atlas

UNDERSTANDING DEEP ATLANTIC ECOSYSTEMS

Impact of ocean acidification on the octocoral *Viminella flagellum* under variable food supply

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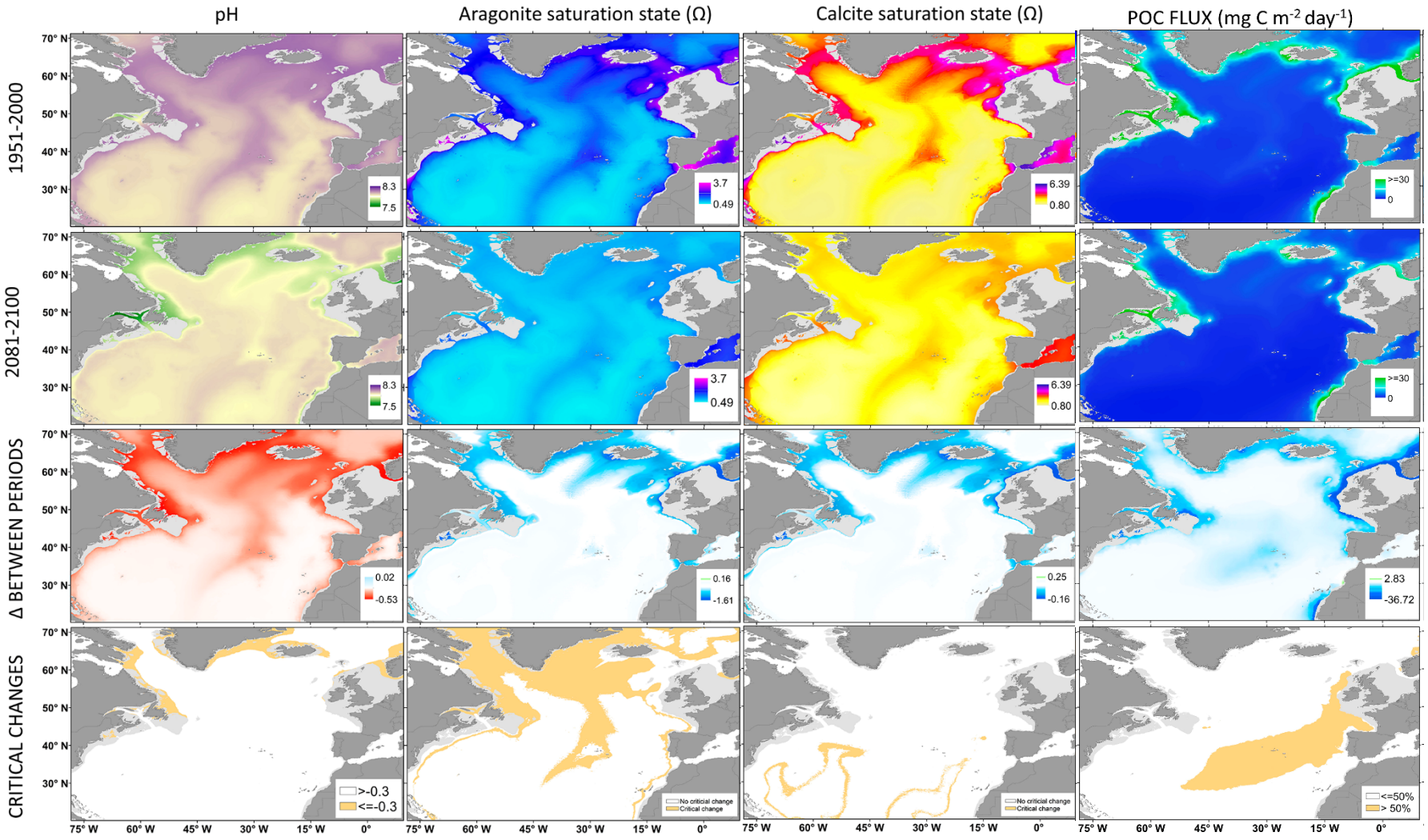
Introduction

