Zooplankton Assemblages Associated with Submarine Canyons Off the East Coast of South Africa

Presented by Njabulo Mdluli
Email: methembemdluli@gmail.com

Contributors: Dr Jenny Huggett (DFFE), Prof Amanda Lombard (NMU), Dr Nicola Carrasco(UKZN) and Dr Shael Harris (UniZulu)

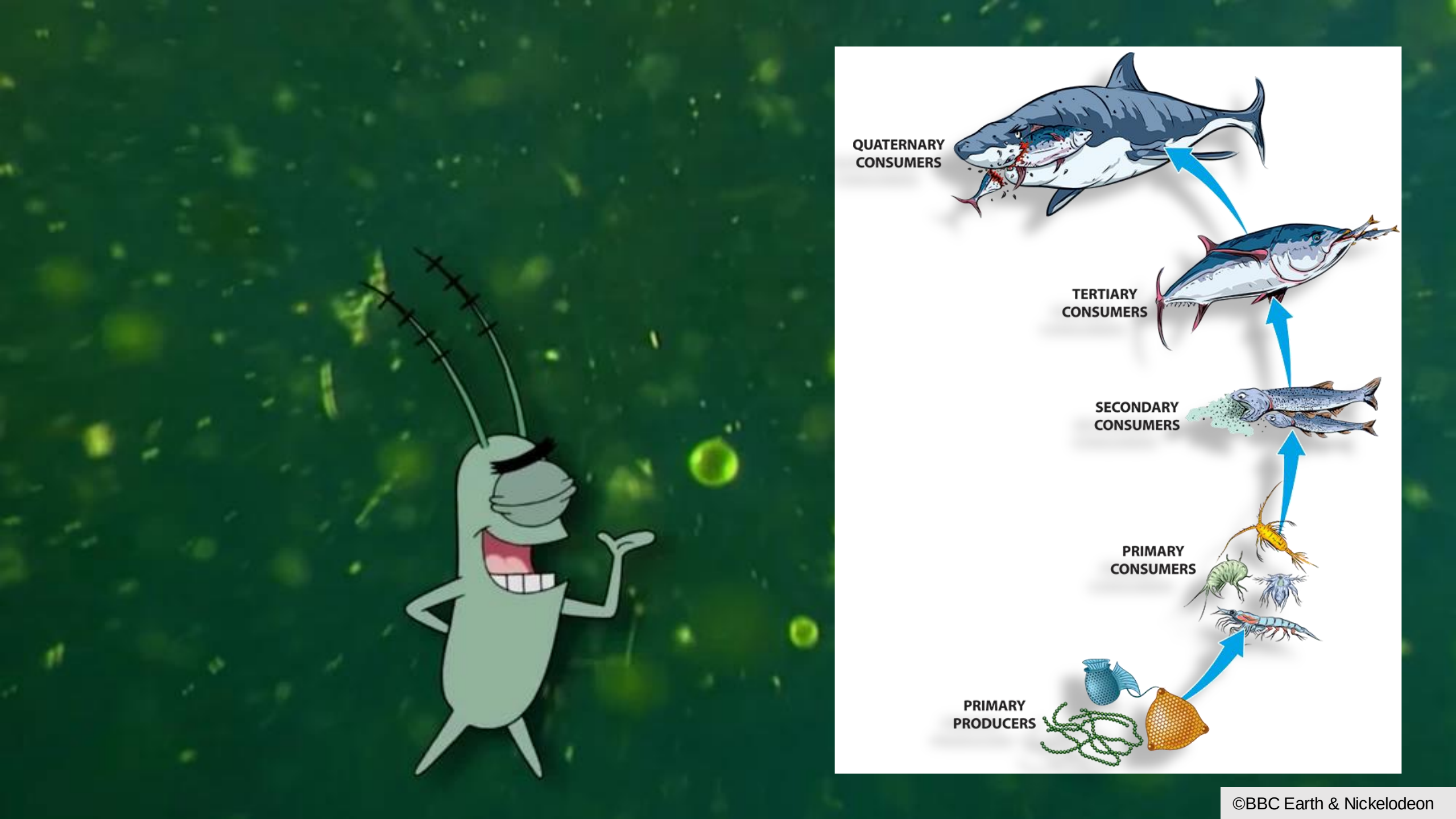
National Research Foundation

NELSON MANDELA UNIVERSITY

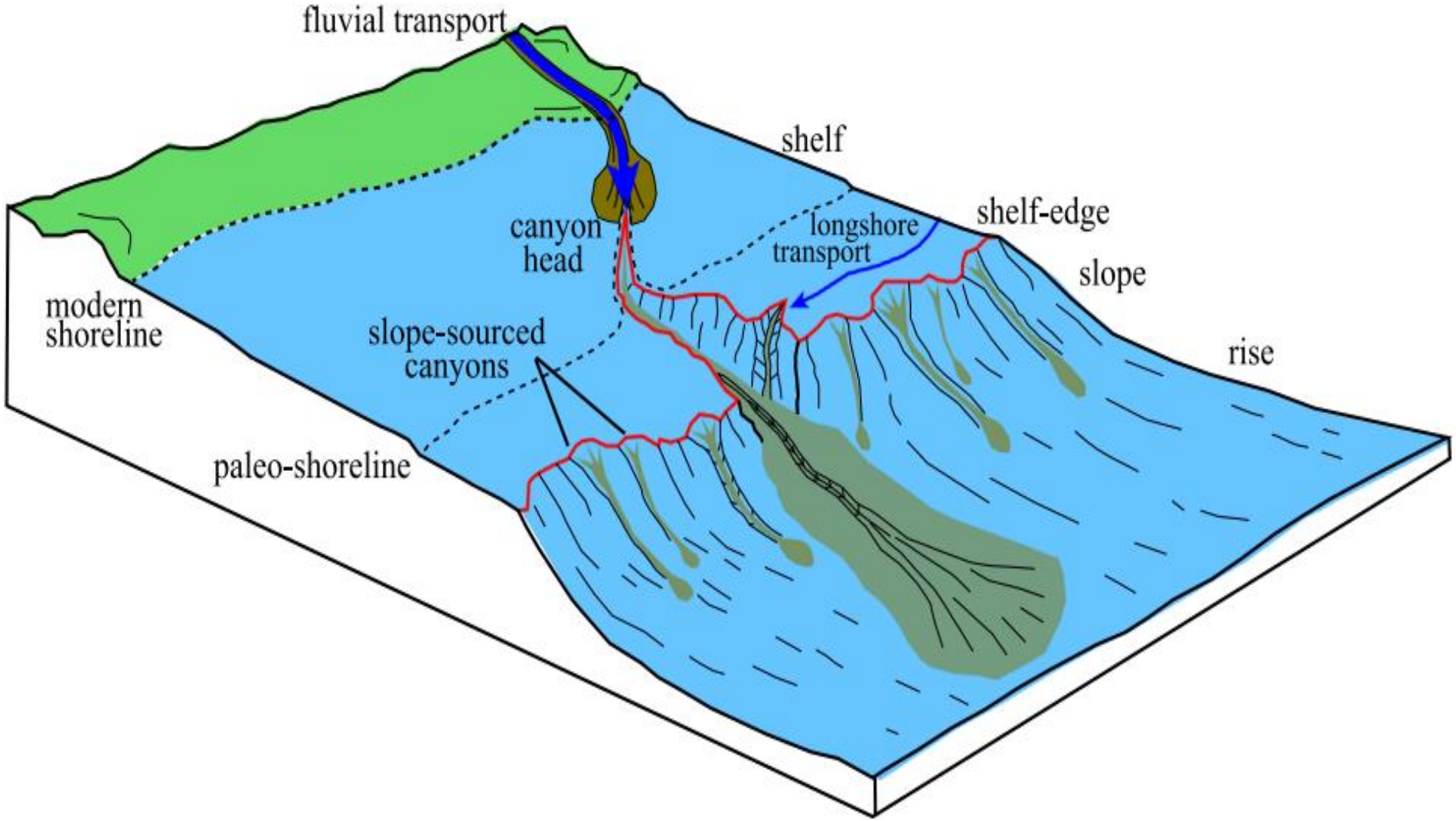
WILDOCEANS

