

# Phytosociological Research Center

www.globalbioclimatics.org

## Worldwide Bioclimatic Classification System

Prof.Dr. Salvador Rivas-Martinez

(Adapted to Synoptical Table 30/08/2017)

LAGHOUAT EL MAKR (ALGERIA)

Altitude: 765 m.

Latitude: 33°46'N Longitude: 2°56'E

Temperature observation period.: 1967-1994 (28)

Rainfall observation period....: 1964-1994 (31)

| (C/mm) | Ti    | Mi    | mi    | M'i   | m'i   | Pi   | EPI    |
|--------|-------|-------|-------|-------|-------|------|--------|
| Jan.   | 7.50  | 13.89 | 1.11  | 30.00 | -8.89 | 11.9 | 9.98   |
| Feb.   | 10.00 | 17.22 | 2.78  | 30.00 | -6.67 | 10.9 | 17.14  |
| Mar.   | 13.06 | 20.56 | 5.56  | 31.11 | -3.89 | 15.0 | 34.65  |
| Apr.   | 16.39 | 24.44 | 8.33  | 39.44 | -2.22 | 16.0 | 57.23  |
| May.   | 20.56 | 28.89 | 12.22 | 39.44 | 0.00  | 14.0 | 98.26  |
| Jun.   | 26.11 | 35.00 | 17.22 | 46.11 | 7.78  | 10.9 | 156.99 |
| Jul.   | 29.73 | 38.89 | 20.56 | 48.89 | 12.78 | 5.1  | 196.85 |
| Aug.   | 29.17 | 38.33 | 20.00 | 45.00 | 11.11 | 8.1  | 181.97 |
| Sep.   | 24.45 | 32.78 | 16.11 | 41.67 | 7.22  | 24.1 | 118.46 |
| Oct.   | 18.34 | 25.56 | 11.11 | 38.89 | -1.11 | 22.1 | 63.49  |
| Nov.   | 12.23 | 18.89 | 5.56  | 31.11 | -4.44 | 11.9 | 25.73  |
| Dec.   | 8.61  | 15.00 | 2.22  | 27.78 | -7.22 | 19.1 | 12.78  |
| Year   | 18.01 | 25.79 | 10.23 | 37.45 | 0.37  | 169  | 973.52 |

### BIOCLIMATIC INDICES AND DIAGNOSIS

|   |      |
|---|------|
| Thermicity index.....(It):                          | 330  |
| Compensated thermicity index.....(Itc):             | 364  |
| Simple continentality index.....(Ic):               | 22.2 |
| Diurnality index.....(Id):                          | 18.3 |
| Annual ombrothermic index.....(Io):                 | 0.78 |
| Monthly estival ombrothermic index.....(Ios1):      | 0.17 |
| Bimonthly estival ombrothermic index.....(Ios2):    | 0.22 |
| Threemonthly estival ombrothermic index.....(Ios3): | 0.28 |
| Fourmonthly estival ombrothermic index.....(Ios4):  | 0.36 |
| Annual ombro-evaporation index.....(Ioe):           | 0.99 |
| Annual positive temperature.....(Tp):               | 2162 |
| Annual negative temperature.....(Tn):               | 0    |
| Estival temperature.....(Ts):                       | 850  |
| Positive precipitation.....(Pp):                    | 169  |

| N. of  | P>4T | P:2T-4T | PT-2T | P<T | T<0 |
|--------|------|---------|-------|-----|-----|
| Months | 0    | 1       | 4     | 7   | 0   |

Latitudinal Belt...: Subtropical

Continentality.....: Continental - Low Subcontinental

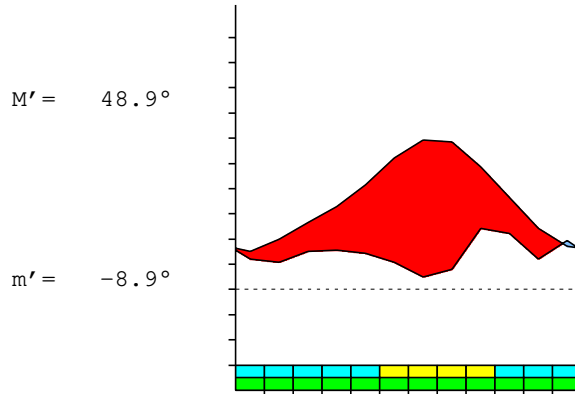
Bioclimate.....: MEDITERRANEAN DESERTIC-CONTINENTAL

