



AGROMETEOROLOGICAL BULLETIN

December 2009
3rd 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



Hellenic National Meteorological Service
Division of Climatology-Applications
El. Venizelou Street 14, 16777
Helliniko, Athens

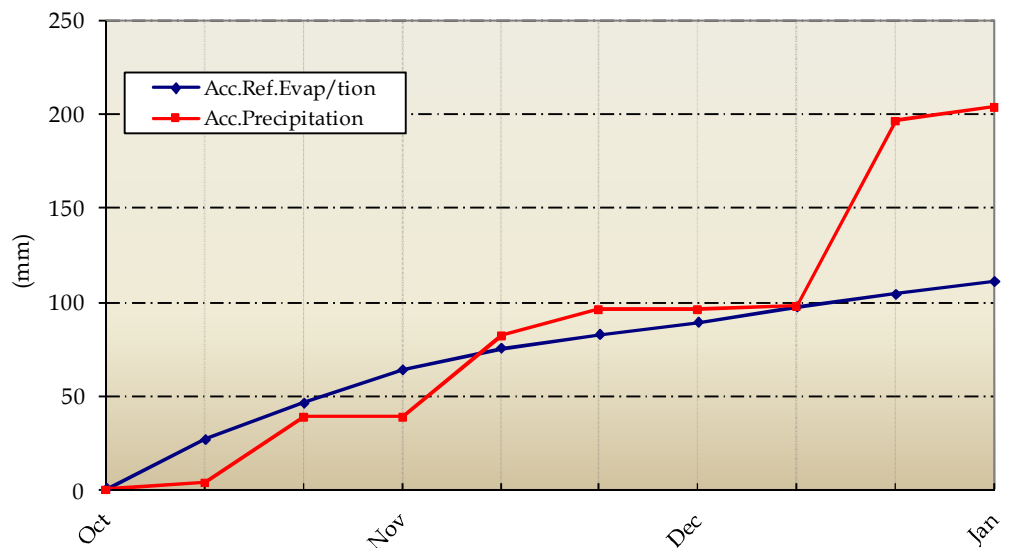
Web addresses of HNMS
www.hnms.gr
www.emy.gov.gr
www.meteo.gov.gr
www.meteohellas.gr

Alexandroupoli

3rd 10-day period (21-31/12/2009)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	6.6	10.4	15.4	16.4	16.4	18.4	17.2	17.2	13.0	14.2	16.8	14.7	-	9.8
	Min	1.2	-0.8	4.8	11.0	14.0	14.6	13.6	7.8	3.6	3.0	9.4	7.5	-	2.4
Relative Humidity	Max	93	94	97	98	93	96	100	98	94	97	95	96	-	-
	Min	59	74	75	81	79	79	82	79	50	73	82	74	-	-
Soil Temperature at 10 cm	06 UTC	7.2	5.2	6.6	8.8	11.0	12.4	13.0	13.8	9.6	8.6	10.6	9.7	-	6.0
	12 UTC	7.6	6.4	7.8	10.4	12.0	13.4	13.4	13.8	11.0	10.2	11.4	10.7	-	7.2
Sunshine Duration		5.3	0.1	0.2	1.0	0.0	7.4	0.0	0.0	7.3	4.6	0.0	2.4	-	2.6
Precipitation		2.7				0.1		2.8	1.5				7.1	-	24.7
Evaporation		0.0	0.0	4.0	0.4	0.8	0.4	2.6	2.3	1.1	1.4	0.4	13.4	-	12.0
Growing Degrees	5	0.0	0.0	5.1	8.7	10.2	11.5	10.4	7.5	3.3	3.6	8.1	68.4	-	24.9
	10	0.0	0.0	0.1	3.7	5.2	6.5	5.4	2.5	0.0	0.0	3.1	26.5	-	4.2

3rd 10-day period (21-31/12/2009)	Previous Year Value	Past Years Mean Value	
Reference Evapotranspiration	6.9	-	8.4
Precipitation - Reference Evapotranspiration	0.2	-	16.3
Number of Rainy Days	4.0	-	2.9
Number of Dry Days	0.0	-	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

