

| MEMBER COUNTRY: POLAND | | | | | | |
|----------------------------------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-------------------|-----------------------|------------------|
| National Report to SCAR for year 2023 | | | | | | |
| Activity | Contact Name | Address | Telephone | Fax | Email | web site |
| National SCAR Committee | | | | | | |
| President | Piotr Głowacki | Institute of Geophysics, Polish Academy of Sciences, Księcia Janusza 64, 01-452 Warszawa, Poland | (48 22) 691 56 87 | (48 22) 691 59 15 | glowacki@igf.edu.pl | www.kbp.pan.pl |
| SCAR Delegates | | | | | | |
| Delegate | Robert Bialik | Institute of Biochemistry and Biophysics, Polish Academy of Sciences, Department of Antarctic Biology, Pawinskiego 5a, 02-106 Warszawa, Poland | (48 22) 659 57 93 | (48 22) 592 21 90 | rbialik@ibb.waw.pl | www.arctowski.aq |
| Alternate Delegate | Wojciech Majewski | Institute of Paleobiology, Polish Academy of Sciences, Twarda 51/55, 00-818 Warszawa, Poland | (48 22) 697 88 53 | (48 22) 620 62 25 | wmaj@twarda.pan.pl | www.paleo.pan.pl |
| Standing Scientific Groups | | | | | | |
| Life Sciences | | | | | | |
| | Robert Bialik | Institute of Biochemistry and Biophysics, Polish Academy of Sciences, Department of Antarctic Biology, Pawinskiego 5a, 02-106 Warszawa, Poland | (48 22) 659 57 93 | (48 22) 592 21 90 | rbialik@ibb.waw.pl | www.arctowski.aq |
| | Katarzyna Chwedorzewska | Warsaw University of Life Sciences, Faculty of Agriculture and Biology, Nowoursynowska 166, 02-787 Warszawa, Poland | (48) 785 600 553 | | kchwedorzewska@go2.pl | |
| | Piotr Kukliński | Institute of Oceanology, Polish Academy of Sciences, Powstańców Warszawy 55, 81-967 Sopot, Poland | (48 58) 731 17 96 | (48 58) 551 21 30 | kuki@iopan.pl | www.iopan.gda.pl |
| | Maria Olech | Jagiellonian University, Department of Polar Studies and Documentation, Institute of Botany, Kopernika 27, 31-501 Kraków, Poland | (48 12) 421 02 77 ext. 26 | (48 12) 423 09 49 | olech@ib.uj.edu.pl | www.ib.uj.edu.pl |

| | | | | | | |
|-------------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------|---------------------------|-----------------------|
| Geosciences | | | | | | |
| | Monika A. Kusiak | Institute of Geophysics, Polish Academy of Sciences, Księcia Janusza 64, 01-452 Warszawa, Poland | (48 22) 691 57 49 | (48 22) 691 59 15 | monika.kusiak@igf.edu.pl | www.igf.edu.pl |
| | Marek Lewandowski | Institute of Geophysics, Polish Academy of Sciences, Księcia Janusza 64, 01-452 Warszawa, Poland | (48 22) 691 57 64 | (48 22) 691 59 15 | lemar@igf.edu.pl | www.igf.edu.pl |
| | Wojciech Majewski | Institute of Paleobiology, Polish Academy of Sciences, Twarda 51/55, 00-818 Warszawa, Poland | (48 22) 697 88 53 | (48 22) 620 62 25 | wmaj@twarda.pan.pl | www.paleo.pan.pl |
| Physical Sciences | | | | | | |
| | Adam Nawrot | Institute of Geophysics, Polish Academy of Sciences, Księcia Janusza 64, 01-452 Warszawa, Poland | (48 22) 691 58 43 | (48 22) 691 59 15 | anawrot@igf.edu.pl | www.igf.edu.pl |
| | Michał Pętlicki | Institute of Geography and Spatial Management - Jagiellonian University in Krakow, Gronostajowa 7, 30-387 Kraków, Poland | (48 12) 664 52 82 | (48 12) 664 53 85 | michal.petlicki@uj.edu.pl | https://geo.uj.edu.pl |
| | Grzegorz Rachlewicz | Adam Mickiewicz University in Poznań, Institute of Geoecology and Geoinformation, Krygowskiego 10, 61-680 Poznań, Poland | (48 61) 829 61 83 | (48 61) 829 62 71 | grzera@amu.edu.pl | polar.amu.edu.pl |
| Scientific Research Programs | | | | | | |
| Ant-ICON | | | | | | |
| | Małgorzata Korczak-Abshire | Institute of Biochemistry and Biophysics, Polish Academy of Sciences, Department of Antarctic Biology, Pawinskiego 5a, 02-106 Warszawa, Poland | (48 22) 659 57 94 | (48 22) 592 21 90 | mka@ibb.waw.pl | www.arctowski.aq |
| | Adam Nawrot | Institute of Geophysics, Polish Academy of Sciences, Księcia Janusza 64, 01-452 Warszawa, Poland | (48 22) 691 58 43 | (48 22) 691 59 15 | anawrot@igf.edu.pl | www.igf.edu.pl |

