Federal Policy Research

Annual activity report

2023-2024 | PASPARTOUT

[RT/23/PASPARTOUT]

Pathways of particles, VOCs and moisture into East-Antarctica in a changing climate

https://ozone.meteo.be/projects/paspartout

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The Report is drawn up by the Coordinator for the entire network and sent to the address: impuls@belspo.be on the dates set in article 7.6 of annex I to the contract. It presents the state of progress and achievements of the research, as well as forecasts for the following of the project. This information refers explicitly to the tasks and the project schedule defined in articles 2 and 3 of annex I. It also informs of any modification of the data included in the initial and earlier activity reports and gives the list of publications and missions carried out during the past year. This template must be completed in English.

1. EXECUTIVE SUMMARY OF THE REPORT

Pathways of particles, VOCs and moisture into East Antarctica in a changing climate

Current knowledge on the interaction between clouds, atmospheric particles, and VOCs, as well as on the atmospheric transport and transformation pathways of atmospheric compounds in Antarctica is still limited. This is unfortunate, as Antarctica is not only a key region for the evolution of the future global climate, but also very sensitive to a changing climate. The main objective of PASPARTOUT is, (i) establishing an in-depth understanding of the links between atmospheric circulation patterns, weather regimes, particles, VOCs and moisture, (ii) determining the source regions and origin (natural, anthropogenic) of organic and inorganic compounds, and (iii) investigating implications and changes within a changing global climate.

The objectives of PASPARTOUT are:

- PASPARTOUT will establish an in-depth understanding of the links between atmospheric circulation patterns, weather regimes, particles, VOCs and moisture;
- PASPARTOUT will characterise VOCs and partially oxidised VOCs in an unprecedented way and improve the understanding of their degradation pathways and seasonal patterns;
- PASPARTOUT will characterise the seasonal patterns of metals and rare earth elements, and Pb, Sr and Nd isotopes;
- Understanding the seasonal variability in the sources of nitrate in Antarctica through the measurement of nitrate isotopes (δ15N, δ18O, Δ17O);
- PASPARTOUT will determine the source regions and atmospheric transport pathways of organic and inorganic compounds;
- PASPARTOUT will investigate implications and changes to the before-mentioned points within a changing global climate.

PASPARTOUT started in February 2023 as planned. The main task was to prepare the BELARE 2023-2024 expedition to Princess Elisabeth station. Several meetings of the project partners took place:

- Kick-Off meeting in Leuven; 8 March 2023
- Project progress meeting in Ghent, 4 July 2023
- Belare preparation meeting online 6 December 2023
- Belare debriefing meeting at RMI Brussels, 9 April 2024;

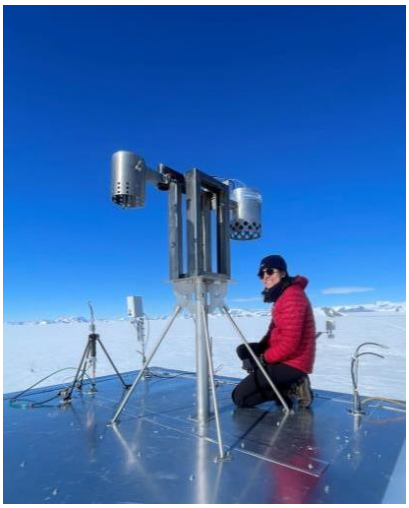
Besides these meetings there were several (in-person, online) meetings with the International Polar Foundation in order to discuss practical points of the Belare expedition.

Two members of PASPARTOUT participated in the Belare 2023-2024 expedition: Paula Lamprea of Ghent University and Sibylle Boxho from ULB. They stayed at Princess Elisabeth station (PES) from mid-December 2023 to beginning of February 2024. During their stay they completed the foreseen tasks successfully. The sampling system for year-round passive and active collection of VOCs was installed on the southern science shelter at PES and is still operational at writing this report. The automatic (year-round) sampling system for inorganic analysis was tested at PES (in particular the power provision by batteries and solar panels) and finally installed at the PASPARTOUT sampling site near the coast. In addition, two large snow pits were done in order to collect snow samples. These samples have well arrived in April 2024 at ULB and are now stored safely at ULB for further analyses.

Further, the instrumentation of the atmospheric observatory (aerosol instruments, cloud and precipitation instruments, total ozone and uv radiation instrument, and radio soundings by weather balloons) has been successfully maintained.

