DRIFTER ACTIVITY IN MEDESS4MS, SERIOUS GAME EXPERIMENT, 16-25 MAY 2014

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Approved by: ……

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1. Introduction

The MEDESS4MS Serious Game Experiment is a real exercise at Sea to the test the MEDESS4MS oil spill forecasting capabilities. It is organized by the Italian coast Guard (ITCG), the INGV and the CNR. The aim of the experiment is to combine the MEDESS4MS model system and multi-platform observations (satellite, drifters, aerial surveys, CTD surveys) to improve the forecast skill and the rapid analysis of environmental and oil pollution conditions. It is organized as follow:

- Two CTD survey will be conducted in the area so as to study the water masses characteristics and some CODE drifters will be released upstream with respect to the mean current shown by the ocean forecasts;
- a real oil slicks will be detected by the satellite using CleanSeaNet2 (CSN-2) and COSMOSKYMED (CSK) and eventually by the ITCG airplanes;
- then the oil spill forecast will be produced (using the MEDESS4MS meteo-oceanographic models available in the area and the MEDESS4MS oil spill models);
- the vessels and/or airplane of ITCG will be sent to the polluted area so as to locate/confirm the position of the oil slick and to analyze the chemical characteristics of the pollution;
- different kind of drifters will be launched in the oil slick;
- drifters and oil slick will be monitored via internet and satellite, respectively and additional in-situ inspections will be organized in order to confirm the position of the core of the oil slick and in order to check which kind of drifter better follow the oil pollution.

The present report describes the experiment from the drifter point of view. The different types of drifters are illustrated in Chapter 2, while the drifter activities (preparation, deployment and recovery) are detailed day by day in Chapter 3.

Part of the drifters was used to describe the main circulation, while a group of other drifters was employed during an oil-spill accident. A float and a Waverider buoy were also deployed within the MEDESS4MS Serious Game Experiment.

2. Instruments

Several kind of instruments were initially available for the MEDESS4MS Serious Game Experiment. In particular:

- 4 i-sphere drifters (produced by Metocean; owned by ITCG; Fig.1);
- 4 i-sphere drifters (Metocean; Uni Partenope; Fig.1);
- 7 i-sldmb drifters (Metocean; ITCG; Fig.2);
- 4 MAR-GE/T drifters (CLS; ITCG; Fig.3);
- 5 CODE drifters (DBI; OGS; Fig.4);
- 5 oil-spill drifters (TOSCA experiment; OGS; Fig.5);
- 6 CODE drifters with GPRS communication (ELCON Italia; OGS; Fig.6);
- 1 CODE prototype drifter equipped with an acoustic current meter and an acoustic current profiler (OGS; OGS; Fig.7);
- 1 Waverider buoy for the measurement of the wave motion in the survey area (Datawell; OGS; Fig.8);
- 1 Arvor C profiler (0-200m) (NKE; OGS; Fig.9);
- 1 Arvor I profiler (0-2000m) (NKE; OGS; Fig.10).

Unfortunately, 5 i-sldmb drifters were not available (they remained in Rome), 2 brand new DBI CODE drifter did not power on, 1 ELCON CODE drifter and the Arvor C profiler were not deployed because of a broken antenna and because of the failure of the pre-deployment test (bladder problems), respectively.

