Biodiversity
and the relevance to conservation

Javier Cristobo
Director of Gijon Oceanographic Centre
Spanish Institute of Oceanography

Healthier oceans and human beings:
Sponges as “engine” of the deep sea

Hosted by

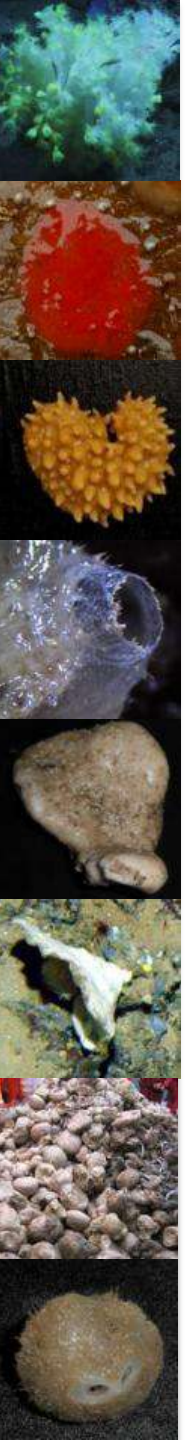
Ricardo Serrão Santos MEP

Tuesday 6 November 2018, 11:00-12:30
ASP 3H1, European Parliament, Brussels

Food and Agriculture Organization of the United Nations

SponGES

EP Intergroup Climate Change, Biodiversity & Sustainable Development



Deep-sea Sponge Grounds Ecosystems of the North Atlantic: an integrated approach towards their preservation and sustainable exploitation

EUROPEAN COMISION Project number 679849. Call: H2020-BG-2015-2

Work Package 2: Biodiversity.

Aim and Objectives:

The aim of WP2 is to provide a complete assessment of the biodiversity contained within sponge grounds ecosystems of the North Atlantic. In order to reach this aim the objectives are:

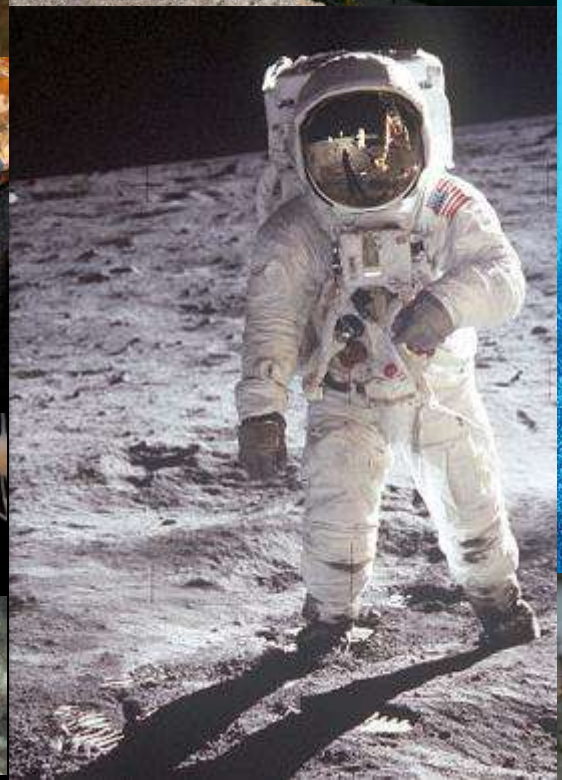
- Identify, describe and classify all **sponge-dominated habitats**, their composition and structure in the study area
- Investigate the diversity of sponge grounds **associated fauna**
- Investigate the **diversity and function** of **microbial consortia** associated with key sponge species





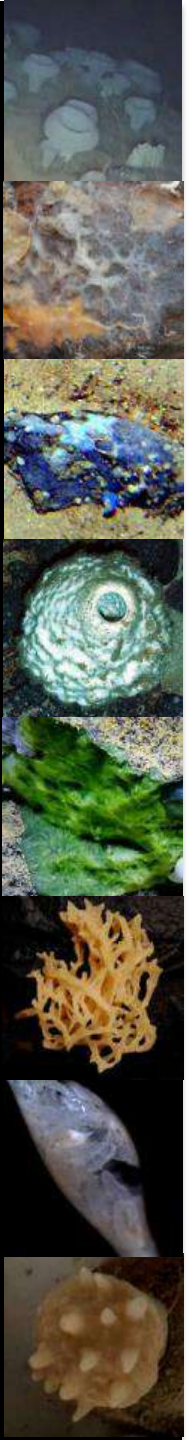





G. O. SARS




ÆGIR 6000

OPEN ACCESS Freely available online PLOS BIOLOGY

How Many Species Are There on Earth and in the Ocean?