The project is thus in schedule. Planning for the coming Belare expedition 2024-2025 has already started. In particular, Ghent University is testing a second sampling system for VOCs, to be deployed at the coastal site. The one installed at PES will stay there for sampling.
Also, PASPARTOUT related results have been published and presented in peer-reviewed articles, at scientific conferences and have been stored at referenced data repositories (see section 9).

The coordinates of the coastal sample sites are:
Site 1; large snow pit and automatic inorganic sampler = 70°32'11.93"S 24°12'30.25"E;
Site2; second snow pit = 70°32'9.03"S 23°59'15.60"E



Left image: Autosampler for inorganic analyses of ULB with solar panel and curious penguin; right image: the passive and active sampling system for VOCs and partially oxidised VOCs of UGent on the roof of the southern science shelter at PES

2. PROMOTOR(S)

2.1. coordinator (partner 1)

1. Dr. Alexander MANGOLD, Royal Meteorological Institute of Belgium

2.2. Other partners

2. Prof. Dr. Nicole VAN LIPZIG, Katholieke Universiteit Leuven

3. Prof. Dr. Christophe WALGRAEVE, Universiteit Gent

4. Prof. Dr. Nadine MATTIELLI, Université Libre de Bruxelles

3. PROJECT WEBSITE, SOCIAL MEDIA …

[https://ozone.meteo.be/projects/paspartout]
[https///belatmos.blogspot.be]
[https://ozone.meteo.be/projects/paspartout/expedition-2023-2024] / blog for the BELARE expedition 2023-2024 of Paspartout Pax
…

4. PROGRESS REPORT

4.1. GENERAL DELAY

If your project has been delayed in general due to a late start, please indicate it on the table here below and do not take this general delay into account on the tables referring to the tasks (point 3.2.)

A. Has the beginning of your project been delayed?	☐ Yes	☒ No
B. How many months has the beginning been delayed from the starting date indicated in the contract?	[number of months]	

REASON FOR THE DELAY

Not applicable

4.2. PROGRESS OF THE PROJECT

WP= Work Package; T =Task; D =Deliverable
List the Work Packages, the Tasks and the Deliverables of your project.
Add as many lines as needed to each work package, and as many work packages are required.
PROGRESS COLUMN:

- *Assess each task by indicating: 25% - 50% - 75% or 100% in accordance to its completion.*
- *Indicate the achievement of deliverables by crossing the box it if has been accomplished.*

DELAY COLUMN:

- *Indicate when a task has been delayed in relation to the Gantt chart of Annex I of the contract, by crossing the box.*

WP 1: **Project coordination, management, reporting**

			Progress	Delay
T.1.1.	**T1.1: Coordination activities**		continuous	☐
	D.1.1.1		☐	
	D.1.1.2		☐	
	D.1.1.3		☐	
T.1.2.	**Interaction between project partners**		Continuous	☐
	D.1.2.1		☐	
	D.1.2.2		☐	
	D.1.2.3		☐	
T.1.3	**Reporting activities**		25%	
	D.1.3.1	Initial report	☒	
	D.1.3.2	Progress meetings	☒	
	D.1.3.3	Annual report 2024	☒	

WP 2: **Organics – Sampling strategy, innovative analytical methods and VOC analysis**

			Progress	Delay
T.2.1.	**Active sampling**		25%; done for year 1	☐
	D.2.1.1	Operational sequential sampler for (po-)VOCs	☒	
	D.2.1.2		☐	
	D.2.1.3		☐	
T.2.2.	**Development and optimisation of new methods**		25%	☐
	D.2.2.1	Target method for (po-)VOC developed and optimized	☐	
	D.2.2.2	Non-target method based on TD-GCxGC-Orbitrap HRMS for (po-)VOC developed and optimized	☐	
	D.2.2.3	non-Target method based on TD-PTR-Time-of-flight-HRMS for (po-)VOC developed and optimized	☐	
T.2.3	**Understanding** the seasonal variances in atmospheric composition of (po-)VOCs		Planned year 2 to 3	☐
	D.2.3.1	Understanding of degradation pathways, and seasonal patterns are investigated	☐	
	D.2.3.2		☐	
	D.2.3.3		☐	