Fig. 1. I-sphere drifter by Metocean

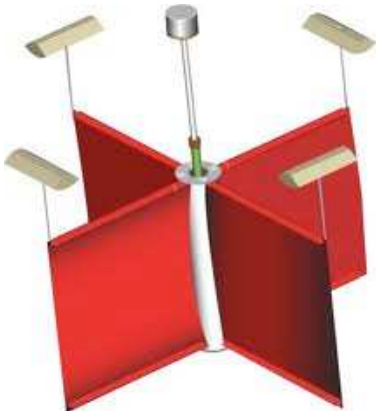

Fig. 2. I-sldmb drifters byMetocean

Fig. 3. MAR-GE/T drifters by CLS

Fig. 4. DBI CODE drifter

Fig. 5. Oil-spill TOSCA drifter

Fig. 6. CODE drifter with GPRS by ELCON

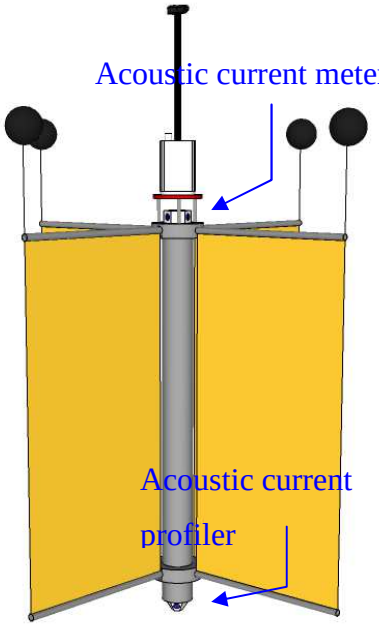

Fig. 7. CODE prototype drifter realized by OGS

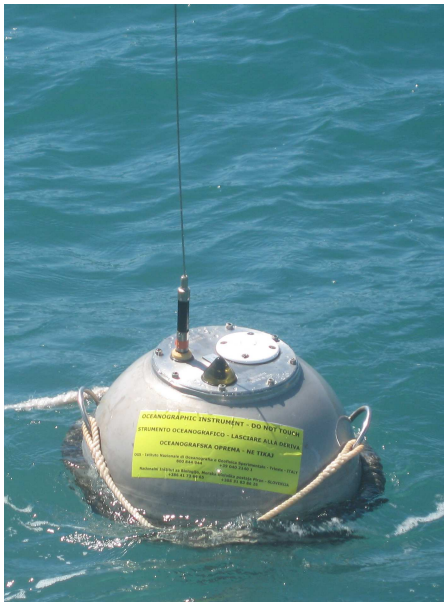

Fig. 8. Waverider buoy by Datawell

Fig. 9. Arvor C profiler by NKE

Fig. 10. Arvor I profiler by NKE

3. Drifter activity

3.1. 16 May 2014

The day was dedicated to the test of the ITCG drifters. The instruments were switched on and the communication through the satellite was checked. All the drifters transmitted their position correctly. During the evening, the DBI CODE drifters were powered on. The oil-spill drifters were tested and recharged during the night.

3.2. 17 May 2014

Two of the DBI drifters did not transmitted any message during the night. They were repeatedly power off and on, without obtaining any message from them.

Early in the morning an oil slick were detected by the satellite. The CP286 were sent to the polluted area in order to follow the evolution of the contamination. The planned deployment of the CODE drifters for the characterization of the general surface current was postponed and part of the drifters dedicated to the oil-spill were prepared.

The drifter team onboard the CP567 left Portoferraio at 8:45 GMT and located the oil-spill core at about 11:30 GMT. There, 9 drifters were deployed according to Fig.11 and Table 1.

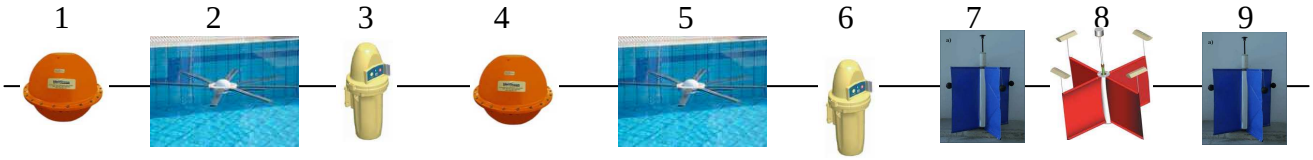

Fig. 11. Drifter deployment sequence

	Drifter	IMEI	Deploy time GMT	LAT	LON
1	I-SPHERE	300234061615020	11:38:26	42° 58.232'	9° 59.029'
2	TOSCA (George 2)	393667769989	11:38:41	42° 58.222'	9° 59.016'
3	CLS (Beacon) 125677	125677	11:39:01	42° 58.197'	9° 59.025'
4	I-SPHERE	300034012659810	11:39:17	42° 58.181'	9° 59.030'
5	TOSCA (George 3)	393667769966	11:39:35	42° 58.160'	9° 59.019'
6	CLS (Beacon) 125725	125725	11:39:50	42° 58.144'	9° 59.010'
7	CODE Elcon 1275	3356986728	11:08:39	42° 58.294'	9° 58.833'
8	I-SLDMB (ITCG)	300234061640130	11:00:15	42° 58.166'	9° 58.863'
9	CODE Elcon 1276	3351513355	11:04:47	42° 58.163'	9° 58.785'

Table 1: Drifter deployment on 17 May 2014.

