LifeWatch Scientific Community Meeting

Rome, 27-29 May 2019

LifeWatch ERIC

LifeWatchGreece Research Infrastructure (ESFRI)

Vasilis Gerovasileiou, Eva Chatzinikolaou, Nicolas Bailly, Tilemachos Bourtzis, Sarah Faulwetter, Irene Filiopoulou, Alexandros Gougousis, Kleoniki Keklikoglou, Dimitra Mavraki, Nikitas Michalakis, Nikos Minadakis, Stamatina Nikolopoulou, Evangelos Pafilis, Emmanouela Panteri, Theodore Patkos, Christina Pavloudi, George Perantinos, Anastasis Oulas, Kostas Varsos, Christos Arvanitidis

LifeWatch ERIC Scientific Community Meeting
27-29 May 2019, Rome, Italy

LifeWatchGreece
Research (e-)Infrastructure

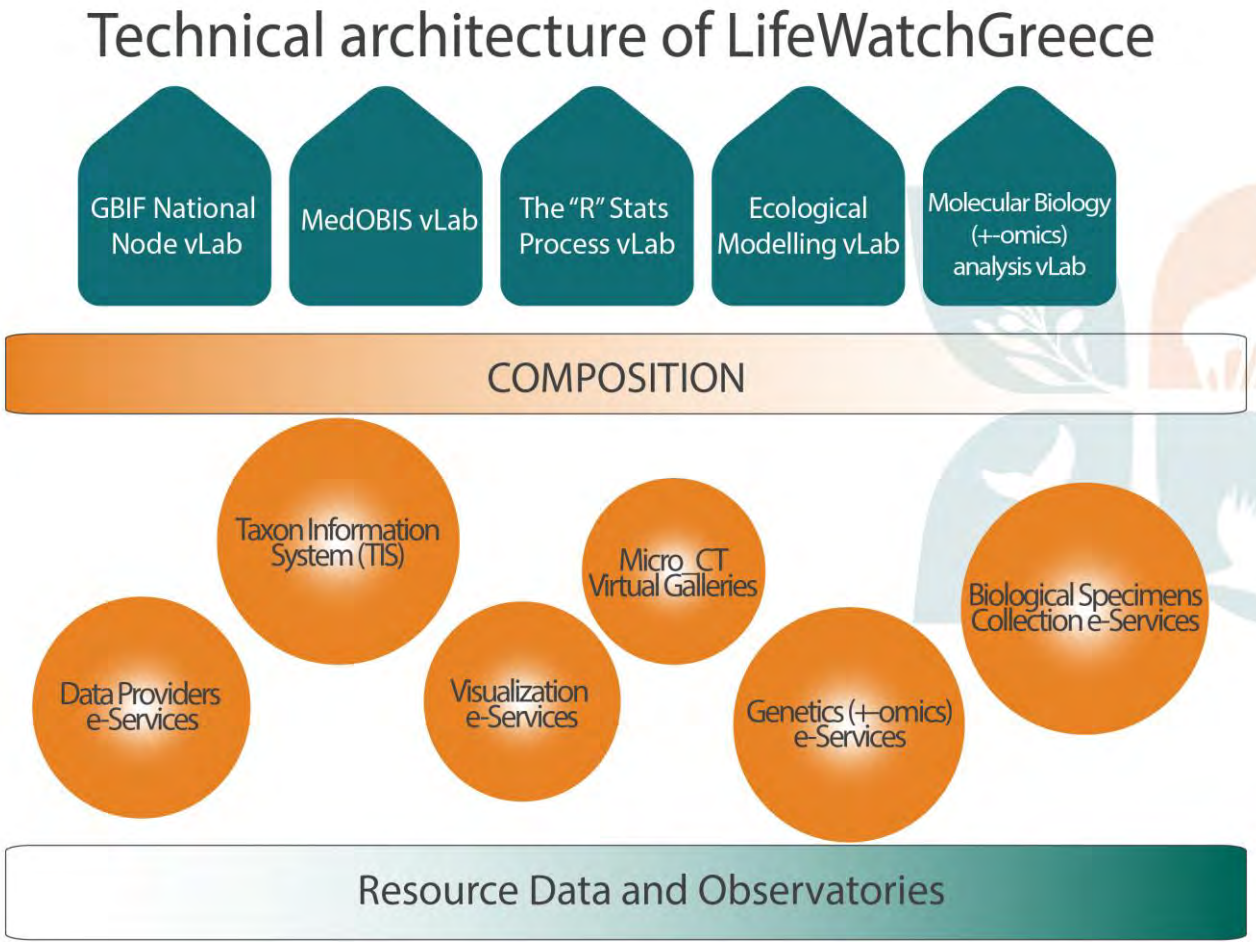
LWG e-infrastructure:

- Multi-server e-infrastructure currently deployed in HCMR, Crete
- Hosts biodiversity data and applications
- Consists of web tools/applications (vLabs or e-services) for the public

Applications:

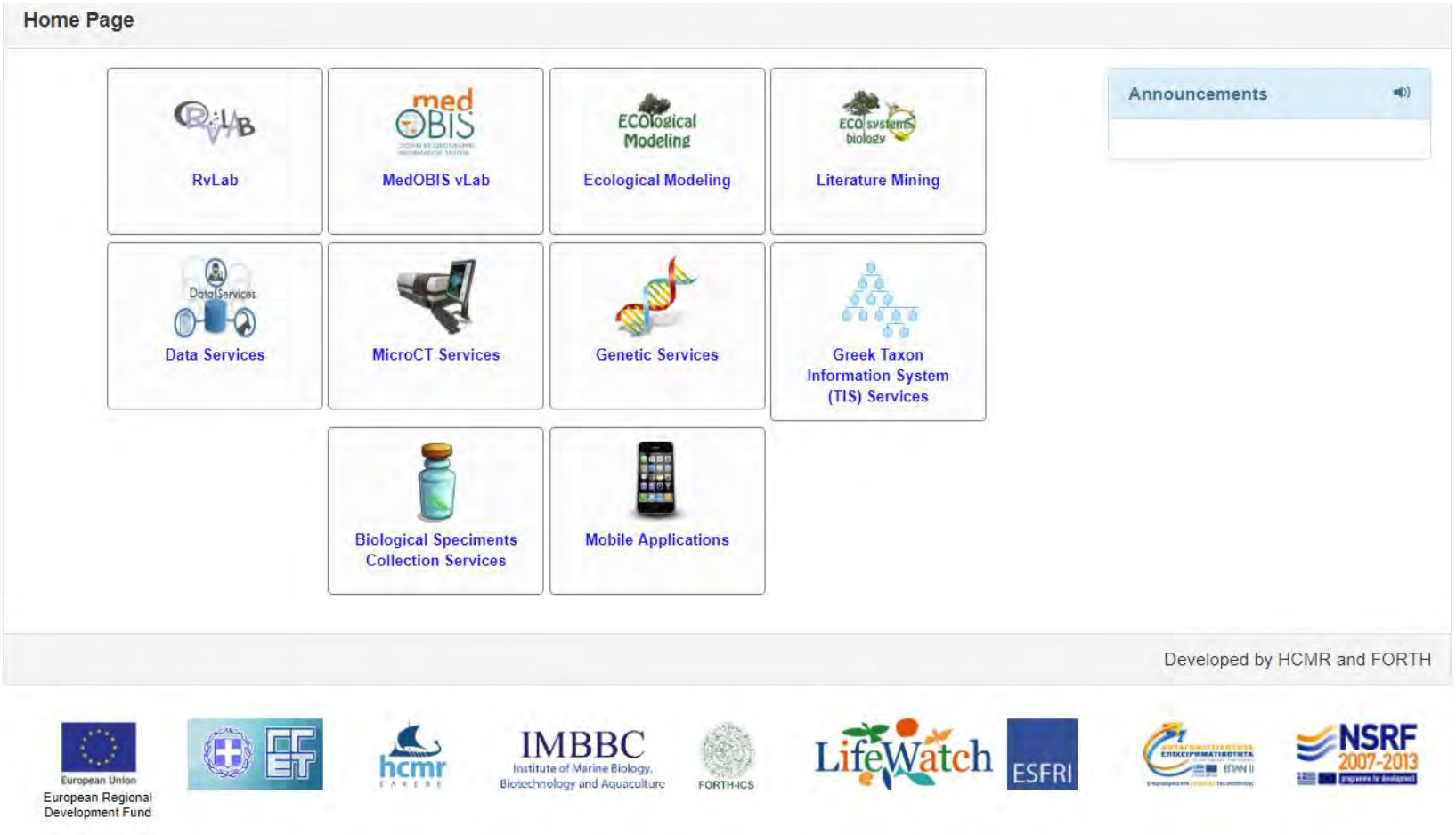
- **e-services**: searching datasets/ data or one-shot analyses
- **vLabs**: interfaces for advanced selection of datasets/data, and more elaborated suites of analyses

LifeWatchGreece
Concept Architecture



LifeWatchGreece Portal view

https://portal.lifewatchgreece.eu/



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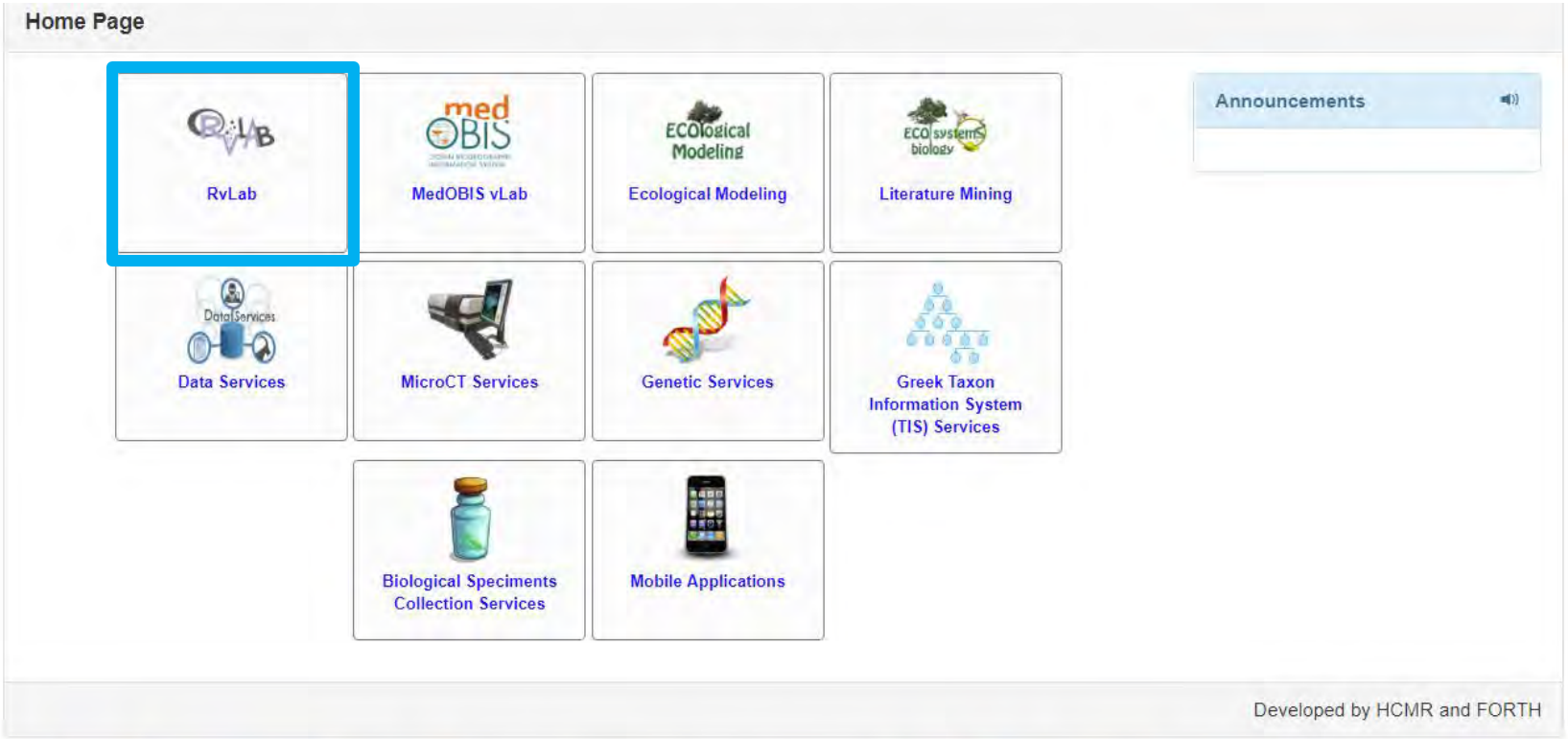
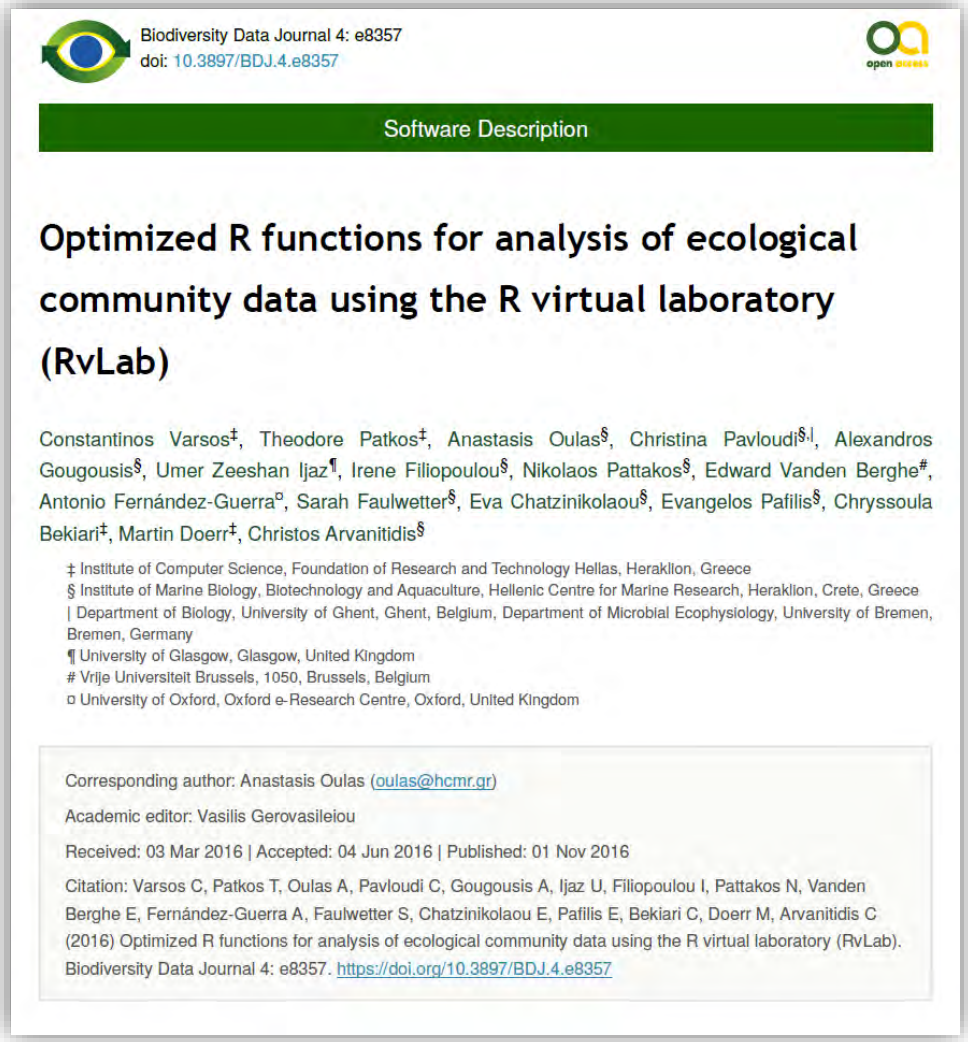


