

# Belgium at the Science-Policy interface in the Antarctic Treaty System : creation of an Antarctic Specially Protected Area for environmental and scientific values

Wilmotte A.<sup>1</sup>, Van Hellemont, Q<sup>2</sup>, Savaglia, V<sup>1,3</sup>, Lambrechts, S<sup>4</sup>.  
Willems A.<sup>4</sup>, Verleyen, E.<sup>3</sup>, Tytgat, B<sup>3,4</sup>, Vyverman, W<sup>3</sup>

1. Inbios-Molecular Diversity and Ecology of Cyanobacteria, University of Liège, Liège, Belgium
2. Institute of Natural Sciences, Brussels, Belgium
3. Protistology and Aquatic Ecology, University of Ghent, Ghent, Belgium
4. Laboratory for Microbiology, University of Ghent, Ghent, Belgium



See Poster GA-S24-204 by  
Valentina Savaglia et al.

# Outline

1. ASPAs in the frame of the Antarctic Treaty System
2. The Sør Rondane Mountains: which values to protect ?
3. Creation of ASPA 179
4. Future: monitoring of ASPA

# 1. ASPAs in the frame of the Antarctic Treaty System

## Annex V of the Protocol : Area protection and Management

### ARTICLE 3 : *Antarctic Specially Protected Areas (ASPA)*

1. ...to protect "outstanding **environmental, scientific, historic, aesthetic** or **wilderness values**, any combination of those values, or ongoing or planned **scientific research**"
2. ... Parties shall seek to identify, within a **systematic environmental-geographical** framework, and to include in the series of Antarctic Specially Protected Areas :
  - (a) « areas kept **inviolable** from human interference so that future comparisons may be possible with localities that have been affected by human activities »
  - (b) representative of major **ecosystems**
  - (c) Important or unusual assemblages of **species**
  - (d) **Type locality** or **only known habitat** of any species
  - (e) areas of particular interest to ongoing or planned **scientific research**;
  - (f) examples of outstanding **geological, glaciological or geomorphological features**;
  - (g) areas of outstanding **aesthetic and wilderness value**;
  - (h) sites or monuments of recognised **historic value**; and ...

(<http://www.ats.aq>)

# In practice .....

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PERSPECTIVE

## Antarctica's Protected Areas Are Inadequate, Unrepresentative, and at Risk

Justine D. Shaw, Aleks Terauds, Martin J. Riddle, Hugh P. Possingham, Steven L. Chown