After the drifter operations, the Arvor I was released at station D5 (42° 57.670' N - 10° 08.784' E at 12:56 GMT; Fig.12). The water samples collected by the CP296 were then loaded on the CP567 at station E5 and the CP567 arrived in the arbor at 14:30 GMT.

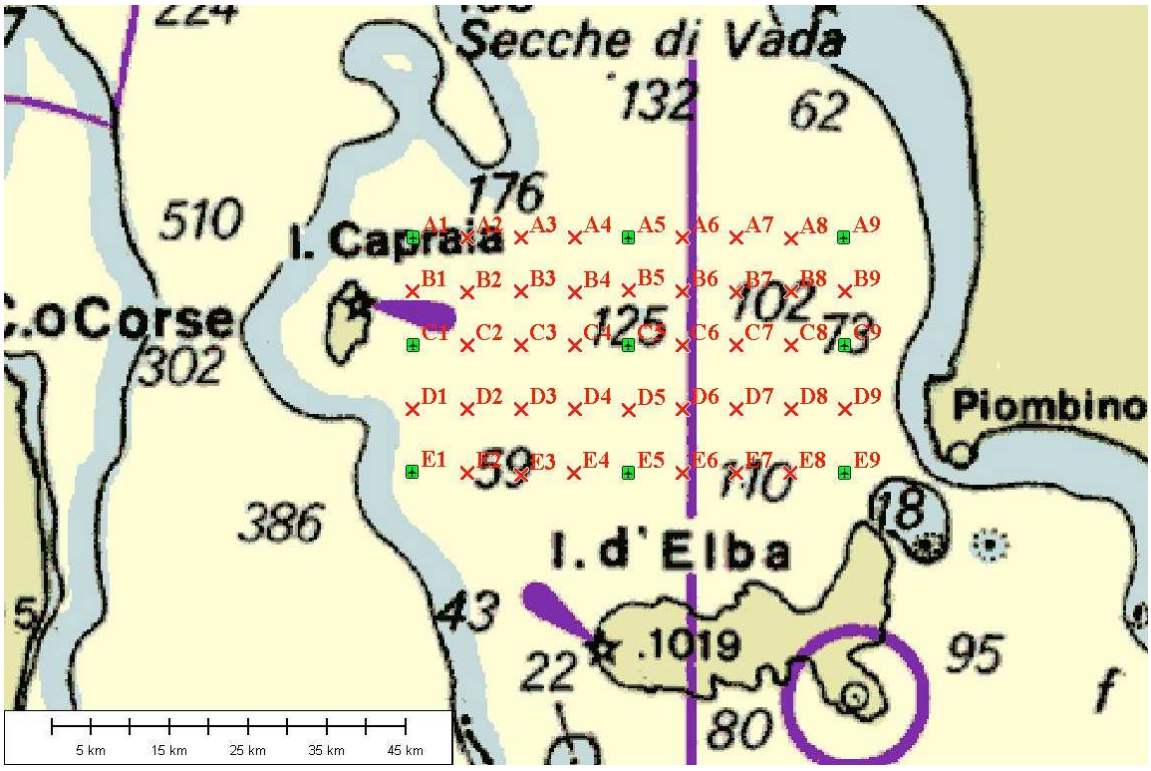

Fig. 12. CTD stations (red crosses), Niskin Stations (green boxes).

During the first hours after the deployments, the drifter trajectories showed a displacement toward the North (Figs.13 and 14).

