

Phytosociological Research Center

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Worldwide Bioclimatic Classification System

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(Adapted to Synoptical Table 30/08/2017)

RIO GRANDE (ARGENTINA)

Altitude: 9 m.

Latitude: 53°48'S Longitude: 67°47'W

Temperature observation period.: 1941-1950 (10)

Rainfall observation period....: 1941-1950 (10)

| (C/mm) | Ti | Mi | mi | M'i | m'i | Pi | Epi |
|--------|------|-------|-------|-------|--------|------|--------|
| Jan. | 9.80 | 15.20 | 5.30 | 24.10 | -2.80 | 38.0 | 93.25 |
| Feb. | 9.50 | 14.90 | 4.50 | 23.90 | -2.70 | 35.0 | 73.81 |
| Mar. | 7.70 | 12.60 | 3.50 | 21.40 | -6.20 | 52.0 | 60.48 |
| Apr. | 5.20 | 9.60 | 0.90 | 17.00 | -8.20 | 32.0 | 35.82 |
| May. | 1.70 | 5.20 | -1.90 | 15.00 | -12.80 | 33.0 | 13.37 |
| Jun. | 0.70 | 3.40 | -2.50 | 10.50 | -14.20 | 23.0 | 6.01 |
| Jul. | 0.40 | 3.20 | -2.20 | 9.60 | -16.60 | 25.0 | 4.29 |
| Aug. | 1.20 | 4.70 | -1.80 | 10.90 | -10.00 | 21.0 | 11.74 |
| Sep. | 2.90 | 7.50 | -0.20 | 15.00 | -9.90 | 27.0 | 26.51 |
| Oct. | 5.40 | 10.50 | 1.80 | 16.50 | -6.80 | 28.0 | 51.22 |
| Nov. | 6.70 | 11.70 | 2.70 | 18.50 | -4.10 | 29.0 | 66.00 |
| Dec. | 9.20 | 14.50 | 5.30 | 22.00 | -3.00 | 35.0 | 91.51 |
| Year | 5.03 | 9.42 | 1.28 | 17.03 | -8.11 | 378 | 534.01 |

BIOCLIMATIC INDICES AND DIAGNOSIS

| | |
|---|------|
| Thermicity index.....(It): | 60 |
| Compensated thermicity index.....(Itc): | 60 |
| Simple continentality index.....(Ic): | 9.4 |
| Diurnality index.....(Id): | 10.4 |
| Annual ombrothermic index.....(Io): | 6.26 |
| Monthly estival ombrothermic index.....(Ios1): | 3.88 |
| Bimonthly estival ombrothermic index.....(Ios2): | 3.78 |
| Threemonthly estival ombrothermic index.....(Ios3): | 3.79 |
| Fourmonthly estival ombrothermic index.....(Ios4): | 3.89 |
| Annual ombro-evaporation index.....(Ioe): | 1.35 |
| Annual positive temperature.....(Tp): | 604 |
| Annual negative temperature.....(Tn): | 0 |
| Estival temperature.....(Ts): | 285 |
| Positive precipitation.....(Pp): | 378 |

| N. of | P>4T | P:2T-4T | PT-2T | P<T | T<0 |
|--------|------|---------|-------|-----|-----|
| Months | 9 | 3 | 0 | 0 | 0 |

Latitudinal Belt...: Low subtemperate

Continentalty.....: Hyperoceanic - High Subhyperoceanic

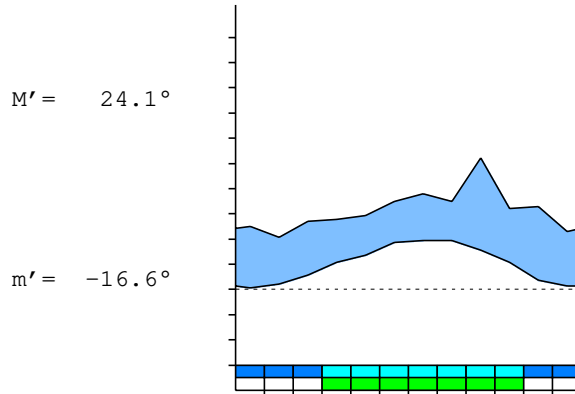
Bioclimate.....: BOREAL (ANTIBOREAL) HYPEROCEANIC

Macrobioclimate.....: UPPER MESOBOREAL LOW HUMID

RIO GRANDE (ARGENTINA)

9 m

P= 378 53° 48' S 67° 47' W 10/10 y.
 T= 5.0° Ic= 9.4 Tp= 604 Tn= 0
 m= -2.2° M= 3.2° Itc= 60 Io= 6.3



