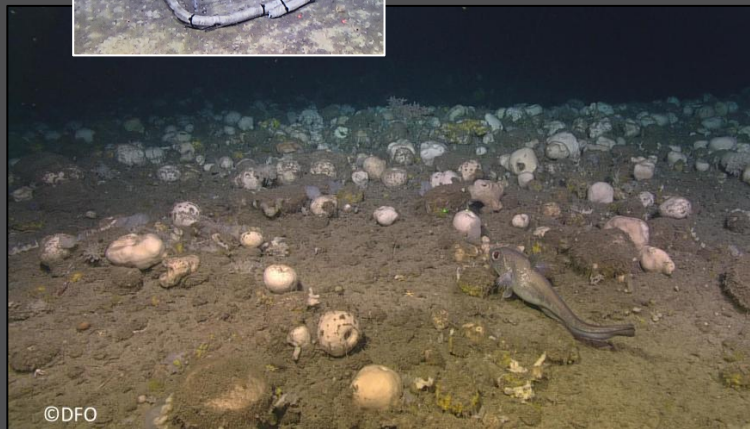
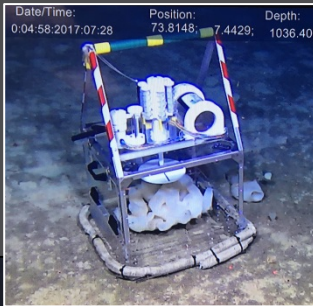


De sponsmotor van het **leven** — of haar destructie?— in **zee**

Jasper M. de Goeij

j.m.degoeij@uva.nl





St. Maartencollege, Maastricht '89-'95





Zonlicht



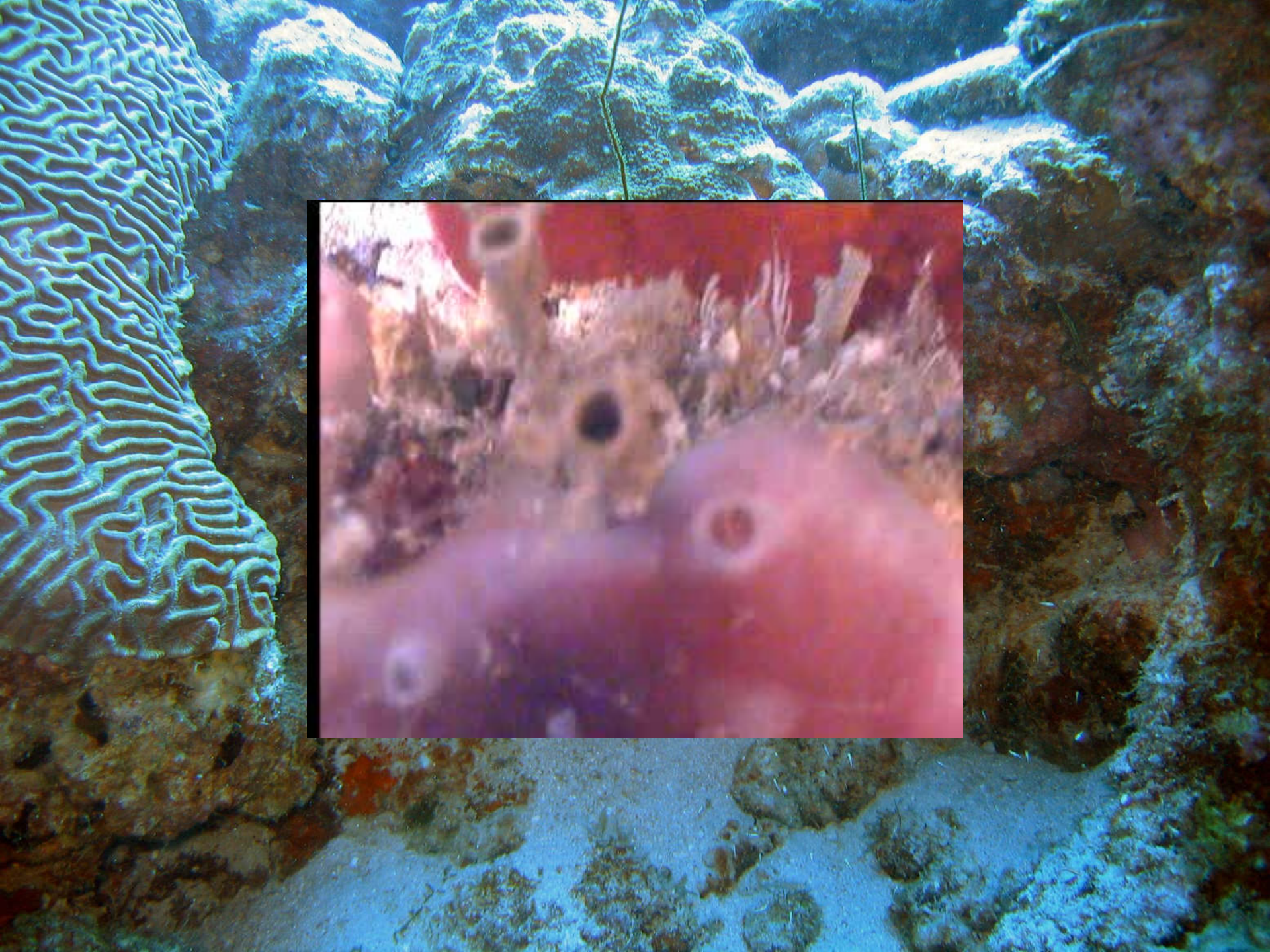
Relatief
onbekend;
'overlooked'

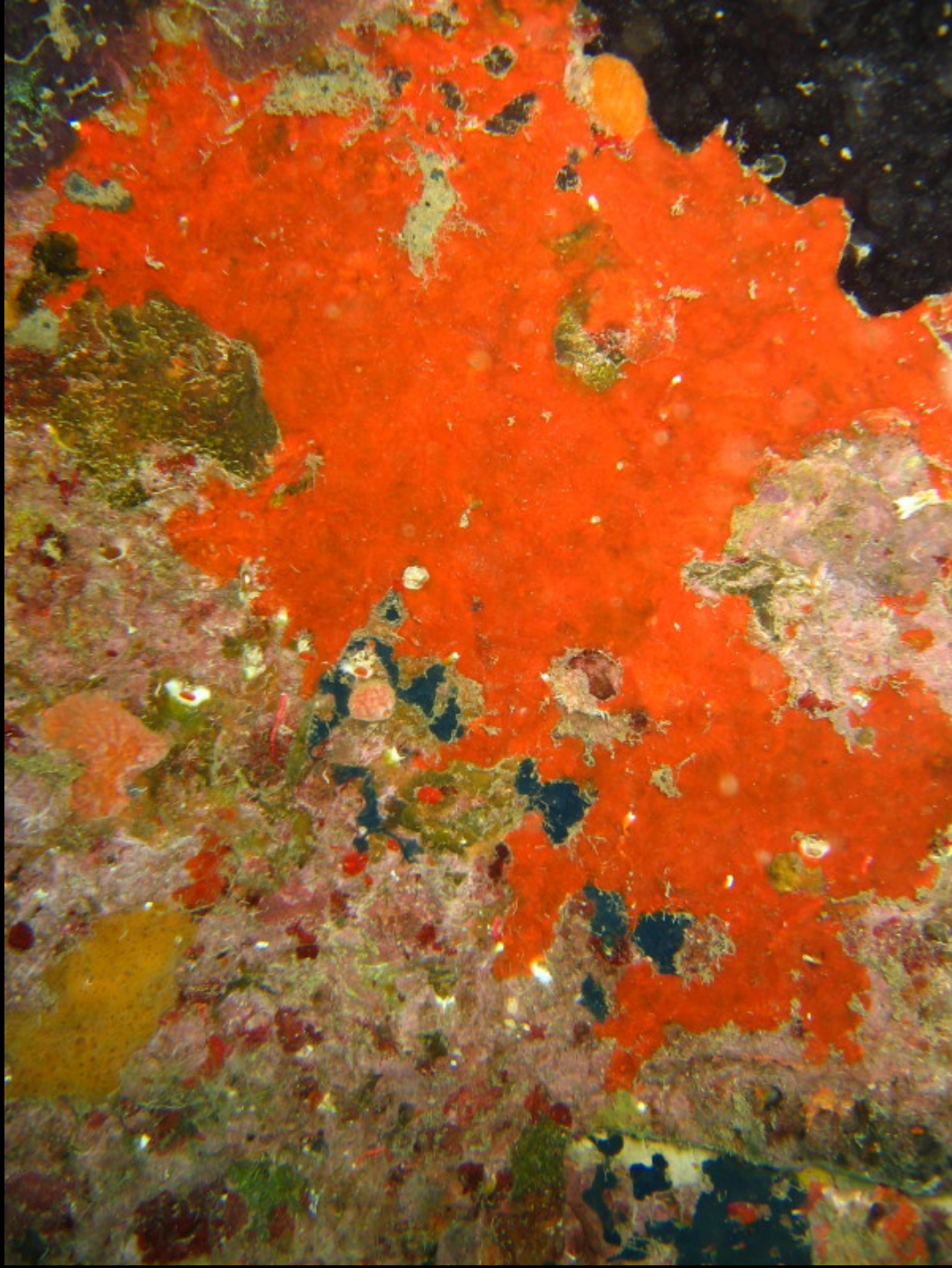
Enorm **volume** (2/3
van totaal rif volume)
en **oppervlak**



