



AGROMETEOROLOGICAL BULLETIN

July 2013
2nd 10-day period

- Temperature
- Relative Humidity
- Soil Temperature
- Sunshine Duration
- Precipitation
- Evaporation
- Growing Degrees
- Reference Evapotranspiration
- Accumulated Rainfall from the beginning of wet period
- Accumulated Reference Evapotranspiration
- Number of dry days



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Division of Climatology-Applications
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Helliniko, Athens

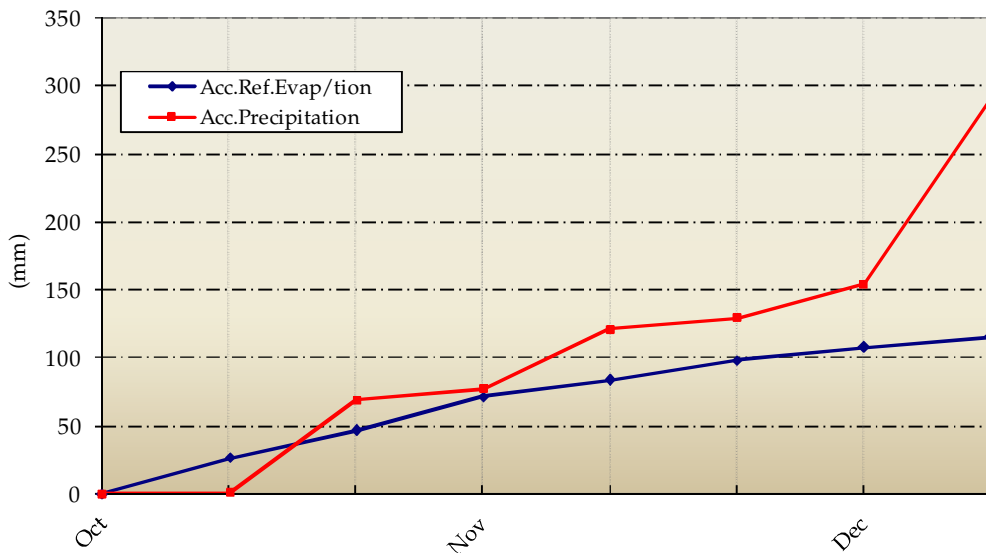
Web addresses of HNMS
www.hnms.gr
www.emy.gov.gr
www.meteo.gov.gr
www.meteohellas.gr

Agrinio

2nd 10-day period (11-20/07/2013)		11	12	13	14	15	16	17	18	19	20	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	32.4	32.6	34.2	33.6	34.0	34.6	32.0	33.0	33.0	33.6	33.3	37.7	33.3
	Min	17.8	18.8	18.4	19.4	19.5	19.0	18.0	16.0	16.0	17.4	18.0	20.2	17.4
Relative Humidity	Max	84	82	87	73	80	84	83	80	80	78	81	62	-
	Min	39	45	32	35	27	29	36	34	34	32	34	26	-
Soil Temperature at 10 cm	06 UTC	28.0	28.0	28.6	29.6	30.0	30.0	28.0	26.0	26.0	28.6	28.3	33.1	27.6
	12 UTC	31.8	33.2	32.2	34.0	36.0	34.0	28.0	33.0	30.0	32.4	32.5	38.2	33.5
Sunshine Duration		13.2	13.2	13.5	13.2	13.1	8.8	9.4	12.6	12.2	11.1	12.0	13.2	11.8
Precipitation							7.4	0.9			0.7	9.0		3.6
Evaporation		8.5	9.0	9.0	10.0	9.2	3.4	5.6	6.0	10.8	7.5	79.0	112.1	85.2
Growing Degrees	5	20.1	20.7	21.3	21.5	21.8	21.8	20.0	19.5	19.5	20.5	206.7	239.5	203.8
	10	15.1	15.7	16.3	16.5	16.8	16.8	15.0	14.5	14.5	15.5	156.7	189.5	153.8

2nd 10-day period (11-20/07/2013)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	56.4	66.4	56.6
Precipitation - Reference Evapotranspiration	-47.4	-66.4	-53.0
Number of Rainy Days	3.0	0.0	0.7
Number of Dry Days	5.0	51.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