| | | | | | | |
|---------------------------------------------------------------------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------|----------------------------|------------------|
| | Piotr Androsiuk | Faculty of Biology and Biotechnology, University of Warmia and Mazury, ul. Michała Oczapowskiego 1A, 10-719 Olsztyn, Poland | (48 89) 523 44 29 | | piotr.androsiuk@uwm.edu.pl | wbib.uwm.edu.pl |
| INSTANT | | | | | | |
| | Grzegorz Rachlewicz | Adam Mickiewicz University in Poznań, Institute of Geoecology and Geoinformation, Krygowskiego 10, 61- 680 Poznań, Poland | (48 61) 829 61 83 | (48 61) 829 62 71 | grzera@amu.edu.pl | polar.amu.edu.pl |
| | Wojciech Majewski | Institute of Paleobiology, Polish Academy of Sciences, Twarda 51/55, 00-818 Warszawa, Poland | (48 22) 697 88 53 | (48 22) 620 62 25 | wmaj@twarda.pan.pl | www.paleo.pan.pl |
| AntClimNow | | | | | | |
| EXPERT GROUPS | | | | | | |
| ANTOS | Adam Nawrot | Institute of Geophysics, Polish Academy of Sciences, Księcia Janusza 64, 01-452 Warszawa, Poland | (48 22) 691 58 43 | (48 22) 691 59 15 | anawrot@igf.edu.pl | www.igf.edu.pl |
| Birds and Marine Mammals (EG-BAMM) | Robert Bialik | Institute of Biochemistry and Biophysics, Polish Academy of Sciences, Department of Antarctic Biology, Pawinskiego 5a, 02-106 Warszawa, Poland | (48 22) 659 57 93 | (48 22) 592 21 90 | rbialik@ibb.waw.pl | www.arctowski.aq |
| Input pathways of persistent organic pollutants to Antarctica (ImPACT) | Żaneta Polkowska | Faculty of Chemistry, Gdańsk University of Technology, Narutowicza 11/12, 80-233 Gdańsk, Poland | (48 58) 347 21 10 | (48 58) 347 26 94 | zanpolko@pg.edu.pl | chem.pg.edu.pl |
| | Małgorzata Szopińska | Faculty of Civil and Environmental Engineering, Gdańsk University of Technology, Narutowicza 11/12, 80- 233 Gdańsk, Poland | (48 58) 347 27 43 | (48 58) 347 20 44 | malszopi@pg.edu.pl | wilis.pg.edu.pl |

| | | | | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-------------------|--------------------------------------|-----------------------------------|
| Geological heritage and Geoconservation | Robert Bialik | Institute of Biochemistry and Biophysics, Polish Academy of Sciences, Department of Antarctic Biology, Pawinskiego 5a, 02-106 Warszawa, Poland | (48 22) 659 57 93 | (48 22) 592 21 90 | rbialik@ibb.waw.pl | www.ibb.waw.pl |
| Standing Committee on Antarctic Geographic Information (SCAGI) | Robert Bialik | Institute of Biochemistry and Biophysics, Polish Academy of Sciences, Department of Antarctic Biology, Pawinskiego 5a, 02-106 Warszawa, Poland | (48 22) 659 57 93 | (48 22) 592 21 90 | rbialik@ibb.waw.pl | www.ibb.waw.pl |
| Remote Sensing Group | Małgorzata Korczak-Abshire | Institute of Biochemistry and Biophysics, Polish Academy of Sciences, Department of Antarctic Biology, Pawinskiego 5a, 02-106 Warszawa, Poland | (48 22) 659 57 94 | (48 22) 592 21 90 | mka@ibb.waw.pl | www.arctowski.aq |
| SOOS | Piotr Kukliński | Institute of Oceanology, Polish Academy of Sciences, Powstańców Warszawy 55, 81-967 Sopot, Poland | (48 58) 731 17 96 | (48 58) 551 21 30 | kuki@iopan.pl | www.iopan.gda.pl |
| SCADM | | | | | | |
| | Katarzyna Chwedorzewska | Warsaw University of Life Sciences, Faculty of Agriculture and Biology, Nowoursynowska 166, 02-787 Warszawa, Poland | (48) 785 600 553 | | kchwedorzewska@go2.pl | |
| NATIONAL ANTARCTIC DATA CENTRE | | | | | | |
| Institute of Biochemistry and Biophysics, Polish Academy of Sciences, Department of Antarctic Biology, Pawinskiego 5a, 02-106 Warszawa, Poland | | | (48 22) 846 33 83 | (48 42) 846 19 12 | secretariate@ibb.waw.pl | www. ibb.waw.pl |
| Department of Polar Studies and Documentation, Institute of Botany, Jagiellonian University, Kopernika 27, 31-501 Kraków, Poland | | | (48 12) 421 02 77 ext. 26 | (48 12) 423 09 49 | olech@ib.uj.edu.pl | www.ib.uj.edu.pl |
| SCAR-MarBIN (RAMS editors) | | | | | | |
| | Magdalena Błażewicz | University of Łódź, Department of Invertebrate Zoology & Hydrobiology, Banacha 12/16, 90-237 Łódź, Poland | (48 42) 635 42 97 | (48 42) 635 44 40 | magdalena.blazewicz@biol.uni.lodz.pl | www.invertebrates.uni.lodz.pl/en/ |
| | Katarzyna Błachowiak-Samołyk | Institute of Oceanology, Polish Academy of Sciences, Powstańców Warszawy 55, 81-967 Sopot, Poland | (48 58) 731 17 77 | (48 58) 551 21 30 | kasiab@iopan.gda.pl | www.iopan.gda.pl |

| | | | | | | |
|--------------------------------------------------|-----------------|---------------------------------------------------------------------------------------------------|-------------------|-------------------|------------------------|------------------|
| | Piotr Kukliński | Institute of Oceanology, Polish Academy of Sciences, Powstańców Warszawy 55, 81-967 Sopot, Poland | (48 58) 731 17 96 | (48 58) 551 21 30 | kuki@iopan.pl | www.iopan.gda.pl |
| | Anna Rocka | Institute of Parasitology, Polish Academy of Sciences, Twarda 51/55, 00-818 Warszawa, Poland | (48 22) 751 17 14 | (48 22) 620 62 27 | abroczy@poczta.onet.pl | www.ipar.pan.pl |
| A BRIEF SUMMARY OF SCIENTIFIC HIGHLIGHTS: | | | | | | |
| <i>See the following pages</i> | | | | | | |

Revitalization of the *A. B. Dobrowolski* Polish Antarctic Station, Bunger Hills, East Antarctica

Members of the 4th Polish Antarctic Research Expedition to Bunger Hills, including Marek Lewandowski (leader), Monika A. Kusiak, Adam Nawrot and Wojciech Miloch, joined the 67th Russian Antarctic Expedition for the 2021/2022 summer season to the Bunger Hills in East Antarctica. The Polish group visited Dobrowolski Station, that was not operational since 1979, to conduct a reconnaissance geoscience program, including environmental studies, geological field surveys at multiple locations, and seismological, magnetic, meteorological and ionospheric measurements at the Station. The huts were repaired and new equipment was installed inside. The Station remained clean and in good condition, ready to serve as a summer base for future expeditions. Future plans include the installation of an automatic and autonomous magnetometer, seismometer and weather station, and the continuation of research programs in geomorphology, geology and environmental studies. Details of the Polish expedition's activities at Dobrowolski Station were presented at the SCAR conference in India (2022). See <https://dobrowolski.igf.edu.pl/> for more details.