Opgelost
organisch
materiaal
(suikers)









Hoeveel sponzen op een rif?
Het 'normale' 2D plaatje:



Algen



steen
koraal

zacht
koraal



massieve
sponzen



korst
sponzen



kalk
algen



Het 'nieuwe' 3D plaatje:

algen



zacht
koraal

kalk
algen



steen
koraal



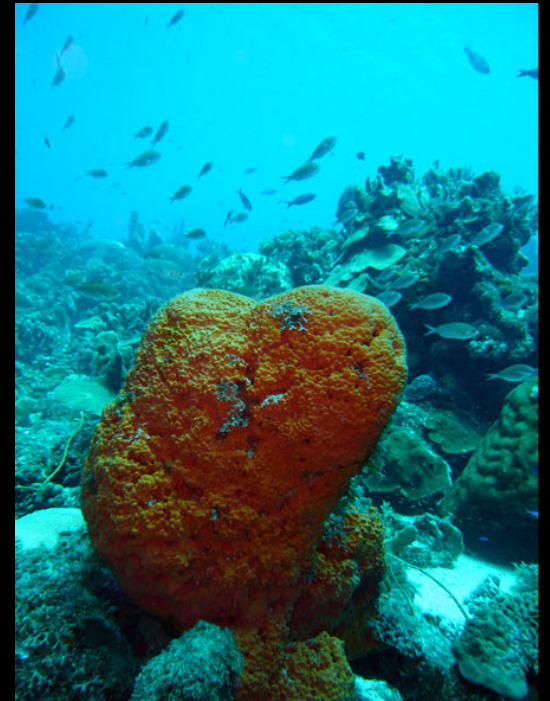
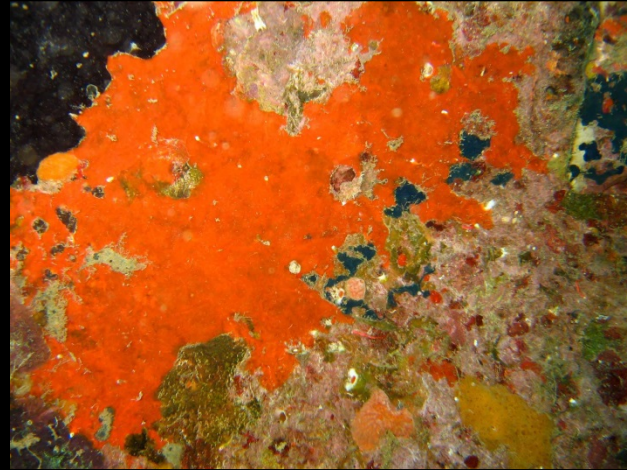
massieve
sponzen



korst
sponzen

Een korte spons introductie

- Sponzen (Porifera) zijn onze oudste, nog levende, multicellulaire voorouders; > 700 miljoen jaar oud ('levende fossielen')
- > 15.000 soorten (er bestaan 'slechts' ~ 5.000 zoogdieren)
- Enorme variatie in vorm, kleur en omvang
- 'Wonen' overal op Aarde; zoet- en zoutwater; cosmopoliet (!)

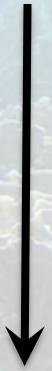


Een korte spons introductie

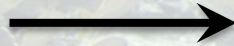
- Sponzen (Porifera) zijn onze oudste, nog levende, multicellulaire voorouders; > 700 miljoen jaar oud ('levende fossielen')
- > 15.000 soorten (er bestaan 'slechts' ~ 5.000 zoogdieren)
- Enorme variatie in vorm, kleur en omvang
- 'Wonen' overal op Aarde; zoet- en zoutwater; cosmopoliet (!)



Zonlicht



Opgelost
organisch
materiaal
(suikers)

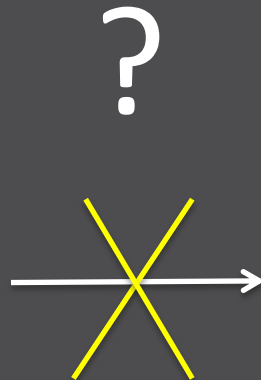


Sponzen

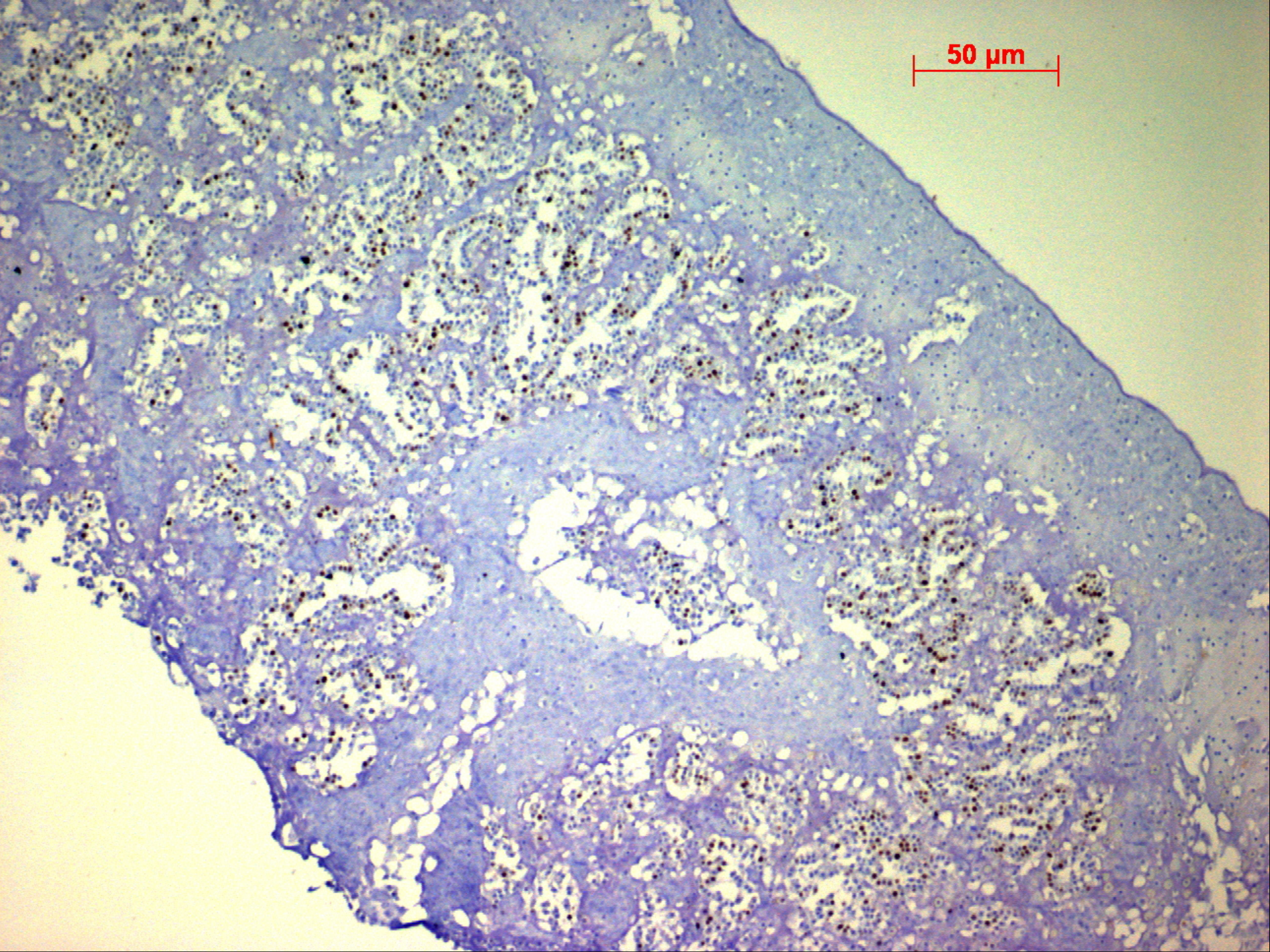


Verdwenen biomassa...

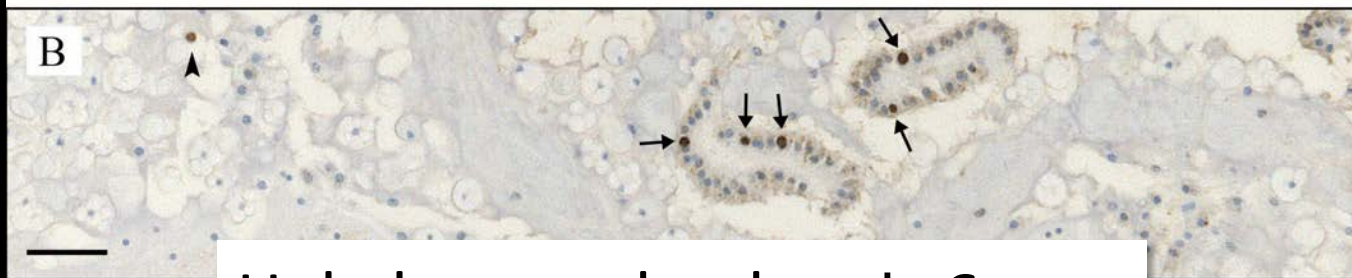
> 50% assimilatie: 'nieuwe biomassa'