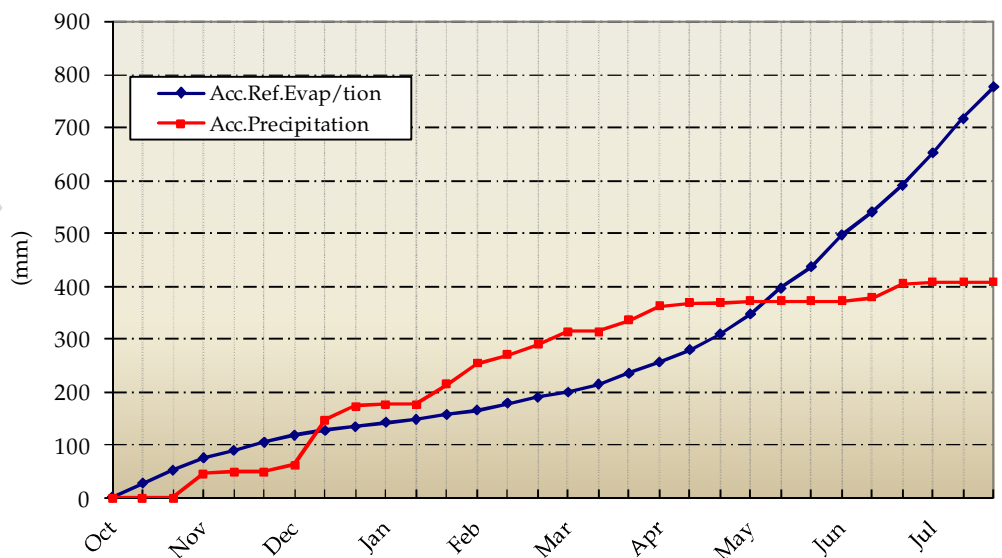


This station is not fully operated

2nd 10-day period (11-20/07/2013)		11	12	13	14	15	16	17	18	19	20	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	33.0	30.8	31.4	30.4	30.4	30.4	29.8	30.2	31.4	32.6	31.0	35.0	30.5
	Min	19.6	22.0	22.6	19.6	19.4	19.4	20.8	18.8	20.0	17.4	20.0	22.4	17.5
Relative Humidity	Max	73	68	68	60	65	77	74	76	73	67	70	68	-
	Min	26	38	35	33	36	39	33	28	28	24	32	28	-
Soil Temperature at 10 cm	06 UTC	27.4	27.8	28.4	27.8	27.6	27.4	26.4	26.4	26.4	26.4	27.2	30.2	24.2
	12 UTC	31.0	31.8	31.4	31.8	30.4	30.6	29.6	30.0	29.4	30.4	30.6	33.2	28.8
Sunshine Duration		13.4	10.8	12.5	13.1	12.2	8.0	12.9	13.3	12.5	13.4	12.2	12.3	11.2
Precipitation							0.0					0.0		5.1
Evaporation		6.4	11.1	8.8	7.7	8.1	9.9	7.5	12.5	7.3	13.9	93.2	110.7	98.7
Growing Degrees	5	21.3	21.4	22.0	20.0	19.9	19.9	20.3	19.5	20.7	20.0	205.0	236.9	190.1
	10	16.3	16.4	17.0	15.0	14.9	14.9	15.3	14.5	15.7	15.0	155.0	186.9	140.1

2nd 10-day period (11-20/07/2013)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	60.3	68.2	60.3
Precipitation - Reference Evapotranspiration	-60.3	-68.2	-55.2
Number of Rainy Days	0.0	0.0	0.9
Number of Dry Days	19.0	44.0	-

