

Meridional changes of zooplankton community and copepods population along 110°E transect in the Indian sector of the Southern Ocean during austral summer

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The Indian sector of the Southern Ocean is featured by oceanic fronts developed by strong ocean currents such as Antarctic Circumpolar Current (ACC). The front structure often operates high primary production and temporally local scale branches affected by hydrographic conditions. In the Southern Ocean, because of these oceanographic features, zooplankton community structure is different between north and south. Also, dominant large copepods show species-specific distribution. Various zooplankton researches have been conducted using Continuous Plankton Recorder (CPR) or NORPAC net in the Southern Ocean. However, the former collects only zooplankton in the surface layer and the latter is less quantitative for collecting macro-zooplankton. There are few researches studying both meso- and macro-zooplankton and population structure of large copepods in this area. The purpose of this study was to reveal north-south change of meso- and macro-zooplankton community structure and population structure of large copepods along 110°E transect the Indian sector of the Southern Ocean.

Zooplankton samples were collected at nine stations from 59.00 to 64.68°S on 110°E transect by an oblique tow using Ocean Research Institute (ORI) net (mouth diameter: 1.6 m, mesh size: 500 μm) from 200 m depth to the surface during January 2018. Through the sampling region, zooplankton abundance was ranged from 12.99 to 247.90 ind. m⁻³, and biomass was varied from 21.26 to 346.87 mg WM m⁻³, being dominated by large copepods, especially *Calanoides acutus*. A cluster analysis identified four zooplankton community groups at 61% similarity level (Figure 1A and B). The distribution pattern of the community groups is likely to be related to the frontal system observed in this research area (Figure 1C). The population structure of dominant species *C. acutus*, *Calanus propinquus* and *Rhincalanus gigas* had a similar tendency; early copepodite stages were abundant in northern stations while late copepodite stages dominated in southern stations. It is suggested that this meridional changes on a population structure is explained by different reproduction period in each region related to phytoplankton bloom timing. In conclusion, this study indicates that zooplankton community and population structures of copepods are associated with fronts, phytoplankton bloom and life cycle of each species in the Indian sector of the Southern Ocean during austral summer.

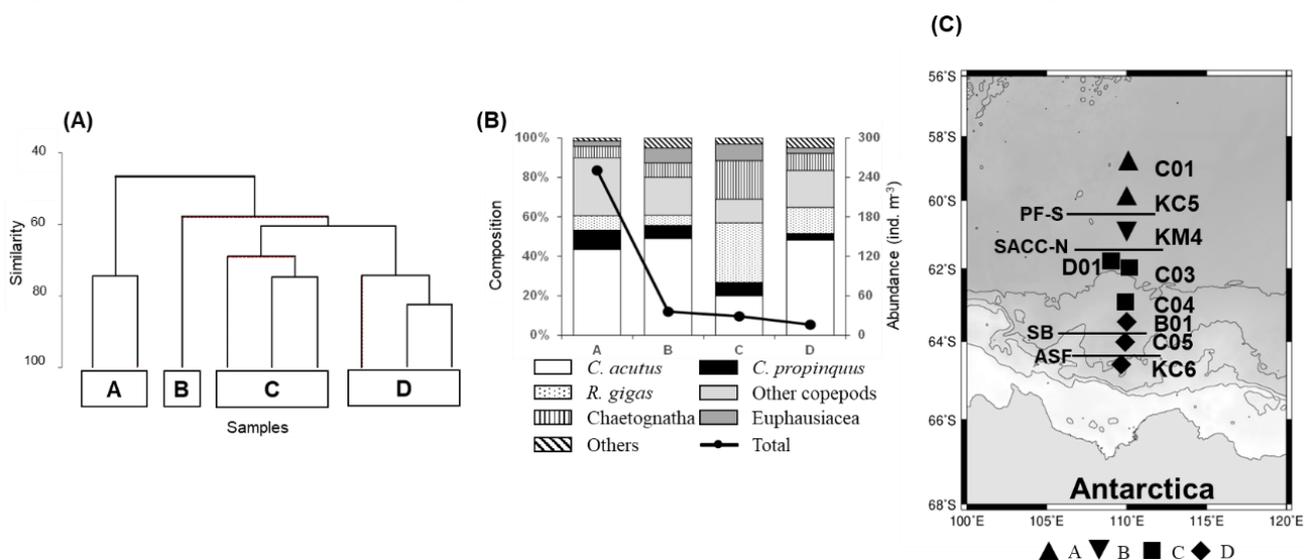


Figure 1. Results of cluster analysis based on zooplankton abundance along the 110°E in the Indian sector of the Southern Ocean during January 2018 (A). Four groups (A-D) were identified from Bray-Curtis similarity connected with UPGMA. Mean abundance and species/taxon composition of each group (B). Spatial distribution of the group in the Indian sector of the Southern Ocean during January 2018 (C). PF-S: southern branch of Polar Front, SACC-N: northern branch of Southern Antarctic Circumpolar Current front, SB: Southern Boundary, ASF: Antarctic Slope Front