4th Euro-Argo Science Meeting and Workshop

Hydrographic properties of Cretan Sea derived from Argo float's profiles and buoy data measurements during 2010-2012

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** Presenting author*
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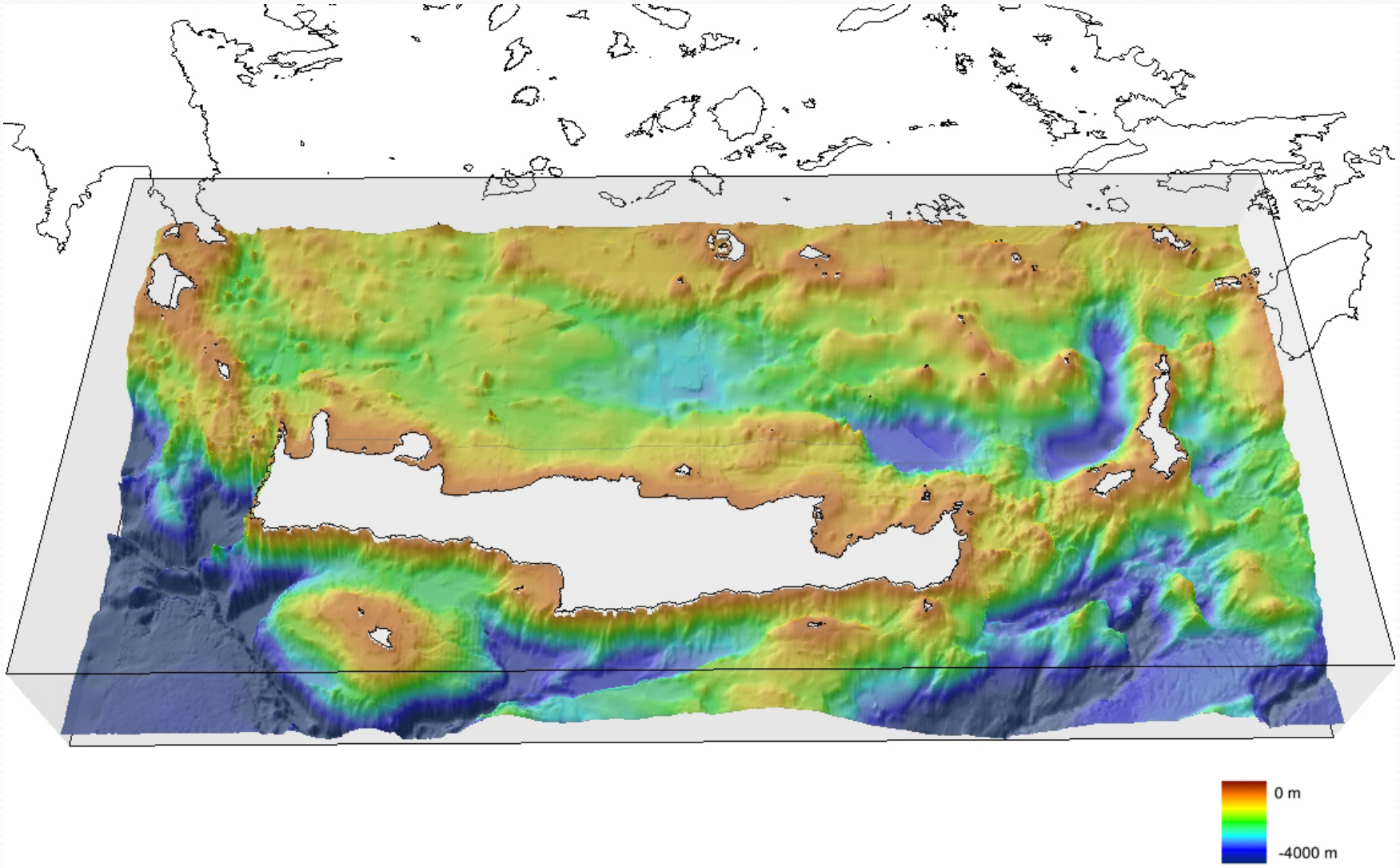
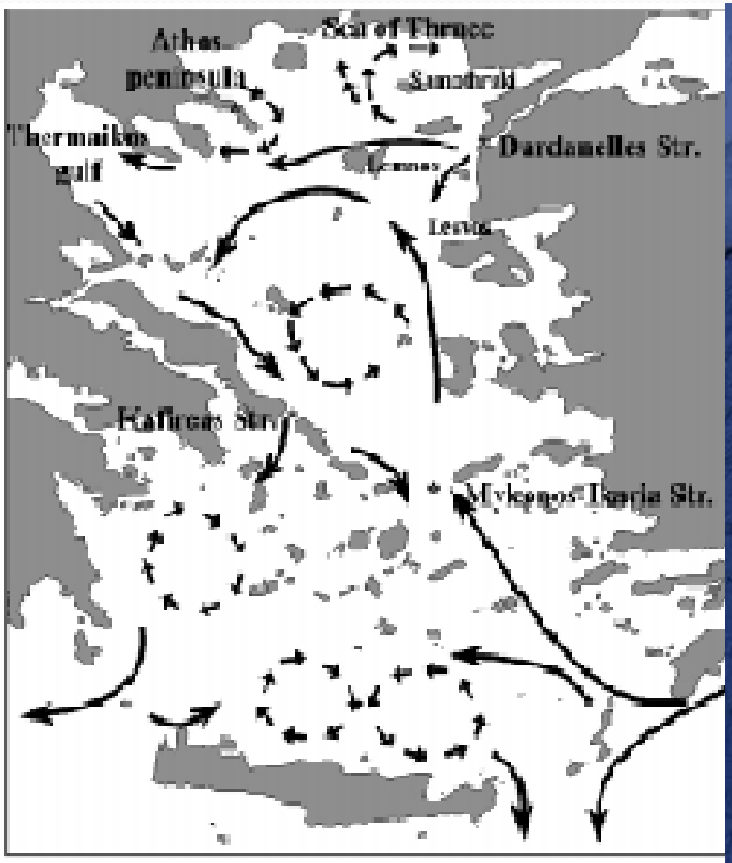
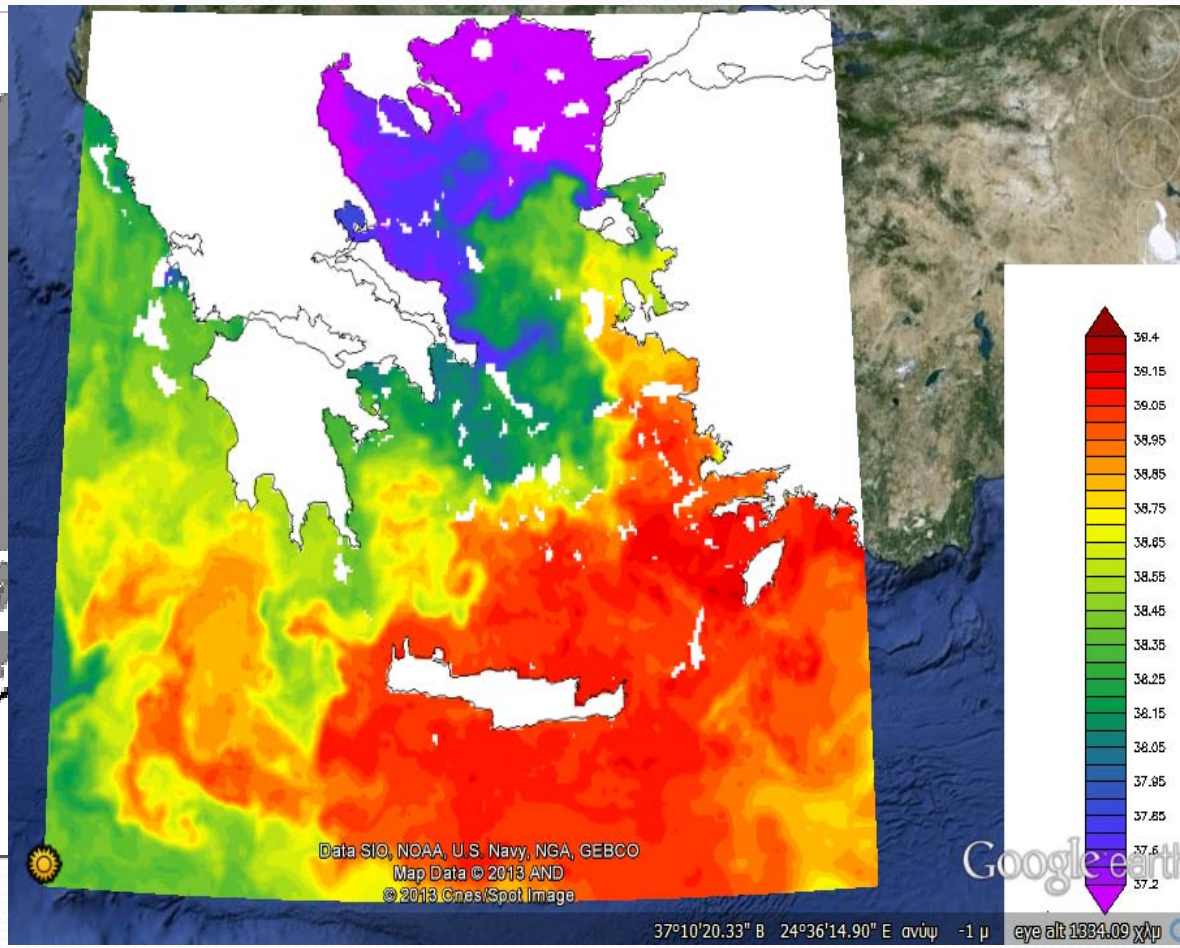
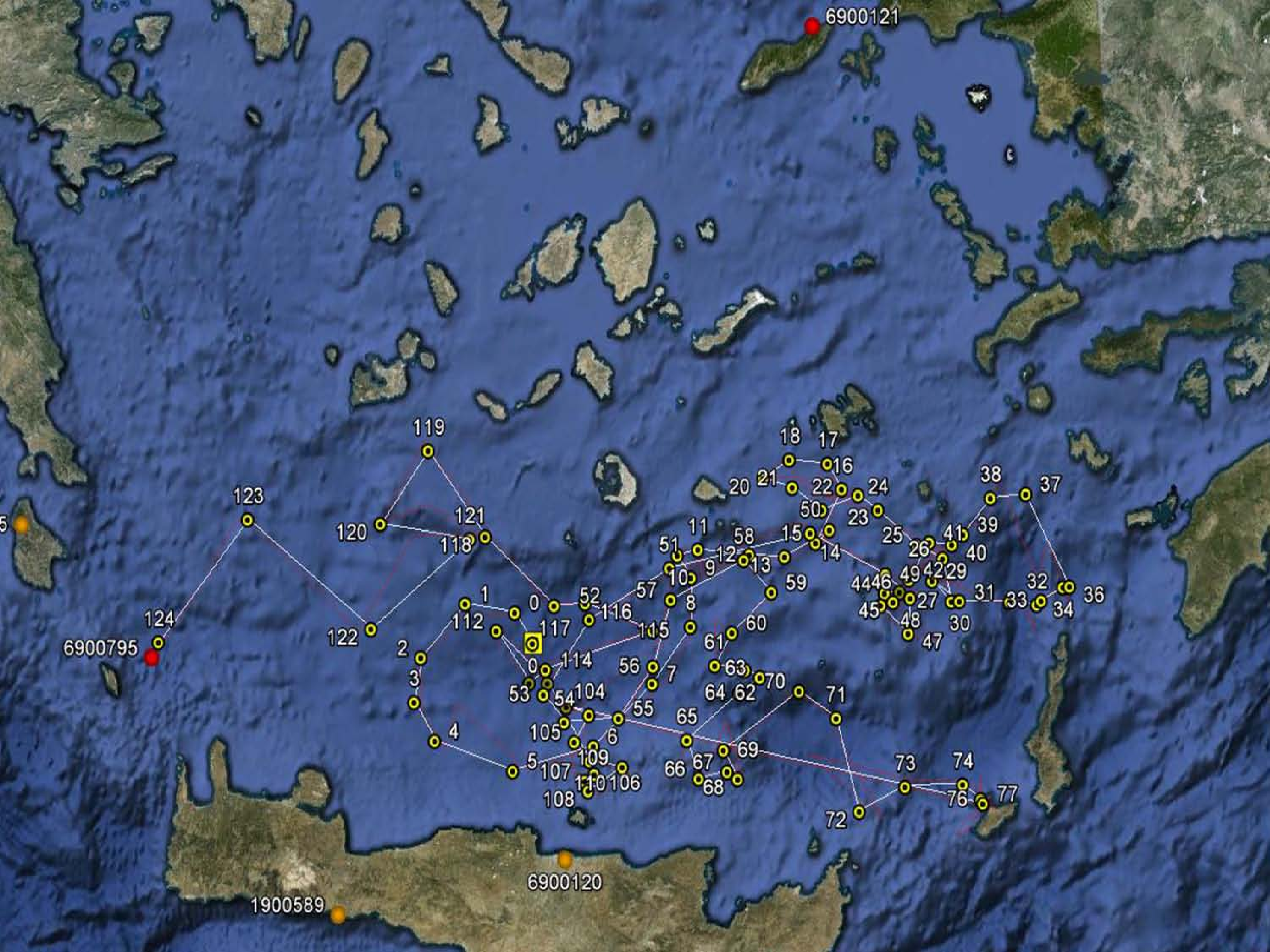
2) Ifremer, LER/LOS, France


0 m
-4000 m



Theocharis et al., 1993 & 1999





6900121
6900795
6900120
1900589
119
123
121
120
118
124
122
1
112
2
3
4
5
0
117
52
116
57
115
114
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104
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110
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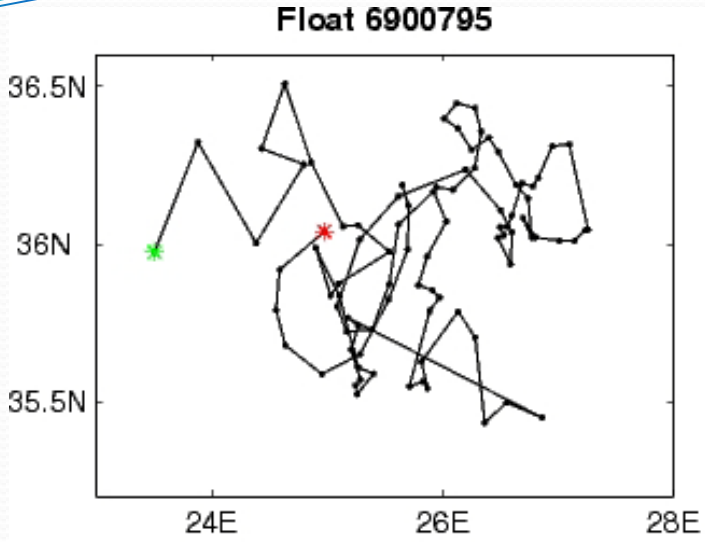
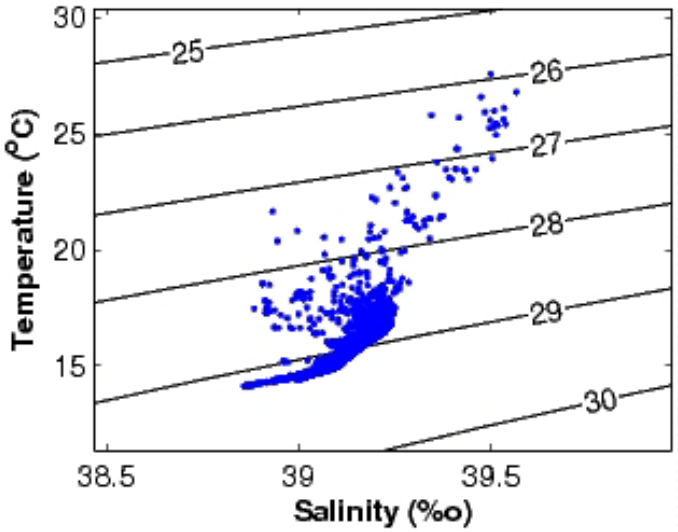
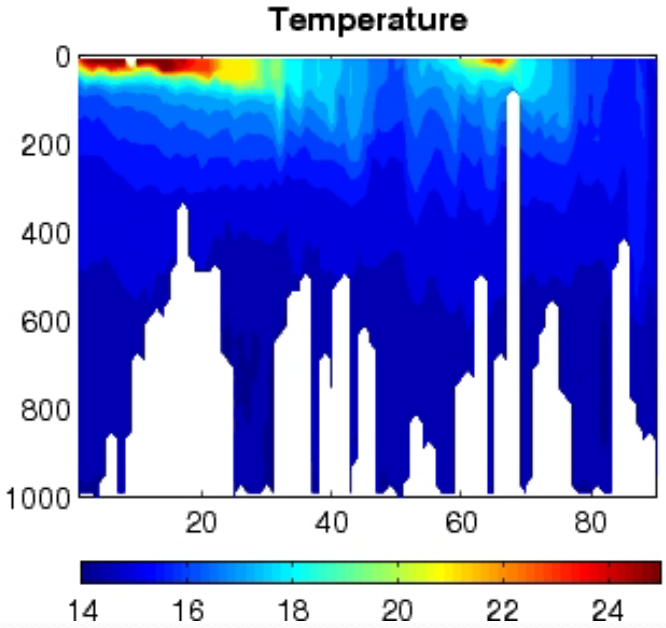
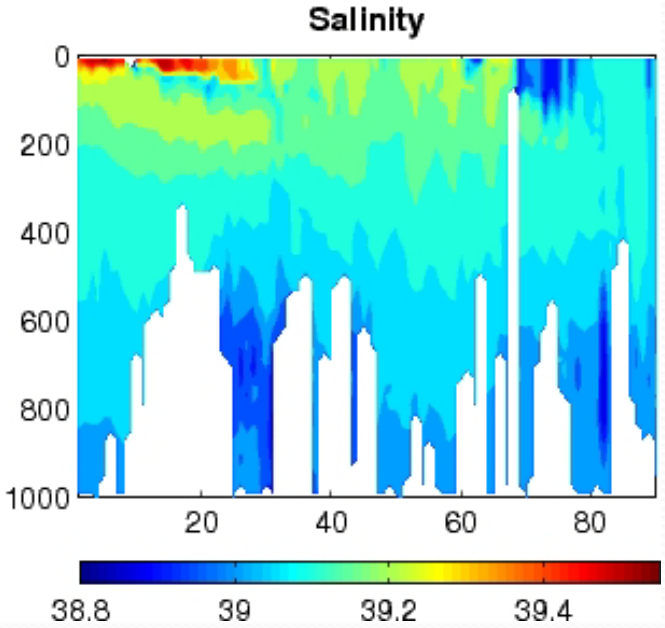
36

