



μ μ

&

&



μμ

()

2 : μ μ



μ 2.1

5

2.2

	1	2	3	4	5
(cm)	50	82	73	64	105

μ
10%

μ

μ

■ μ μ

$$P = \frac{1}{m} \sum_{i=1}^m P_i = 74.8 \text{ cm}$$

■

μ :

$$S = \left[\sum_{i=1}^m \frac{(x_i - \bar{x})^2}{m-1} \right]^{0.5} = 20.61 \text{ cm}$$

■

C_u μ

μ :

$$C_u = \frac{100 \times 20.61}{74.8} = 27.55\%$$

■

μ

:

$$N = \left(\frac{27.55}{10} \right)^2 = 7.59 \cong 8 \text{ βροχογράφοι}$$

■

μ 2.2

15

μ μ

μ

μ

2.3.

μ

;

μ

μ
30

μ

μ

μ

μ

μ

.

2.3

 μ μ μ 15 μ .

	μ (cm)	μ 15 μ (cm)		μ (cm)	μ 15 μ (cm)
1950-51	47	29	1965-66	36	34
1951-52	24	21	1966-67	35	28
1952-53	42	36	1967-68	28	23
1953-54	27	26	1968-69	29	33
1954-55	25	23	1969-70	32	33
1955-56	35	30	1970-71	39	35
1956-57	29	26	1971-72	25	26
1957-58	36	26	1972-73	30	29
1958-59	37	26	1973-74	23	28
1959-60	35	28	1974-75	37	34
1960-61	58	40	1975-76	34	33
1961-62	41	26	1976-77	30	35
1962-63	34	24	1977-78	28	26
1963-64	20	22	1978-79	27	25
1964-65	26	25	1979-80	34	35

μ

$\mu\mu$
 μ ,

2.4 (

4, 5

6).

