A long-term time series of microplastics: an investigation into ingestion of microplastics by the Antarctic cushion star *Odontaster validus*.

Plastic remnants are a serious environmental contaminant, that may impact organisms across all trophic levels globally. Long term investigations into the proportion of plastic entering ecosystems are difficult, in part due to the relatively new discovery of the impact plastics have, and because of the complex nature of interactions between coastal ecosystems and generally dense placement of human settlements. Samples of pyloric caeca of the Antarctic seastar *Odontaster validus* were collected next to Rothera Research Station, Adelaide Island (67.57, -68.12) over a 23-year period and processed to quantify microplastic loading. Plastic particles were quantified and categorised using UV microscopy and Laser Direct Infra-Red (LDIR) techniques, respectively. Peak plastic density (376.7 ±73.4 SD particles/g of tissue) was observed after a fire in the station's Bonner Laboratory in 2001, whereas the lowest plastic level (11.8 ±73.4 SD particles/g of tissue) coincided with the implementation of new waste management strategies in 2019. A relationship between plastic density and pyloric caeca weight ($f(2,294) = 143.8$, adjusted $r^2 = 0.49$, $p < 0.05$) suggests that plastic uptake changes based on physiological factors, which should be considered when measuring species-wide plastics uptake. Ecological factors also impacted these data, such as a relationship between plastic density and ice scour ($f(2,238 = 4.7$, adjusted $r2 = 0.03$, $p < 0.05$). These data show the complexity of the microplastics problem even when studying the relationships between plastics and people in an isolated locale, while affirming ideas that sustainability efforts can lessen the flow of plastic pollutants into the ecosystem.