Published: June 17, 2014 | <https://doi.org/10.1371/journal.pbio.1001888>

146

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Conservation Biology

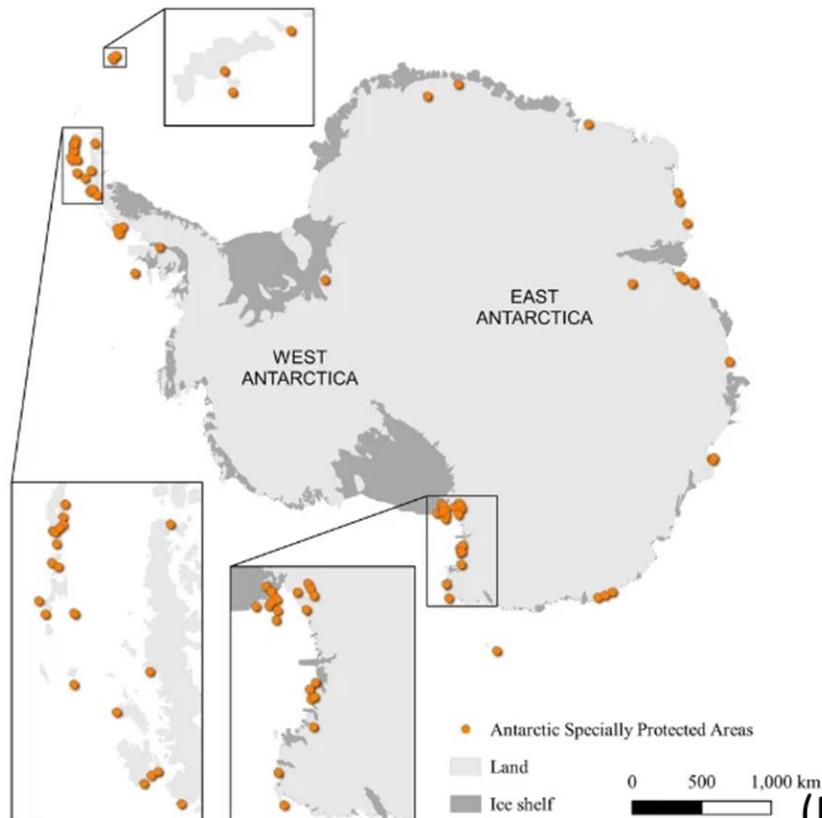


PRACTICE AND POLICY | Open Access | CC BY

## Evaluating the conservation impact of Antarctica's protected areas

Joanna L. Burrows, Jasmine R. Lee, Kerrie A. Wilson

First published: 20 January 2023 | <https://doi.org/10.1111/cobi.14059> | Citations: 1



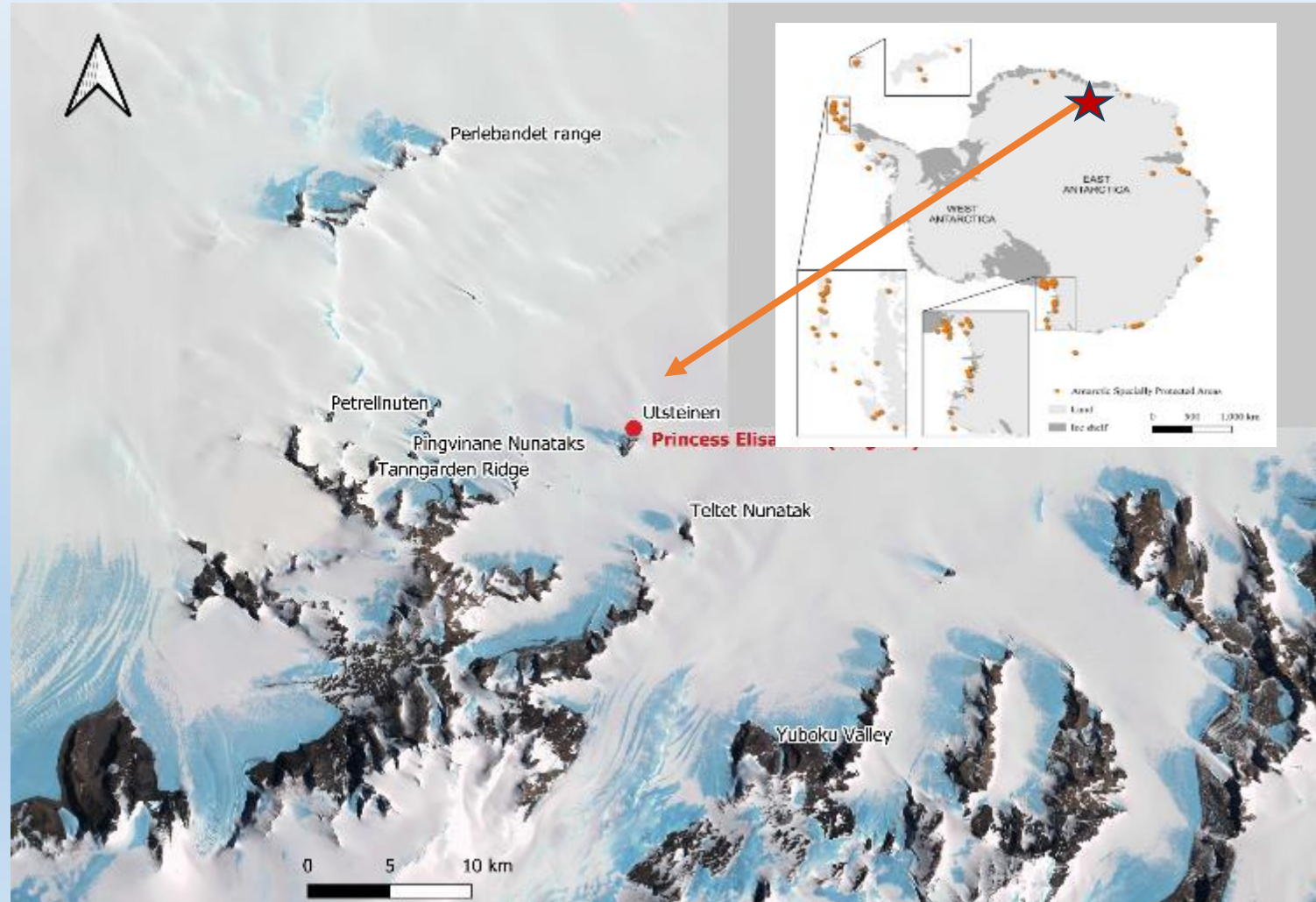
ASPAs concentrated in some areas and cover less than 1.5 % of the ice-free areas (Shaw et al. 2014)