μ

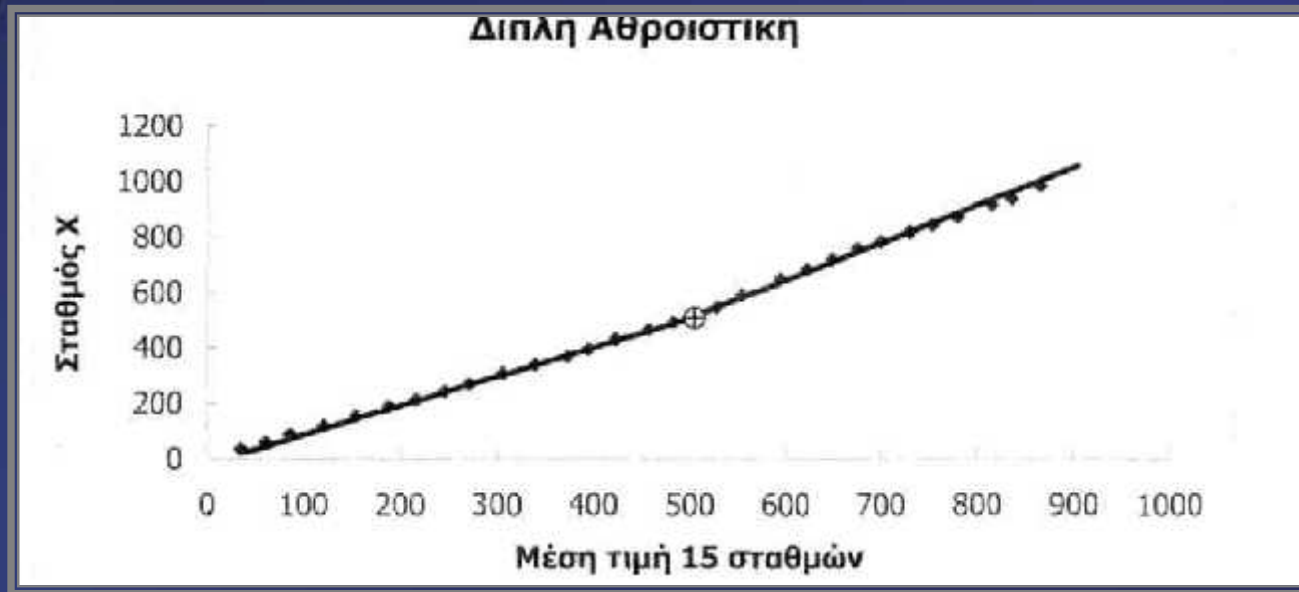
2.4

 μ

(1)	(2)	(3)	(4)	(5)	(6)
μ					
	μ	μ 15		μ	μ 15
		μ			μ
50-51	47	29	79-80	34	35
51-52	24	21	78-79	27	25
52-53	42	36	77-78	28	26
53-54	27	26	76-77	30	35
54-55	25	23	75-76	34	33
55-56	35	30	74-75	37	34
56-57	29	26	73-74	23	28
57-58	36	26	72-73	30	29
58-59	37	26	71-72	25	26
59-60	35	28	70-71	39	35
60-61	58	40	69-70	32	33
61-62	41	26	68-69	29	33
62-63	34	24	67-68	28	23
63-64	20	22	66-67	35	28
64-65	26	25	65-66	36	34
65-66	36	34	64-65	26	25
66-67	35	28	63-64	20	22
67-68	28	23	62-63	34	24
68-69	29	33	61-62	41	26
69-70	32	33	60-61	58	40
70-71	39	35	59-60	35	28
71-72	25	26	58-59	37	26
72-73	30	29	57-58	36	26
73-74	23	28	56-57	29	26
74-75	37	34	55-56	35	30
75-76	34	33	54-55	25	23
76-77	30	35	53-54	27	26
77-78	28	26	52-53	42	36
78-79	27	25	51-52	24	21
79-80	34	35	50-51	47	29



μ , 2.5 (7 8) μ μ 2.6.



1963-64. μ μ , μ μ μ 1950-51 μ 1962-63.

2.5

μ

	(7)	(8)
	μ	μ 15 μ
79-80	34	35
78-79	61	60
77-78	89	86
76-77	119	121
75-76	153	154
74-75	190	188
73-74	213	216
72-73	243	245
71-72	268	271
70-71	307	306
69-70	339	339
68-69	368	372
67-68	396	395
66-67	431	423
65-66	467	457
64-65	493	482
63-64	513	504
62-63	547	528
61-62	588	554
60-61	646	594
59-60	681	622
58-59	718	648
57-58	754	674
56-57	783	700
55-56	818	730

	(7)	(8)
	μ	μ_{15}
54-55	843	753
53-54	870	779
52-53	912	815
51-52	936	836
50-51	983	865

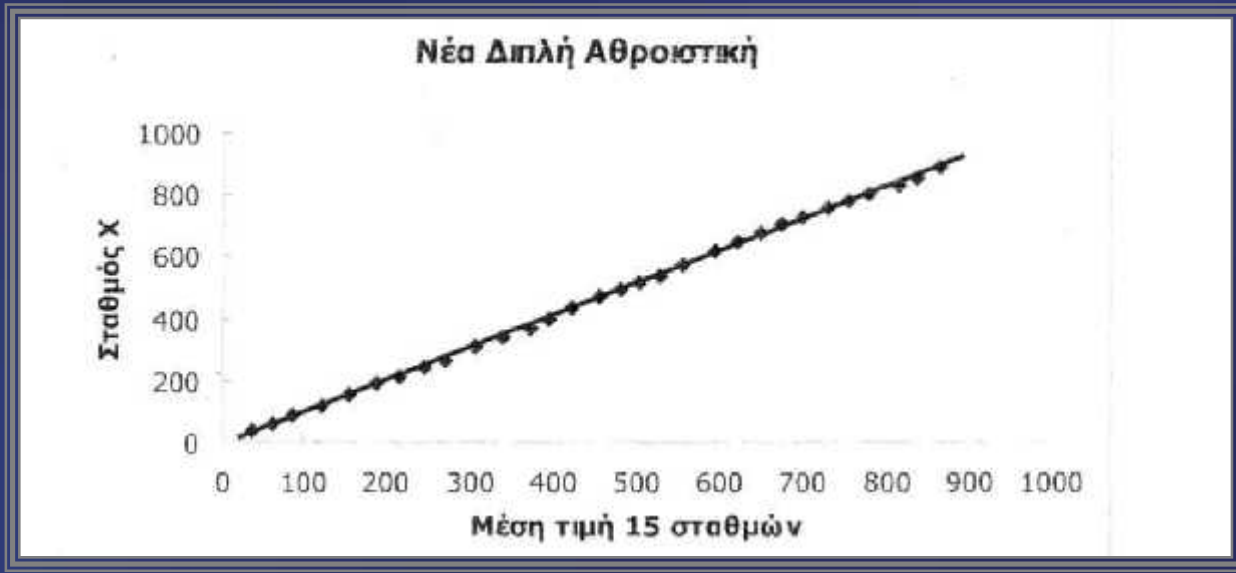
$\mu_{15} = 1.0192$
 $\mu_7 = 1.2669$
 $\mu_8 = 0.8046$
 $\mu_{1979-80 \sim 1963-64} = 1.0192$
 $\mu_{1963-64 \sim 1950-51} = 0.8046$
 $\mu_{1950-51} = 2.6$
 $\mu_{1962-63} = 9$
 $\mu_{10} = 5$

