

**Project:
Profiling Float Observations in the Aegean Sea**

Cruise I

CRUISE REPORT

1. Introduction and objectives

The Profiling Float Observations in the Aegean Sea - Cruise I experiment is a joint effort of the **University of Washington, the Hellenic Center for Marine Research and the University of Athens**. The overall objective of this project is to provide a continuous long-term record of temperature and salinity characteristics of the water column in the major deep basins of the Aegean Sea. The results of these measurements can contribute significantly to our understanding of the seasonal and interannual variability of the circulation and water mass characteristics in the region as well as to the connection between the different sub-basins. The project is funded by the **Office of Naval Research** and the **U.S. Office of Naval Research Global**

More specifically, the project is aiming to

- produce an updated climatology of water mass structure in the larger sub-basins of the Aegean Sea
- monitor patterns of the interannual variability in the water mass structure, the circulation and water mass formation of the region
- create a valuable data set for numerical model initialization and assimilation used by the operational near real time models of the region (POSEIDON, ALERMO).



Figure 1. The R/V Aegaeo

In order to achieve these objectives, four (4) profiling floats will be deployed in the Aegean Sea and a series of cruises will be conducted in the various sub-basins. This report describes the fieldwork carried out during the first cruise (Cruise I) aboard the R/V Aegaeo that took place in March 2005. The shipboard scientific activities consisted of the deployment of the first two (2) profiling floats (prepared by the University of Washington – PI: S. Riser) and a hydrographic survey in the areas of deployment as well as on key location of exchange between sub-basins. Analysis of the experimental data will lead to a better understanding of the water mass characteristics and formation processes as well as the mechanisms of exchange between the various sub-basins.

2. Cruise Dates and Personnel

The cruise was carried out aboard the R/V Aegaeo (Figure 1), from March 1 to March 10, 2005. The R/V Aegaeo departed from Piraeus, Greece, on March 1, 2005 and proceeded to the study areas (North Aegean and Cretan Sea). The cruise ended in Piraeus on March 10, 2005.

TABLE 1. SCIENCE PERSONEL			
	NAME	INSTITUTE	POSITION
1	Alexander Theocharis	Hellenic Center for Marine Research	Researcher (Chief Scientist)
2	Sarantis Sofianos	University of Athens	Researcher
3	Pangiotis Renieris	Hellenic Center for Marine Research	Technician
4	Athanasios Morphis	Hellenic Center for Marine Research	Technician
5	Vassilis Vervatis	University of Athens	PhD Student

3. Scientific Activities

3.1. CTD Stations

A total of 44 hydrographic (CTD) stations were occupied on the cruise. The location of the CTD stations was selected in the areas of the profiling float deployment to capture the three-dimensional structure and circulation pattern of the specific regions. A few stations (9) were occupied in various locations around the Aegean Sea basin in order to investigate exchange of water masses between the Aegean Sea sub-basins. Table 2 contains station times, locations and depths, and the stations locations are plotted in Figure 2. At each station, profiles of temperature, salinity (conductivity),

and dissolved oxygen concentration were collected using a Sea-Bird CTD system. Water samples for the calibration of the salinity were collected at seven stations.