Camilo Mora[1,2*], Derek P. Tittensor[1,3,4], Sina Adl[1], Alastair G. B. Simpson[1], Boris Worm[1]

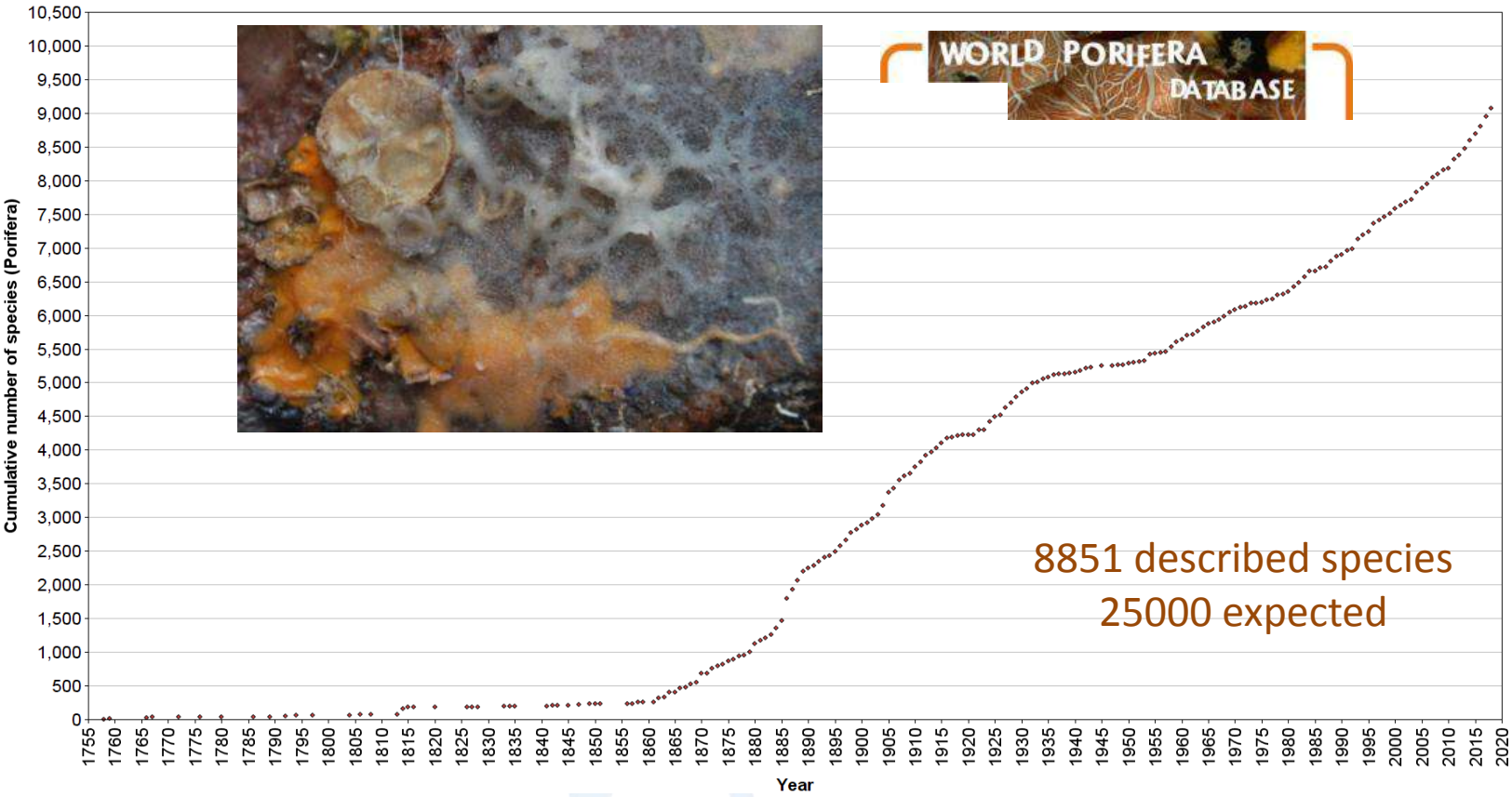
1 Department of Biology, Dalhousie University, Halifax, Nova Scotia, Canada, 2 Department of Geography, University of Hawaii, Honolulu, Hawaii, United States of America, 3 United Nations Environment Programme World Conservation Monitoring Centre, Cambridge, United Kingdom, 4 Microsoft Research, Cambridge, United Kingdom