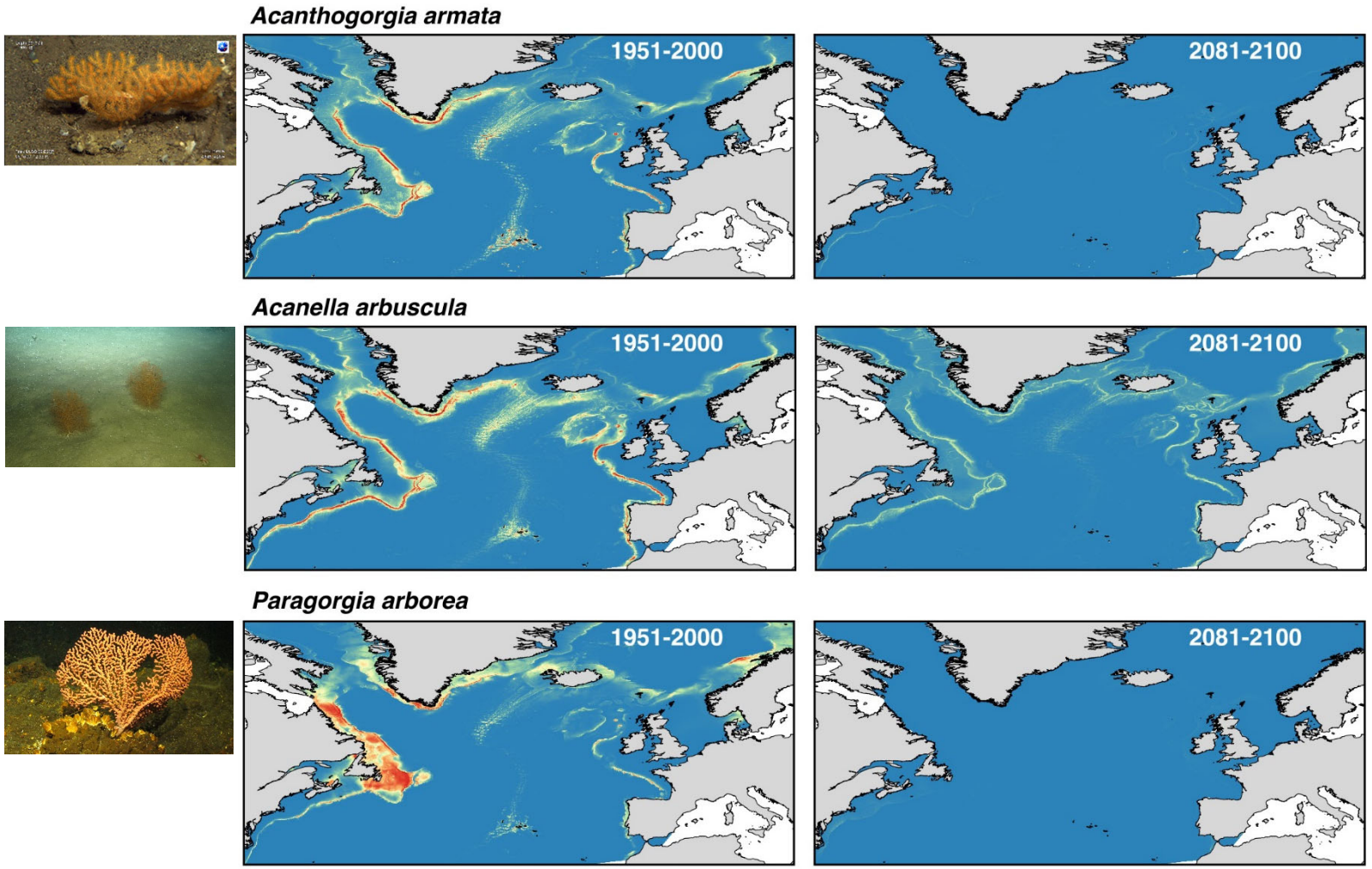
Climate change projections



Puerta et al in revision

Introduction

Predicting the distribution of VMEs under future climate change scenarios



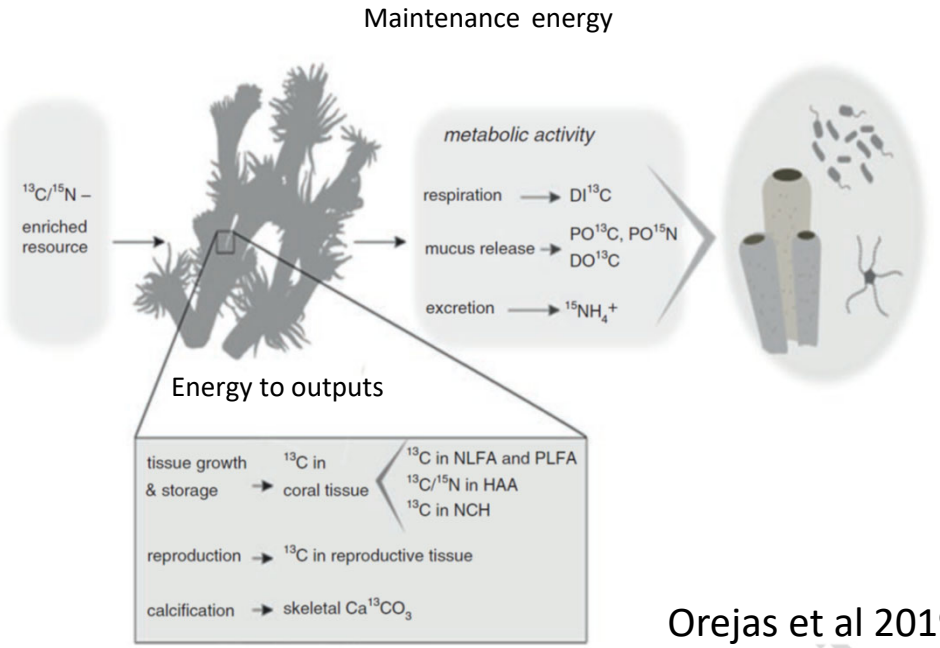
Morato et al 2020

Introduction

Experimental studies in ATLAS:

1 - Determine the feeding preferences and assimilation of different food sources of selected coral garden forming octocorals in Azores

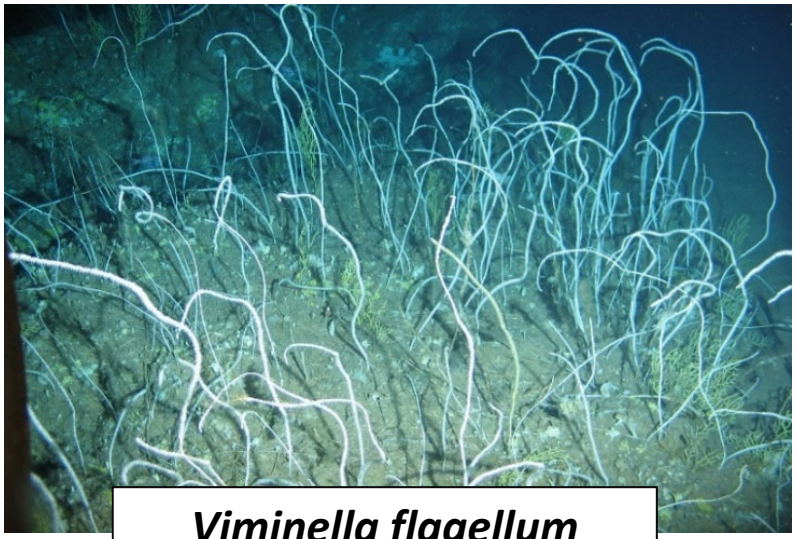
2 – Understand the impacts of ocean acidification on octocorals under variable food supply