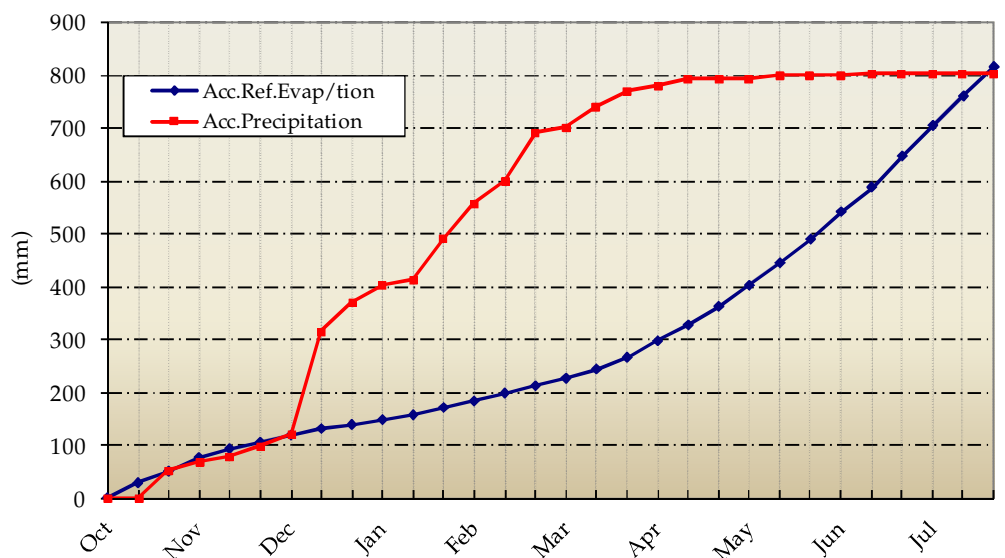
Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



2nd 10-day period (11-20/07/2013)		11	12	13	14	15	16	17	18	19	20	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	28.5	29.1	29.4	29.2	29.2	29.4	30.9	29.8	29.8	29.6	29.5	34.2	30.4
	Min	19.8	18.4	19.4	19.2	19.6	18.9	19.0	16.8	16.7	17.3	18.5	20.7	18.1
Relative Humidity	Max	88	88	89	88	86	87	84	88	83	86	87	84	-
	Min	50	51	49	53	48	47	32	36	32	38	44	33	-
Soil Temperature at 10 cm	06 UTC	28.4	28.2	28.4	28.4	28.6	28.6	28.2	27.8	27.2	27.4	28.1	29.8	27.1
	12 UTC	35.2	34.8	35.4	36.0	36.0	34.6	34.2	33.4	33.2	33.4	34.6	37.5	31.8
Sunshine Duration		13.2	12.9	12.8	12.6	12.7	12.6	10.9	13.0	13.1	12.4	12.6	12.2	12.3
Precipitation														0.8
Evaporation		6.3	7.6	7.8	7.4	7.6	9.0	10.8	10.6	9.1	7.5	83.7	92.9	77.4
Growing Degrees	5	19.2	18.8	19.4	19.2	19.4	19.2	20.0	18.3	18.3	18.5	190.0	224.7	192.4
	10	14.2	13.8	14.4	14.2	14.4	14.2	15.0	13.3	13.3	13.5	140.0	174.7	142.4

2nd 10-day period (11-20/07/2013)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	55.6	59.8	55.3
Precipitation - Reference Evapotranspiration	-55.6	-59.8	-54.5
Number of Rainy Days	0.0	0.0	0.1
Number of Dry Days	40.0	52.0	-

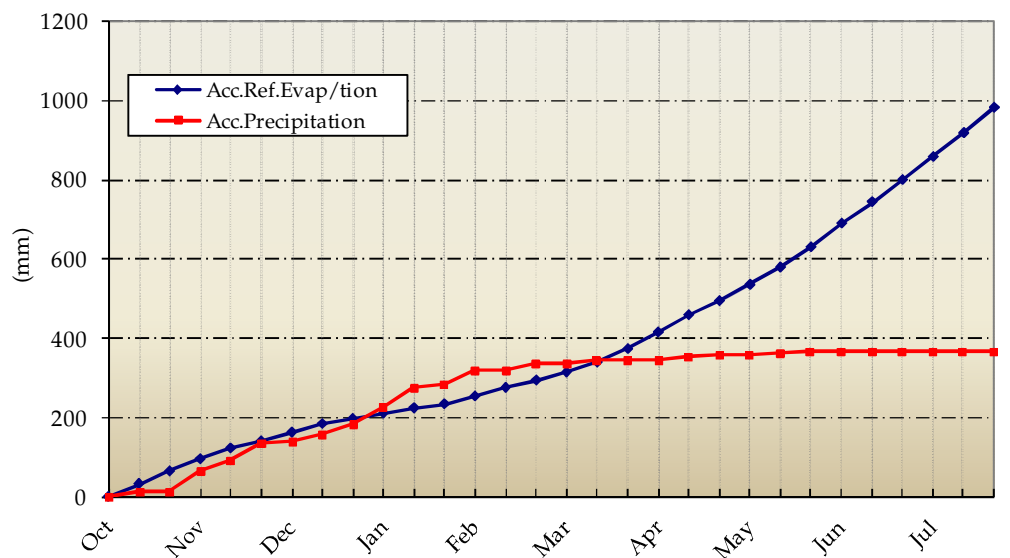
Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