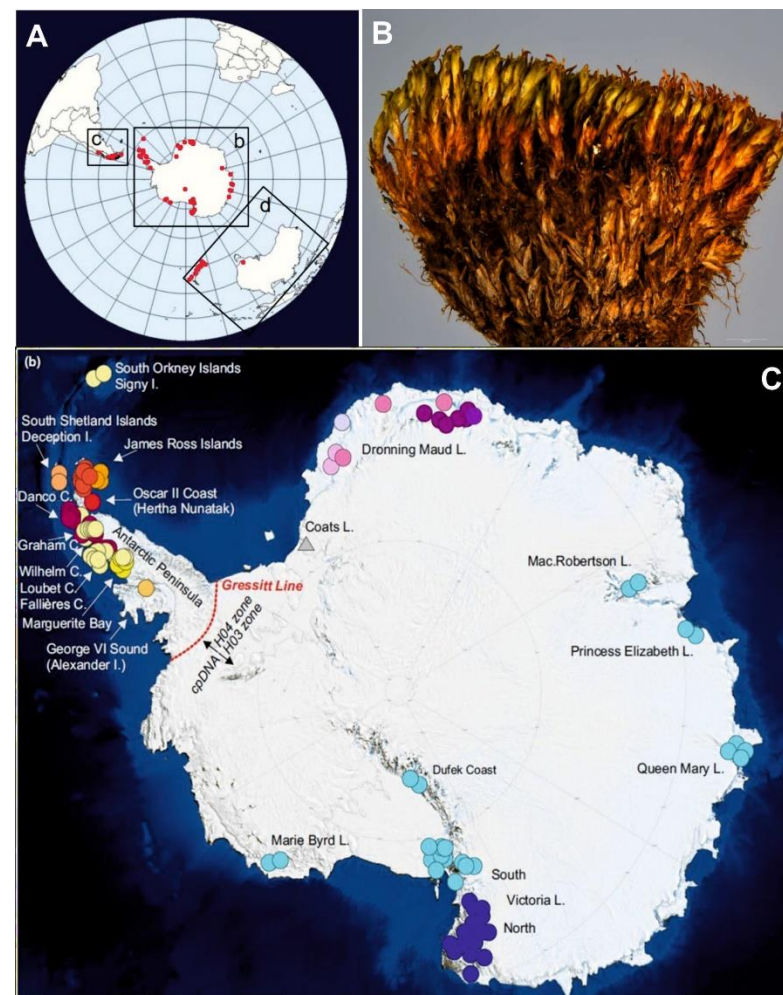
A. B. Dobrowolski Polish Antarctic Station in Bunger Hills, East Antarctica on January 2022. Photo by Adam Nawrot.

Saluga M., Ochyra R. & Ronikier M. 2022. Phylogeographical breaks and limited connectivity among multiple refugia in a pan-Antarctic moss species. *Journal of Biogeography* 49: 1991-2004.

The historical biogeography of the Antarctic terrestrial flora remains poorly explored and understood. Long-term *in situ* persistence of mosses was demonstrated but the phylogeographic patterns and processes that shaped their present-day distribution are still largely unknown.

We addressed, using phylogenetic and phylogeographic tools, the biogeography, origin and approximate age of *Syntrichia sarconeurum*, one of the most widespread but scattered Antarctic endemic moss species. Its phylogeographical structure revealed a long-term survival and limited connectivity of different regions within the Antarctic. The species has survived several Quaternary glacial periods in multiple refugia (since about 1.36 Ma), not only in the peripheral areas of the maritime Antarctic but also within the Antarctic continent. The phylogeographic structure shows notably a major genetic discontinuity coinciding with the Gressitt Line – a biogeographical barrier observed between the biota of the Antarctic Peninsula and main continental Antarctica.