Bioclimatic Belt...: UPPER THERMOMEDITERRANEAN UPPER ARID

LAGHOUAT EL MAKR (ALGERIA)

765 m

P= 169      33° 46'N      2° 56'E      28/31 y.  
 T= 18.0°    Ic= 22.2      Tp= 2162      Tn= 0  
 m= 1.1°      M= 13.9°      Itc= 364      Io= 0.8



MEDITERRANEAN DESERTIC-CONTINENTAL  
 UPPER THERMOMEDITERRANEAN UPPER ARID

WATER INDEX CARD      LAGHOUAT EL MAKR (ALGERIA)

Altitude: 765 m.      Latitude: 33° 46'N

| (C/mm) | T    | PE  | P   | VR | R | RE  | DF  | SP | DR | HC   |
|--------|------|-----|-----|----|---|-----|-----|----|----|------|
| Jan.   | 7.5  | 10  | 12  | 2  | 8 | 10  | 0   | 0  | 0  | 0.1  |
| Feb.   | 10.0 | 17  | 11  | -6 | 2 | 17  | 0   | 0  | 0  | -0.3 |
| Mar.   | 13.1 | 35  | 15  | -2 | 0 | 17  | 18  | 0  | 0  | -0.5 |
| Apr.   | 16.4 | 57  | 16  | 0  | 0 | 16  | 41  | 0  | 0  | -0.7 |
| May.   | 20.6 | 98  | 14  | 0  | 0 | 14  | 84  | 0  | 0  | -0.8 |
| Jun.   | 26.1 | 157 | 11  | 0  | 0 | 11  | 146 | 0  | 0  | -0.9 |
| Jul.   | 29.7 | 197 | 5   | 0  | 0 | 5   | 192 | 0  | 0  | -0.9 |
| Aug.   | 29.2 | 182 | 8   | 0  | 0 | 8   | 174 | 0  | 0  | -0.9 |
| Sep.   | 24.5 | 118 | 24  | 0  | 0 | 24  | 94  | 0  | 0  | -0.7 |
| Oct.   | 18.3 | 63  | 22  | 0  | 0 | 22  | 41  | 0  | 0  | -0.6 |
| Nov.   | 12.2 | 26  | 12  | 0  | 0 | 12  | 14  | 0  | 0  | -0.5 |
| Dec.   | 8.6  | 13  | 19  | 6  | 6 | 13  | 0   | 0  | 0  | 0.4  |
| Year   | 18.0 | 974 | 169 | *  | * | 169 | 804 | 0  | 0  | *    |

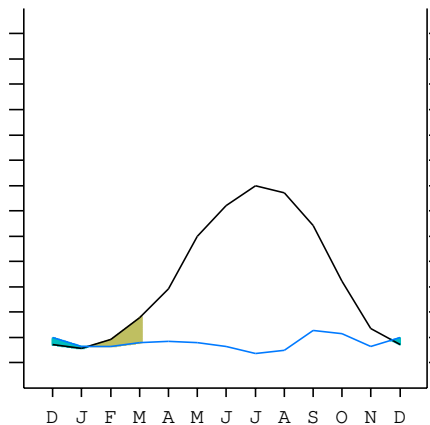
R = Reserve    VR = Variation of the reserve    RE = Real evapotranspiration  
 DR = Drainage    HC = Humidity coefficient    DF = Deficit    SP = Superavit

LAGHOUAT EL MAKR (ALGERIA)

33°46'N    2°56'E    765 m 28/31 y.

