Population Dynamics of Euphausiid Species of the Benguela Current off the Namibian Coast

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Purpose

Euphausiids (krill) are holoplanktonic crustaceans frequently associated with particular water masses or environments making them useful **tracers** of water movement. They play a **keystone role** in the pelagic **food web** by transferring energy in marine trophic levels.

The purpose of the research was to compare the spatial and temporal abundances of krill of the Northern Benguela Upwelling System (NBUS) (Fig. 1) with special focus on *Euphausia hanseni*, *Euphausia lucens, Nematoscelis megalops, Nyctiphanes capensis* and *Euphausia recurva.* It was to also assess the population structure of krill and to calculate different species' Trophic Levels (TL).

Research questions were as follows:

1. Are there significant differences in euphausiid abundances during Upwelling & Off-peak seasons?

2. Are there any spatial differences in euphausiid abundances at 17˚ S Kunene (KN) & 23˚ S Walvis Bay (WB) transects ?

3. Are there differences in species trophic levels?

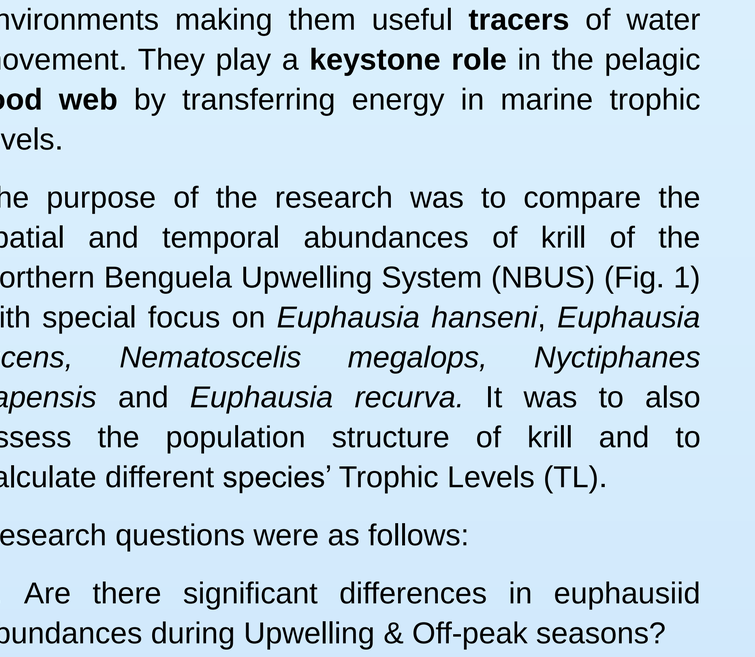

Fig. 3a: MOCNESS
(http://www.soki.aq/display/StandMeth/MOCNESS)

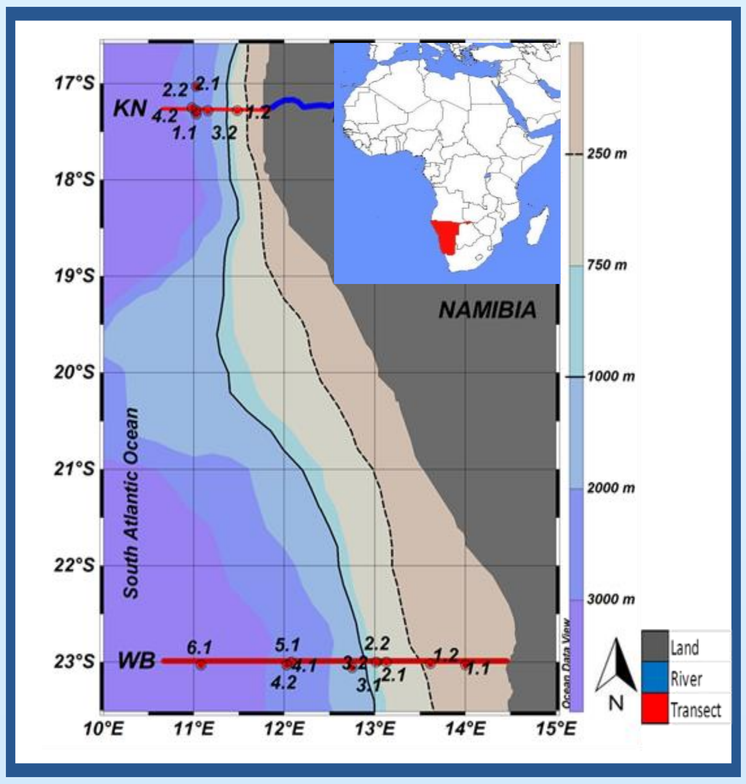

Fig.1: Map showing the sampled stations at KN and WB transects during September 2013 & January 2014 R/V Meteor cruises