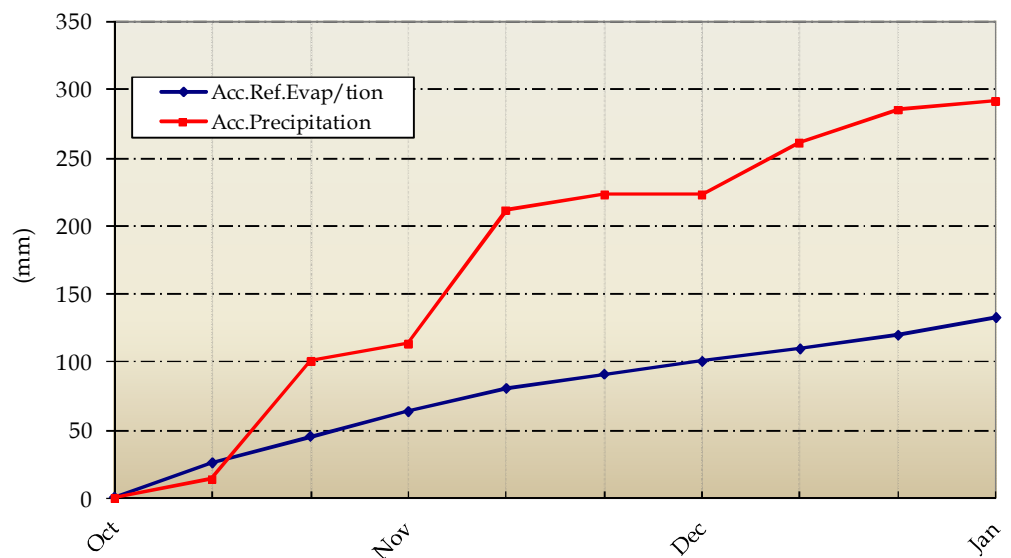


Andravida

3rd 10-day period (21-31/12/2009)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	12.0	14.2	18.4	19.6	19.6	20.8	20.0	17.0	16.0	16.4	20.0	17.6	-	14.4
	Min	7.6	3.8	11.6	13.8	15.4	14.6	14.8	12.6	8.8	10.4	9.6	11.2	-	6.0
Relative Humidity	Max	93	91	89	89	88	98	96	96	95	97	98	94	-	-
	Min	47	59	71	67	59	67	66	42	72	77	66	63	-	-
Soil Temperature at 10 cm	06 UTC	11.8	10.0	12.0	13.6	14.2	14.8	15.8	15.2	12.6	13.4	13.2	13.3	-	9.0
	12 UTC	12.2	11.6	13.4	15.0	15.4	16.4	16.0	15.8	13.6	14.2	15.0	14.4	-	10.5
Sunshine Duration		5.5	0.8	2.0	4.1	1.7	6.5	1.0	5.6	0.0	0.0	7.7	3.2	-	4.0
Precipitation		0.0						0.4	6.5				6.9	-	44.5
Evaporation		0.4	1.5	2.4	1.0	1.8	0.8	2.6	2.4	1.1	1.0	1.3	16.3	-	21.9
Growing Degrees	5	4.8	4.0	10.0	11.7	12.5	12.7	12.4	9.8	7.4	8.4	9.8	103.5	-	57.7
	10	0.0	0.0	5.0	6.7	7.5	7.7	7.4	4.8	2.4	3.4	4.8	49.7	-	13.8

3rd 10-day period (21-31/12/2009)	Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	13.1	- 9.5
Precipitation - Reference Evapotranspiration	-6.2	- 35.0
Number of Rainy Days	2.0	- 4.8
Number of Dry Days	6.0	- -

