

HIGH-FREQUENCY VARIABILITY OF TEMPERATURE AND SALINITY PROFILES IN THE MEDITERRANEAN SEA AS REVEALED BY ARGO FLOATS



P.-M. Poulain, G. Notarstefano and M. Pacciaroni
National Institute of Oceanography and Experimental Geophysics, Sgonico (Trieste), Italy



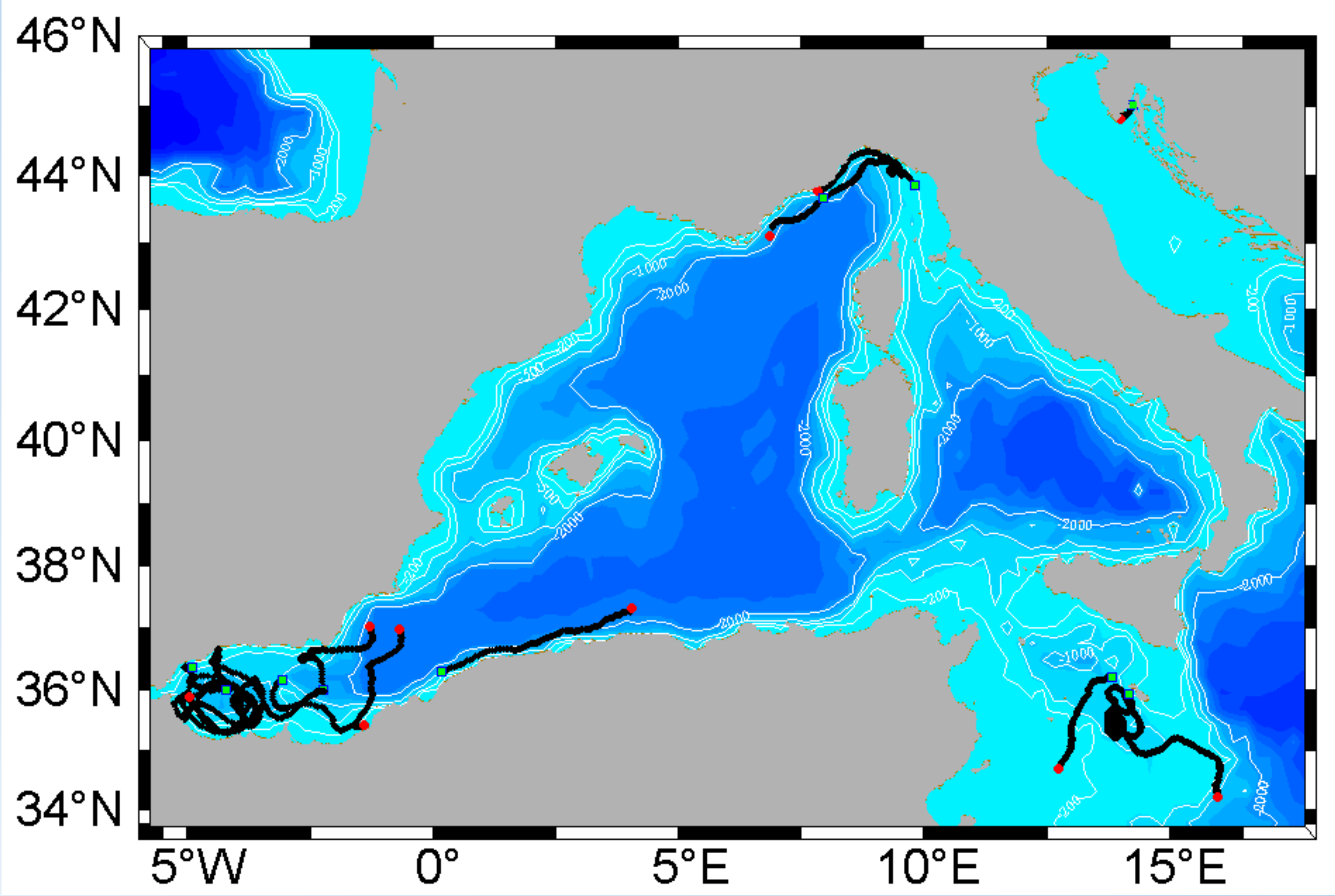
Abstract

Since 2014 a few Argo floats have been operated in the Mediterranean Sea (Northern Adriatic, Sicily Channel, Ligurian Sea and Alboran Sea) with a cycling period of 3 or 6 h in order to measure the variability of the thermohaline properties due to internal waves and tides. Two float designs were used: the Arvor-C and the Arvor-I. They provided data with a vertical resolution of 1 m between the surface and 150-350 m depth. The strongest high frequency (HF) signals were measured in the western Alboran sea with internal semidiurnal tides (M2) as large as 30 m in the thermocline between 50 and 150 m. In April 2019, a float even measured an extreme event (soliton) displacing the 27 σ_θ isopycnal from less than 60 m to more than 130 m in about 6 h. Further to the east in the