Our phylogeographic study has serious taxonomic implications, *i.e.*, *Syntrichia sarconeurum* is a heterogeneous taxon that actually consists of two distinct species. Populations from the sub-Antarctic islands, the Antarctic Peninsula region as well as Coats Land and Dronning Maud Land in the continental Antarctic are conspecific with the Fuegian *S. lithophila*. The populations from East Antarctica, in turn, constitute the second species called *S. frigidideserticola*.

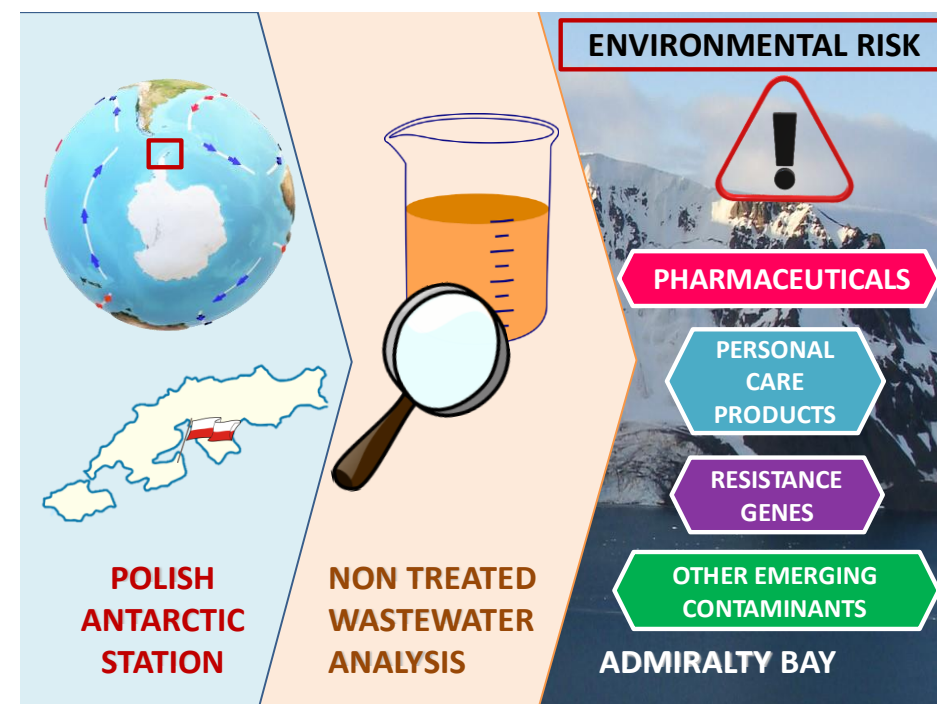


(A) Geographical range of the studied groups; (B) dried specimens of *Syntrichia sarconeurum* (phot. H. Bednarek-Ochyra); and (C) map of Antarctica showing the genetic characteristic of *S. sarconeurum*. The dashed line outlines the boundary between the distribution of the two main cpDNA haplotypes (H03 and H04) that coincides with the Gressitt Line.

Szopińska M., Potapowicz J., Jankowska K., Luczkiewicz A., Svahn O., Björklund E., Nannou C., Lambropoulou D. & Polkowska Ż. 2022. Pharmaceuticals and other contaminants of emerging concern in Admiralty Bay as a result of untreated wastewater discharge: Status and possible environmental consequences. *Science of the Total Environment* 835: 155400.