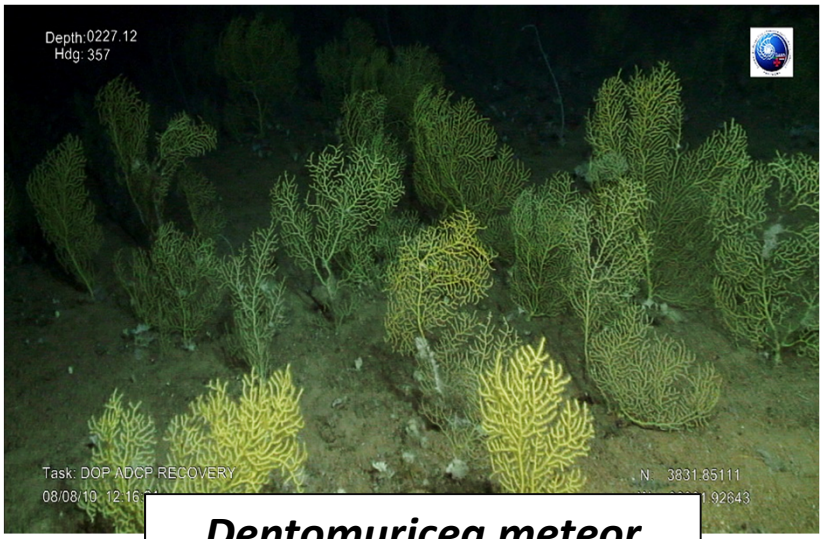
Orejas et al 2019

Introduction

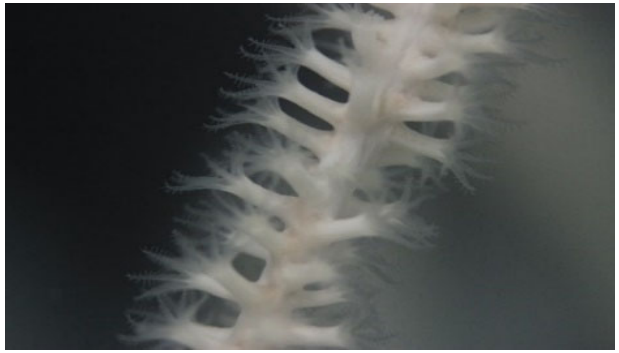
Target species

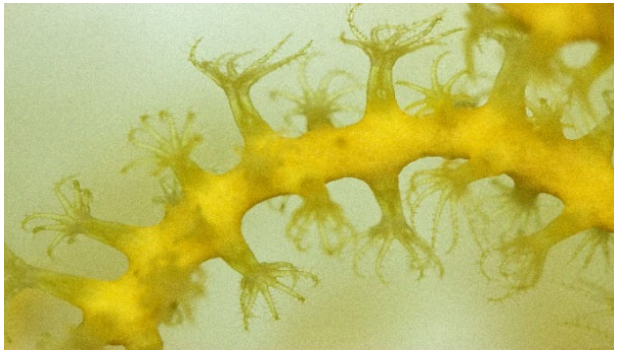


Viminella flagellum



Dentomuricea meteor



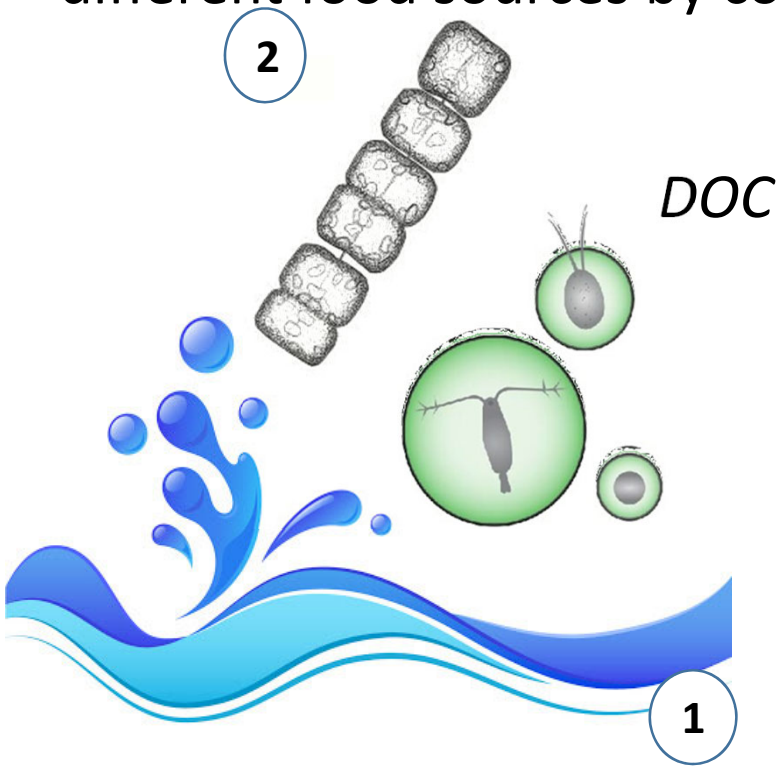


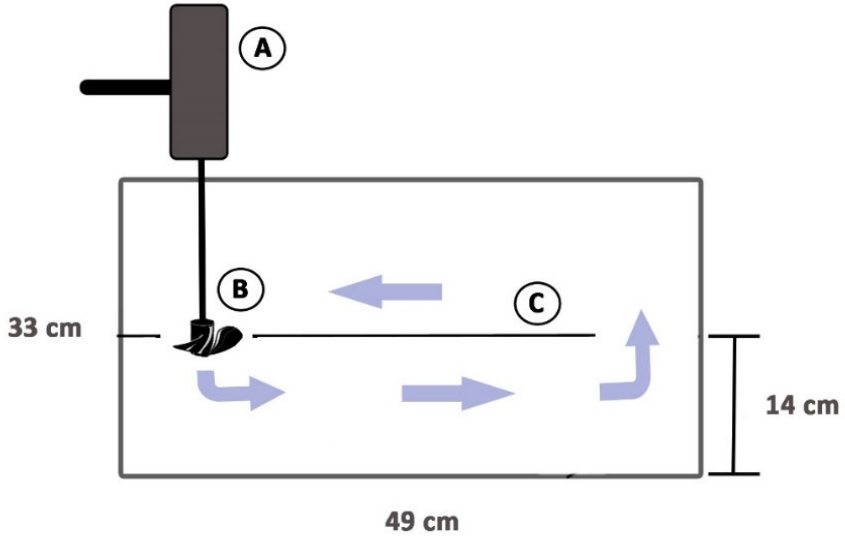
Feeding experiments