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

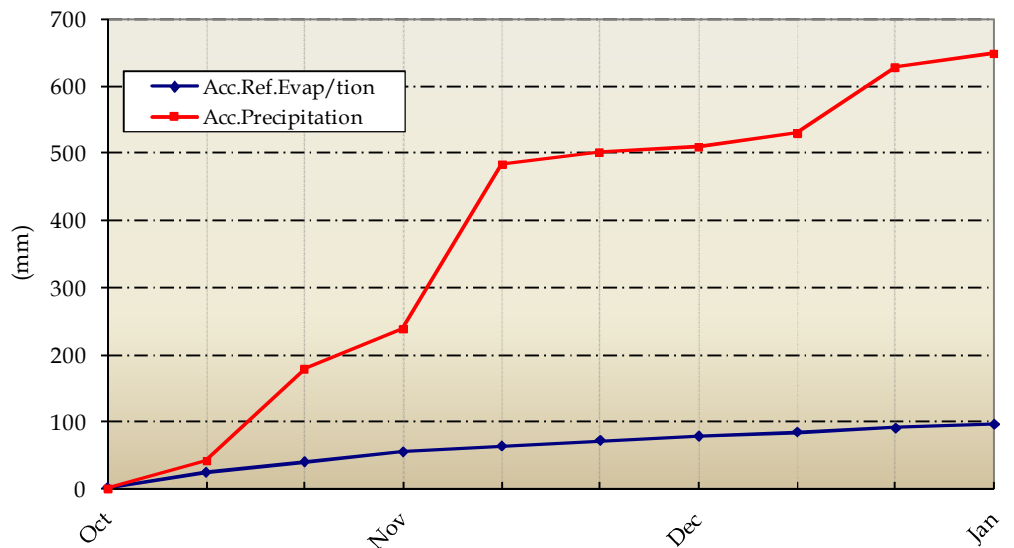


Arta

3rd 10-day period (21-31/12/2009)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	13.0	9.8	16.0	21.0	19.8	22.0	19.0	17.2	14.6	13.2	20.6	16.9	-	13.9
	Min	1.4	2.0	8.8	12.4	13.4	11.4	14.0	9.2	6.4	9.6	9.0	8.9	-	4.3
Relative Humidity	Max	97	95	95	95	95	95	98	84	98	97	98	95	-	-
	Min	33	76	80	63	67	65	63	50	68	84	50	64	-	-
Soil Temperature at 10 cm	06 UTC	9.0	8.2	9.2	10.6	11.8	12.6	13.4	13.8	12.0	11.6	12.0	11.3	-	7.6
	12 UTC	9.0	8.4	10.0	11.6	12.4	13.2	14.0	13.6	12.4	12.0	12.6	11.7	-	8.8
Sunshine Duration		7.9	0.0	0.2	4.4	0.4	2.5	0.4	5.8	0.0	0.0	6.7	2.6	-	3.7
Precipitation						1.3		17.9	0.2	0.2		0.3	19.9	-	65.2
Evaporation		1.2	1.2	0.2	0.6	1.4	0.3	0.8	1.9	0.5	0.7	1.4	10.2	-	-
Growing Degrees	5	2.2	0.9	7.4	11.7	11.6	11.7	11.5	8.2	5.5	6.4	9.8	86.9	-	45.7
	10	0.0	0.0	2.4	6.7	6.6	6.7	6.5	3.2	0.5	1.4	4.8	38.8	-	7.8

3rd 10-day period (21-31/12/2009)	Previous Year Value	Past Years Mean Value	
Reference Evapotranspiration	6.4	-	7.2
Precipitation - Reference Evapotranspiration	13.5	-	58.0
Number of Rainy Days	5.0	-	4.7
Number of Dry Days	4.0	-	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