2nd 10-day period (11-20/07/2013)		11	12	13	14	15	16	17	18	19	20	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	30.0	30.0	29.4	30.2	29.6	29.6	27.8	26.8	26.8	28.6	28.9	-	28.5
	Min	23.0	21.4	22.0	25.0	24.4	24.4	24.4	23.8	23.6	21.6	23.4	-	22.1
Relative Humidity	Max	79	76	86	70	74	73	74	79	72	70	75	-	-
	Min	48	56	53	50	50	51	58	65	62	53	55	-	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-
Sunshine Duration		12.8	12.7	12.8	12.8	12.7	12.7	12.4	10.4	12.1	12.4	12.4	-	12.1
Precipitation													-	0.0
Evaporation		8.8	7.0	6.3	10.2	7.7	7.5	7.5	8.3	6.7	8.4	78.4	-	93.8
Growing Degrees	5	21.5	20.7	20.7	22.6	22.0	22.0	21.1	20.3	20.2	20.1	211.2	-	203.0
	10	16.5	15.7	15.7	17.6	17.0	17.0	16.1	15.3	15.2	15.1	161.2	-	153.0

2nd 10-day period (11-20/07/2013)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	64.0	-	-
Precipitation - Reference Evapotranspiration	-64.0	-	0.0
Number of Rainy Days	0.0	-	0.0
Number of Dry Days	63.0	-	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