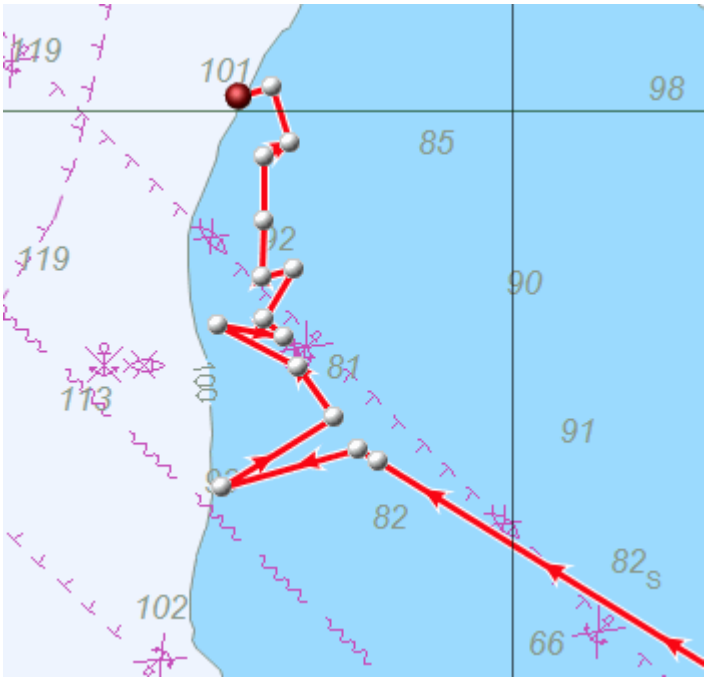

Fig. 13. Initial path of the beacon 125725

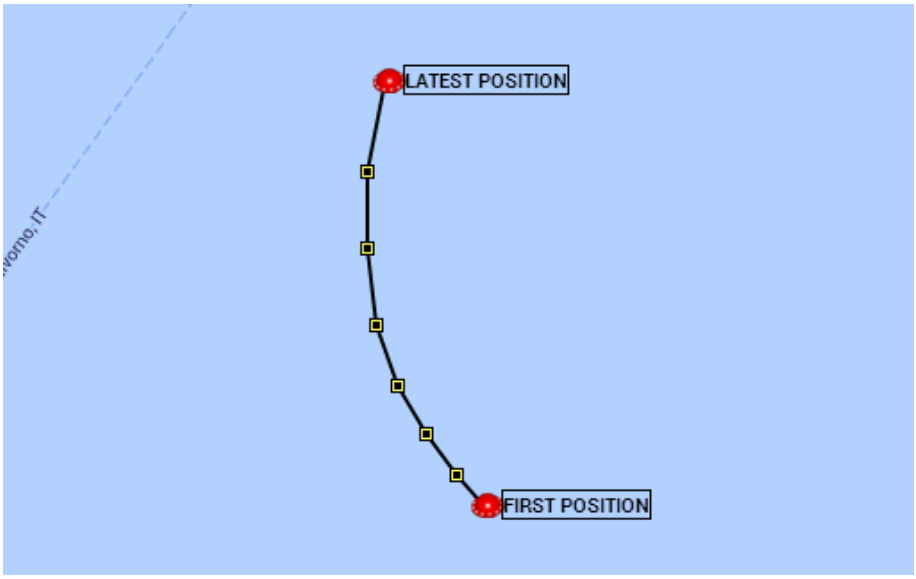

Fig. 14. Trajectory of the i-sphere

3.3. 18 May 2014

The drifter trajectories displayed an increasing speed of the current (Fig.15). Therefore, due also to the bad weather forecast, the recovery of the drifter deployed the day before was organized. The drifter team went out to sea at 8:00 GMT with the class 500 vessel.

