The distribution of zooplankton in relation to physical parameters along a transect (23ºS) off Walvis Bay.

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INTRODUCTION

- The Namibian coast covered by the cold Benguela current and forms part of the Benguela Current Large Marine Ecosystem (BCLME).

- characterized by intense upwelling of cold, nutrient-rich waters along the coast due to Ekman transport that transport shore water offshore, a divergence in response to equator ward wind stress.

- Upwelling areas are important centre’s of plankton (phytoplankton & zooplankton) production and support large biomass of mid-trophic level fish such as sardine and anchovy, as well as seabirds and marine mammals.
Zooplankton is distinguished from phytoplankton either:

- on the basis of morphology.
- mode of nutrition (autotrophic or heterotrophic).

The mean densities of zooplankton are low across the widest part of the shelf and west of 23°S, but increase towards the coastal areas of the south and east coast of Atlantic Ocean (Lebourges-Dhaussy, 2009).
Continue...

- zooplankton such as the small planktonic marine copepods (< 1 mm in length) are the most abundant metazoans in the marine water systems (Turner, 2004)

- These microscopic organisms play a key role in the pelagic food web by controlling phytoplankton production and shaping pelagic ecosystems (Harris, 1999).

- Zooplankton are food source for larval and juvenile fish, therefore their population dynamics, reproductive cycles, growth, reproduction and survival rates are all important factors that influencing recruitment of fish stocks (Harris, 1999).
Zooplankton distribution is governed by water depth, trophic status of the area and temperature regime.

Water depth separates neritic from oceanic plankton

- Neritic plankton inhabits inshore waters up to about 200m at the shelf edge.
- Oceanic zooplankton on the other hand is characterized by a general absence of meroplankton and the presence of distinct vertical migration.

- The epipelagic zone (0±200 m) and mesopelagic zones (200±1000 m) is the main domain of zooplankton (Lenz, 1992)
The aim and objectives:

- **Aim(s):**
  - To investigate distribution of major zooplankton groups in relation to physical parameters in the Walvis Bay transect (23°S) off Namibia.

- **Objectives:**
  - To determined the distribution composition, abundance, taxonomy of major crustacean zooplankton.
  - To determine how temperature, oxygen and salinity affect the distribution of zooplankton
Research hypothesis:

- Zooplankton abundance and community structure differ across the (23°S) transect.

- Temperature, salinity and oxygen affect zooplankton distribution across the 23° transect differentially.
Methodology

- **Sample collection (at sea)**

  The sampling stations are located at 2 and 5 nautical miles (nm), and then every 10 nm till 70 nm in an offshore direction on the monitoring line.

- **Zooplankton samples** were collected using the UNESCO WP-2 net (200-μm mesh), hauled vertically at an average towing speed of 0.75m s⁻¹ from 200m (or 10m from the bottom if shallower) to the surface.

- **Flow** was measured with a calibrated HydroBios digital flowmeter oriented eccentrically in the mouth opening of the net.
The depth of the net was monitored using a Scanmar acoustic depth sensor, attached to the net frame.

All samples were fixed and preserved for taxonomic analyses in 4% formaldehyde-seawater solution buffered prior with sodium tetraborate after removal of jellyfish.

In addition to zooplankton, environmental parameters (i.e. temperature, salinity and dissolved oxygen concentration) were also measured concurrently at each station with a CTD.
Materials

Figures: on left show CDT deployed and on right show zooplankton identification
Taxonomic analysis (laboratory)

- (Gibbons, M. 1997), *Introduction to the Zooplankton of the Benguela Current Region*.
- Homogenous sample in bottle by shaking, pour it in 200µm sieve to filter zooplankton.
- Using filtered sea water, to remove zooplankton from sieve into cleaned bottle.
- Filtered samples was poured into Folsom plankton sample divider and take one sample poured into a bottle cylinder.
- Sealed the bottle with a plunger sampling pipette accosting to Hensen. After inserting pipetter, homogenous samples and take 5ml.
- 5ml samples poured into the counting chamber for zooplankton, using regular microscope and record results in a form using tally mark.
Statistical analysis

- Excel, to generate graph.
- surfer
- sigma plot
- primer software, to determine the similarity analysis.
oxygen concentration is high on top layer, decreases with increasing depth.

Figure 1, show oxygen concentration
Figure 2, show temperature distribution at line 23ºS
Figure 3, show zooplankton distribution
Figure 4, show zooplankton distribution
Figure 5, show calanoida species distribution
Figure 6, show zooplankton distribution
Species distribution at different stations.

<table>
<thead>
<tr>
<th>Station</th>
<th>Species</th>
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<td>Polychaeta_larvae</td>
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DISCUSSION

- During the day oxygen is high in water bodies at top layer due to photosynthesis process.
- Oithona is the most abundance species with 193 339 at 70nm, Oncaea and the Calanoid carinatus male are the least with 70.
- Species have specific water masses for reproduction, feed, spawning.
Acknowledgements

- Department of Fisheries and Aquatic science
- NATMIRC
Reference

- Gibbons, M. (1997). *An Introduction to the Zooplankton of the Benguela Current Region*. Zoology Department, University of Western Cape, South Africa


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