2.6

 μ

	(9)	(10)	(11)
	μ		
	μ		μ 15
		μ	μ
79-80	34	34	35
78-79	27	61	60
77-78	28	89	86
76-77	30	119	121
75-76	34	153	154
74-75	37	190	188
73-74	23	213	216
72-73	30	243	245
71-72	25	268	271
70-71	39	307	306
69-70	32	339	339
68-69	29	368	372
67-68	28	396	395
66-67	35	431	423
65-66	36	467	457
64-65	26	493	482
63-64	20	513	504
62-63	27.4	540.4	528
61-62	33.0	573.3	554
60-61	46.7	620.0	594
59-60	28.2	648.2	622
58-59	29.8	677.9	648
57-58	29.0	706.9	674
56-57	23.3	730.2	700
55-56	28.2	758.4	730
54-55	20.1	778.5	753
53-54	21.7	800.2	779
52-53	33.8	834.0	815
51-52	19.3	853.3	836
50-51	37.8	891.1	865

10 11 2.6, μ , μ μ
 μ 2.7 μ .



■ μ μ 32.8 cm μ μ μ 29.7
 cm.

μ 2.3



μ

μ

μ

μ

μ

μ

μ

(

μ

μ

)

μ

,

C

107, 89

122 mm.

μ

C

978, 1120, 935

1200 mm

μ



μ

2.7.

	(mm)		(mm)
	107	X	978
B	89	A	1120
C	122	B	935
		C	1200



μ

μ

:

μ

μ



μ

μ

μ

:

μ

$$P_x = \frac{1}{m} \sum_{i=1}^m \frac{N_x}{N_i} P_i = \frac{1}{3} \left(\frac{N_x}{N_A} P_A + \frac{N_x}{N_B} P_B + \frac{N_x}{N_C} P_C \right) \Rightarrow$$

$$P_x = \frac{1}{3} \left(\frac{978}{1120} 107 + \frac{978}{935} 89 + \frac{978}{1200} 122 \right) \text{ mm} \Rightarrow$$

$$P_x = 95.32 \text{ mm} \cong 95 \text{ mm}$$

μ 2.4

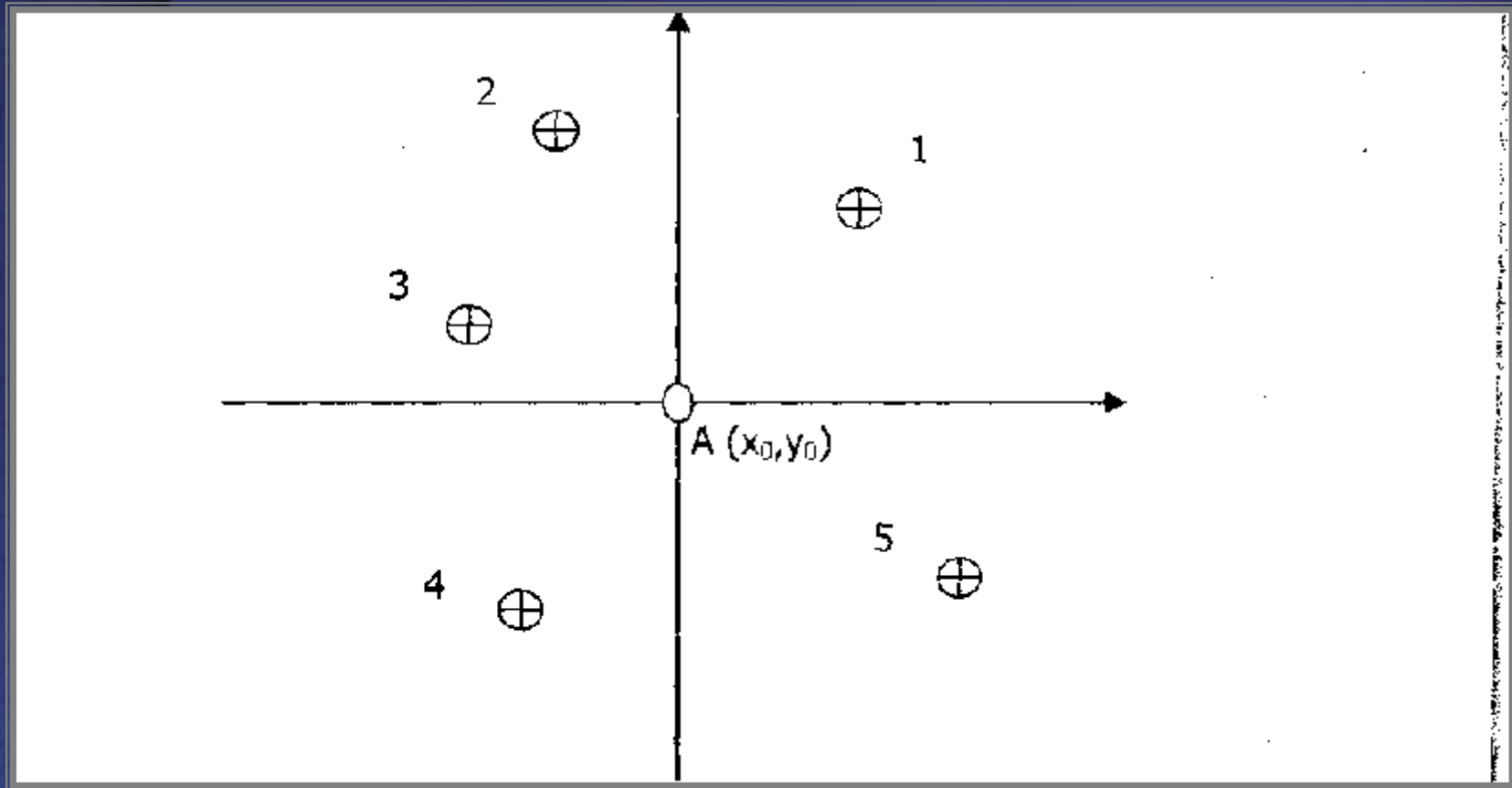
μ μ 2.8, μ μ μ μ μ μ μ μ
 μ 2.8, μ μ μ μ μ μ μ μ μ
 μ 2.8 μ μ μ μ μ μ μ μ