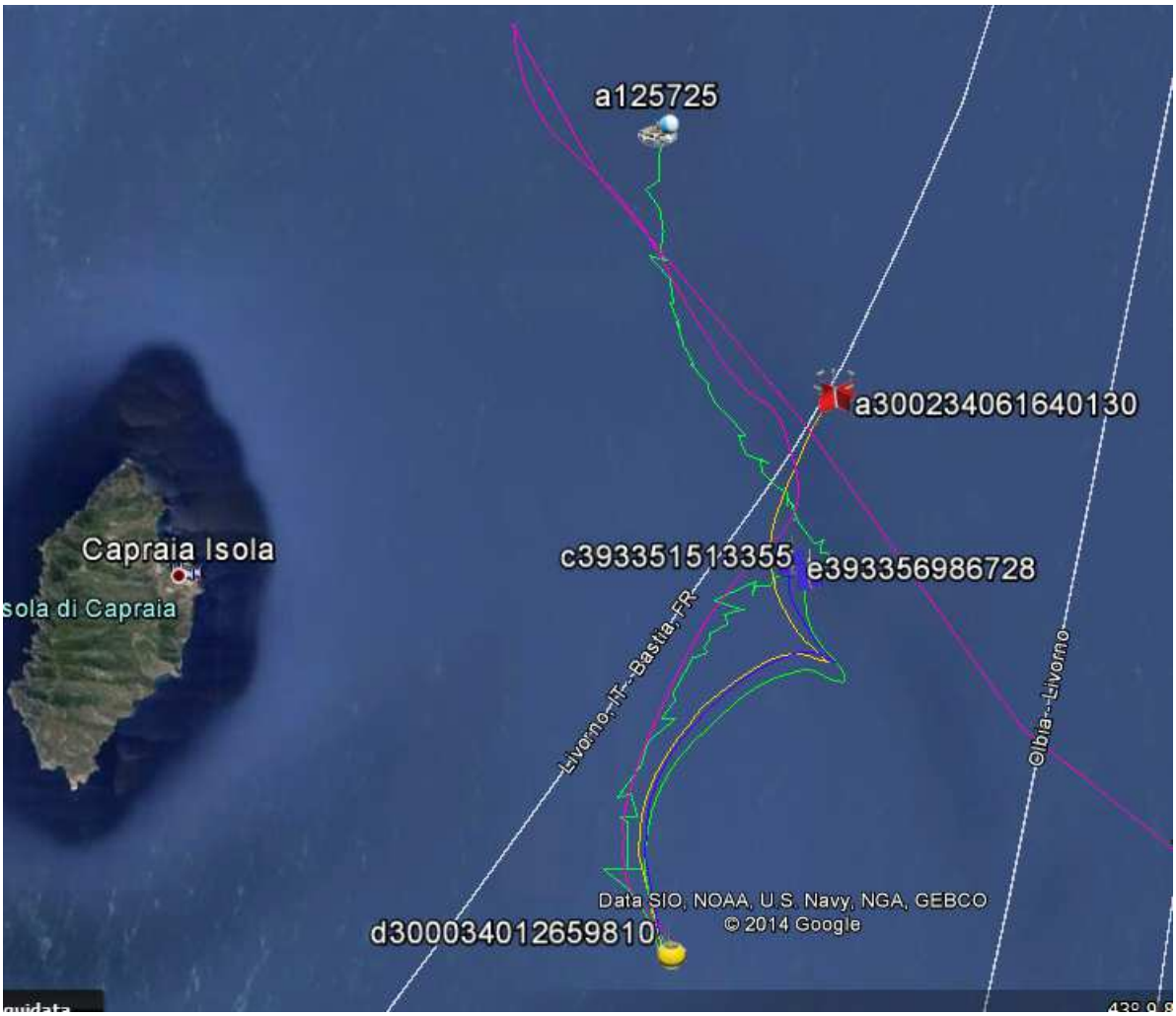

Fig. 15. Drifter trajectories after one day at sea.

The two i-sphere drifters were recovered at 10:15 GMT at about 43°09.958' N - 009°56.265' E. Due to the bad sea conditions, no other drifters were recovered and the boat headed toward the port.

3.4. 19 May 2014

Due to the bad weather conditions no activity at sea was conducted during 19 May. Some maintenance on the drifters was performed and the drifter trajectories were monitored.

The server at OGS was tested and some scripts were modified in order to solve new transmission problems due to erroneous communications from the new (ITCG) drifters.

3.5. 20 May 2014

The ELCON drifters were checked again, their batteries were replaced. Six CODE type drifters were released in the late afternoon in order to characterize the general surface circulation of the area (Table 2).

