TNA PROJECT REPORT

1. Project Information

Proposal reference number	JN_CALL_2_15
Project Acronym (ID)	MONICOAST
Title of the project	Monitoring of organic contaminants by passive samplers in the Southern Europe coastal areas
Host Research Infrastructure	Heraklion Coastal Buoy (HCB) Saronikos buoy (SB)
Starting date - End date	06/2018 – 06/2019
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User group members	Natalia Montero Ruiz, Marco Schintu, Alessandro Marrucci - University of Cagliari, Italy; María Jesús Belzunce Segarra - AZTI-TECNALIA, Spain

2. Project objectives

The overall aim of MONICOAST is to evaluate the presence and distribution of organic pollutants in the Southern European coastal areas.

Additionally, the following operational objectives have been set:

1. To investigate the presence of organic contaminants by means of specific water and air passive samplers placed at two buoys (Heraklion Coastal Buoy (HCB) and Saronikos Buoy (SB)) in Greece, affected by various sources of contamination and characterized by different physico-chemical characteristics.
2. To study the air-sea exchange of organic pollutants, which will determine the potential long-range transport of contaminants.
3. To establish relationships between the information obtained by passive samplers, in terms of concentrations of organic contaminants, with the environmental data (e.g. salinity, currents).

3. Main achievements and difficulties encountered

MONICOAST, developed in the framework of the Jerico-Next Transnational Access (TNA) Call, is a collaborative project between the University of Cagliari (UNICA, Italy) and AZTI (Spain), hosted by the Hellenic Centre for Marine Research (HCMR, Greece).

The main achievements of the project are listed as follows:

1) Successful deployment of water and air passive samplers for two consecutive periods (June-October 2018 and October 2018 -June 2019), at two buoys (Heraklion Coastal Buoy (HCB) and Saronikos Buoy (SB)) located in the Mediterranean Sea (Greece) and affected by various sources

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of contamination.

2) Retrieval of the passive samplers and sending of the samples to the reference laboratories in Czech Republic (Research Centre for Toxic Compounds in the Environment; RECETOX) and Italy (University of Cagliari) for analysis.

3) Meeting with the HCMR group in Heraklion to visit the HCMR infrastructures, discuss the scientific outcomes of the TNA Project and to strengthen the relationships between groups.

The main difficulties encountered:

1) Adaptation of the sampling strategy for the deployment of the passive samplers in the buoys. This problem was overcome thanks to the expertise of HCMR technicians.

2) Delay in the retrieval of the passive samplers deployed at the second sampling period, due to weather conditions and technical issues. This is a common risk when working offshore and HCMR has proactively searched for a solution.

4. Dissemination of the results

Passive samplers have been sent to the reference laboratories and the analysis of the samples are ongoing. However, the MONICOAST project was presented, via poster, at the 2nd General Assembly Meeting and at the Final General Assembly of Jerico-Next, carried out in Galway (September 2018) and Brest (July 2019), respectively.

We are in direct contact with another TNA Group from the HCMR, who has deployed the same type of passive samplers at two buoys in Italy. Last February we met in Heraklion, to discuss the scientific outcomes of both TNA Projects and the potential collaboration for common publications in order to increase the impact of the results.

The results produced within the framework of MONICOAST will be published as scientific articles. Additionally, the dissemination of the results will be further ensured by the attendance to pertinent conferences and participation in specific working groups dealing with coastal water contamination.

5. Technical and Scientific preliminary Outcomes

In order to achieve the objectives of MONICOAST, specific air (Polyurethane foam (PUF)) and water (Silicon Rubber (SSP) and Low Density Polyethylene (LDPE)) passive samplers were deployed at two buoys (Heraklion Coastal Buoy (HCB) and Saronikos Buoy (SB)) in Greece. In this sense, HCMR technicians were able to adapt the sampling strategy to guarantee the correct installation of the samplers in the buoys and to reduce the damage/loss of the samplers due to strong meteorological conditions (See Figure 1).