LifeWatchGreece RvLab



Biodiversity Data Journal 4: e8357
doi: 10.3897/BDJ.4.e8357

Software Description

Optimized R functions for analysis of ecological community data using the R virtual laboratory (RvLab)

Constantinos Varsos‡, Theodore Patkos‡, Anastasis Oulas§, Christina Pavloudi§,|, Alexandros Gougousis§, Umer Zeeshan Ijaz¶, Irene Filiopoulou§, Nikolaos Pattakos§, Edward Vanden Berghe#, Antonio Fernández-Guerra¤, Sarah Faulwetter§, Eva Chatzinikolaou§, Evangelos Pafilis§, Chryssoula Bekiari‡, Martin Doerr‡, Christos Arvanitidis§

‡ Institute of Computer Science, Foundation of Research and Technology Hellas, Heraklion, Greece
§ Institute of Marine Biology, Biotechnology and Aquaculture, Hellenic Centre for Marine Research, Heraklion, Crete, Greece
| Department of Biology, University of Ghent, Ghent, Belgium, Department of Microbial Ecophysiology, University of Bremen, Bremen, Germany
¶ University of Glasgow, Glasgow, United Kingdom
# Vrije Universiteit Brussels, 1050, Brussels, Belgium
¤ University of Oxford, Oxford e-Research Centre, Oxford, United Kingdom

Corresponding author: Anastasis Oulas (oulas@hcmr.gr)

Academic editor: Vasilis Gerovasileiou

Received: 03 Mar 2016 | Accepted: 04 Jun 2016 | Published: 01 Nov 2016

Citation: Varsos C, Patkos T, Oulas A, Pavloudi C, Gougousis A, Ijaz U, Filiopoulou I, Pattakos N, Vanden Berghe E, Fernández-Guerra A, Faulwetter S, Chatzinikolaou E, Pafilis E, Bekiari C, Doerr M, Arvanitidis C (2016) Optimized R functions for analysis of ecological community data using the R virtual laboratory (RvLab). Biodiversity Data Journal 4: e8357. https://doi.org/10.3897/BDJ.4.e8357

RvLab

A virtual R laboratory that makes execution of complex functions and visualization of results easy and readily available to the end-user.

https://portal.lifewatchgreece.eu/

LifeWatchGreece Portal view

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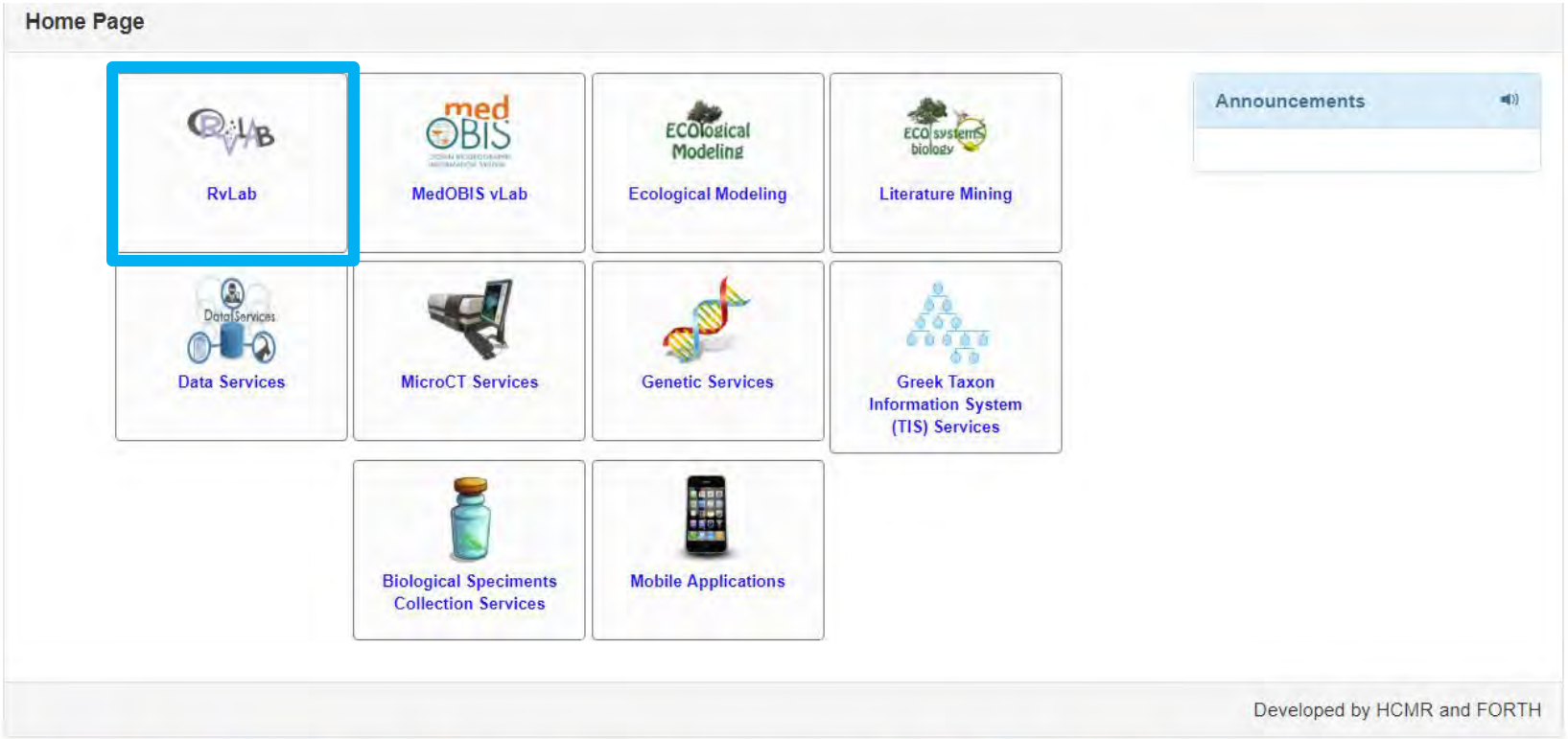

Workspace File Management

Input Files

- Macrobenthos_Classes_Adundance.csv
- Macrobenthos_Crustacea_Adundance.csv
- Macrobenthos_Femilies_Adundance.csv
- softLagoonAbundance.csv
- softLagoonAggregation.csv
- softLagoonEnv.csv
- softLagoonFactors.csv

Delete selected files

Upload new input files

Select file(s)...

Add Files

Check your Storage Utilization

Recent Jobs:

Job ID	Function	Status	Submitted At
Job248	anosim	Completed	09 May 2019 15:19:00
Job247	taxondive	Completed	09 May 2019 15:12:04
Job246	taxondive	Completed	09 May 2019 15:10:11
Job244	taxa2dist	Completed	09 May 2019 15:07:41
Job243	metamds_visual	Completed	09 May 2019 15:04:17
Job242	metamds	Completed	09 May 2019 15:03:22

Delete selected jobs

Help

- About R vLab
- User manual
- Storage and Usage Policy
- R vLab video presentation
- Add example data to your workspace

Submit a new Job

Statistical Function anosim

Analysis of Similarities: This function provides a way to test statistically whether there is a significant difference between two or more groups of sampling units.

Input files

Select community data file from workspace files

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- Macrobenthos_Femilies_Adundance.csv
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- softLagoonAggregation.csv
- softLagoonEnv.csv
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Select Transformation Method: none

Check to transpose matrix

Select factor file:

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Statistical Function anosim

taxa2dist
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vegdist
hclust
bict
pca
cca
anosim
anova
permanova
mantel
metamds
cca_visual
mapping_tools_visual
mapping_tools_div_visual
heatcloud
phylobar
2nd stage MDS
metamds_visual
radfit

Analysis of Similarities: This fun
whether there is a significant differ
sampling units... Read more

Input files

Select community data file from

- Macrobenthos_Classes_Ad
- Macrobenthos_Crustacea_
- Macrobenthos_Femilies_Ad
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- softLagoonAggregation.csv
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- softLagoonAbundance.csv
- softLagoonAggregation.csv
- softLagoonEnv.csv
- softLagoonFactors.csv

Select Column in Factor File: Location

Parameters

Permutations: 999

Method: euclidean

Run Function

Job248 Information/Results (anosim)

Input files

softLagoonAbundance.csv

softLagoonFactors.csv

Input parameters

transpose: tran

R script

```
library(vegan);
ENV <- read.table("/home/rvlab/jobs/vgerovas@hcmr.gr/job248/softLagoonFactors.csv",header = TRUE, sep=",",row.names=1);
mat <- read.table("/home/rvlab/jobs/vgerovas@hcmr.gr/job248/softLagoonAbundance.csv", header = TRUE, sep="," ,row.names=1);
mat <- t(mat);
otu.ENVFACT.anosim <- anosim(mat,ENV$Country,permutations = 999,distance = "bray");
png('rplot.png')
plot(otu.ENVFACT.anosim)
dev.off()
print("summary")
otu.ENVFACT.anosim
```

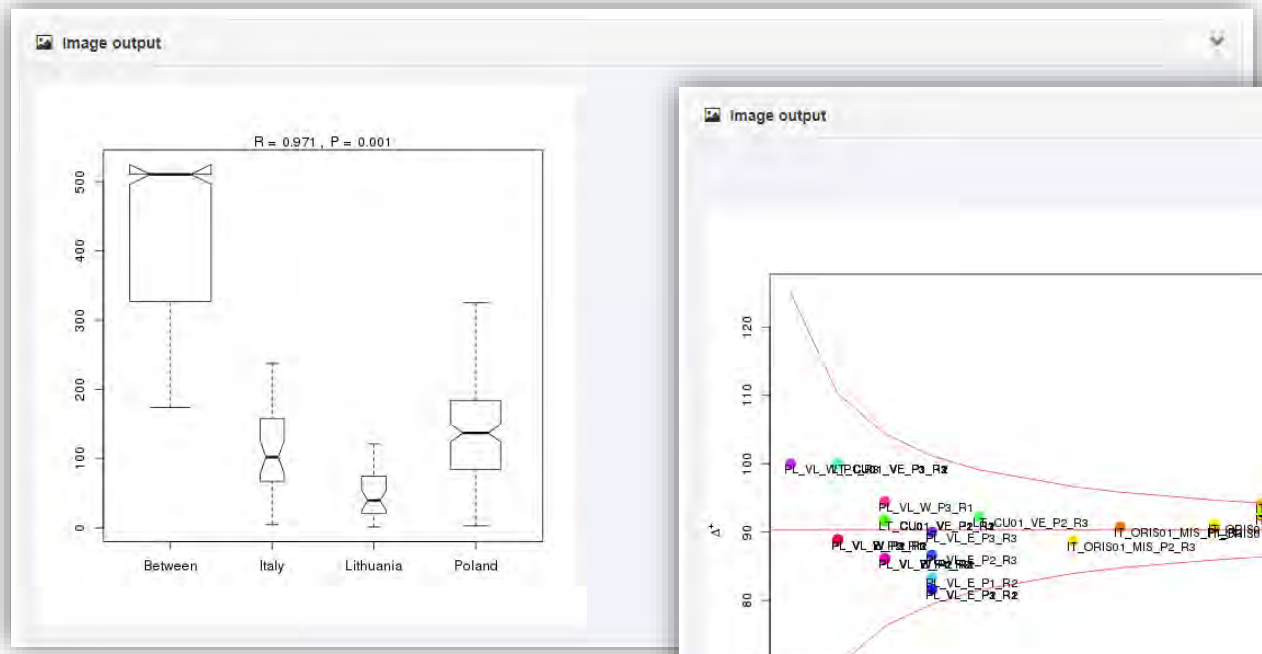
Files produc

rplot.png

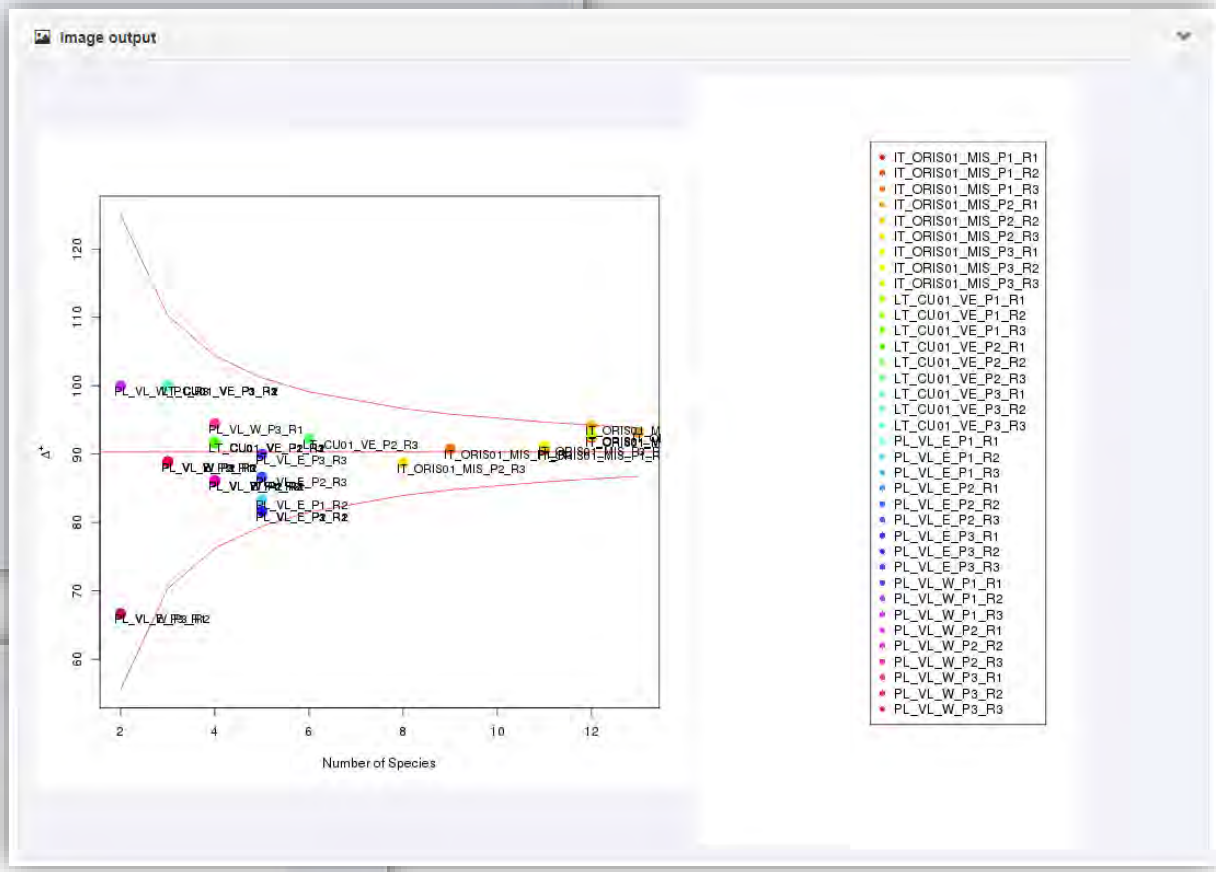
Text output

```
{
[1] "summary"

> otu.ENVFACT.


Call:

anosim(dat = mat, grouping = ENV$Country, permutations = 999,      distance = "bray")

Dissimilarity: bray


ANOSIM statistic R: 0.9711

      Significance: 0.001
```