	Drifter	IMEI	Deploy time GMT	LAT	LON
1	DBI 050540	300234061050540	16:19	42° 54.658' N	10° 01.320' E
2	Elcon 1271	393667772687	16:34	42° 54.773' N	10° 04.750' E
3	DBI 052530	300234061052530	16:44	42° 54.767' N	10° 08.583' E
4	Elcon 1272	393667772675	16:55	42° 54.774' N	10° 12.335' E
5	DBI 054170	300234061054170	17:05	42° 54.780' N	10° 16.017' E
6	Elcon 1273	393667772682	17:14	42° 54.790' N	10° 19.649' E

Table 2: Deployment of the CODE drifters.

3.6. 21 May 2014

A new oil spill was detected by the satellite west of Elba Island. The pollution was diluted and spread over a large area North of the initial point of detection. There was no possible to identify any oil spill core, therefore no drifters were deployed.

The Datawell buoy was deployed at 42°53.850'N - 10°16.130'E at 12:22 GMT and the prototype CODE drifter (IMEI: 393667772672) was released at sea nearby the buoy (42°54.037'N - 10°16.146'E) at 13:00 GMT. The prototype was equipped with the TRIG (IMEI: 300234011426200) as additional and independent system for the location.

The afternoon was dedicated to the installation of the receiving station of the Datawell. Several position of the receiving antenna were tested at the ITCG building and at the Hotel just in front of the buoy (at about 10 km distance, with no obstacle in between), but all the messages were received with errors and rejected by the receiving station demonstrating the limit of the short antenna used.

3.7. 22 May 2014

All the drifter deployed on 20 May were working fine. The prototype drifter and the I-SLDMB drifter and one beeper of the ITCG released the first day in the oil spill were transmitting their position.

Sporadic transmissions were received from one ELCON CODE drifter released the first day together with the above mentioned ITCG drifters.

Fig.16 depicts the drifter situation as of 22 May.