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

ACEP

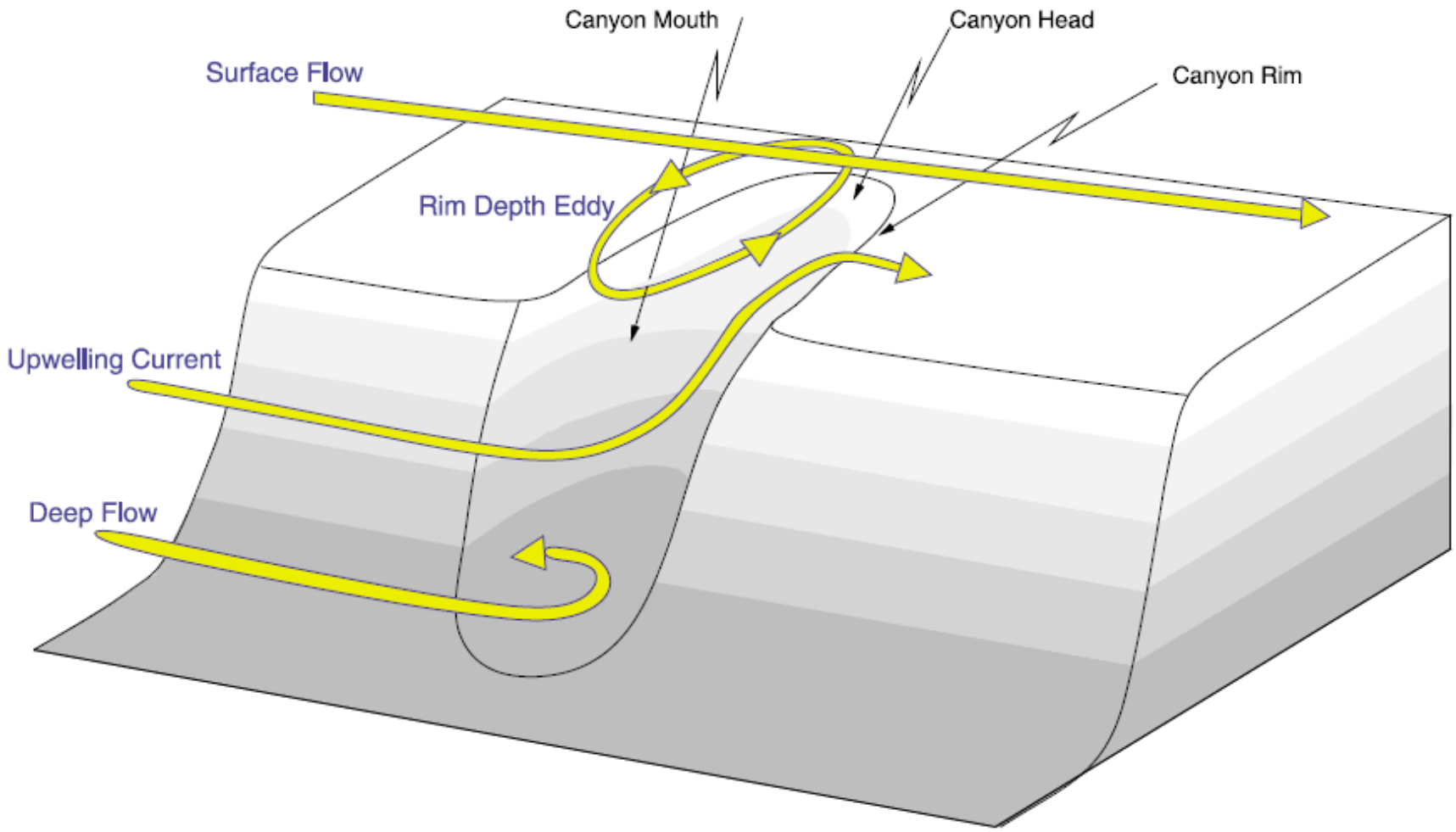


What are submarine canyons?



Source: J. Obelcz et. al., Deep-Sea Research II 104: 106-119 (2014)

How do submarine canyons affect zooplankton communities?



Source: Allen and Hickey 2010. Journal of Geophysical Research: Oceans, Volume: 115, Issue: C8, First published: 19 August 2010, DOI: (10.1029/2009JC005731).