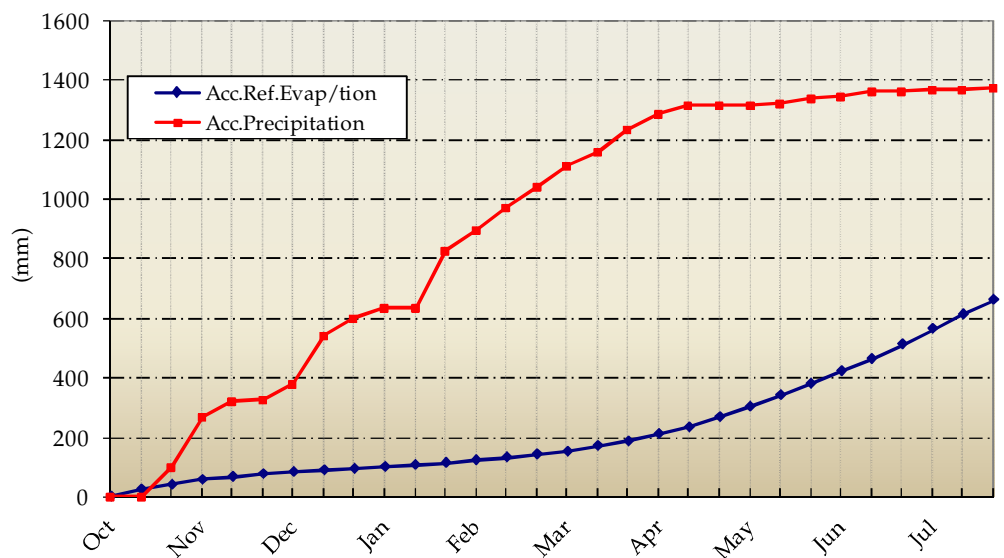


Ioannina

2nd 10-day period (11-20/07/2013)		11	12	13	14	15	16	17	18	19	20	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	31.9	31.8	32.7	32.8	31.9	28.8	27.9	30.2	30.9	30.1	30.9	36.0	31.4
	Min	12.4	13.5	14.8	14.8	15.4	15.6	13.0	13.0	13.6	15.5	14.2	17.8	15.3
Relative Humidity	Max	88	72	91	70	89	92	92	60	90	94	84	66	-
	Min	27	28	20	29	24	32	25	26	22	31	26	23	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	23.4
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	27.8
Sunshine Duration		12.7	11.6	11.6	12.2	8.9	10.5	10.5	9.2	9.7	4.2	10.1	11.8	10.3
Precipitation				0.0		0.3	0.2				3.9	4.4		13.3
Evaporation		-	-	-	-	-	-	-	-	-	-	-	-	83.3
Growing Degrees	5	17.2	17.7	18.8	18.8	18.7	17.2	15.5	16.6	17.3	17.8	175.3	-	178.2
	10	12.2	12.7	13.8	13.8	13.7	12.2	10.5	11.6	12.3	12.8	125.3	-	129.5

2nd 10-day period (11-20/07/2013)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	49.2	59.7	50.5
Precipitation - Reference Evapotranspiration	-44.8	-59.7	-37.2
Number of Rainy Days	3.0	0.0	1.6
Number of Dry Days	5.0	45.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

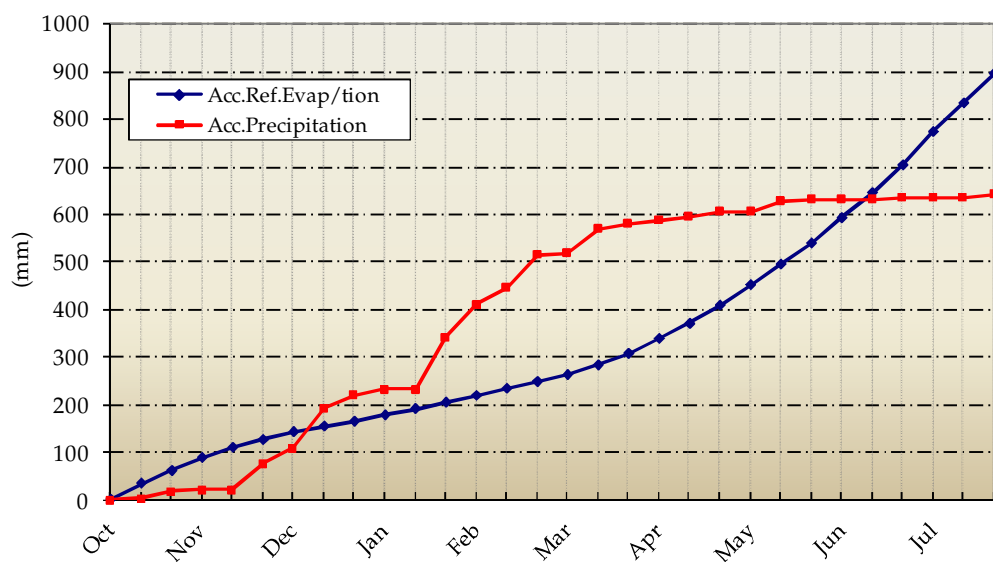


Kalamata

2nd 10-day period (11-20/07/2013)		11	12	13	14	15	16	17	18	19	20	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	33.0	33.0	31.2	32.1	31.2	30.2	29.8	33.2	30.6	32.2	31.6	34.9	31.2
	Min	21.2	19.2	19.9	20.2	19.0	17.2	17.6	16.4	18.6	17.2	18.6	20.2	17.8
Relative Humidity	Max	82	82	84	82	89	87	90	84	85	83	85	80	-
	Min	27	32	34	37	36	37	40	23	27	28	32	29	-
Soil Temperature at 10 cm	06 UTC	25.4	25.6	26.0	26.0	26.0	25.6	25.4	23.8	22.8	24.2	25.1	27.6	25.6
	12 UTC	28.8	28.6	29.0	29.0	28.8	28.6	27.6	27.6	27.4	27.6	28.3	29.9	30.0
Sunshine Duration		12.7	12.8	12.5	12.6	12.2	9.2	8.4	12.4	12.5	11.0	11.6	12.1	11.5
Precipitation								8.0				8.0		3.4
Evaporation		10.6	11.2	13.2	11.6	12.0	8.0	1.8	4.4	15.6	4.8	93.2	-	87.7
Growing Degrees	5	22.1	21.1	20.6	21.2	20.1	18.7	18.7	19.8	19.6	19.7	201.5	225.7	195.0
	10	17.1	16.1	15.6	16.2	15.1	13.7	13.7	14.8	14.6	14.7	151.5	175.7	145.0