€ Exploration of marine biodiversity VS Exploration of terrestrial biodiversity €

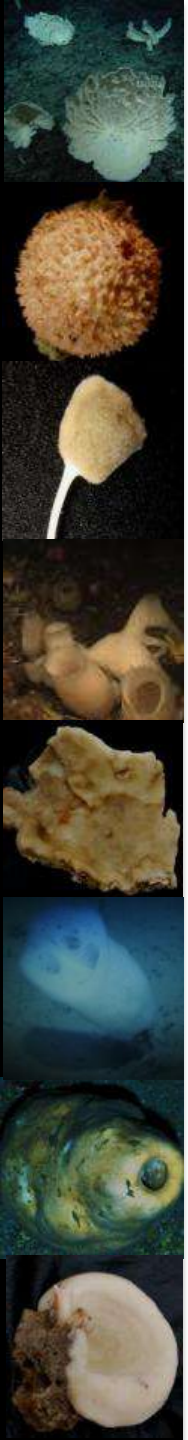
2.2 Million sp. 91 % undescribed

8.7 Million sp. 86 % undescribed

Discovery rate



(van Soest et al., 2018)



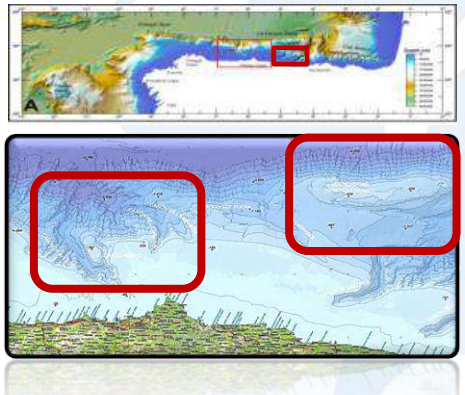
Closing this knowledge gap will require a renewed interest in exploration and taxonomy, and a continuing effort to catalogue existing biodiversity data in publicly available databases

€ Exploration of marine biodiversity VS Exploration of terrestrial biodiversity €

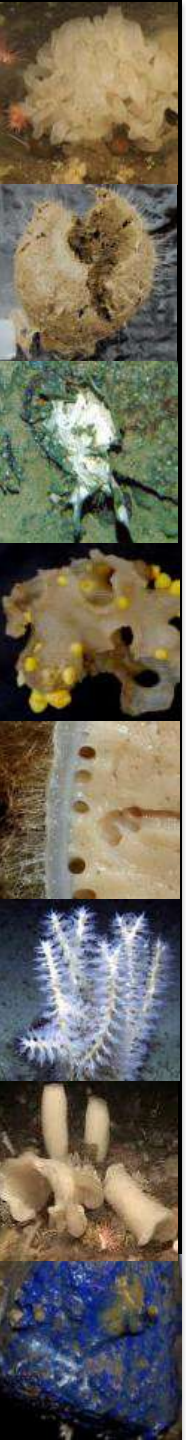
Difficulties.

- The lost of biodiversity
- The destruction of habitats
- Challenges in deep-sea ocean research
- Taxonomic impediment Lack of experts. 250-1000 years
- …

Examples - The **Avilés Canyon** and Le **Danois seamount** (Cantabrian Sea)



Id	Código	Campaña	Año	Lance	Muestreador	Phylum	Clase	Orden	Familia	Género	Especie
AVI0410DR03	001DR0322041 0	Indemares Aviles 0410	2010	DR3	Draga de roca	Porifera	Hexactinellida	Lyssacinosida	Euplectellidae	Regadrella	Regadrella phoenix
AVI0511DR06	001DR0603051 1	Indemares Avilés 0511	2011	DR6	Draga de roca	Porifera	Demospongiae	Poecilosclerida	Podospongiidae	Podospongia	Podospongia lovenii
AVI0710DR09	001DR0901081 0	Indemares Avilés 0710	2010	DR9	Draga de roca	Porifera	Hexactinellida	Hexactinosida	Aphrocallistidae	Aphrocallistes	Aphrocallistes beatrix
AVI0410DR03	002DR0322041 0	Indemares Aviles 0410	2010	DR3	Draga de roca	Porifera	Hexactinellida	Hexactinosida	Aphrocallistidae	Aphrocallistes	Aphrocallistes beatrix
AVI0710DR04	002DR0430071 0	Indemares Avilés 0710	2010	DR4	Draga de roca	Porifera	Demospongiae	Halichondrida	Axinellidae	Phakellia	Phakellia ventilabrum
AVI0511DR09	005DR0907051 1	Indemares Avilés 0511	2011	DR9	Draga de roca	Porifera	Demospongiae	Poecilosclerida	Guitarridae	Guitarra	Guitarra solorzanoi
AVI0710DR10	005DR1001081 0	Indemares Avilés 0710	2010	DR10	Draga de roca	Porifera	Demospongiae	Halichondrida	Heteroxyidae	Halicnemia	Halicnemia patera confirmar
AVI0710DR14	005DR1403081 0	Indemares Avilés 0710	2010	DR14	Draga de roca	Porifera	Demospongiae	Halichondrida	Axinellidae	Phakellia	Phakellia robusta
AVI0511DR01	006DR0102051 1	Indemares Avilés 0511	2011	DR1	Draga de roca	Porifera	Demospongiae			Phakellia	Phakellia robusta



