3º Ciclo de Estudos em Biologia

MONICEPH: cephalopod collection

Season 2023

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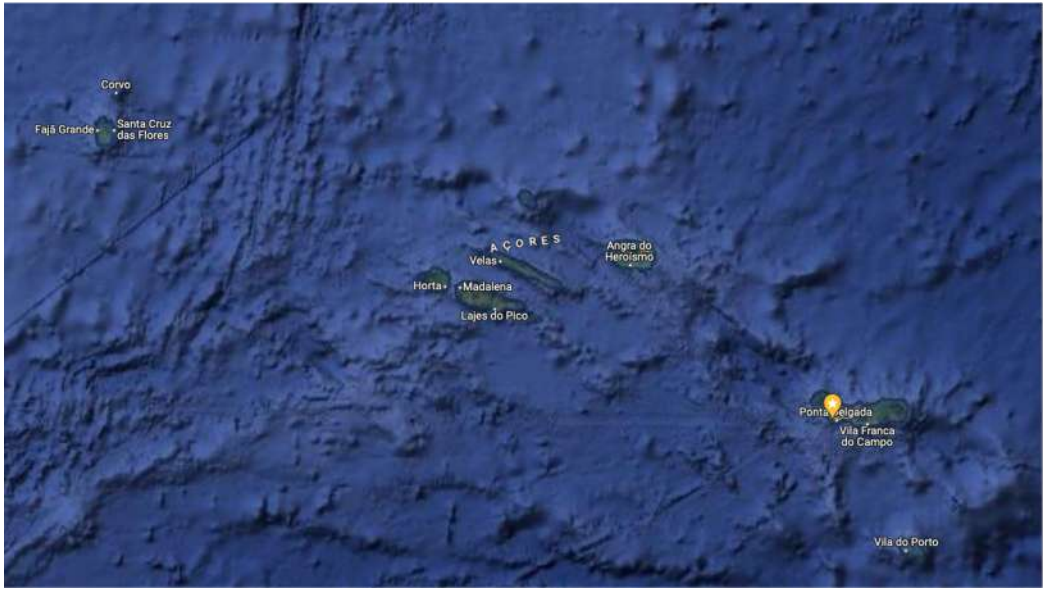
MONICEPH and the study of trophic ecology of cetaceans in the Azores

- **Introduction**
- How can you help? : Protocol



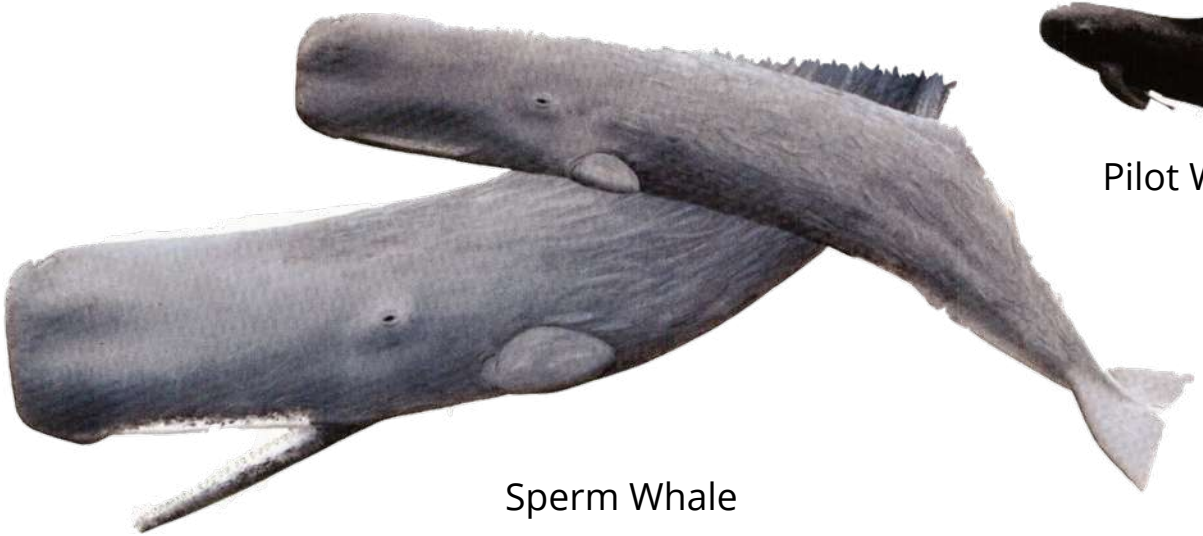
Historically, sperm whales diet study was based on **stomach content analysis**

