ICES/PICES 6ZPS 2016/

Long-term zooplankton swimmer sampling with sediment traps in northeastern Fram Strait in times of global change

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The by-collection of zooplankton swimmers in time-series sediment traps offers a unique insight into year-round and inter-annual trends in zooplankton population dynamics. These samples are especially valuable in remote and difficult to access areas such as the Arctic, where samples from the ice-covered winter season are rare. In the present study we investigate the year-round swimmer composition of sediment trap samples collected at water depths of 200-300 m over a period of 12 years (2000-2012) at the LTER (Long-Term Ecological Research) observatory HAUSGARTEN located in the northeastern Fram Strait (79° N, 4° E). Here we describe seasonal and inter-annual appearances within the dominant zooplankton groups including amphipods, chaetognaths, copepods, ostracods and pteropods. Amphipods and copepods made up the largest amount of the swimmer fraction. Although the seasonal occurrence of these groups was relatively consistent between years there were notable inter-annual variations in abundance that suggested the influence of different environmental conditions. In addition to these general patterns, specific changes were also detected. Notably, concerning pelagic amphipods, the occurrence of a southern invader *Themisto compressa* could be observed from 2004 onwards. Concurrent to this observation a reversal in dominance of the arctic pteropod species *Limacina helicina* towards the subarctic-boreal *L. retroversa* was noticed. In addition to a long-term trend in warming in eastern Fram Strait since 1997, a warm anomaly event was also observed during late 2004 to 2007. Whether these trends indicate lasting alterations due to global environmental change, or simply reflect natural variability on multiyear time-scales is presently unclear.

Keywords: Zooplankton; Fram Strait; HAUSGARTEN; Swimmer in traps; Inter-annual variability and seasonality

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