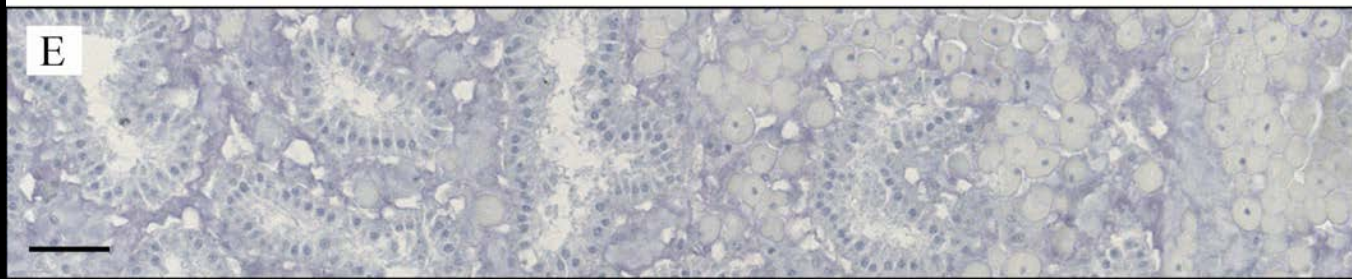
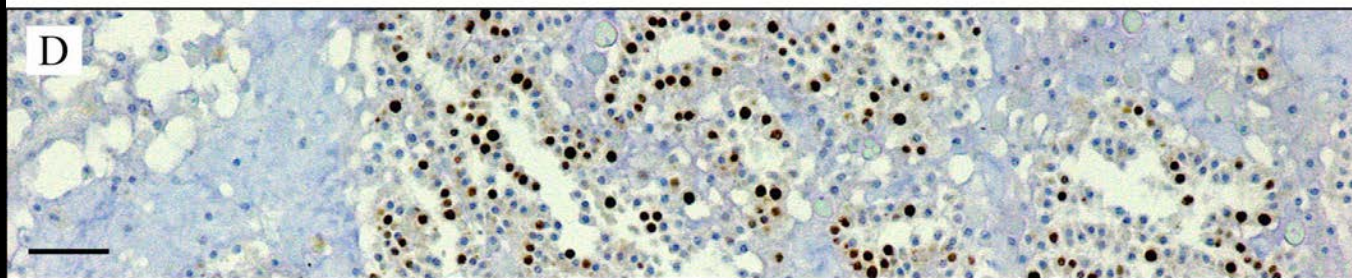
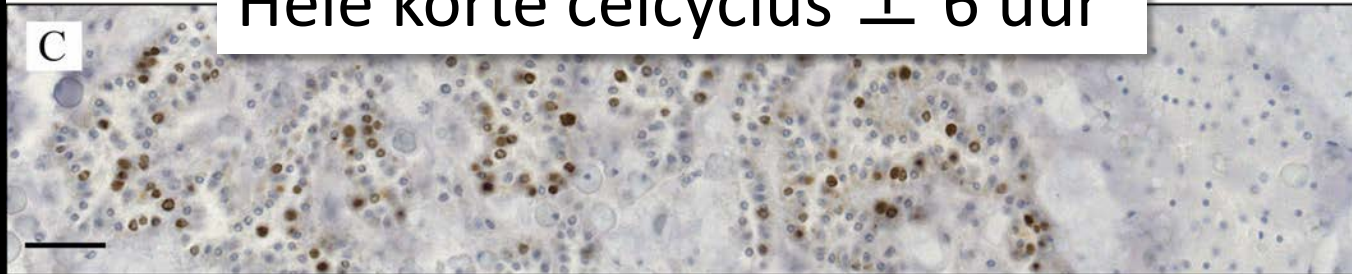
Antwoord ligt in de cellen

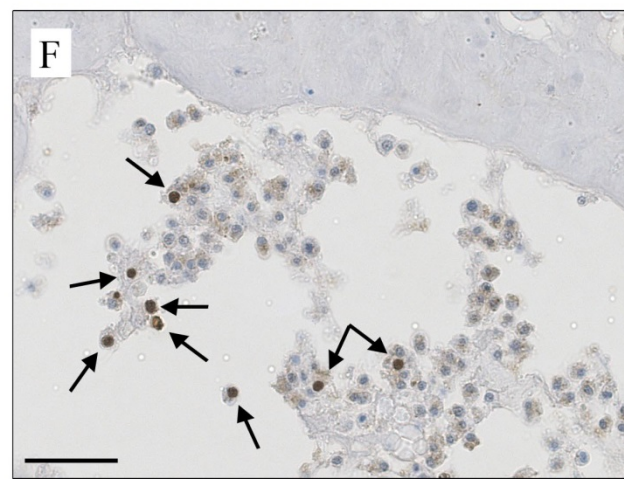
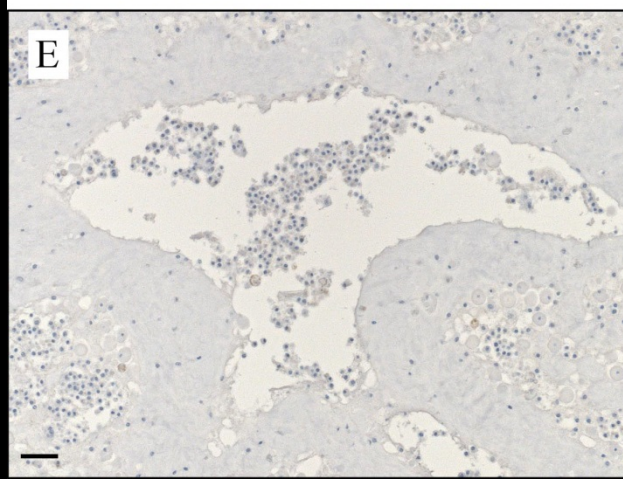
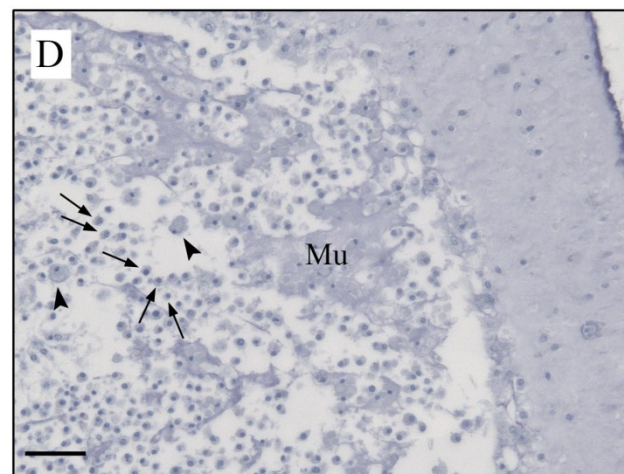
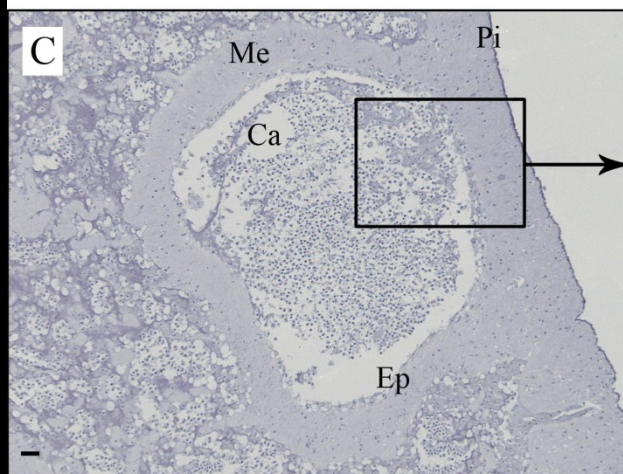
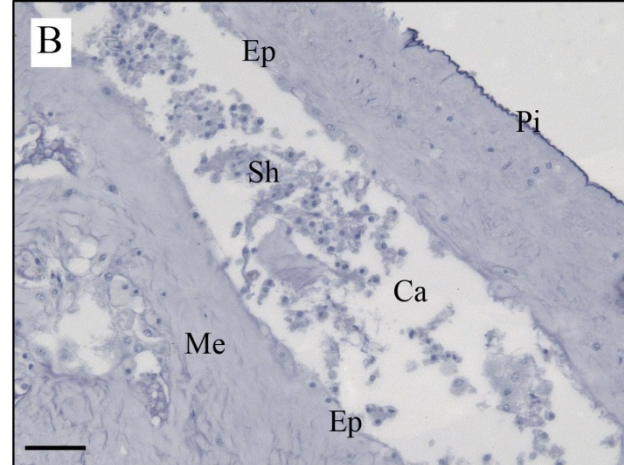
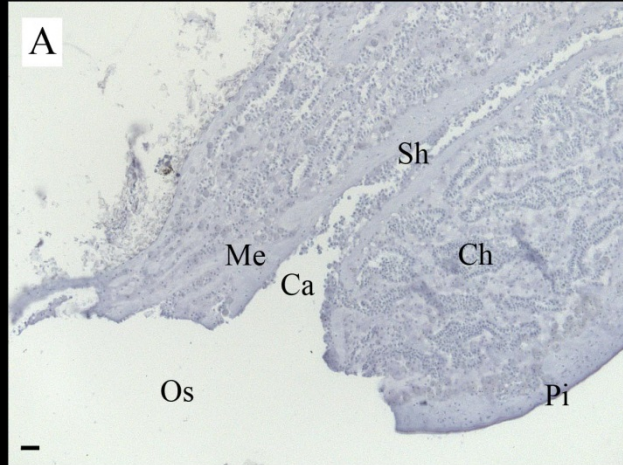