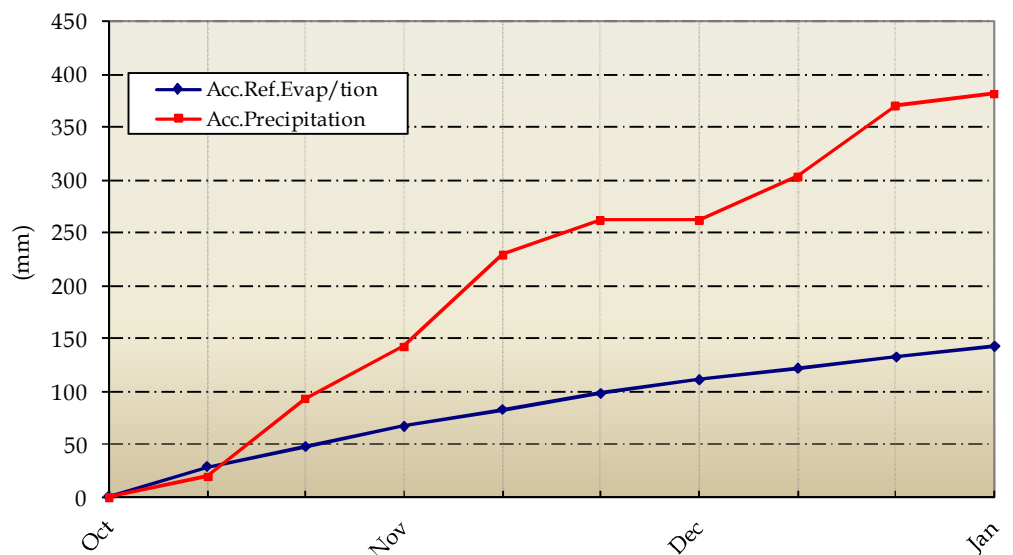


Kalamata

3rd 10-day period (21-31/12/2009)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	13.4	16.0	17.8	19.0	19.0	20.6	19.2	17.4	17.0	17.4	19.0	17.8	-	15.2
	Min	5.0	2.2	7.0	13.6	11.8	11.0	12.6	11.0	6.0	8.6	6.8	8.7	-	6.1
Relative Humidity	Max	93	94	97	95	98	98	100	98	95	97	100	97	-	-
	Min	45	55	74	78	75	73	78	55	67	70	74	68	-	-
Soil Temperature at 10 cm	06 UTC	12.6	11.0	11.6	11.6	13.6	14.0	14.6	15.0	12.8	13.0	12.4	12.9	-	10.0
	12 UTC	12.6	11.2	-	14.0	14.4	15.0	15.0	15.0	13.0	13.6	13.2	13.7	-	10.9
Sunshine Duration		7.9	4.6	1.4	3.6	4.7	6.5	0.0	4.2	2.8	2.8	7.9	4.2	-	3.9
Precipitation		0.3						0.1	11.2				11.6	-	41.5
Evaporation		2.6	0.6	1.8	1.0	1.6	1.4	1.1	2.4	1.1	1.3	0.6	15.5	-	22.7
Growing Degrees	5	4.2	4.1	7.4	11.3	10.4	10.8	10.9	9.2	6.5	8.0	7.9	90.7	-	62.1
	10	0.0	0.0	2.4	6.3	5.4	5.8	5.9	4.2	1.5	3.0	2.9	37.4	-	14.5

3rd 10-day period (21-31/12/2009)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	10.3	-	11.8
Precipitation - Reference Evapotranspiration	1.3	-	29.7
Number of Rainy Days	3.0	-	4.8
Number of Dry Days	0.0	-	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