- **Clarke (1993), The Diet of Sperm Whales off the Azores**
- During his work, Clarke reported 36 species of cephalopods, including species not previously recorded in the North Atlantic

Norberto & Helen Rose Martins in Sao Roque de Pico, 1982 / author unknown

Photo Credit: Tony Hu

The study focus on the diet and eating behavior of teuthophagous cetaceans in the Azores



Sperm Whale

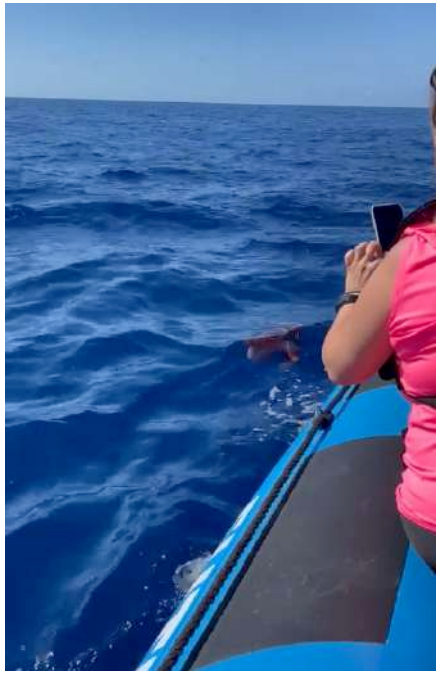
Pilot Whale

Risso's dolphin

Beaked Whale

MONICEPH: MONItoring CEPHalopod

In collaboration with whales watching companies, MONICEPH is monitoring cephalopods pieces found and cetaceans feces during touristic activities in the Azores



How did it start?

On several occasions, whale watching companies found cephalopods pieces at the surface of the water during touristic activities

Haliphron atlanticus found by Terra Azul in 2019

Haliphron atlanticus
found by Futurismo

MONICEPH is a collaborative network

- Started to collect bio-samples in 2020 in **São Miguel** and expanded **to the central group** in 2021
- Created to collect samples of **floating pieces of cephalopods** found at sea (2020), and continued with **sperm whales' feces** collection (2022)

MONICEPH

DIVEAZORES whale watching . scuba diving

SEA COLORS EXPEDITIONS

TERRA DO PICO MOSTEIROS - AZORES

AQUA AÇORES

OCEANEMOTION PT Azores Whale Watching

AZORES ADVENTURES FUTURISMO

AZORES EXPERIENCES

Whale WATCHING Peter

DIVER Norberto

PICOS·DE AVENTURA

WAzores

terraazul azores whale watching

MobyDick-Tours Whale and Dolphin Watching

The methodology based on participatory science was published in Arquipelago:

Full Article

SHORT COMUNICATION

Whale-watching contributions for the study of cetacean-cephalopod interactions

STÉPHANIE R.A. SUCIU, JASMINE ZEREBA, LORENZO FIORI AND JOSÉ M.N. AZEVEDO

Suciu, S.R.A., J. Zereba, L. Fiori and J.M.N. Azevedo 2021. Whale-watching contributions for the study of cetacean-cephalopod interactions. *Arquipelago*. Life and Marine Sciences 38: 1 – 6.