T= 18.0    Ic= 22.2    MEDITERRANEAN DESERTIC-CONTINENTAL  
 m= 1.1    Tp= 2162    UPPER THERMOMEDITERRANEAN  
 M= 13.9    Tn= 0    UPPER ARID  
 M' = 48.9    Itc= 364  
 m' = -8.9    Io= 0.8  
 P= 169    mm    ———  
 PE= 974    mm    ———

|             |         |
|-------------|---------|
| Imbibing    | 21 Nov. |
| Saturation  | 8 Jan.  |
| Reserve Use | 4 Mar.  |
| Deficit     |         |



LAGHOUAT EL MAKR (ALGERIA)

Latitude: 33°46'N Longitude: 2°56'E Altitude: 765 m

SUMMARY OF RIVAS-MARTINEZ CLASSIFICATION

Continental Index [C2a]  
 + Type .....: C. Continental  
 + Subtype .....: 2. Subcontinental  
 + Variant .....: a. Low

Thermic types [A3.A3]  
 + Latitudinal zone .....: A. Warm  
 + Latitudinal belt .....: 3. Subtropical  
 + Thermic type .....: A. Warm  
 + Thermic subtype .....: 3. Subwarm

Bioclimatic types [B3.2a.3a]  
 + Macrobioclimate .....: B. MEDITERRANEAN  
 + Bioclimate .....: 3. DESERTIC-CONTINENTAL  
 + Bioclimatic variant ..:  
 + Thermic type.....: 2. THERMOMEDITERRANEAN  
 + Thermic subtype.....: a. UPPER  
 + Ombrothermic type ...: 3. ARID  
 + Ombrothermic subtype : a. UPPER

Bioclimatic Classification .....: Mexo.Tme.Ari

LAGHOUAT EL MAKR (ALGERIA)

Latitude: 33°46'N Longitude: 2°56'E Altitude: 765 m

PRECIPITATION PARAMETERS

Warmest semester of the year.....(Pss): 84  
 Coldest semester of the year.....(Psw): 85  
 Warmest four months period of the year.....(Pcm1): 48  
 Following warmest four months period.....(Pcm2): 65  
 Positive precipitation dryest 3 months.....(Ppd): 24  
 Positive precipitation dryest 2 months.....(Ppd2): 13  
 Positive precipitation dryest 1 month.....(Ppd1): 5  
 Positive precipitation warmest 3 months.....(Pps): 24  
 Positive precipitation warmest 2 months.....(Pps2): 13  
 Positive precipitation warmest 1 month.....(Pps1): 5  
 Positive precipitation coldest 3 months.....(Ppw): 42  
 Positive precipitation coldest 2 months.....(Ppw2): 31  
 Positive precipitation coldest 1 month.....(Ppw1): 12

| Seasons  | Winter<br>Tr1-W | Spring<br>Tr2-P | Summer<br>Tr3-S | Automn<br>Tr4-F |
|----------|-----------------|-----------------|-----------------|-----------------|
| Rainfall | 41              | 45              | 24              | 58              |

Seasonal rainfall rhythms: F > P > W > S

LAGHOUAT EL MAKR (ALGERIA)

Latitude: 33°46'N Longitude: 2°56'E Altitude: 765 m

TEMPERATURE PARAMETERS

Average warmest month [T].....(Tmax): 29.7  
 Average coldest month [T].....(Tmin): 7.5  
 Maximum temp. warmest month [M].....(Tmmax): 38.9  
 Minimum temp. coldest month [m].....(Tmmin): 1.1  
 Absolute Max.temp. warmest month [M'].....(Tamax): 48.9  
 Absolute Min.temp. coldest month [m'].....(Tamin): -8.9  
 First warmest contrasted month [M].....(Tcmax): 38.9 (7)  
 First coldest contrasted month [m].....(Tcmin): 20.6 (7)  
 Estival temperature.....(Ts): 850  
 Positive temperature dryest 3 months.....(Tpd): 850  
 Positive temperature dryest 2 months.....(Tpd2): 589  
 Positive temperature dryest 1 month.....(Tpd1): 297  
 Positive temperature warmest 3 months.....(Tps): 850  
 Positive temperature warmest 2 months.....(Tps2): 589  
 Positive temperature warmest 1 month.....(Tps1): 297  
 Positive temperature coldest 3 months.....(Tpw): 261  
 Positive temperature coldest 2 months.....(Tpw2): 161  
 Positive temperature coldest 1 month.....(Tpw1): 75