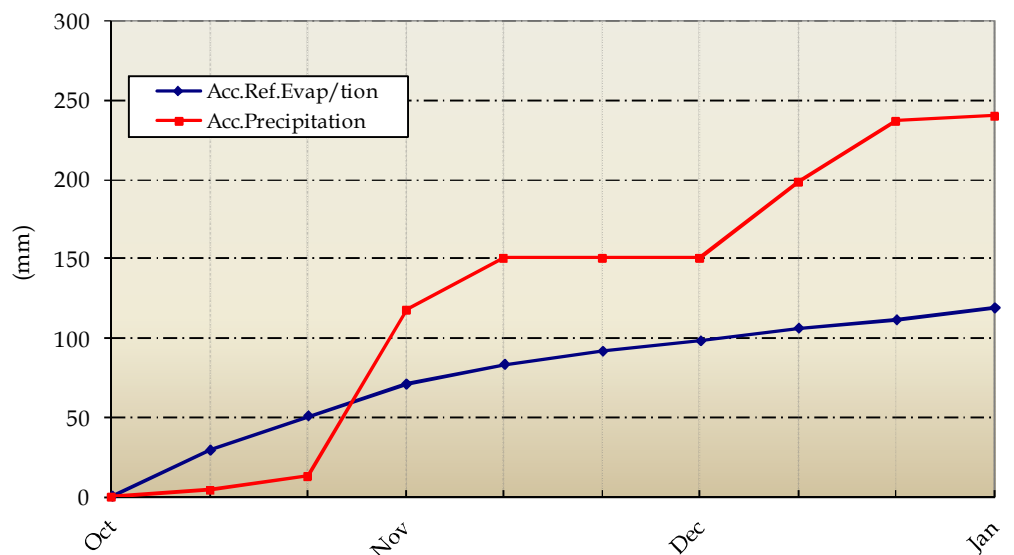


Larisa

3rd 10-day period (21-31/12/2009)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	10.8	8.8	14.8	16.6	16.8	21.0	20.6	16.8	15.6	13.6	17.6	15.7	-	10.0
	Min	0.8	2.2	5.0	5.8	9.6	8.8	10.8	10.4	5.0	2.8	2.6	5.8	-	1.1
Relative Humidity	Max	89	97	97	97	97	98	98	95	94	97	97	96	-	-
	Min	46	73	66	71	75	60	53	36	43	64	62	59	-	-
Soil Temperature at 10 cm	06 UTC	7.0	7.0	7.6	8.4	9.6	10.4	11.4	12.0	10.0	9.2	8.6	9.2	-	5.7
	12 UTC	9.2	7.6	8.4	10.4	10.6	11.2	12.2	12.4	10.8	9.8	9.4	10.2	-	6.1
Sunshine Duration		7.6	0.0	4.6	0.3	0.4	5.1	5.5	7.5	5.5	3.2	7.2	4.3	-	3.0
Precipitation							0.4	3.2					3.6	-	14.0
Evaporation		0.0	1.0	0.6	0.3	0.4	0.3	1.4	3.8	1.5	0.5	1.8	11.6	-	7.2
Growing Degrees	5	0.8	0.5	4.9	6.2	8.2	9.9	10.7	8.6	5.3	3.2	5.1	63.4	-	18.9
	10	0.0	0.0	0.0	1.2	3.2	4.9	5.7	3.6	0.3	0.0	0.1	19.0	-	2.2

3rd 10-day period (21-31/12/2009)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	7.6	-	6.4
Precipitation - Reference Evapotranspiration	-4.0	-	7.6
Number of Rainy Days	2.0	-	3.0
Number of Dry Days	5.0	-	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