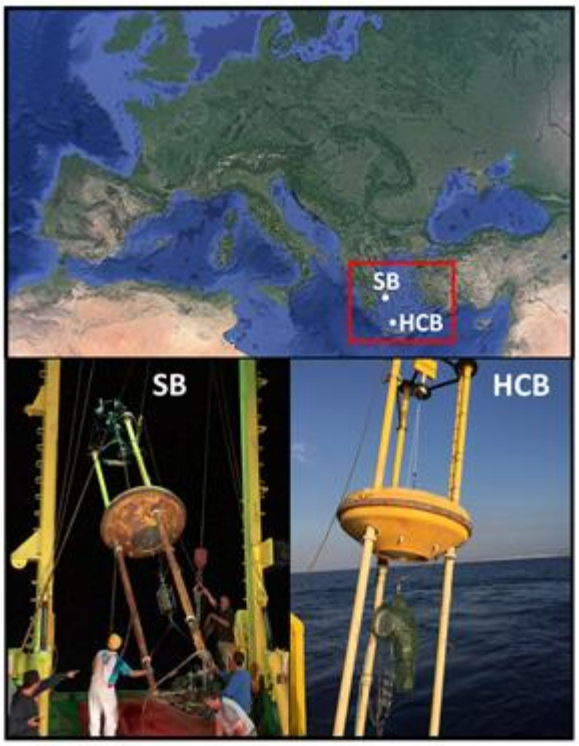

Figure 1. Deployment of water and air passive samplers at two buoys (Saronikos Buoy (SB) and Heraklion Coastal Buoy (HCB)) in Greece.

As explained when applied for the TNA Call, the activities listed in MONICOAST were aligned with the objectives of the AQUA-GAPS (Aquatic Global Passive Sampling) network, which aims to understand better the geographic distribution of organic contaminants, especially persistent organic pollutants (POPs), in the world oceans. Therefore, the passive samplers that are used in MONICOAST are those selected within the framework of AQUA-GAPS and the samplers have been sent for analysis to RECETOX, the reference laboratory of the AQUA-GAPS network. At this point, the analysis of the samplers are ongoing, and as agreed with the Jerico-TNA Office, the final TNA report will be updated once the data are available. The data obtained will be used to fulfil the objectives of the MONICOAST project and those of the AQUA-GAPS passive sampling global network, enriching the current knowledge of organic compound distribution in the Southern Europe coastal areas.

At this point, the only results available are those of the organic compound concentrations measured at the buoys by means of the PUF air passive samplers. In Figure 2 are represented the air concentrations of several PCBs, OCPs and PAHs measured by PUFs. Briefly, air concentrations of the target compounds were derived dividing the mass accumulated in the PUFs (ng sampler-1) by the effective air volume (Vair, m3) (Shoeib and Harner 2002; Harner 2016). The linear phase uptake sampling rate used for PCBs and OCPs was 3.9 m3d-1 and 5.0 m3d-1 for PAHs, following Estellano et al. (2012) and Harner et al. (2013), respectively.