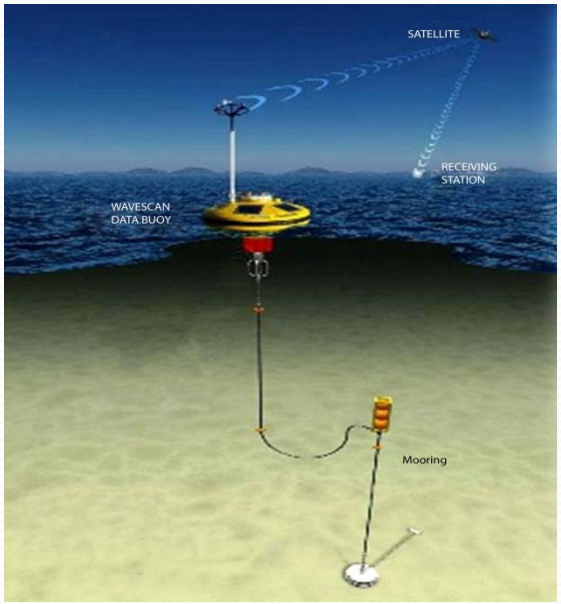

Float 6900795
36.5N
36N
35.5N
24E
26E
28E

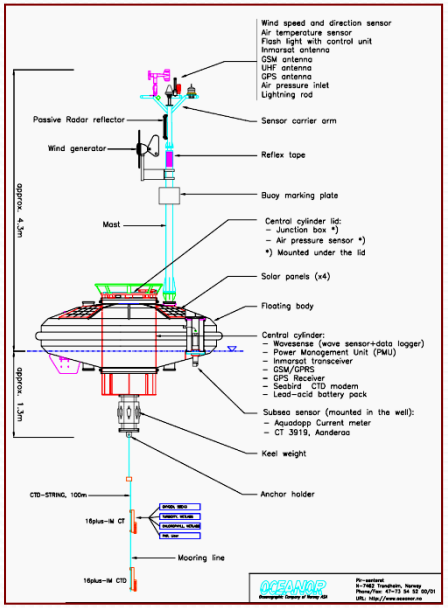

30
25
20
15
Temperature (°C)
25
26
27
28
29
30
38.5
39
39.5
Salinity (‰)

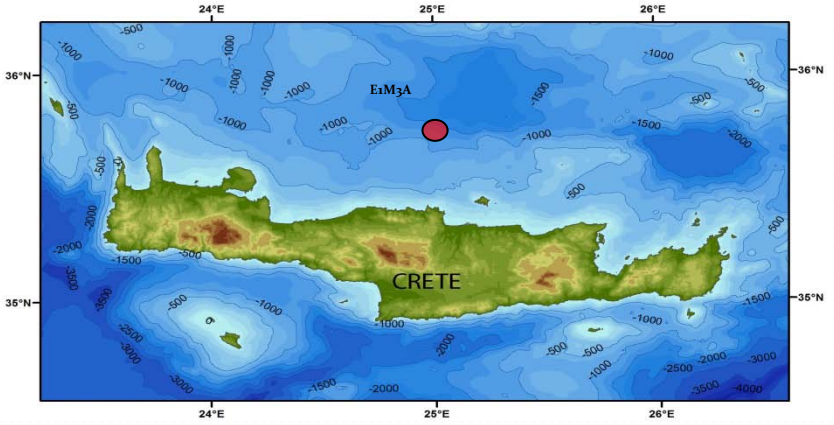

Temperature
0
200
400
600
800
1000
20
40
60
80
14
16
18
20
22
24


Salinity
0
200
400
600
800
1000
20
40
60
80
38.8
39
39.2
39.4

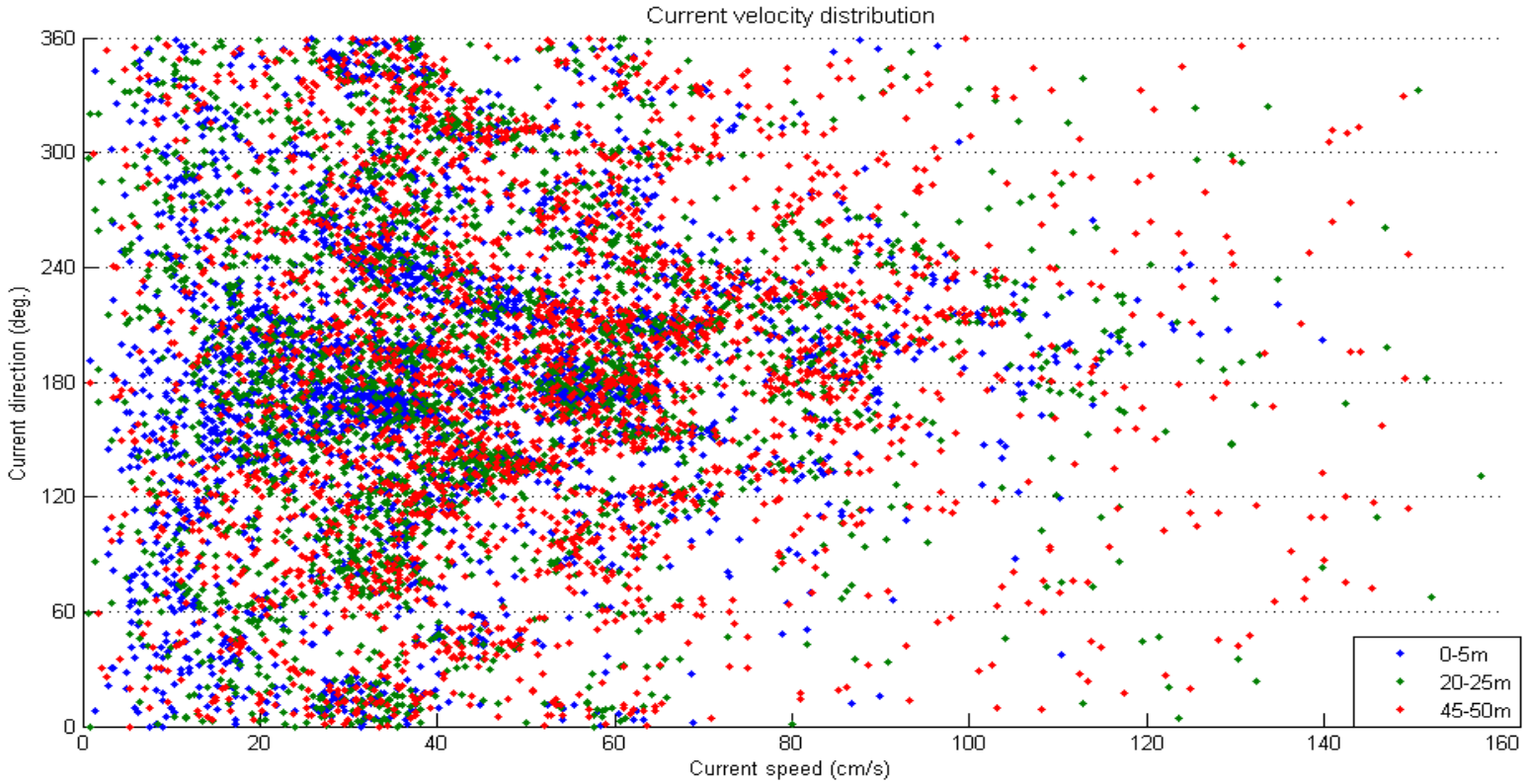
E1M3A Platform



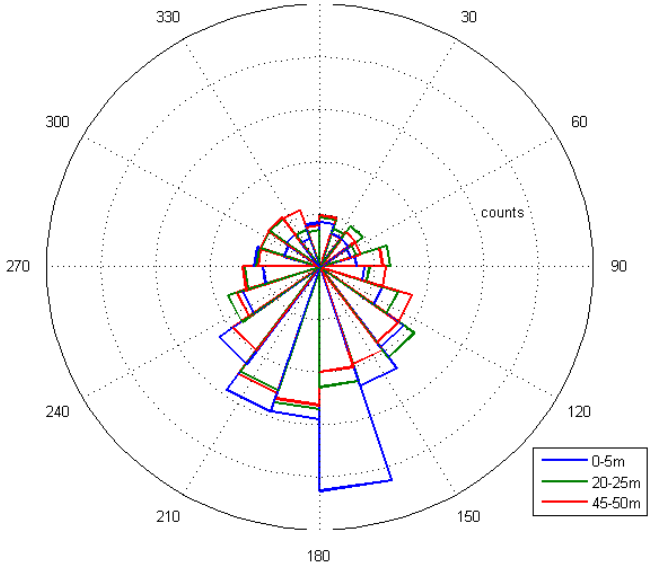


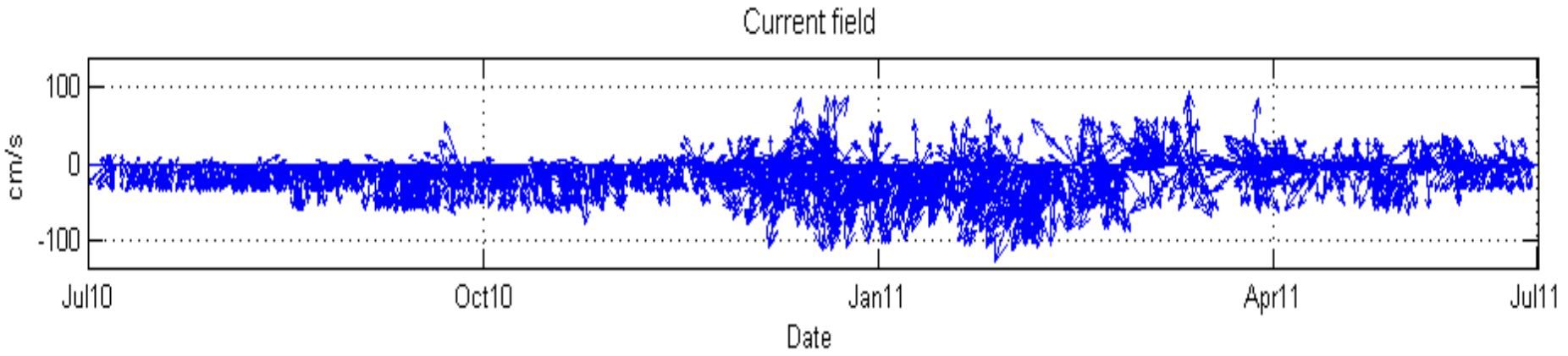


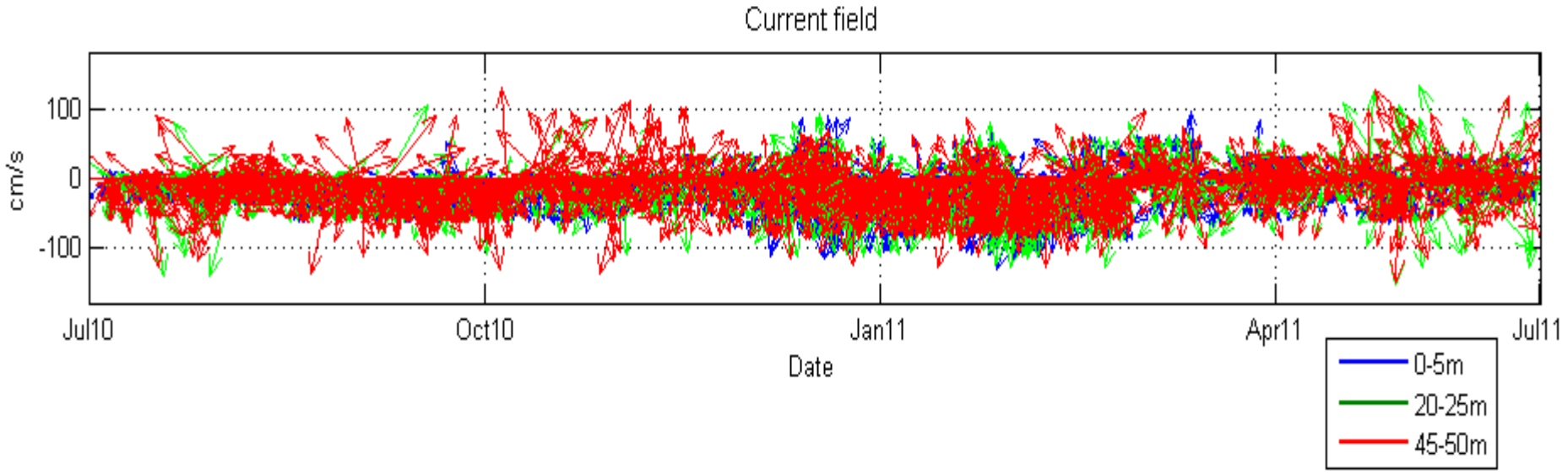
Parameter	Depths measured (m)	Sensor(s) used
Wind speed/dir.,	Surface	Young x
Air Pressure,	Surface	Vaisala PTB 220A
Air temperature,	Surface	Omega
Wave Height	Surface	Fugro OCEANOR Wavesense
Pyranometer PSP,	Surface	Eppley
Radiometer PIR,	Surface	Epply
Relative humidity,	Surface	Vaisala HMP 45A
Precipitation sensor,	Surface	Young 50203
Radiance	Surface	Satlantic ocr-507-r1ow
Irradiance	Surface	Satlantic ocr-507-ricsw
SST, SSS surface,	Surface (1m)	Aanderaa 3919A
CO_2	Surface (1m)	CONTROS
Currents	5-50, 10 bins of 5m	Nortek Aquadopp 400 kHz
Temperature	1, 20, 50, 75, 100, 250, 400, 600, 1000m	Seabird 16plus-IMP C-T Seabird 37-IM C-T
Salinity	1, 20, 50, 75, 100, 250, 400, 600, 1000m	Seabird 16plus-IMP C-T Seabird 37-IM C-T
Pressure	250m	Seabird 37-IM C-T-P
Turbidity	20, 50, 75, 100m	Wetlabs flntus-rt
Dissolved Oxygen	20, 50, 75, 100m	SBE43
Chl-a	20, 50, 75, 100m	Wetlabs flntus-rt
PAR	20, 50, 75, 100m	Licor LI-193