Today, human activity is having an ever-growing impact on the environment, while there is also increasing interest in nature preservation. Consequently, a detailed characterization of emerging contaminants (ECs) in the aquatic environment is of primary importance. One of the potential point source of EC can be improper wastewater disposal. Overall, there is a risk of pharmaceutical and personal care products emission to the Antarctic environment through the discharge of both treated and untreated wastewater. Moreover, antibiotics disseminated with wastewater may also favor the selection of resistant populations naturally occurring in the microbiota of the receiving waters. This is of serious concern in the pristine Antarctic environment, as it leads to changes in the original resistome and to genetic homogenization of the bacterial community. Additionally, the discharge of wastewater may enrich the environment with mobile genetic elements, such as conjugative plasmids, transposons and integrons, which act as effective carriers of antibiotic resistance genes. Research shows that pharmaceuticals like ketoconazole, diclofenac, ibuprofen pose the greatest risk for the aquatic environment. Moreover, antibiotic resistance genes and integrons were present in the studied samples. To overcome this problem the following

mitigation strategies are suggested: (1) to create a centralized record of the medications prescribed and consumed *in situ*, to improve knowledge of potential contaminants without analysis; (2) to use more environmentally friendly substitutes for pharmaceuticals and personal care products when possible to limit consumption at the source; and (3) to apply advanced systems for wastewater treatment before discharge to the recipient, i.e., use end-of-pipe technologies as a final barrier.



Non-treated wastewater discharge as a point source for pharmaceutical and personal care products emission to the Antarctic environment.

Chelchowski M., Balazy P. & Kuklinski P. 2022. Seasonal variability in macrobenthos assemblage parameters in the highly disturbed Antarctic intertidal zone – Relatively rich biodiversity year around. *Estuarine, Coastal and Shelf Science* 278: 108114.

To understand the impact of anthropogenically induced transformations of biological communities, their naturally occurring fluctuation must be recognized first. Therefore, the aim of our study was to investigate the variability in Antarctic intertidal benthic assemblage faunal composition during an annual cycle on King George Island, South Shetland Islands. Once a month, from December 2016 to November 2017, we collected samples at low-, mid- and high-tidal levels. Polychaetae were the most diverse group, including 15 species, followed by amphipods (12 species). Throughout the year, the most abundant taxa were gastropods (38% of the total number), followed by amphipods (23%) and bivalves (22%). The general pattern of the number of species and their abundance and biomass depended on the season and exhibited the highest values in austral autumn (April–June). Both species richness and abundance were highest in June and lowest in August. Our study discovered that Antarctic intertidal macrofauna assemblages quickly respond to changes in environmental conditions and thus reflect seasonal climate fluctuations. The rapid development of these assemblages when the conditions are favorable proves their opportunistic and highly adaptable nature, which is potentially a good prognosis for survival in this ever-changing ecosystem.



Snow covered and impacted by ice intertidal zone in November 2017. The study site was selected in Admiralty Bay in the direct vicinity of the Polish Antarctic Station (62° 09.41' S; 58° 28.10' W).

Geosciences

1. Król P., Kusiak M.A., Dunkley D.J., Wilde S.A., Yi K., Whitehouse M.J., Lee S., Harley S.L. 2022. Neoproterozoic magmatism in the Scott and Ragatt Mountains, Napier Complex, east Antarctica. *Precambrian Research* 370: 106530.

Life sciences**Marine ecosystems**

2. Chelchowski M., Bałazy P., Grzelak K., Grzelak L., Kędra M., Legezynska J., Kukliński P. 2022. Vertical zonation of benthic invertebrates in the intertidal zone of Antarctica (Admiralty Bay, King George Island). *Antarctic Science* 34: 29–44.
3. Chelchowski M., Bałazy P., Kukliński P. 2022. Seasonal variability in macrobenthos assemblage parameters in the highly disturbed Antarctic intertidal zone – Relatively rich biodiversity year around. *Estuarine, Coastal and Shelf Science* 278: 108114.
4. Gooday A.J., Holzmann M., Majewski W., Pawłowski J. 2022. New species of *Gromia* (Protista, Rhizaria) from South Georgia and the Falkland Islands. *Polar Biology* 45: 647–666.
5. Holzmann M., Gooday A.J., Majewski W., Pawłowski J. 2022. Molecular and morphological diversity of monothalamous foraminifera from South Georgia and the Falkland Islands: Description of four new species. *European Journal of Protistology* 85: 125909.
6. Moreau C., Le Bourg B., Bałazy P., Danis B., Eleaume M., Jossart Q., Kukliński P., Lepoint G., Saucède T., Van de Putte A. Michel L.N. 2022. Trophic markers and biometric measurements in Southern Ocean sea stars (1985–2017). *Ecology* 203: e3611.
7. Nędzarek A., Stepanowska K. 2022. The excretion of nitrogen and phosphorus and changes in nitrogen content in the Antarctic amphipod *Waldeckia obesa* and isopod *Glyptonotus antarcticus* during long-term starvation. *The European Zoological Journal* 89: 1026–1039.