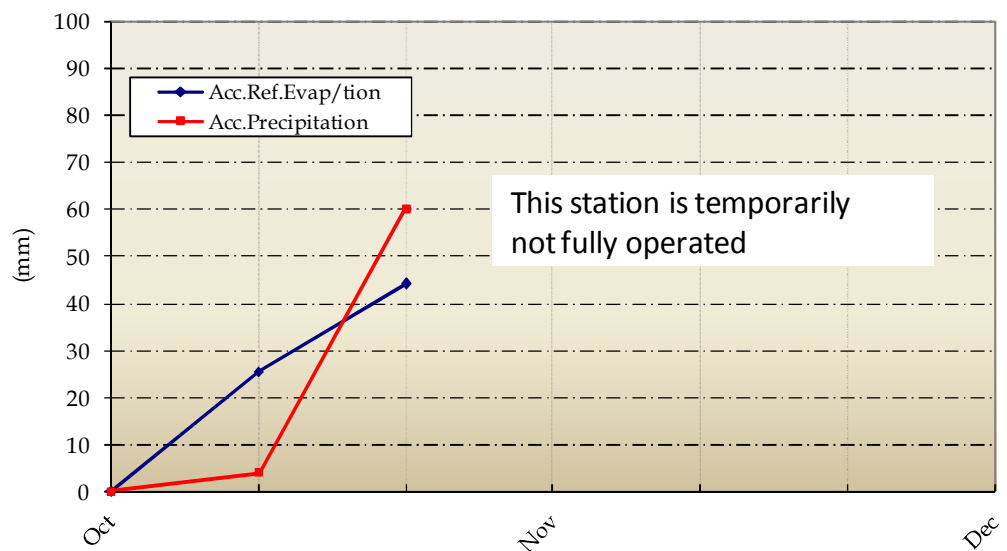


Pyrgela

3rd 10-day period (21-31/12/2009)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	-	-	-	-	-	-	-	-	-	-	-	-	-	15.0
	Min	-	-	-	-	-	-	-	-	-	-	-	-	-	4.0
Relative Humidity	Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-	7.2
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-	10.2
Sunshine Duration		-	-	-	-	-	-	-	-	-	-	-	-	-	3.6
Precipitation		-	-	-	-	-	-	-	-	-	-	-	-	-	22.0
Evaporation		-	-	-	-	-	-	-	-	-	-	-	-	-	10.5
Growing Degrees	5	-	-	-	-	-	-	-	-	-	-	-	-	-	50.2
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	11.0

3rd 10-day period (21-31/12/2009)	Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	-	7.6
Precipitation - Reference Evapotranspiration	-	14.4
Number of Rainy Days	-	4.1
Number of Dry Days	-	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

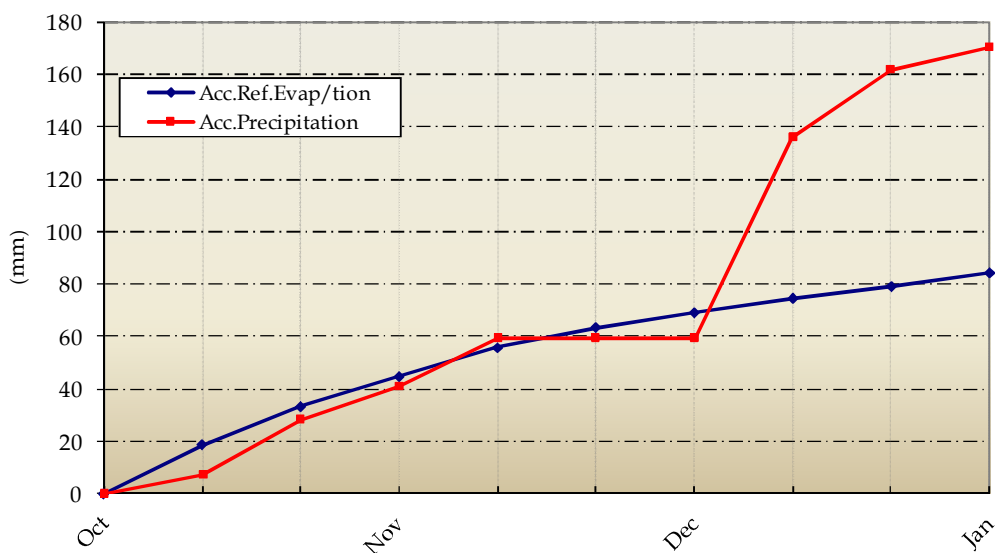


Series

3rd 10-day period (21-31/12/2009)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	7.0	5.4	7.8	10.4	10.0	10.6	19.8	14.4	13.4	9.6	13.8	11.1	-	8.5
	Min	-2.2	-1.2	1.0	2.0	5.0	8.0	9.2	9.4	3.6	1.0	3.0	3.5	-	0.3
Relative Humidity	Max	88	93	96	96	97	97	100	90	79	96	93	93	-	-
	Min	49	73	80	82	92	95	76	33	40	73	63	69	-	-
Soil Temperature at 10 cm	06 UTC	5.5	4.4	5.2	5.2	7.0	8.6	9.4	11.0	8.0	6.4	6.8	7.0	-	4.2
	12 UTC	5.4	-	6.0	6.2	-	-	10.6	10.8	10.0	9.4	10.4	8.6	-	4.9
Sunshine Duration		4.3	0.0	0.9	0.5	0.0	0.0	4.1	3.4	3.3	0.7	3.5	1.9	-	2.6
Precipitation			0.0	0.6		2.4	0.5	3.8	1.0				8.3	-	14.1
Evaporation		0.0	0.0	0.5	0.4	0.7	0.0	1.1	3.0	0.9	1.4	0.3	8.3	-	3.2
Growing Degrees	5	0.0	0.0	0.0	1.2	2.5	4.3	9.5	6.9	3.5	0.3	3.4	31.6	-	12.6
	10	0.0	0.0	0.0	0.0	0.0	0.0	4.5	1.9	0.0	0.0	0.0	6.4	-	0.8