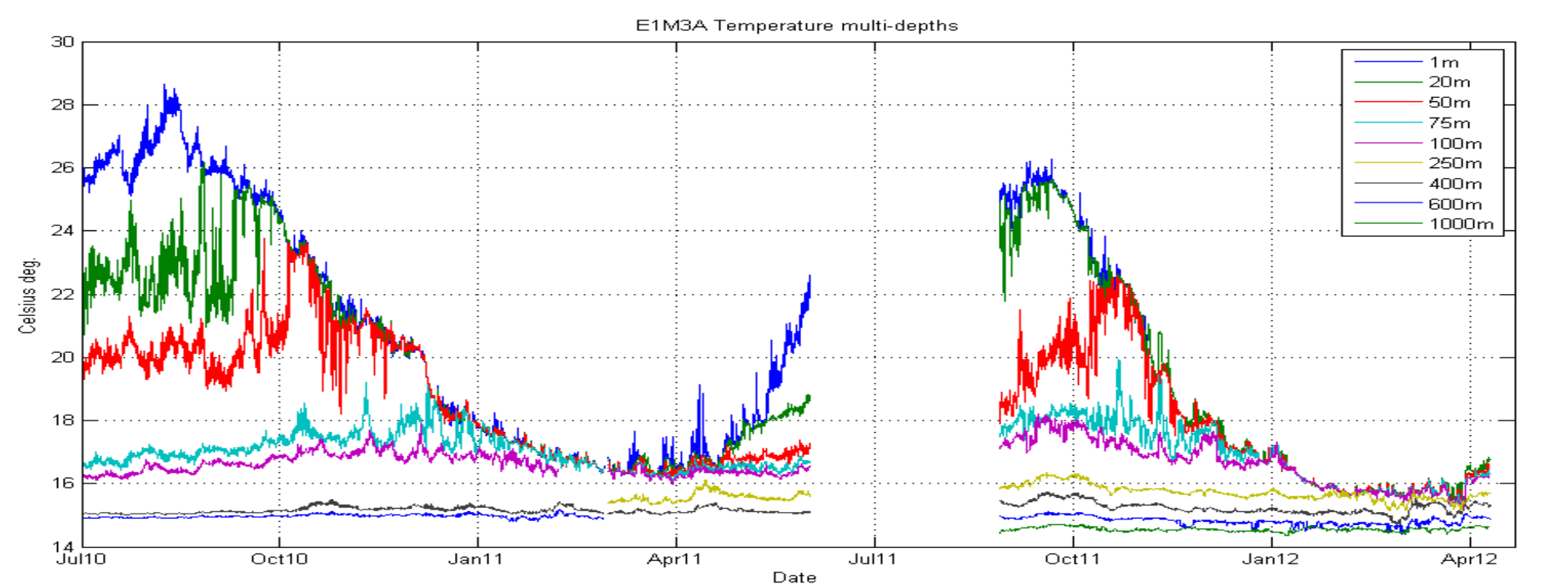


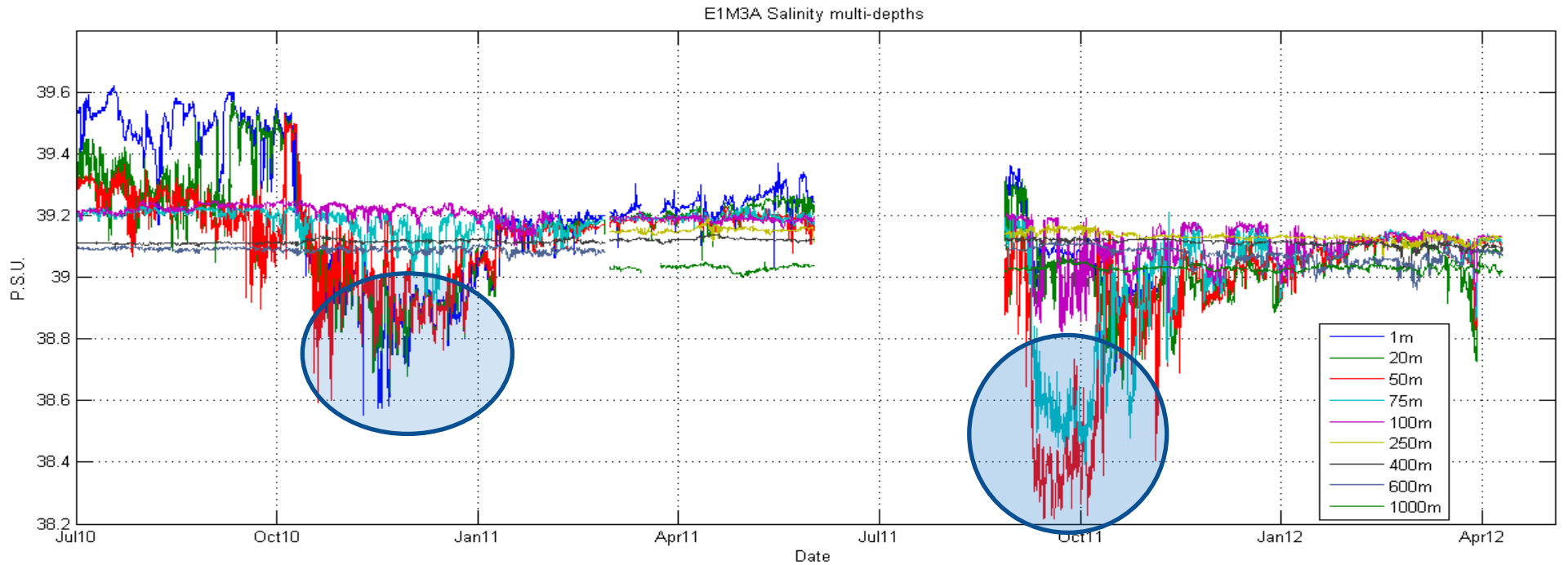
Buoy Data 2010-2012

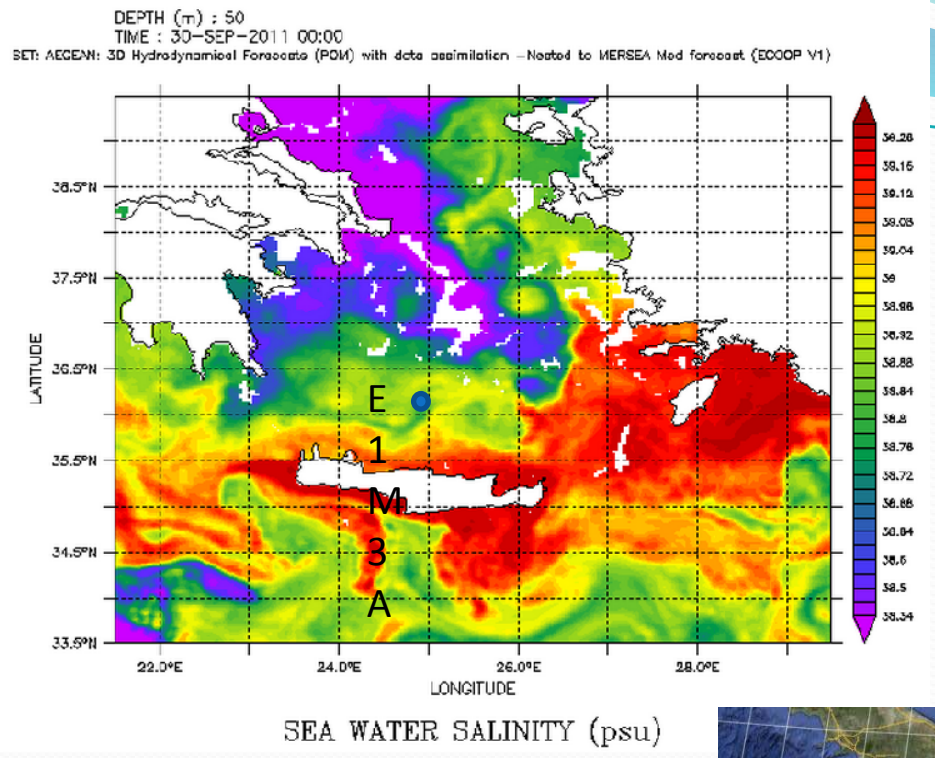



Current field
100
0
-100
cm/s
Jul10
Oct10
Jan11
Apr11
Jul11
Date

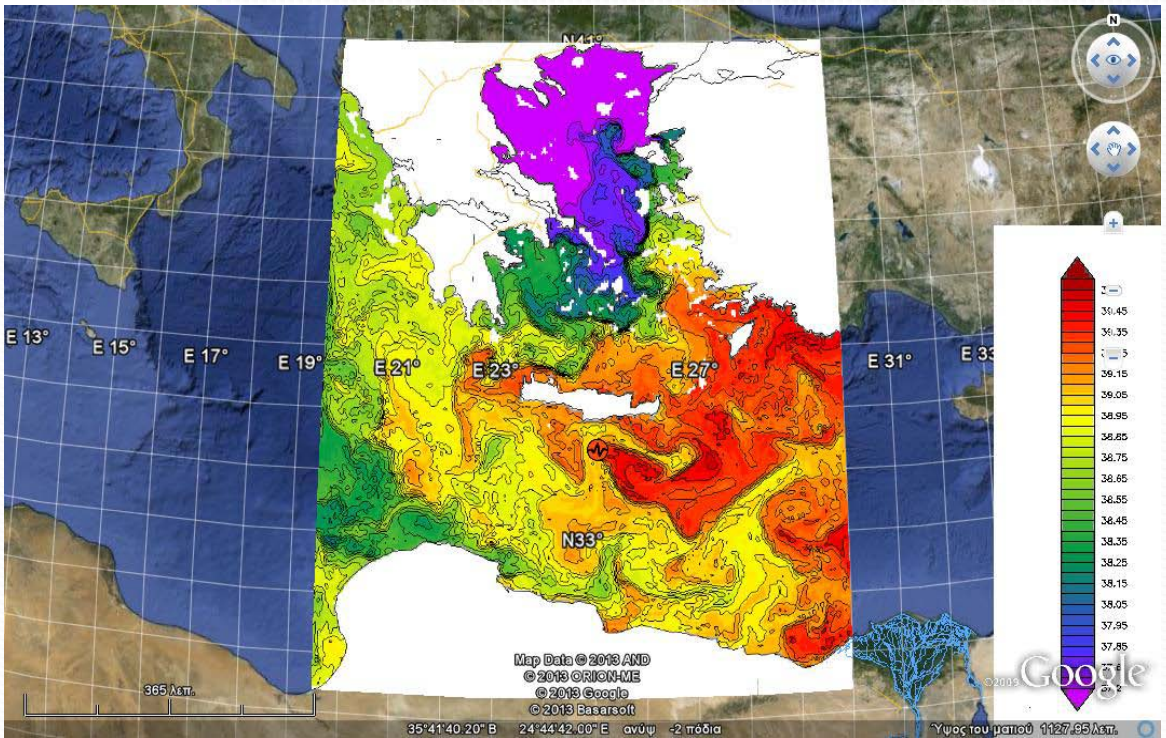

Current field
100
0
-100
cm/s
Jul10
Oct10
Jan11
Apr11
Jul11
Date
0-5m
20-25m
45-50m

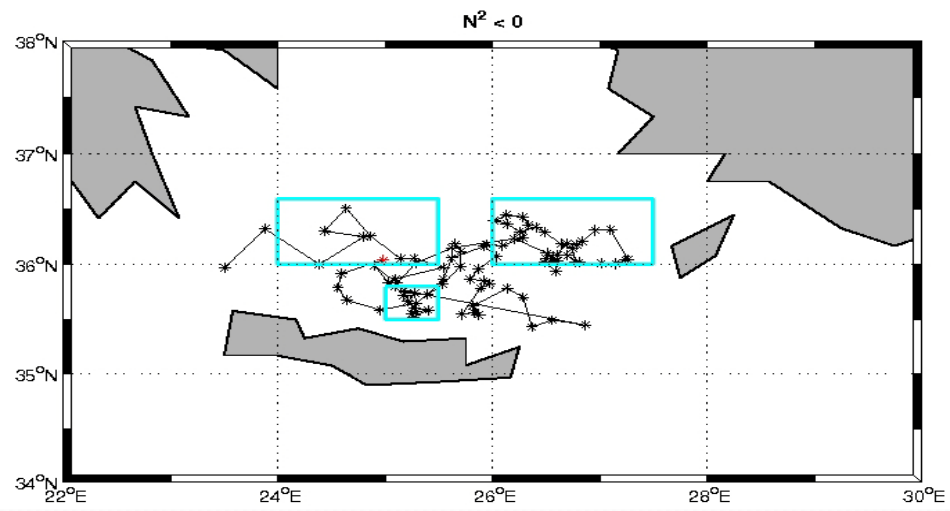

E1M3A Temperature multi-depths
Celsius deg.
Date
Jul10
Oct10
Jan11
Apr11
Jul11
Oct11
Jan12
Apr12
1m
20m
50m
75m
100m
250m
400m
600m
1000m

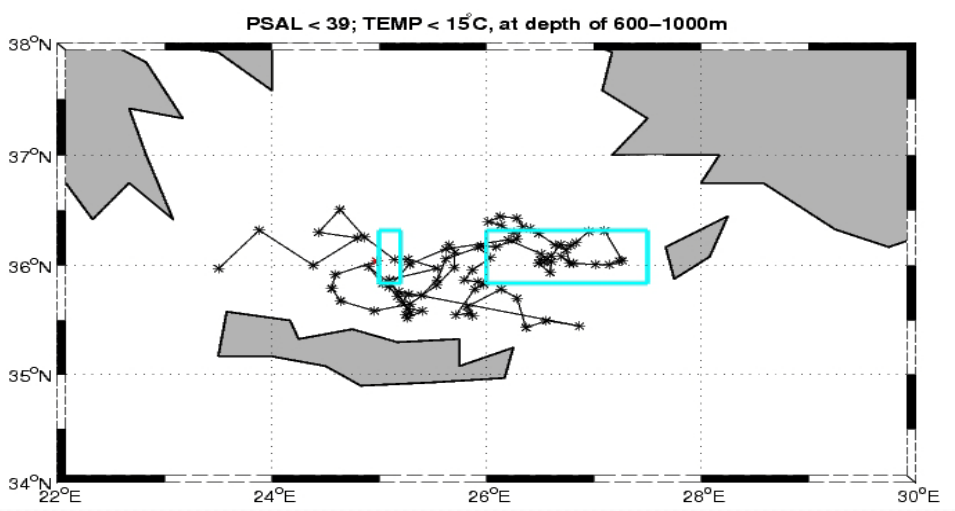

E1M3A Salinity multi-depths
P.S.U.
Date
Jul10
Oct10
Jan11
Apr11
Jul11
Oct11
Jan12
Apr12
1m
20m
50m
75m
100m
250m
400m
600m
1000m