Animals on land

8. Fudala K., Bialik R.J. 2022. The use of drone-based aerial photogrammetry in population monitoring of Southern Giant Petrels in ASMA 1, King George Island, maritime Antarctica. *Global Ecology and Conservation* 33: e01990.
9. Fudala K., Bialik R.J. 2022. Seals from outer space - Population census of southern elephant seals using VHR satellite imagery. *Remote Sensing Applications-Society and Environment* 28: 100836.
10. Gwiazdowicz D.J., Niedbała W., Skarżyński D., Zawieja B. 2022. Occurrence of mites (Acari) and springtails (Collembola) in bird nests on King George Island (South Shetland Islands, Antarctica). *Polar Biology* 45: 1035-104.
11. Kochman-Kędziora N., Noga T., Olech M., Van de Vijver B. 2022. The influence of penguin activity on soil diatom assemblages on King George Island, Antarctica with the description of a new *Luticola* species. *PeerJ* 10: e13624.
12. Oosthuizen W.Ch., Pistorius P.A., Korczak-Abhire M., Hinke J.T., Santos M., Lowther A.D. 2022. The foraging behavior of nonbreeding Adélie penguins in the western Antarctic Peninsula during the breeding season. *Ecosphere* 13: e4090.

Terrestrial plants, bacteria and fungi

13. Androsiuk P., Paukszto Ł., Jastrzębski J.P., Milarska S.E., Okorski A., Pszczółkowska A. 2022. Molecular diversity and phylogeny reconstruction of genus *Colobanthus* (Caryophyllaceae) based on mitochondrial gene sequences. *Genes* 13: 1060.

14. Abu Bakar N., Lau B.Y.C., Smykla J., Karsani S.A., Alias S.A. 2022. Protein homeostasis, regulation of energy production and activation of DNA damage-repair pathways are involved in the heat stress response of *Pseudogymnoascus* spp. *Environmental Microbiology* 24: 1849–1864.
15. Bacior M., Harańczyk H., Nowak P., Kijak P., Marzec M., Fitas J., Olech M. 2022. Low-temperature investigation of residual water bound in free-living Antarctic *Prasiola crispa*. *Antarctic Science* 35: 389–400.
16. Galera H., Rudak A., Wódkiewicz M. 2022. Unified system describing factors related to the eradication of an alien plant species. *PeerJ* 10: e13027.
17. Krishnan A., Alias Z., Convey P., González-Aravena M., Smykla J., Rizman-Idid M., Alias S.A. 2022. Temperature and pH profiling of extracellular amylase from Antarctic and Arctic soil microfungi. *Fermentation* 8: 601.
18. Ochyra R., Saługa M., Ronikier M., 2022. Taxonomic and nomenclatural novelties in *Syntrichia* (Bryophyta: Pottiaceae), with reinstatement of an endemic continental Antarctic species. *Plant and Fungal Systematics* 67: 40–44.
19. Saługa M., Ochyra R., Ronikier M., 2022. Phylogeographical breaks and limited connectivity among multiple refugia in a pan-Antarctic moss species. *Journal of Biogeography* 49: 1991–2004.
20. Svec P., Kralova S., Stankova E., Holochova P., Sedlar K., Koudelkova S., Krsek D., Grzesiak J., Sedo O., Vaczi P., Urvashi V., Sood U., Lal R., Korpole S., Sedlacek I. 2022. *Pedobacter fastidiosus* sp. nov., isolated from glacial habitats of maritime Antarctica. *International Journal of Systematic and Evolutionary Microbiology* 72: 005309.
21. Wong H.J., Mohamad-Fauzi N., Rizman-Idid M., Convey P., Smykla J., Alias S.A. 2022. UV-B induced DNA damage and repair pathways in polar *Pseudogymnoascus* sp. from the Arctic and Antarctic regions and their effects on growth, pigmentation and conidiogenesis. *Environmental Microbiology* 24: 3164–3180.
22. Znoj A., Gawor J., Gromadka R., Chwedorzewska K.J., Grzesiak J. 2022. Root-associated bacteria community characteristics of Antarctic plants: *Deschampsia antarctica* and *Colobanthus quitensis* - a comparison. *Microbial Ecology* 84: 808–820.
23. Znoj A., Grzesiak J., Gawor J., Gromadka R., Chwedorzewska K.J. 2022. Highly specialized bacterial communities within three distinct rhizocompartments of Antarctic hairgrass (*Deschampsia antarctica* Desv.). *Polar Biology* 45: 833–844.