Closing this knowledge gap will require a renewed interest in exploration and taxonomy, and a continuing effort to catalogue existing biodiversity data in publicly available databases

€ Exploration of marine biodiversity VS Exploration of terrestrial biodiversity €

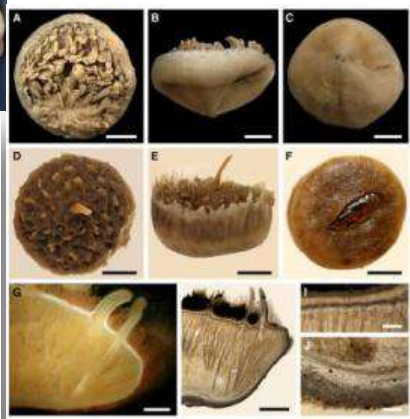
Difficulties.

- The lost of biodiversity
- The destruction of habitats
- Challenges in deep-sea ocean research
- Taxonomic impediment Lack of experts. 250-1000 years
- …

Examples - The **Avilés Canyon** and Le **Danois seamount** (Cantabrian Sea)

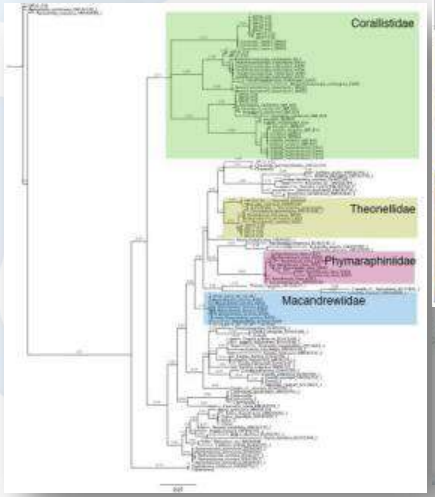
Macro- and megafaunal diversity assessed

- sponge grounds vs control areas
- Direct sampling (boxcore, dredge)
- video transects (ROV, photogrammetric sled)



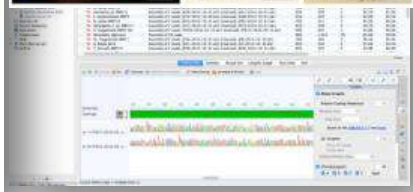
Integrative taxonomic approach

- Morphological descriptions
- Molecular barcodes – mtDNA COI gene
- 10 specimens/species across its range