## LAGHOUAT EL MAKR (ALGERIA)

Latitude: 33°46'N Longitude: 2°56'E Altitude: 765 m

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

## LAGHOUAT EL MAKR (ALGERIA)

Latitude: 33°46'N Longitude: 2°56'E Altitude: 765 m

## OMBROTHERMIC PARAMETERS

Annual aridity index.[PE/P].....(Iar): 5.76  
Mediterranean index of July.[PE/P].....(Im1): 38.60  
Mediterranean index of July & August.....(Im2): 28.70  
Mediterranean index of June, July & August....(Im3): 22.23

| Months     | Dec.         | Jan. | Feb. | Mar.      | Apr. | May. | Jun.          | Jul. | Aug. | Sep.      | Oct. | Nov. |
|------------|--------------|------|------|-----------|------|------|---------------|------|------|-----------|------|------|
| Pp(x10)    | 191          | 119  | 109  | 150       | 160  | 140  | 109           | 51   | 81   | 241       | 221  | 119  |
| Tp         | 86           | 75   | 100  | 131       | 164  | 206  | 261           | 297  | 292  | 245       | 183  | 122  |
| Io (Iom)   | 2.22         | 1.59 | 1.09 | 1.15      | 0.98 | 0.68 | 0.42          | 0.17 | 0.28 | 0.99      | 1.21 | 0.97 |
| Seasons    | Winter       |      |      | Spring    |      |      | Summer        |      |      | Autumn    |      |      |
| Pp(x10)/Tp | 419 / 261    |      |      | 450 / 500 |      |      | 241 / 850     |      |      | 581 / 550 |      |      |
| Io (Iot)   | 1.605        |      |      | 0.900     |      |      | 0.283         |      |      | 1.056     |      |      |
| Semesters  | December-May |      |      |           |      |      | June-November |      |      |           |      |      |
| Pp(x10)/Tp | 869 / 761    |      |      |           |      |      | 822 / 1400    |      |      |           |      |      |
| Io (Iosm)  | 1.142        |      |      |           |      |      | 0.587         |      |      |           |      |      |

## LAGHOUAT EL MAKR (ALGERIA)

Latitude: 33°46'N Longitude: 2°56'E Altitude: 765 m

## Aridity Value Index (AVI)

[10xPP/TP=IO]: 1691/2162=0.78 **There is No Yearly Aridity**

| Months                   | Dec.      | Jan. | Feb. | Mar.      | Apr. | May. | Jun.                      | Jul. | Aug. | Sep.      | Oct. | Nov. |
|--------------------------|-----------|------|------|-----------|------|------|---------------------------|------|------|-----------|------|------|
| Pp [P*10]                | 191       | 119  | 109  | 150       | 160  | 140  | 109                       | 51   | 81   | 241       | 221  | 119  |
| Tp [T*10]                | 86        | 75   | 100  | 131       | 164  | 206  | 261                       | 297  | 292  | 245       | 183  | 122  |
| Iom [Pp/Tp]              | 222       | 159  | 109  | 115       | 98   | 68   | 42                        | 17   | 28   | 99        | 121  | 97   |
| Avm [200-Iom]            | ***       | 41   | 91   | 85        | 102  | 132  | 158                       | 183  | 172  | 101       | 79   | 103  |
| Seasons                  | Winter    |      |      | Spring    |      |      | Summer                    |      |      | Autumn    |      |      |
| Pp / Tp                  | 419 / 261 |      |      | 450 / 500 |      |      | 241 / 850                 |      |      | 581 / 550 |      |      |
| Iot [Pp/Tp]              | 160       |      |      | 90        |      |      | 28                        |      |      | 106       |      |      |
| Avs E[Avm<200]           | ***       |      |      | 319       |      |      | 513                       |      |      | 284       |      |      |
| Upper ultrahyperarid [1] |           |      |      |           |      |      | Lower hyperarid [2]       |      |      |           |      |      |
| Strong lower arid [1]    |           |      |      |           |      |      | Weak lower arid [1]       |      |      |           |      |      |
| Weak upper arid [4]      |           |      |      |           |      |      | Strong lower semiarid [3] |      |      |           |      |      |
| Weak lower semiarid [1]  |           |      |      |           |      |      | Strong upper semiarid [1] |      |      |           |      |      |