TABLE 2. CTD STATIONS								
	LATITUDE	LONGITUDE	DATE			Time	Max. Depth	Calibration
			YY	MM	DD			
1	40 05.33	25 00.02	05	03	03	14:15	480	Sal
2	40 12.51	25 00.49	05	03	03	15:20	380	
3	40 18.69	25 00.07	05	03	03	16:25	255	
4	40 25.11	25 00.02	05	03	03	17:20	340	
5	40 24.97	25 08.02	05	03	03	18:05	350	
6	40 18.57	25 07.95	05	03	03	19:05	675	Sal
7	40 18.60	25 15.99	05	03	03	20:05	580	
8	40 24.97	25 16.26	05	03	03	21:05	110	
9	40 24.95	25 23.93	05	03	03	21:45	100	
10	40 18.72	25 23.81	05	03	03	22:35	305	
11	40 12.19	25 23.90	05	03	03	23:35	505	
12	40 06.34	25 23.46	05	03	04	00:25	114	
13	40 06.16	25 16.32	05	03	04	01:05	245	
14	40 12.14	25 15.88	05	03	04	01:50	1295	
15	40 12.26	25 08.40	05	03	04	03:15	1320	
16	40 05.79	25 07.72	05	03	04	05:15	460	Sal
17	40 13.89	25 16.18	05	03	04	11:35	1550	
18	35 30.18	25 49.22	05	03	07	14:50	680	
19	35 35.00	25 59.00	05	03	07	16:15	1595	
20	35 34.99	26 09.50	05	03	07	18:10	2290	Sal
21	35 29.97	26 07.86	05	03	07	20:00	1616	
22	35 34.73	26 17.05	05	03	07	21:50	2255	
23	35 30.19	26 25.73	05	03	08	00:10	1380	
24	35 35.20	26 26.46	05	03	08	01:50	1815	
25	35 29.89	26 41.60	05	03	08	04:15	2005	
26	35 40.42	26 34.99	05	03	08	06:40	1530	
27	35 40.28	26 25.98	05	03	08	08:20	2065	
28	35 45.45	26 26.19	05	03	08	10:10	815	
29	35 45.54	26 16.90	05	03	08	11:50	1860	Sal
30	35 37.21	25 38.39	05	03	09	10:05	365	
31	35 40.30	25 58.79	05	03	09	12:05	2135	
32	35 40.64	26 07.12	05	03	09	14:00	2315	
33	35 40.41	26 16.53	05	03	09	15:50	2320	
34	35 45.41	26 07.79	05	03	09	18:10	2050	
35	35 45.55	25 58.91	05	03	09	19:55	1585	Sal
36	39 14.93	25 39.74	05	03	04	19:40	325	
37	39 09.24	25 48.42	05	03	04	20:50	120	
38	37 42.70	25 28.72	05	03	06	19:10	810	Sal
39	37 30.71	25 27.61	05	03	06	21:50	130	
40	36 47.16	24 12.21	05	03	07	02:20	100	
41	36 15.40	25 29.78	05	03	07	09:30	305	
42	35 48.89	25 21.04	05	03	10	01:40	1885	
43	36 18.68	24 11.94	05	03	10	08:40	995	
44	36 51.84	24 01.52	05	03	10	12:30	1063	

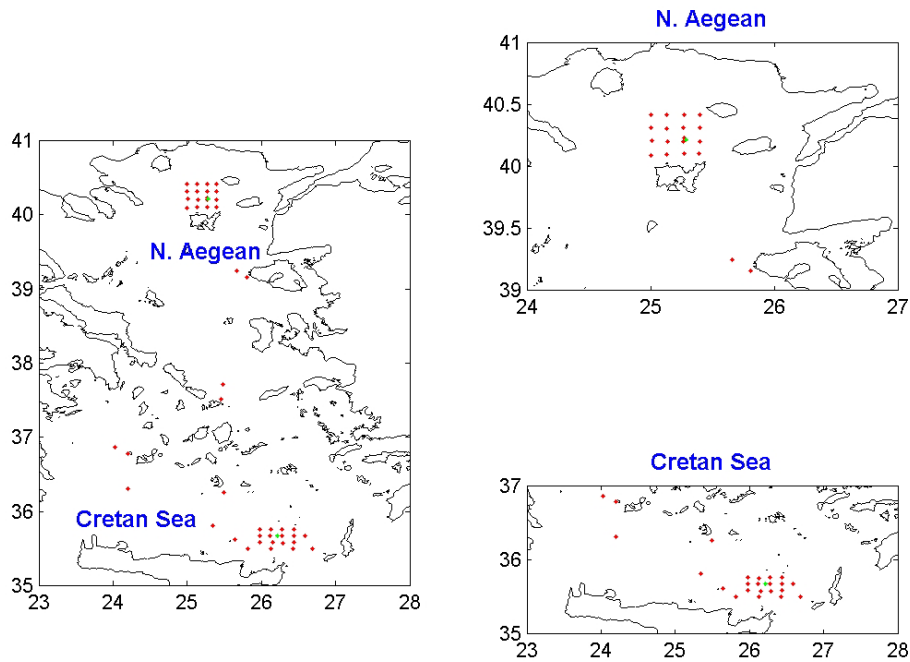


Figure 2. Locations of the CTD stations (red dot) and the profiling floats deployment (green dot).

3.2. Profiling floats

The first two profiling floats were deployed during the cruise at two of the deepest sub-basins of the Aegean Sea (Table 3). These floats are APEX-style profiling floats with Sea-Bird CTD sensors, constructed at the University of Washington in Seattle from components purchased from Webb Research Corporation. The parking depths were selected relatively close to the bottom (1100 m in the north basin and 2000 m to the south) to measure the biggest part of the water column and in order to ensure that the floats are trapped in the basins. The time of deployment was selected in order to avoid fishing and other activities during the surfacing of the profiling floats.