2nd 10-day period (11-20/07/2013)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	62.2	67.9	57.1
Precipitation - Reference Evapotranspiration	-54.2	-67.9	-53.7
Number of Rainy Days	1.0	0.0	0.4
Number of Dry Days	32.0	57.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

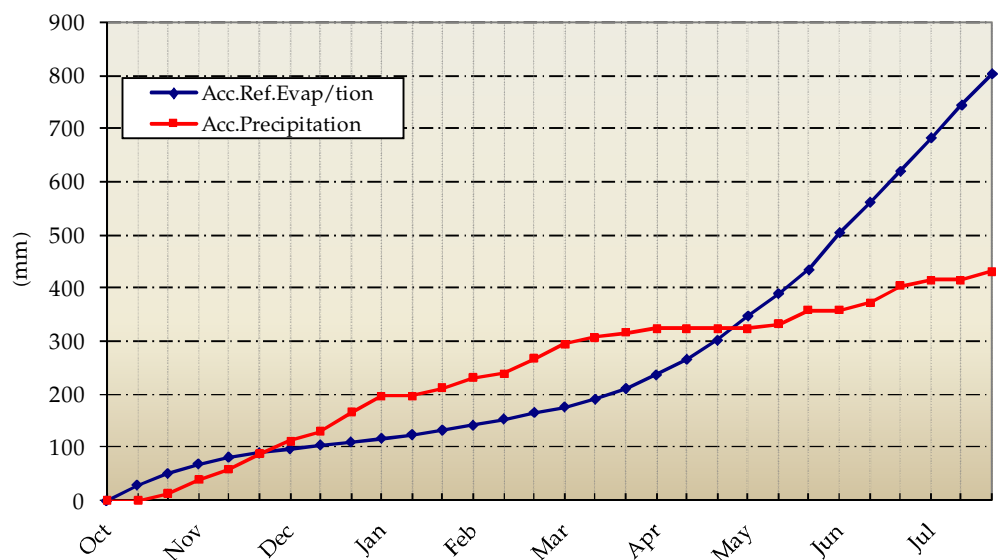


Larisa

2nd 10-day period (11-20/07/2013)		11	12	13	14	15	16	17	18	19	20	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	34.2	34.2	33.0	33.6	33.2	32.4	29.0	31.6	31.6	32.6	32.5	37.0	33.3
	Min	17.0	19.0	16.6	19.4	24.6	20.3	17.0	17.6	19.0	17.4	18.8	21.7	17.9
Relative Humidity	Max	79	92	99	75	58	70	100	93	79	84	83	64	-
	Min	24	28	27	19	19	20	34	22	22	23	24	19	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	29.1	26.6
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	31.3	29.2
Sunshine Duration		12.4	9.5	12.4	12.5	9.6	11.3	7.8	12.6	10.9	10.8	11.0	12.4	11.0
Precipitation			1.6	0.0				15.9				17.5		9.9
Evaporation		10.7	7.2	11.6	10.0	12.1	10.4	6.8	9.3	10.0	9.4	97.5	124.7	96.3
Growing Degrees	5	20.6	21.6	19.8	21.5	23.9	21.4	18.0	19.6	20.3	20.0	206.7	243.6	205.9
	10	15.6	16.6	14.8	16.5	18.9	16.4	13.0	14.6	15.3	15.0	156.7	193.6	155.9

2nd 10-day period (11-20/07/2013)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	58.8	73.1	62.2
Precipitation - Reference Evapotranspiration	-41.3	-73.1	-52.3
Number of Rainy Days	2.0	0.0	1.2
Number of Dry Days	12.0	25.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