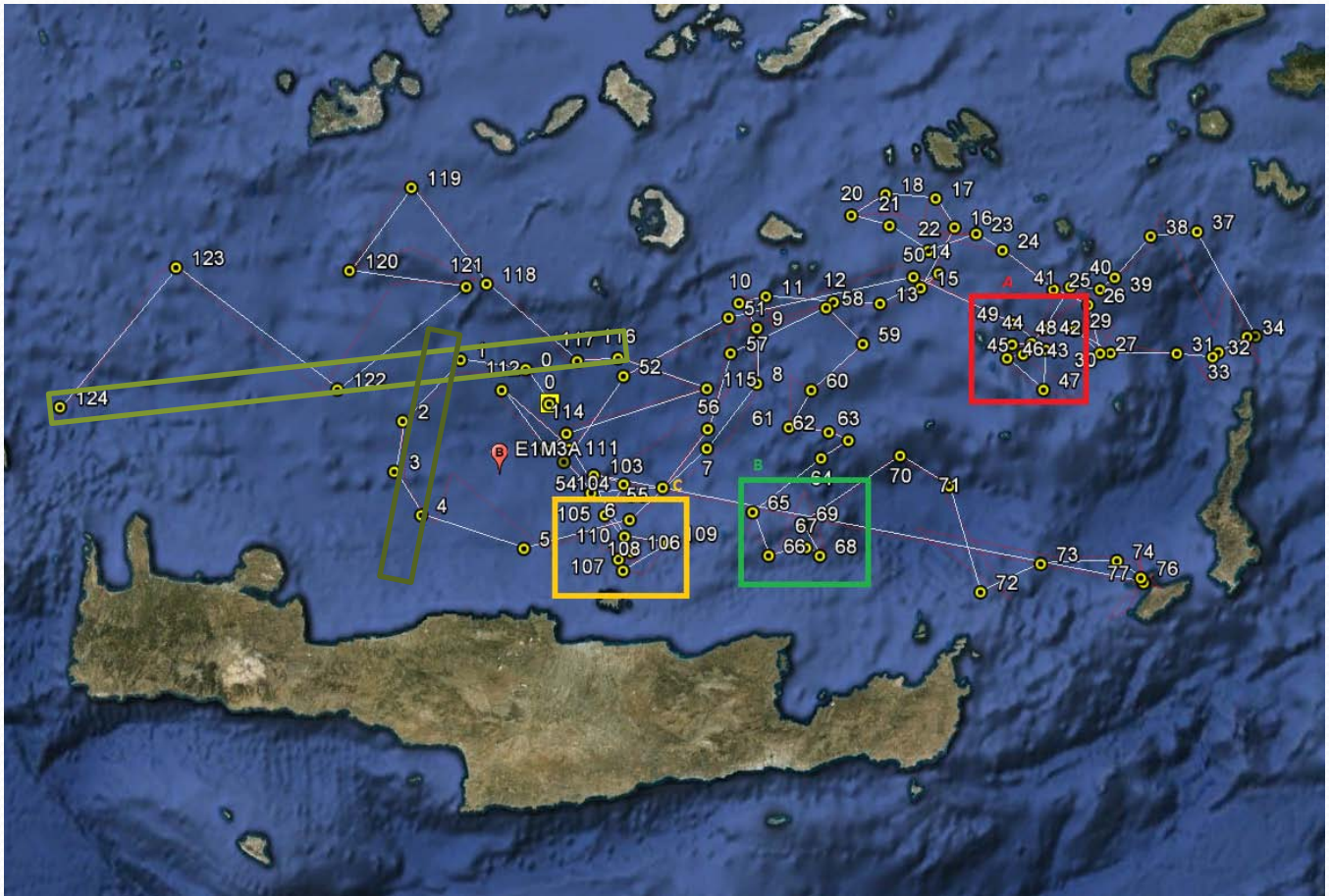


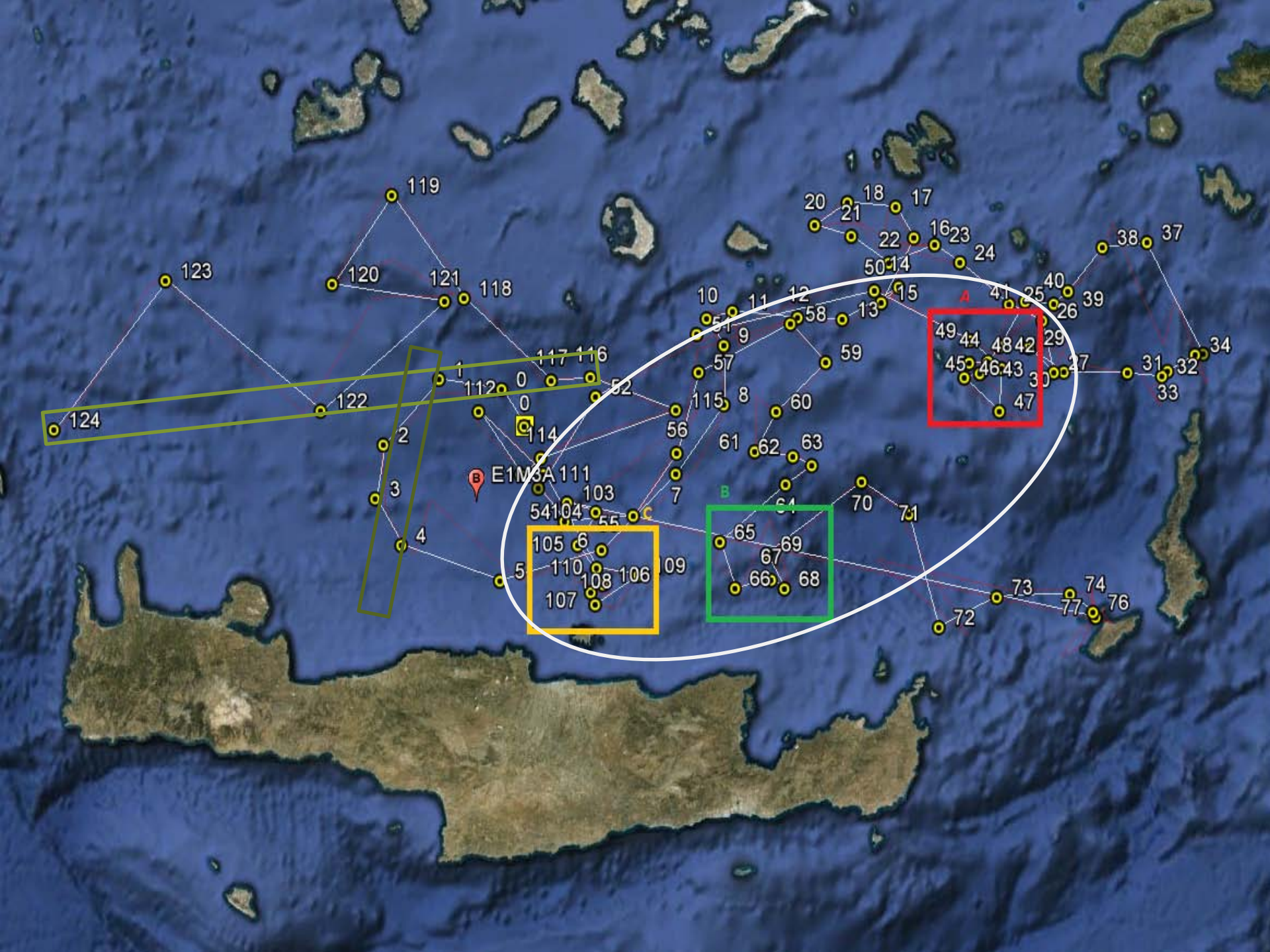
SEA WATER SALINITY (psu)

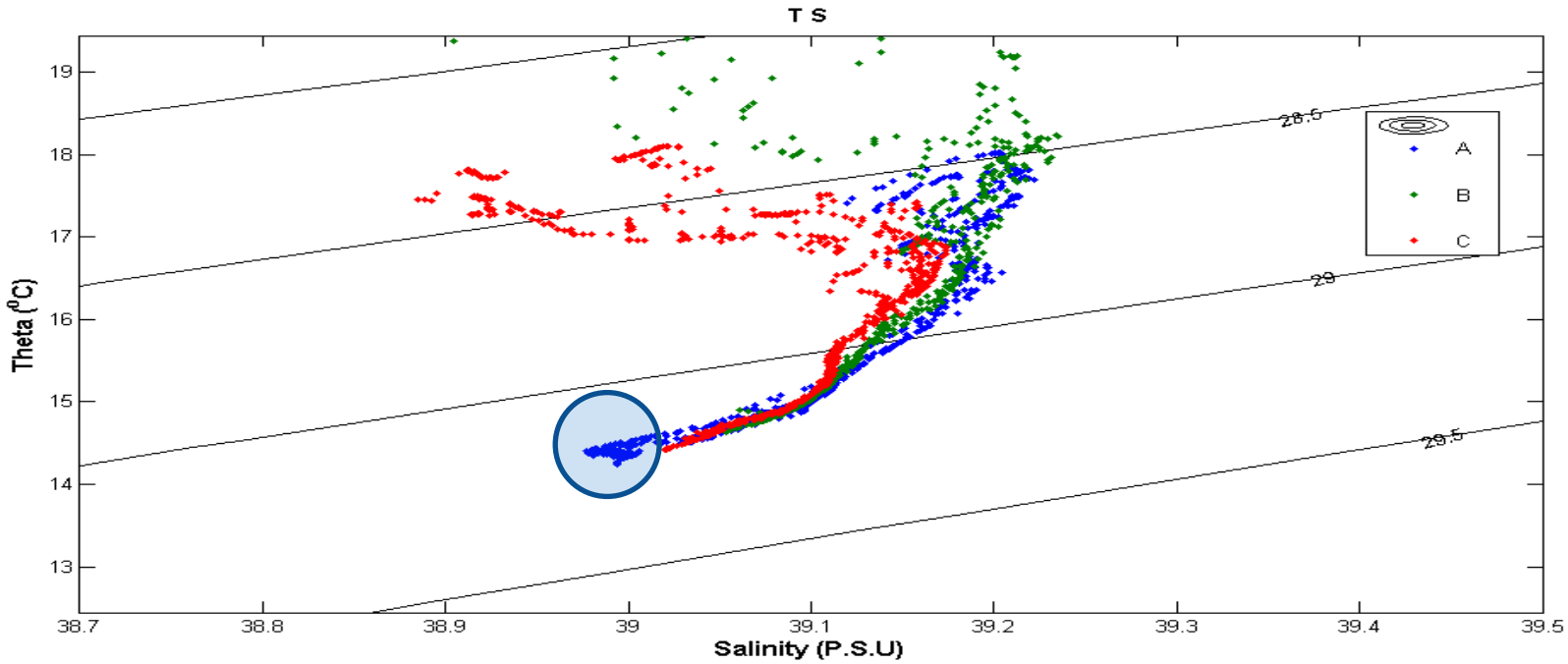


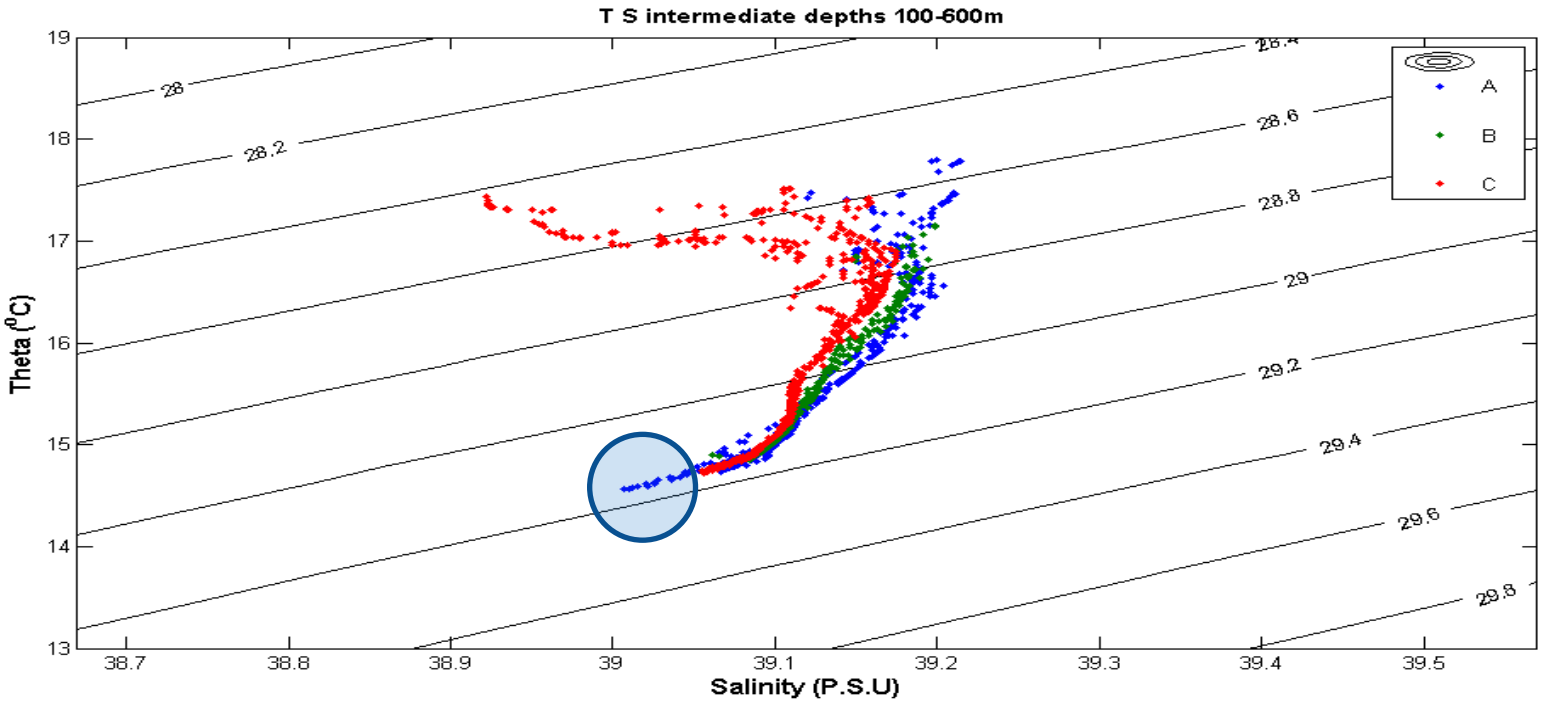

$N^2 < 0$
38°N
37°N
36°N
35°N
34°N
22°E
24°E
26°E
28°E
30°E

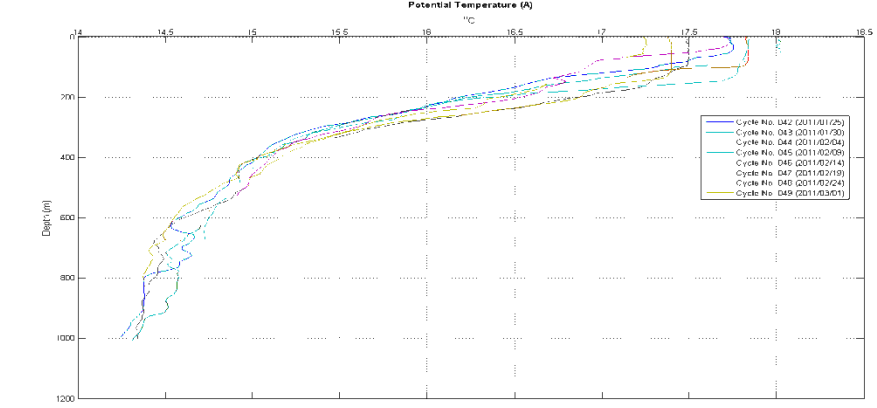

PSAL < 39; TEMP < 15°C, at depth of 600–1000m
38°N
37°N
36°N
35°N
34°N
22°E
24°E
26°E
28°E
30°E

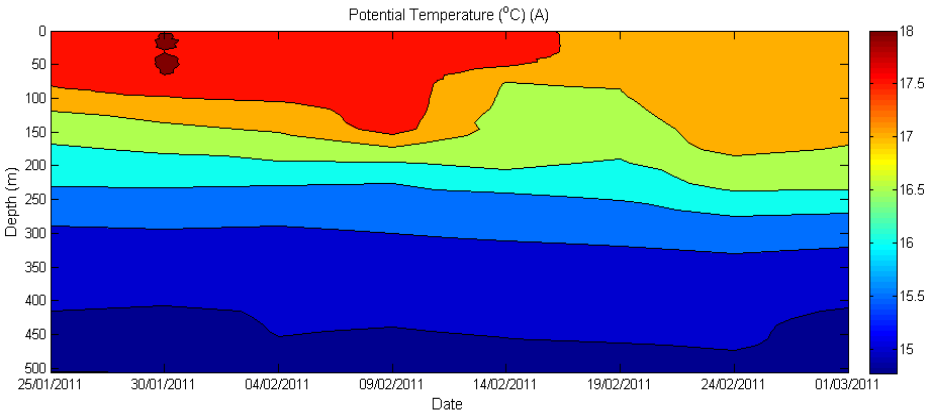

E1M3A
A
B
C

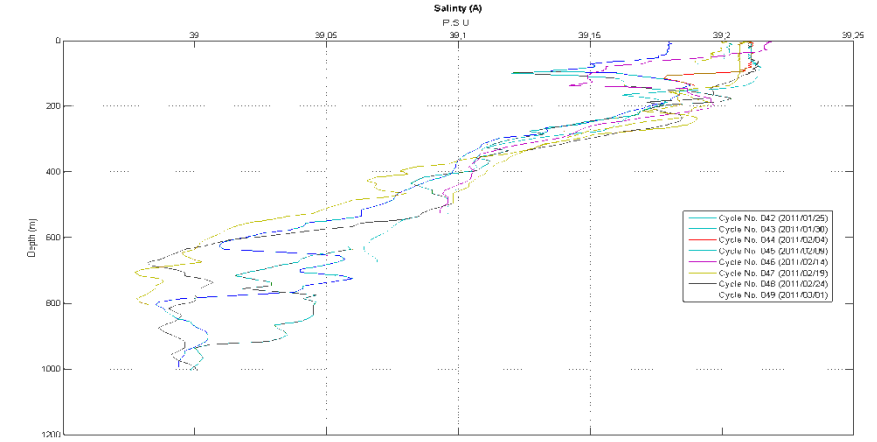

E1M3A
A
B
C

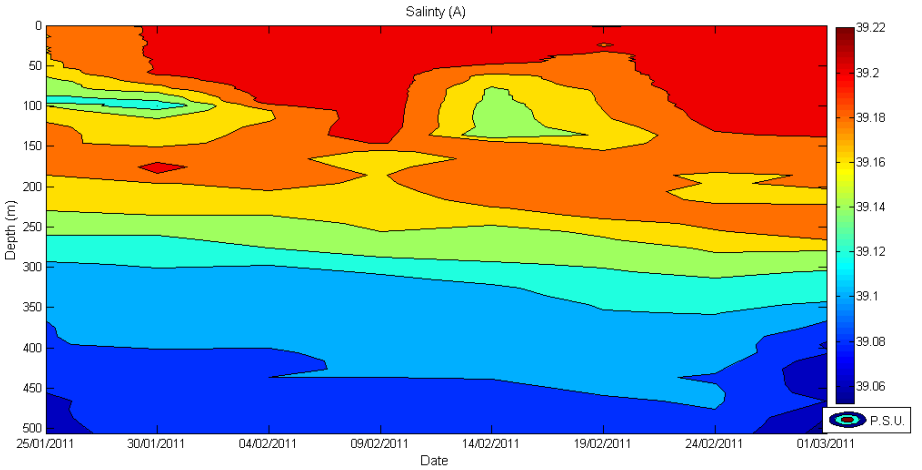

T S
Theta (°C)
Salinity (P.S.U)
A
B
C
28.5
29
29.5
19
18
17
16
15
14
13
38.7
38.8
38.9
39
39.1
39.2
39.3
39.4
39.5