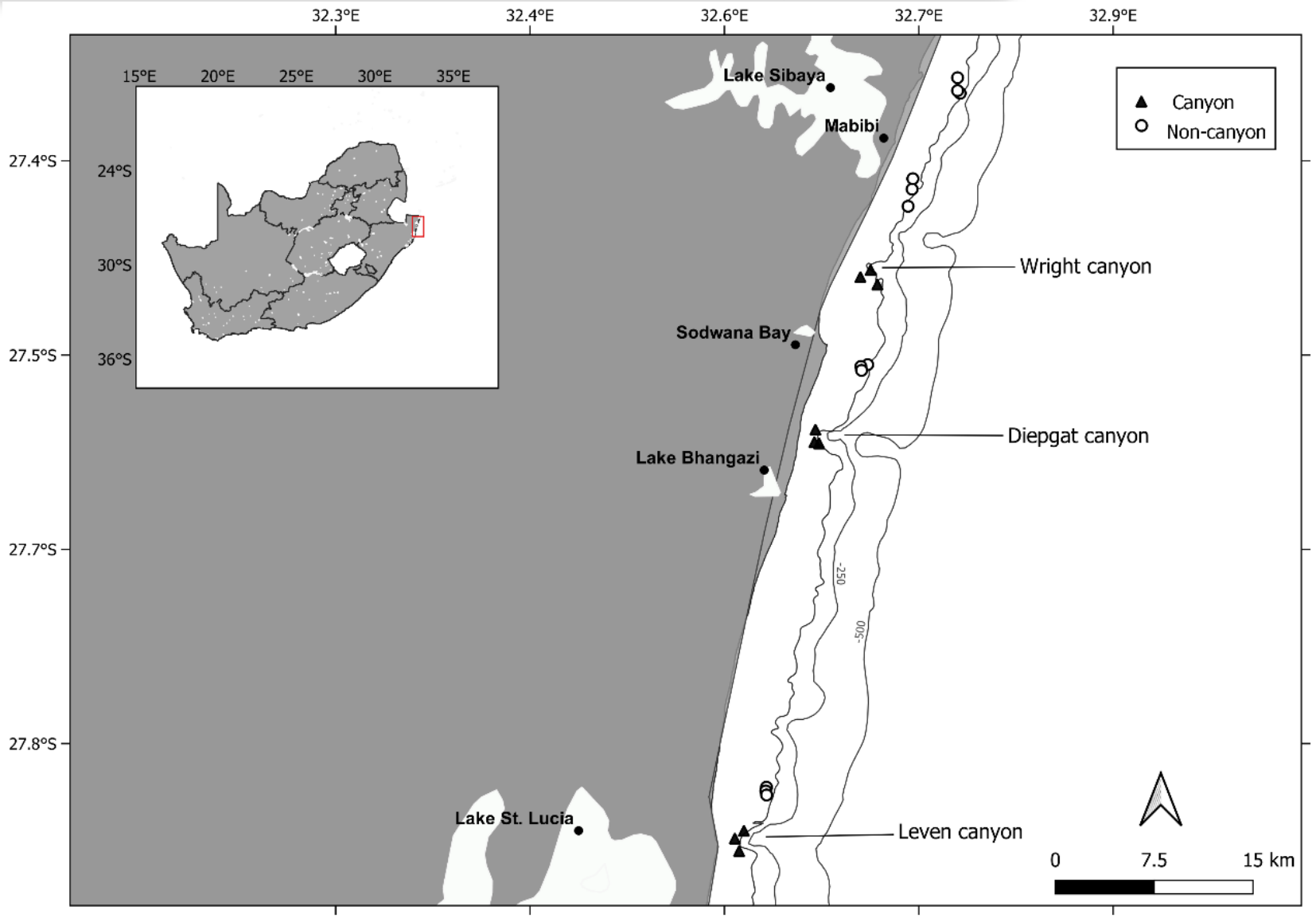
Research questions

Do submarine canyons support more zooplankton biomass, abundance and diversity compared to the adjacent non-canyon shelf?

What are some of the abiotic factors controlling the observed patterns?

Study area

- The study is located within the iSimangaliso Marine Protected Area.
- Also, a UNESCO World Heritage site.



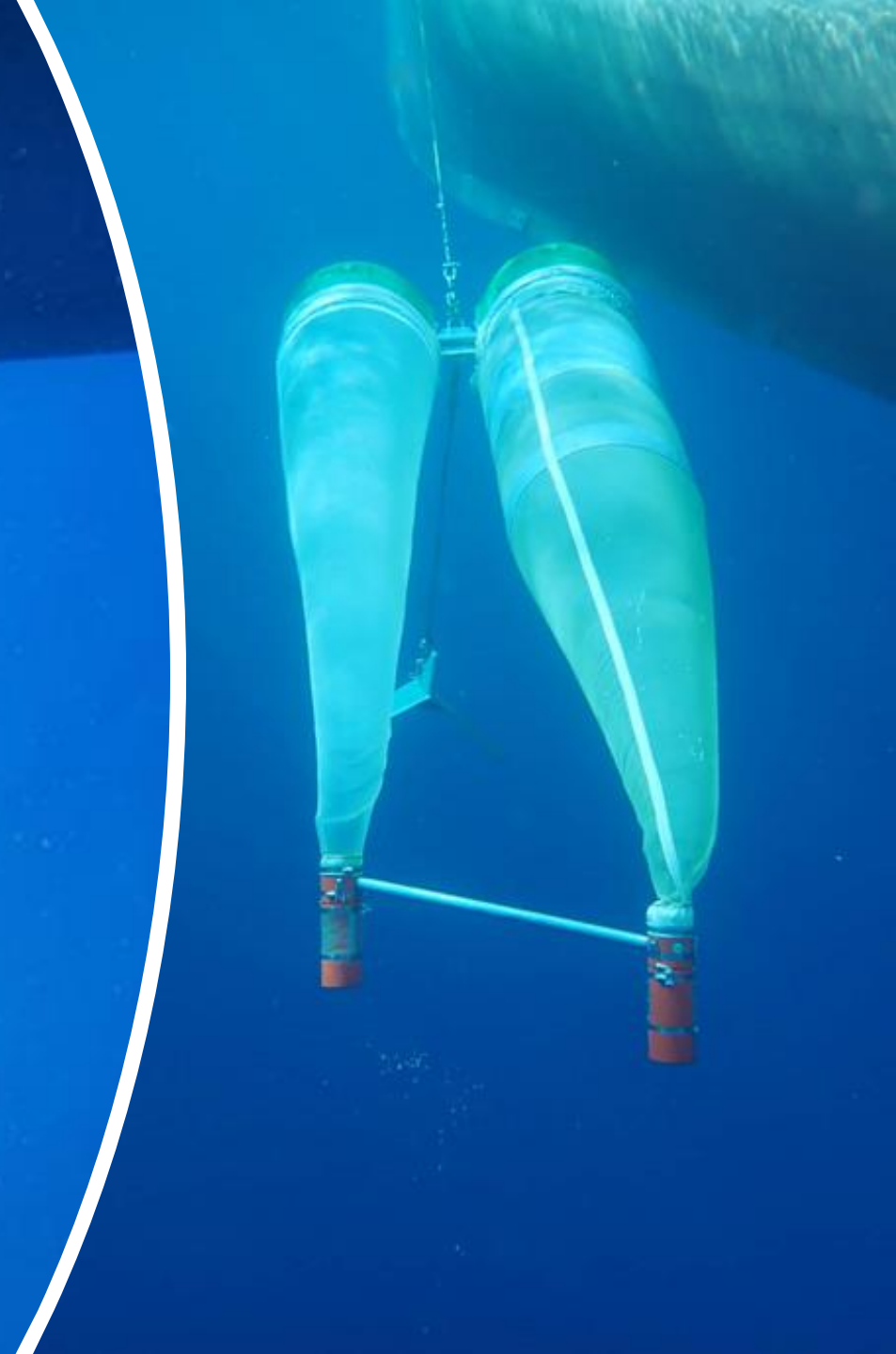
What else makes these canyons special?