BOREAL (ANTIBOREAL) HYPEROCEANIC
 UPPER MESOBOREAL LOW HUMID

WATER INDEX CARD RIO GRANDE (ARGENTINA)
 Altitude: 9 m. Latitude: 53° 48' S

| (C/mm) | T | PE | P | VR | R | RE | DF | SP | DR | HC |
|--------|-----|-----|-----|-----|----|-----|-----|----|----|------|
| Jul. | 0.4 | 4 | 25 | 21 | 57 | 4 | 0 | 0 | 0 | 4.8 |
| Aug. | 1.2 | 12 | 21 | 9 | 67 | 12 | 0 | 0 | 0 | 0.7 |
| Sep. | 2.9 | 27 | 27 | 0 | 67 | 27 | 0 | 0 | 0 | 0.0 |
| Oct. | 5.4 | 51 | 28 | -23 | 44 | 51 | 0 | 0 | 0 | -0.4 |
| Nov. | 6.7 | 66 | 29 | -37 | 7 | 66 | 0 | 0 | 0 | -0.5 |
| Dec. | 9.2 | 92 | 35 | -7 | 0 | 42 | 50 | 0 | 0 | -0.6 |
| Jan. | 9.8 | 93 | 38 | 0 | 0 | 38 | 55 | 0 | 0 | -0.5 |
| Feb. | 9.5 | 74 | 35 | 0 | 0 | 35 | 39 | 0 | 0 | -0.5 |
| Mar. | 7.7 | 60 | 52 | 0 | 0 | 52 | 8 | 0 | 0 | -0.1 |
| Apr. | 5.2 | 36 | 32 | 0 | 0 | 32 | 4 | 0 | 0 | -0.1 |
| May. | 1.7 | 13 | 33 | 20 | 20 | 13 | 0 | 0 | 0 | 1.4 |
| Jun. | 0.7 | 6 | 23 | 17 | 37 | 6 | 0 | 0 | 0 | 2.8 |
| Year | 5.0 | 534 | 378 | * | * | 378 | 156 | 0 | 0 | * |

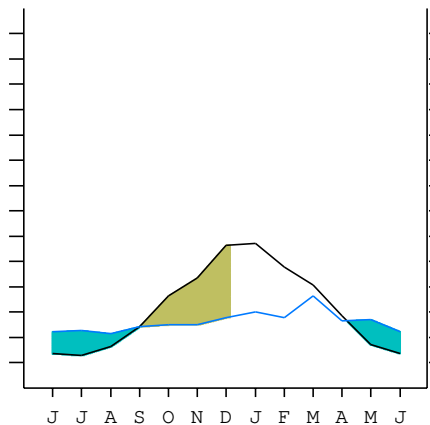
R = Reserve VR = Variation of the reserve RE = Real evapotranspiration
 DR = Drainage HC = Humidity coefficient DF = Deficit SP = Superavit

RIO GRANDE (ARGENTINA)

53°48' S 67°47' W 9 m 10/10 y.

T= 5.0 Ic= 9.4 BOREAL (ANTIBOREAL) HYPEROCEANIC
 m= -2.2 Tp= 604 UPPER MESOBOREAL
 M= 3.2 Tn= 0 LOW HUMID
 M' = 24.1 Itc= 60
 m' = -16.6 Io= 6.3
 P= 378 mm ———
 PE= 534 mm ———

| | |
|-------------|--------|
| Imbibing | 5 Apr. |
| Saturation | 1 Sep. |
| Reserve Use | 4 Dec. |
| Deficit | |



RIO GRANDE (ARGENTINA)

Latitude: 53°48'S Longitude: 67°47'W Altitude: 9 m

SUMMARY OF RIVAS-MARTINEZ CLASSIFICATION

Continental Index [A3a]
 + Type: A. Hyperoceanic
 + Subtype: 3. Subhyperoceanic
 + Variant: a. High
 Thermic types [B3.C6]
 + Latitudinal zone: B. Temperate
 + Latitudinal belt: 3. Low subtemperate
 + Thermic type: C. Cold
 + Thermic subtype: 6. Cool
 Bioclimatic types [D6.3a.7b]
 + Macrobioclimate: D. BOREAL (ANTIBOREAL)
 + Bioclimate: 6. HYPEROCEANIC
 + Bioclimatic variant ..:
 + Thermic type.....: 3. MESOBOREAL
 + Thermic subtype.....: a. UPPER
 + Ombrothermic type ...: 7. HUMID
 + Ombrothermic subtype : b. LOW
 Bioclimatic Classification: Boxe.Sbo.Hum