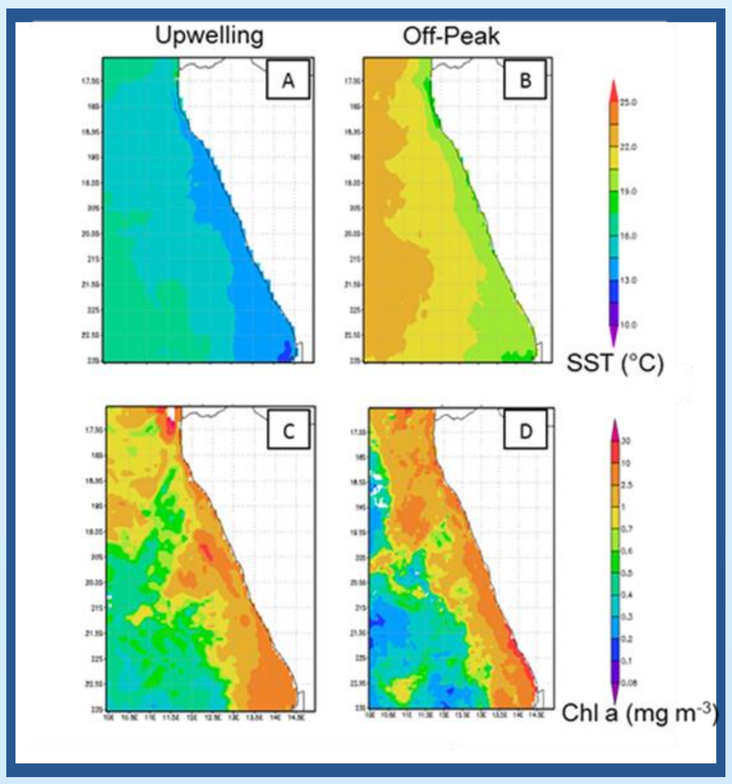

Fig. 2: Sea Surface Temperature ranges in the NBUS during the two seasons A & B. Chlorophyll a concentration in the two seasons C & D

Methods

A MOCNESS (Fig. 3a) was used to sample krill at 8 predetermined stations (ideally 4 at each transect) in each season. Upon retrieval, krill were preserved in 4% formalin and few were frozen for further stable isotope analysis. Krill (Fig. 3b) were analyzed under stereo microscope to species level.

Results

Mean Sea Surface Temperature values were lower during Upwelling compared to Off-peak season (Fig. 2A & B). Chlorophyll *a* averages showed slight differences between the two seasons (Fig. 2C & D). Off-peak season had a more krill abundance than Upwelling season while Kunene transect had more krill abundance than Walvis Bay (Fig. 4). Species length distributions showed bimodal distribution per season (Fig. 5). *E. lucens* had highest trophic level & *N. capensis* lowest (Fig. 6). *N. capensis* was found near coast, *E. hanseni & N. megalops* were found in the shelf/break waters & *E. recurva* was associated with oceanic waters (Fig. 7).