3rd 10-day period (21-31/12/2009)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	5.2	-	4.2
Precipitation - Reference Evapotranspiration	3.1	-	9.9
Number of Rainy Days	5.0	-	2.7
Number of Dry Days	2.0	-	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

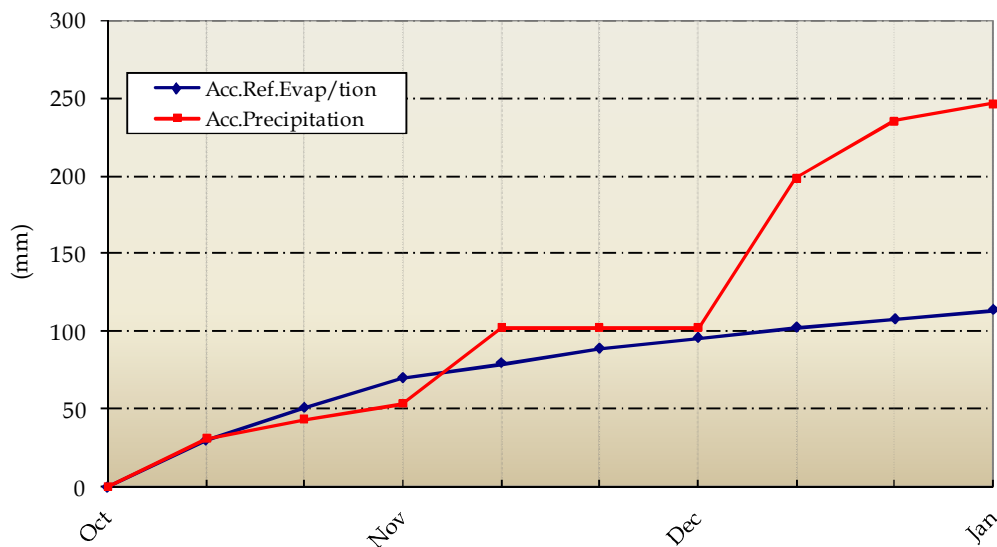


Trikala Imathias

3rd 10-day period (21-31/12/2009)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	7.2	7.2	11.8	12.4	12.4	14.4	19.0	14.4	15.0	12.2	12.6	12.6	-	9.2
	Min	-1.2	0.4	4.8	5.8	10.4	9.6	11.2	8.0	3.8	2.4	5.4	5.5	-	0.8
Relative Humidity	Max	92	92	98	98	99	100	98	86	92	95	96	95	-	-
	Min	46	65	67	88	93	95	80	48	30	58	60	66	-	-
Soil Temperature at 10 cm	06 UTC	4.8	5.0	6.0	7.6	9.4	10.0	10.4	11.2	8.2	7.8	8.2	8.1	-	5.3
	12 UTC	5.2	5.2	7.2	8.2	10.0	11.0	11.6	12.0	9.8	8.2	9.4	8.9	-	5.5
Sunshine Duration		8.0	0.0	1.5	0.0	0.0	0.3	5.5	7.5	6.8	2.0	0.0	2.9	-	3.5
Precipitation						2.6	1.5	3.3	3.7				11.1	-	19.3
Evaporation		1.0	0.6	1.1	0.1	1.8	0.2	1.7	1.8	1.6	1.6	0.8	12.3	-	5.3
Growing Degrees	5	0.0	0.0	3.3	4.1	6.4	7.0	10.1	6.2	4.4	2.3	4.0	47.8	-	17.2
	10	0.0	0.0	0.0	0.0	1.4	2.0	5.1	1.2	0.0	0.0	0.0	9.7	-	2.5