Feeding experiments
objectives

1. Determine the influence of flow velocity on the ability of the target species to capture live food;

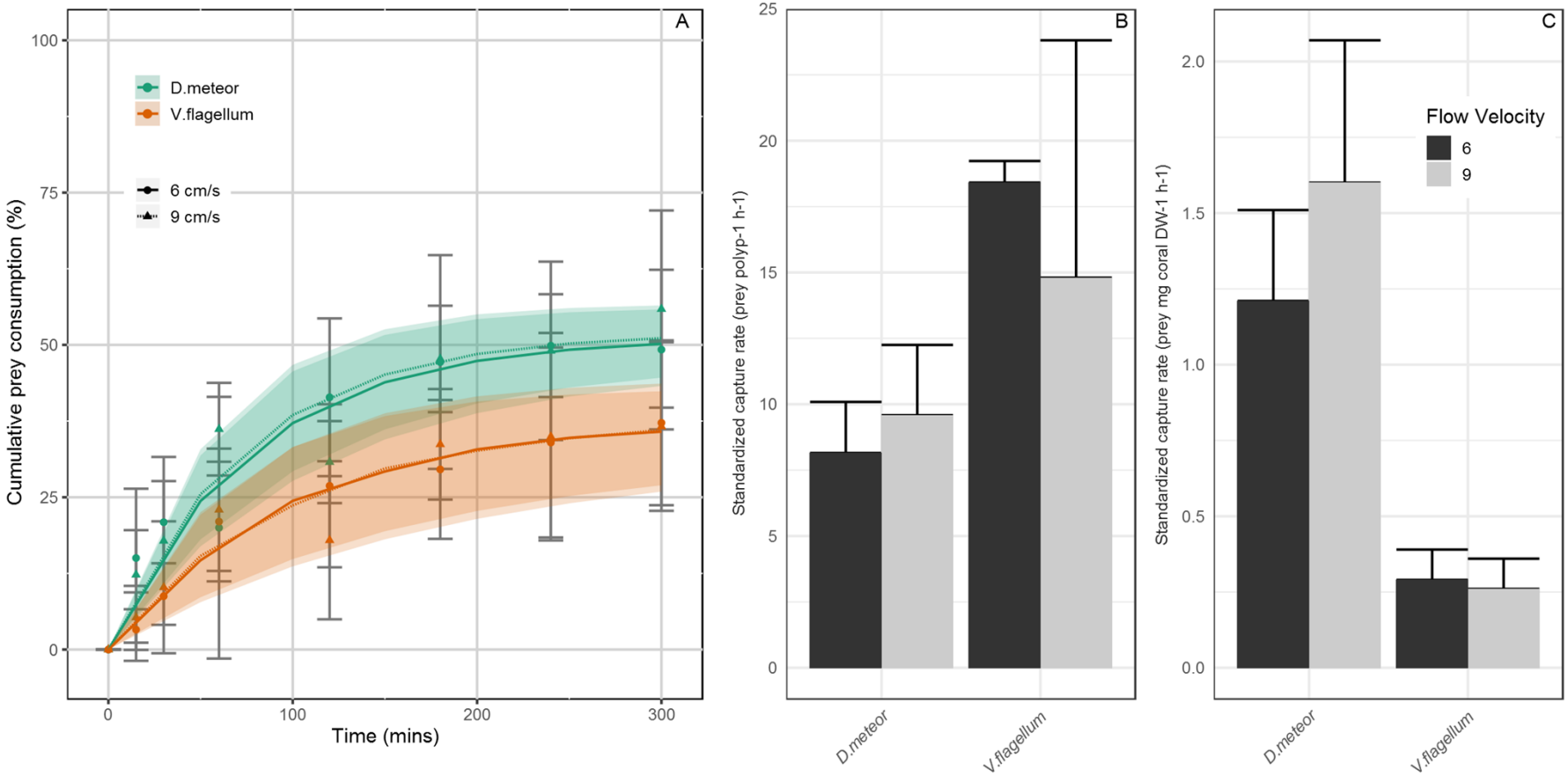
2. Assess their food preferences and assimilation under provision of different food sources by conducting stable isotope tracer studies