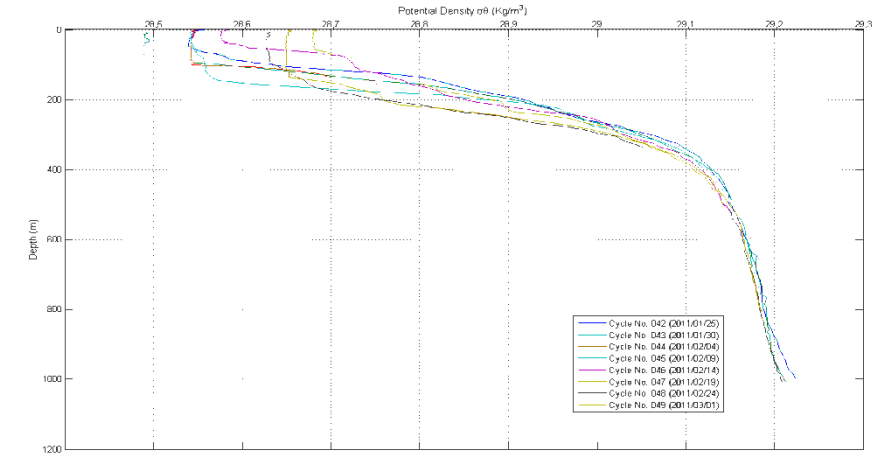

T S intermediate depths 100-600m
Theta (°C)
Salinity (P.S.U)
A
B
C
28
28.2
28.6
28.8
29
29.2
29.4
29.6
29.8
19
18
17
16
15
14
13
38.7
38.8
38.9
39
39.1
39.2
39.3
39.4
39.5

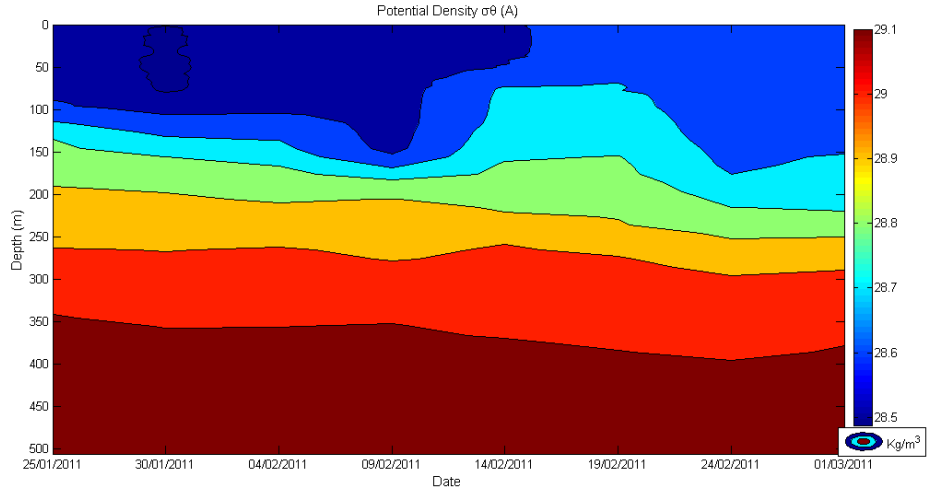

Potential Temperature (A)
°C
Depth (m)
Cycle No. 042 (2011/01/25)
Cycle No. 043 (2011/01/30)
Cycle No. 044 (2011/02/04)
Cycle No. 045 (2011/02/09)
Cycle No. 046 (2011/02/14)
Cycle No. 047 (2011/02/19)
Cycle No. 048 (2011/02/24)
Cycle No. 049 (2011/03/01)

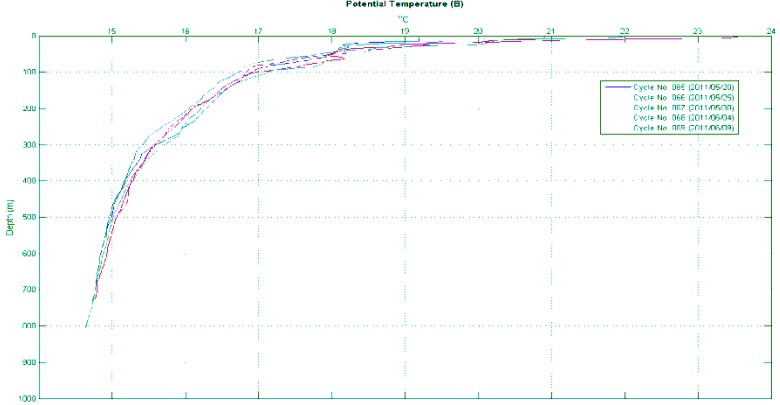

Potential Temperature (°C) (A)
Depth (m)
Date
25/01/2011
30/01/2011
04/02/2011
09/02/2011
14/02/2011
19/02/2011
24/02/2011
01/03/2011

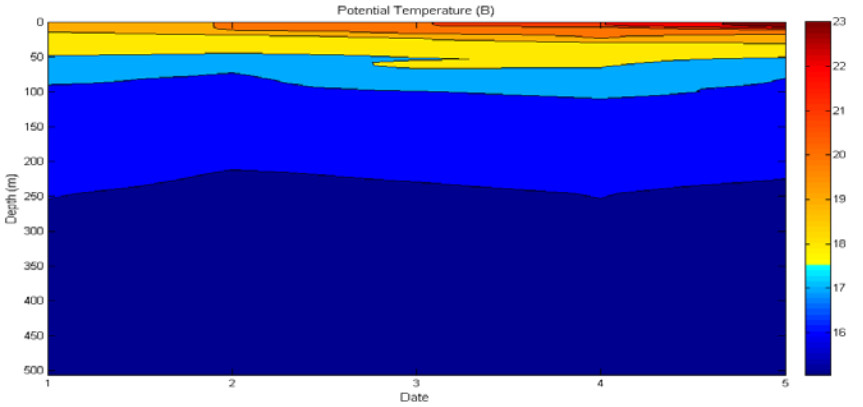

Salinty (A)
P.S.U
Depth (m)
Cycle No. 042 (2011/01/25)
Cycle No. 043 (2011/01/30)
Cycle No. 044 (2011/02/04)
Cycle No. 045 (2011/02/09)
Cycle No. 046 (2011/02/14)
Cycle No. 047 (2011/02/19)
Cycle No. 048 (2011/02/24)
Cycle No. 049 (2011/03/01)

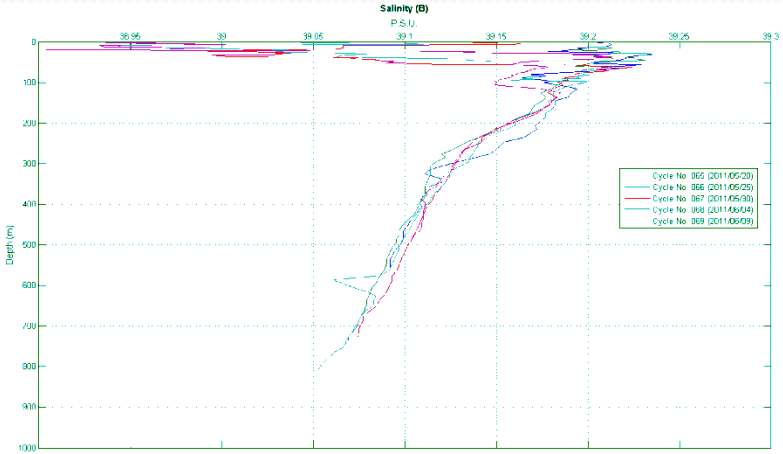

Salinty (A)
Depth (m)
Date
P.S.U.
25/01/2011
30/01/2011
04/02/2011
09/02/2011
14/02/2011
19/02/2011
24/02/2011
01/03/2011

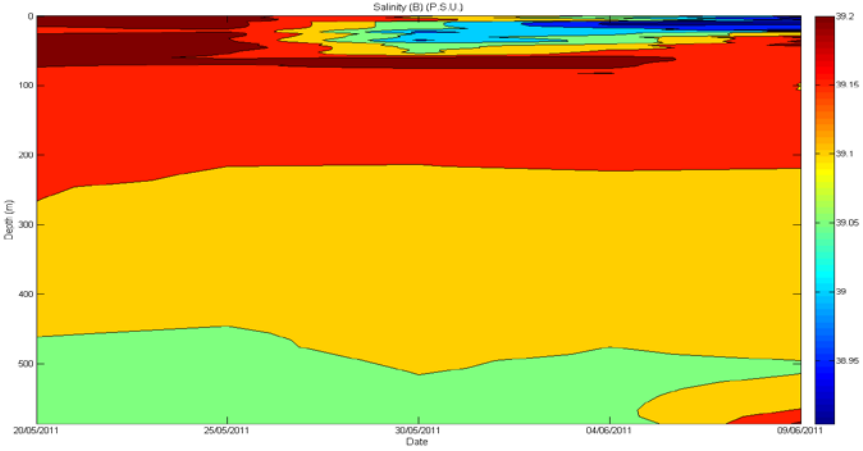

Potential Density σθ (Kg/m³)
Depth (m)
Cycle No. 042 (2011/01/25)
Cycle No. 043 (2011/01/30)
Cycle No. 044 (2011/02/04)
Cycle No. 045 (2011/02/09)
Cycle No. 046 (2011/02/14)
Cycle No. 047 (2011/02/19)
Cycle No. 048 (2011/02/24)
Cycle No. 049 (2011/03/01)

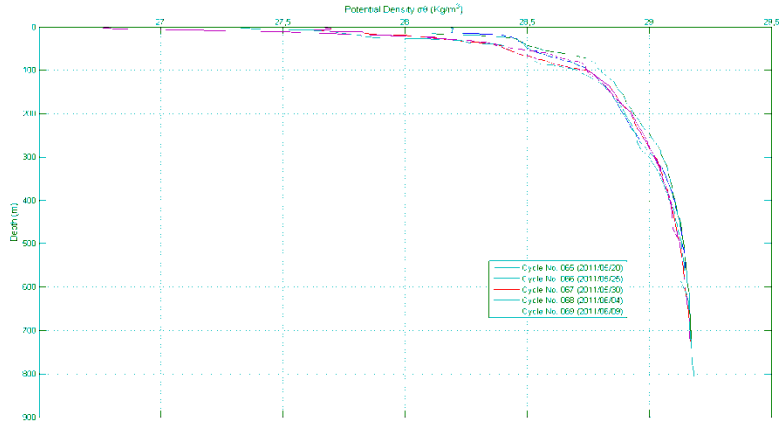

Potential Density σθ (A)
Depth (m)
Date
Kg/m³
25/01/2011
30/01/2011
04/02/2011
09/02/2011
14/02/2011
19/02/2011
24/02/2011
01/03/2011

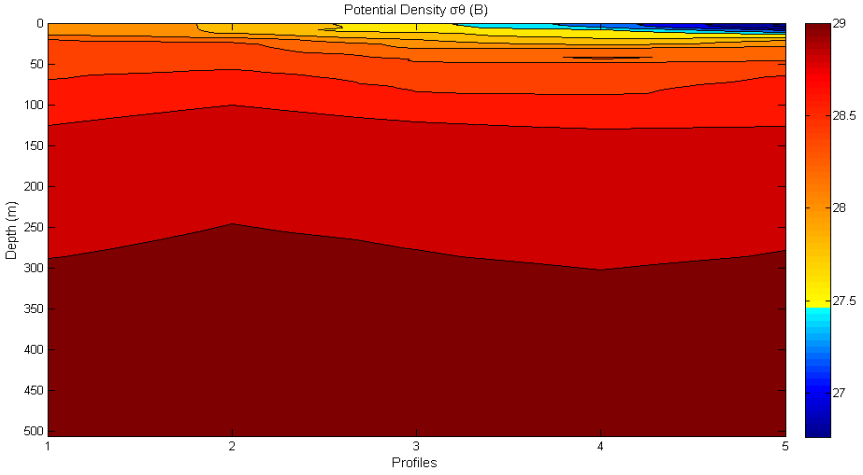

Potential Temperature (B)
°C
Depth (m)
Cycle No. 065 (2011/05/20)
Cycle No. 066 (2011/05/25)
Cycle No. 067 (2011/05/30)
Cycle No. 068 (2011/06/04)
Cycle No. 069 (2011/06/09)

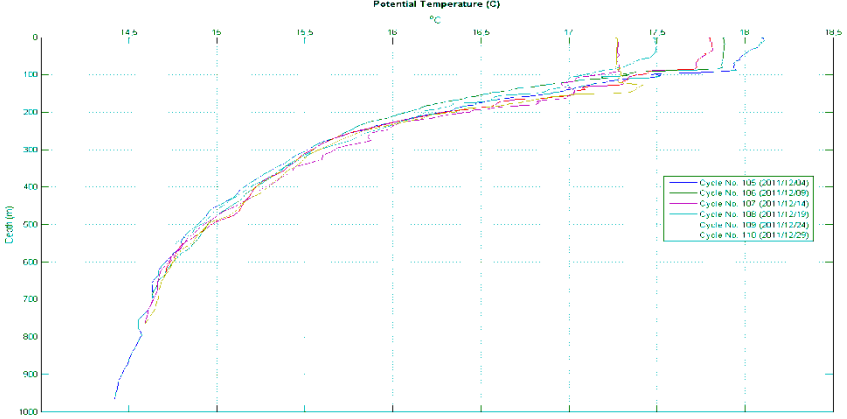

Potential Temperature (B)
Depth (m)
Date

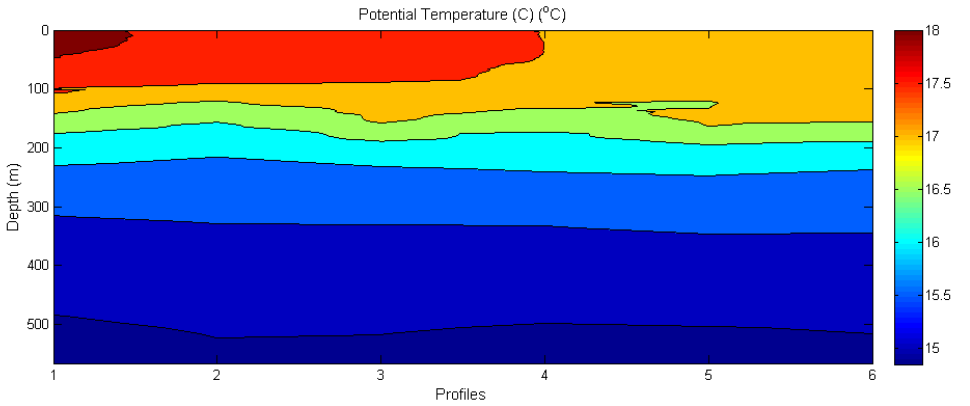

Salinity (B)
P.S.U.
Depth (m)
Cycle No. 065 (2011/05/20)
Cycle No. 066 (2011/05/25)
Cycle No. 067 (2011/05/30)
Cycle No. 068 (2011/06/04)
Cycle No. 069 (2011/06/09)

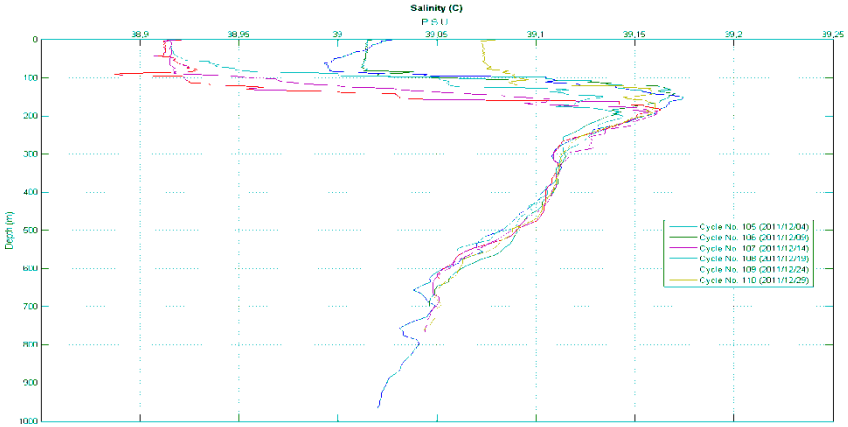

Salinity (B) (P.S.U.)
Depth (m)
20/05/2011
25/05/2011
30/05/2011
04/06/2011
09/06/2011
Date