Mediterranean, in particular in the Sicily Channel, internal waves dominated with amplitudes of 5-10 m. These results reveal that Argo data sampled with the standard cycling period of 5 or 10 days can be drastically biased in sea areas where internal waves/tides dominate. Furthermore, they show that standard Argo floats with two-way Iridium telemetry can be used to study high frequency dynamics in the upper ocean, if needed during dedicated experiments.

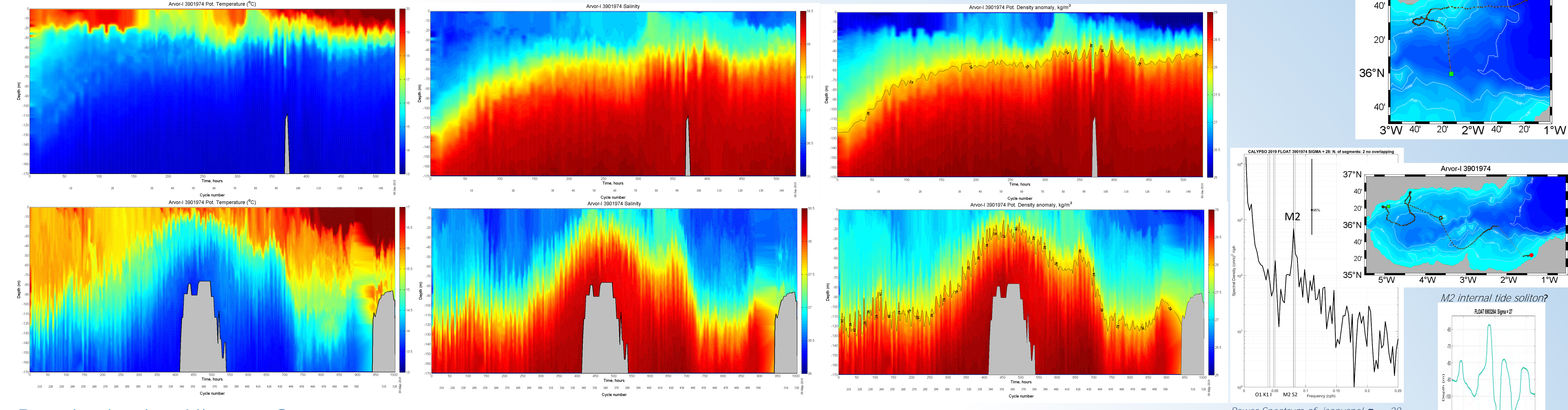
Argo floats operated (partially) with HF cycling

In order to support specific experiments at sea (e.g. CALYPSO in the Alboran Sea and LOGMEC18 in the Ligurian Sea) Argo floats were operated with cycling period of 3 or 6 h. At the end of these experiments, the cycling and sampling characteristics of most floats (the Arvor-I and Arvor-I DO types) were changed to the MEDARGO standard (cycles of 5 days, alternated profiles down to 700 and 2000 m, etc.). The following table provides information on the floats operated in high frequency cycling mode. Their tracks are shown in the map to the right.