50 μm

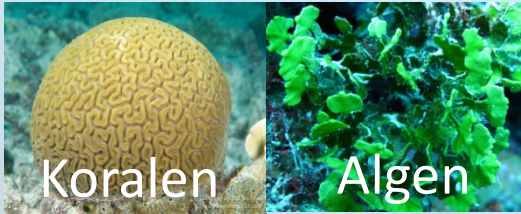


Hele korte celcyclus ± 6 uur





Zonlicht



Grote fauna



Kleine fauna



Particulair
organisch
materiaal
(sponspoep)

De Sponge Loop

Opgelost
organisch
materiaal
(suikers)

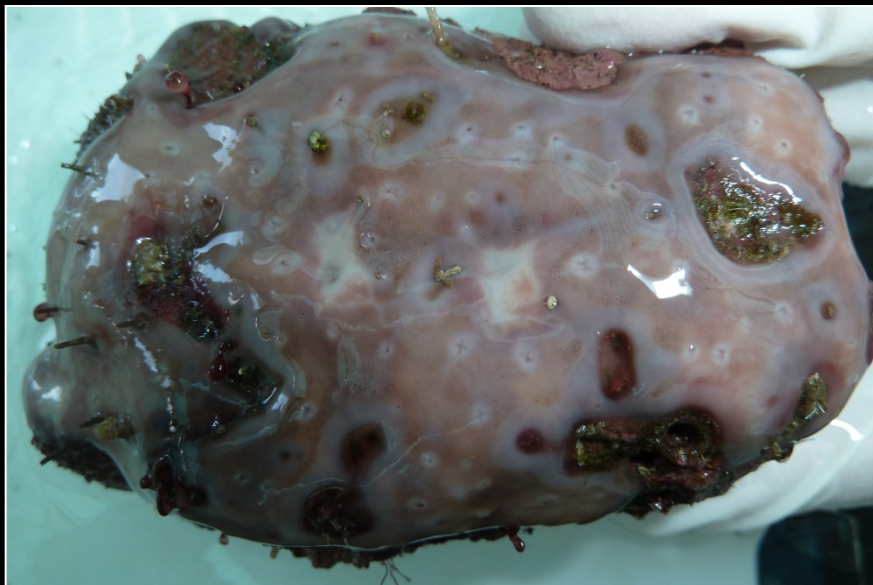
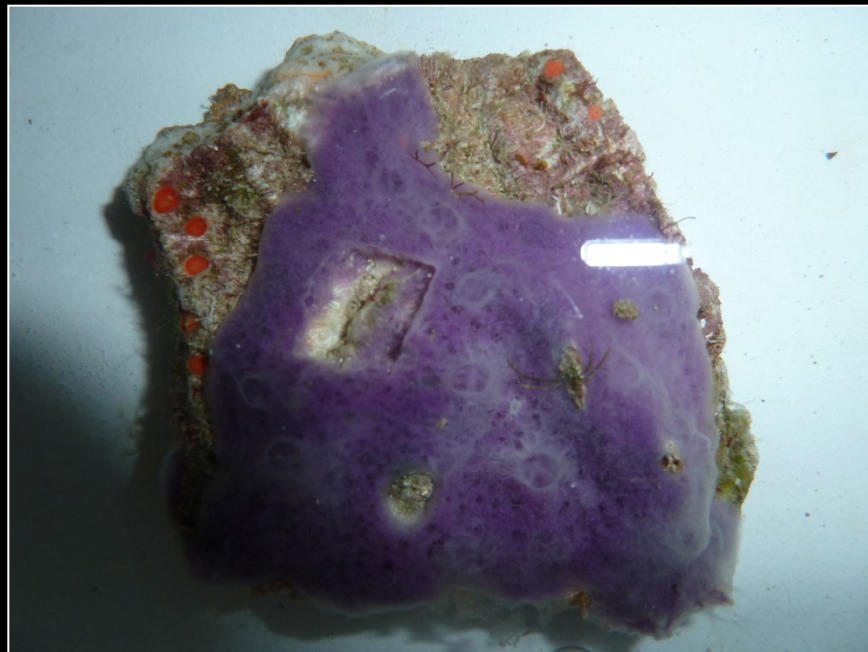


Sponges

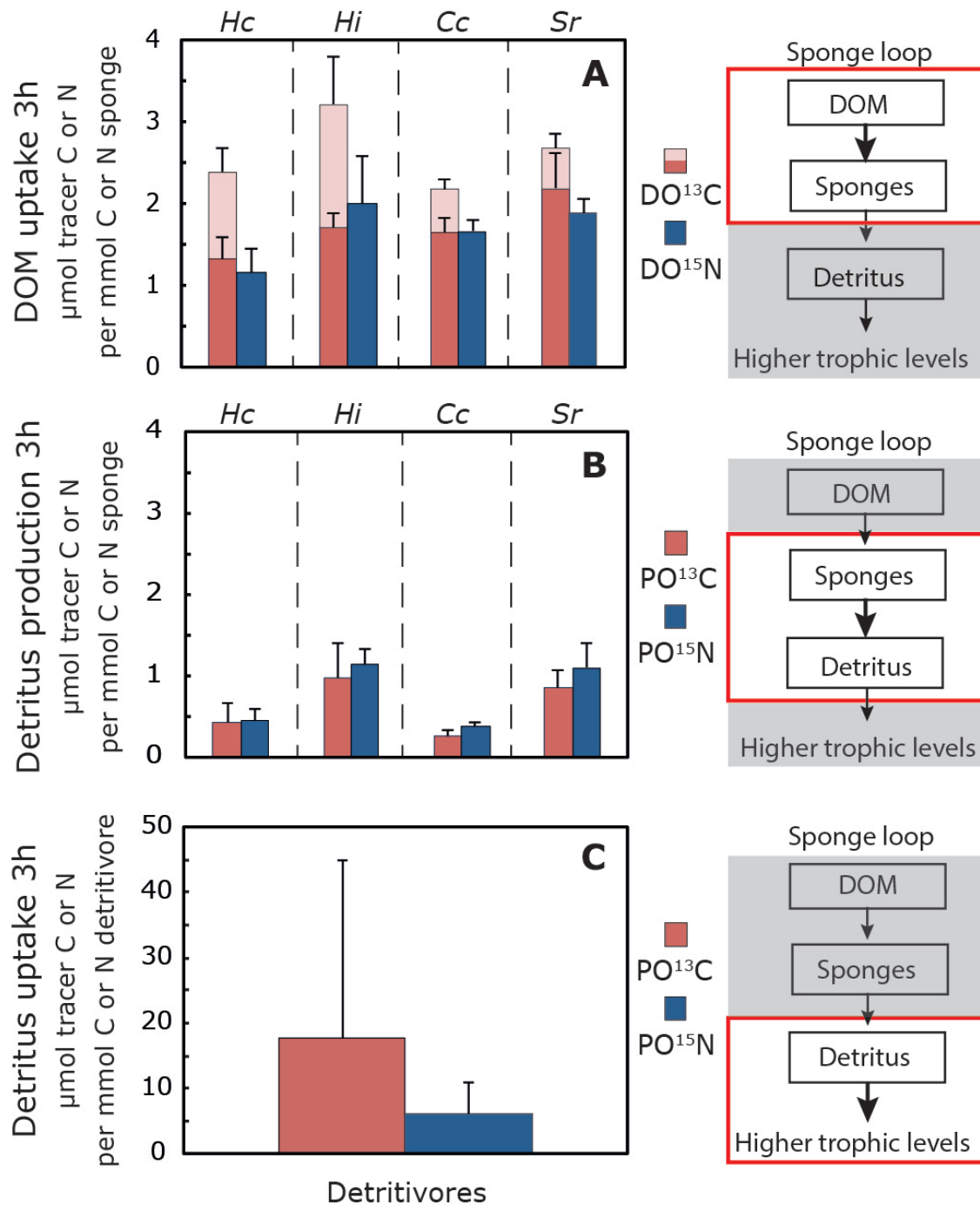


Drie voorwaarden:

1. Sponzen nemen (^{13}C - en ^{15}N -gelabelde) DOM (suikers) op
2. Sponzen zetten DOM om in (^{13}C - en ^{15}N -gelabelde) deeltjes; sponspoep of 'detritus'
3. Spons detritus wordt gegeten door detritivoren (kleine beestjes)