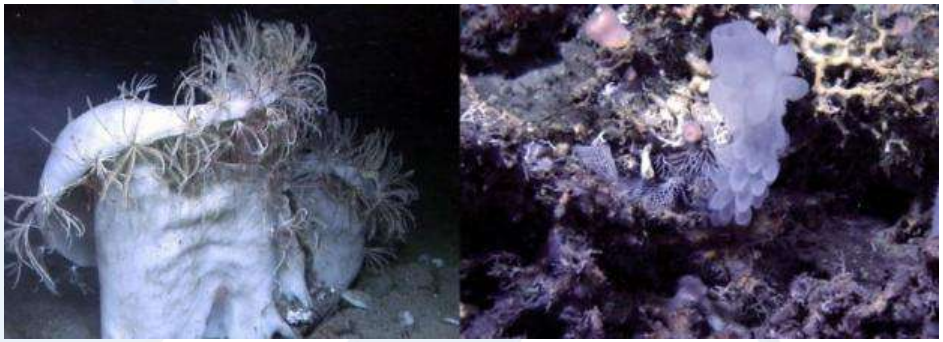


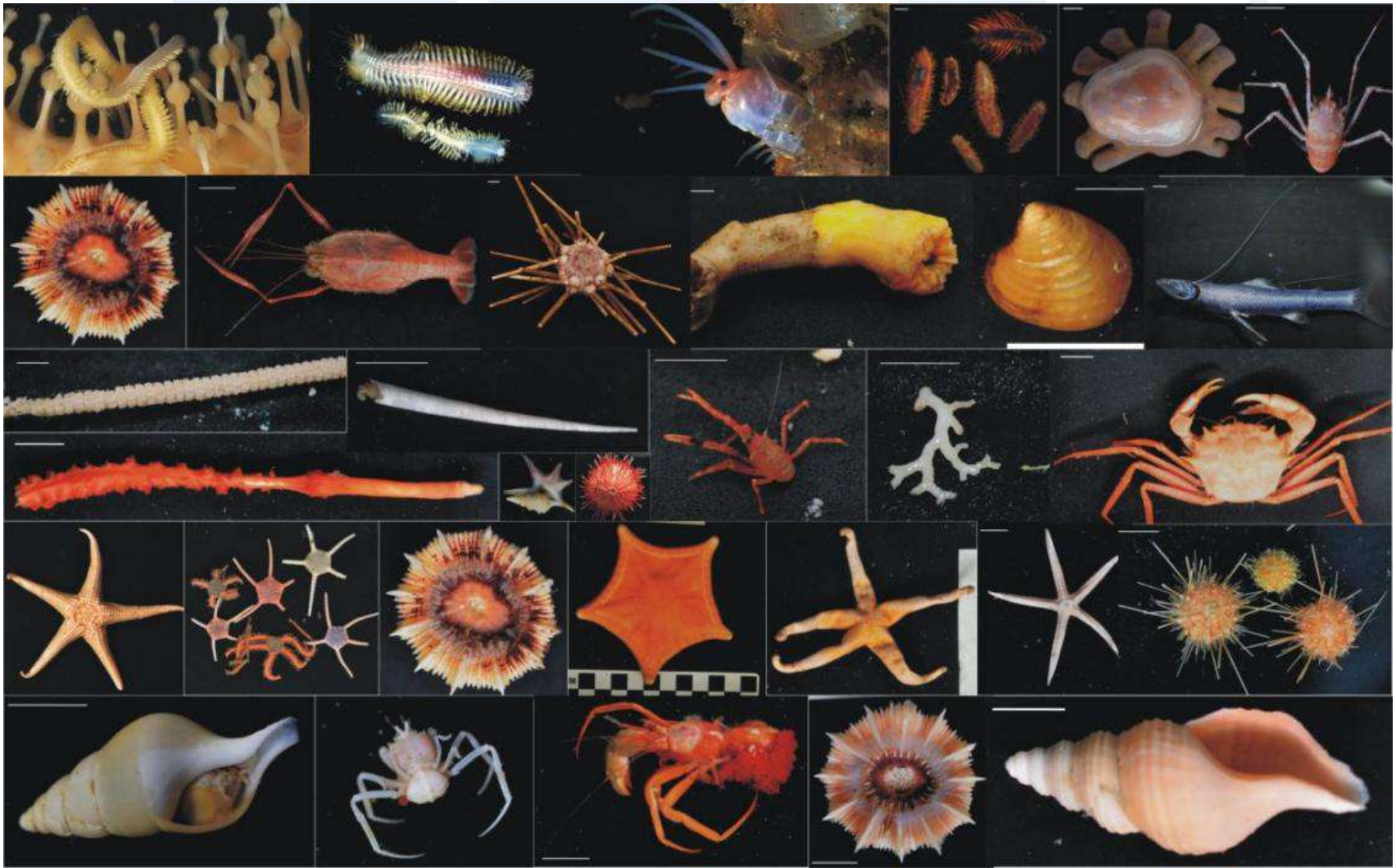
Main outputs:

✓ Production of identification tools
✓ Building of a multi-institutional reference collection
✓ Development of habitat descriptions

