Because Arctic organisms are adapted to extreme environmental conditions with strong seasonal forcing, the accelerating rate of recent climate change challenges the resilience of Arctic life. In 1999, the multidisciplinary deep-sea long-term observatory HAUSGARTEN was established by the Alfred Wegener Institute for Polar and Marine Research (AWI) to study the development of an Arctic deep-sea ecosystem under global change.

HAUSGARTEN observatory is located about 150 km west of Svalbard (79°N, 4°E) in Fram Strait, the only deep-water connection between the northern North-Atlantic and the central Arctic Ocean and thus, one of the most sensitive areas with regard to climate change in the North. The observatory, representing one of the key sites within the EU funded Network of Excellence ESONET (European Seas Observatory NETwork), consists out of 15 sampling sites along a depth transect between 1000 – 5500 m water depth, and along a latitudinal transect following the 2500 m isobaths. The unique long-term record assessed at HAUSGARTEN is one of the best data sets available to study marine Arctic deep-sea ecosystem dynamics. Sampling sites are revisited yearly to analyze variations in biological, geochemical, and sedimentological parameters. The use of autonomous systems and moorings anchored at the seafloor was initiated to assess seasonal variability. The development of benthic assemblages on larger scales is tracked via repeated seafloor imagery. Two sites at 2500 m depth were chosen for biological long-term experiments to study causes and effects of physical and biogeochemical gradients on deep-sea biodiversity in a seasonally ice covered area.
One of the key elements of our work at HAUSGARTEN is our multidisciplinary approach. Measurements and sampling campaigns comprise the water column, the benthic boundary layer, and the sediment-water interface. Benthic communities are investigated over the entire size spectra from bacteria up to macro- and megafauna. Our studies, supported by extensive use of working class Remotely Operated Vehicles, show remarkable changes in Arctic key variables. The decrease of sea-ice extent and sea-ice thickness in the past decade is accompanied by decreasing food availability and microbial biomass over almost the entire depth transect. On the other hand a constant temperature increase in the bottom water at 2500 m depth has been measured since the beginning of our studies. Recent observations exhibited rapid changes in megafauna abundances along video transects at mid-slope depths. Further research is needed to confirm whether we observe rapid change or pronounced natural variability.