The POSEIDON system: A new Glider component and future applications

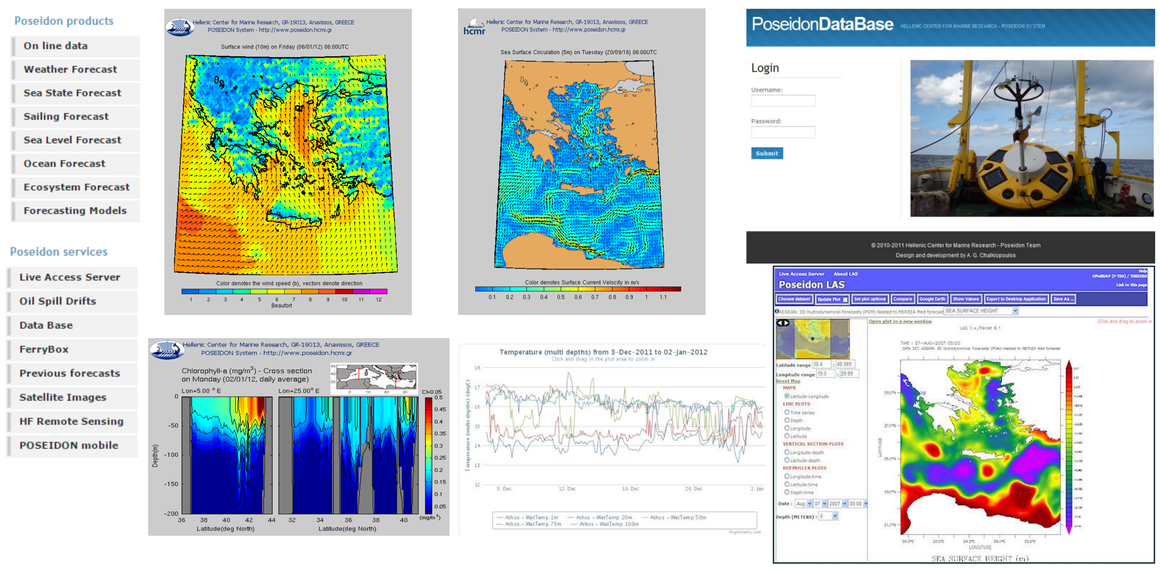
E. Bourma, L. Perivoliotis, D. Ballas, S. Velanas, A. Chalkiopoulos and the POSEIDON team
Hellenic Centre for Marine Research, Attica, Greece

7th EGO conference on autonomous ocean gliders and their applications, 26-29th September 2016, Southampton, UK

The Poseidon System

The POSEIDON System, the operational monitoring, forecasting and information system for the Greek Seas was initially established in 1999 using as its observing component a network of moored buoys equipped with meteorological and oceanographic sensors.

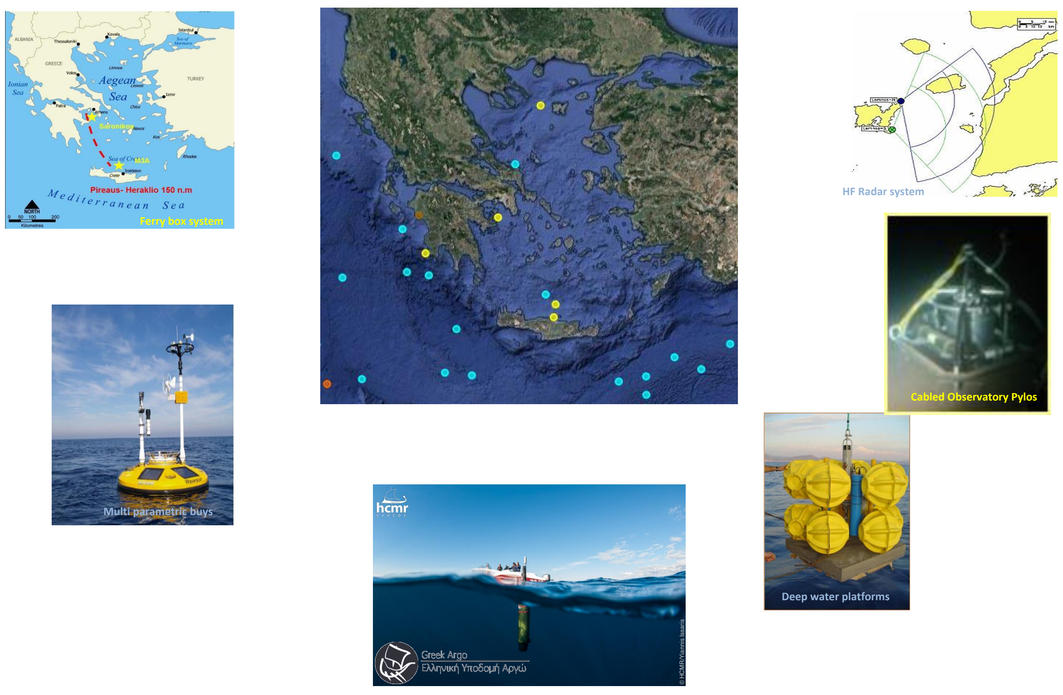
Poseidon System — Monitoring, Forecasting and Information System for the Greek Seas



Poseidon System: products and services

Currently, the POSEIDON system's monitoring module is relying on an integrated observatory, which includes a number of platforms that have been implemented into its observing component over the past years:

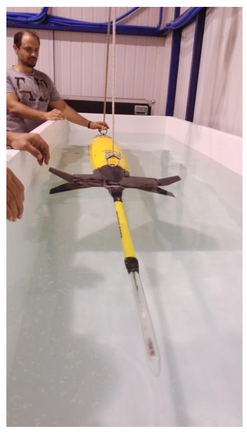
- A Ferry Box system is in operation since 2012 in the Piraeus – Crete route
- An HF Radar system has been installed in 2009 in collaboration with the Department of Marine Science, Aegean University at the NE part of the Aegean Sea for the monitoring of Black Sea Waters outflow from the Dardanelles straits.
- The Greek Argo infrastructure started in 2010 has funded the deployment of several autonomous profiling floats in the Aegean and Ionian Seas, as the Greek contribution to EuroArgo ERIC.
- A cabled observatory at the seafloor of SE Ionian Sea at 1670 meters depth, nearby the Pylos fixed station, is expected to start transmitting physical and biochemical data in real time during 2016.



