The Antarctic is one of the few regions on the planet that is still considered a pristine area, therefore especially important are activities aimed at protecting this unique part of the world. The latest research indicates possible contamination of the Antarctic environment by anthropogenic pollutants, including heavy metals, which relatively high concentrations were measured in organisms at various trophic levels of the marine food web. Of the many pollutants present in the Antarctic, mercury (Hg) is considered to be particularly dangerous. This is due to the specific properties of this metal: volatility, persistence and high toxicity, mainly its organic forms. Particularly sensitive to mercury pollution and its compounds is the aquatic environment, where this metal accumulates and biomagnifies in the trophic chain. In contrast to the Arctic, where Hg concentrations in marine organisms are relatively well recognized, Hg transformations in the Antarctic are poorly studied. Mercury in the Antarctic comes from both natural (eruptions of volcanoes, rocks weathering) and anthropogenic (long-distance atmospheric Hg transport) sources. Despite the low Hg concentration in abiotic samples (water, sediments), the concentration of this metal in birds and mammals reaches relatively high values, compared to organisms occurring in other, more polluted areas. This may suggest the presence of an additional mercury source in this region. The project authors hypothesize that melting glaciers are an important secondary source of mercury in the Antarctic coast zone, which can be potentially dangerous to organisms in this region. The aim of the research is to identify mercury sources in Antarctica and determine their potential for accumulation and biomagnification in the marine trophic chain.

Environmental research was conducted in the Admiralty Bay during a two-month scientific expedition (December 2018-January 2019). As part of the research, terrestrial samples (water and suspension from a melting glacier, soil, mosses, lichens, vascular plants and excrements) and marine samples (water, sediment, plankton, suspension, phyto- and zoobenthos) were collected. Both on land and in the sea, samples were taken at different distances from the glacier. A total of 1,500 samples were taken from 10 terrestrial stations and from 15 marine stations. In these samples, the concentration of total mercury and methylmercury will be determined. In addition, in selected samples, selenium concentration, as well as isotopic analysis of mercury, carbon and nitrogen, will be performed.

Terrestrial samples will enable identification of the main mercury sources in the coastal zone of the Admiralty Bay and determination of the form in which mercury is introduced from these sources into the sea. Whereas, marine samples will be used to determine the potential for the accumulation and biomagnification of mercury introduced by selected sources and factors (a type of organism, its size and trophic level) controlling these processes. The planned research will be the first such detailed study on mercury in selected species of Antarctic organisms and will fill the gap in information on the transformation of Hg in this region. They will also help determine if mercury entering the sea due to melting glaciers may be a danger for organisms located nearby. This aspect is particularly important in the global warming era, which effects are most noticeable in the polar regions.