3rd 10-day period (21-31/12/2009)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	6.0	-	5.5
Precipitation - Reference Evapotranspiration	5.1	-	13.8
Number of Rainy Days	4.0	-	3.0
Number of Dry Days	4.0	-	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

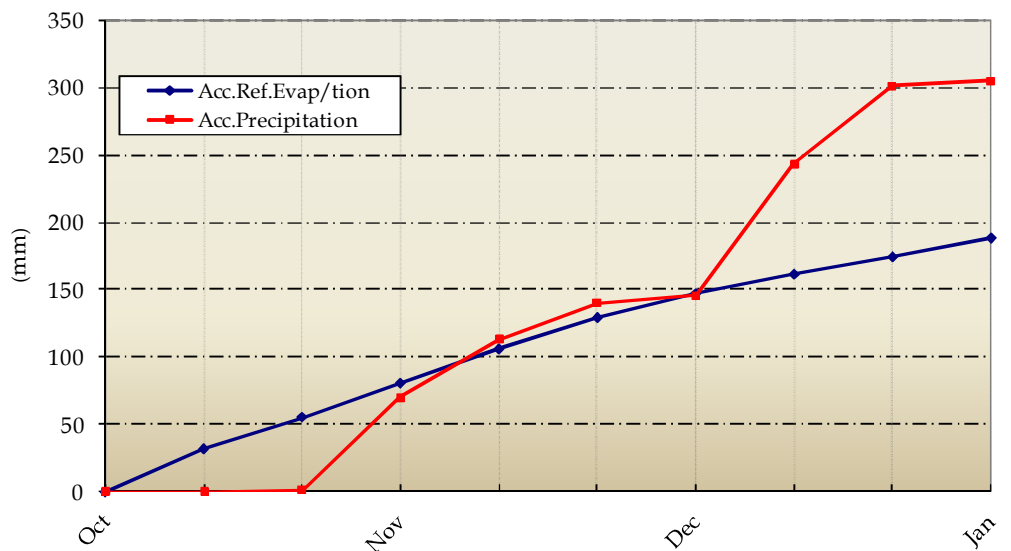


Tympaki

3rd 10-day period (21-31/12/2009)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	18.0	16.6	17.4	20.8	21.0	20.0	23.8	20.2	19.8	19.8	19.0	19.7	-	16.4
	Min	12.0	5.6	8.8	10.0	9.6	11.6	12.4	12.6	14.4	11.0	11.6	10.9	-	8.1
Relative Humidity	Max	88	97	97	99	98	99	97	97	100	100	100	97	-	-
	Min	37	39	68	62	46	74	39	46	41	52	81	53	-	-
Soil Temperature at 10 cm	06 UTC	15.4	11.2	12.4	13.2	13.0	13.8	14.6	15.0	14.0	14.2	14.6	13.8	-	11.9
	12 UTC	16.4	14.4	14.0	15.4	15.4	16.8	18.0	17.8	16.6	17.2	17.2	16.3	-	13.5
Sunshine Duration		7.7	6.3	0.0	2.2	1.4	5.4	4.1	5.0	3.7	6.9	4.9	4.3	-	4.2
Precipitation											4.0		4.0	-	31.9
Evaporation		4.6	1.9	0.5	1.5	1.0	1.0	0.6	5.4	3.0	1.6	1.1	22.2	-	30.0
Growing Degrees	5	10.0	6.1	8.1	10.4	10.3	10.8	13.1	11.4	12.1	10.4	10.3	113.0	-	79.7
	10	5.0	1.1	3.1	5.4	5.3	5.8	8.1	6.4	7.1	5.4	5.3	58.0	-	26.8

3rd 10-day period (21-31/12/2009)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	13.9	-	14.3
Precipitation - Reference Evapotranspiration	-9.9	-	17.6
Number of Rainy Days	1.0	-	4.1
Number of Dry Days	11.0	-	-

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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HELLENIC NATIONAL METEOROLOGICAL SERVICE

Division of Climatology-Applications

Issue Editors :

Charalabopoulos Christos

Filiou Anna

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