Feeding experiments

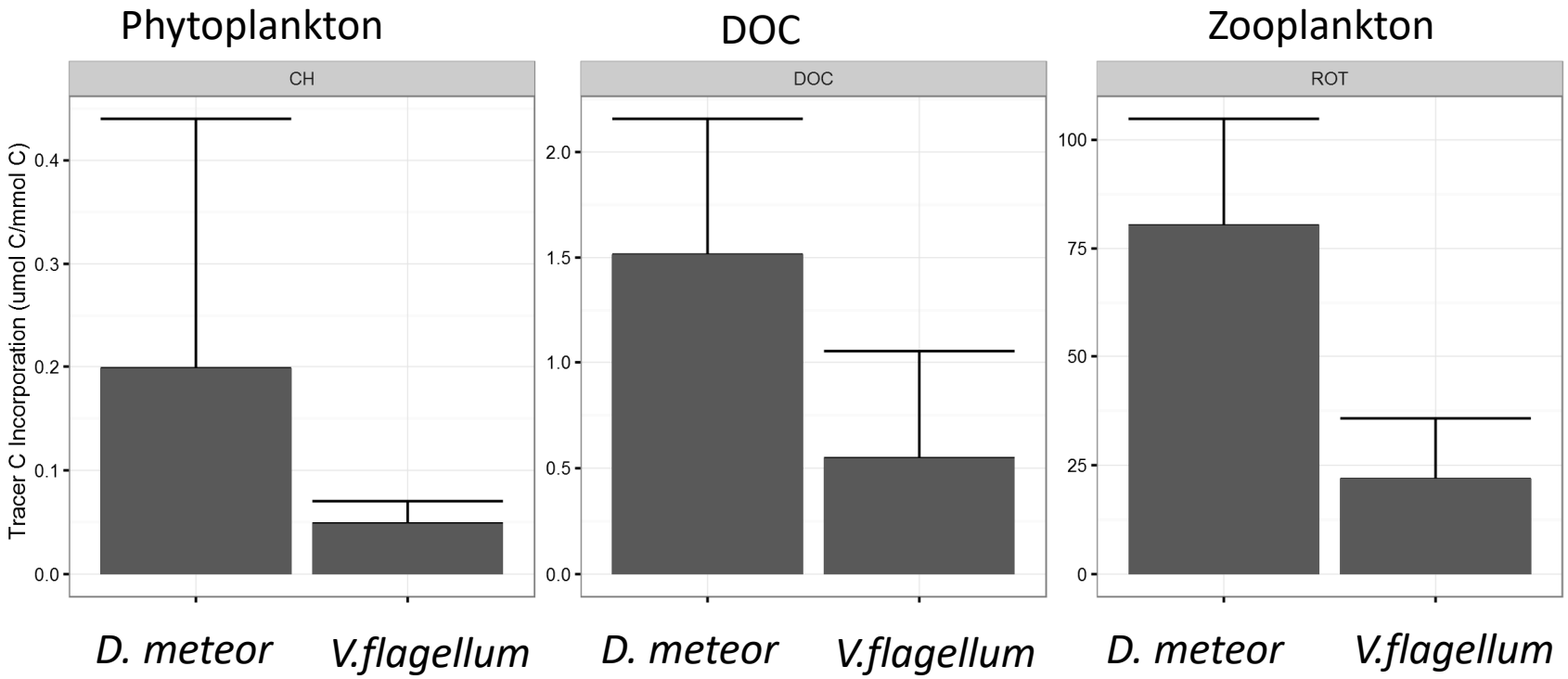
Prey capture



D. meteor captures more total prey, although *V. flagellum* captured more prey per polyp

Feeding experiments

Food selectivity

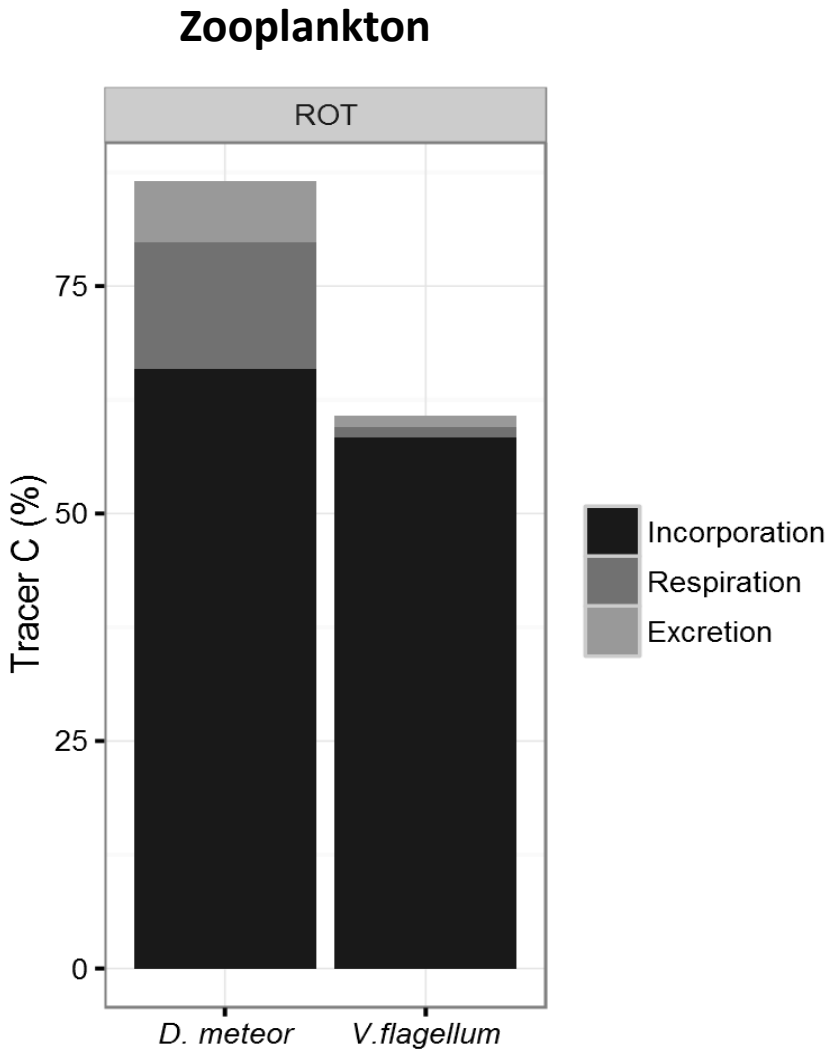


Both species preferentially fed on zooplankton

Dentomuricea meteor fed more of all food substrates

Feeding experiments

Resource allocation



Both species incorporate a similar amount of carbon but *D. meteor* spent more respiration and excretion