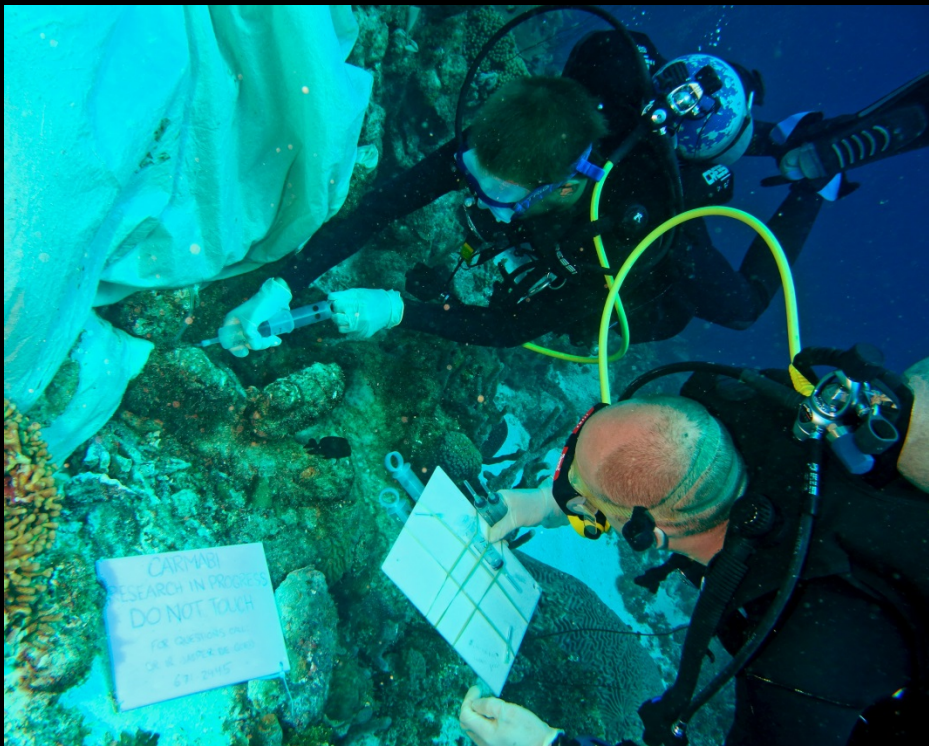


De veld studie

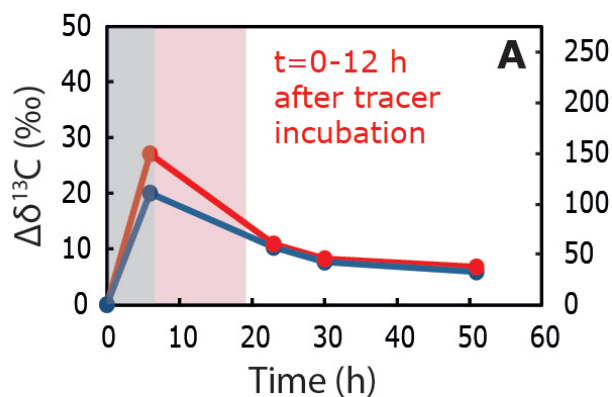


NIBI 2020

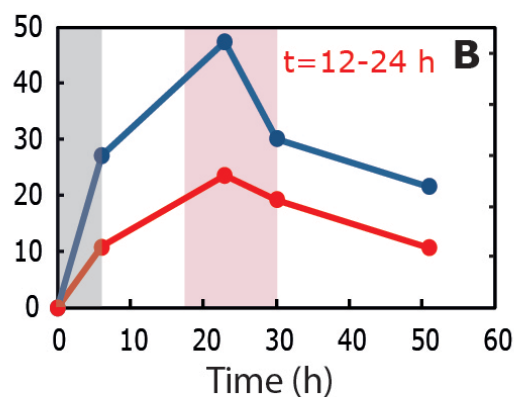
Zee Kust Klas



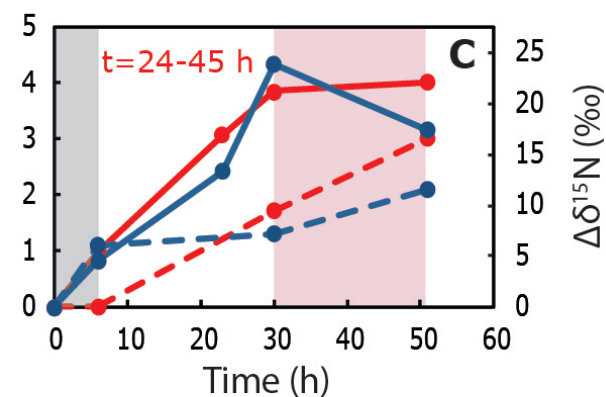
Sponges



Detritus



Detritivores



—●— ^{13}C

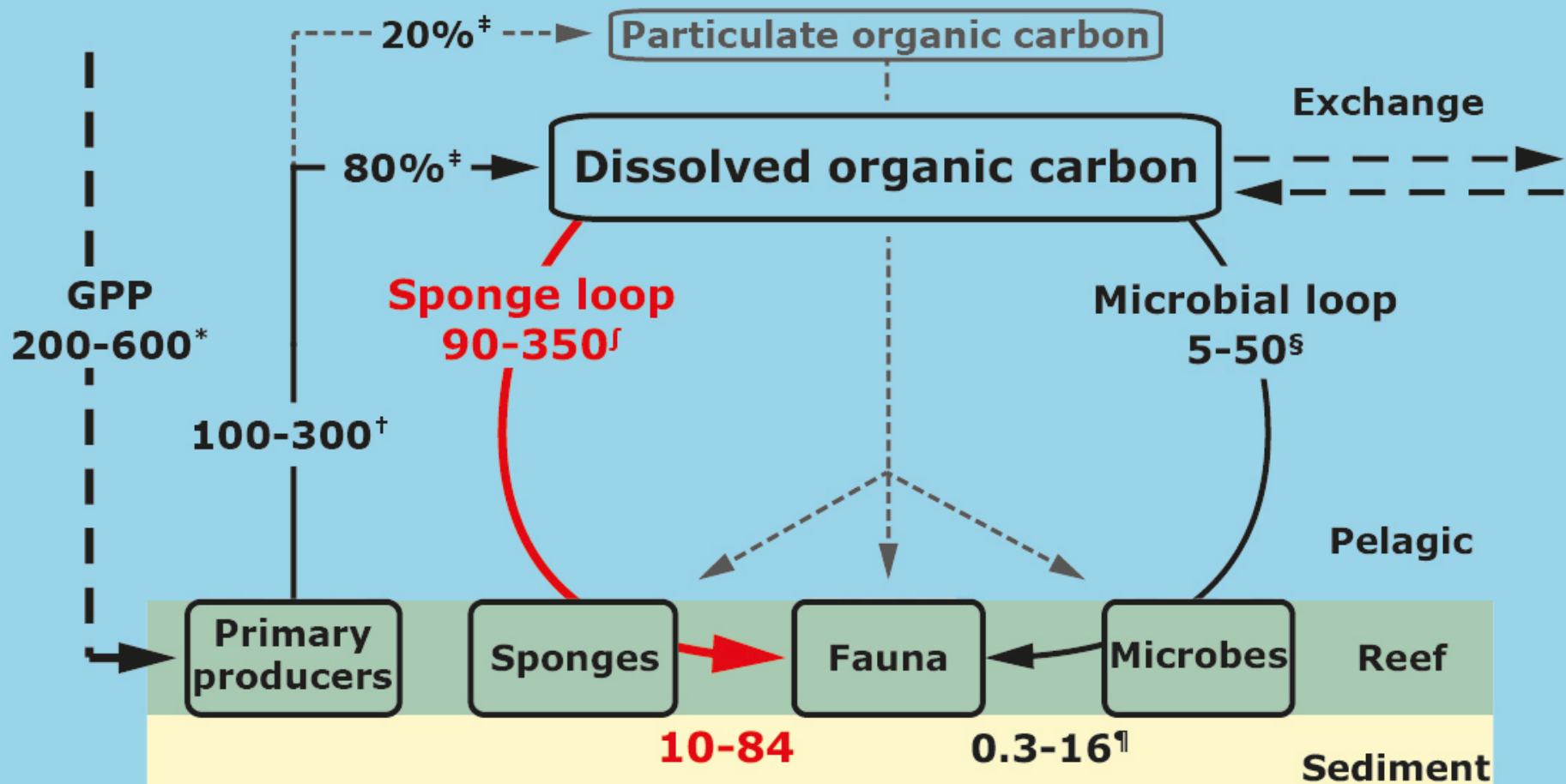
—●— ^{15}N

6 h incubation with labeled tracer (DOM)

peak tracer incorporation for each compartment (for guidance only)

— filter feeders

- - - motile fauna



University of Bergen,
ÆGIR6000 SponGES

G.O.Sars
Dive 48

Date/Time: (UTC)
11/08/2018:16:43:38

Position:
70.2623; 22.4814;

Depth:
250.37;

Heading:
141.77;

Altitude:
0.33;

Pitch:
-3.77;

Roll:
-0.25;



Sponge loop in *Science*

1% beste publicaties wat betreft aandacht (social) media en wetenschap

Waarom?

Achteruitgang riffen krijgt veel aandacht

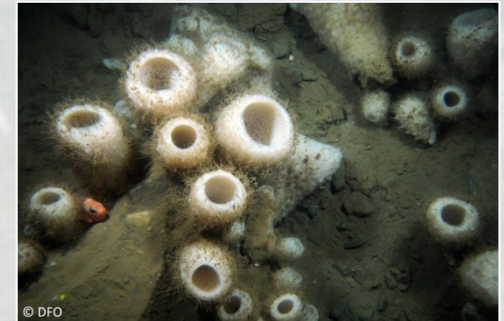
Zeer uitgebreid beschreven, maar:

Ecologische processen die koraalriffen vormen en veranderen in toekomst **voor groot deel onbekend**

Sleutel tot begrip hoe riffen functioneren

Uitdagingen

- Voedselweb moet opnieuw worden beschreven
- Nieuwe **basis** om Alles duidelijk, toch? toekomstige koraalrif ecosystemen te begrijpen
- Brengt **Neer!** of is Katalysator van destructie?
- En in andere spons-aangedreven ecosystemen!



Nieuw model spons-aangedreven ecosystemen

Sponzen sturen en moduleren voedselweb rif ecosystemen

Andere spons-aangedreven ecosystemen?



