

# Zooplankton community structure influences the distribution of flying seabirds off Vincennes Bay, East Antarctica

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## Introduction

In the Southern Ocean food web, flying seabirds of the Procellariiformes order feed on zooplankton such as copepods, euphausiaceans, fish, or squid, and then migrate to remote waters or continental areas within a relatively short period of time. Through this migration, procellariiforms transport vast amounts of material worldwide. Most studies of seabird distribution in the Southern Ocean have examined its relationship with large-scale hydrographic structures such as oceanic front positions; relatively few have explored its effects on the distribution of zooplankton, which are the main food items of Procellariiformes seabirds, and have instead tended to focus on Antarctic krill, *Euphausia superba*.

In the waters north of Vincennes Bay, East Antarctica, the seabird distribution pattern is virtually unknown, and Antarctic krill is less abundant. Therefore, the objective of this study was to determine seabird distribution and examine its relationship with zooplankton community structure off Vincennes Bay.

## Material and Methods

We conducted 89 visual censuses of seabirds during 19–30 January, 2014, aboard the training vessel *Umitaka-maru* (Fig. 1). Observations were conducted during 15-min periods. Cluster analysis was performed to identify seabird assemblages based on Bray–Curtis similarities.

Zooplankton was sampled at a depth of 0–200 m using a multiple opening/closing net system (IONESS) and ring net (ORI-net) at nine stations, and enumerated by taxon (expressed as individuals m<sup>-3</sup>). Copepods and euphausiaceans were identified to the species level.

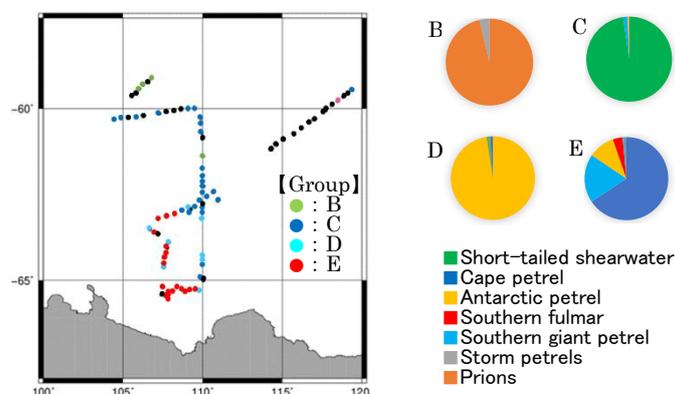
## Results

We observed a total of 17 seabird taxa from four families during the study period. Cluster analysis divided the visual census stations into four groups with 25% similarity (Fig. 1). The stations were mainly divided at 63°S, with most belonging to groups C and D/E to the north and south, respectively. Group B was distributed mainly north of 60°S. Groups C and D mainly comprised the short-tailed shearwater (*Puffinus tenuirostris*) and Antarctic petrel (*Thalassoica antarctica*), respectively, which accounted for 98% of all procellariiforms. Group E was dominated by the cape petrel (*Daption capense*), followed by the southern giant petrel (*Macronectes giganteus*) and Antarctic petrel.

Among the zooplankton community, *Calanus propinquus* and Antarctic krill were dominant north and south of 63°S, respectively.

## Discussion

The cape petrel and Antarctic petrel (groups D and E) primarily forage Antarctic krill. The results of this study suggest that the distribution of dominant seabird species is influenced by the relative abundances of Antarctic krill and copepods off Vincennes Bay, where Antarctic krill is less abundant.



**Fig. 1.** Cluster analysis of visual census stations based on seabird assemblage similarities off Vincennes Bay, East Antarctica.