Feeding experiments

Resource acquisition & allocation

D. meteor

V. flagellum

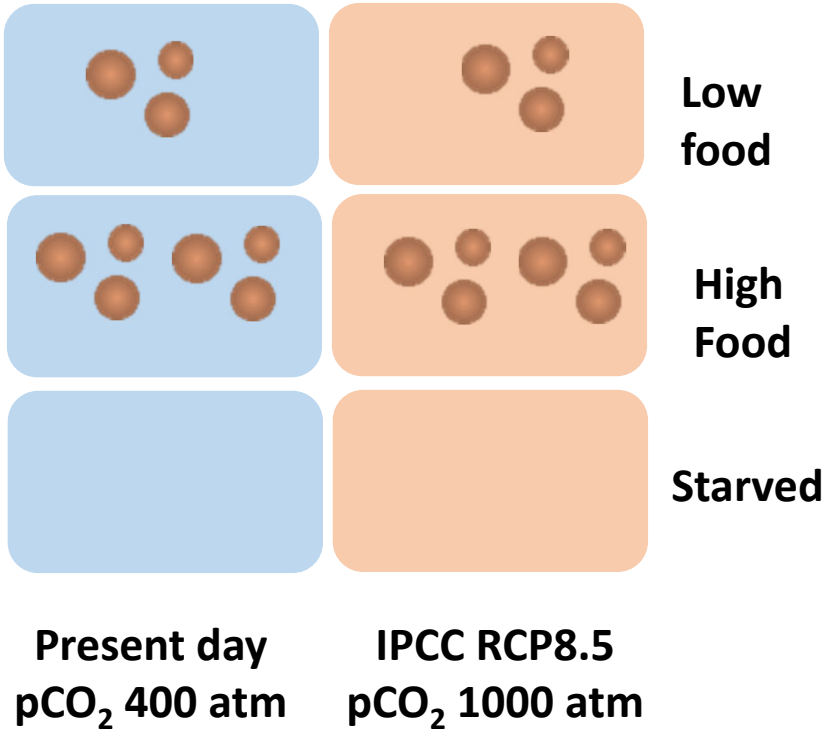
Ocean acidification & food supply experiments

Acidification experiments

Objectives

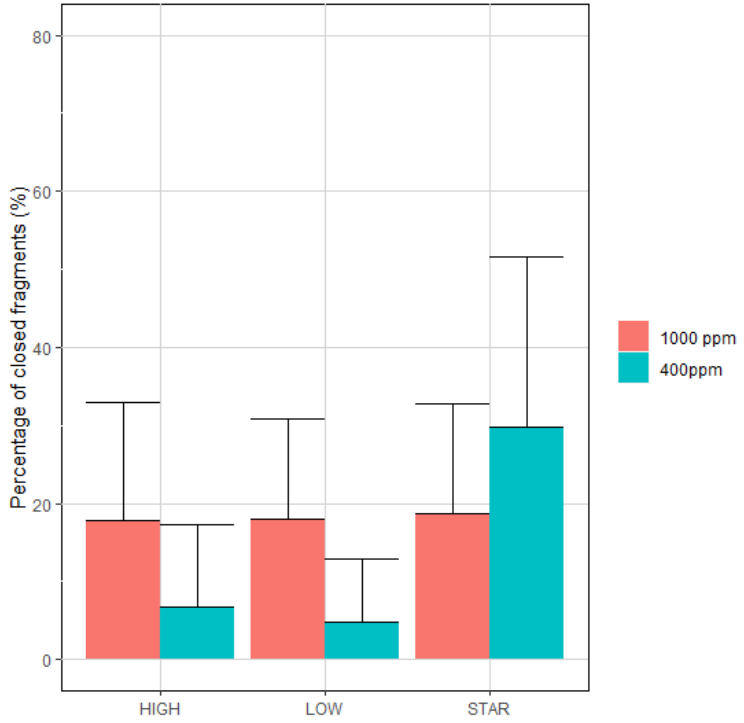
1 - Determine the impacts of predicted pCO_2 levels for 2100 on octocoral physiology;

2- Assess if and how food concentration alters the impacts of ocean acidification on their physiological response.