Temperature, salinity, density and oxygen concentrations from CTD stations closest to the deployment site are presented in Figures 3 and 4.

TABLE 3. Profiling Float Deployment					
ARGOS No.	Reset Time (Local)	Date	Deployment Time (Local)	Latitude	Longitude
2014	13:32	04/03/2005	13:55	40° 12.92'	25° 17.29'
2058	04:00	09/03/2005	04:30	35° 40.44'	26° 12.64'

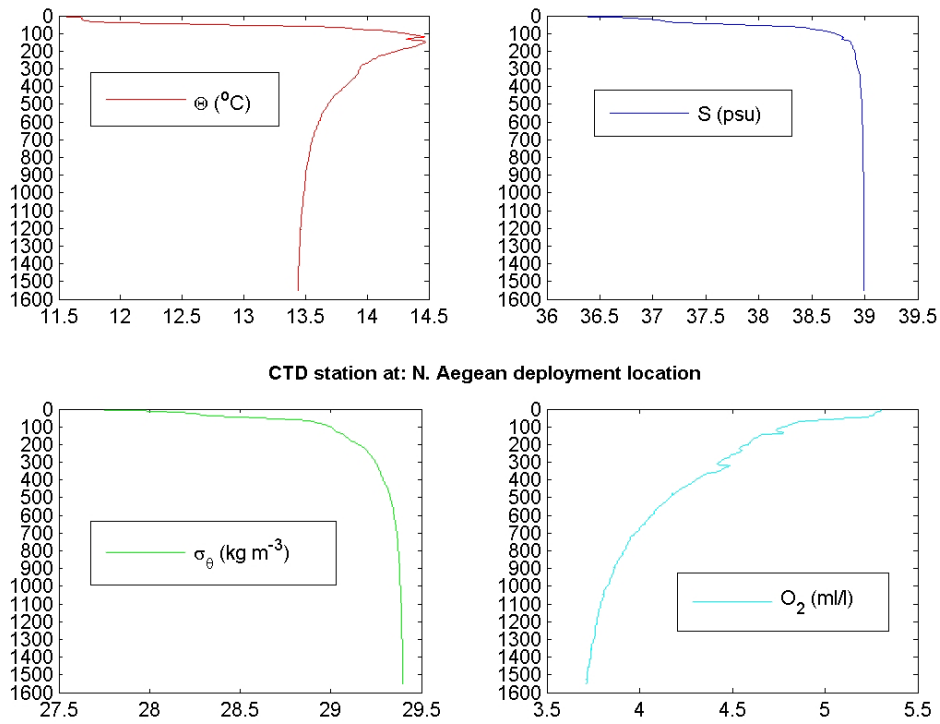


Figure 3. Temperature, salinity, density and oxygen concentrations from CTD station closest to the deployment site in the North Aegean.