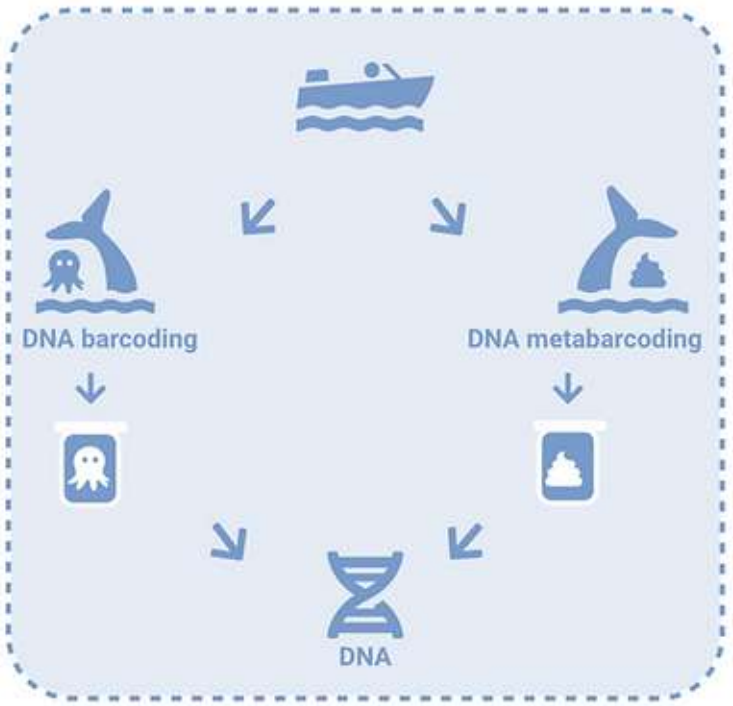
Cephalopods are the primary source of food for several species of odontocetes. The unstable nature of this trophic resource is likely to affect the ecology of their cetacean predators. This can be reflected in whale conservation status but also in the tourist activities which focus on cetacean observation. However, the study of cetacean-cephalopod interactions is limited by the complicated and heavy logistics of dedicated scientific campaigns. Fortunately, this limitation can be overcome by coupling modern molecular tools with indirect sampling methods. In this note we present the first results of a project to involve whale watching companies, which represent an intense observation effort worldwide, in the collection of biological material and information for studies of cetacean-cephalopod interactions and cephalopod distribution. In early 2020 we contacted all whale watching companies on São Miguel Island, Azores. All of them welcomed the invitation and received training and a sampling kit. Nine cephalopod tissue samples were collected, most of them in close association with sperm whales. All samples were determined by DNA barcoding (confirmed in a few cases by morphological observation) to belong to the gelatinous giant octopod *Haliphron atlanticus* (Octopoda, Alloposidae). We believe that, although the Azores may have particularly favourable conditions for participatory science, similar programs can be replicated elsewhere.

Key words: cephalopods, DNA barcoding, teuthophagous cetaceans, whale watching, participatory science

How to study deep divers cetaceans diet from the surface?

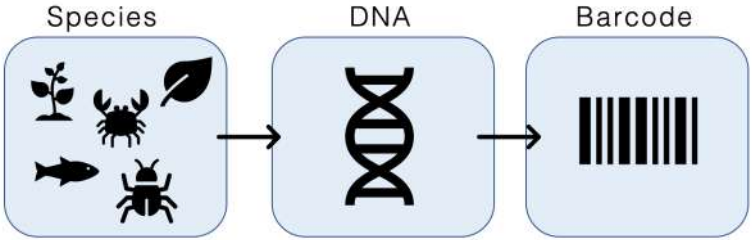
MONICEPH is currently collecting:

1. Cephalopod remains



2. Sperm whale feces

Barcoding on cephalopods remains and metabarcoding on whales' feces allow to identify cephalopods species present in the diet of the whales



DNA analysis allow to study deep-ocean ecology and cephalopod/cetacean interaction

MONICEPH and the study of trophic ecology of cetaceans in the Azores

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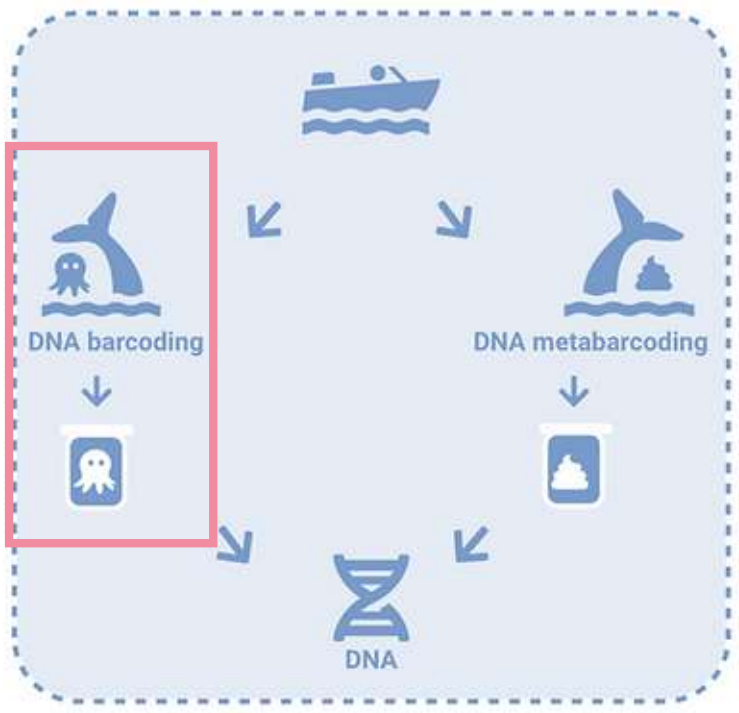
Cephalopods pieces are usually found in sperm whales area (but not only!)