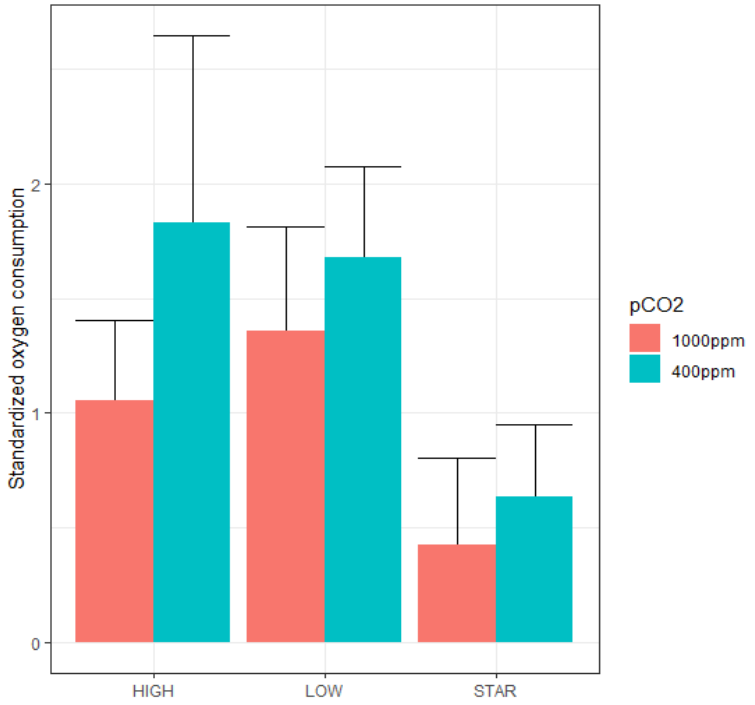


Acidification experiments

Polyp activity & oxygen consumption



Standardized oxygen consumption= OC_t/OC_{AC}



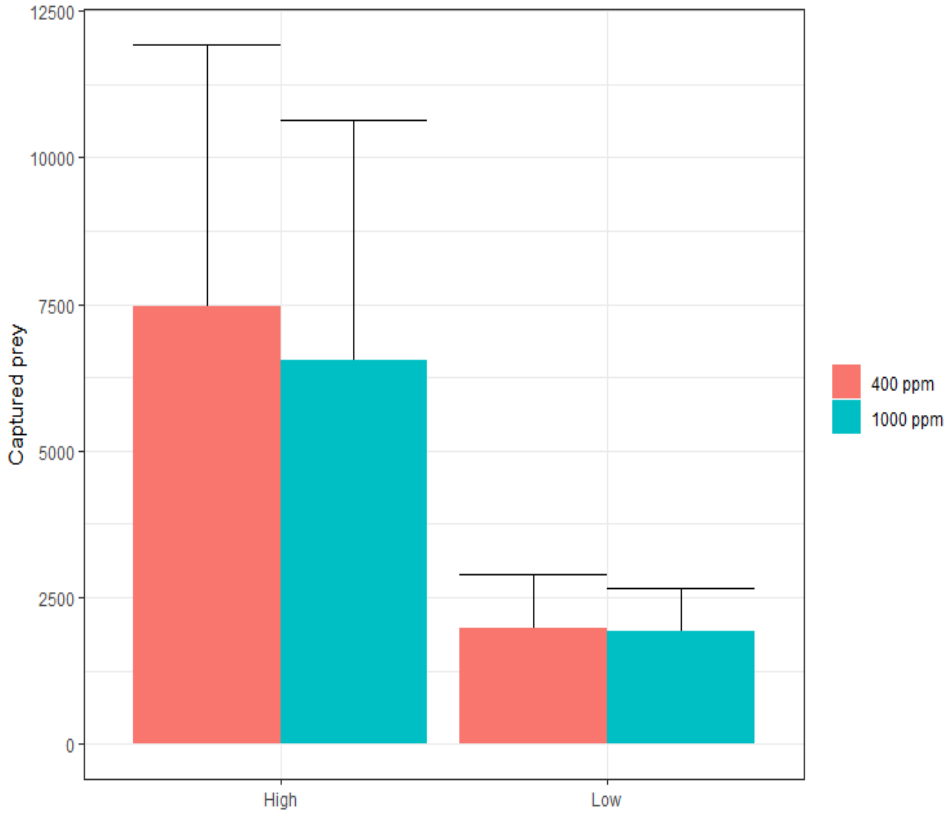
Significantly higher percentage of retracted polyps under OA conditions for High and Low food

Reduced metabolic rates (oxygen consumption) for corals under OA conditions, with starved corals showing the lowest rates

M6

Acidification experiments

Prey Capture



Octocorals captured more prey when offered higher food concentrations independently on the pCO_2 conditions

Slide 15

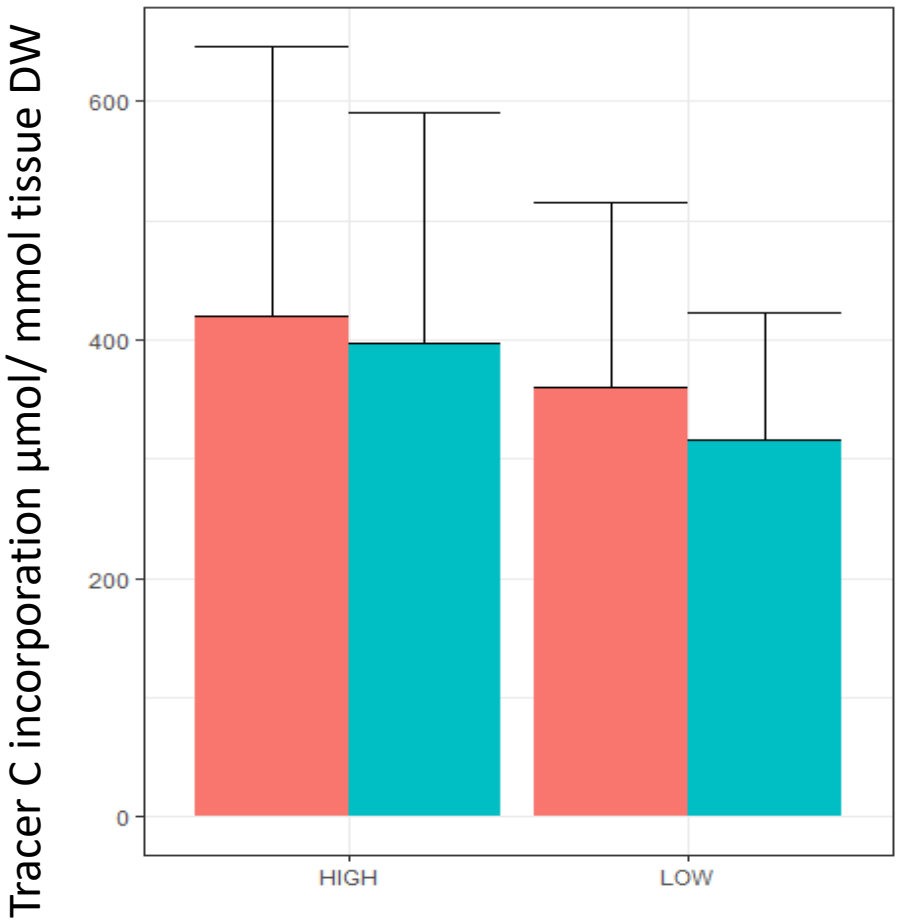
M6 On this slide, I would mention that there is a high SD under high food which means some fragments did not manage to use the high quantity of food. This might be key in interpreting the lack of differences in the tracer results