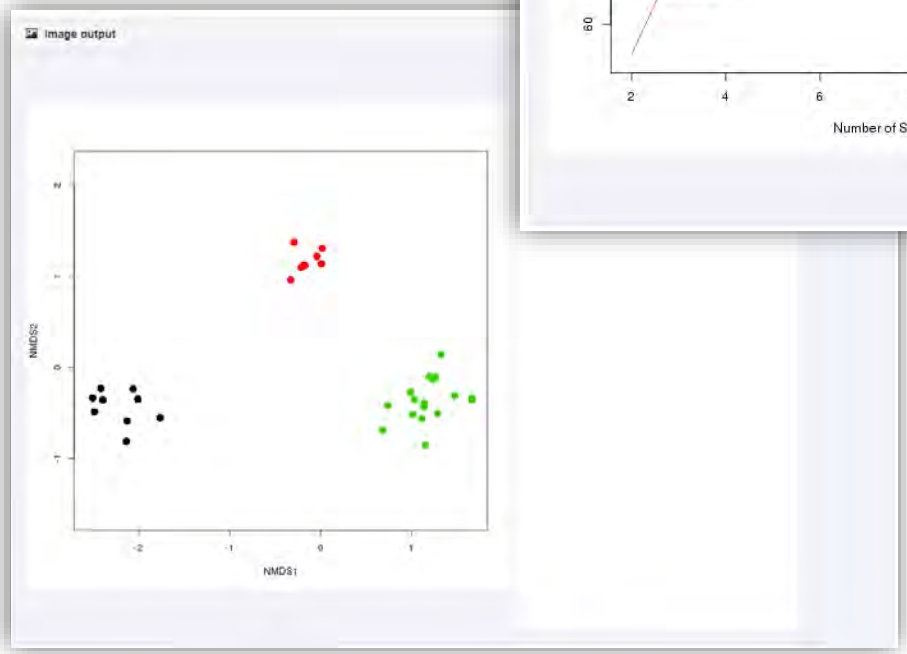
anosim



taxondive



metamds



LifeWatchGreece RvLab

Journal of Experimental Marine Biology and Ecology 366 (2008) 184–186

Contents lists available at ScienceDirect

Journal of Experimental Marine Biology and Ecology

journal homepage: www.elsevier.com/locate/jembe

All animals are equal, but some animals are more equal than others

R.M. Warwick *, P.J. Somerfield

Plymouth Marine Laboratory, Prospect Place, West Hoe, Plymouth, PL1 3DH, UK

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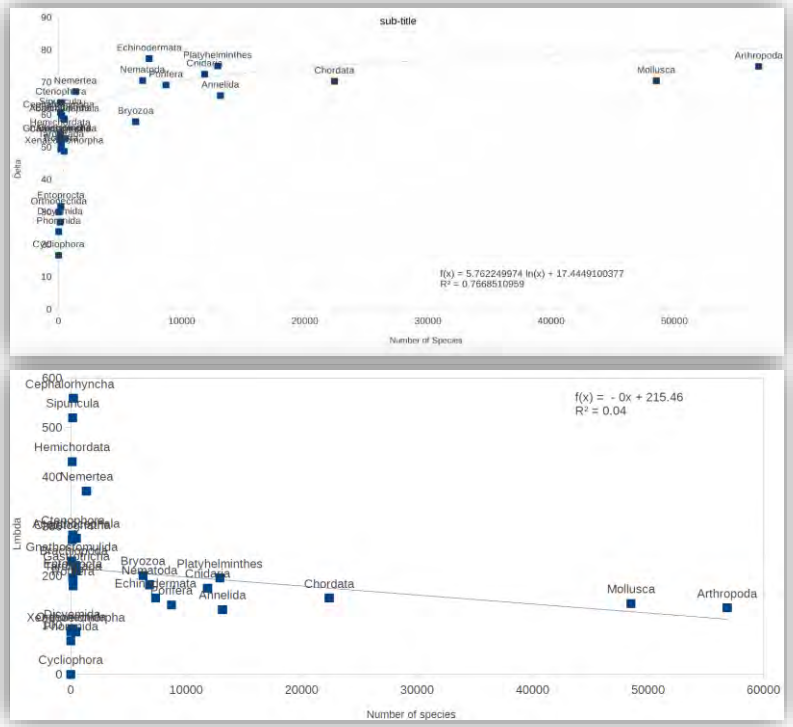
Research Infrastructures offer capacity to address scientific questions never attempted before: Are all taxa equal?

Research article | Biodiversity | Bioinformatics | Marine Biology | Taxonomy | Zoology

Christos D Arvanitidis [1], Richard M Warwick [2], Paul J Somerfield [2], Christina Pavloudi [1], Evangelos Pafilis [1], Anastassis Oulas [1], Giorgos Chatzigeorgiou [1], Vasilis Gerovasileiou [1], Theodoros Patkos [3], Nicolas Bailly [1], Francisco Hernandez [4], Bart Vanhoorne [4], Leen Vandepitte [4], Ward Appeltans [5], Robert Adlard [6], Peter Adriaens [7], Ahn Kee-Jeong [8],

and the WoRMS Editorial Team



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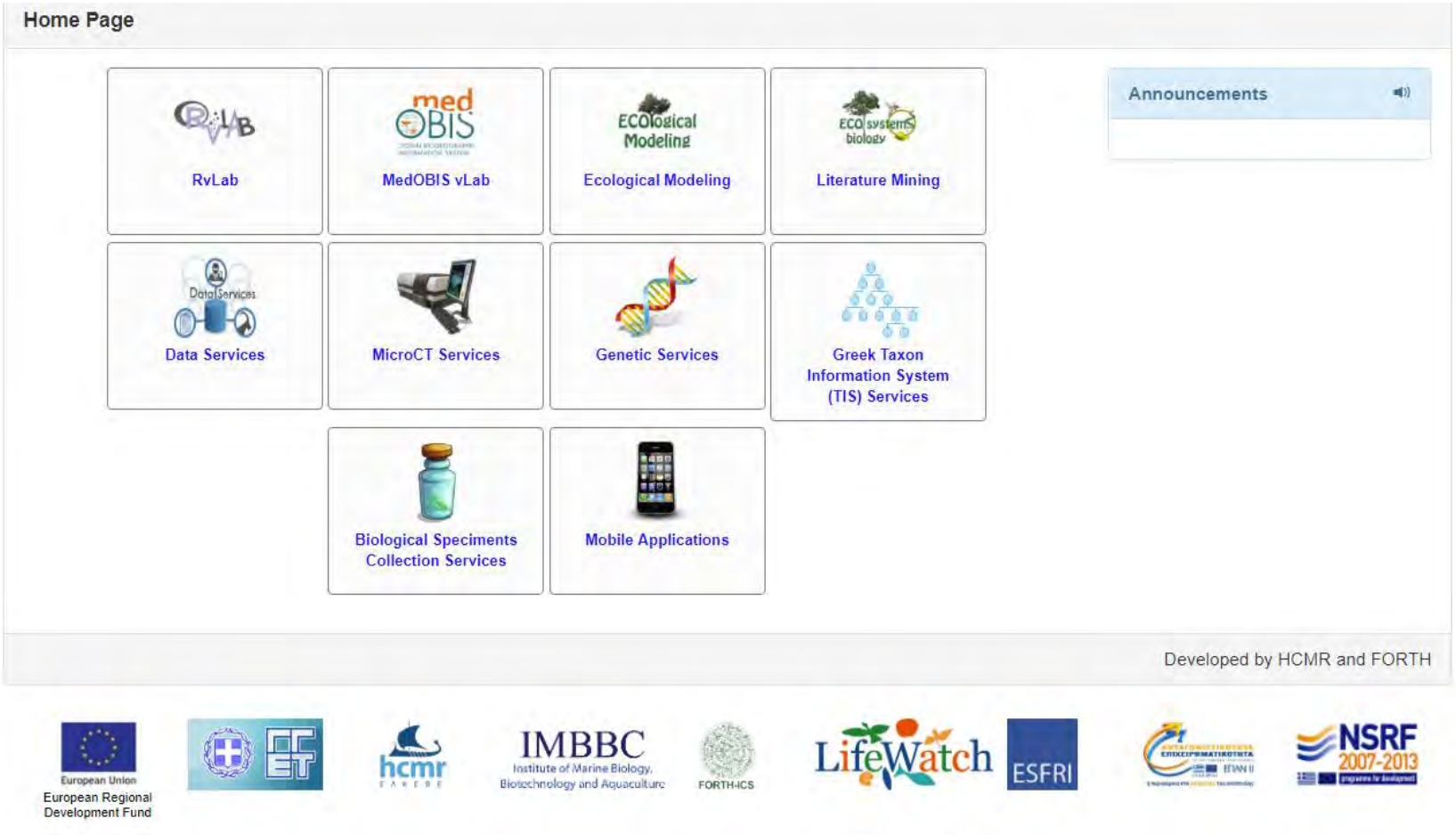

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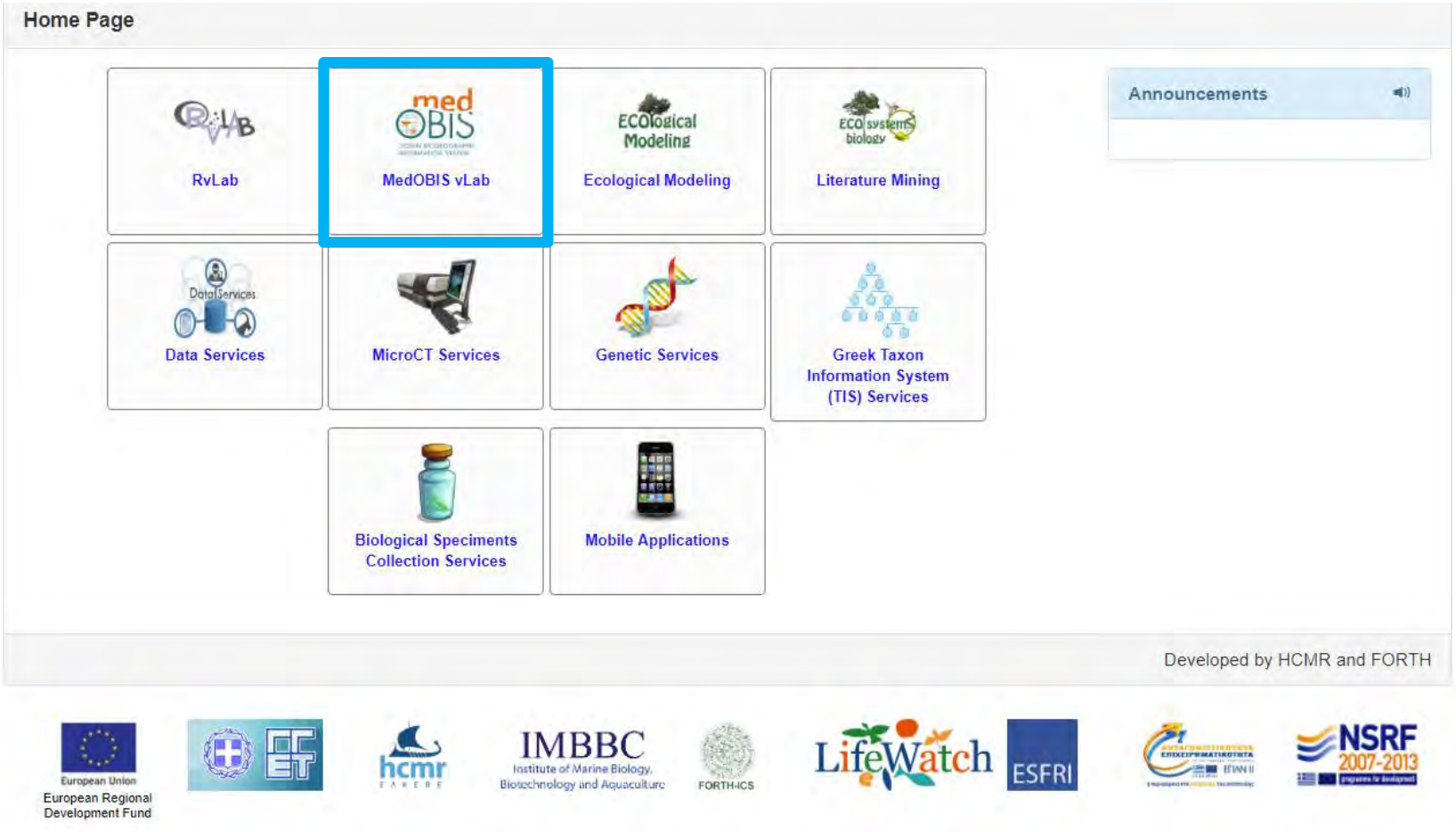

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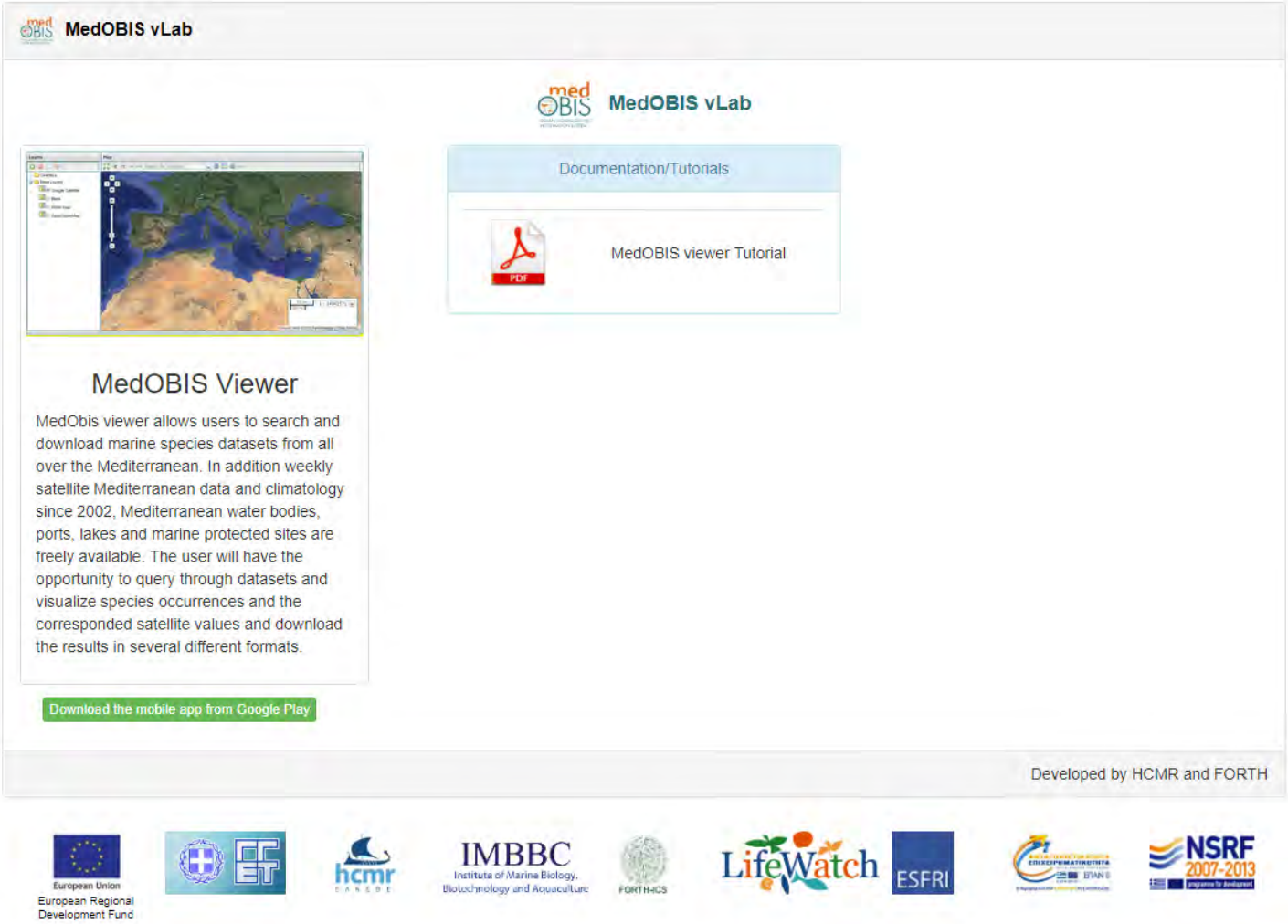
MedOBIS vLab