Haliphron atlanticus remain on a sperm whale, Sea Colors, 2019

Collect and secure samples of cephalopods from the Azores

1. Cephalopod remains



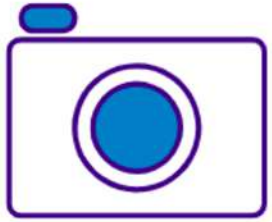
Protocol for cephalopod remains

1/ Take pictures

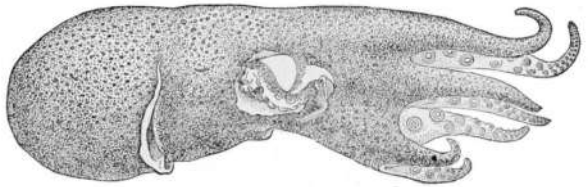
- Take several pictures, from several angles.
- Focus on distinctive features

that could help identify the animal, but also to understand which part of the animals have been found.

- Try to include an element in the picture that can be used to estimate the size of the animal.

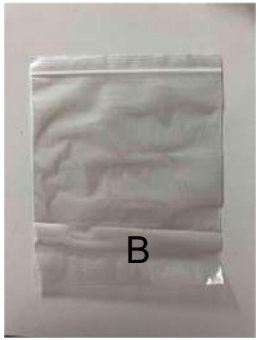


Taking pictures of cephalopod can allow to identify species, and to understand which part has been eaten



2/ Collect and store cephalopod remains of the material in the sampling kit

Pots



Ziplock for the beak (if present)

Disinfected pocket knife

Gloves to reduce contamination

Ethanol 96%

2/ Collect and store cephalopod remains of the material in the sampling kit

- **Once you caught the cephalopod remains in a bucket**, make the sampling on land (or in the boat)
  - Use **gloves** if needed to avoid intersample contamination
  - With the **pocket knife** **cut a small piece** (approx 1-2 cm3) from the animal remains
- Place the **sample in a numbered pot**, and fill it with 96% ethanol
- **Close the pot well !**
- If present, **extract the beak with its muscle** and keep it in a zip lock bag in the freezer
- After each collection, **wash the tool used with detergent**
- **Change ethanol** of the sample after 24h.

3/ Fill in the Data Form

Be as precise as possible
What did you see just before, just after finding the cephalopods:

- Species of cetaceans in the area
- Gender of the individuals
- Age category of the individual (adult, juvenile, calf)
- Number of individuals for each gender and age category
- Behavior

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Data Form

Number of sample pot
Date
Time
GPS coordinates
Name of collector
Company
Observations

4/ Contact the MONICEPH team

Place the cephalopods sample(s) in a refrigerator

Contact the project team for help and pick-up

- Stéphanie Suciu: **+351 914 892 298**

Send pictures to

- ✓ Whatsapp **+351 914 892 298**
- ✓ stephanie.ra.suciu@uac.pt

MEMO

CEPH

- Take pictures at sea and on land
- Put CEPH sample in pot with 96% alcohol and keep at RT
- If present, put BEAK (including muscle) in bag at -20°C
- Fill in DATA FORM !
- Send to+351 914 892 298 or stephanie.ra.suciu@uac.pt

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PhD advisors

- Supervisor: José Azevedo
- Co-supervisor: Jean-Luc Jung

Hosting entities

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NAL HIST
NATURELLE

Current collaborators

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Thank you!

Any questions, any doubts:
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