μ	$X_i - X_0$ (km)	$Y_i - Y_0$ (km)	(cm)
1	1.2	0.9	2.5
2	0.5	1.1	3.4
3	0.8	0.3	1.5
4	0.5	1.2	2.2
5	1.1	0.8	1.8

μ 2.8

μ

μ



- μ

$$Pa = \sum (Pi \times Wi)$$

- μ

$$w_i = \frac{\frac{1}{d_i^2}}{\sum_{j=1}^k \frac{1}{d_j^2}}$$

k = 5.

μ $P_i \cdot w_i$

2.9

μ

μ	$P_i(\text{cm})$	$x_i - x_0(\text{km})$	$y_i - y_0(\text{km})$	$d_i^2(\text{km})$	$d_i^{-2}(\text{km})$	w_i	$P_i \cdot w_i(\text{cm})$
1	2,5	1,2	0,9	2,25	0,44	0,12	0,3
2	3,4	0,5	1,1	1,46	0,19	0,19	0,65
3	1,5	0,8	0,3	0,73	0,38	0,38	0,57
4	2,2	0,5	1,2	1,69	0,16	0,16	0,35
5	1,8	1,1	0,8	1,85	0,15	0,15	0,27

μ

:

$$P_a = \sum(P_i \cdot w_i) = 2.14 \text{ cm}$$

μ 2.5

mm

μ

μ

μ

μ

.

μ

1970-71 μ

μ

μ

1989-90 μ

μμ

μ

μ 2 μ

2.10

μ .

	μ 1	μ 2
1970-71	1147.5	1372.9
1971-72	1322.4	1507.7
1972-73	1083.4	-
1973-74	1294.9	1485.3
1974-75	1252.5	1587.2
1975-76	1093.0	1377.2
1976-77	1180.5	1847.8
1977-78	979.5	1468.3

	μ 1	μ 2
1978-79	1092.7	-
1979-80	963.6	1085.8
1980-81	1095.6	1208.3
1981-82	1301.8	-
1982-83	1327.3	1445.1
1983-84	1169.8	1671.3
1984-85	1328.8	1486.4
1985-86	944.9	-
1986-87	1130.6	1573.7
1987-88	978.4	1191.2
1988-89	1161.7	1549.8
1989-90	933.5	1229.1

$$y = 0.8224x + 499.2$$

$$r = 0.566.$$

2.11 μ μ μ μμ μ

	μ 1 (x)	μ 2	μ 2 (y)
1970-71	1147.5	1372.9	
1971-72	1322.4	1507.7	
1972-73	1083.4	-	1390.2
1973-74	1294.9	1485.3	
1974-75	1252.5	1587.2	
1975-76	1093.0	1377.2	
1976-77	1180.5	1847.8	
1977-78	979.5	1468.3	
1978-79	1092.7	-	1397.9