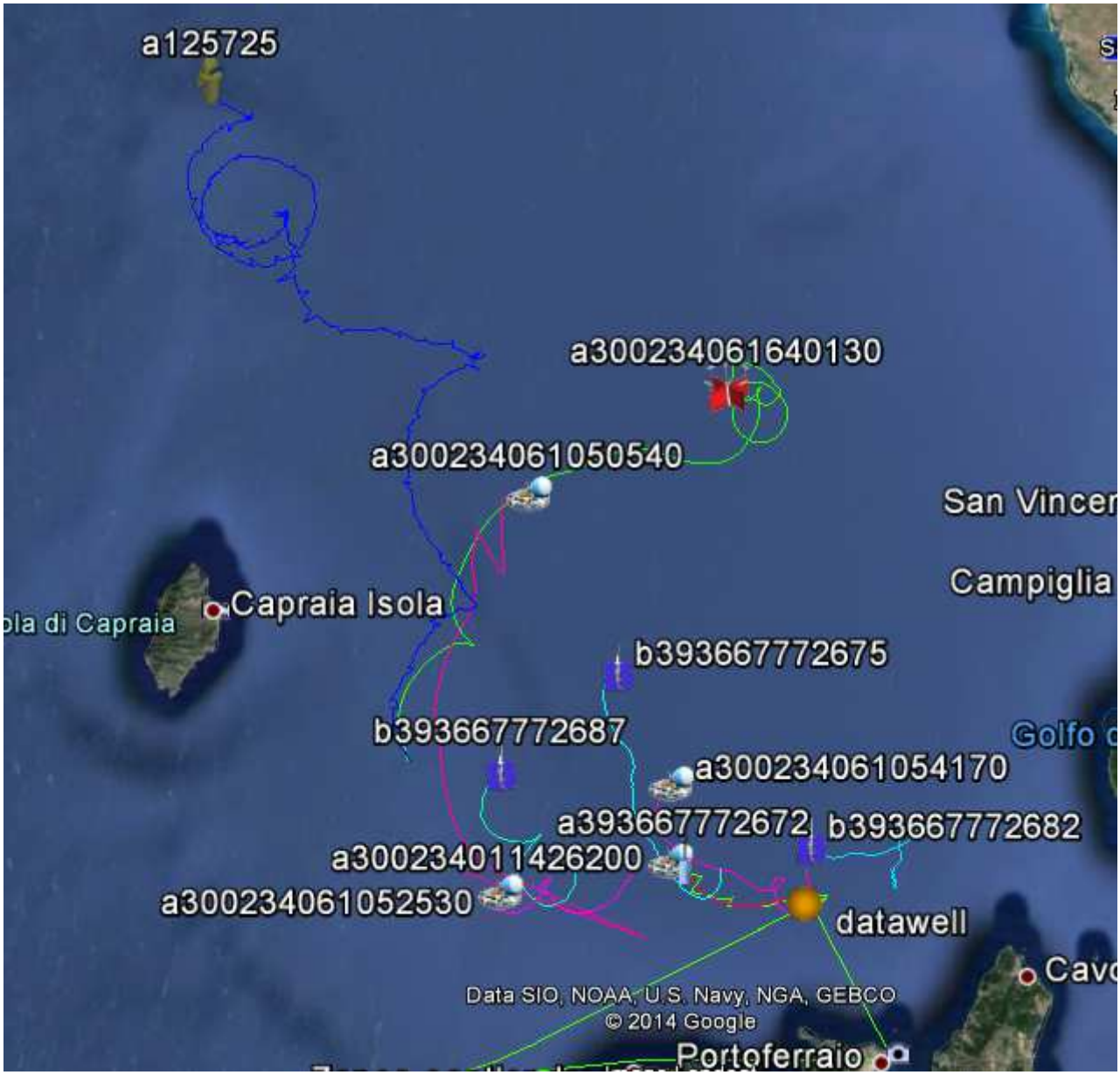

Fig. 16. Drifter trajectories as of 22 May 2014.

3.8. 23 May 2014

The drifters were monitored in the morning and the recovery of the prototype CODE drifter was performed at 11:27 GMT (recovery point: 42° 55.346'N - 10° 8.408'E).

The data collected by the current meter and by the current profiler mounted onboard the prototype were downloaded and the instrument was prepared for a new deployment (batteries replacement, mechanic checks and maintenance, loading mission, …).

3.9. 24 May 2014

Due to an overloading script elaboration, the computational server at OGS cannot perform any operation and it hanged up. Therefore, no web products were elaborated and it was not possible to monitor the drifter evolution. No personnel at OGS were available because of the not-working day. No drifters were deployed during this day. The ITCG beacon 125725 was recovered by the CP286 while the vessel went back to its port in Livorno.

3.10. 25 May 2014

The computational server problems arose the day before persisted also during the last day of the experiment. The recovery of the still working ELCON CODE and I-SLDMB drifters were carried out by using the raw (undecoded) data sent by the instrument to the OGS server dedicated to the receiving of the SMS messages and by utilizing the web page at JouBeh (https://asset.joubeh.com/), respectively (Table 3).

	Drifter	IMEI	Deploy time GMT	LAT	LON
1	I-SLDMB (ITCG)	300234061640130	08:57	42° 51.778'N	10° 10.830'E
2	Elcon 1273	393667772682	09:34	42° 53.438'N	09° 55.448'E
3	Elcon 1272	393667772675	09:49	42° 55.275'N	09° 59.410'E

Table 3: Drifters recovered on 25 May 2014.

4. Datawell recovery

The recovery of the Datawell buoy was not possible on the planned day (24 May) because of the bad sea state conditions and because the CP286 (which would have recovered the buoy) was sent in Livorno before expected. The buoy was recovered by a fisherman in cooperation with the ITCG at the beginning of June.

5. Conclusions

Except for the two DBI CODE drifters which did not power on, the instruments deployed to characterize the general surface circulation worked fine, depicting an anticyclonic tendency of the surface circulation with some (probably) near-inertial loops. Three drifters are still working (Fig.17).

Unfortunately, due to the scarcity of satellite images (some days the satellite images were not provided), only a few drifters (compared to the available amount of units) were deployed in real oil pollution.

Furthermore, because of the forced stop of the minor vessel, due to safety reason in case of bad weather conditions, some deployments were not performed (as the second prototype release).