SAMPLE COLLECTION

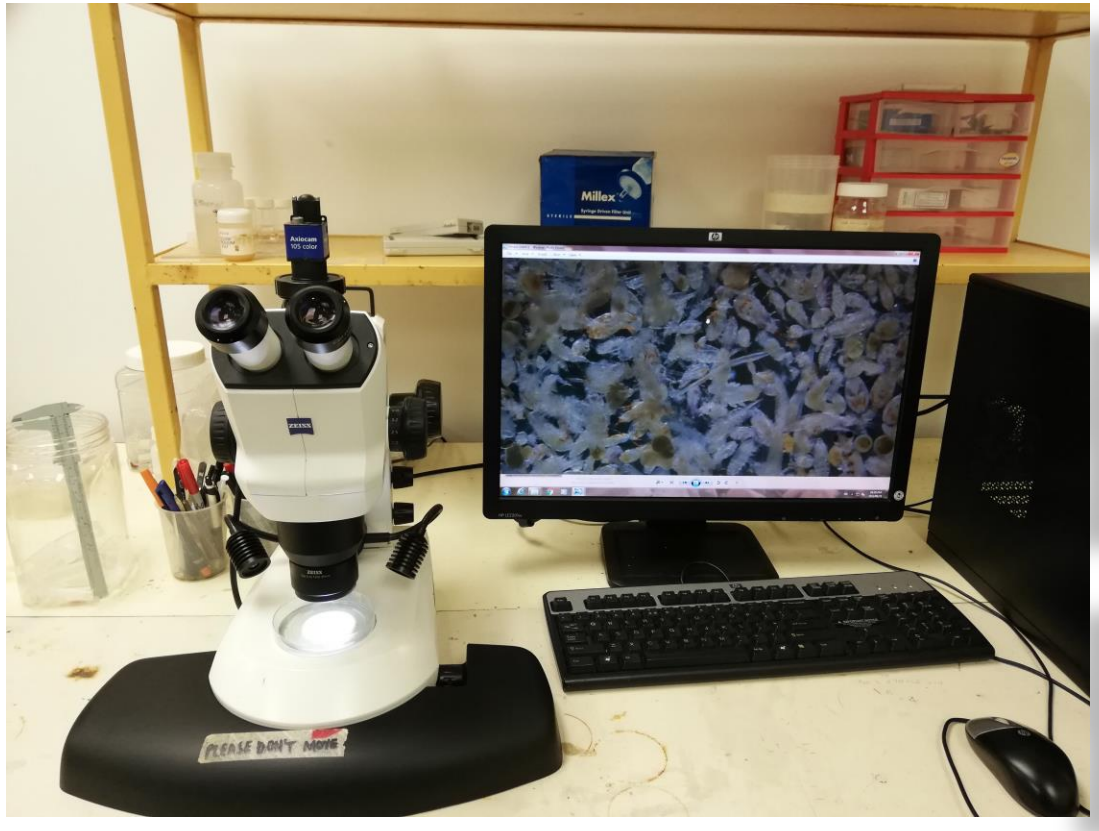
Samples were collected in June 2018 and May 2019

A Bongo net (200 µm) was used to collect samples

A CTD was used to measure environmental variables



Abundance



A dissecting microscope was used to identify and count number of individuals

Abundance (ind m^{-3}) = No. Individuals/volume seawater filtered (m^3)

Fourth root transformed abundance data was used for multivariate analysis on PRIMER