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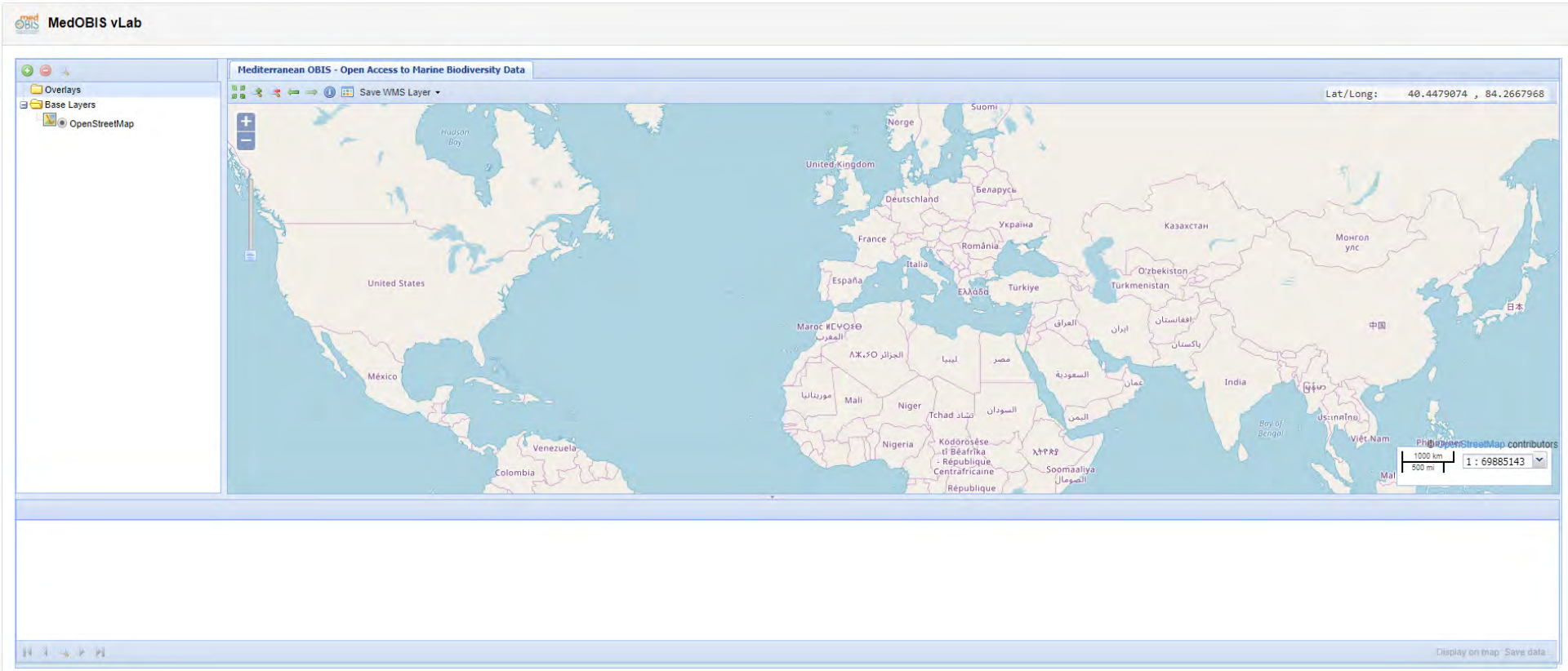

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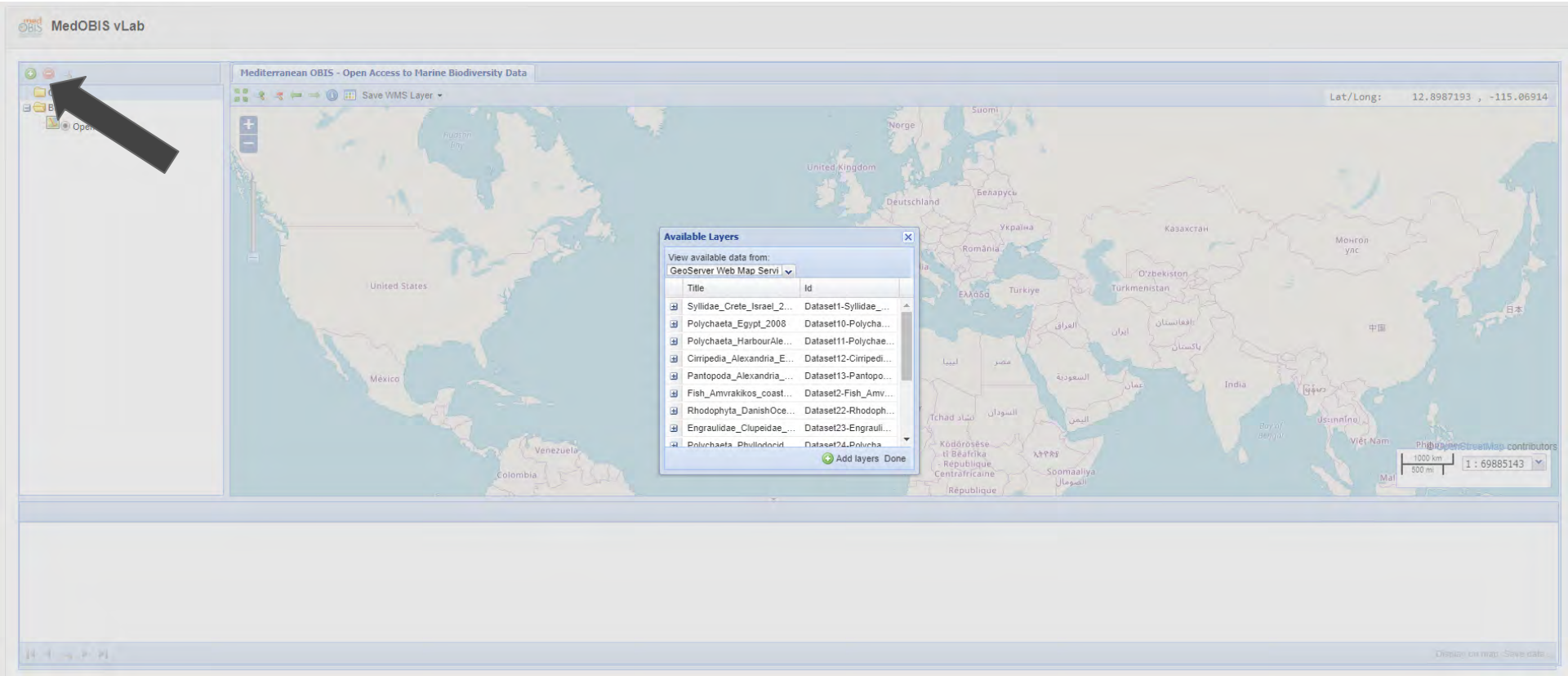

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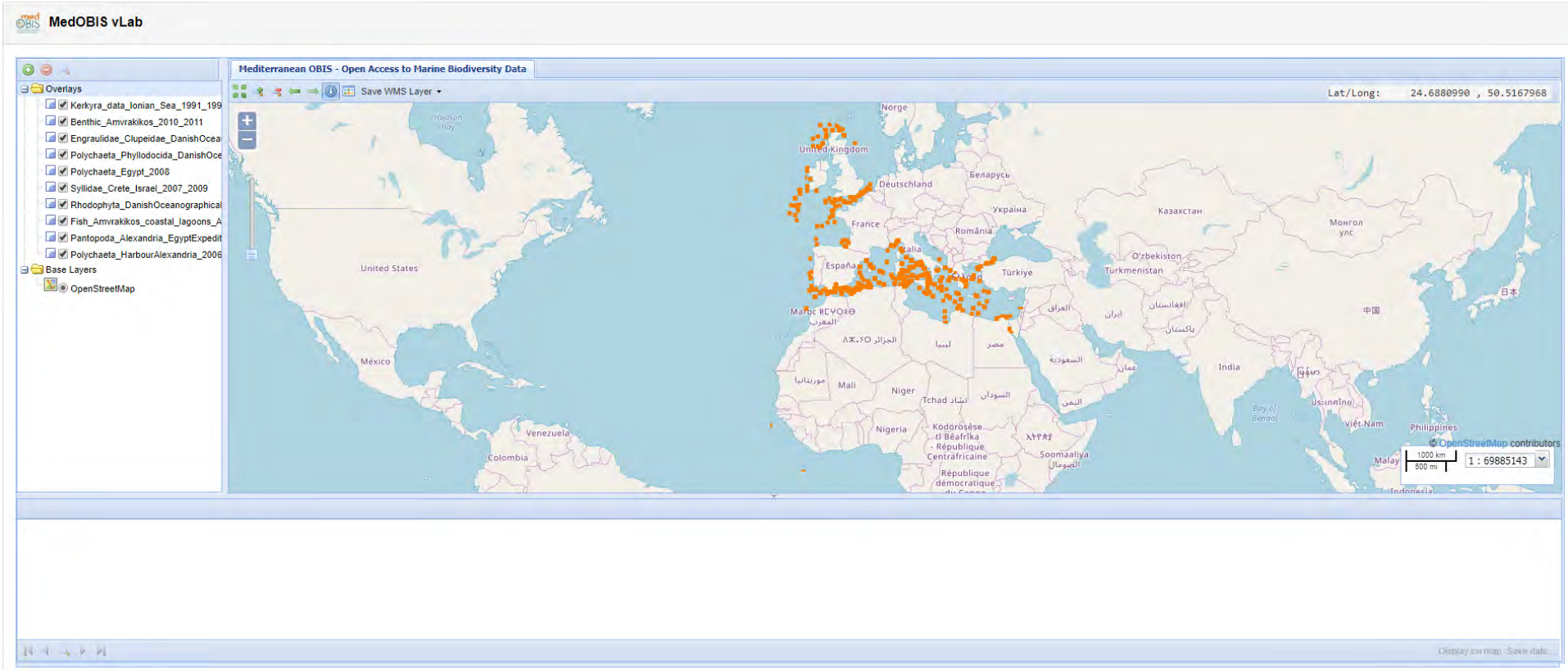

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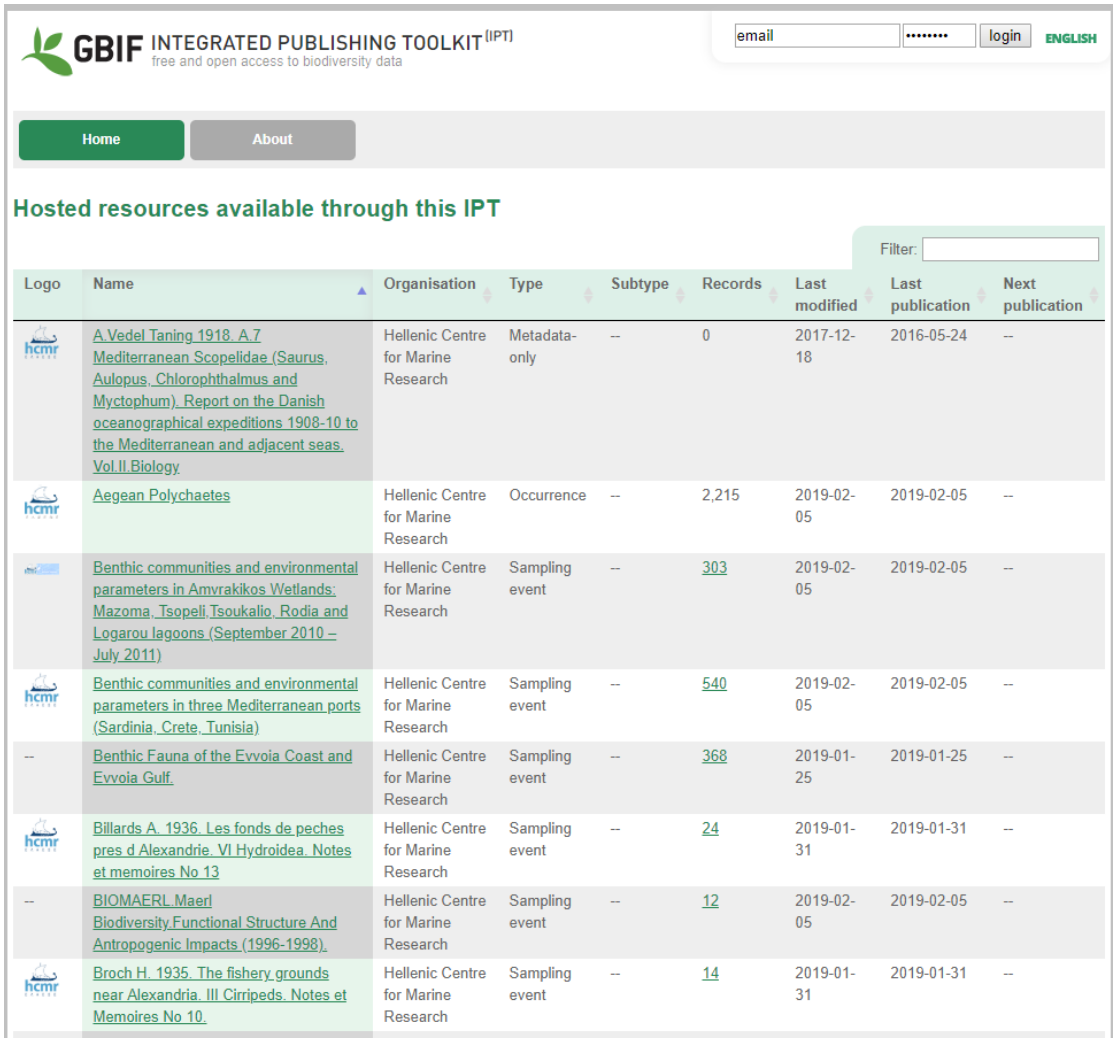

GBIF INTEGRATED PUBLISHING TOOLKIT (IPT)
free and open access to biodiversity data

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Filter:

