**Figure 1.** KAXIS survey region and the MIDOC sampling stations (n = 34) over the southern Kerguelen Axis. Inset panel locates region (black box) off East Antarctica. Background displays bathymetry in 1000 m intervals. Sea ice concentration is shown on February 18th 2016. The voyage track is highlighted by the solid black line. The solid purple lines show major oceanographic fronts as determined from the voyage oceanographic sampling (Bestley et al. 2020): the Southern Antarctic Circumpolar Circulation Front (SACCF), the Southern Boundary (SB) of the ACC, the Antarctic Slope Front (ASF), and the Fawn Trough Current (FTC). The dotted black lines indicate climatological locations of the major Antarctic circumpolar current (ACC) fronts (Orsi, Whitworth III and Nowlin Jr 1995).

**Figure 2.** Biomass (g m⁻³) of mesopelagic micronekton sampled with a midwater trawl (0-1000 m) across 34 MIDOC stations, between January and February 2016, separated by major taxonomic groups.

**Figure 3.** Distribution of fish biomass across the K-axis survey region. Data from 34 MIDOC sampling stations are overlaid on the mean biophysical features during the survey period: **(A)** sea surface temperature (◦C); **(B)** near-surface geostrophic velocities during the survey period (scale capped above 25 cms-1); **(C)** sea-surface chlorophyll-*a*, note that the colour bar is on a natural log scale; **(D)** ice history, the colour scale indicates time since ice melt (days) at the end of the survey (16th February). Sea ice concentration is shown on February 18th 2016. See Table 1 for details on data sources and resolution. The voyage track is highlighted in magenta. The solid black lines show major oceanographic fronts as determined from the voyage oceanographic sampling (Bestley et al. 2020): the Southern Antarctic Circumpolar Circulation Front (SACCF), the Southern Boundary (SB) of the ACC, the Antarctic Slope Front (ASF), and the Fawn Trough Current (FTC). The dotted black lines indicate climatological locations of the major Antarctic circumpolar current (ACC) fronts (Orsi et al., 1995).