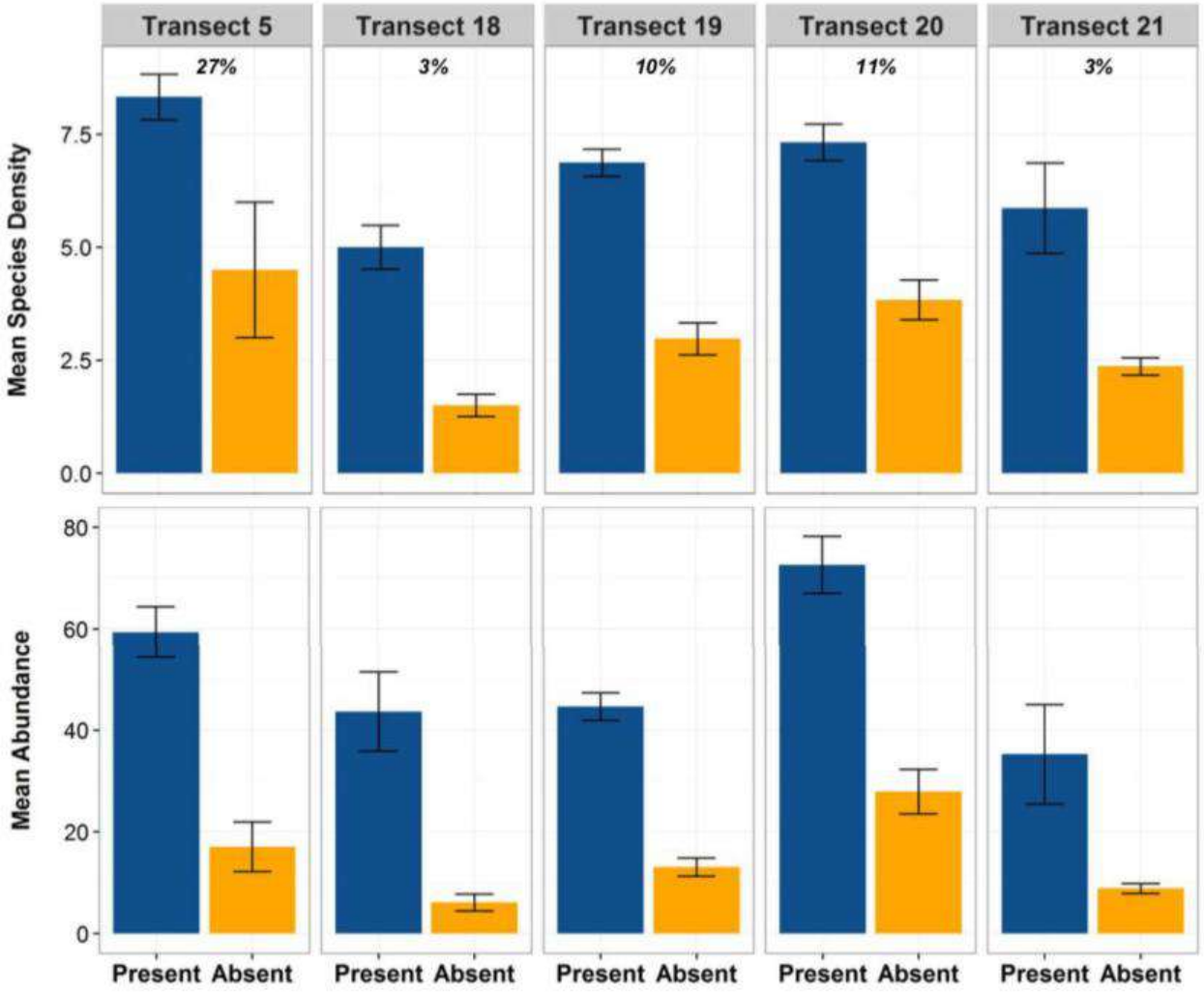


The diversity of sponge-grounds associated fauna