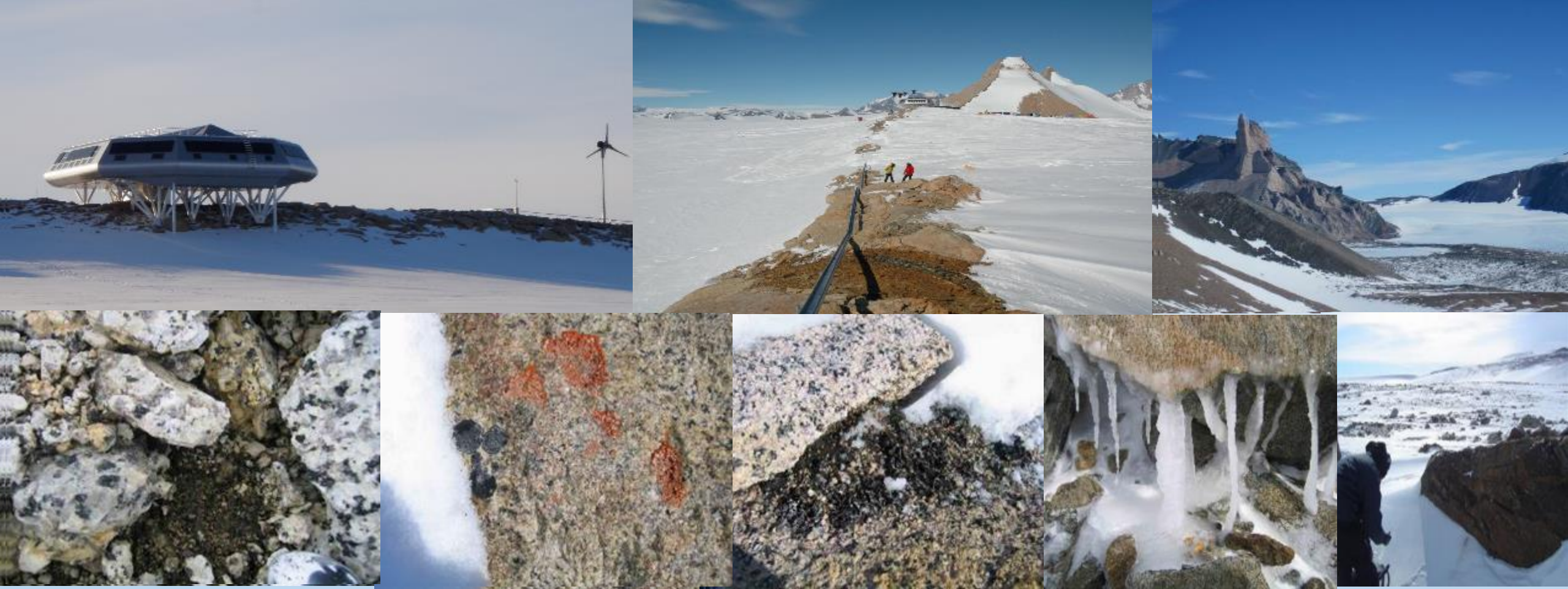
(Burrows et al. 2023)

## 2. The Sør Rondane Mountains: which values to protect?

Dronning Maud Land, Sør Rondane Mountains  
Belgian station, Princess Elisabeth (2009)

- Inland mountains and nunataks
- Air temperatures constantly negative
- At the edge of life conditions





# Belgian Science Policy Office funded projects ANTAR-IMPACT, BELDIVA, MICROBIAN and EXPOSOILS (2008-2026) :

## Bacterial community composition in relation to bedrock type and macrobiota in soils from the Sør Rondane Mountains, East Antarctica