	$\mu_1(x)$	μ_2	$\mu_2(y)$
1979-80	963.6	1085.8	
1980-81	1095.6	1208.3	
1981-82	1301.8	-	1569.9
1982-83	1327.3	1445.1	
1983-84	1159.8	1671.3	
1984-85	1328.8	1486.4	
1985-86	944.9	-	1276.3
1986-87	1130.6	1573.7	
1987-88	978.4	1191.2	
1988-89	1161.7	1549.8	
1989-90	933.5	1229.1	

μ 2.6

2.12

μ

μ

μ

μ

μ

μ

μ

μ

μ 2.11.

μ

μ

μ

, Thiessen

μ

μ

μ

μ

Thiessen,

μ

μ

μ 2940 km²

μ

μ

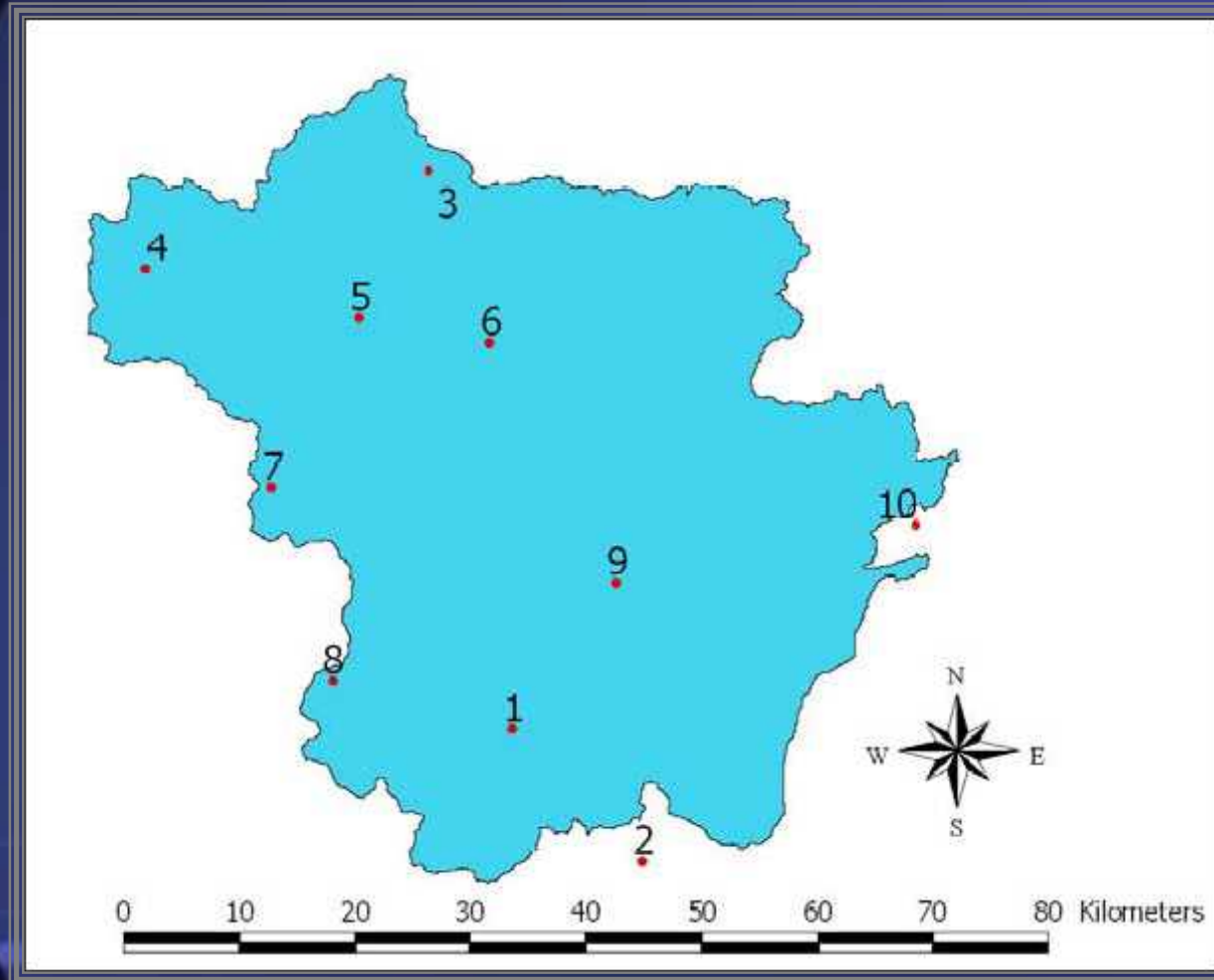
μ 532 m.