Tropisch
Indo-Pacifisch



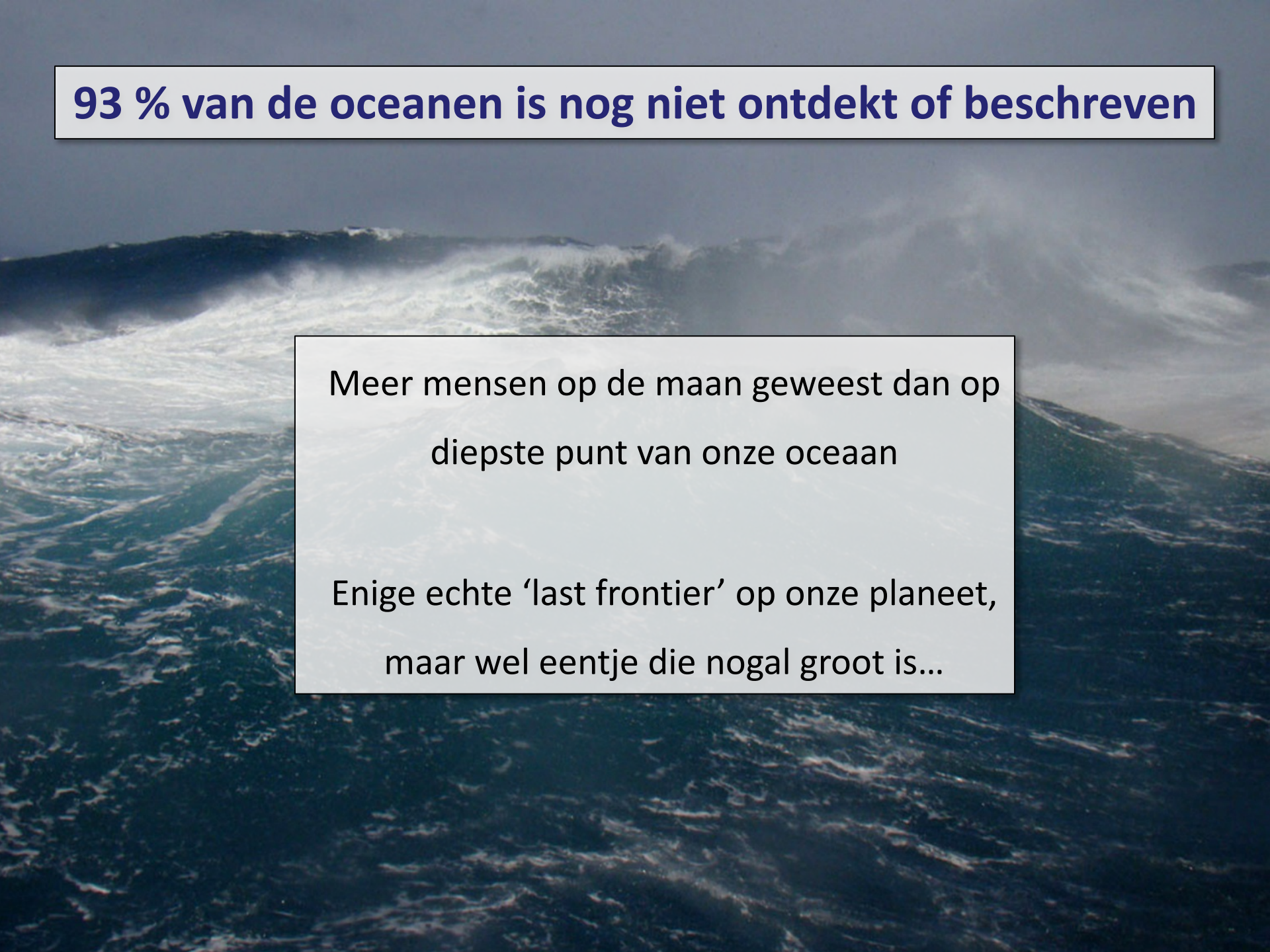
Gematigd
Mediterraan



Koud
Atlantisch

Wat zijn dat nou?





93 % van de oceanen is nog niet ontdekt of beschreven

Meer mensen op de maan geweest dan op
diepste punt van onze oceaan

Enige echte 'last frontier' op onze planeet,
maar wel eentje die nogal groot is...

Hoe kunnen diepzee ecosystemen
voorkomen in de immense, gitzwarte,
zeewoestijn?

De diepzee

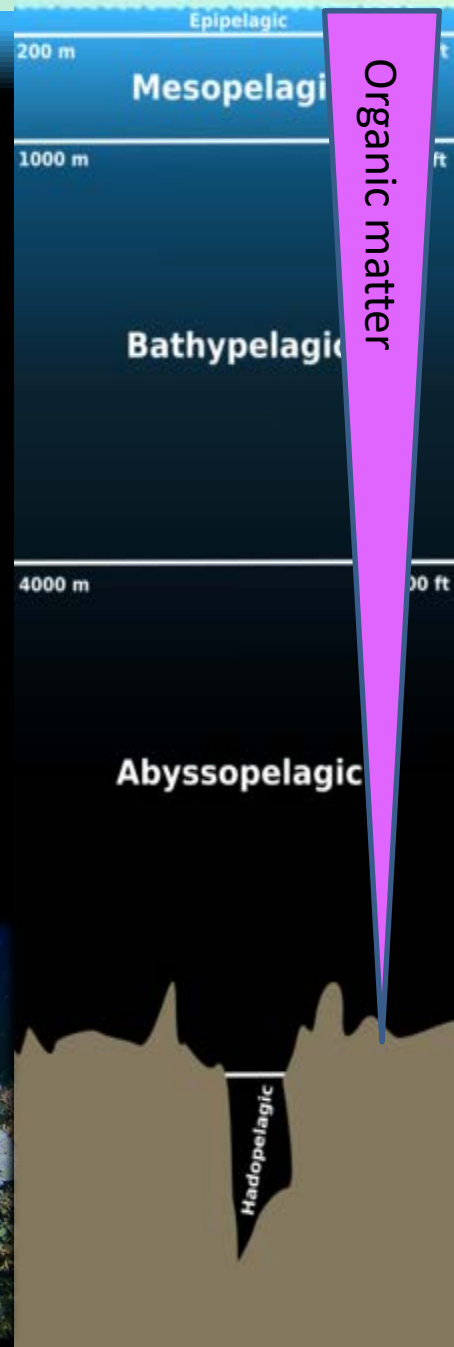
geen woestijn?

200

1000

4000

8000



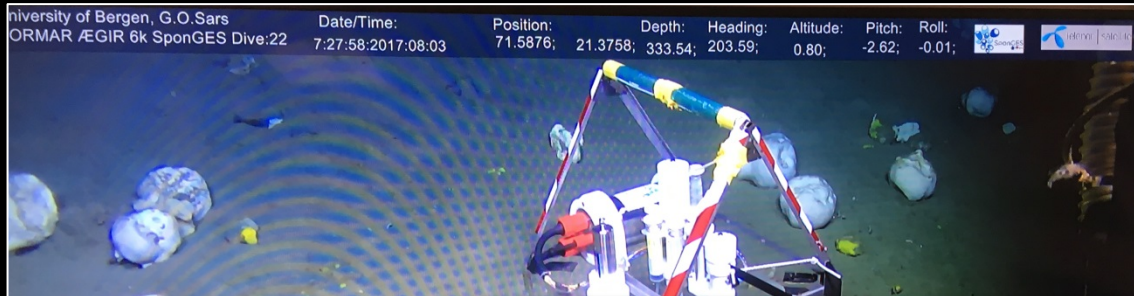
18:50:50 7.5339; 73.8155; HDG: 206.28;

Rov: 1 Alt.: 2.20; Depth: 609.30;



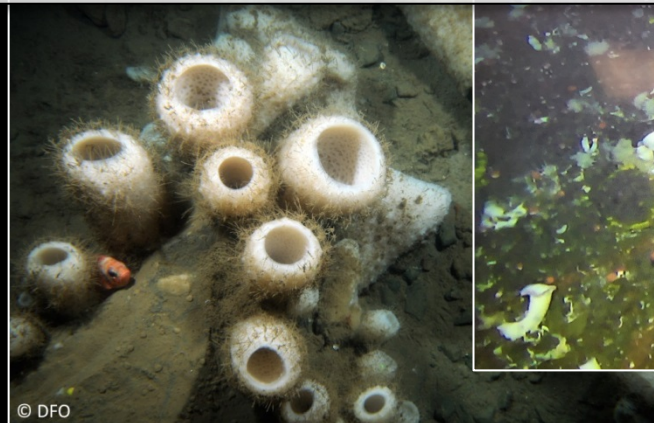
What the...

Sponzen domineren onze planeet??



Eerste indicatie: 3–8 Tg koolstof standing stock Noord-Atlantische Oceaan

± 5% van de totale levende biomassa van de hele Noord-Atlantische Oceaan...