Bjorn Tytgat<sup>1,\*</sup>, Elie Verleyen<sup>2</sup>, Maxime Sweetlove<sup>2</sup>, Sofie D'hondt<sup>2</sup>, Pia Clercx<sup>1</sup>, Eric Van Ranst<sup>3</sup>, Karolien Peeters<sup>1</sup>, Stephen Roberts<sup>4</sup>, Zorigto Namsaraev<sup>5,6</sup>, Annick Wilmotte<sup>7</sup>, Wim Vyverman<sup>2</sup> and Anne Willems<sup>1</sup>

Contents lists available at [ScienceDirect](http://www.elsevier.com/locate/elsevier)

Remote Sensing Applications: Society and Environment

journal homepage: [www.elsevier.com/locate/rsase](http://www.elsevier.com/locate/rsase)

ELSEVIER

Towards physical habitat characterisation in the Antarctic Sør Rondane Mountains using satellite remote sensing

Quinten Vanhellemont<sup>b,c</sup>, Sam Lambrechts<sup>b,c</sup>, Valentina Savaglia<sup>b,d</sup>, Bjorn Tytgat<sup>b</sup>, Elie Verleyen<sup>b</sup>, Wim Vyverman<sup>b</sup>

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EDITED BY  
Sam Haines,  
University of Waikato, New Zealand

REVIEWED BY  
Kirstenley Warren-Rhodes,  
Almas Research Center, National Aeronautics  
and Space Administration, United States  
Ian S. MacDonald,  
University of Waikato, New Zealand

\*CORRESPONDENCE  
Valentina Savaglia  
[v.savaglia@gmail.com](mailto:v.savaglia@gmail.com)

Geology defines microbiome structure and composition in nunataks and valleys of the Sør Rondane Mountains, East Antarctica

Valentina Savaglia<sup>1,2\*</sup>, Sam Lambrechts<sup>2,3</sup>, Bjorn Tytgat<sup>2</sup>, Quinten Vanhellemont<sup>4</sup>, Josef Elster<sup>5</sup>, Anne Willems<sup>1</sup>, Annick Wilmotte<sup>1</sup>, Elie Verleyen<sup>2</sup> and Wim Vyverman<sup>2</sup>

- Late Proterozoic to Paleozoic **metamorphic and plutonic rocks** (gneiss, granite and amphibolite)
- Most of the existing life forms are **microbial**, except nesting birds (snow petrels and skuas), invertebrates, lichens and mosses
- **Visible soil crusts and biofilms** restricted to terrestrial microhabitats with suitable conditions (exposure to the sun, shelter from katabatic winds, meltwater, stable bedrock like granite) showing a rich and unique biodiversity (SSU rRNA metabarcoding, strain isolations, microscopic observations)
- Yûboku-dani valley : 3 **lakes** with benthic mats
- SSU rRNA metabarcoding 105 samples → differences in community structure depending on **substrate type**
- **moraine** substrates: higher abundance of Actinomycetota and Cercozoa were the most abundant bacterial and eukaryotic phyla
- **gneiss, granite and marble** substrates: dominance of Cyanobacteriota and Metazoa
- In 4 sites: **Open Top Chambers** to manipulate climate variables

See Poster GA-S24-204 by Valentina Savaglia et al.

# 1. Outstanding values:

## 1. Biodiversity

2. Unique **representativeness** of mountainous ecosystems (very extreme) in ACBR6
3. Potential **refuges** for living organisms during the glaciation cycles in Antarctica
4. Scientific **experimental** value (Open Top Chambers)