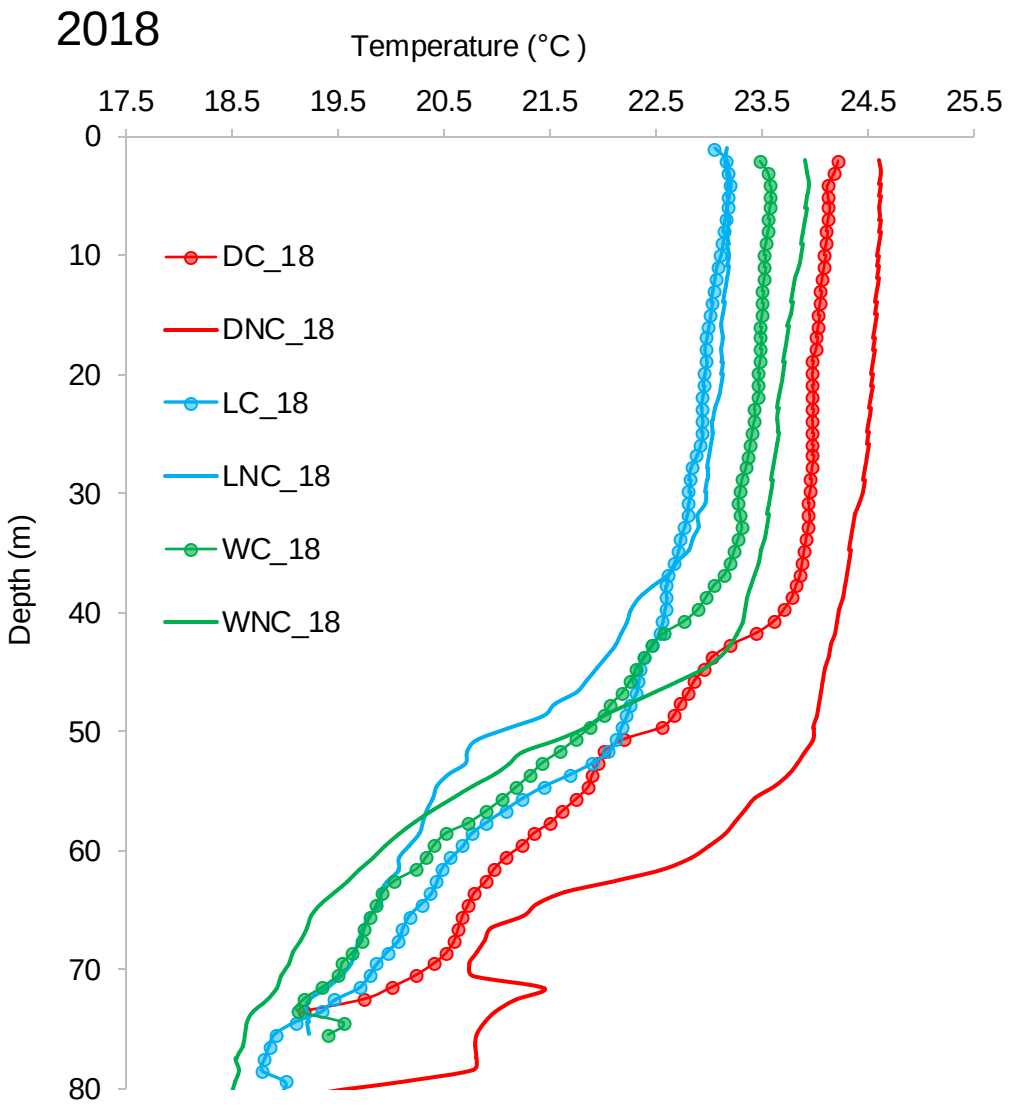
Dried biomass

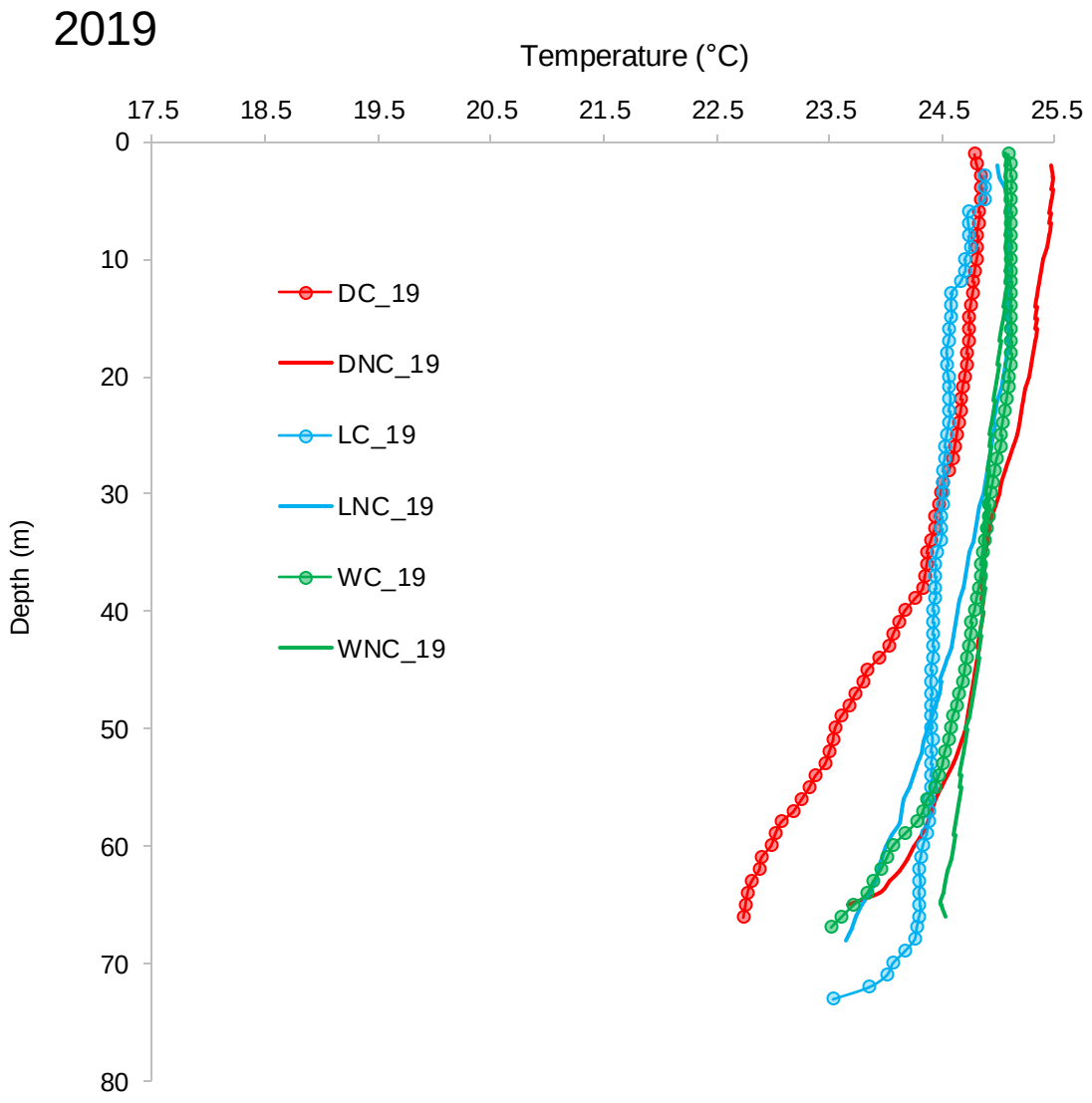
Dried zooplankton mass was obtained from the second Bongo net sample

Biomass (mg m^{-3}) = Dried zooplankton mass (g)/ volume seawater filtered (m^3)

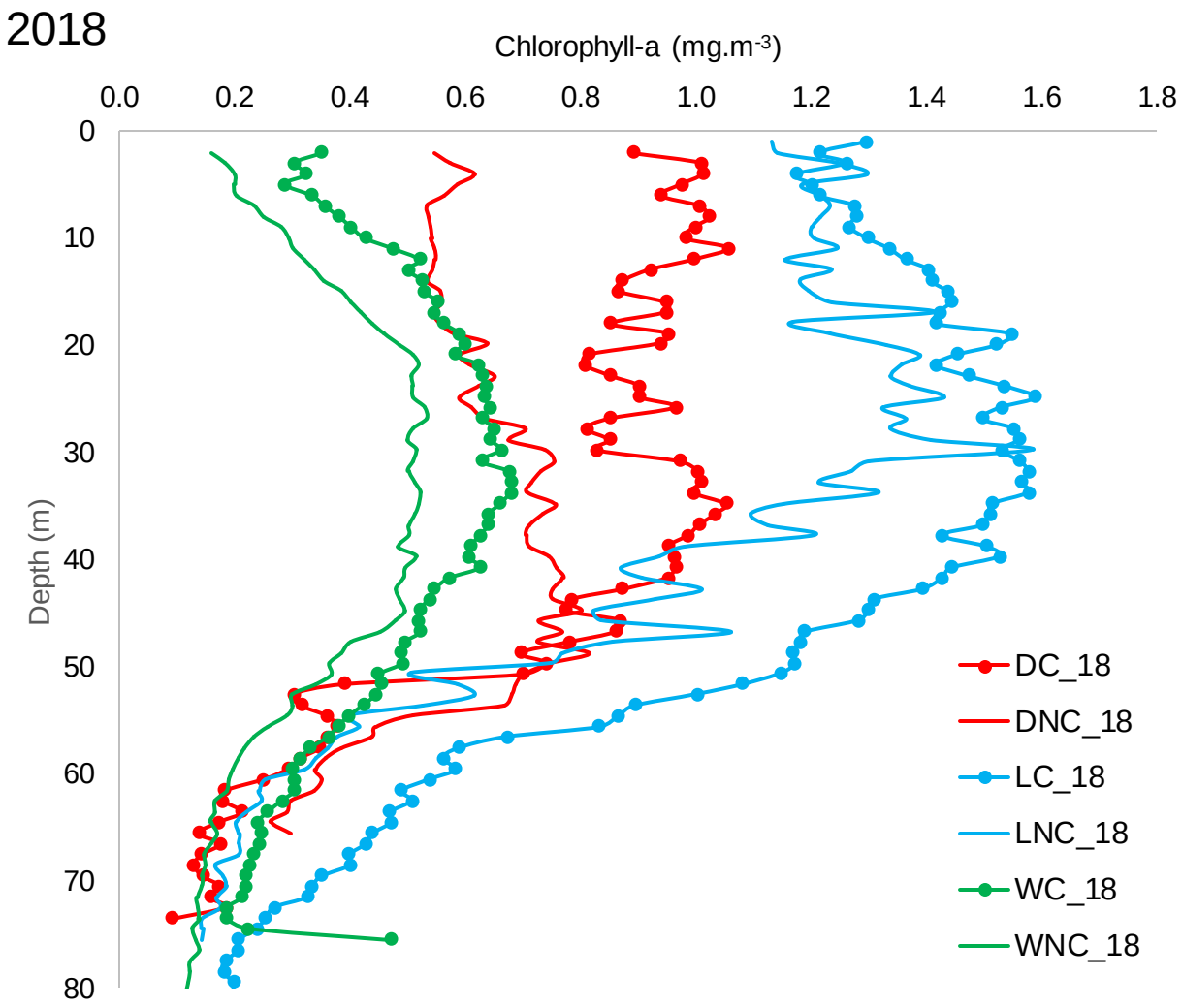
ANOVA was used test for differences in biomass between canyon and non-canyon sites