Logo	Name	Organisation	Type	Subtype	Records	Last modified	Last publication	Next publication
	A.Vedel Taning 1918. A.7 Mediterranean Scopelidae (Saurus, Aulopus, Chlorophthalmus and Myctophum). Report on the Danish oceanographical expeditions 1908-10 to the Mediterranean and adjacent seas. Vol.II.Biology	Hellenic Centre for Marine Research	Metadata-only	--	0	2017-12-18	2016-05-24	--
	Aegean Polychaetes	Hellenic Centre for Marine Research	Occurrence	--	2,215	2019-02-05	2019-02-05	--
	Benthic communities and environmental parameters in Amvrakikos Wetlands: Mazoma, Tsopeli,Tsoukalio, Rodia and Logarou lagoons (September 2010 – July 2011)	Hellenic Centre for Marine Research	Sampling event	--	303	2019-02-05	2019-02-05	--
	Benthic communities and environmental parameters in three Mediterranean ports (Sardinia, Crete, Tunisia)	Hellenic Centre for Marine Research	Sampling event	--	540	2019-02-05	2019-02-05	--
--	Benthic Fauna of the Evvoia Coast and Evvoia Gulf.	Hellenic Centre for Marine Research	Sampling event	--	368	2019-01-25	2019-01-25	--
	Billards A. 1936. Les fonds de peches pres d Alexandrie. VI Hydroidea. Notes et memoires No 13	Hellenic Centre for Marine Research	Sampling event	--	24	2019-01-31	2019-01-31	--
--	BIOMAERL Maerl Biodiversity Functional Structure And Antropogenic Impacts (1996-1998).	Hellenic Centre for Marine Research	Sampling event	--	12	2019-02-05	2019-02-05	--
	Broch H. 1935. The fishery grounds near Alexandria. III Cirripeds. Notes et Memoires No 10.	Hellenic Centre for Marine Research	Sampling event	--	14	2019-01-31	2019-01-31	--

http://ipt.medobis.eu/

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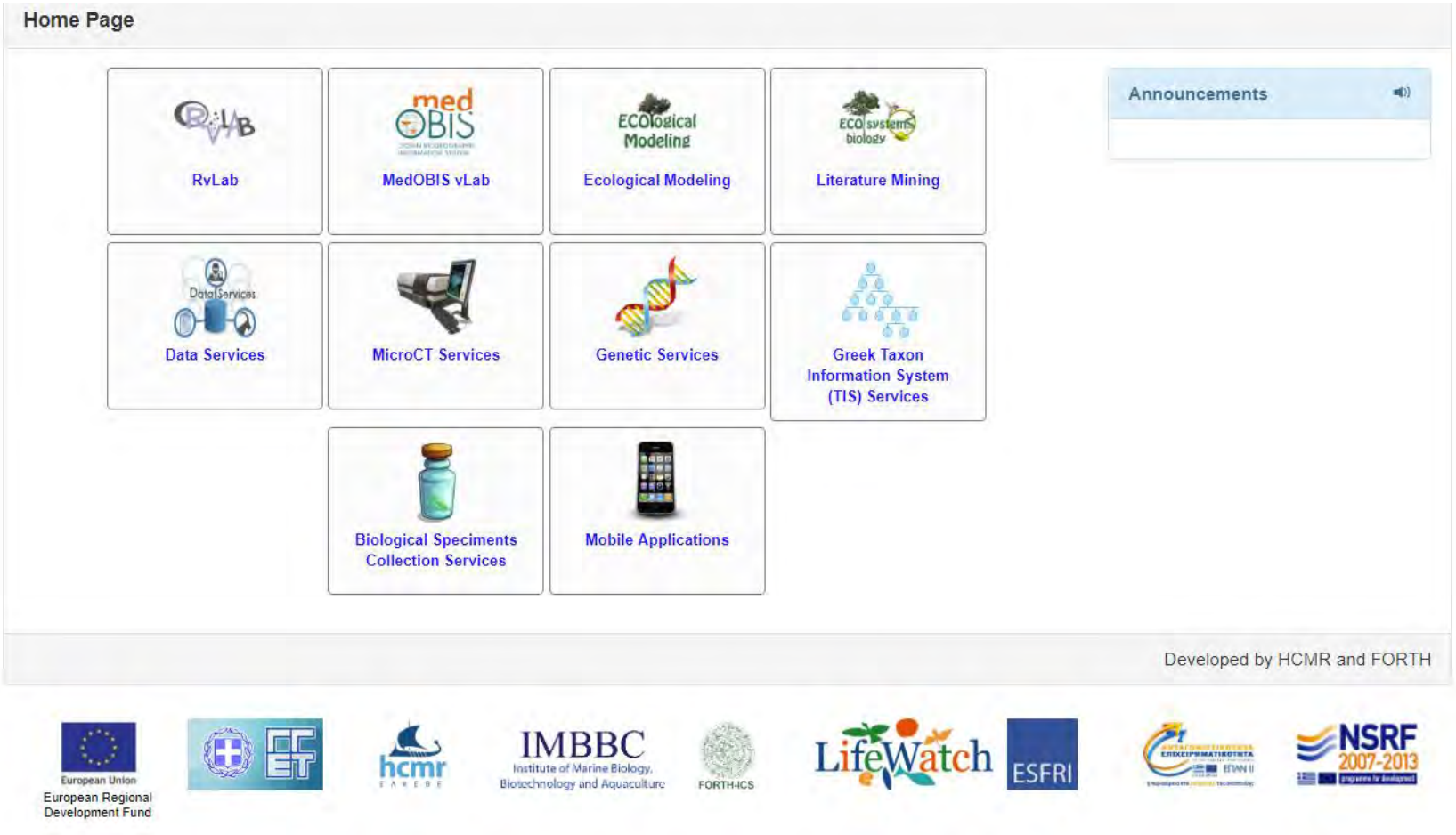

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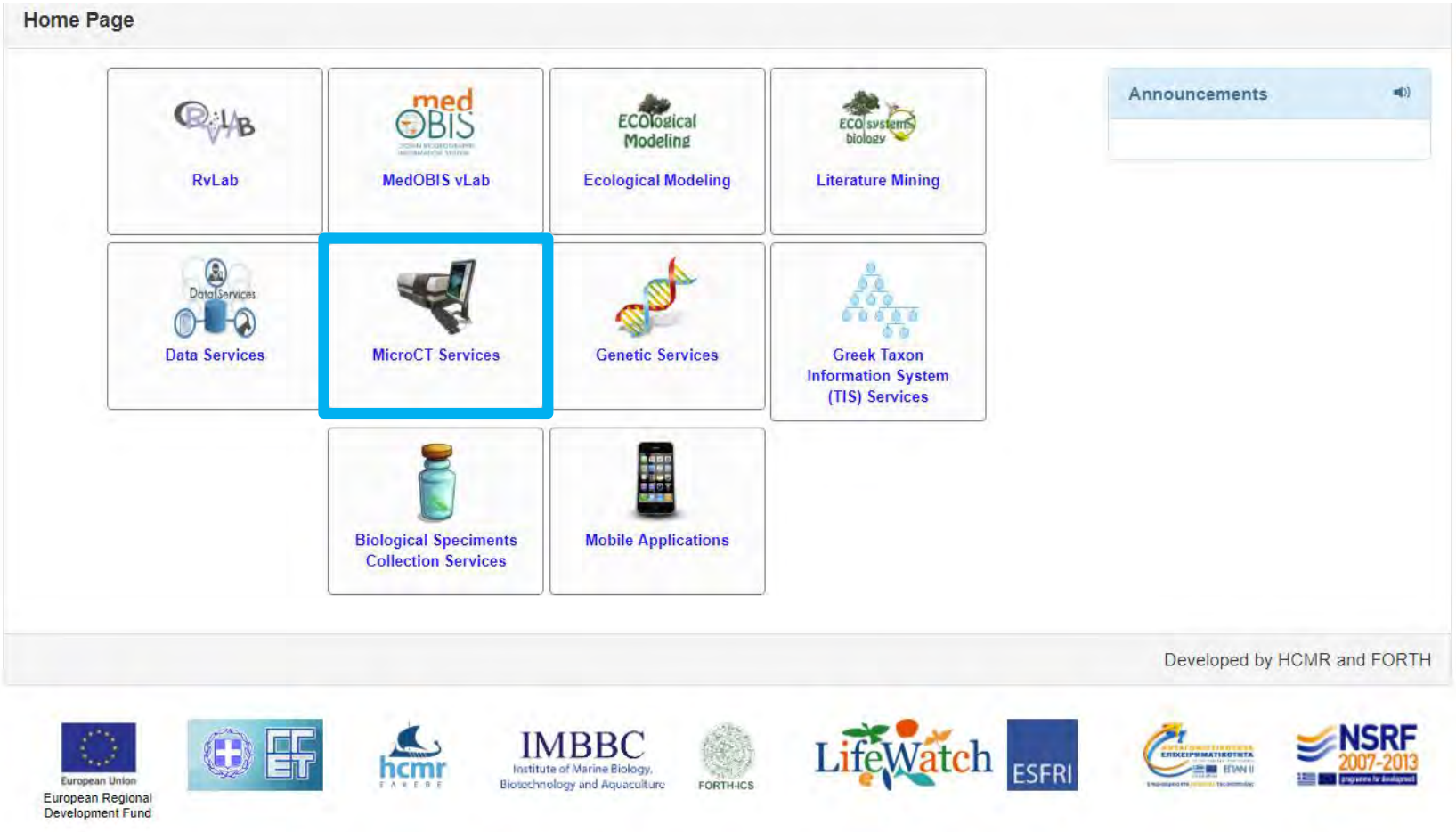


LifeWatchGreece Micro-CT vLab

What is micro-CT?

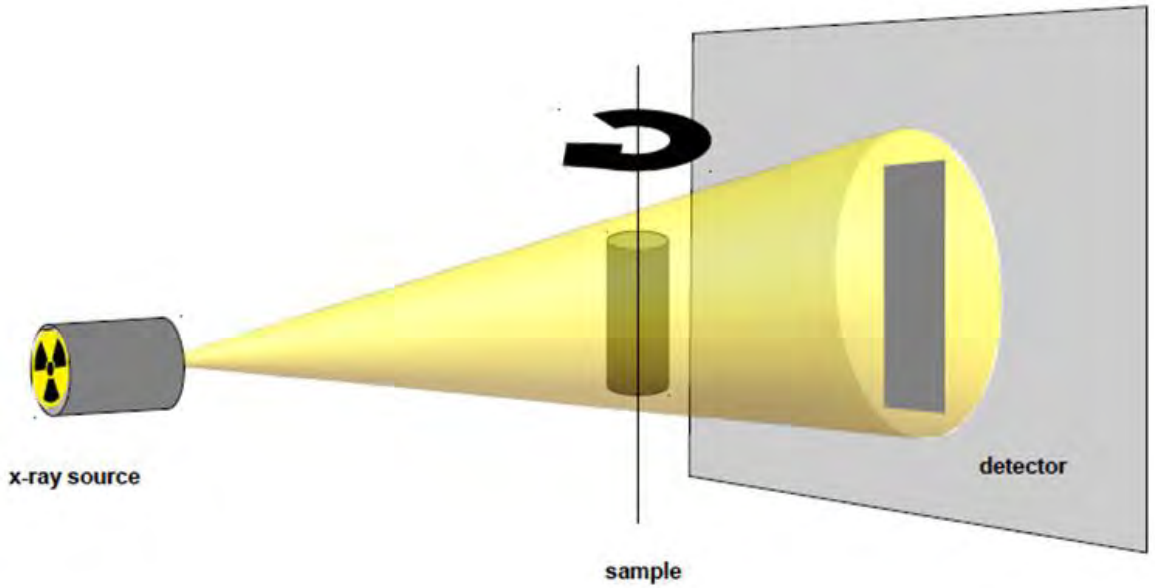
- **Non destructive three-dimensional imaging technique similar to computer tomography used in hospitals, just on a much smaller scale.**

- **Samples of a few millimeters up to a size of a mouse, and structures in the range of a few microns (<0.8µm/pixel) can be seen in the images.**

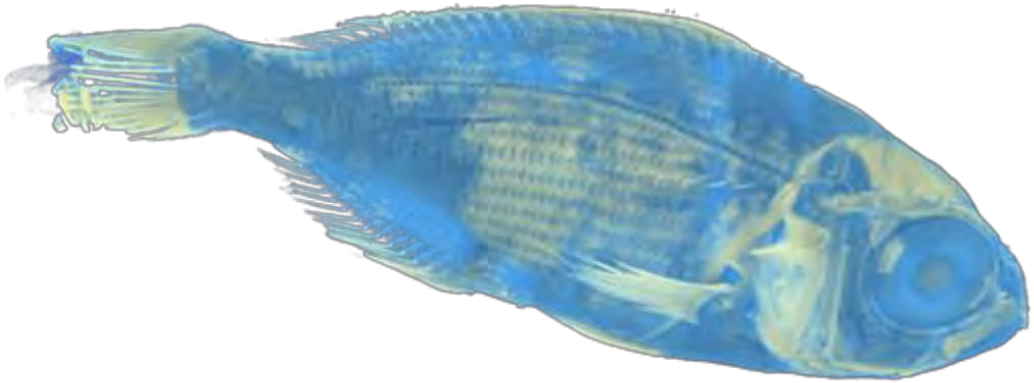
LifeWatchGreece Micro-CT vLab

What is micro-CT?

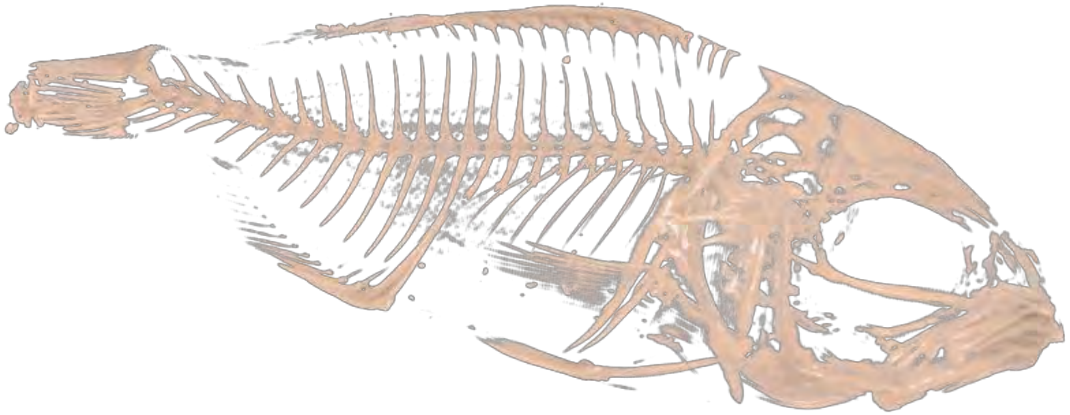
MARBIGEN



LifeWatchGreece Micro-CT vLab



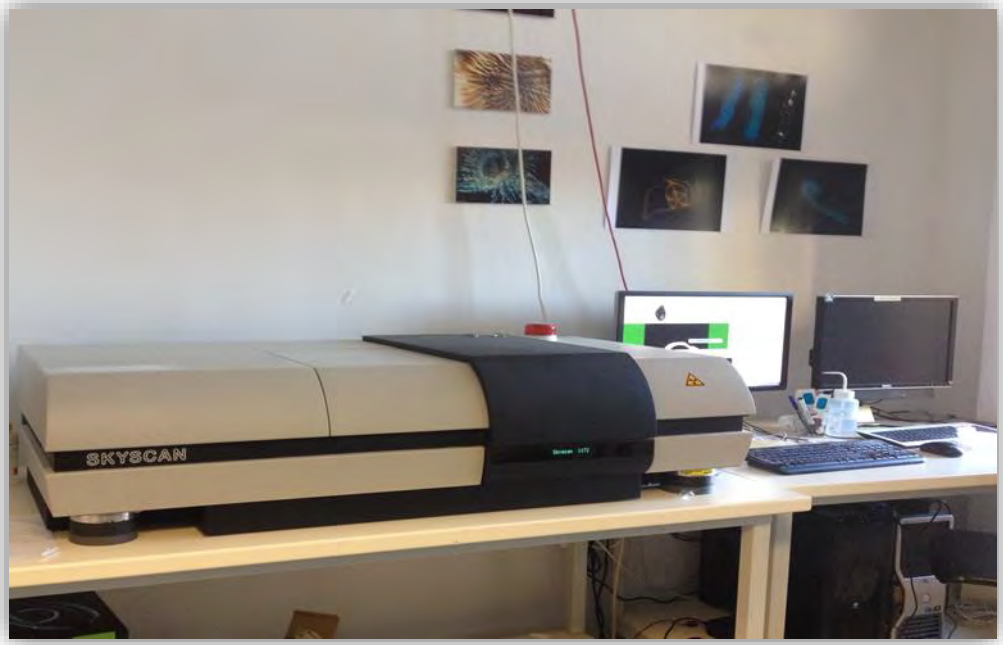
Exterior parts



Interior parts

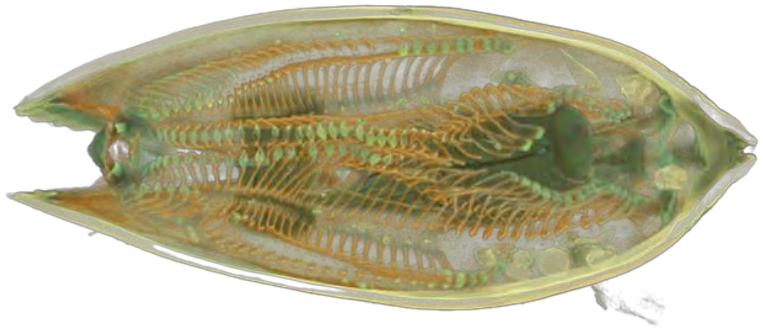
LifeWatchGreece Micro-CT vLab

- >1000 scans have been created.
- 17 scans have been uploaded for the initiation of this web service.
- The uploaded datasets belong to several taxa and are annotated with metadata.