# 2. Implications of an increase of activities in the area

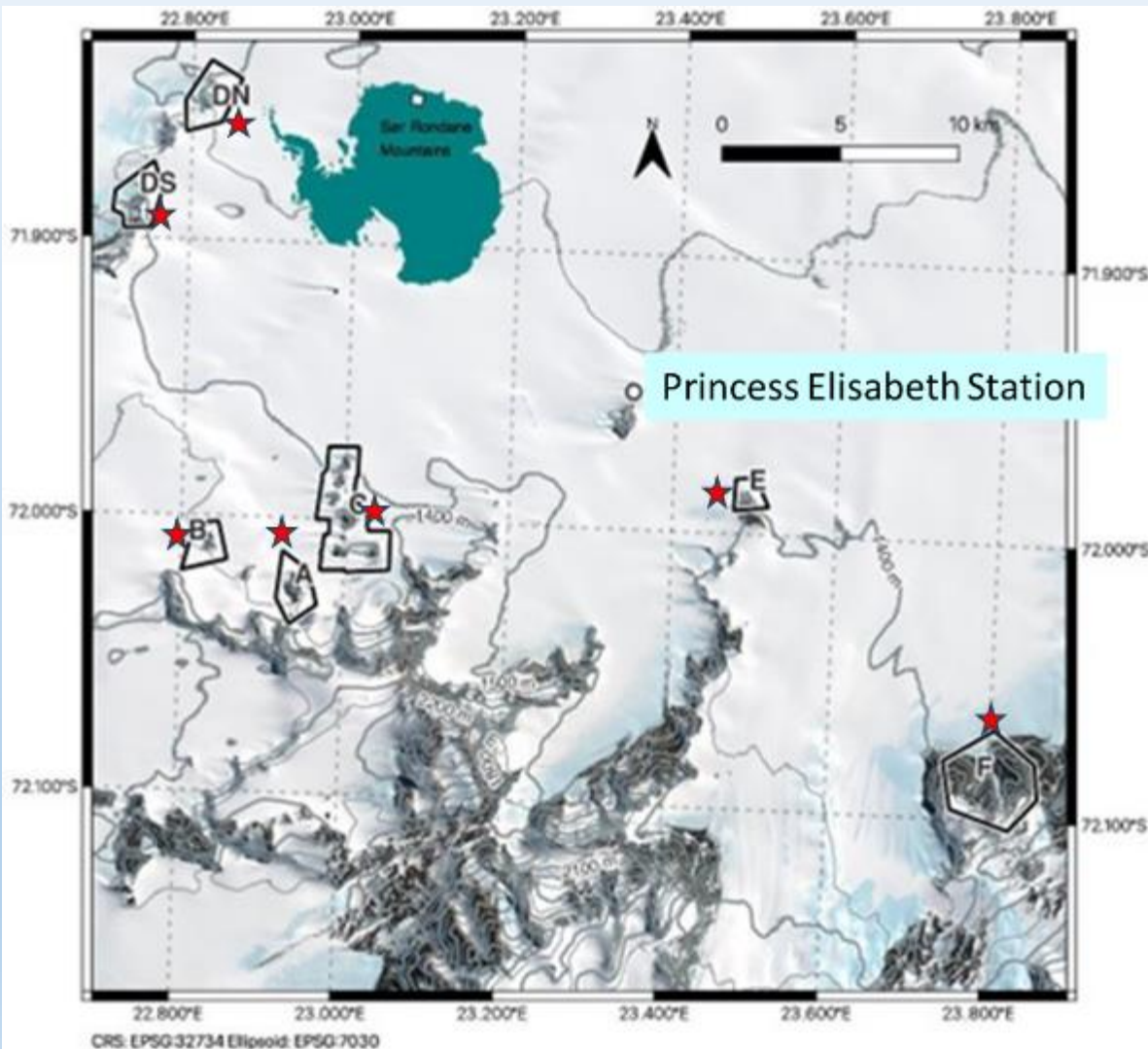
Potential for negative impacts due to **visits** and **human disturbances**:

- **infrastructures** (Belgian Station, Perseus Runway for intercontinental flights, Andromeda project (private university/congress center) in the vicinity
- general increase in **inland tourism**.

⇒ The involved scientists initiated the process of creating an ASPA in **collaboration with the relevant ministries** (Foreign Affairs, Environment and Science Policy)



