP/TP=IO]: 2495/864=2.89 **There is No Yearly Aridity**

Months	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.
Pp [P*10]	*	*	*	*	185	262	546	610	257	340	295	*
Tp [T*10]	*	*	*	*	28	125	181	200	181	119	31	*
Iom [Pp/Tp]	!!	!!	!!	!!	665	210	302	305	142	285	964	!!
Avm [200-Iom]	***	***	***	***	***	***	***	***	58	***	***	***
Seasons	Winter			Spring			Summer			Autumn		
Pp / Tp	* / *			* / *			1413 / 561			* / *		
Iot [Pp/Tp]	**			**			252			**		
Avs E[Avm<200]	***			***			***			***		
Weak lower semiarid [1]												

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BIOCLIMATIC INDICES I

CI of Supan (1884) [Tmax-Tmin] .....(Sp): 37.78  
 CI of Gorezinski (1920) [1.7\*Sp/sin(Lat)-20.4] .....: 59.79  
 CI of Conrad (1946) [1.7\*Sp/sin(Lat+10)-14] .....: 57.94  
 + Subcontinental (40<CI<60)  
 CI of Currey (1974) [CI=Sp/(1+Lat/3)] .....: 2.02  
 + Continental (1.7<CI<2.3)  
 Rainfall Index of Lang (1925) [R=P/T] .....: 211.33  
 + Humid (R>160)  
 Aridity Index of Martonne (1926) [Ia=P/(T+10)] .....: 29.11  
 + Subhumid (30>Ia>20)  
 I of Emberger (1930) [Q=100\*P/(Tmax<sup>2</sup>-Tmin<sup>2</sup>)] .....: 175.50  
 + Humid (Q>90)  
 I of Dantin & Revenga (1940) [DR=100\*T/P] .....: 0.47  
 + Humid (2>DR>0)  
 Aridity Index of UNEP [I=P/PE] .....: 0.59  
 + Subhumid - dry (0.65>I>0.5)  
 Potential Erosion I of Fournier (1960) [K=Pi<sup>2</sup>/P].....: 11.02  
 + Very low (K<60)

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BIOCLIMATIC INDICES II

Bioclimatic classification of Gaussen & Bagnouls (1957)  
 + Climate .....: B. Cold and temperate cold  
 + Region .....: 10. Psicroxeroteric (Submediterranean)  
 + Thermic type: 7. Hipermicrothermic

Thornthwaite (1948)												
	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
P-E ratio	0.18	0.14	0.13	0.11	0.12	0.22	0.24	0.10	0.16	0.19	0.15	0.07
T-E ratio	0.00	0.00	0.00	1.25	5.63	8.13	9.00	8.13	5.37	1.38	0.00	0.00
Precipitation-effectiveness: 18.01						Temperature-efficiency .....: 38.88						
Moisture Index [MI=100*(P-PE)/PE] .....: -40.91 + D.Semiarid (-66.7<MI<-33.3)												
Index of dryness [DI=100*d/PE] .....: 41.73 + Strong deficit (33.3<DI)												
Index of humidity [HI=100*s/PE] .....: 0.81 + No surplus (0<HI<10)												
Potential Evapotranspiration PE .....: 571.35 + First mesothermic (570<PE<712)												