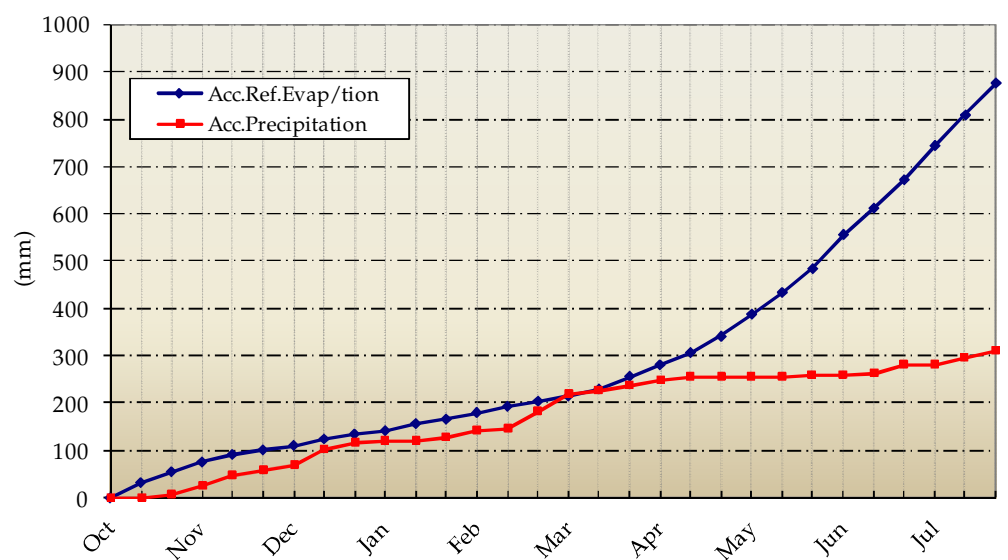


Mikra

2nd 10-day period (11-20/07/2013)		11	12	13	14	15	16	17	18	19	20	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	32.0	32.0	32.0	31.8	31.2	31.0	28.6	30.8	30.8	32.0	31.2	35.3	31.7
	Min	19.0	22.8	21.0	24.1	24.8	19.5	17.1	20.4	20.0	19.3	20.8	23.0	18.9
Relative Humidity	Max	80	78	53	43	66	70	90	65	73	74	69	63	-
	Min	29	38	29	27	25	30	35	24	27	26	29	26	-
Soil Temperature at 10 cm	06 UTC	28.4	28.6	28.2	28.4	29.0	28.8	27.0	26.4	27.0	27.4	27.9	31.1	26.6
	12 UTC	33.6	33.8	33.4	33.4	34.6	35.0	30.4	32.2	37.4	33.6	33.7	35.0	31.5
Sunshine Duration		12.5	9.8	12.8	13.2	13.1	9.6	9.8	11.9	11.8	11.6	11.6	12.1	10.8
Precipitation								13.9				13.9		4.3
Evaporation		10.4	13.4	12.3	12.8	9.5	11.5	9.0	8.4	1.8	9.6	98.7	127.7	94.9
Growing Degrees	5	20.5	22.4	21.5	23.0	23.0	20.3	17.9	20.6	20.4	20.7	210.1	241.6	203.4
	10	15.5	17.4	16.5	18.0	18.0	15.3	12.9	15.6	15.4	15.7	160.1	191.6	153.4

2nd 10-day period (11-20/07/2013)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	67.2	77.8	60.5
Precipitation - Reference Evapotranspiration	-53.3	-77.8	-56.2
Number of Rainy Days	1.0	0.0	1.4
Number of Dry Days	7.0	25.0	-