### 3. Creation of ASPA 179



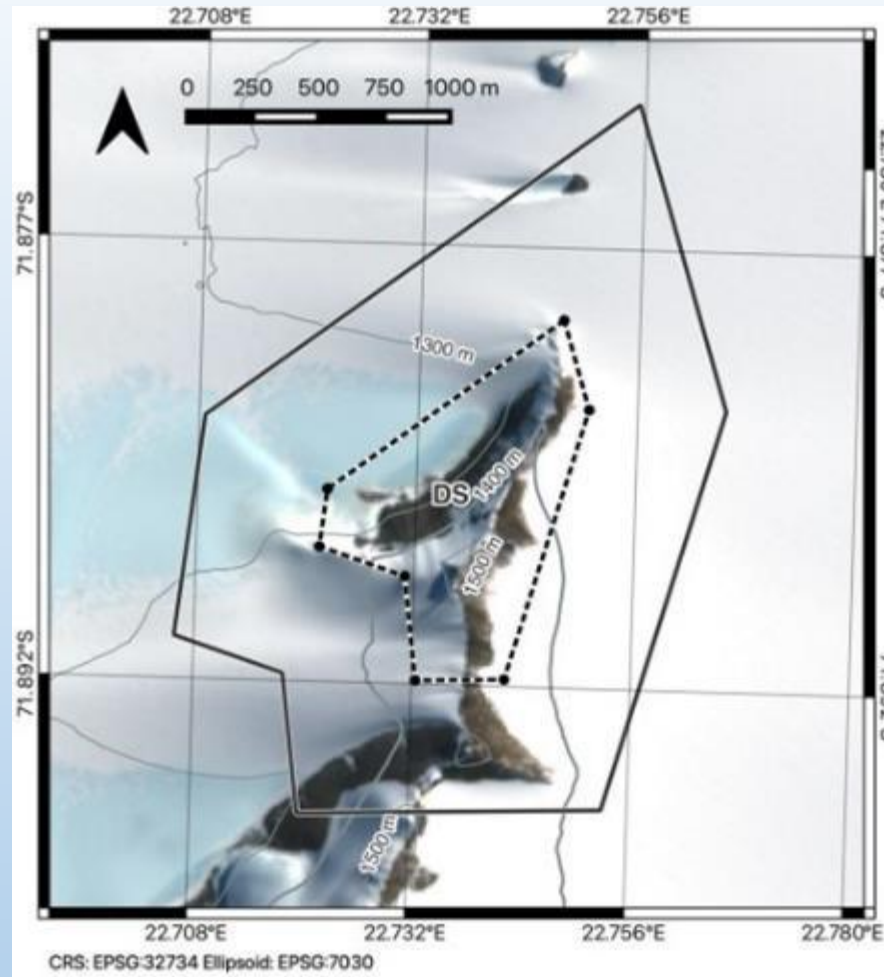
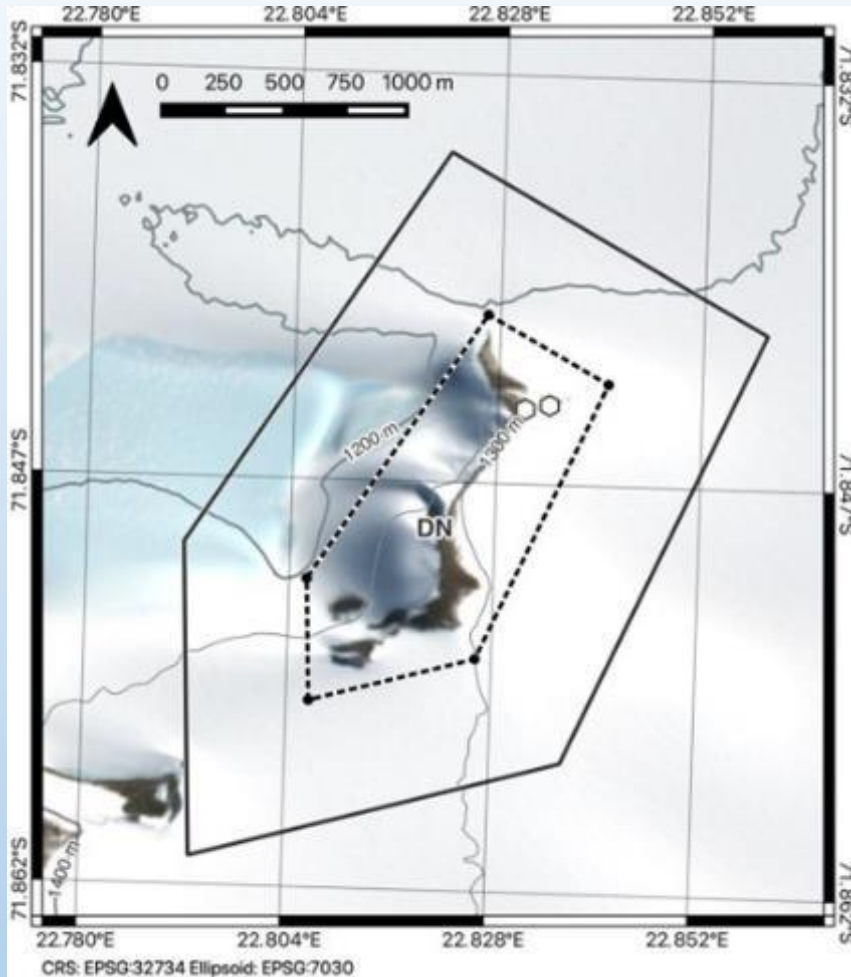
A **multi-site** Antarctic Specially Protected Area (ASPA 179) in parts of the Eastern Sør Rondane Mountains (71°50'-72°S; 22°50'-23°50'E) including 7 ice-free areas.

