

Seal-mounted cameras detect invertebrate fauna on underside of Antarctic ice shelf

Yuuki Watanabe^{1*}, Horst Bornemann², Nikolai Liebsch³, Katsufumi Sato^{1,4},
Yasuhiko Naito⁴, Nobuyuki Miyazaki¹ and Joachim Plötz²

¹Ocean Research Institute, The University of Tokyo ²Alfred-Wegener-Institut für Polar- und Meeresforschung ³Institut für Meereskunde
⁴National Institute of Polar Research *E-mail: yuuki@ori.u-tokyo.ac.jp

Introduction

While the fauna under Antarctic sea ice only a few meters thick is becoming known using modern sampling technologies such as autonomous underwater vehicles, little is known about the marine life underneath Antarctic ice shelves that are more than a hundred meters thick because of greater sampling difficulties.

A recent concept is to use marine predators as autonomous samplers for investigating marine organisms difficult to observe in their natural environment. In order to obtain images of marine organisms that were encountered by seals during their dives, we deployed a digital camera system on Weddell seals inhabiting Drescher Inlet (72.87° S, 19.43° W) surrounded by the Riiser Larsen Ice Shelf in Antarctica.



Animal-borne camera system



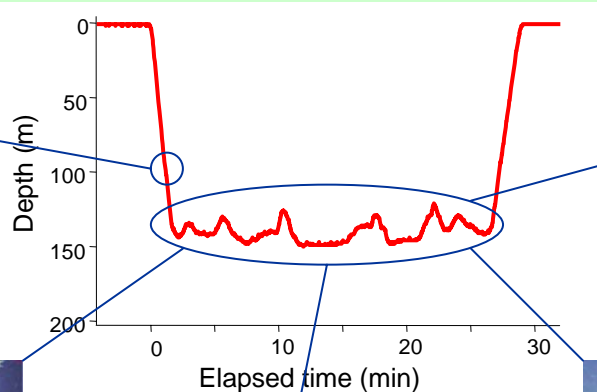
Weddell seal

- Takes still color pictures (510 × 492 pixels) with flash at 30 s intervals and stores up to 700 images.
- Provides depth data at 1 s intervals.
- Weighs 3.4 kg in air (approximately 1% of a seal's body mass) and 1.6 kg in water.
- Manufactured by Little Leonardo Co. Japan.

A seal's dive and images from its perspective



The seal descended adjacent to underwater ice cliffs. Depth, 97m.



The seal stretched its neck towards the ice presumably to capture prey. Depth, 151 m.



Invertebrates on the underside of the ice shelf, possibly cnidarians with tubular bodies ending in a crown of tentacles. Depth, 150 m.



Dense aggregation of invertebrates. Depth, 148 m.



Crustaceans, possibly isopods (*Antarcturus* sp.), hanging down from the ice shelf, with long paired antennae and what appear to be legs in filter-feeding mode. Depth, 161 m.

Conclusion

- Our images indicate that Antarctic ice shelves may serve as a substrate for a remarkable amount of invertebrate fauna. The seals regularly dived and foraged just below the ice shelf, suggesting that the area just below the ice may also be an important habitat for fishes such as *Pleuragramma antarcticum*, the predominant prey of Weddell seals at the study area.
- Gradual retreat of ice shelves punctuated by periods of rapid collapse in response to the regional atmospheric warming in the last few decades could reduce the number and diversity of animals inhabiting these icy substrates and consequently may influence the Antarctic marine ecosystem.
- The present study demonstrates that the use of marine predators as autonomous samplers provides new insights into the marine fauna otherwise inaccessible to visual observations.

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