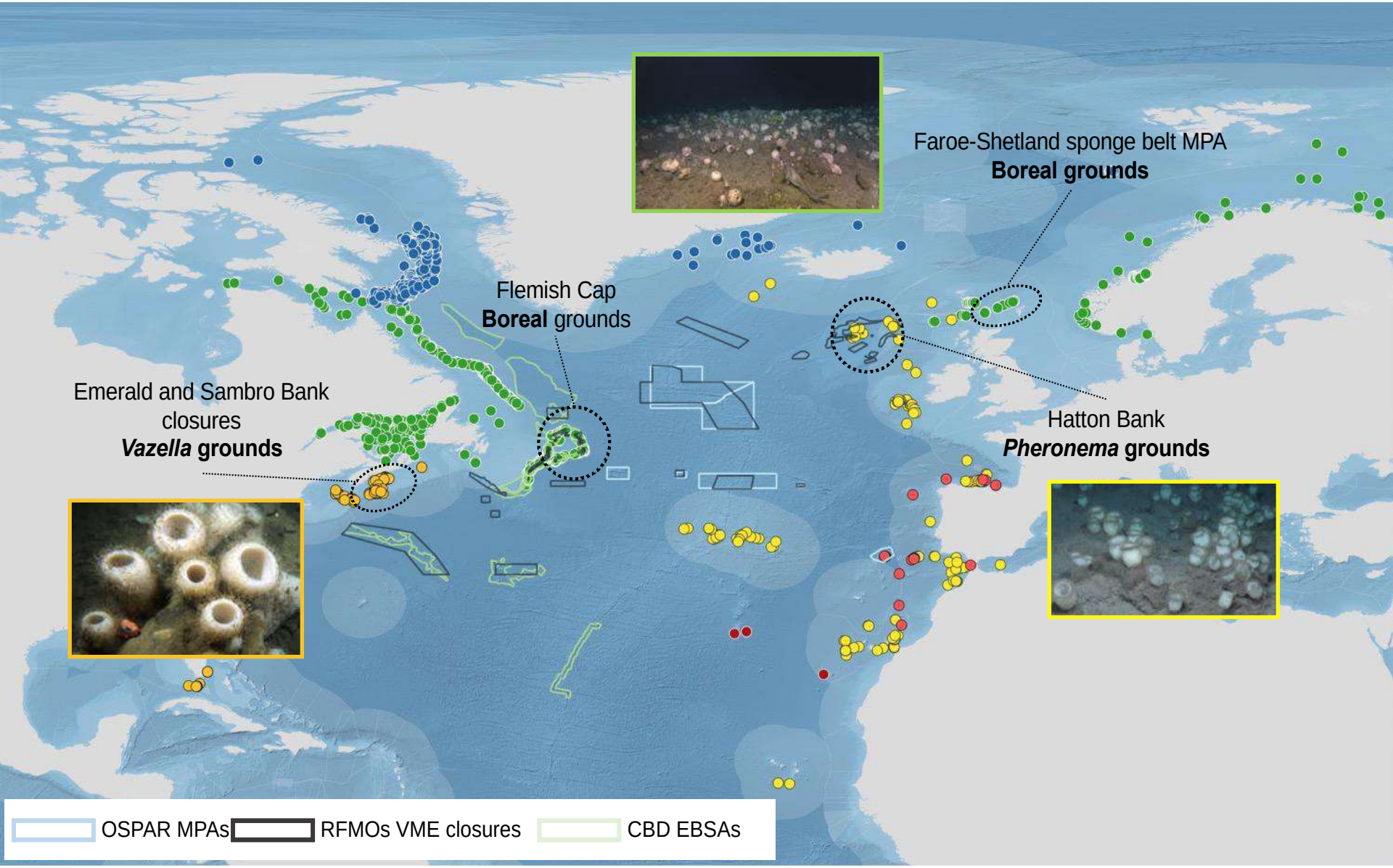
The diversity of sponge grounds associated fauna



