Use of stable isotope ratios to delineate coastal benthic food web structure in Adélie Land (East Antarctica)

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Context, objectives & methods

- Climate change has contrasted effects on Antarctica. West Antarctic Peninsula: T° and sea ice; East Antarctica: T° and sea ice cover.


- How will Antarctic communities respond to such environmental changes? How could increased sea ice cover impact benthic food webs?

- Use of stable isotope ratios of C and N (integrative trophic markers, “you are what you eat”) to identify resources supporting dominant benthic invertebrates (here: focus on primary consumers and omnivores)

- Use of a mixing model to quantify relative importance of 4 producers / organic matter pools: sympagic algae, suspended particulate organic matter, benthic macroalgae (Himantothallus grandifolius) and benthic biofilm (unusually abundant, heterogeneous mix of microalgae, amorphous material and detrital items)

- Interpretation of data is complicated by the lack of background data (“normal” conditions) and by physiological features of studied organisms.

Results & discussion

1) Isotopic biplot of consumers and food sources

2) Main food items according to SIAR mixing model

3) Comparison with literature data

- Main organic matter source of most consumers = sympagic algae (1, 2).

- Important differences in resource use by consumers of Adélie Land and from other locations of coastal Antarctica, including sea ice influenced sites (3).

- Trophic importance of benthic biofilm comparatively limited despite high abundance (2).

- Norkko et al. 07: benthic invertebrates consume more detrital matter in sea ice influenced locations. Our results disagree with this hypothesis (2,3).

- However, no data about dynamics of biofilm accumulation + long-lived consumers with low metabolic rates: low isotopic turnover? Is isotopic equilibrium reached?

Conclusions & perspectives

- Important sea ice cover is linked with high reliance of benthic invertebrates on sympagic algae.

- Important spatial and/or temporal discrepancies in feeding habits and benthic community response to sea ice: high trophic plasticity?

- Interpretation of data is complicated by the lack of background data (“normal” conditions) and by physiological features of studied organisms.

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References


Species

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Main food items

- Sympagic algae / Ice POM
- Benthic algae / Biofilm
- Plankton / SPOM
- Sediment POM
- Animal-based diet
- No data

Acknowledgements