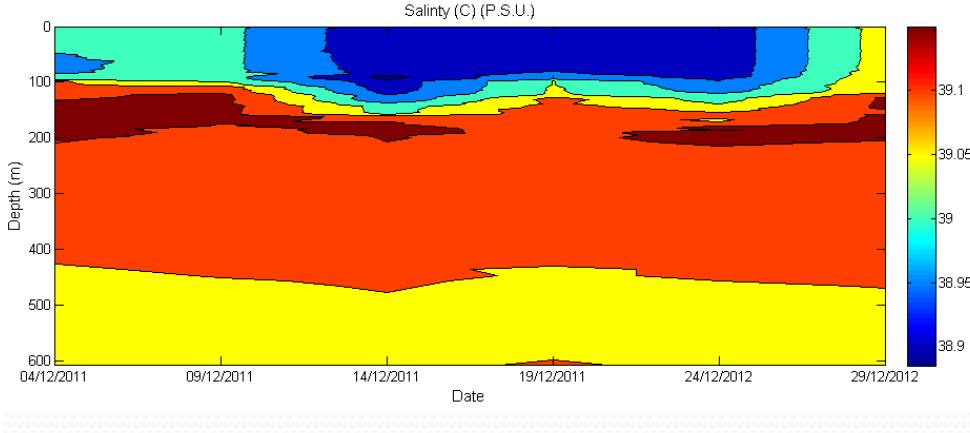

Potential Density σθ (Kg/m³)
Depth (m)
Cycle No. 065 (2011/05/20)
Cycle No. 066 (2011/05/25)
Cycle No. 067 (2011/05/30)
Cycle No. 068 (2011/06/04)
Cycle No. 069 (2011/06/09)

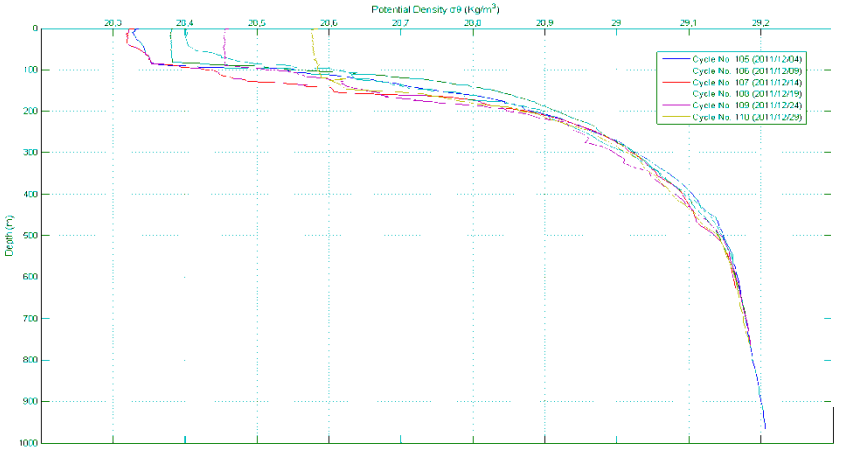

Potential Density σθ (B)
Depth (m)
Profiles

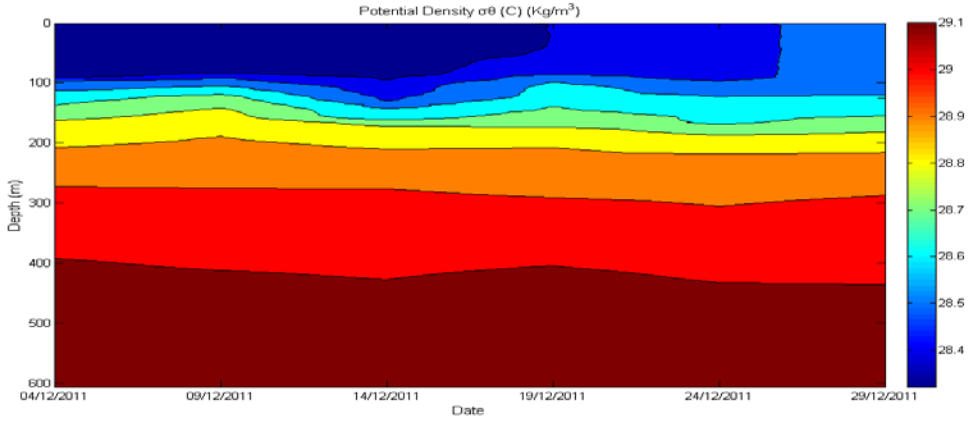

Potential Temperature (C)
°C
Depth (m)
Cycle No. 105 (2011/12/04)
Cycle No. 106 (2011/12/09)
Cycle No. 107 (2011/12/14)
Cycle No. 108 (2011/12/19)
Cycle No. 109 (2011/12/24)
Cycle No. 110 (2011/12/29)

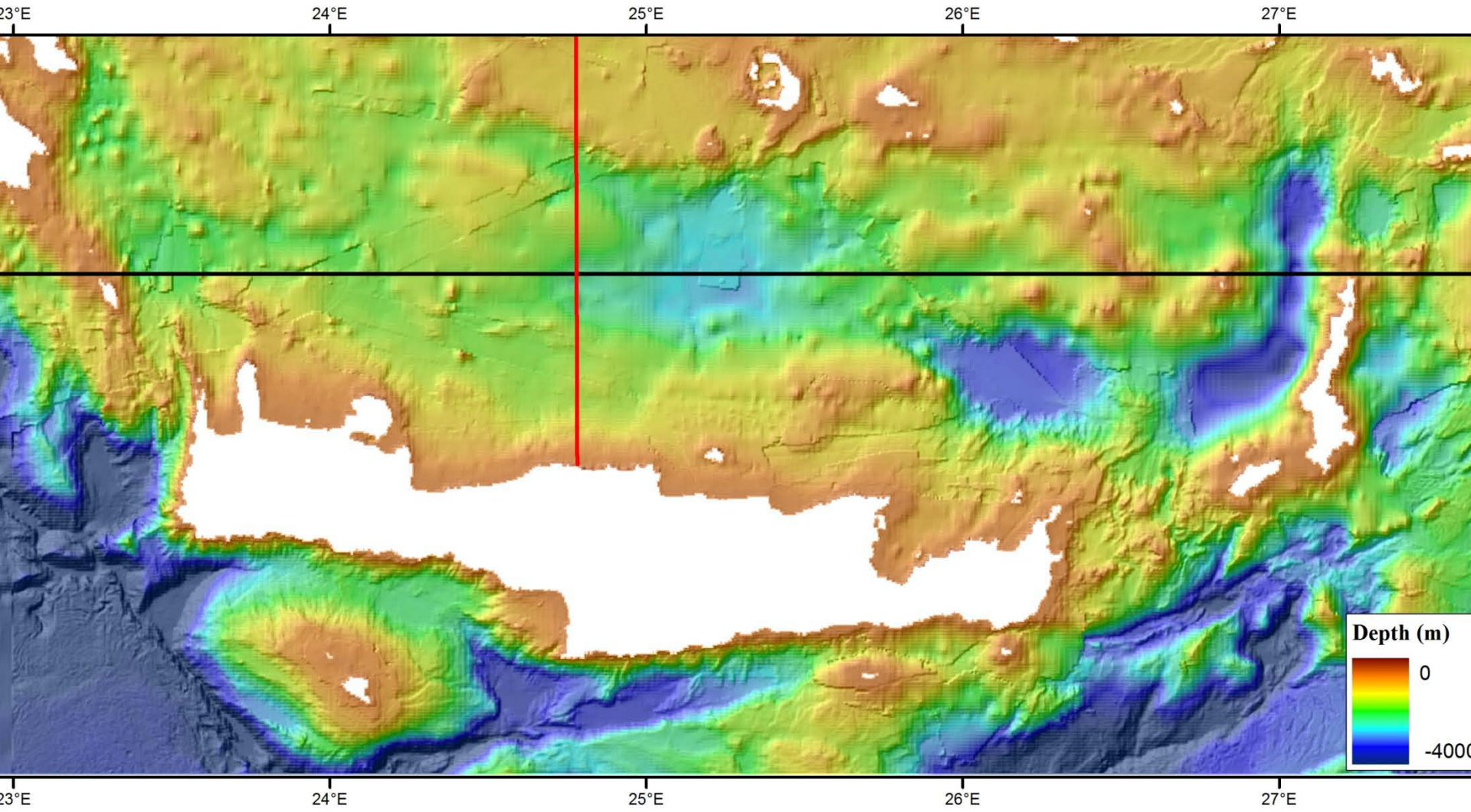

Potential Temperature (C) (°C)
Depth (m)
Profiles

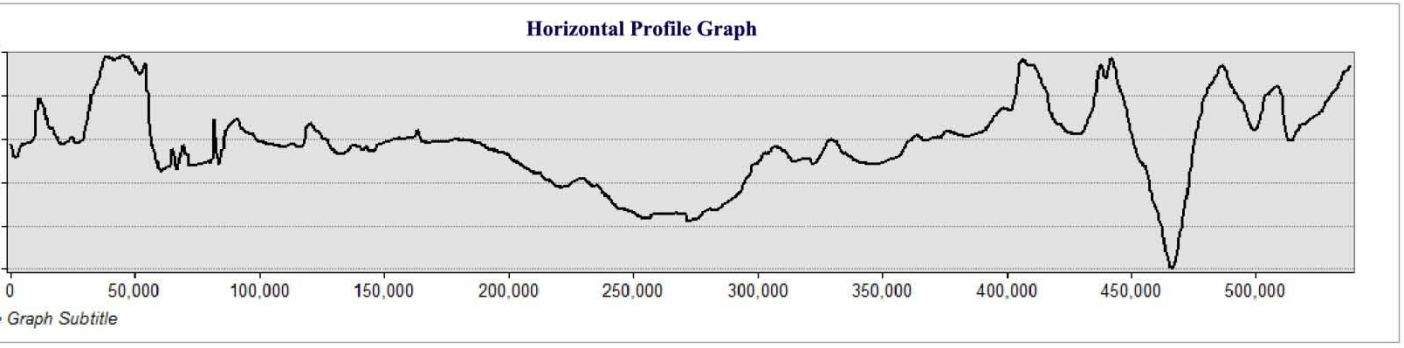

Salinity (C)
P.S.U.
Depth (m)
Cycle No. 105 (2011/12/04)
Cycle No. 106 (2011/12/09)
Cycle No. 107 (2011/12/14)
Cycle No. 108 (2011/12/19)
Cycle No. 109 (2011/12/24)
Cycle No. 110 (2011/12/29)

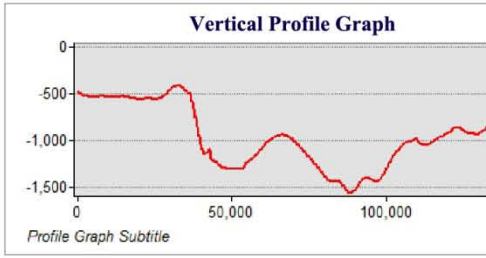

Salinty (C) (P.S.U.)
Depth (m)
04/12/2011
09/12/2011
14/12/2011
19/12/2011
24/12/2012
29/12/2012
Date


Potential Density σθ (Kg/m³)
Depth (m)
Cycle No. 105 (2011/12/04)
Cycle No. 106 (2011/12/09)
Cycle No. 107 (2011/12/14)
Cycle No. 108 (2011/12/19)
Cycle No. 109 (2011/12/24)
Cycle No. 110 (2011/12/29)

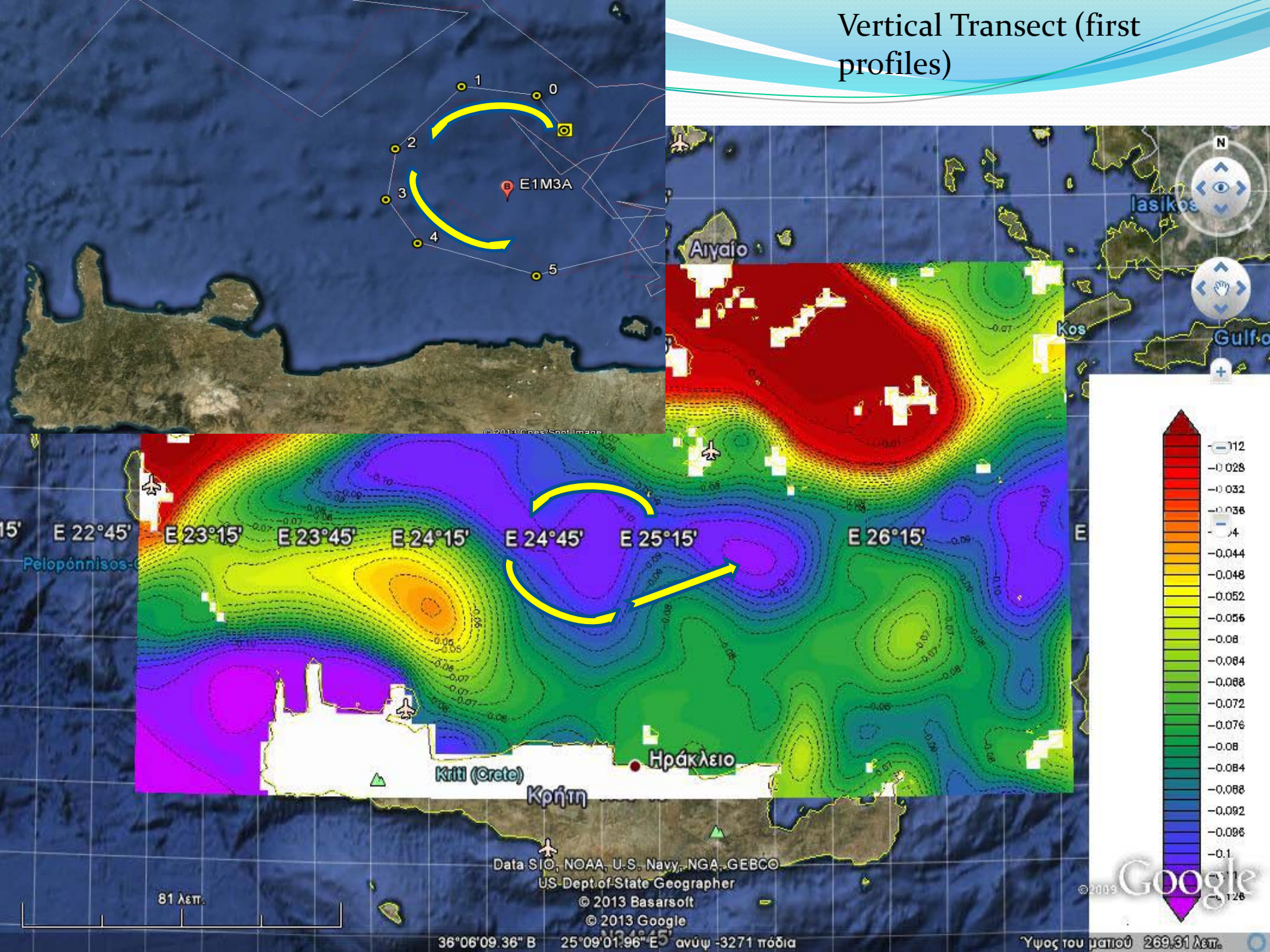

Potential Density σθ (C) (Kg/m³)
Depth (m)
04/12/2011
09/12/2011
14/12/2011
19/12/2011
24/12/2011
29/12/2011
Date

