Effects of climate change on Antarctic marine food webs: new evidence from squid

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**An Information Paper submitted by Portugal and the United Kingdom**

***Summary***

This paper provides scientific evidence of the effects of climate change on Southern Ocean squid. Results from analyses on squid beaks collected between 1976 and 2016 showed that the distribution of four (out of five) of the squid species changed over the last 50 years with the trophic levels of all squid species similar across decades. We highlight the need for studies on the long-term effects of climate change on Southern Ocean marine food webs and promote the development of long-term monitoring programs for Antarctic species relevant to Antarctic policy.

***Introduction***

There is a growing desire within the ATCM to discuss and identify strategic science priorities, particularly in relation to climate change (as stated in the ATCM Multi-Year Strategic Work Plan, CEP Five-year Work Plan and CEP Climate Change Response Work Programme (CCRWP); see ATCM XL (Decision 1 (2017), ATCM XLII WP21, ATCM XLII WP36), as well as increase understanding of the implications of climate change to inform management within the Antarctic Treaty area (ATCM XLII WP 1, ATCM XLII IP 129, ATCM XLII IP 136). Indeed, the impacts of climate change on Antarctica and the Southern Ocean were identified as a priority area by the ATCM intersessional contact group on future Antarctic Science challenges (ATCM XLII WP32). Such information on climate change research and monitoring is essential to improve the basis for decision making (ATCM XLII Final Report (para 48)). However, long-term research using biological data from the Southern Ocean is rare.

Here we report the long-term changes in distribution (i.e. habitat) and trophic level (i.e., where a species is positioned within the food web, related to their diet) in squid from the Southern Ocean (Abreu et al. 2020). Squid are short lived marine organisms (generally with a 1-2 year life span), occur across the Southern Ocean and are preyed upon by a wide range of top predators, thereby providing them with the capacity to respond to environmental changes.

***Long-term changes in distribution and trophic level of squid of the Southern Ocean***

Between 1976 and 2016, squid beaks from five important Southern Ocean squid species (*Taonius* *notalia*, *Gonatus antarcticus*, *Galiteuthis glacialis* and *Histioteuthis atlantica*) were collected from diet samples of wandering albatrosses. Stable isotope ratios were measure in the beaks to assess distribution (using Carbon (δ13C)) and trophic level (using Nitrogen (δ15N)). During the study period, environmental conditions changed due to increases in the strength and frequency of the Southern Annular Mode and Southern Oscillation Index. The results show that the distribution of four (out of five) of the squid species changed over the last 50 years. However, the trophic levels of all squid species did not significantly change across decades (Abreu et al. 2020).

As the majority of the studied squid species changed their habitats with changing environmental conditions over the last 50 years but maintained similar trophic levels, cephalopods are likely to remain important prey for top predators in Southern Ocean food webs, despite ongoing climate change (Abreu et al. 2020). Indeed, adult squid may move southwards with climate change, possibly impacting top predators living in Southern Ocean northern islands (Queirós et al. 2021). Overall, this advances our knowledge on the long-term effects of climate change on Southern Ocean marine food webs and emphasizes the importance of long-term monitoring programs of Antarctic populations to inform management actions.

Imagen que contiene animal, agua, perro, pequeño

Descripción generada automáticamente

Figure 1. *Galiteuthis glacialis* is a common squid in the Southern Ocean, being present in the diet of numerous predators, include in the study by Abreu *et al*. (2020).

***References***

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