2.12 μ μ μ .

/	μ	μ (m)	(mm)
1		226	74
2		220	73
3		581	92
4		842	101
5		500	83
6		596	87
7		1050	110
8		860	103
9		116	82
10		87	70

μ 2.11

μ



)

μ μ

μ

μ

μ

μ

μ

μ

10

μ

:

$$= (74+73+92+101+83+87+110+103+82+70)/ 10 = 88 \text{ mm } 64$$

)

Thiessen



μ

μ

μ



μ

,

Thiessen

w

Thiessen

μμ μ μ

Thiessen

μ

Thiessen

μ

μ

μ

2.12.

μ

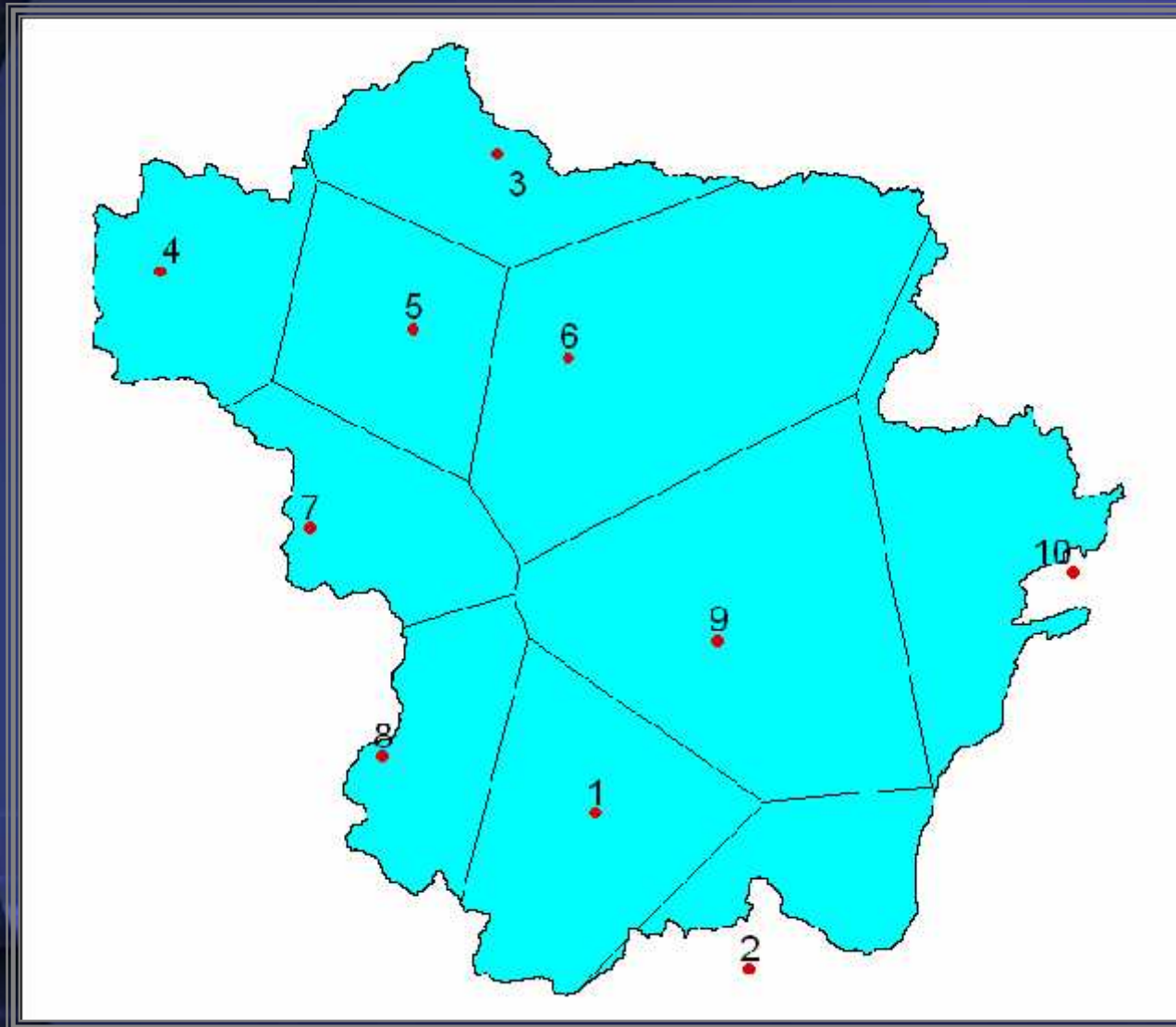
μ

μ ,

.