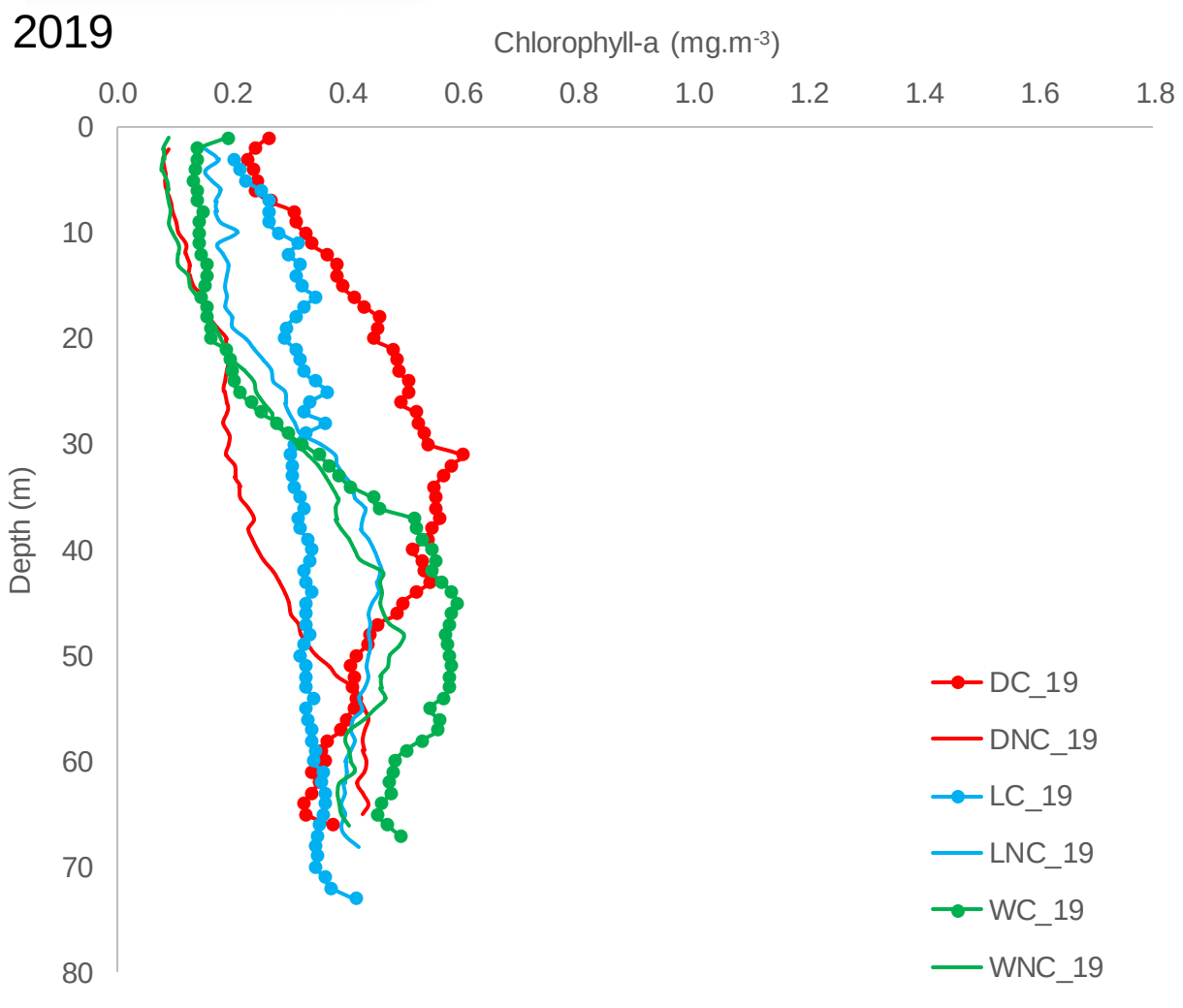
Environmental conditions in the canyons vs non-canyon sites: Temperature





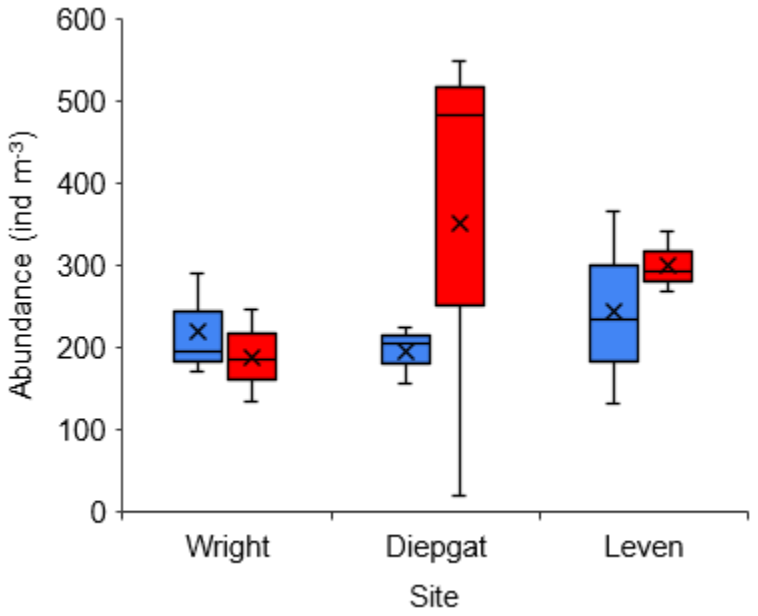
Chlorophyll-a





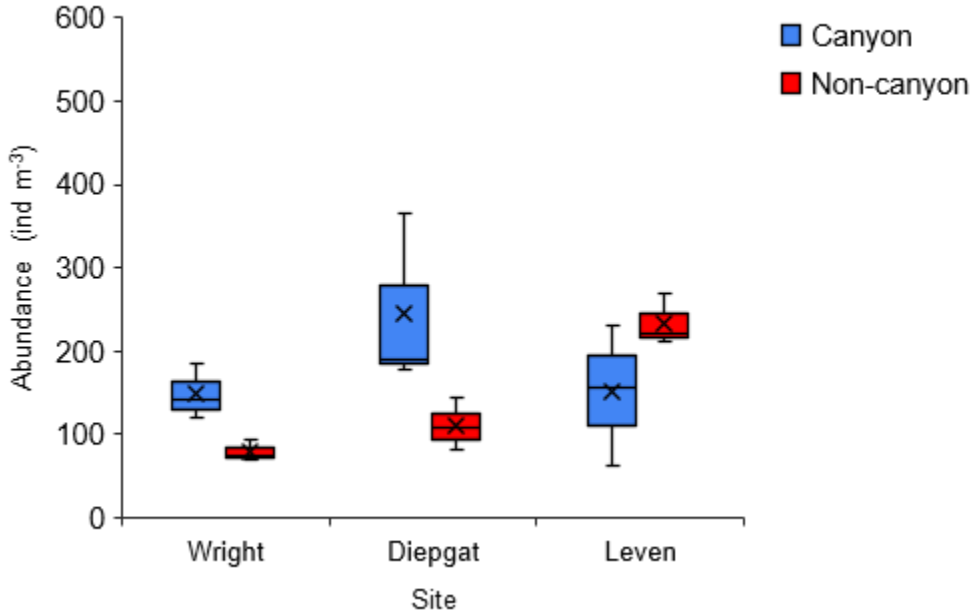
Did the zooplankton abundance differ between the canyons and non-canyon sites?

