Biodiversity is one of the most valuable assets of our planet. It needs to be urgently documented and protected, especially as it is under increased threat from climate change and human impact. One such area that is under threat is southern-eastern Australia, a sensitive environment where temperature anomalies ('heatwaves') are especially intense and are dangerous even for ecosystems located in the deeper parts of the ocean.

The SE Australian marine habitat is described as a global biodiversity 'hot-spot", with species richness in this region being particularly high and unique. Despite many studies have documented the large variation observed in different organisms, there are still many groups, mostly small invertebrates, whose diversity is unknown.

One of the hypotheses that have been posed to explain such high diversity levels takes into account the relationship between diversity and the amount of food resources - understood as the amount of particulate organic carbon (POM). Oxygen depletion (hypoxia) has been suggested to restrict diversity, but some scientists consider that, on the contrary, low oxygen levels can break genetic connectivity between populations and trigger allopatric speciation.

The main aim of this project is to assess the diversity of small marine crustaceans, namely Tanaidacea and asellote Isopoda, from shelf, continental slope and abyssal habitats of eastern and south-eastern Australia (Fig. 1). The diversity assessment will be done from a wide depth range (0–4000 m) and large latitudinal gradient (43°S–23°S). An extensive collection of over 80,000 specimens will be studied using various methods to explore their morphology, ecology and phylogenetic relationships. This unique dataset will allow us to uncover the biodiversity patterns and scale along a 3-dimensional space, correlating biological variables with environmental data on particulate organic carbon, temperature and oxygen levels.

Fig 1. Examples of the diversity of asellote Isopoda (two left) and Tanaidacea (three right) from SE Australia.