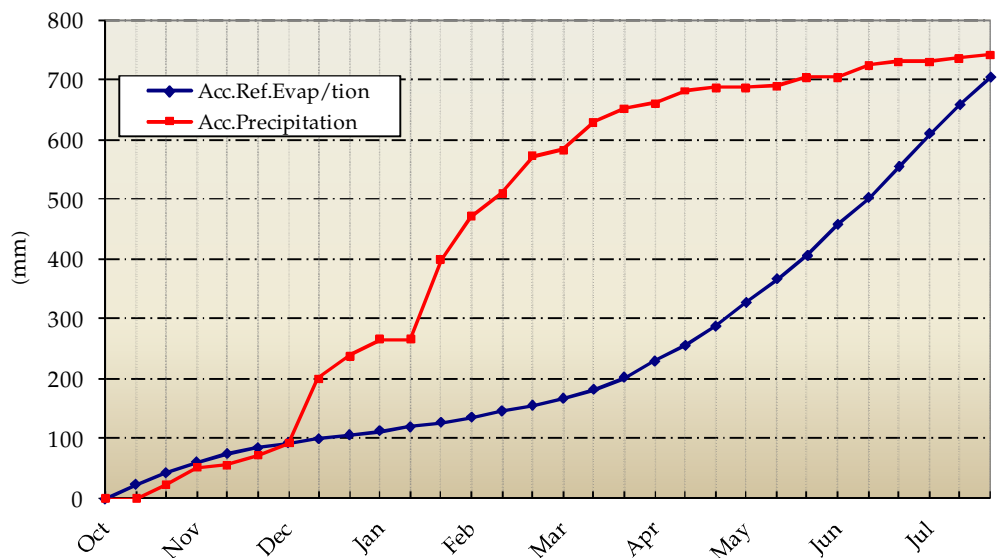
Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



2nd 10-day period (11-20/07/2013)		11	12	13	14	15	16	17	18	19	20	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	30.5	32.5	29.6	30.6	30.0	28.6	26.7	28.8	28.0	31.4	29.7	36.7	30.6
	Min	13.5	13.3	15.0	15.9	14.0	13.1	13.0	16.7	13.5	11.4	13.9	16.1	14.1
Relative Humidity	Max	96	96	83	96	81	92	93	61	72	43	81	70	-
	Min	26	26	30	28	28	30	37	25	23	22	28	16	-
Soil Temperature at 10 cm	06 UTC	22.4	23.6	24.8	23.0	24.0	22.0	21.4	22.0	23.2	23.4	23.0	28.6	25.3
	12 UTC	30.2	32.4	30.0	30.6	30.2	27.6	27.2	28.2	30.4	30.4	29.7	34.8	28.3
Sunshine Duration		7.9	8.8	7.1	8.6	7.0	4.9	8.1	12.3	12.0	10.2	8.7	13.0	10.5
Precipitation		0.0		1.3		3.5						4.8		9.1
Evaporation		4.7	4.7	1.4	6.7	3.8	2.9	6.4	8.1	8.9	6.2	53.8	-	63.7
Growing Degrees	5	17.0	17.9	17.3	18.3	17.0	15.9	14.9	17.8	15.8	16.4	168.1	214.1	173.2
	10	12.0	12.9	12.3	13.3	12.0	10.9	9.9	12.8	10.8	11.4	118.1	164.1	123.2

2nd 10-day period (11-20/07/2013)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	46.2	67.2	53.3
Precipitation - Reference Evapotranspiration	-41.4	-67.2	-44.2
Number of Rainy Days	2.0	0.0	1.4
Number of Dry Days	2.0	10.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration





◆ **List of Symbols and Abbreviations**

Reference Evapotranspiration ETo (mm):

Calculated by the FAO Penman-Montieth equation

$$ET_0 = \frac{0.408 * \Delta * (R_n - G) + \gamma * \frac{900}{T + 273} * u_2 * (e_s - e_a)}{\Delta + \gamma * (1 + 0.34 * u_2)}$$

using 10-day step.

R_n is estimated from sunshine measurements and G assumed to be zero.

Growing Degrees: Degrees with mean temperature exceeding the base of 5 or 10 °C.

Number of Rainy Days: Number of days with precipitation of at least 0.1 mm.

Number of Dry Days: Number of dry days recorded since the last rainy day.

Measurements Units

- ◆ Temperature : °C
- ◆ Relative Humidity : %
- ◆ Soil Temperature : °C
- ◆ Sunshine Duration : Hours
- ◆ Precipitation : mm
- ◆ Evaporation (Pan) : mm
- ◆ Growing Degrees : °C

UTC (Universal Time coordinates) in Greece

- ◆ Winter : Time(UTC) = Local time - 2
- ◆ Summer : Time(UTC) = Local time - 3

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