The ASPA site and its Management Plan adopted in 2023:

<https://www.ats.aq/devph/en/apa-database/197>.

3 examples of sites:

# Two Nunataks of the Perlebandet range (DN and DS)






Total size = 1,807 km<sup>2</sup>

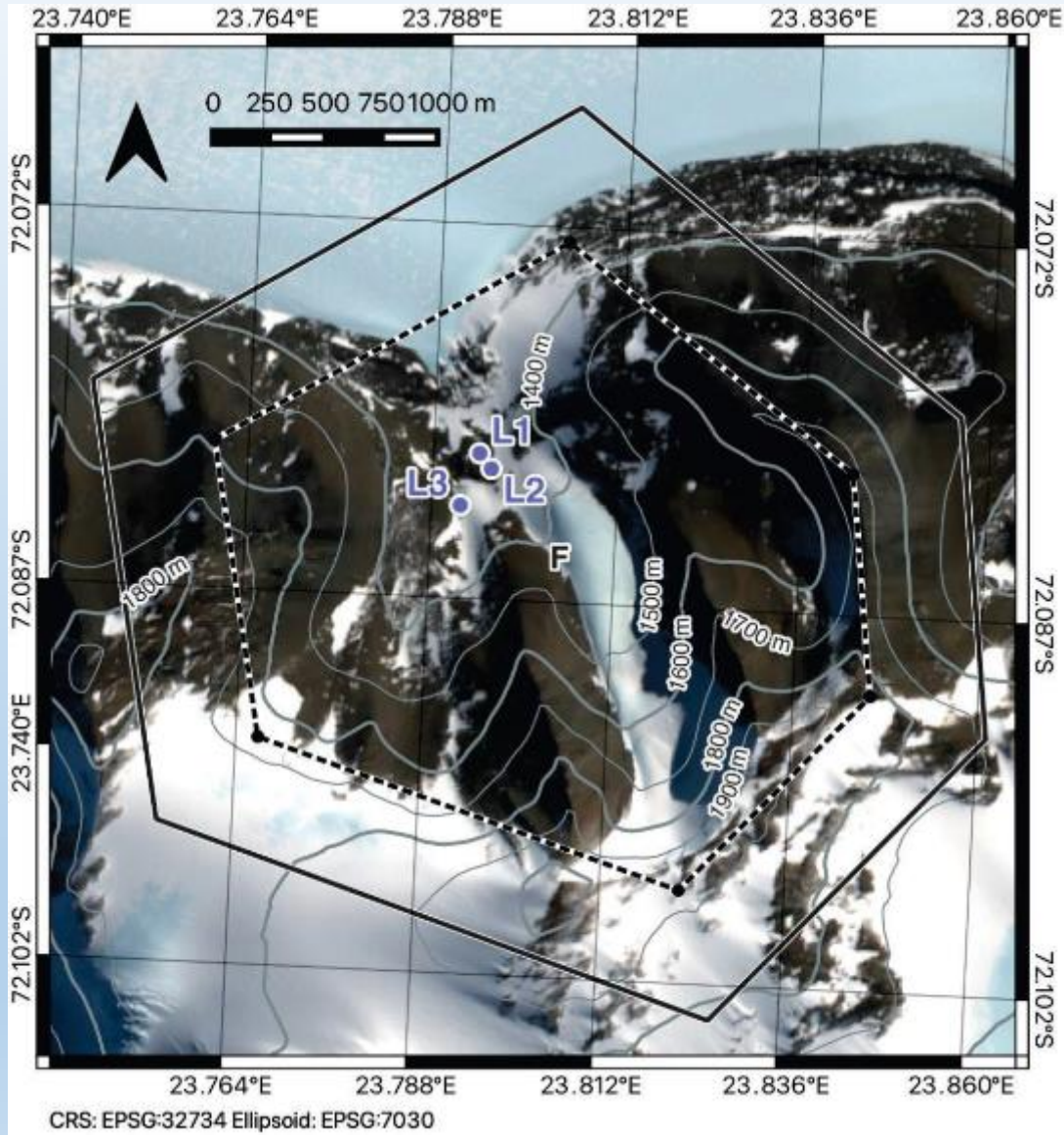
marble intrusions in a gneiss bedrock

DN: 5 OTCs + control sites (gneiss and marble)

## Legend:

-  Boundary of the site(s)
-  Boundary of the subsite(s)
-  Location of OTCs

# Yûboku-dani Valley (F)



Area of 5.809 km<sup>2</sup>

Two first lakes : shallow, with benthic or floating mats, variable water levels, might be frozen to the bottom

## Legend:

- Boundary of the site(s)
- - - Boundary of the subsite(s)
- ⬡ Location of OTCs
- Lx Lakes

## Range of seven Pingvinane Nunataks (C)

Total area of 1, 807 km<sup>2</sup>

Granitic bedrock with visible microbial mats in suitable habitats.

3<sup>rd</sup> and 7<sup>th</sup> nunataks not yet accessed

Two OTCs plus controls on the SW slope of the 4<sup>th</sup> nunatak, but one is broken



### Legend:

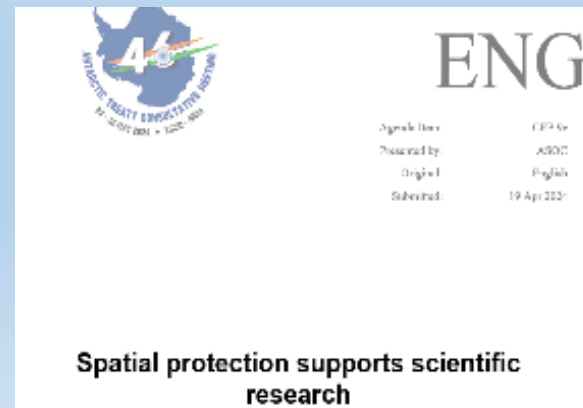
- Boundary of the site(s)
- - - Boundary of the subsite(s)
- ⬡ Location of OTCs
- ▨ Restricted zones

! In proposal to CEP, they were inviolate areas!

# Scientific techniques are evolving, becoming better in sensitivity and big data production

- Potential to describe the microbial communities with **unprecedented details** without preconceived expectations
- 🔔 Will there still be **pristine Antarctic areas** to study the native microbial flora, its functioning and properties?