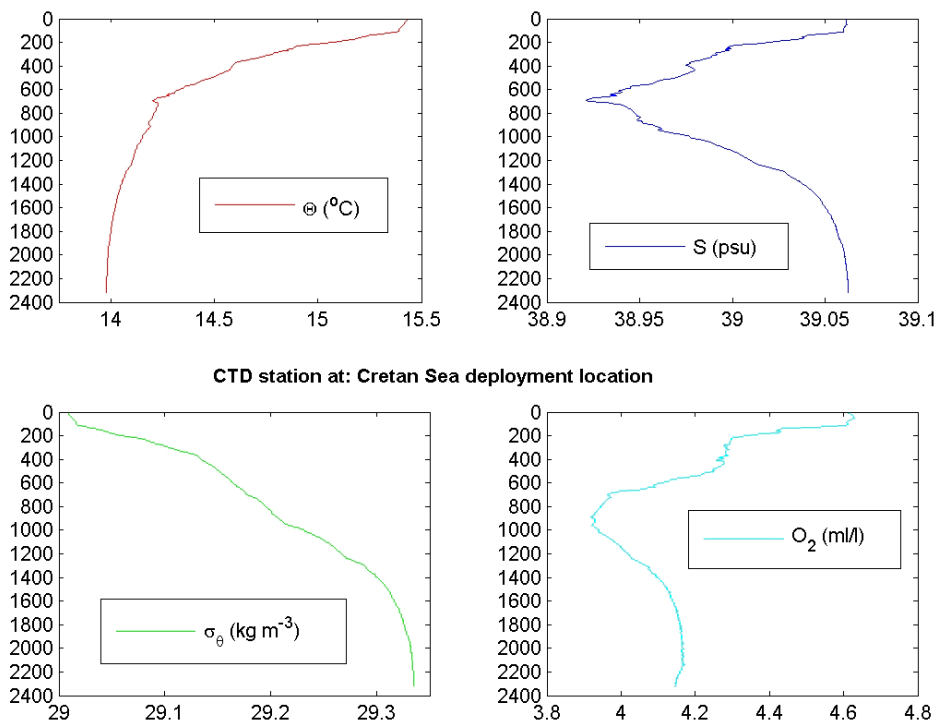


Figure 4. Temperature, salinity, density and oxygen concentrations from CTD station closest to the deployment site in the Cretan Sea (Southern Aegean).

The two profiling floats were deployed successfully and results can be viewed at the website: <http://runt.ocean.washington.edu/uo>

4. Preliminary findings and future work

The hydrographic measurements will be processed and used together with the profiling float measurements to investigate the water mass stratification of region. They will be also used as part of a PhD thesis in the University of Athens. Figure 5 presents a summary of the temperature/salinity characteristics measured during the hydrographic survey. The different colors correspond to the different sub-basins (blue for the North Aegean, red for the Cretan Sea and green for the various stations in the peripheries of the two main sampling sites). There is a remarkable difference of the temperature/salinity characteristics of the two main sub-basins. At the surface layers this can attributed to the presence of the Black Sea Water in the northern basin (inflowing to the Aegean from the Dardanelles strait with very low temperature and salinity), while in the Cretan Sea surface waters are influenced by the warmer and more saline waters of Levantine origin. The intermediate and deep-water temperature and salinity differences are also important, indicating a possible decoupling of the two sub-basins. The present data set should be compared with available historical data and modeling results in the region in order to evaluate the findings in the context of the very strong climatic variability of the region (Eastern Mediterranean Transient, etc.).

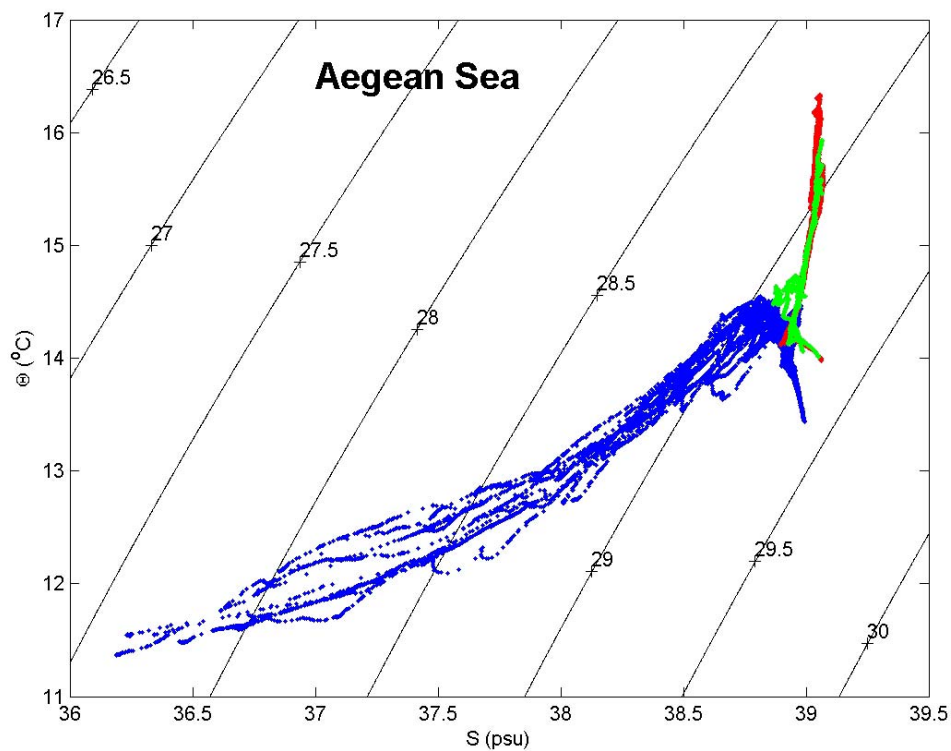


Figure 5. Temperature/salinity characteristics from the CTD stations for the North Aegean (blue), Cretan Sea (red) and the peripheries of the sub-basins (green).