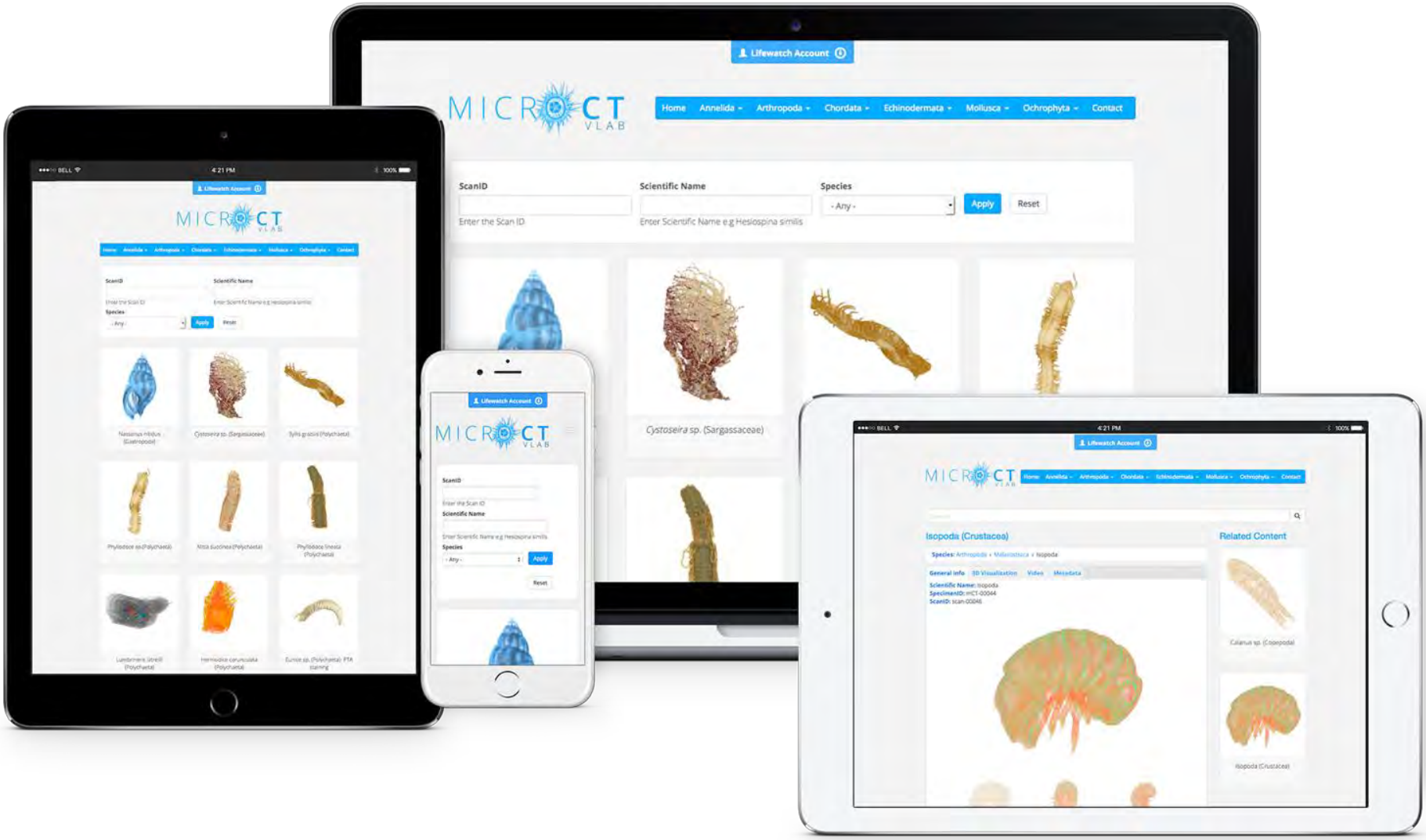
- 7 micro-CT datasets can be downloaded from the Dryad Digital Repository which is a repository system for several datatypes.
- The remaining datasets can be shared through personal communication as the storage is still under construction.

LifeWatchGreece Micro-CT vLab

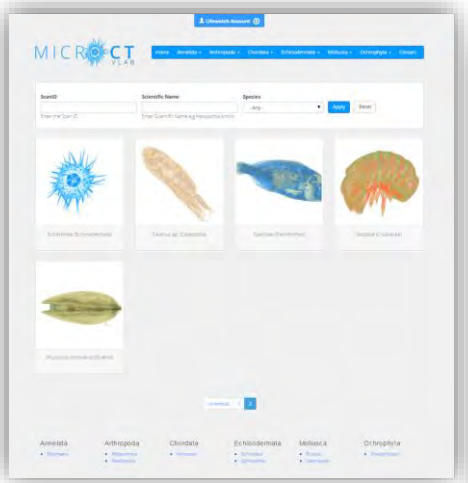


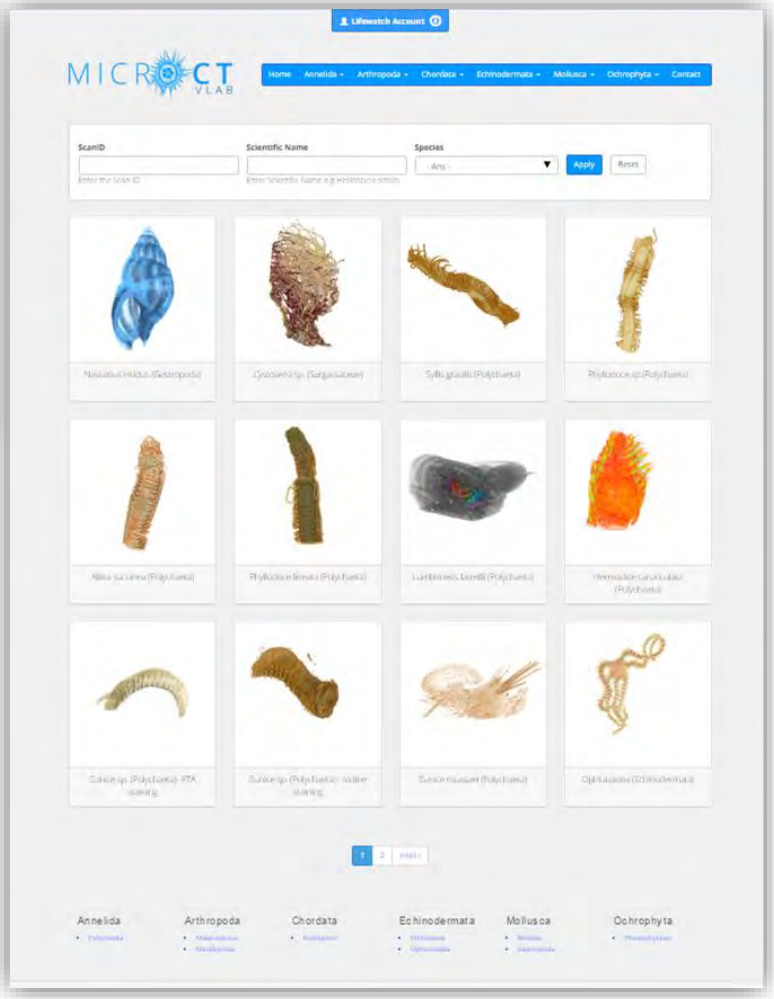
Micro-CT services are now available through
http://microct.portal.lifewatchgreece.eu/

LifeWatchGreece Micro-CT vLab



LifeWatchGreece Micro-CT vLab





Scans are presented as a preview of images with the title of the dataset

LifeWatchGreece
Micro-CT vLab

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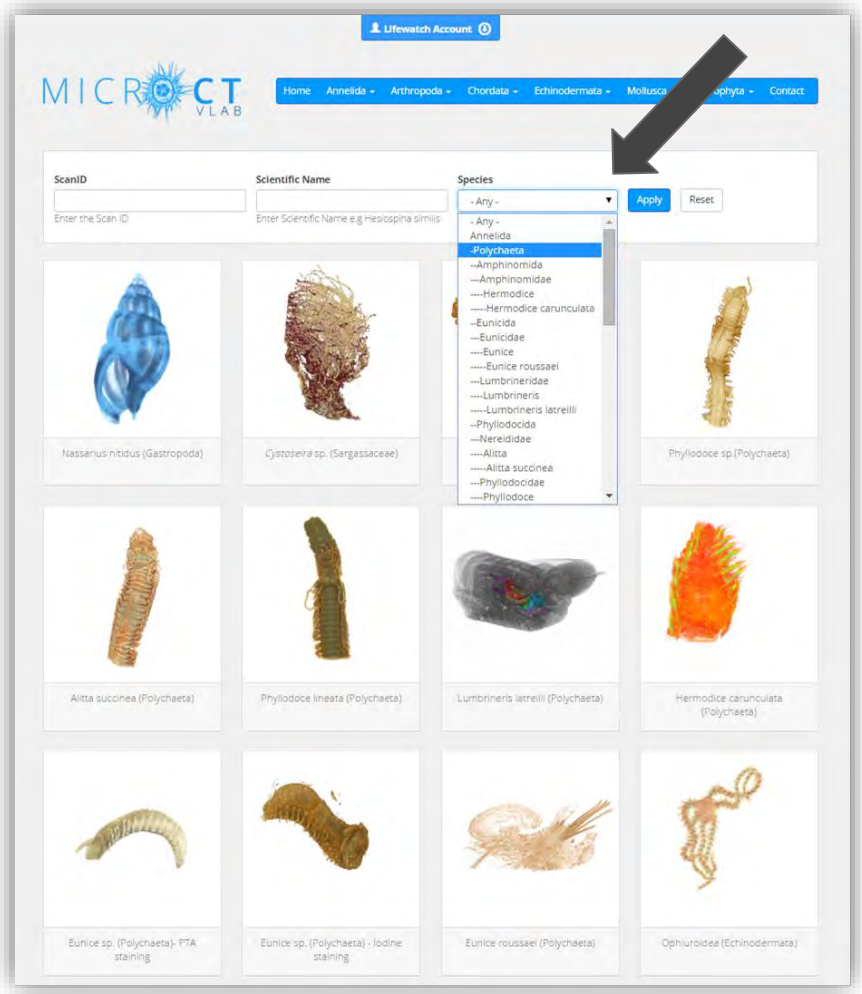
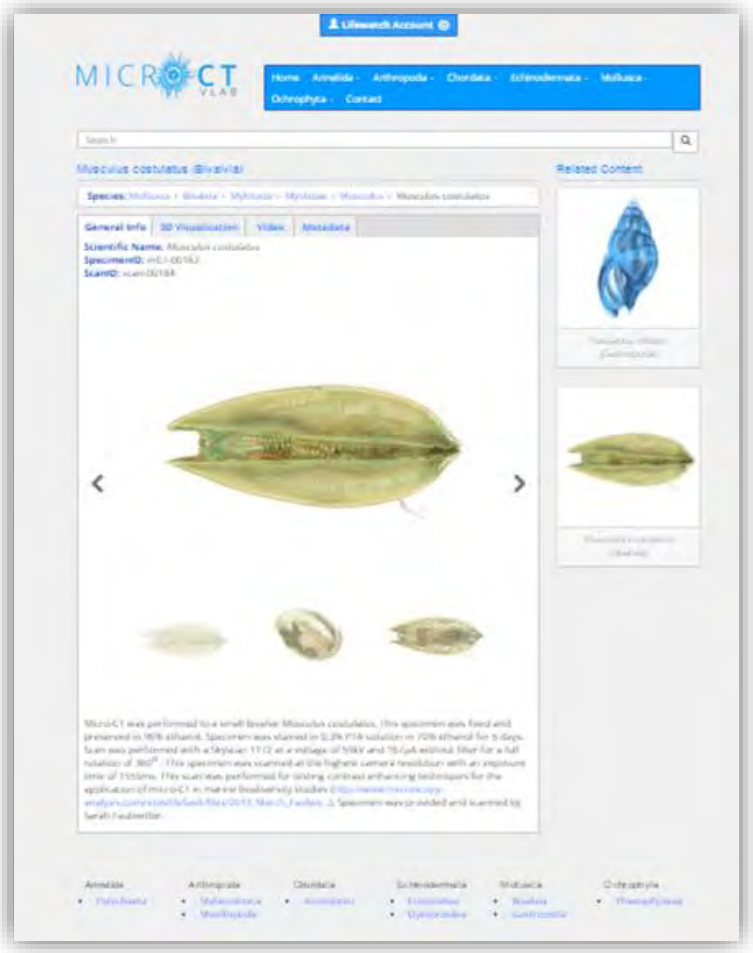