Maria Rakka, 07/03/2020

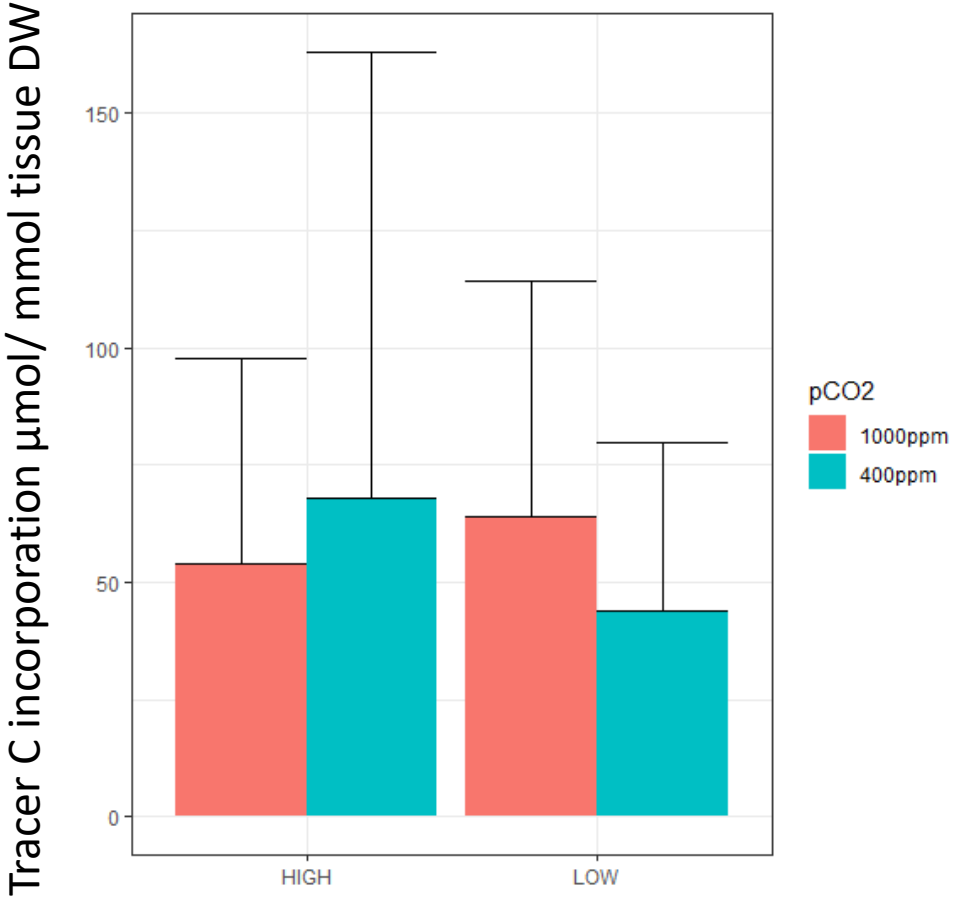
Acidification experiments

Tracers: Tissue Incorporation

Organic fraction

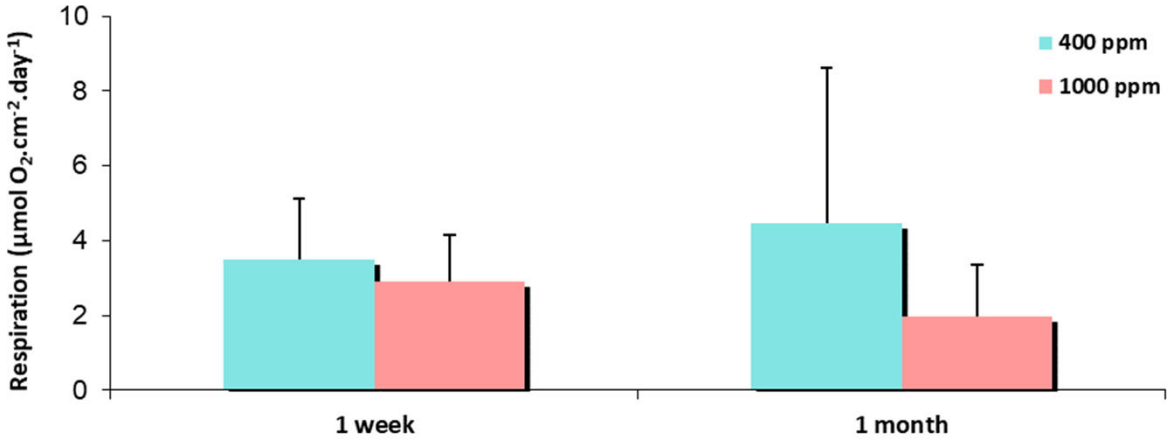


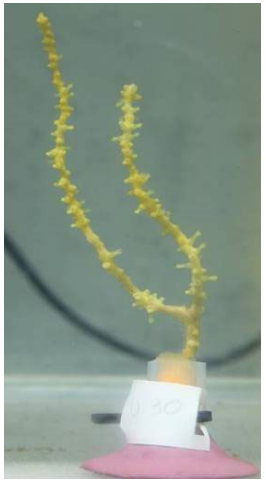
Inorganic fraction

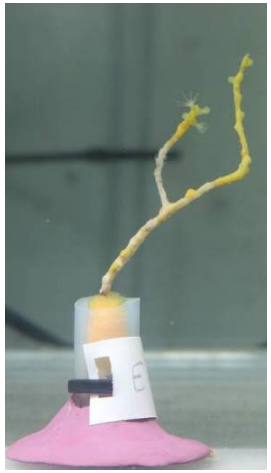


Acidification experiments

Comparison with *D. meteor*







pCO_2 400 ppm **$pCO_2$1000 ppm**

Decreased respiration rates after 1 month in the elevated pCO_2 treatment

Increased tissue paleness and necrosis in the elevated pCO_2 treatment

Conclusions

- ✓ Ocean acidification reduced octocorals' polyp activity and basal metabolism, for all food treatments although this was more pronounced under starvation;

- ✓ Increased food supply did not counteract the effect of ocean acidification, with V. flagellum showing similar incorporation rates of carbon and nitrogen in its tissue under High and Low food;

- ✓ Higher apparent susceptibility of *D. meteor* to OA conditions may be related to its faster metabolism and turnover but this needs to be confirmed;

- ✓ Differential responses by habitat-forming species may translate into a shift in coral gardens' species composition, structural complexity and functioning (nutrient and carbon cycling) with cascading effects to associated fauna and whole communities.

Thank You!

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David Figueras, Gerald Taranto, Carla Nunes, João Rodeia

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