GLOBAL CHANGE, KRILL-SALPS SHIFT, AND STOICHIOMETRY OF DISSOLVED NUTRIENTS IN THE SOUTHERN OCEAN

By M. Alcaraz¹, R. Almeda², C.M. Duarte³,⁴ and B. Horstkotte³

¹ Institut de Ciències del Mar, CSIC, Barcelona (Spain), e-mail: miquel@icm.csic.es
² Marine Sciences Institute, U. of Texas, Port Aransas (USA)
³ IMEDEA, (CSIC-UIB), Esporles (Spain)
⁴ UWA Oceans Institute, Crawley, WA (Australia)

1 The problem...
The rising temperatures, summer sea-ice retreat and whale decimation will lead to a shift in the main zooplankton grazers in the Southern Ocean and to changes in the community structure.

2 The question...
Will changes in zooplankton community structure (individual size and taxonomic composition) modify the amount of regenerated ammonia and phosphate and the C:N:P metabolic stoichiometry? (3, 4)

3 What we did
We analysed the taxonomic composition, abundance and average individual biomass (as organic C) of the zooplankton in a series of stations around the Antarctic Peninsula, and measured the C-specific respiration and NH₄⁺, N and PO₄³⁻ excretion rates of krill, salps and copepods.

4 How
Zooplankton was sampled by 200-0 m depth vertical hauls made with a double 200 µm WP-2 net with 6 L plastic bag as cod-end.

Mesozooplankton biomass as C calculated by the relationships between zoo-biovolume (ZooImage®) and organic C contents. Krill biomass was measured with a Simrad® EK60 multifrequency echosounder (6)

Metabolism was measured by temperature-controlled incubation of experimental and control (without organisms) flasks.

Respiration rates were estimated by semi-continuous analysis of O₂ concentration using OXY-10 PreSens® optodes. NH₄⁺-N and PO₄³⁻ excretion rates were estimated simultaneously to respiration by difference between their concentration in experimental and control flasks (1, 2).

5 Results
Total metabolic C requirements by zooplankton, N and P excreted by zooplankton (rates X zooplankton biomass) and metabolic N:P ratios

6 Conclusions:
• If salps substitute krill, zooplankton C-requirements will increase by a factor of 5.
• The N and P regenerated by zooplankton excretion will increase by a factor of 7 and 3 respectively.
• The N:P ratio of excretion products will double, thus changing the nutrient stoichiometry.
• These changes will modify fundamental properties of primary producers that will translate across Antarctic food webs. (7)

Bibliography
3) Alcaraz M. et al. (2013), Biogeosciences, 10, 689–697.

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