LifeWatchGreece Micro-CT vLab

- Short description of the dataset
- Gallery of 3D images
- Related datasets



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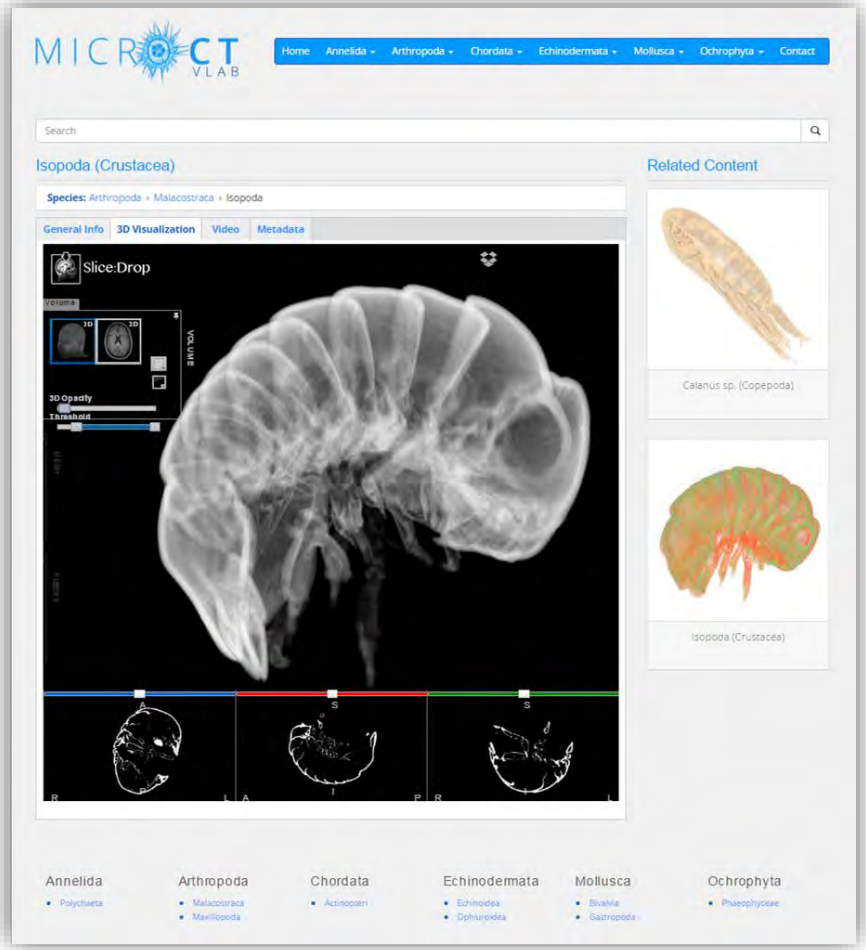
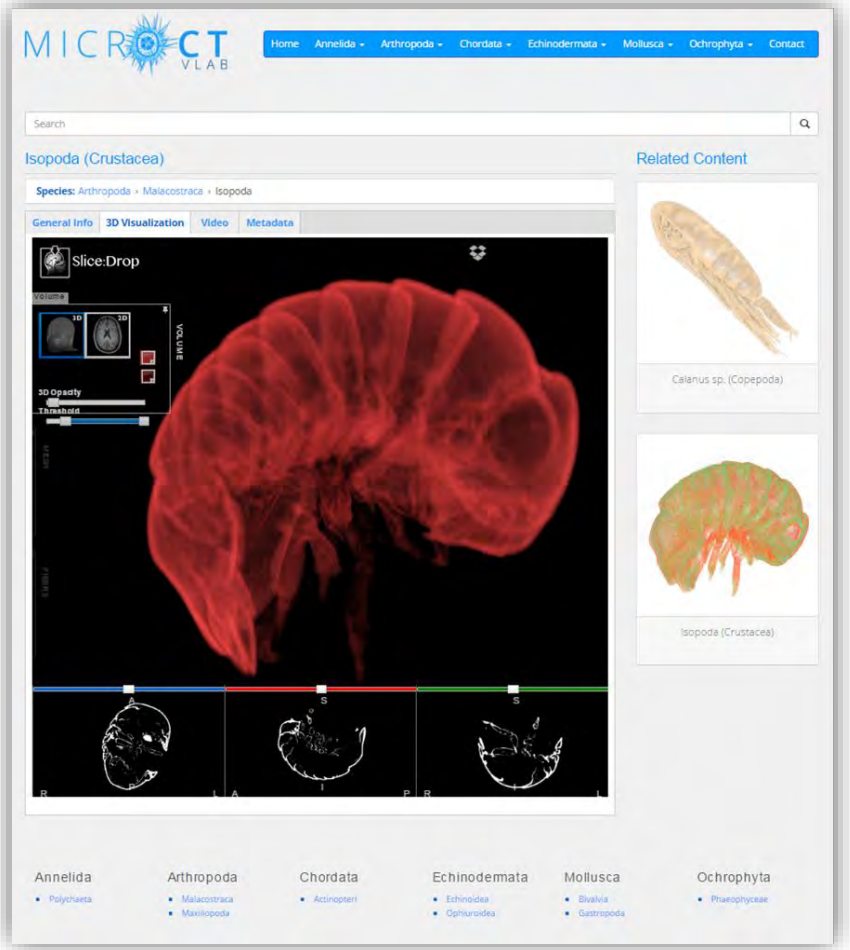
Micro-CT vLab





LifeWatchGreece Micro-CT vLab

Biodiversity Data Journal 4: e8740
doi: 10.3897/BDJ.4.e8740

Software Description

Micro-CT$_{vlab}$: A web based virtual gallery of biological specimens using X-ray microtomography (micro-CT)

Kleoniki Keklikoglou‡, Sarah Faulwetter‡, Eva Chatzinikolaou‡, Nikitas Michalakis‡, Irene Filiopoulou‡, Nikos Minadakis§, Emmanouela Panteri‡, George Perantinos‡, Alexandros Gougousis‡, Christos Arvanitidis‡

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ISSN 2118-9773
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2019 · Keklikoglou K. *et al.*

Collection management

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Micro-computed tomography for natural history specimens: a handbook of best practice protocols

Kleoniki KEKLIKOGLOU[1,*], Sarah FAULWETTER[2], Eva CHATZINIKOLAOU[3], Patricia WILS[4], Jonathan BRECKO[5], Jiří KVAČEK[6], Brian METSCHER[7] & Christos ARVANITIDIS[8]

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[8]urn:lsid:zoobank.org:author:737F149F-C30C-42EB-A690-5E693AD95427

Abstract. Micro-computed tomography (micro-CT or microtomography) is a non-destructive imaging technique using X-rays which allows the digitisation of an object in three dimensions. The ability of micro-CT imaging to visualise both internal and external features of an object, without destroying the specimen, makes the technique ideal for the digitisation of valuable natural history collections. This handbook serves as a comprehensive guide to laboratory micro-CT imaging of different types of natural history specimens, including zoological, botanical, palaeontological and geological samples. The basic

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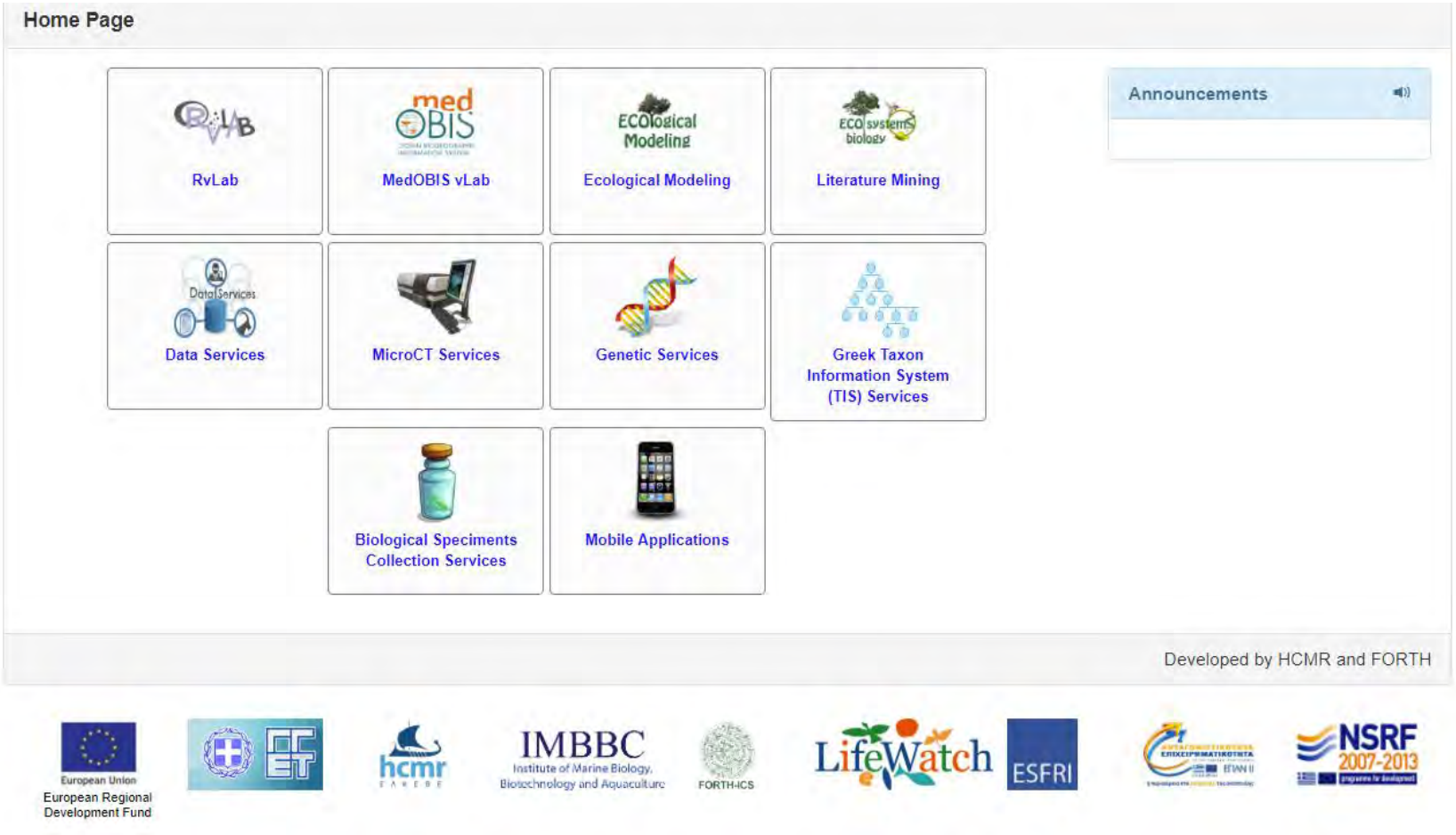

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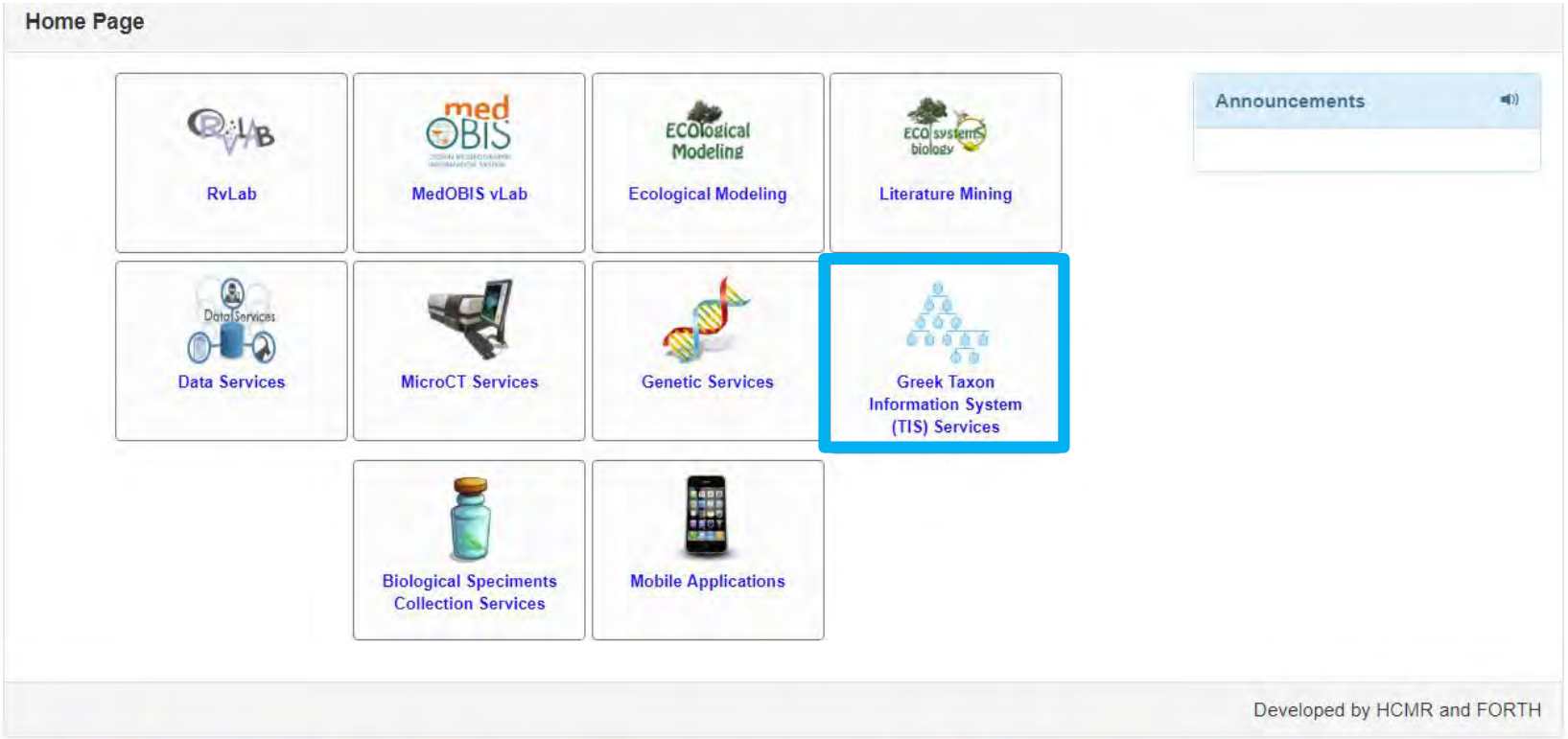

LifeWatchGreece
Greek Taxon Information System

Greek Taxon Information System (TIS) Services

Biodiversity Data Journal 4: e7959
doi: 10.3897/BDJ.4.e7959

open access

Editorial

Introduction to the Greek Taxon Information System (GTIS) in LifeWatchGreece: the construction of the Preliminary Checklists of Species of Greece

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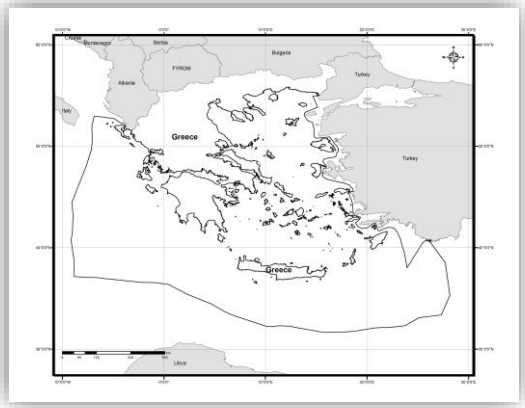

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LifeWatchGreece
Greek Taxon Information System

Greek Taxon Information System (TIS) Services

Introduction to the Greek Taxon Information System (GTIS) in LifeWatchGreece: the construction of the Preliminary Checklists of Species of Greece
Nicolas Bailly, Vasilis Gerovasileiou, Christos Arvanitidis, Anastasios Legakis
Editorial doi: 10.3897/BDJ.4.e7959
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Spyros Gkelis, Iordanis Ourailidis, Manthos Panou, Nikos Pappas
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Porifera of Greece: an updated checklist
Eleni Voultsiadou, Vasilis Gerovasileiou, Nicolas Bailly
Taxonomic Paper doi: 10.3897/BDJ.4.e7984
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Panayota Koulouri, Vasilis Gerovasileiou, Nicolas Bailly
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Vasilis Gerovasileiou, Antonietta Rosso
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Ascidiacea (Chordata: Tunicata) of Greece: an updated checklist
Chryssanthi Antoniadou, Vasilis Gerovasileiou, Nicolas Bailly
Taxonomic Paper doi: 10.3897/BDJ.4.e9273
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Name	Gerovasileiou, V.; Rosso, A. (2016). Marine Bryozoa of Greece: an annotated checklist. *Biodiversity Data Journal*. 4: e10672.
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Authors	Gerovasileiou, V.; Rosso, A.
Year	2016
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Journal	Biodiversity Data Journal
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Distributions (234)

Greek Exclusive Economic Zone for *Adeonella calveti* (Canu & Bassler, 1930)
Greek Exclusive Economic Zone for *Adeonella pallasii* (Heller, 1867)
Greek Exclusive Economic Zone for *Aetea anguina* (Linnaeus, 1758)
Greek Exclusive Economic Zone for *Aetea lepadiformis* Waters, 1906
Greek Exclusive Economic Zone for *Aetea sica* (Couch, 1844)
Greek Exclusive Economic Zone for *Aetea truncata* (Landsborough, 1852)
Greek Exclusive Economic Zone for *Alcyonidium cellarioides* Calvet, 1900
Greek Exclusive Economic Zone for *Alcyonidium duplex* Prouho, 1892
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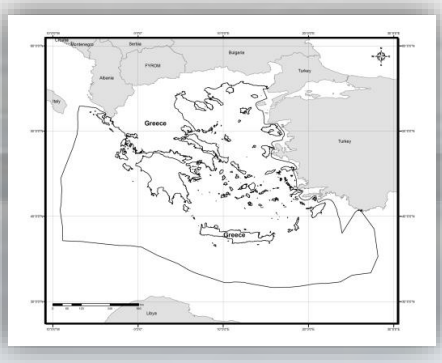
Greek Exclusive Economic Zone for *Alderina imbellis* (Hincks, 1860)



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Greek Taxon Information System

Greek Taxon Information System (TIS) Services

LIFEWATCH Regional portal

Home » Aristotle and marine biodiversity

http://www.lifewatch.be/en/2016-news-aristotle-taxonomy

Aristotle and marine biodiversity

Many people are unaware that the great Greek philosopher Aristotle can also be regarded as "the father of marine biodiversity". Indeed, this "Linnaeus avant la lettre" spent a considerable part of his life studying marine species. In fact, more than 40% of the animals he studied in his zoological works had a marine origin. If Aristotle were still alive today, he would have made an excellent ambassador for modern marine biodiversity research. To highlight his very early contributions to the study of marine biodiversity, we are featuring a series of five stories that cover different aspects of his life and research, linking his work to current initiatives and projects, and demonstrating that at least part of his work is still relevant and very much alive today...