μ 2.12

Thiessen.



2.13

μ

Thiessen.

μ	(km ²)	w	(mm)	w x P
1	316	0.107	74	7.955
2	153	0.052	73	3.800
3	216	0.073	92	6.760
4	212	0.072	101	7.270
5	238	0.081	83	6.720
6	582	0.198	87	17.225

μ	(km ²)	w	- P(mm)	W*P
7	194	0.066	110	7.260
8	177	0.060	103	6.202
9	550	0.187	82	15.342
10	302	0.103	70	7.191
	2940	1		86

Thiessen,

μ 86 mm.

)



μ 2.13

μ

10

μ

μ

μ

μ

5 mm.



μ

Thiessen,

μ

μ

μ

μ

μ

μ

μ

(GIS)

μ

μ



2.14

μ

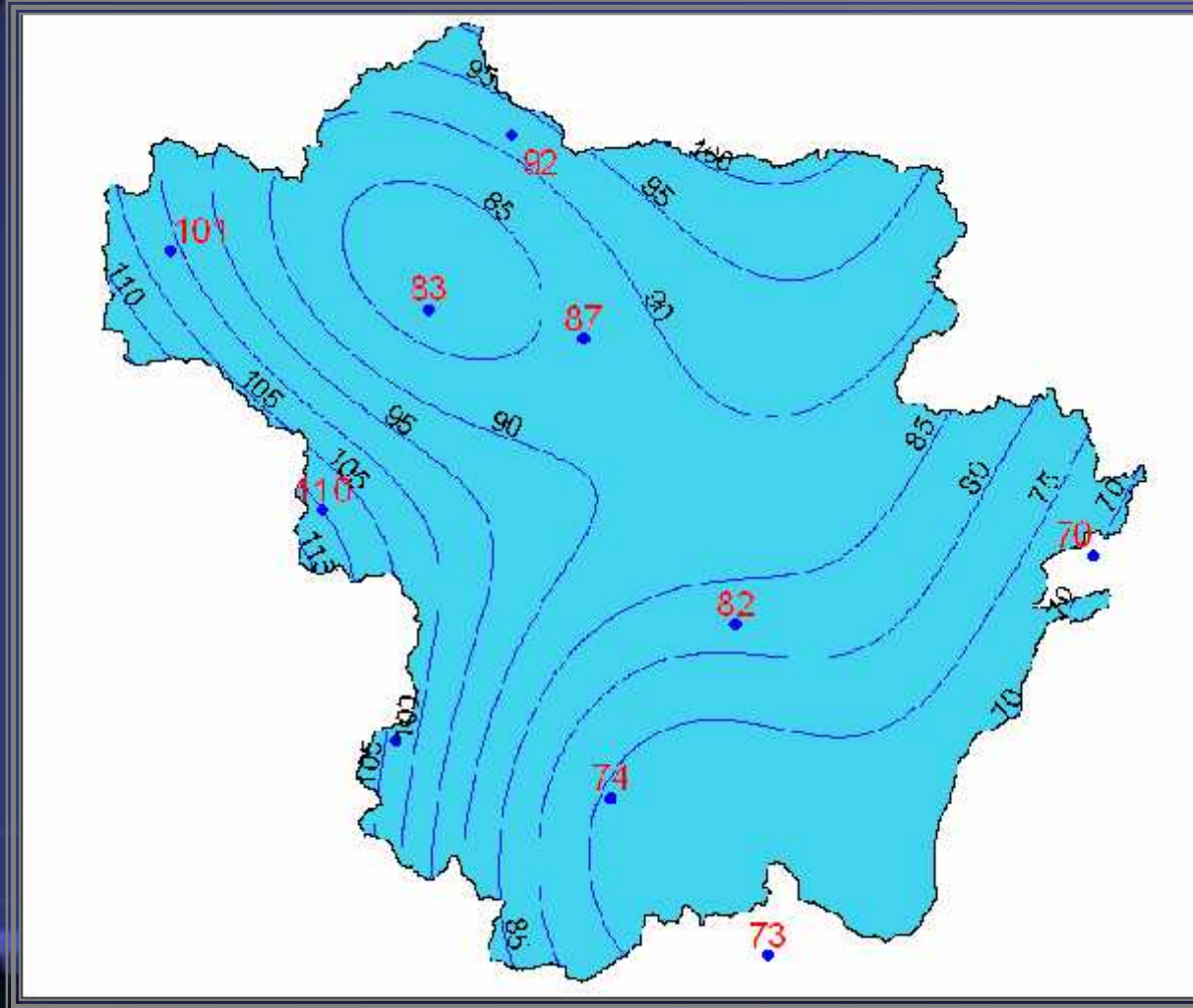
μ

μ

.

