

A new tool for monitoring the Antarctic marine ecosystem using environmental DNA

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Monitoring biological community structure and diversity is essential to understanding the impact of global climate on the Antarctic marine ecosystem. Traditional biomonitoring methods typically rely on organism sampling combined with morphological identification, which is time-consuming and requires sophisticated expertise. To elucidate the full impact of the rapidly shifting climate on the Antarctic ecosystem, efficient and effective tools are required to clarify spatiotemporal variation in biological communities. Environmental DNA (eDNA), genomic material extracted from cells and tissue shed by organisms into environmental media such as soil, sediment, and water, is a possible tool for rapidly assessing marine biodiversity and community composition. We conducted eDNA observations in January 2019 from 40°S to 65°S along the 110°E transect off Wilkes Land, East Antarctica, using the training vessel *Umitaka-maru* of Tokyo University of Marine Science and Technology (Tokyo, Japan). We collected 189 water samples from surface to deep layers, covering various water masses. The DNA-based biodiversity data generated from these samples will produce the first comprehensive analysis of metazoan genetic diversity in the Southern Ocean. This report outlines the eDNA observations and preliminary experiments, and presents a plan for future analyses.

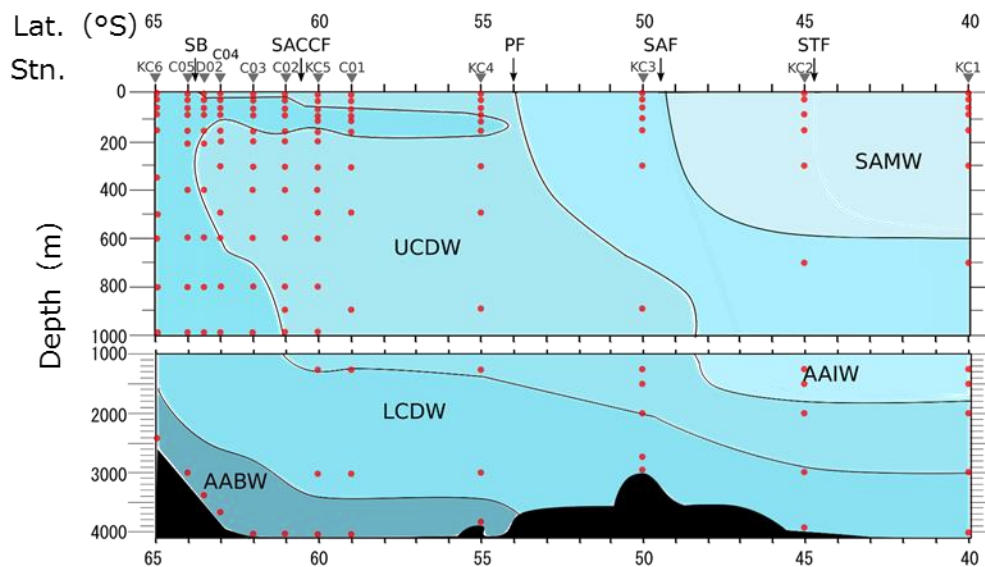


Figure 1. A schematic view of sampling stations and layers of environmental DNA (cycle) in January 2019 along the 110° E transect. The contour shows location of water mass, and the arrow shows location of identifying fronts.