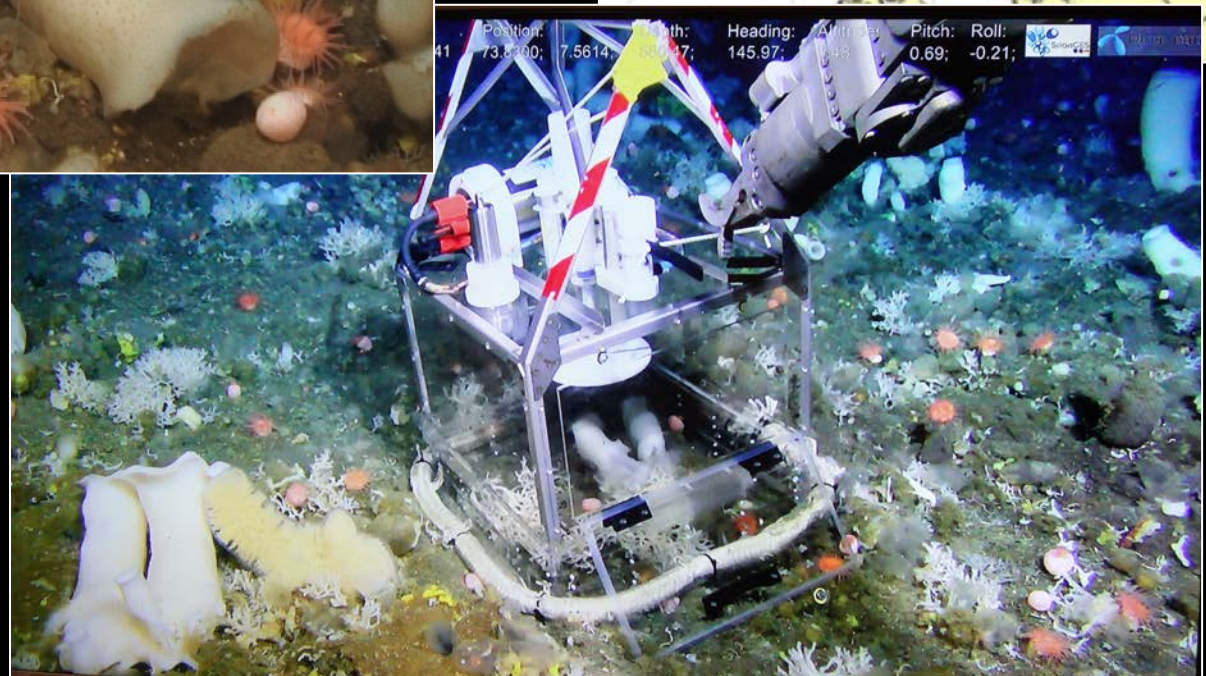


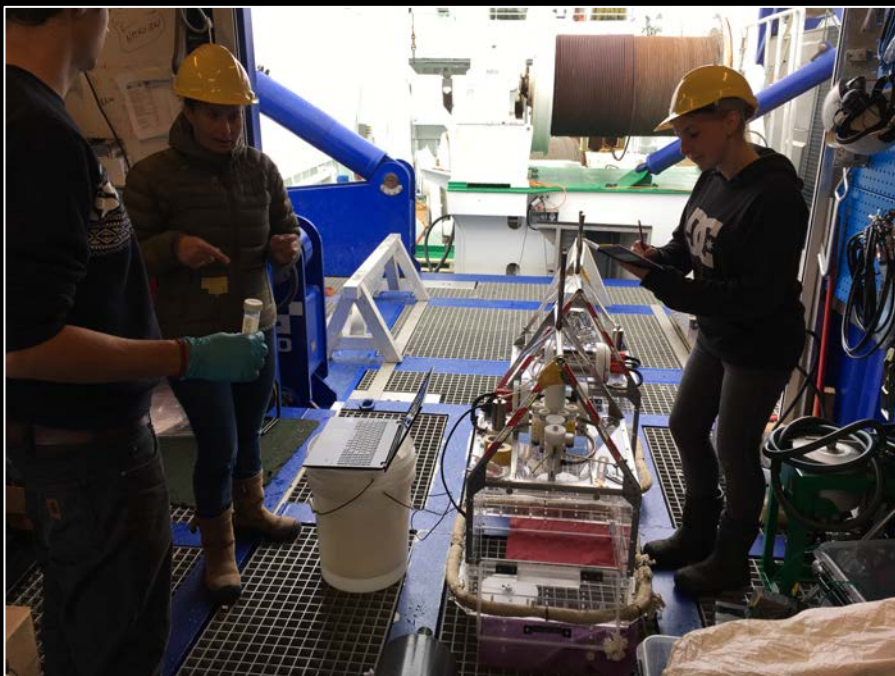
Diepzee spons ecosystemen:

Wat gebeurt er eigenlijk als je die 'motor' weghaalt?



Schulz Banken





ÆGIR6000 SponGES

Dive 14

Date Time: (UTC)

Position:

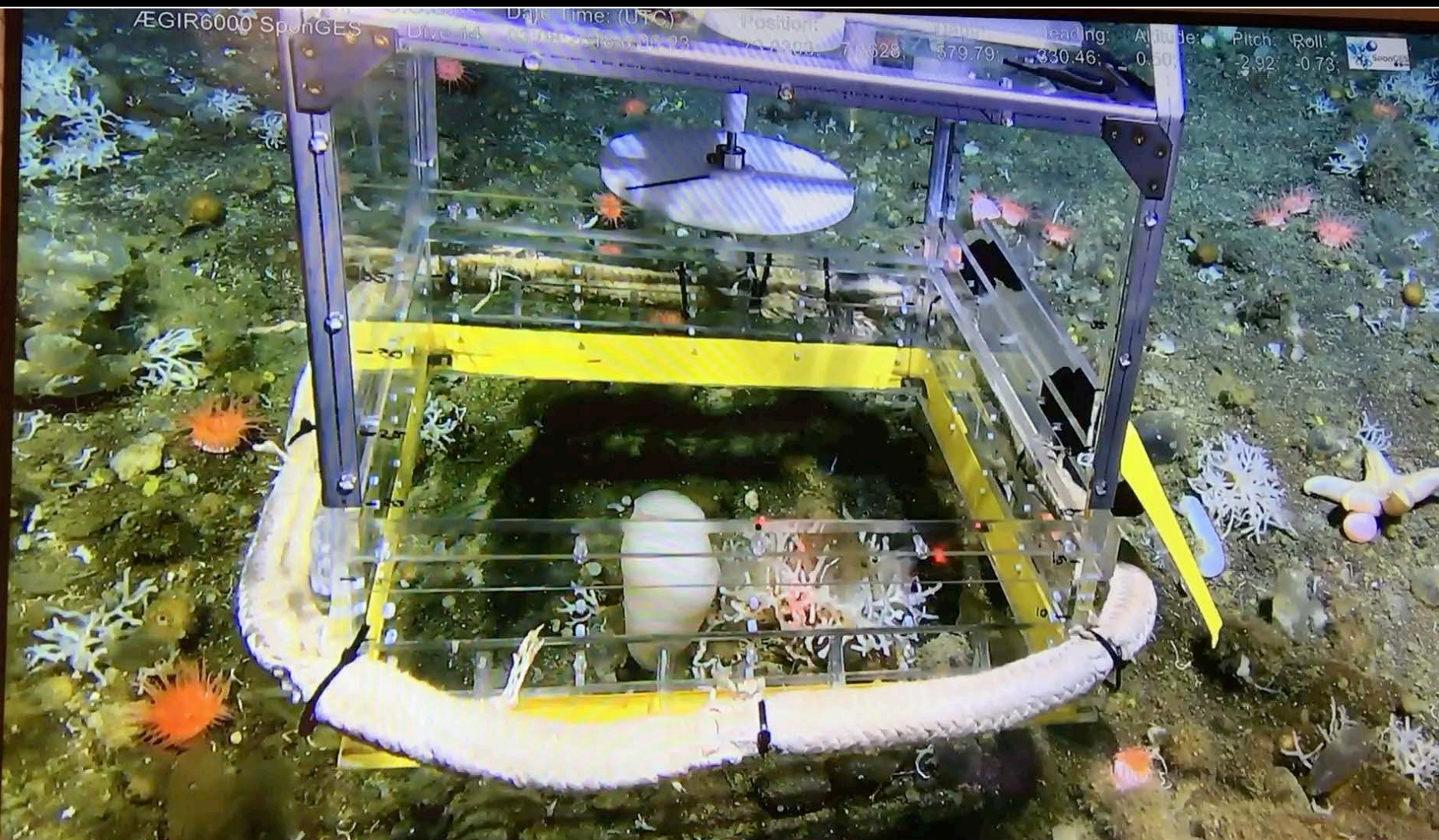
Depth:

Heading:

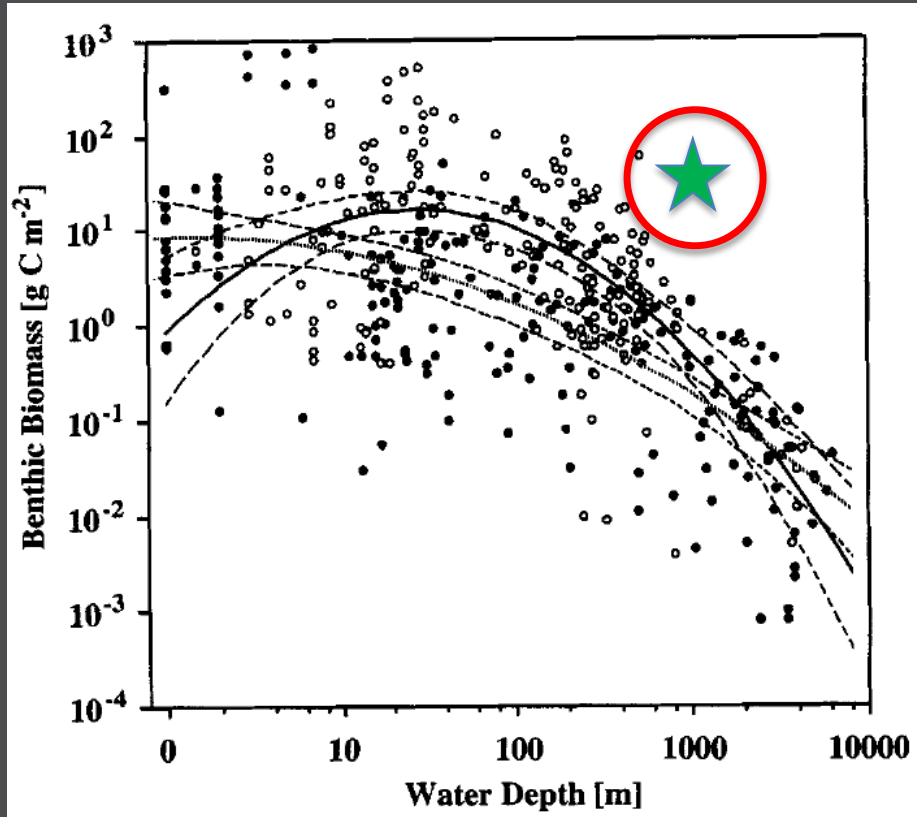
Altitude:

Pitch:

Roll:



Biologische hotspot?