RIO GRANDE (ARGENTINA)

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PRECIPITATION PARAMETERS

Warmest semester of the year.....(Pss): 217
 Coldest semester of the year.....(Psw): 161
 Warmest four months period of the year.....(Pcm1): 160
 Following warmest four months period.....(Pcm2): 113
 Positive precipitation dryest 3 months.....(Ppd): 69
 Positive precipitation dryest 2 months.....(Ppd2): 46
 Positive precipitation dryest 1 month.....(Ppd1): 21
 Positive precipitation warmest 3 months.....(Pps): 108
 Positive precipitation warmest 2 months.....(Pps2): 73
 Positive precipitation warmest 1 month.....(Pps1): 38
 Positive precipitation coldest 3 months.....(Ppw): 69
 Positive precipitation coldest 2 months.....(Ppw2): 48
 Positive precipitation coldest 1 month.....(Ppw1): 25

| Seasons | Winter Tr1-W | Spring Tr2-P | Summer Tr3-S | Automn Tr4-F |
|----------|-----------------|-----------------|-----------------|-----------------|
| Rainfall | 69 | 84 | 108 | 117 |

Seasonal rainfall rhythms: F > S > P > W

RIO GRANDE (ARGENTINA)

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TEMPERATURE PARAMETERS

Average warmest month [T].....(Tmax): 9.8
 Average coldest month [T].....(Tmin): 0.4
 Maximum temp. warmest month [M].....(Tmmax): 15.2
 Minimum temp. coldest month [m].....(Tmmin): -2.5
 Absolute Max.temp. warmest month [M'].....(Tamax): 24.1
 Absolute Min.temp. coldest month [m'].....(Tamin): -16.6
 First warmest contrasted month [M].....(Tcmax): 14.9 (2)
 First coldest contrasted month [m].....(Tcmin): 4.5 (2)
 Estival temperature.....(Ts): 285
 Positive temperature dryest 3 months.....(Tpd): 23
 Positive temperature dryest 2 months.....(Tpd2): 16
 Positive temperature dryest 1 month.....(Tpd1): 12
 Positive temperature warmest 3 months.....(Tps): 285
 Positive temperature warmest 2 months.....(Tps2): 193
 Positive temperature warmest 1 month.....(Tps1): 98
 Positive temperature coldest 3 months.....(Tpw): 23
 Positive temperature coldest 2 months.....(Tpw2): 11
 Positive temperature coldest 1 month.....(Tpw1): 4

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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 | o | o |
| Ultragelid...[M' <=0] (Pf) | | | | | | | | | | | | |
| Hypergelid...[M <=0] (Pf) | | | | | | | | | | | | |
| Gelid.....[T <=0] (Pf) | | | | | | | | | | | | |
| Subgelid.....[m <=0] (Pf) | | | | | o | o | o | o | o | | | |
| Pregelid.....[m' <=0] (Pf) | o | o | o | o | o | o | o | o | o | o | o | o |
| Agelid.....[m' > 0] (Pf) | | | | | | | | | | | | |
| HiperAgelid..[all>0] (Pf) | | | | | | | | | | | | |

RIO GRANDE (ARGENTINA)

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OMBROTHERMIC PARAMETERS

Annual aridity index.[PE/P].....(Iar): 1.41
 Mediterranean index of January.....(Im1): 2.45
 Mediterranean index of January & February.....(Im2): 2.29
 Mediterranean index of December to February...(Im3): 2.39

| Months | Dec. | Jan. | Feb. | Mar. | Apr. | May. | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. |
|------------|--------------|------|------|------------|------|------|---------------|------|------|-----------|------|------|
| Pp(x10) | 350 | 380 | 350 | 520 | 320 | 330 | 230 | 250 | 210 | 270 | 280 | 290 |
| Tp | 92 | 98 | 95 | 77 | 52 | 17 | 7 | 4 | 12 | 29 | 54 | 67 |
| Io (Iom) | 3.80 | 3.88 | 3.68 | 6.75 | 6.15 | 19.4 | 32.9 | 62.5 | 17.5 | 9.31 | 5.19 | 4.33 |
| Seasons | Summer | | | Autumn | | | Winter | | | Spring | | |
| Pp(x10)/Tp | 1080 / 285 | | | 1170 / 146 | | | 690 / 23 | | | 840 / 150 | | |
| Io (Iot) | 3.789 | | | 8.014 | | | 30.00 | | | 5.600 | | |
| Semesters | December-May | | | | | | June-November | | | | | |
| Pp(x10)/Tp | 2250 / 431 | | | | | | 1530 / 173 | | | | | |
| Io (Iosm) | 5.220 | | | | | | 8.844 | | | | | |