The observing components of POSEIDON System: Fixed stations, Profiling floats, Cabled Seabed platform, Ferry Box, HF Radar

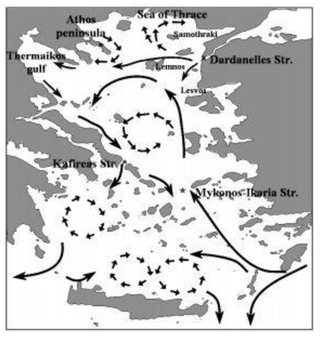
The new glider component

Two SeaExplorer gliders were recently added to the monitoring platforms of the Poseidon system.

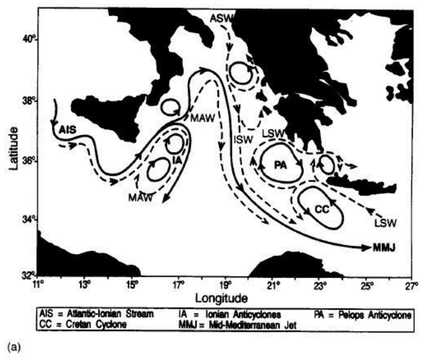


The two gliders will be gradually integrated into the operational network of the system with the ultimate objective of establishing two endurance lines in the Aegean and Ionian Sea.

Future planning

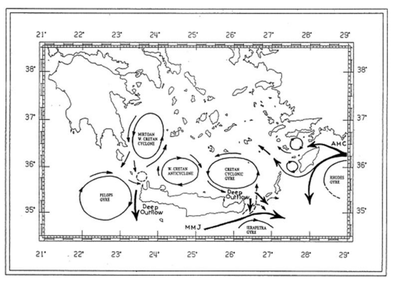


The Aegean Sea
Schematic representation of the Aegean Sea upper circulation (Nittis and Perivoliotis , 2002)

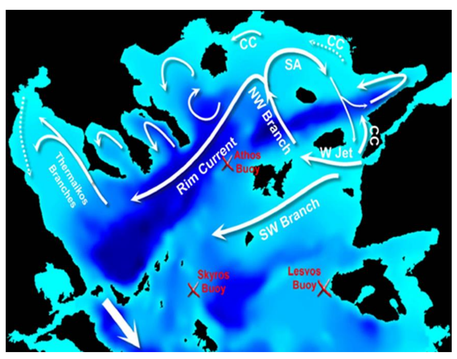


The Ionian Sea
Schematic of the upper thermocline circulation and water mass pathways. (Malanotte-Rizzoli et al , 2002)

In the Cretan Sea at the southern part of the Aegean, the continuous monitoring through an endurance line is expecting to contribute to the further knowledge of the seasonal variability of the flow field, collecting also evidences for the intermediate or deep water formation events that are known to occur in the area.



Cretan Sea
Schematic configuration of the main upper thermocline circulation features and deep Aegean Outflow (Theocharis et al, 1999)



North Aegean Sea
Major North Aegean circulation features related to the BSW plume propagation (Androulidakis and Kourafalou, 2011)

On the other hand, the tracking of the low salinity Black Sea Water path in the North Aegean is an important feature to be studied through the introduction of an endurance line. The deployment and the operation of a glider unit in the area is expected to be challenging due to the existing circulation pattern, the vertical density gradients in the water column and the constrains imposed by the topography.

The short term planning includes the design of focused missions in the framework of the EU funded JERICO Next project, aiming to data collection that will be assimilated into the POSEIDON hydrodynamic models in order to quantify the impact of glider's observations on model performances.

References

1. http://www.poseidon.hcmr.gr/
2. Nittis K. and Perivoliotis L., 2002, Circulation and hydrological characteristics of the North Aegean Sea: a contribution from real-time buoy measurements, Mediterranean Marine Science, Vol. 3/1, 21-31
3. Malanotte-Rizzoli P., Manca B.B.,, Ribera D'Alcala M., Theocharis A., Bergamasco A., Bregant D., Budillon G., Civitarese G., Georgopoulos D., Michelato A., Sansone E., Scarazzato P., Souvermezoglou E., 1997, A synthesis of the Ionian Sea hydrography, circulation and water mass pathways during POEM-Phase I, Prog. Oceanog. Vol. 39, 153-204
4. Androulidakis, Y., and Kourafalou, V. (2011). Evolution of a buoyant outflow in the presence of complex topography: The Dardanelles plume (North Aegean Sea). Journal of Geophysical Research: Oceans, Volume 116, Issue 4, 2011, Article number C04019, doi:10.1029/2010JC006316
5. Theocharis A., Balopoulos E., Kioroglou S., Kontoyiannis H., Iona A., 1999, A synthesis of the circulation and hydrography of the South Aegean Sea and the Straits of the Cretan Arc (March 1994–January 1995), Progr. Oceanog., Vol. 44, Issue 4, 469–509, http://dx.doi.org/10.1016/S0079-6611(99)00041-5

Contact info: evibourma@hcmr.gr, lperiv@hcmr.gr