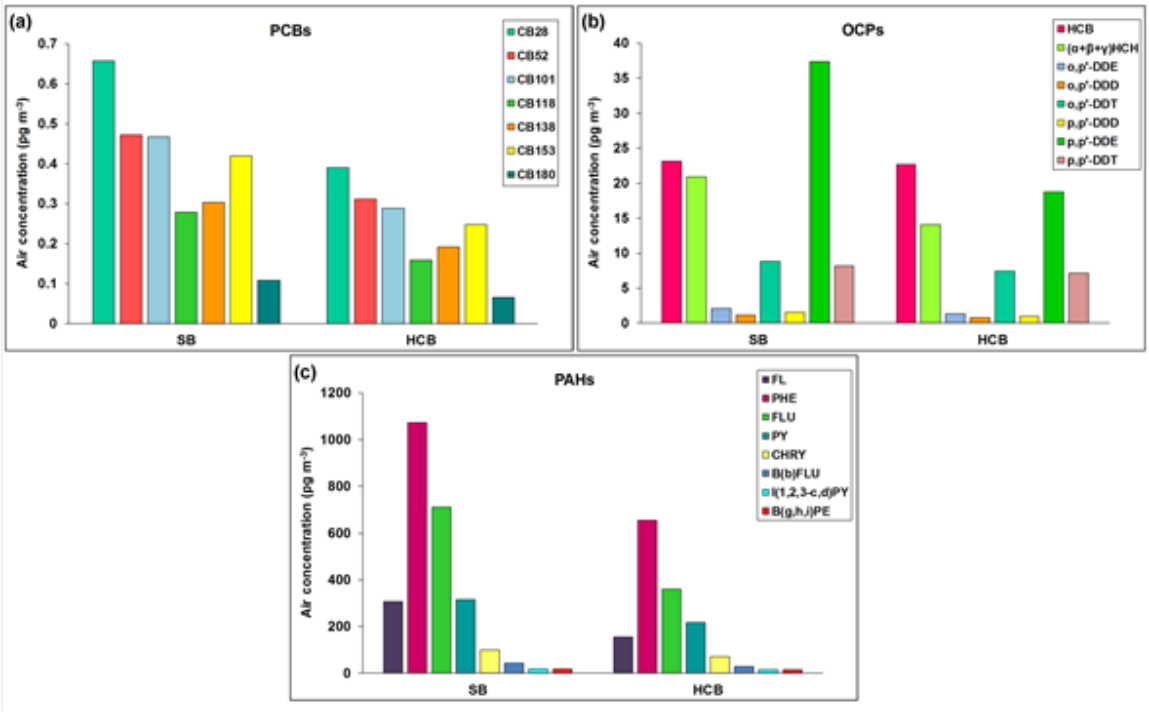

Figure 2. Air concentrations (pg m-3) of (a) polychlorinated biphenyls (PCBs), (b) organochlorine pesticides (OCPs) and (c) polycyclic aromatic hydrocarbons (PAHs) measured by PUFs in two buoys (Saronikos Buoy, SB; Heraklion Coastal Buoy, HCB) in Greece. FL: fluorene; PHE: phenanthrene; FLU: fluoranthene; PY: pyrene; CHRY: chrysene; B(b)FLU: benzo(b)fluoranthene; I(1,2,3-c,d)PY: indeno(1,2,3-c,d)pyrene; B(g,h,i)PE: benzo(g,h,i)perylene.

In general, the levels of contaminants were higher in SB than in HCB, probably explained by the position of the former at a site affected by anthropogenic activities. Besides, PCBs, OCPs and PAHs concentrations found in the current study are in the range of those found in the literature. These are preliminary results which have to be treated cautiously and interpreted as a whole once that the water passive sampler results are available.

We would like to acknowledge the HCMR for their involvement and professionality all along the development of the project and to the Jerico-TNA office for their willingness to help us all along the process. Finally, we would like to show our gratefulness to the Jerico-Next TNA Call for granting us the opportunity to carry out this project. The analytical part was performed by the RECETOX Research Infrastructure (LM2015051 and CZ.02.1.01/0.0/0.0/16_013/0001761).

References

Estellano, V.H., Pozo, K., Harner, T., Corsolini, S., Focardi, S., 2012. Using PUF disk passive samplers to simultaneously measure air concentrations of persistent organic pollutants (POPs) across the Tuscany Region, Italy. Atmos. Pollut. Res. 3, 88-94.

Harner, T., 2016. 2016_v1_3_Template for Calculating PUF and SIP Disk Sample Air Volumes. http://dx.doi.org/10.13140/RG.2.1.3998.8884.

Harner, T., Su, K., Genualdi, S., Karpowicz, J., Ahrens, L., Mihele, C., Schuster, J., Charland, J.-P., Narayan, J., 2013. Calibration and application of PUF disk passive air samplers for tracking polycyclic aromatic compounds (PACs). Atmos. Environ. 75, 123-128.

Shoeib, M., Harner, T., 2002. Characterization and comparison of three passive air samplers for persistent organic pollutants. Environ. Sci. Technol. 36 (19), 4142-4151.

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