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Conference Abstract

Bulgarian LTER site in Antarctica: review on more than 30 years of research and monitoring life forms on Livingston Island

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Abstract

The Bulgarian Long-Term Ecological Research (LTER) site in Antarctica is located at the Bulgarian Antarctic Base St. Kliment Ohridski Base on Livingston Island, South Shetland Islands. In the context of rapid climate and environmental changes, Bulgarian scientists have conducted long-term research on the biodiversity and ecological conditions of Livingston Island.

Following the establishment of the Bulgarian Antarctic Base on Livingston Island in 1993, investigations into polar ecosystems and their adaptation mechanisms in harsh environments began. Over the past 30 years, the research infrastructure has developed significantly, and the area of scientific research and sampling locations has expanded and become more accessible. Now facilitated with modern on-site laboratories, scientific equipment installed at the base and on board of the Bulgarian research vessel NIK 421 St. st. Cyril and Methodius, this LTER site provides unique opportunities to study the structure and function of the polar biota and understand how a shifting climate will alter the Antarctic ecosystems.

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Research on soils around the Bulgarian Antarctic Base have revealed a diverse community of free-living nematode species and described several species new to science, such as *Mesodorylaimus chipevi*. Diatoms communities on Livingston Island thrive in diverse marine, freshwater, and terrestrial habitats like moss-inhabiting communities and pools, including specialized endemic or rare taxa in low-salinity coastal rock pools near penguin rookeries, such as *Halamphora moncheviana*. Researches have also focus on the biodiversity and adaptation of micro-crustaceans, as significant ecosystem members of the South Shetland Islands. Lichens are growing abundantly around on Livingston Island, where they help form local polar soils (Cryosols) alongside mosses and Antarctic hair grass (*Deschampsia antarctica*), which is thriving due to regional warming trends. Bulgarian scientists and also international teams are continuously studying the terrestrial resilient ecosystems to monitor climate change impacts. Diverse cold-adapted microorganisms, including dominant bacterial groups (Oxyphotobacteria, Bacteroidia, Gammaproteobacteria) are present in soil and waters ecosystems around the Bulgarian Antarctic Base, alongside cold-tolerant fungal genera (Betamyces, Tetracladium). Research on composition of soils has detected trace amounts of potentially toxic elements and heavy metals, largely reflecting local geogenic backgrounds with minor points of human footprint. More recently studies were expanded to include also marine macroinvertebrates and fish (Nototheniidae, Channichthyidae) from South Bay (Livingston Is.).

The specific location of LTER site Livingston Island makes it unique for continuous monitoring of the environmental components, as the area of Maritime Antarctica experiences the most significant and visible changes in biodiversity and ecosystem functioning. Systematic, long-term observations within the Bulgarian LTER site can therefore provide a holistic framework for understanding the ecosystem response to environmental change, trends and interactions between climate, biodiversity, ecosystem processes, and human pressures.

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Conflicts of interest

The authors have declared that no competing interests exist.