The creation of **inviolable areas** (no visitation permitted) is a tool of the Environmental Protocol. These zones could be set aside for future research (Hughes et al. 2013). After a few decades, they would be **unique examples of truly pristine habitats**, representative of the native microbial diversity and processes.



IP 151, ASOC

# 4. Future: monitoring of ASPA

## 1. Site monitoring

Microclimate: e-buttons to register temperature and humidity

Biodiversity: Permanent quadrats in each sub-site, pooled samples taken for targeted metagenomics of prokaryotes and eukaryotes

Cover: pictures from same spot/camera-lapse/drones?

Connection to **ANTOS!**

## 2. Buffer zones around the sites

Extent of ice around the sub-sites: remote sensing and installation of poles/landmarks to detect shifts



Depositphotos Inc.



<https://youtu.be/W4ssQ-UnNmE>

Collaborations for monitoring welcome !

Thanks to :

- Stéphanie Langerock, Nils Vanstappen, François André (Ministry of Health, Food chain safety and Environment, also CEP delegates)
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- Maaïke Vancauwenberghe, Jean-François Mayence (Belgian Science Policy Office)
- Belgian and foreign colleagues involved in research and logistics in the Sør Rondane Mountains and ANT-ICON for advices
- The 'unsung' heros of Antarctica: microbial communities !



# Thanks for your attention!



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Dr Annick Wilmotte ([awilmotte@uliege.be](mailto:awilmotte@uliege.be))  
A meeting during the SCAR2024 OSC is possible