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Aridity Value Index (AVI)

[10xPP/TP=IO]: 3780/604=6.26 **There is No Yearly Aridity**

| Months | Dec. | Jan. | Feb. | Mar. | Apr. | May. | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. |
|-----------------|------------|------|------|------------|------|------|----------|------|------|-----------|------|------|
| Pp [P*10] | 350 | 380 | 350 | 520 | 320 | 330 | 230 | 250 | 210 | 270 | 280 | 290 |
| Tp [T*10] | 92 | 98 | 95 | 77 | 52 | 17 | 7 | 4 | 12 | 29 | 54 | 67 |
| Iom [Pp/Tp] | 380 | 388 | 368 | 675 | 615 | \$\$ | \$\$ | \$\$ | \$\$ | 931 | 519 | 433 |
| Avm [200-Iom] | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** | *** |
| Seasons | Summer | | | Autumn | | | Winter | | | Spring | | |
| Pp / Tp | 1080 / 285 | | | 1170 / 146 | | | 690 / 23 | | | 840 / 150 | | |
| Iot [Pp/Tp] | 379 | | | 801 | | | \$\$ | | | 560 | | |
| Avs E [Avm<200] | *** | | | *** | | | *** | | | *** | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
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BIOCLIMATIC INDICES I

| | | |
|--|-------|--------|
| CI of Supan (1884) [Tmax-Tmin] | (Sp): | 9.40 |
| CI of Gorezinski (1920) [1.7*Sp/sin(Lat)-20.4] | | -0.60 |
| CI of Conrad (1946) [1.7*Sp/sin(Lat+10)-14] | | 3.81 |
| + Hyperoceanic (-20<CI<20) | | |
| CI of Currey (1974) [CI=Sp/(1+Lat/3)] | | 0.50 |
| + Hyperoceanic (0<CI<0.6) | | |
| Rainfall Index of Lang (1925) [R=P/T] | | 75.10 |
| + Temperate warm (100>R>60) | | |
| Aridity Index of Martonne (1926) [Ia=P/(T+10)] | | 25.14 |
| + Subhumid (30>Ia>20) | | |
| I of Emberger (1930) [Q=100*P/(Tmax ² -Tmin ²)] | | 168.16 |
| + Humid (Q>90) | | |
| I of Dantin & Revenga (1940) [DR=100*T/P] | | 1.33 |
| + Humid (2>DR>0) | | |
| Aridity Index of UNEP [I=P/PE] | | 0.71 |
| + Humid (I>0.65) | | |
| Potential Erosion I of Fournier (1960) [K=Pi ² /P] | | 7.15 |
| + Very low (K<60) | | |

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BIOCLIMATIC INDICES II

Bioclimatic classification of Gaussen & Bagnouls (1957)
 + Climate

- + Climate
- + Region
- + Thermic type: 6. Microthermic

| Thornthwaite (1948) | | | | | | | | | | | | |
|---|------|------|------|------|------|------------------------------|------|------|------|------|------|--------|
| | Jan. | Feb. | Mar. | Apr. | May. | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. |
| P-E ratio | 0.19 | 0.18 | 0.29 | 0.19 | 0.22 | 0.16 | 0.17 | 0.14 | 0.17 | 0.16 | 0.16 | 0.18 |
| T-E ratio | 4.41 | 4.27 | 3.46 | 2.34 | 0.77 | 0.31 | 0.18 | 0.54 | 1.31 | 2.43 | 3.01 | 4.14 |
| Precipitation-effectiveness: 22.06 | | | | | | Temperature-efficiency | | | | | | 27.18 |
| Moisture Index [MI=100*(P-PE)/PE] | | | | | | | | | | | | -29.21 |
| + C1.Subhumid dry (-33.3<MI<0) | | | | | | | | | | | | |
| Index of dryness [DI=100*d/PE] | | | | | | | | | | | | 29.21 |
| + Moderate deficit (16.7<DI<33.3) | | | | | | | | | | | | |
| Index of humidity [HI=100*s/PE] | | | | | | | | | | | | 0.00 |
| + No surplus (0<HI<10) | | | | | | | | | | | | |
| Potential Evapotranspiration PE | | | | | | | | | | | | 534.01 |
| + Second microthermic (427<PE<570) | | | | | | | | | | | | |