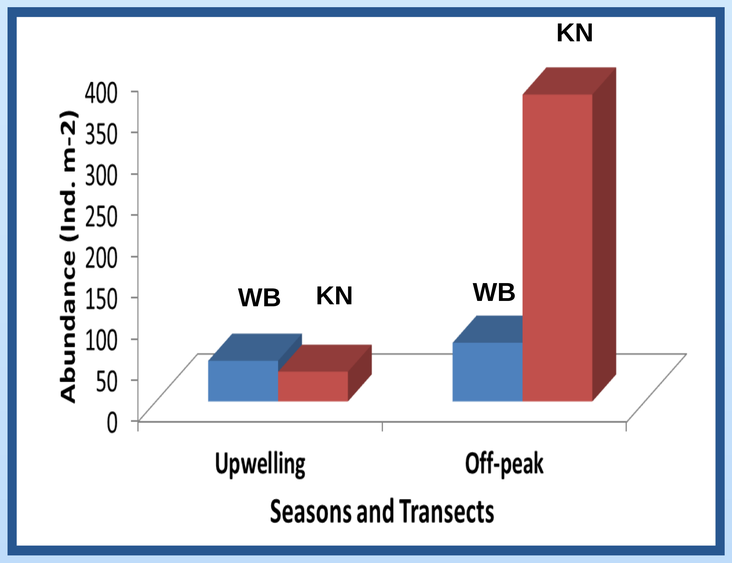

Fig. 4: Overall krill abundance

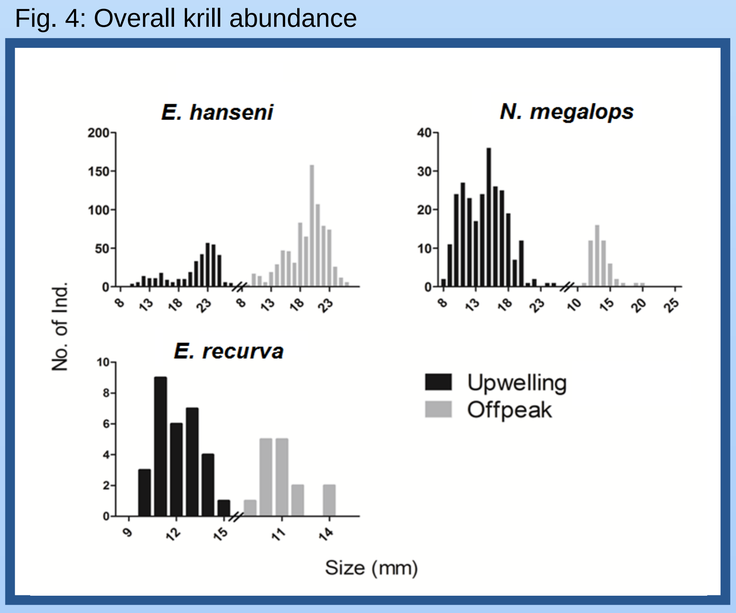

Fig. 5: Species length frequency distributions

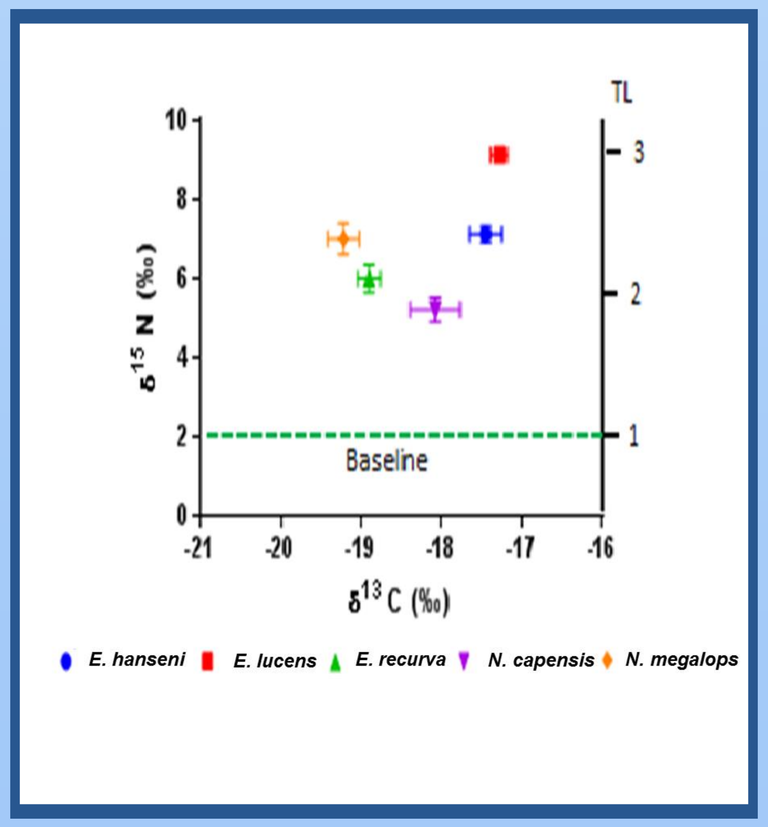

Fig. 6: Species trophic levels

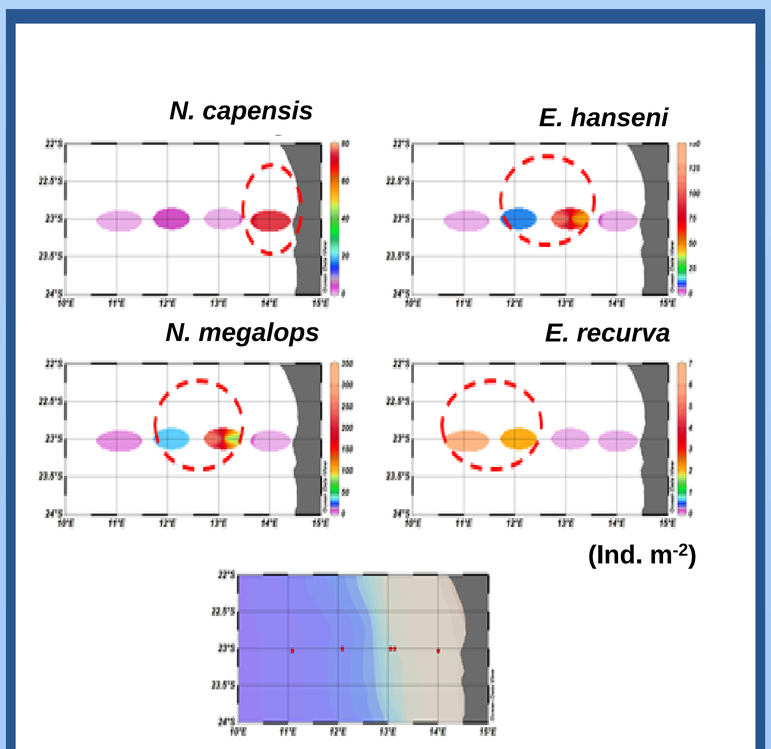

Fig. 7: Species horizontal distributions at Walvis Bay transect

Conclusion

Off-peak season had more krill abundance than Upwelling due to **uncoupling** of **environmental conditions** with krill **biological processes**.

Kunene had more krill abundance than Walvis Bay transect probably because of **intrusion of warm Angola Benguela waters** which promote maintenance of high krill populations there.

All species displayed **continuous breeding** throughout the year.

Krill occupy **trophic levels** between **2 & 3** and feed on different **carbon sources.**

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