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Inferring trophic variation for Antarctic krill (*Euphausia superba*) in the Antarctic Peninsula from the austral fall to early winter using stable isotope analysis

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The Antarctic krill (*Euphausia superba*) is a key species in the Southern Ocean ecosystem and an important link in the food web of the Antarctic ecosystem. The trophic information for this species during the transition from the austral fall to the winter is important to understand its poorly known overwintering mechanisms. However, the few studies on the topic differ in their results, in terms of both spatial and temporal variables. We investigated the size dependence and monthly and regional variation in $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values of adult krill in the Antarctic Peninsula, in the austral fall (April to May) and the early winter (June). We aimed to examine the trophic variations of krill occurred during this period, and the relationship between krill and their feeding environment in the Antarctic marine ecosystem. The following results were obtained: (1) no significant relationship was observed between size and the $\delta^{13}\text{C}$ value of krill, but the $\delta^{15}\text{N}$ value of krill presented a remarkable association with size, (2) the $\delta^{13}\text{C}$ values of krill increased during the austral fall, but no remarkable variation existed at the onset of winter, and the $\delta^{15}\text{N}$ values were not significant different during this period, (3) mean $\delta^{15}\text{N}$ values of krill differed significantly between the Bransfield Strait and the South Shetland Islands. Our data imply that adult krill present size-, season-, and region-dependent trophic variation during the transition from austral fall to early winter in the Antarctic Peninsula.