μ 2.13

μ



2.14

μ

μ

μ μ {mm}	(km ²)	w	(mm)	W*P
65-70	8	0.003	67.5	0.180
70-75	444	0.151	72.5	10.960
75-80	295	0.100	77.5	7.783
80-85	405	0.138	82.5	11.370
85-90	729	0.248	87.5	21.688
90-95	506	0.172	92.5	15.911
95-100	327	0.111	97.5	10.833
100-105	149	0.051	102.1	5.179
105-110	55	0.019	107.5	2.010
110-115	22	0.007	112.5	0.841
	2940	1		87

μ

μ

μ

,

μ 87 mm.

)

μ

μ



Thiessen,

μ

μ

μ

μ

μ

,

μ

μ

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,

μ

,

μ

Thiessen

μ

μ

μ

.

,

μ

Thiessen μ

μ

μ

μ

,

μ

532 m.

μ

μ

μ

μ

μ

μ

μ

(

μ

μ

Thiessen)

μ

μ

μ

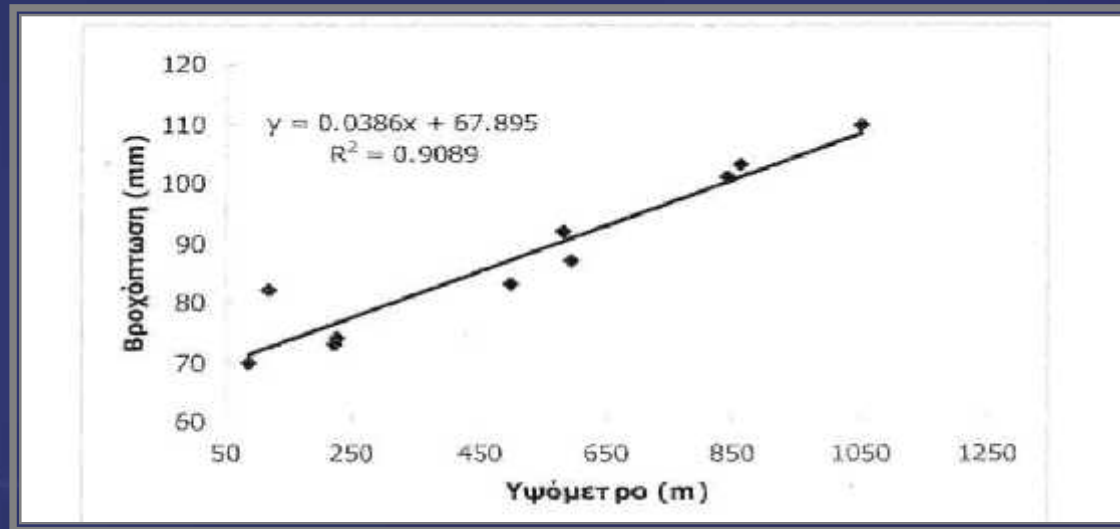
.



μ 2.14.



μ , μ , μ μ
μ (=0.039) μ
μ , μ μ μ
μ 100 μ μ μ
μ 3.86.



μ 2.14

μμ

μ

μ

μ

2.15.

2.15

Thiessen

μ	hiessen w	μ (m)	W*H
1	0.107	226	24.29
2	0.052	220	11.45
3	0.073	581	42.69
4	0.072	842	60.61
5	0.081	500	40.48
6	0.198	596	118.00
7	0.066	1050	69.30
8	0.060	860	51.78
9	0.187	116	21.70
10	0.103	87	8.94
	1		449

$$\bar{P}_t = P_t + \lambda \cdot \Delta h$$

$$P_t = 86 \text{ mm}$$

$$\lambda = 0.039 \text{ (mm/m)}$$

hiessen,

$$h = 532 - 449 = 83 \text{ m}$$

$$\bar{P}_t = 86 + 0.039 \cdot 83 = 89.24 \text{ mm} \approx 89 \text{ mm}$$

3 mm
hiessen.