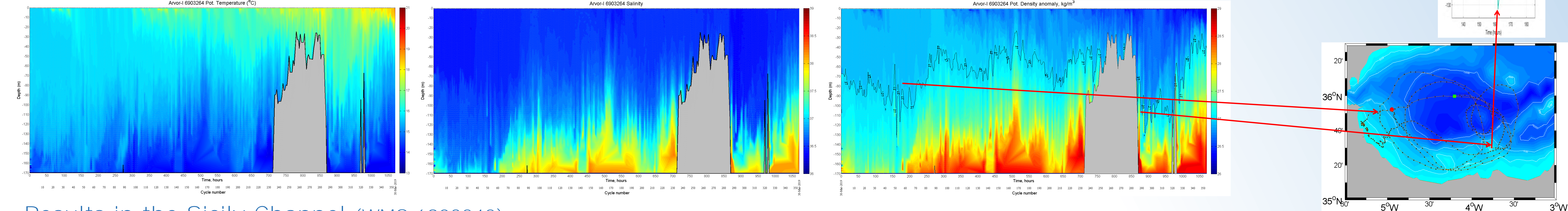
Model	WMO	From date	To date	Cycles	Area (Project)
Arvor-I	3901974	30-May-2018	06-Jun-2018	29 (6h)	Alboran (CALYPSO)
Arvor-I	3901974	06-Jun-2018	21-Jun-2018	119 (3h)	Alboran (CALYPSO)
Arvor-I	3901974	28-Mar-2019	09-May-2019	317 (3h)	Alboran (CALYPSO)
Arvor-I	6903242	20-Aug-2018	13-Dec-2018	906 (3h)	Sicily Channel
Arvor-I	6903248	26-Sep-2018	16-Oct-2018	162 (3h)	Ligurian Sea (LOGMEC18)
Arvor-I	6903264	30-Mar-2019	13-May-2019	356 (3h)	Alboran (CALYPSO)
Arvor-I DO	6903266	05-Apr-2019	24-Apr-2019	148 (3h)	Alboran (CALYPSO)
Arvor-C	-	25-May-2014	12-Jun-2014	217 (3h)	Alboran(Alborex)
Arvor-C	-	19-Feb-2015	05-Mar-2015	108 (3h)	North Adriatic
Arvor-C	-	25-Sep-2016	06-Nov-2016	395 (3h)	Sicily Channel
Arvor-C	-	26-Sep-2018	29-Oct-2018	393 (3 h)	Ligurian Sea (LOGMEC18)



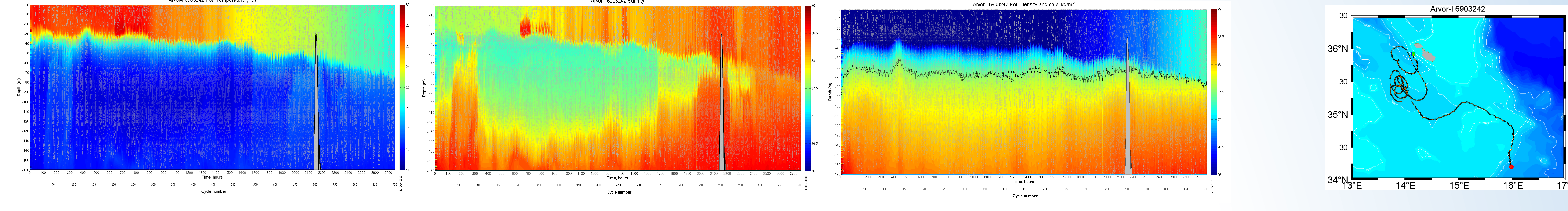
Results in the Alboran Sea (WMO 3901974)



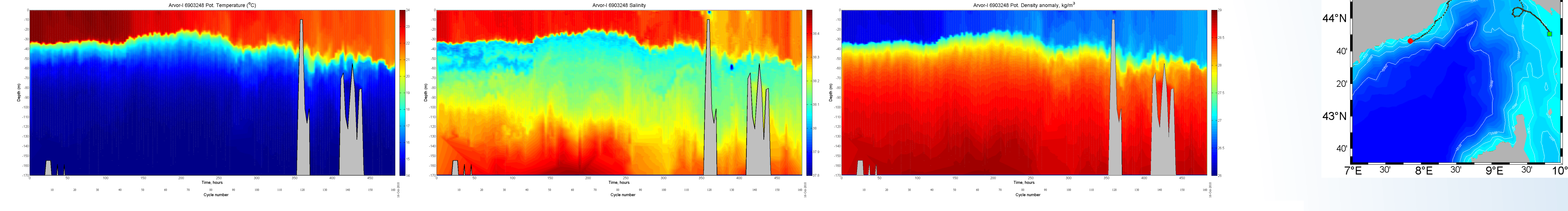
Results in the Alboran Sea (WMO 3901964)



Results in the Sicily Channel (WMO 6903242)



Results in the Ligurian Sea (WMO 6903248)



Acknowledgements

The float data have been collected in the framework of the Argo Italy program, under the sponsorship of MIUR (Italian Ministry of University and Research).