LAGHOUAT EL MAKR (ALGERIA)

Latitude: 33°46'N Longitude: 2°56'E Altitude: 765 m

BIOCLIMATIC INDICES I

|  |       |       |
|--|-------|-------|
| CI of Supan (1884) [Tmax-Tmin] .....   | (Sp): | 22.23 |
| CI of Gorezinski (1920) [1.7*Sp/sin(Lat)-20.4] .....                         |       | 47.59 |
| CI of Conrad (1946) [1.7*Sp/sin(Lat+10)-14] .....                            |       | 40.63 |
| + Subcontinental (40<CI<60)  |       |       |
| CI of Currey (1974) [CI=Sp/(1+Lat/3)] .....                                  |       | 1.81  |
| + Continental (1.7<CI<2.3)   |       |       |
| Rainfall Index of Lang (1925) [R=P/T] .....                                  |       | 9.39  |
| + Steppic (40>R>0)   |       |       |
| Aridity Index of Martonne (1926) [Ia=P/(T+10)] .....                         |       | 6.04  |
| + Arid -steppic- (15>Ia>5)   |       |       |
| I of Emberger (1930) [Q=100*P/(Tmax <sup>2</sup> -Tmin <sup>2</sup> )] ..... |       | 11.19 |
| + Arid (30>Q>0)  |       |       |
| I of Dantin & Revenga (1940) [DR=100*T/P] .....                              |       | 10.65 |
| + Extremely arid (DR>6)  |       |       |
| Aridity Index of UNEP [I=P/PE] .....   |       | 0.17  |
| + Arid (0.2>Im>0.05)   |       |       |
| Potential Erosion I of Fournier (1960) [K=Pi <sup>2</sup> /P] .....          |       | 3.43  |
| + Very low (K<60)  |       |       |

LAGHOUAT EL MAKR (ALGERIA)

Latitude: 33°46'N Longitude: 2°56'E Altitude: 765 m

BIOCLIMATIC INDICES II

Bioclimatic classification of Gaussen & Bagnouls (1957)  
 + Climate .....

- + Climate .....
- + Region .....
- + Thermic type: 3. Macro-mesothermic

| Thornthwaite (1948)                     |      |      |      |      |      |                              |       |       |       |      |      |        |
|---|------|------|------|------|------|------------------------------|-------|-------|-------|------|------|--------|
|   | Jan. | Feb. | Mar. | Apr. | May. | Jun.                         | Jul.  | Aug.  | Sep.  | Oct. | Nov. | Dec.   |
| P-E ratio                               | 0.06 | 0.05 | 0.06 | 0.06 | 0.05 | 0.03                         | 0.01  | 0.02  | 0.08  | 0.08 | 0.05 | 0.09   |
| T-E ratio                               | 3.38 | 4.50 | 5.88 | 7.38 | 9.25 | 11.75                        | 13.38 | 13.13 | 11.00 | 8.25 | 5.50 | 3.87   |
| Precipitation-effectiveness: 6.35       |      |      |      |      |      | Temperature-efficiency ..... |       |       |       |      |      | 97.27  |
| Moisture Index [MI=100*(P-PE)/PE] ..... |      |      |      |      |      |                              |       |       |       |      |      | -82.63 |
| + E.Dry (-110<MI<-66.7)                 |      |      |      |      |      |                              |       |       |       |      |      |        |
| Index of dryness [DI=100*d/PE] .....    |      |      |      |      |      |                              |       |       |       |      |      | 82.63  |
| + Strong deficit (33.3<DI)              |      |      |      |      |      |                              |       |       |       |      |      |        |
| Index of humidity [HI=100*s/PE] .....   |      |      |      |      |      |                              |       |       |       |      |      | 0.00   |
| + No surplus (0<HI<10)                  |      |      |      |      |      |                              |       |       |       |      |      |        |
| Potential Evapotranspiration PE .....   |      |      |      |      |      |                              |       |       |       |      |      | 973.52 |
| + Third mesothermic (855<PE<997)        |      |      |      |      |      |                              |       |       |       |      |      |        |