Physical Sciences

24. Costello D.M., Tiegs S.D., Boyero L., Canhoto C., Capps K.A., Danger M., Frost P.C., Gessner M.O., Griffiths N.A., Halvorson H.M., Kuehn K.A., Marcarelli A.M., Royer T.V., Mathie D.M., Albariño R.J., Arango C.P., Aroviita J., Baxter C.V., Bellinger B.J., Bruder A., Burdon F.J., Callisto M., Camacho A., Colas F., Cornut J., Crespo-Pérez V., Cross W.F., Derry A.M., Douglas M.M., Elosegi A., de Eyto E., Ferreira V., Ferriol C., Fleituch T., Follstad Shah J.J., Frainer A., Garcia E.A., García L., García P.E., Giling D.P., Gonzales-Pomar R.K., Graça M.A.S., Grossart H.-P. Guérolf F., Hepp L.U., Higgins S.N., Hishi T., Iñiguez-Armijos C., Iwata T., Kirkwood A.E., Koning A.A., Kosten S., Laudon H., Leavitt P.R., Lemes da Silva A.L., Leroux S.J., LeRoy C.J., Lisi P.J., Masese F.O., McIntyre P.B., McKie B.G., Medeiros A.O., Miliša M., Miyake Y., Mooney R.J., Muotka T., Nimptsch J., Paavola R., Pardo I., Parnikoza I.Y., Patrick C.J., Peeters E.T.H.M., Pozo J., Reid B., Richardson J.S., Rincón J., Risnoveanu G., Robinson C.T., Santamans A.C., Simiyu G.M., Skuja A., Smykla J., Sponseller R.A., Teixeira-de Mello F., Vilbaste S., Villanueva V.D., Webster J.R., Woelfl S., Xenopoulos M.A., Yates A.G., Yule C.M., Zhang Y., Zwart J.A.

2022. Global patterns and controls of nutrient immobilization on decomposing cellulose in riverine ecosystems. *Global Biogeochemical Cycles* 36: e2021GB007163.
25. Dziembowski M., Bialik R.J. 2022. The remotely and directly obtained results of glaciological studies on King George Island: A review. *Remote Sensing* 14: 2736.
26. Wójcik-Długoborska K.A., Osińska M., Bialik R.J. 2022. The impact of glacial suspension color on the relationship between its properties and marine water spectral reflectance. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing* 15: 3258–3268.

Anthropogenic pollutants

27. Potapowicz J., Szopińska M., Szumińska D., Bialik R.J., Polkowska Ż. 2022. Sources and composition of chemical pollution in Maritime Antarctica (King George Island), part 1: Sediment and water analysis for PAH sources evaluation in the vicinity of Arctowski station. *Chemosphere* 288: 132637.
28. Szopińska M., Potapowicz J., Jankowska K., Luczkiewicz A., Svahn O., Björklund E., Nannou C., Lambropoulou D., Polkowska Ż. 2022. Pharmaceuticals and other contaminants of emerging concern in Admiralty Bay as a result of untreated wastewater discharge: Status and possible environmental consequences. *Science of the Total Environment* 835: 155400.