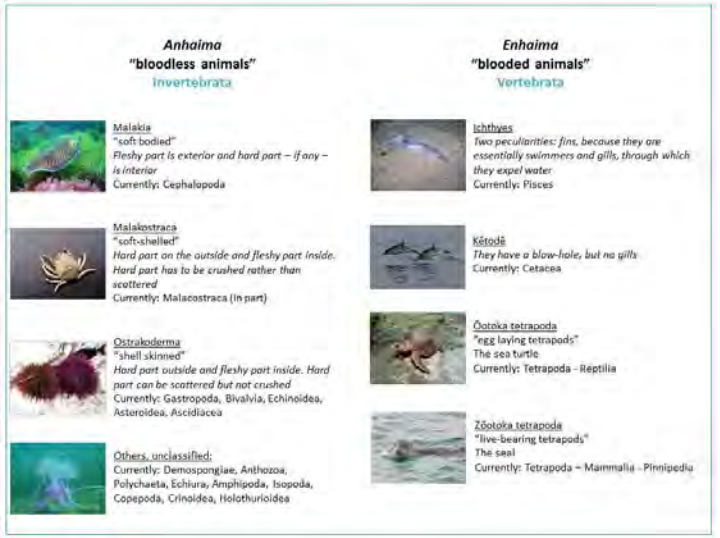
In recognition of Aristotle's important contribution to philosophy and science, UNESCO declared 2016 (the year of his 2400th birth anniversary) as the "Aristotle Anniversary Year". To celebrate his specific contributions to marine sciences, we are featuring 5 stories, linking Aristotle's scientific contributions to taxonomy, ecology and species distributions to current-day initiatives such as the World Register of Marine Species (WoRMS), the European LifeWatch project (featuring the Belgian and Greek contributions), the European Marine Observation and Data Network (EMODnet) and the European node of the Ocean Biogeographic Information System (EurOBIS).

2016 ARISTOTLE ANNIVERSARY YEAR by UNESCO

Aristotle, the 'marine Linnaeus' avant la lettre

The great philosopher Aristotle was also a universal scientist, with a wide interest in several scientific disciplines. Biology, was his pet subject, and many early taxonomists had great admiration for him, including Linnaeus and Mayr. Modern scientists are now deepening their knowledge of Aristotle's works, aiming to better understand the roots of marine biological research and to make use of this information which could potentially provide improved baseline information for the Mediterranean marine environment. (Read more)

	# taxa identified by Aristotle	# taxa identified by Linaeus (#accepted species between brackets)	# species in Greek marine waters	# species in the Mediterranean Sea
Porifera	6	53 (10)	215	681
Cnidaria	5	237 (80)	86	757
Polychaeta	1	132 (50)	849	1122
Echiura	1	0 (0)	1	6
Mollusca	36	1832 (596)	812	2113
Crustacea	23	164 (99)	813	2239
Echinodermata	9	127 (31)	91	154
Ascidiacea	3	25 (5)	75	229
Pisces	109	1150 (292)	510	650
Marine quadrupeds*	1	40 (19)	16	28
TOTAL	**200**	**3760 (1182)**	**3468**	**7979**



LifeWatchGreece
Greek Taxon Information System

Greek Taxon Information System (TIS) Services

Mediterranean Marine Science
Indexed in WoS (Web of Science, ISI Thomson) and SCOPUS
The journal is available on line at http://www.medit-mar-sc.net
DOI: http://dx.doi.org/10.12681/mms.13874

Research Article

Aristotle's scientific contributions to the classification, nomenclature and distribution of marine organisms

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Abstract

The biological works of the Greek philosopher Aristotle include a significant amount of information on marine animals. This study is an overview of Aristotle's scientific contribution to the knowledge of marine biodiversity and specifically to taxonomic classification, nomenclature and distribution of marine species. Our results show that Aristotle's approach looks remarkably familiar to present day marine biologists since: (i) although not directly aiming at it, he gave a taxonomic classification of marine animals, which includes physical groups ranked on three levels at least; (ii) most of Aristotle's marine "major groups" correspond to taxa of the order rank in Linnaeus's classification and to taxa of the class rank in the current classification; (iii) a positive correlation was found between the number of taxa per group identified in Aristotle's writings and those described by Linnaeus; (iv) Aristotle's classification system exhibits similarities with the current one regarding the way taxa are distributed to higher categories; (v) a considerable number of Aristotle's marine animal names have been used for the creation of the scientific names currently in use; (vi) he was the first to give an account of Mediterranean marine fauna, focusing on the Aegean Sea and adjacent areas. In view of the above, we suggest that the foundations of marine taxonomy as laid down by Aristotle are still echoing today.

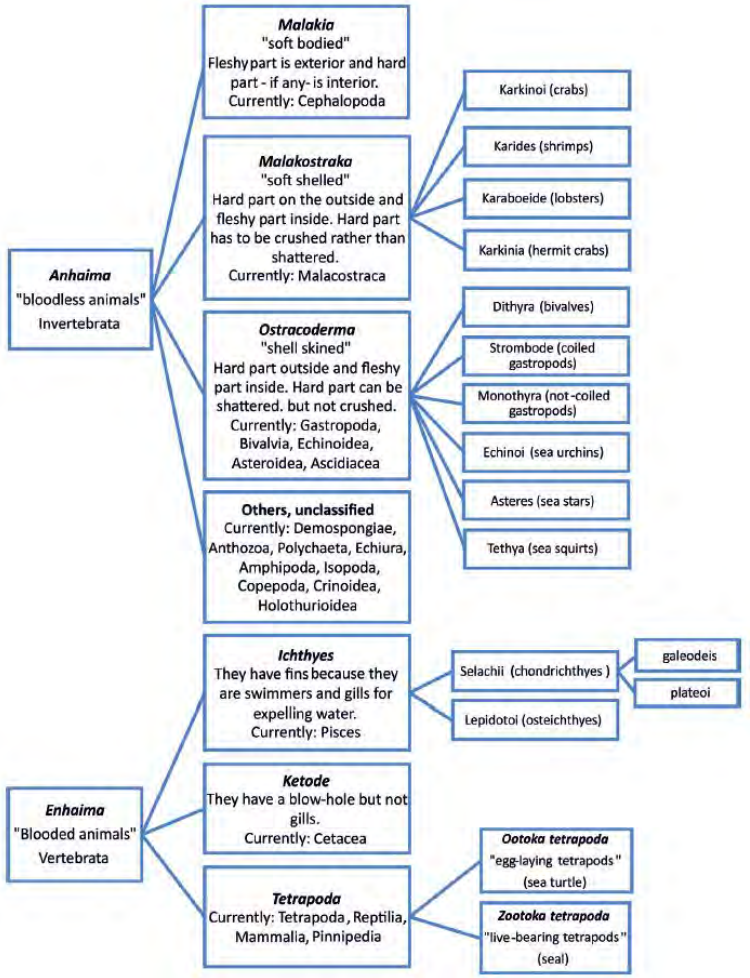
Keywords: Aegean Sea, Ancient Greece, history of marine biology, marine biodiversity, philosophy of biology.

Introduction

The Greek philosopher Aristotle (see BOX 1 for a short biography) is known as a universal scientist with a wide range of interests. While medicine, mathematics and astronomy had already been developed by pre-Socratic philosophers, Aristotle first defined the scientific method and laid the foundations of several scientific disciplines (see Lloyd, 1970; Shields, 2012).

Biology attracted his attention more than any other science (*epistēmē*) and biological writings constitute over 25% of the surviving Aristotelian corpus (Gotthelf & Lennox, 1987). Aristotle was the first to systematically observe and describe biological diversity (Ross, 1977; Leroi, 2014). A great part of his biological works is devoted to the study of marine animals. His interest in marine biology can be linked to his close relationship with the sea; the place where he was born and raised (Macedonian coast) along with his stay for several years on the eastern coast of the Aegean Sea (Assos in Asia Minor and Lesbos Island) probably aroused his interest in the study of the marine environment. He was familiar with the great variety of fish and marine invertebrates harvested and exploited by the coastal Aegean communities, as demonstrated by archaeological records (Mylona, 2008). Aristotle carried out most of his marine research during his stay on Lesbos Island, more specifically in Kalloni Bay, which is frequently mentioned in his biological writings as *Pyrraiōn Evripos* (the Strait of *Pyrra*), *Pyrra* being a town on the eastern coast of the Bay (Thompson D'Arcy, 1913). There, with the help of local fishermen, he had the opportunity to study existing marine life; he also had access to material for his anatomical work and was able to observe, first hand, aspects of the biology and behaviour of marine animals. Consequently, it has been assumed that the bulk of his biological work was done during his stay in Lesbos Island (Lee, 1948). However, Solmsen (1978) suggested that his biological studies continued during his subsequent stay for 6 years in Macedonia, while educating Alexander the Great, and completed during the 13 years of teaching at the Lyceum in Athens.

Aristotle also developed the first scientific classification of animals based on his interpretation of their interrelationships. The taxonomical component of his biology was questioned by some classicists who considered that classification had not been a theoretical task for Aristotle as it had been for the 18th-19th century taxonomists, and that he presented a variety of orderings of animals according to different points of view (see Pellegrin, 1986). In contrast, his classification was recognized and praised by the early taxonomists and evolutionists. Thus, Charles Darwin admired his work as a taxonomist and compared him to Carl Linnaeus (Gotthelf, 1999), while Cuvier (1841) commented that Aristotle's "… genius for



LifeWatchGreece
Data Policy & Sharing

Biodiversity Data Journal 4: e10849
doi: 10.3897/BDJ.4.e10849

Editorial

Data Policy and Data Sharing Agreement in the LifeWatchGreece Research Infrastructure

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Types of data that can be submitted to the LifeWatchGreece repository

According to Egloff et al. (2014) the principles of open access should be applied to every form of scientific knowledge, such as raw or processed data, metadata, source materials, as well as figures and graphs derived from these data. Thus, The LifeWatchGreece RI has created a data infrastructure that can accept and integrate all kinds of biodiversity-related data, such as:

- Species occurrence data: marine distribution data (if at least one of the distribution points in the dataset falls within the boundaries of the Mediterranean Sea) and terrestrial distribution data (if at least one of the distribution points in the dataset falls in the Greek territory)
- Taxonomic checklists
- Genetic data
- Genomics data (including meta-barcoding and metagenomics data)
- Protein data (including those resulting from proteomics)
- Morphometric and three-dimensional morphological data
- Functional trait data
- Habitat maps
- Museum collection data: any data on specimens that were collected within the boundaries of the Greek territory or are held within Greek Natural History Museums
- Environmental data: marine environmental data (only when accompanying species data, since other repositories, such as SeaDataNet and EMODnet, already exist for the submission of marine physiochemical data) and terrestrial environmental data (can be stored in LifeWatchGreece RI even without associated species data if no other repository for environmental data exists)
- Metadata (information about datasets only)
- Literature
- Sound, video, photos, 3-D mapping of environments
- Citizen Science data

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Special papers collection

- ✓ E-infrastructure & Software Applications (e.g. virtual labs)
- ✓ Taxonomic Checklists (Greek Taxon Information System)
- ✓ Data Papers (e.g. historical datasets)
- ✓ Research Articles (e.g. citizen science)

http://bdj.pensoft.net

LifeWatchGreece Construction & Operation

Biodiversity Data Journal 4: e10791
doi: 10.3897/BDJ.4.e10791

Editorial

LifeWatchGreece: Construction and operation of the National Research Infrastructure (ESFRI)

Christos Arvanitidis‡, Eva Chatzinikolaou‡, Vasilis Gerovasileiou‡, Emmanouela Panteri‡, Nicolas Bailly‡, Nikos Minadakis§, Alex Hardisty|, Wouter Los¶

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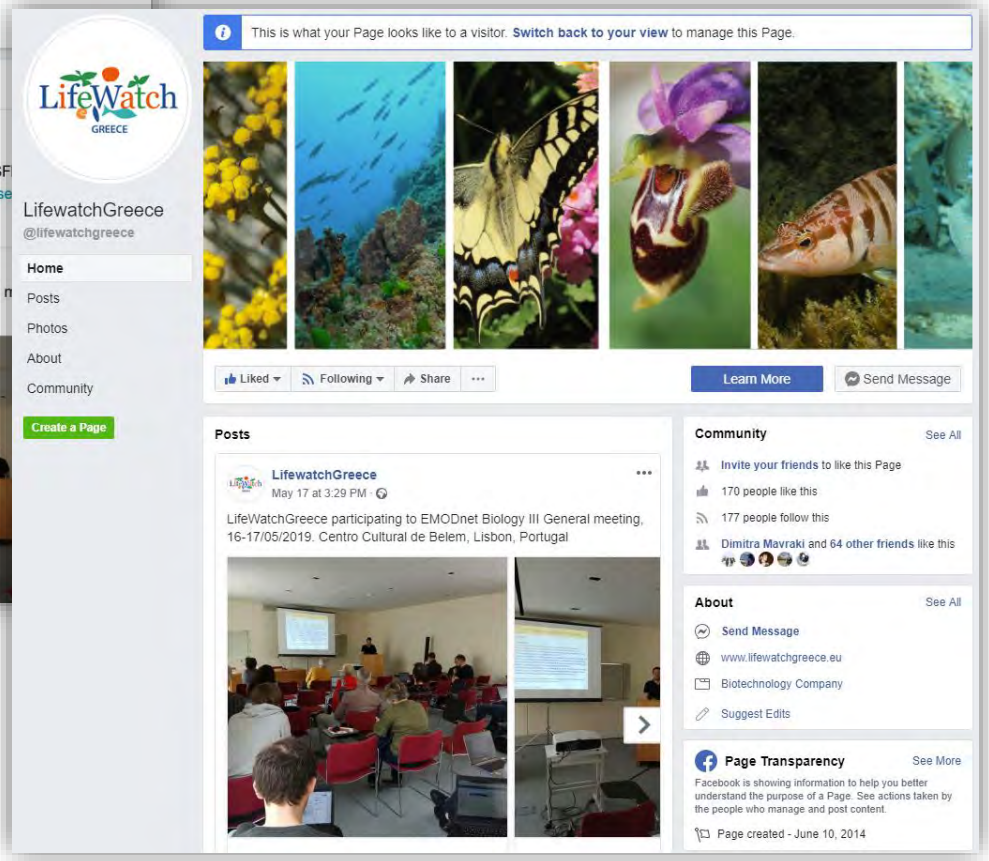

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Thank you