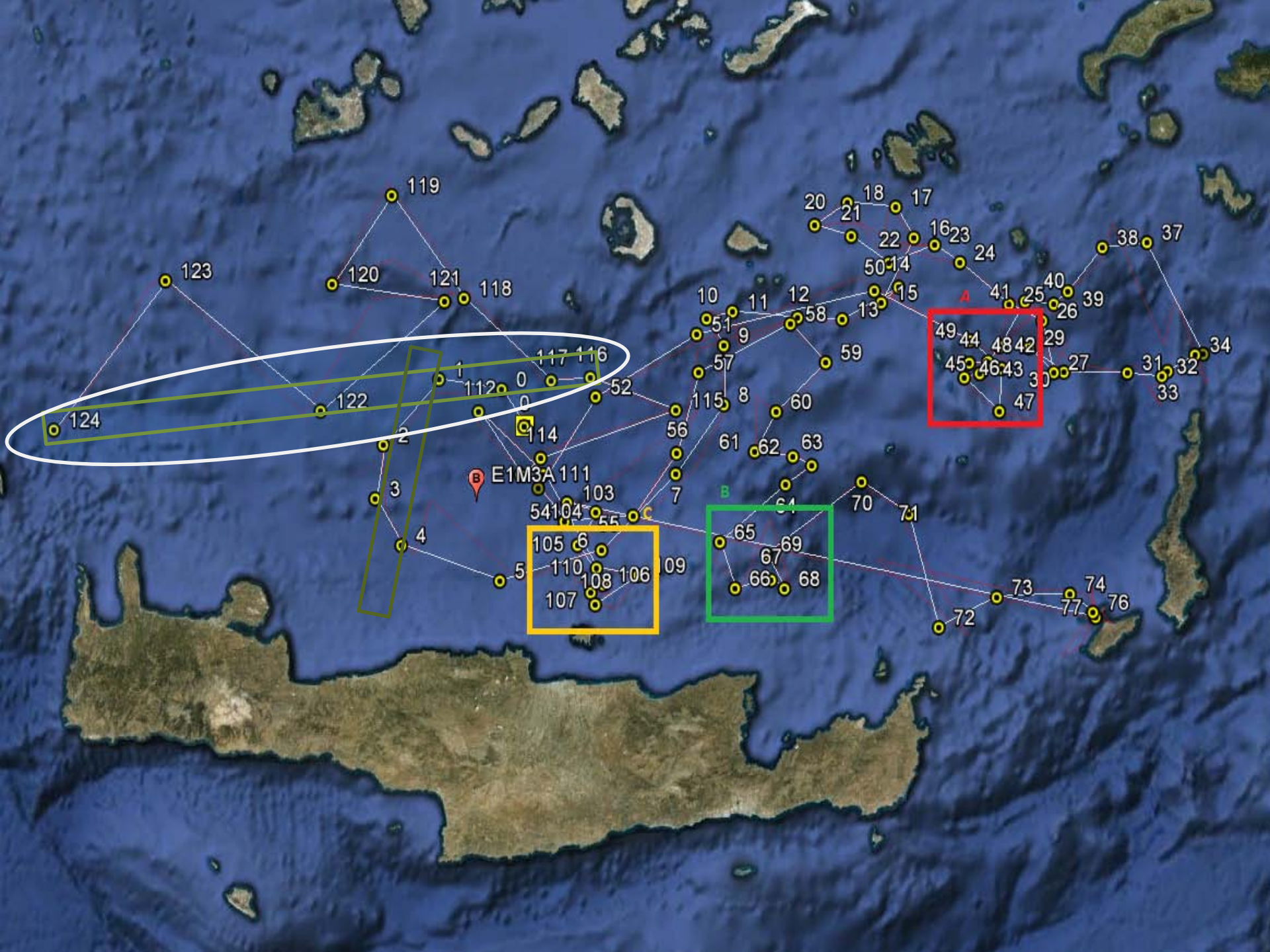

23°E
24°E
25°E
26°E
27°E
Depth (m)
0
-4000

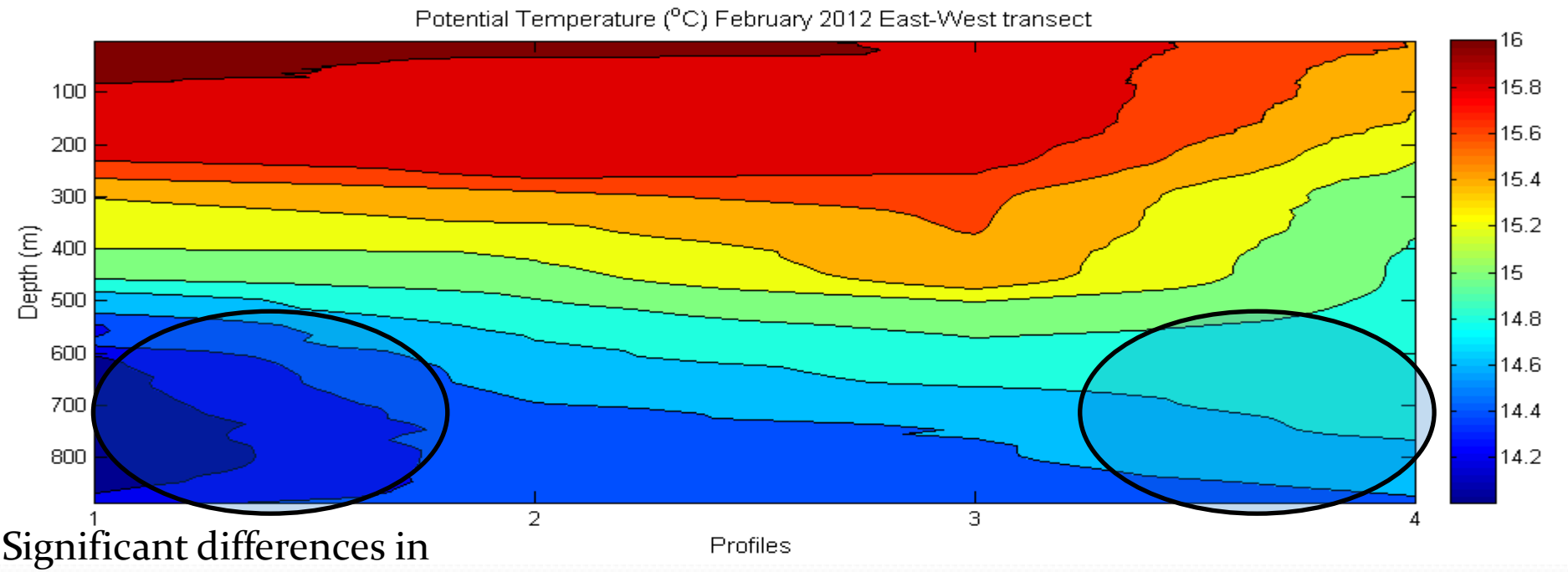

Horizontal Profile Graph
0
50,000
100,000
150,000
200,000
250,000
300,000
350,000
400,000
450,000
500,000
Graph Subtitle


Vertical Profile Graph
0
-500
-1,000
-1,500
0
50,000
100,000
Profile Graph Subtitle

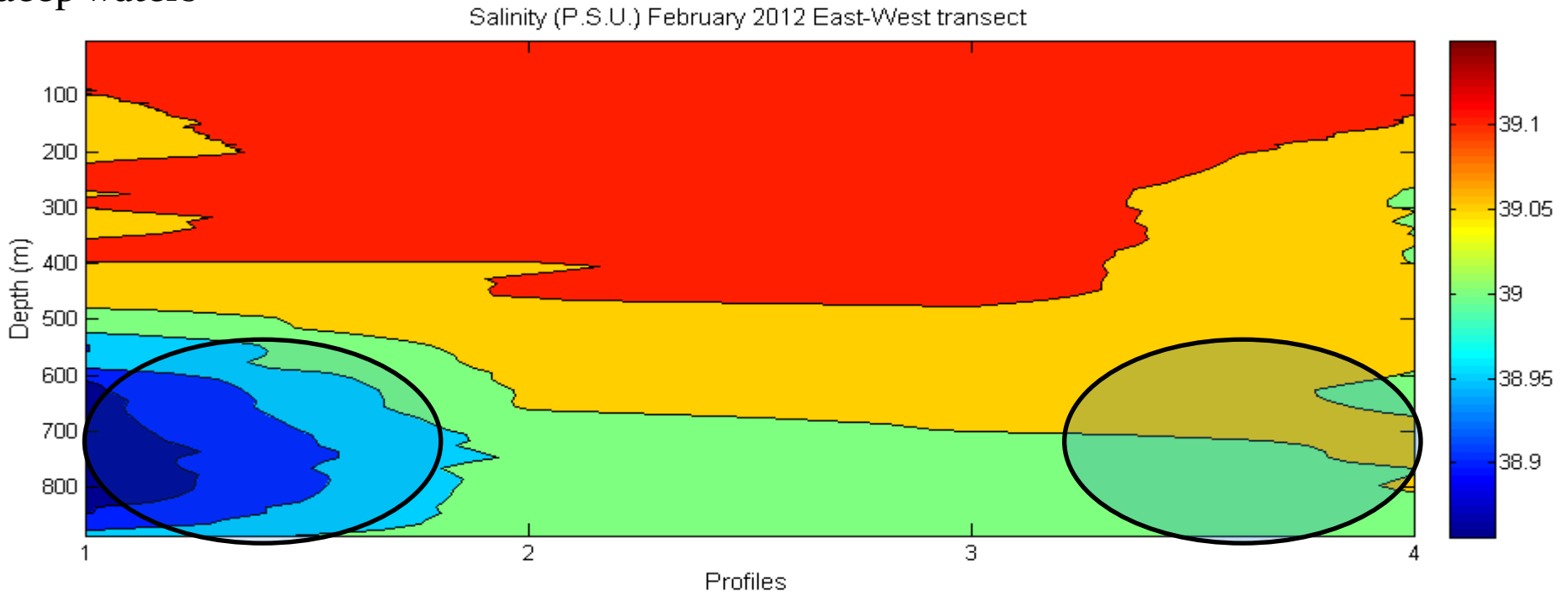
Vertical Transect (first profiles)