2018



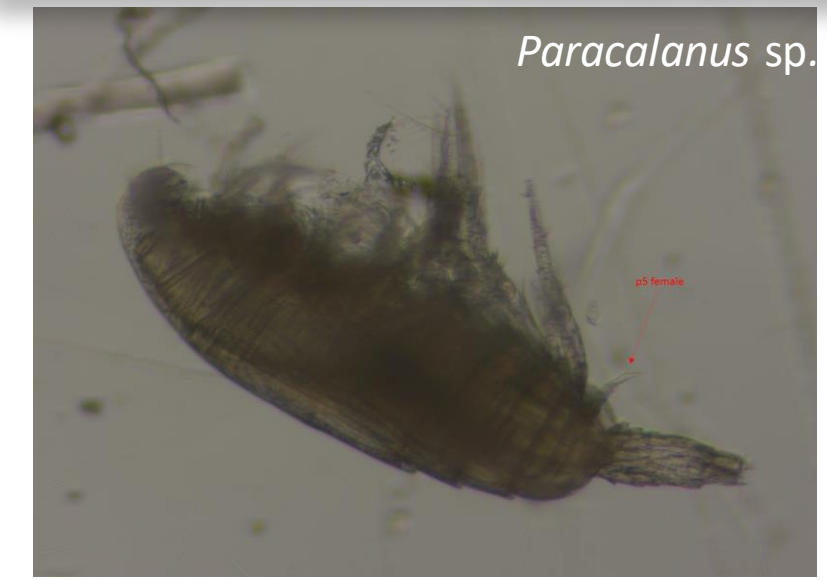
ANOVA
Seafloor feature: p=0.60
Site: p=0.64
Seafloor feature + Site: p=0.02*

2019



ANOVA
Seafloor feature: p=0.58
Site: p= 0.37
Seafloor feature + Site: p= 0.04*

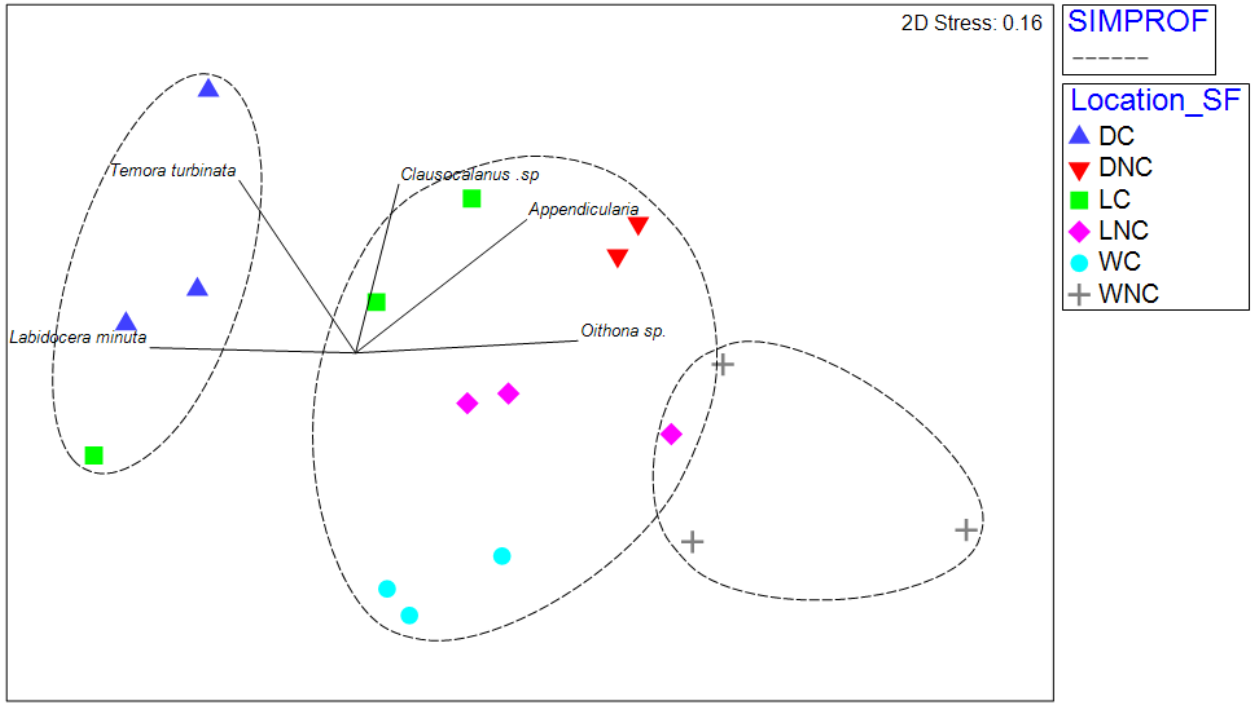
Some of the zooplankton that was abundant



“Rare species”