Moreover, it is important to consider and still to investigate the weird problems occurred on the computational server.

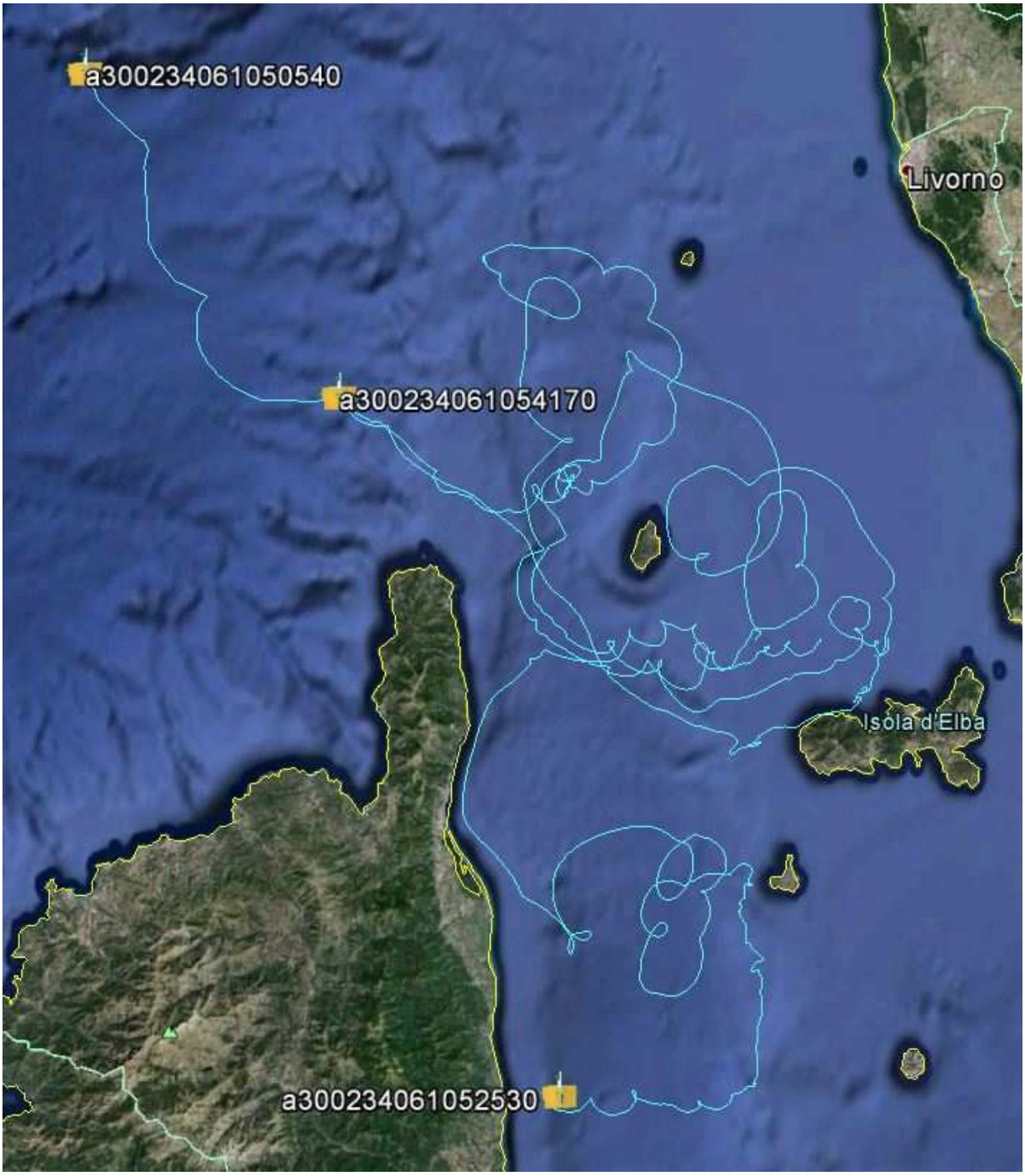

Fig. 17. Drifter trajectories as of 16 June 2014.