Brey and Gerdes 1997

Wanneer hotspots?

> 20 $\text{g C}_{\text{org}} \text{m}^{-2}$
(Grebmeijer et al. 2015)

Schulz Bank:

53 $\text{g C}_{\text{org}} \text{m}^{-2}$
359.067 kg DW km^{-2}

Koud water koraalrif:

38 $\text{g C}_{\text{org}} \text{m}^{-2}$
(Van Oevelen et al. 2009)

Tropisch koraalrif:

390.604 kg DW km^{-2}
(Polovina 1984)

Vraag:

Wordt er veel aandacht besteed aan de zee in de klas?



Gek eigenlijk...

Voldoende context:

- voedsel (vis, schaaldieren, algen)
- Leven (zuurstof)
- klimaat (golfstroom, CO₂, methaan)
- cultuur (toerisme, spiritualiteit, kunst)
- gezondheid (medicijnen)
- Economie (materialen, olie, metalen)
- Etcetera
- Etcetera



Of niet...

MENS IS LANDDIER...

Belangrijke vragen:

Wat zijn de consequenties van gebrek aan kennis over de zee?

En wat kunnen we doen om die kennis over te brengen?



Mogelijkheden?



Jamie Buchanan-Dunlop
CEO/founder
Encounter Edu

<https://vimeo.com/342270629>

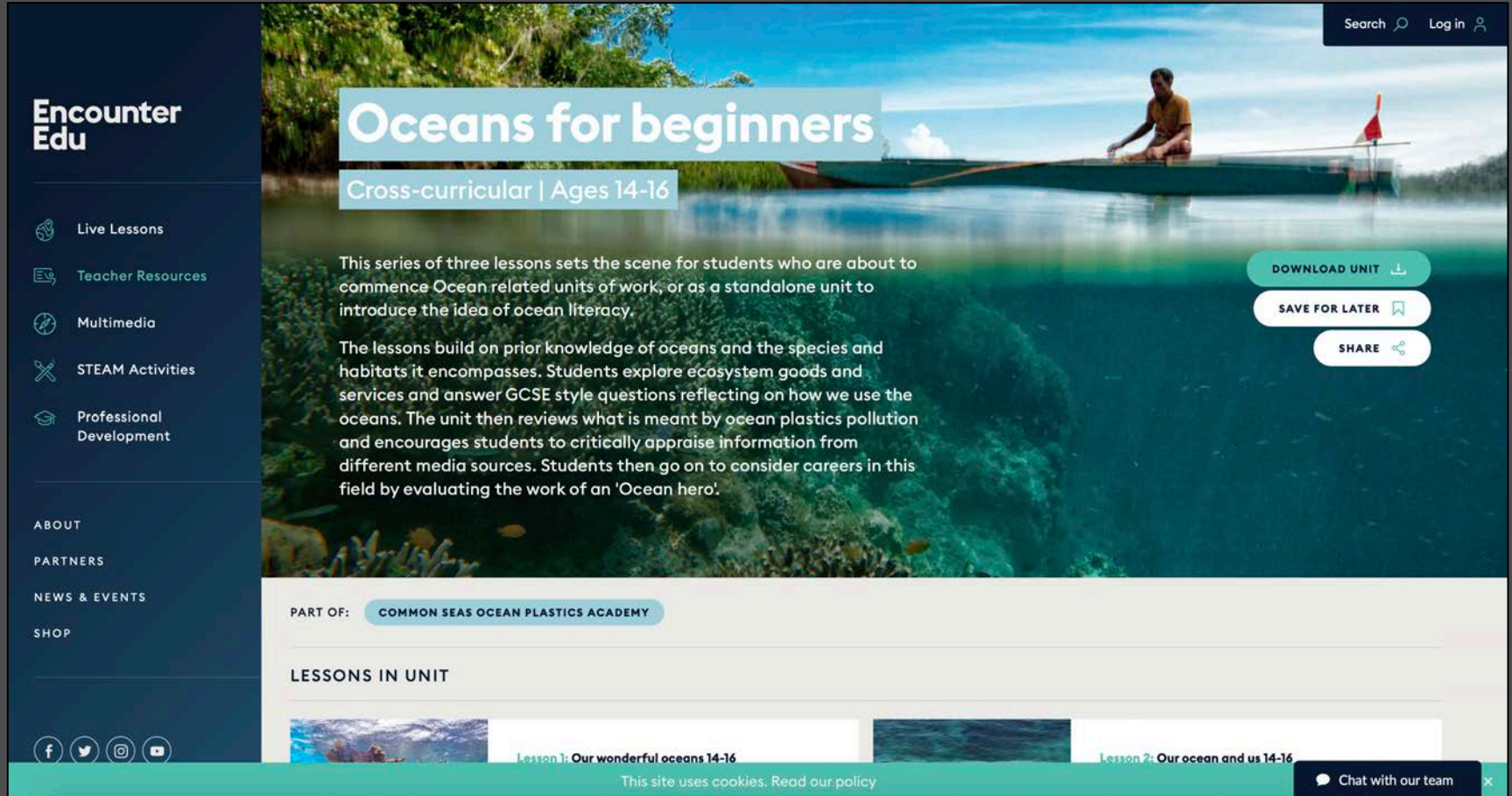
Eenvoudige manier om kennis over de zee — en andere “nieuwe” onderwerpen, zoals klimaatverandering — te behandelen met leerlingen van lager tot middelbaar onderwijs!

Afgelopen jaar **wereldwijd 23.000 scholieren (!)** “live” bereikt in slechts 5 dagen met YouTube lessen op Curaçao. Maar ook in eigen tijd case studies en lesprogramma’s.



Mogelijkheden?

Voorbeeld lesprogramma leeftijdsgroep 14-16 jaar



Encounter Edu

- Live Lessons
- Teacher Resources
- Multimedia
- STEAM Activities
- Professional Development

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Oceans for beginners

Cross-curricular | Ages 14-16

This series of three lessons sets the scene for students who are about to commence Ocean related units of work, or as a standalone unit to introduce the idea of ocean literacy.

The lessons build on prior knowledge of oceans and the species and habitats it encompasses. Students explore ecosystem goods and services and answer GCSE style questions reflecting on how we use the oceans. The unit then reviews what is meant by ocean plastics pollution and encourages students to critically appraise information from different media sources. Students then go on to consider careers in this field by evaluating the work of an 'Ocean hero'.

DOWNLOAD UNIT

SAVE FOR LATER

SHARE

PART OF: COMMON SEAS OCEAN PLASTICS ACADEMY

LESSONS IN UNIT

- Lesson 1: Our wonderful oceans 14-16
- Lesson 2: Our ocean and us 14-16

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Mogelijkheden?

Voorbeeld lesprogramma leeftijdsgroep 14-16 jaar



Encounter Edu

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Plankton, Plastics and Poo

Science | Ages 14-16

Plankton, Plastics and Poo for GCSE Science introduces students to the pioneering research on the impact of microplastics on the marine ecosystem. There are an estimated 5.25 trillion pieces of plastic in the ocean's surface waters and these plastic particles could have significant consequences for the marine food web and carbon cycle.

As students follow the same journey as scientists at the University of Exeter and Plymouth Marine Laboratory, they learn about key scientific principles such as food webs, work scientifically by simulating the researchers' investigations, and are encouraged to use their findings to have a wider impact.

Each of the seven lessons is introduced by a brief from a member of the research team, complemented by a video and concluded with the scientists' reflections.

While these microplastics now represent a major threat to the health of many marine ecosystems, they are a threat that we can all work to resolve.

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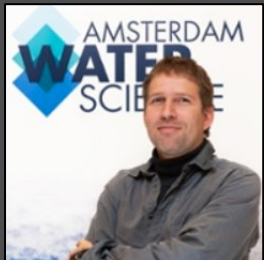
Samenwerken? Aansluiting BSc Biologie



Corina Brussaard
Hoogleraar
Interactieve Lezing
Virus ecologie (L8)



Rob Kroes
Promovendus
Interactieve lezing
Vismigratie (iL37)



Harm van der Geest
Universitair Hoofddocent
Workshop
Waternatuur (W56)



Jasper Croll
Promovendus
Workshop
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WU / Porifarma BV:

Ronald Osinga Erik Wurz
Mischa Streekstra

Thank you for your attention!

FB: sponge loop

j.m.degoeij@uva.nl



UNIVERSITEIT VAN AMSTERDAM

NIBI 2020

Zee Kust Klas