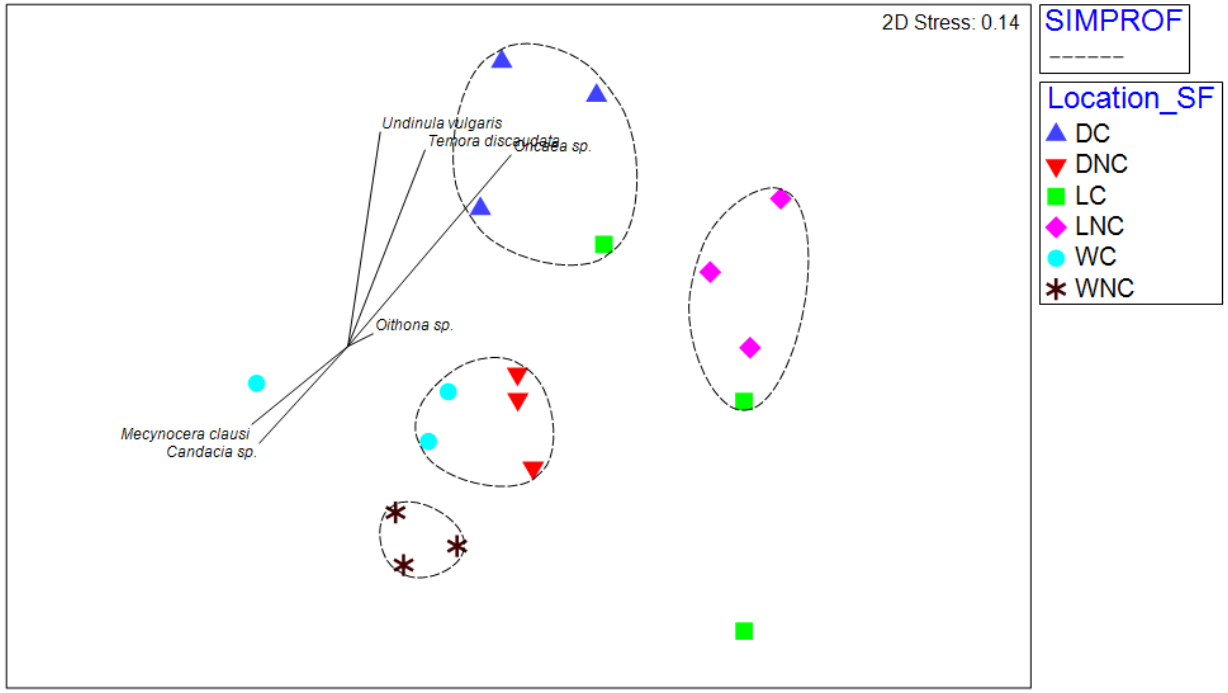
Community structure

2018



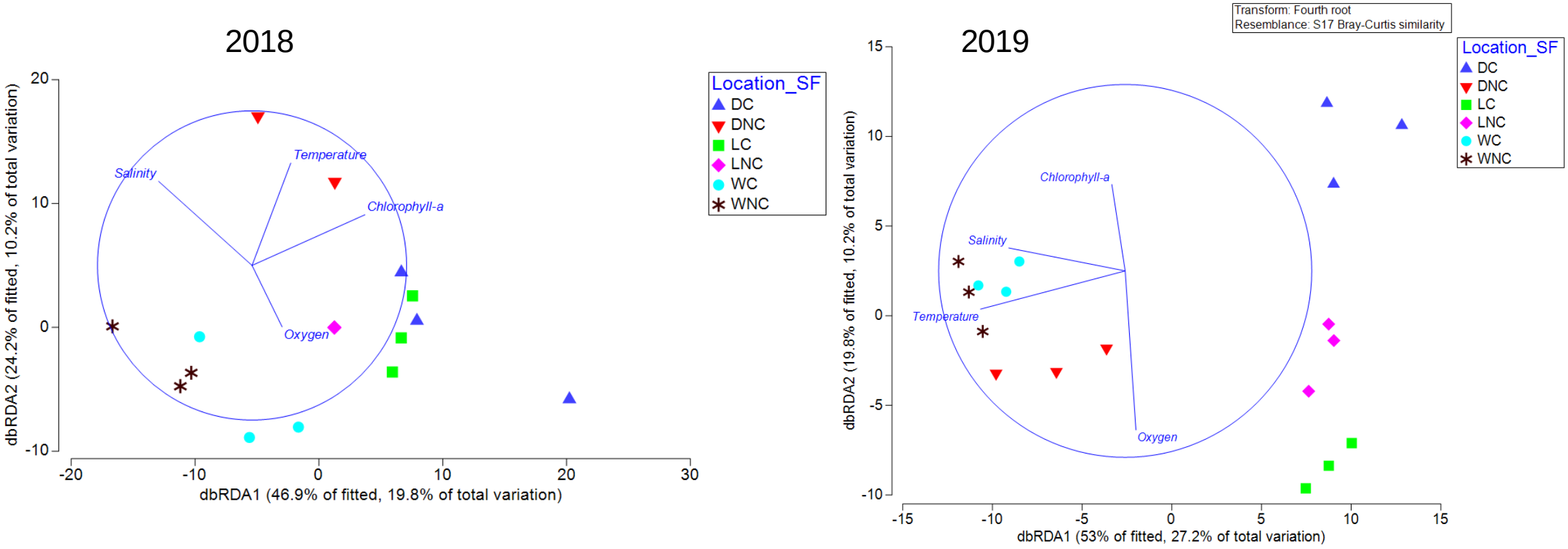
PERMANOVA
Seafloor feature: p=0.19
Site: p<0.05
Site +Seafloor feature: p<0.05

2019



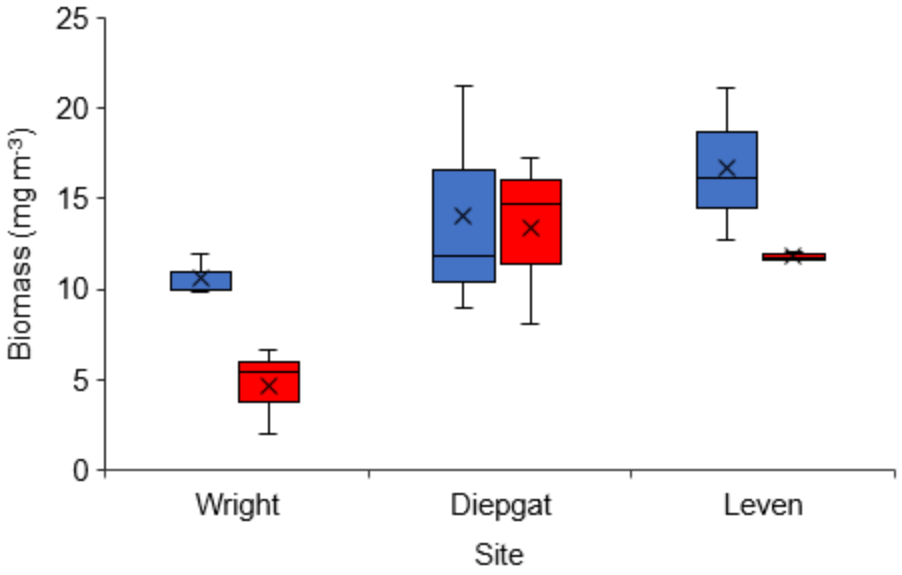
PERMANOVA
Seafloor feature: p=0.39
Site: p<0.05
Site +Seafloor feature: p<0.05

Relationship between environmental variables and abundance: 2018



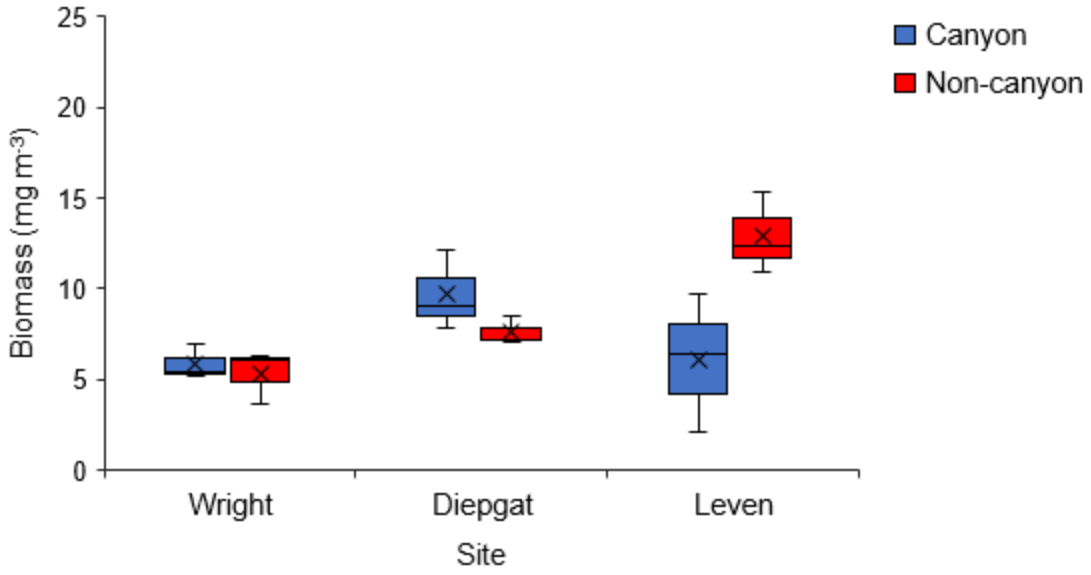
Did the biomass differ between the canyon and non-canyon sites?

2018



ANOVA
Seafloor feature: p=0.13
Site: p= 0.14
Seafloor feature + Site: p=0.48

2019



ANOVA
Seafloor feature: p=0.66
Site: p= 0.58
Seafloor feature + Site: p =0.01*

Summary

- There were no clear canyon effects on zooplankton biomass and abundance.
- The canyons have some effects on the environmental conditions.
- Patterns in abundance correlated with environmental variables.
- The dominance of small but diverse zooplankton is common in oligotrophic environments such as iSimangaliso.
- The study gives a brief insight into intricate functioning of these environments.
- Future long-term studies on zooplankton coupled with oceanography and geomorphology can help better understand the functioning of canyons in the pelagic zone.

Thank you!


UNIVERSITY OF
KWAZULU-NATAL
INYUVESI
YAKWAZULU-NATALI


ACEP


NELSON MANDELA
UNIVERSITY


NRF
National
Research
Foundation


WILDOCEANS


ICES-PICES 7th International
NEW HORIZONS
Zooplankton Production Symposium


ICES
CIEM
PICES


2021
2030
United Nations Decade
of Ocean Science
for Sustainable Development


AAPP


UNIVERSITY of
TASMANIA
IMAS