INCREASED DIVERSITY when sponges are present

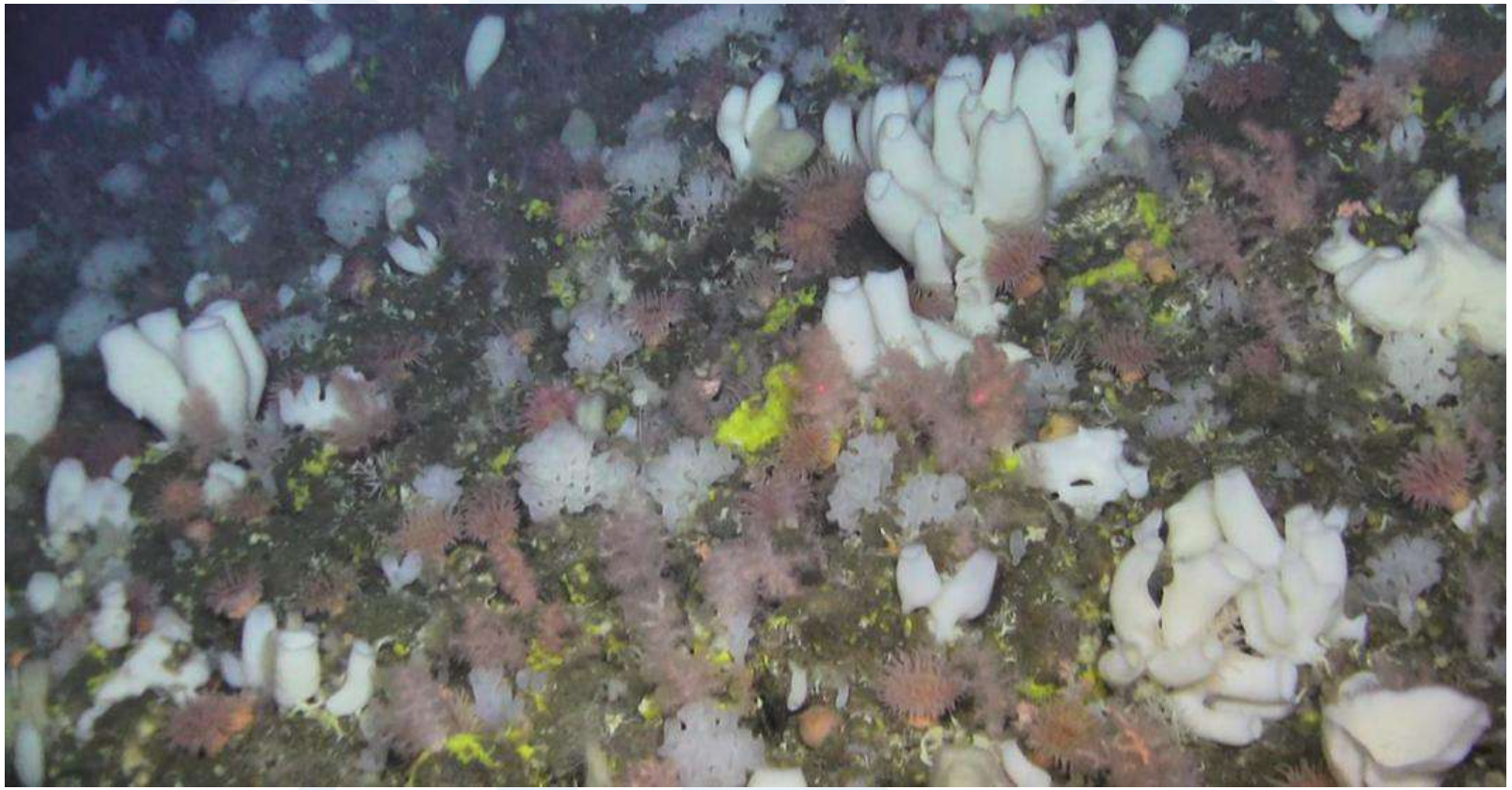
(Hawkes et al., submitted)

Sponge grounds currently protected



(Xavier et al., unpublished)

The diversity of sponge grounds associated fauna



The biodiversity of microbiome

CRUISES
Antarctica2015
Canada2016
GOSars2016
Karasik2016
NewZealand2017
Hausgarten2017a
Hausgarten2017b
KristineBonnevie2017
Canada2017
GOSars2017
Cantabrian2017
Antarctica 2018 GO Sars 2018

CRUISE PARTICIPATION AND SAMPLE COLLECTION

∑= 13 cruises,
> 1121 samples,
> 714 sponge individuals

Pita et al. Microbiome (2018) 6:46
https://doi.org/10.1186/s40168-018-0428-1

Microbiome

REVIEW Open Access

The sponge holobiont in a changing ocean: from microbes to ecosystems

L. Pita[1*], L. Rix[1†], B. M. Slaby[1], A. Franke[1] and U. Hentschel[1,2]

OPEN

The ISME Journal (2017), 1–14
www.nature.com/ismej

ORIGINAL ARTICLE

Metagenomic binning of a marine sponge microbiome reveals unity in defense but metabolic specialization

Beate M Slaby[1,2], Thomas Hackl[3], Hannes Horn[1,2], Kristina Bayer[1] and Ute Hentschel[1,4]
[1]RD3 Marine Microbiology, GEOMAR Helmholtz Centre for Ocean Research Kiel, Kiel, Germany; [2]Department of Botany II, Julius-von-Sachs Institute for Biological Science, University of Würzburg, Würzburg, Germany; [3]Department of Civil and Environmental Engineering, Massachusetts Institute of Technology, Cambridge, MA, USA and [4]Christian-Albrechts University of Kiel, Kiel, Germany

Are deep-water sponge grounds vulnerable marine ecosystems?

Are deep-water sponge grounds ecologically and biologically sensitive areas?

How much megabenthic diversity are we protecting by protecting sponge grounds?

What are the main activities/stressors impacting sponge grounds?

How to account for the effects of a changing ocean when protecting such habitats?

Are sponge grounds “engines” of the deep sea?

Food and Agriculture Organization of the United Nations

SponGES

EP Intergroup Climate Change, Biodiversity & Sustainable Development

SponGES

www.deepseasponges.org

Deep-Sea-Sponges
@DeepSea_Sponges

SponGES has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 679849. This document reflects only the authors' view EASME is not responsible for any use that may be made of the information it contains

SponGES has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 679849. This document reflects only the authors' view EASME is not responsible for any use that may be made of the information it contains