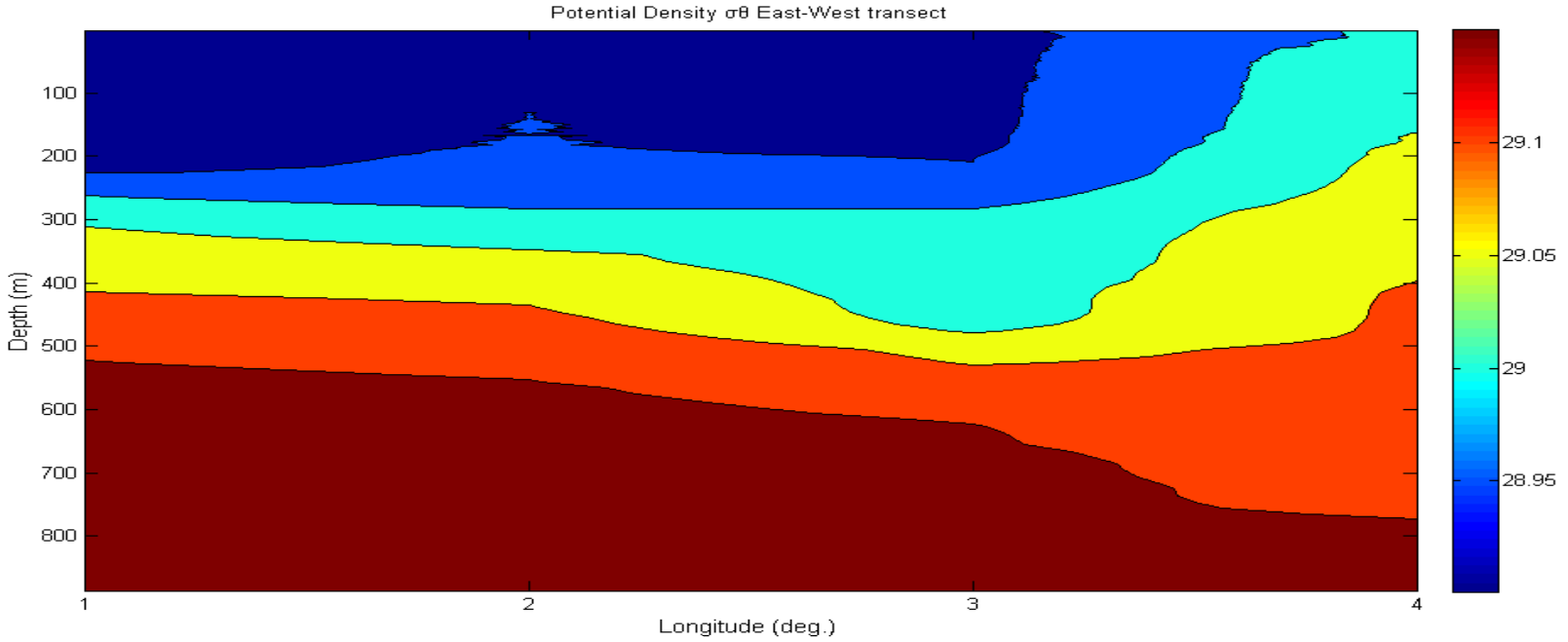


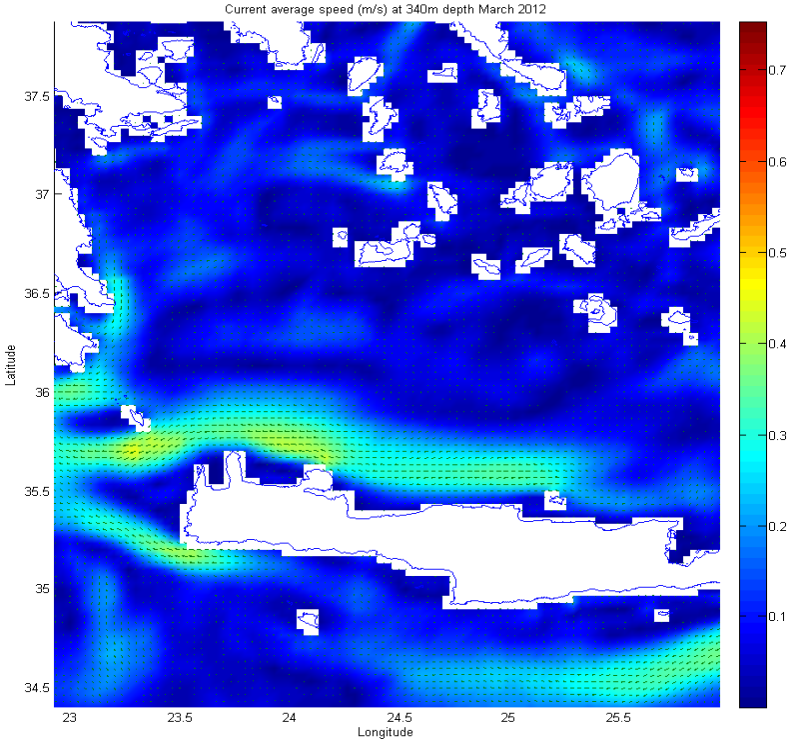

E1M3A
A
B
C

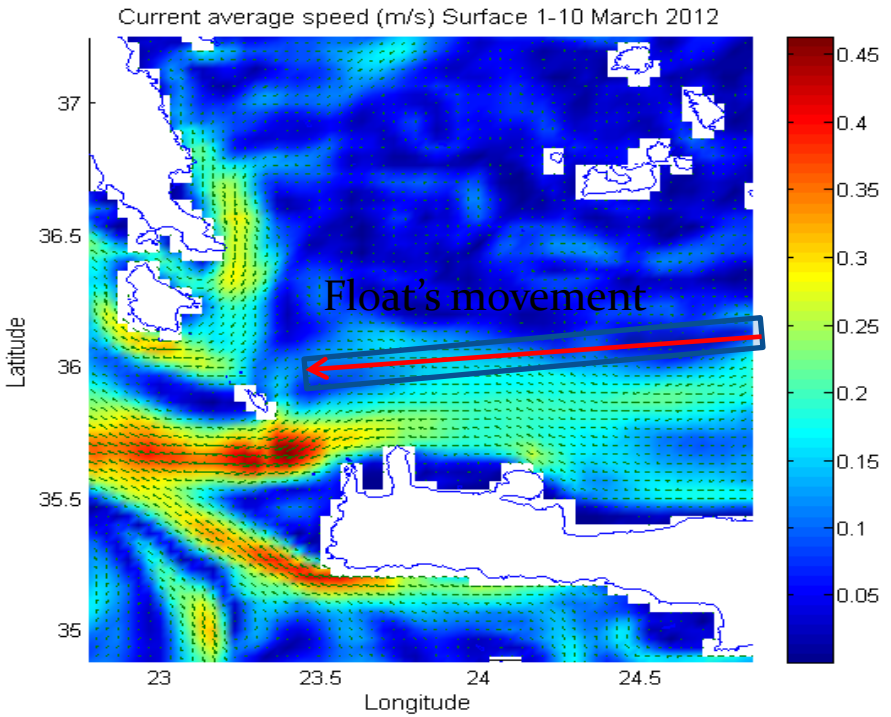


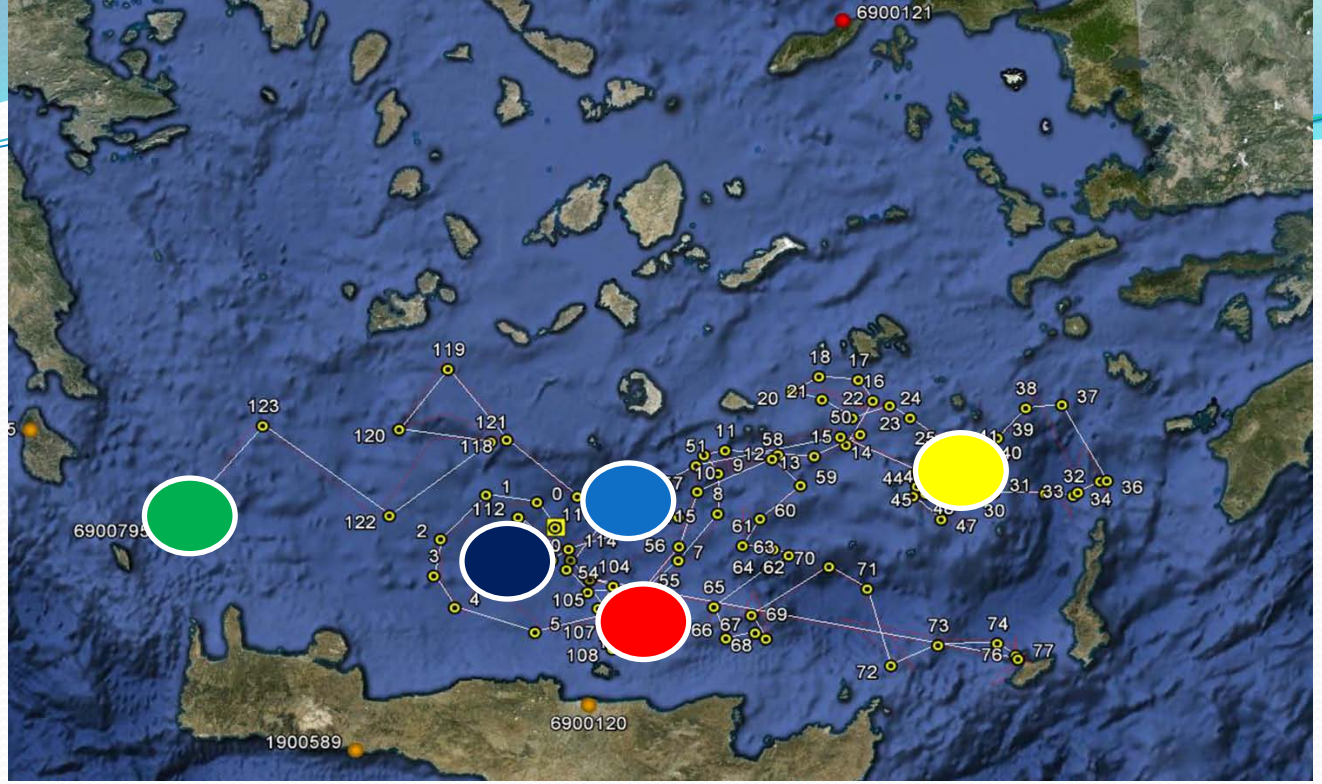
Significant differences in deep waters

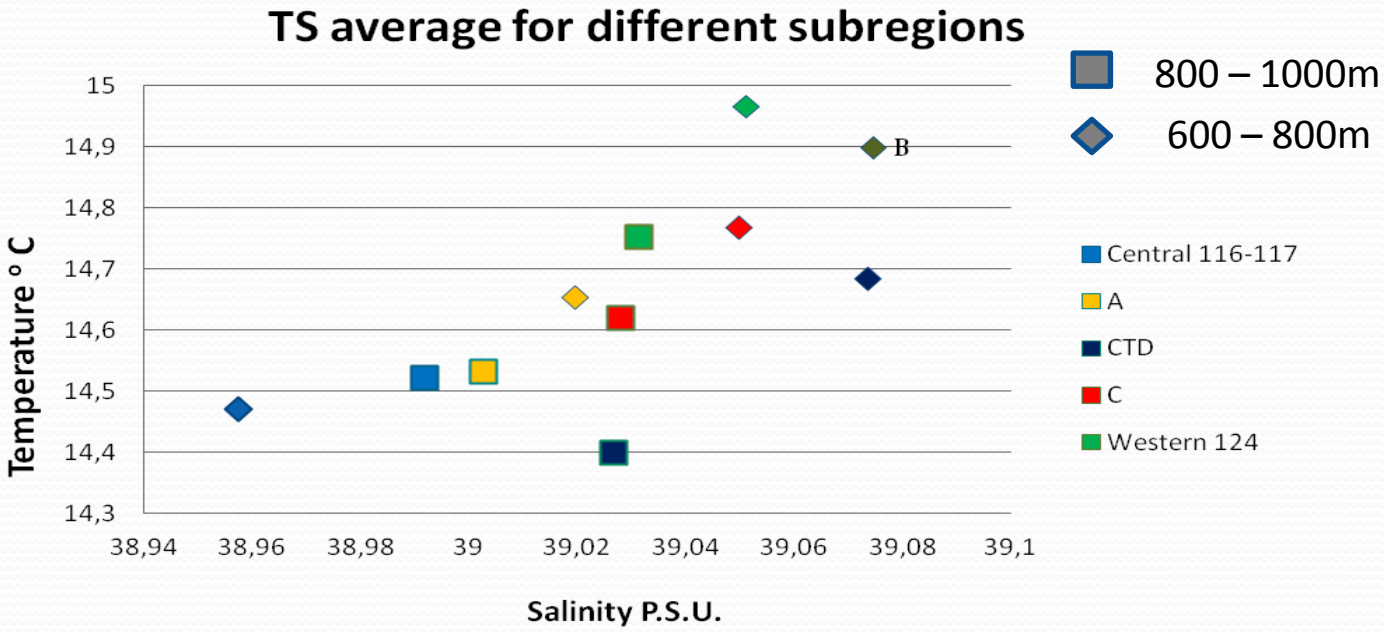



Potential Density σθ East-West transect
Depth (m)
100
200
300
400
500
600
700
800
1
2
3
4
Longitude (deg.)
29.1
29.05
29
28.95


Current average speed (m/s) at 340m depth March 2012
Latitude
37.5
37
36.5
36
35.5
35
34.5
23
23.5
24
24.5
25
25.5
Longitude
0.7
0.6
0.5
0.4
0.3
0.2
0.1


Current average speed (m/s) Surface 1-10 March 2012
Float's movement
Latitude
37
36.5
36
35.5
35
23
23.5
24
24.5
Longitude
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05

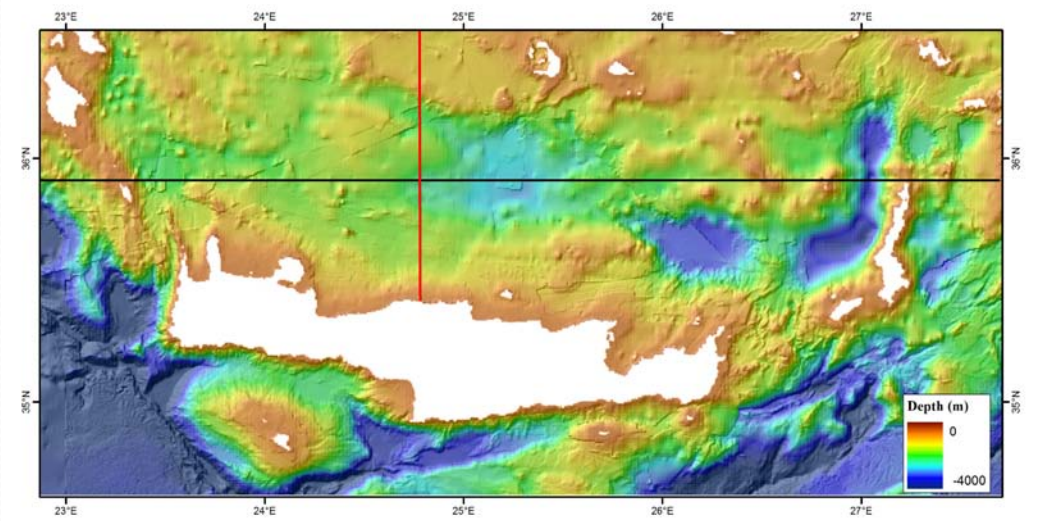

6900121
6900120
1900589
6900795

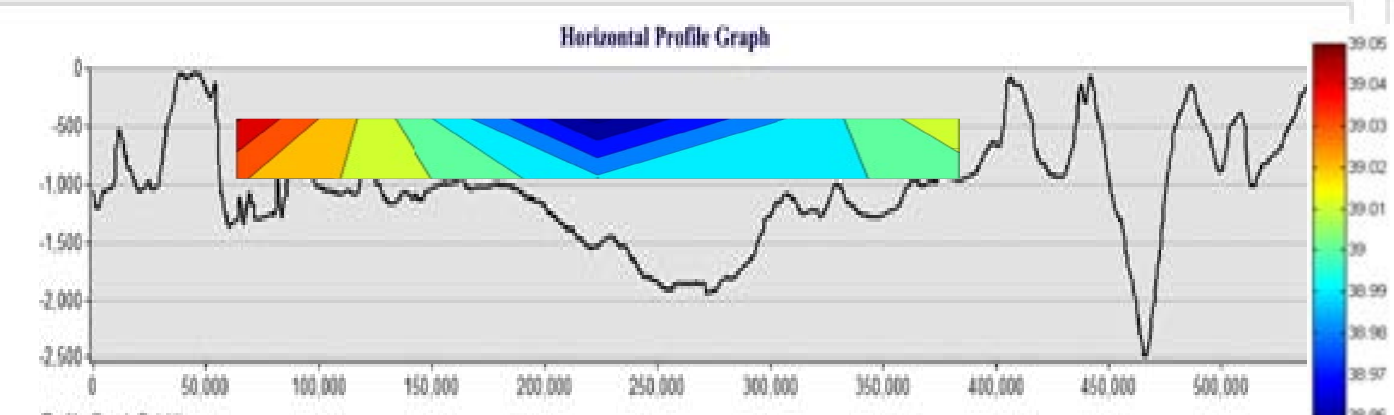

TS average for different subregions
Temperature ° C
Salinity P.S.U.
15
14,9
14,8
14,7
14,6
14,5
14,4
14,3
38,94
38,96
38,98
39
39,02
39,04
39,06
39,08
39,1
B
800 – 1000m
600 – 800m
Central 116-117
A
CTD
C
Western 124

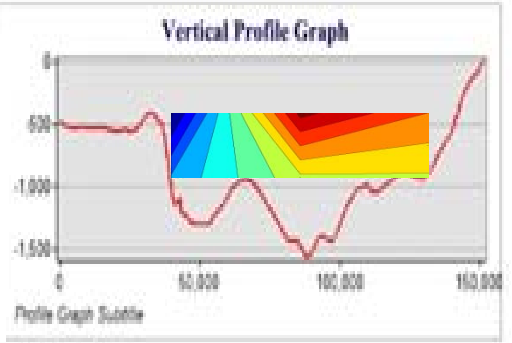
Concluding remarks….

- Large temporal and spatial variability regarding water masses physical properties

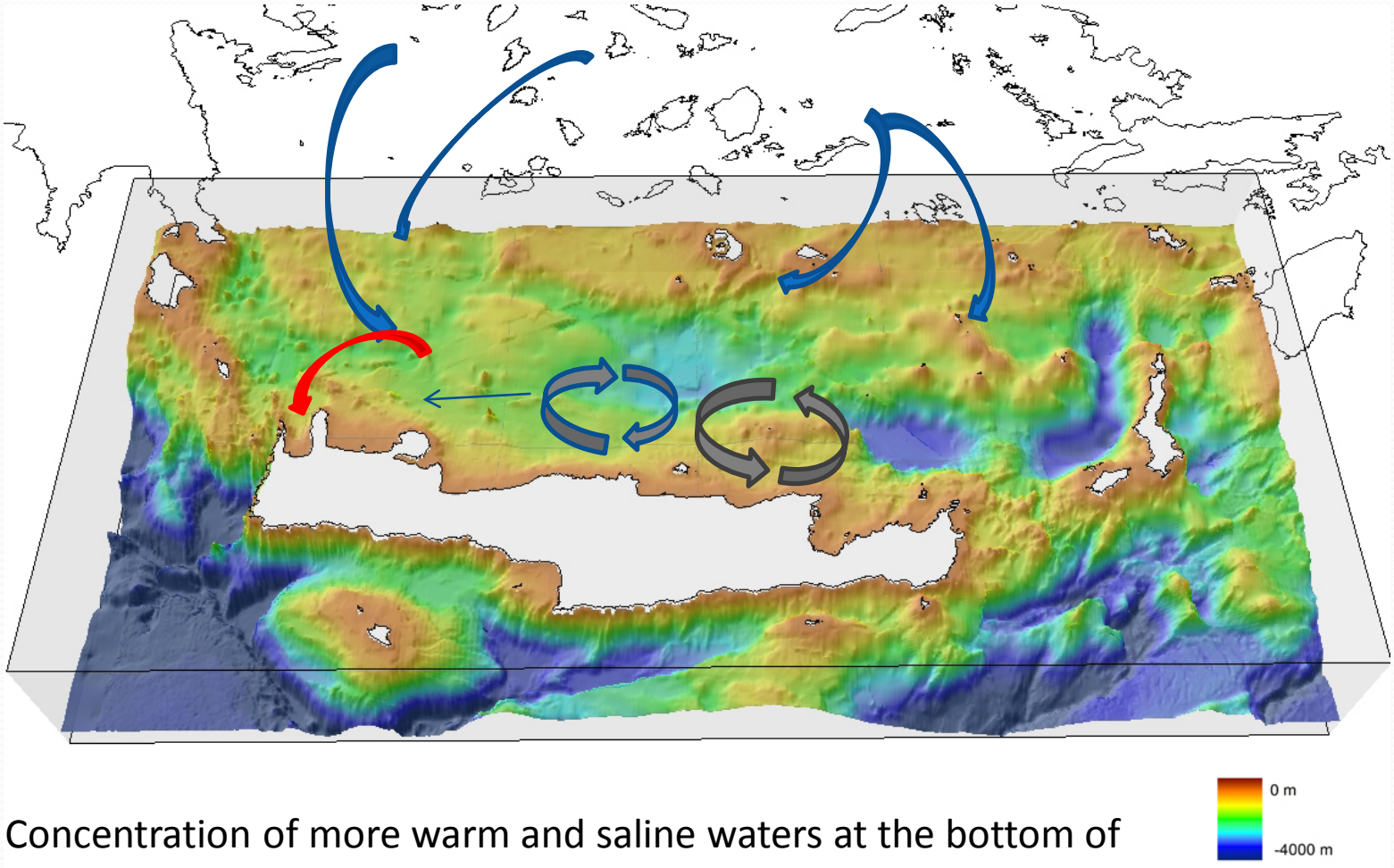
- Deep waters with different characteristics are traced along the basin, big differences revealed at intermediate depths







• Strong thermohaline circulation at subsurface layers, cyclonic-anti-cyclonic dipole presents a significant westward shift



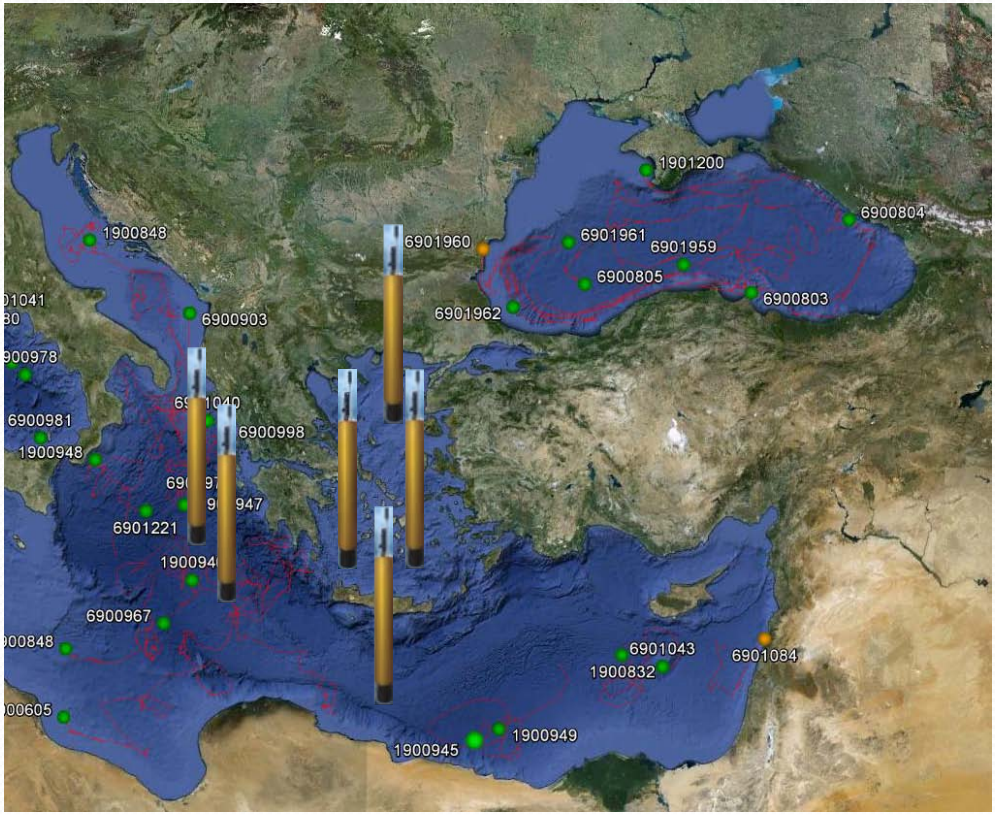
• Concentration of more warm and saline waters at the bottom of western boundary of the basin

• An “interesting” north-eastern flow of fresher water (Black Sea origin) entering Cretan basin

Further Steps…

- Launch of the Greek Argo infrastructure funded by the National Strategic Reference Framework (NSRF) will contribute to an enhanced monitoring over Aegean and Ionian seas as well as Eastern Mediterranean region in general.
  25 Iridium floats will be deployed during the next 4 years

- By the end of 2013 we plan to deploy 6 floats in total in the Ionian (2 floats), in the Aegean Sea (3 floats) and South of Crete (1 float). One of these floats has been already purchased with PERSEUS funds, two will be purchased with IONIO (Interreg-III) allocated funds while National Greek Argo programme will contribute with three additional floats



Thank you!