WP 3: **Dust and inorganic compounds in air and snow**

			Progress	Delay
T.3.1.	**Sampling of airborne particles and particles from snow pit sample**		25% Done for year 1	☐
	D.3.1.1	Operational sampling system for airborne particles and snow pit samples taken	☒	
	D.3.1.2		☐	
	D.3.1.3		☐	
T.3.2.	**Seasonal records of dust deposition rates, morphology and chemical composition**		10 %	☐
	D.3.2.1	from airborne samples (size, shape, number)	☐	
	D.3.2.2	from snow pit samples (crystallography and density throughout the two snow profiles) (size, shape, number, …) / bulk trace element concentration	☐	
	D.3.2.3		☐	
T.3.3	**Metal-bearing nano-particles in snow composition analysis from snow pit**			☐
	D.3.3.1	nano-particle analysis	☐	
	D.3.3.2		☐	
	D.3.3.3		☐	
T3.4	**Nitrate concentration and isotopes: analysis of reactive nitrogen atmospheric chemistry**			☐
	D3.4.1	analysis of nitrate and its isotopes from airborne particles and snow pit samples	☐	
			☐	

WP 4: **Physical particle properties and complementary data**

			Progress	Delay
T.4.1.	**Complementary data at coastal site: data from optical particle sizer, disdrometer, meteorology**			☐
	D.4.1.1	data analysed from instrumentation at coastal site	☐	
	D.4.1.2		☐	
	D.4.1.3		☐	
T.4.2.	**Complementary data from atmospheric observatory at PES**		25%	☐
	D.4.2.1	data analysed from cloud and precipitation observatory at PE	☐	
	D.4.2.2	data analysed from aerosol observatory and further complementary data at PES	☐	
	D.4.2.3		☐	

WP 5: **Present-day atmospheric dynamics and air mass origin**

			Progress	Delay
T.5.1.	**Air mass tracing current climate/meteorology: applying Flextra and Flexpart to present-day conditions**		25%	☒
	D.5.1.1	back trajectory analysis and cluster analysis	☐	
	D.5.1.2	dispersion modelling with Flexpart	☐	
	D.5.1.3		☐	
T.5.2.	**Weather patterns and links with observations at PES: model data analysed and linked to observations**		25 %	☐
	D.5.2.1	East Antarctic weather patterns derived and related to observed data	☐	
	D.5.2.2		☐	
	D.5.2.3		☐	
T.5.3	**Climate modelling cloud-aerosol interaction: assessment of aerosol effect per weather type**		25%	☐
	D.5.3.1	Assessment of the aerosols effect per weather type	☐	
	D.5.3.2		☐	
	D.5.3.3		☐	

WP 6:: **Future atmospheric dynamics, air mass origin and impact on particles, VOC, moisture**

WP starts only in last year of project

			Progress	Delay
T.6.1.	**Future weather patterns from CMIP6: model data analysed and implications for atmospheric properties**			☐
	D.6.1.1	East Antarctic future weather patterns derived and implications for atmospheric properties	☐	
	D.6.1.2		☐	
	D.6.1.3		☐	
T.6.2.	**Air mass tracing future climate/meteorology: applying Flextra and Flexpart to CMIP6 meteorology**			☐
	D.6.2.1	back trajectory analysis and cluster analysis	☐	
	D.6.2.2	dispersion modelling with Flexpart	☐	
	D.6.2.3		☐	

WP 7: **Data management**

Task 7.2 starts only in second half of 2024

			Progress	Delay
T.7.1.	**Data secured locally with partners: data storage at partner institutes**		Continuous	☐
	D.7.1.1	Data of each partner stored and secured at partner institutes	☐	
	D.7.1.2		☐	
	D.7.1.3		☐	
T.7.2.	**Data stored/secured at national/international data bases: data submitted to referenced data bases**			☐
	D.7.2.1	Data of PASPARTOUT submitted to referenced data bases	☐	
	D.7.2.2		☐	
	D.7.2.3		☐	

WP 8: **Valorisation, Dissemination, Exploitation**

			Progress	Delay
T.8.1.	**Data and results published to scientific community**		Continuous	☐
	D.8.1.1	Data and results published to scientific community	☐	
	D.8.1.2		☐	
	D.8.1.3		☐	
T.8.2.	**Data and results communicated to stakeholders**		Continuous	☐
	D.8.2.1	Data and results communicated to stakeholders	☐	
	D.8.2.2		☐	
	D.8.2.3		☐	
T.8.3	**Results communicated to general public and project website operational**		Continuous	☐
	D.8.3.1	Results communicated to general public and website operational	☐	
	D.8.3.2		☐	
	D.8.3.3		☐	

5. REPORT ON ACHIEVEMENTS

5.1. SPECIFIC OBJECTIVES ACCOMPLISHED

List the Specific Objectives stated in Annex I and signal which of them have been achieved by putting 'X' in the 'Accomplished' column.

PASPARTOUT has the scientific deliverables as mentioned in section 4. There are no further specific objectives, however, the project has several scientific goals:

A) PASPARTOUT will establish an in-depth understanding of the links between atmospheric circulation patterns, weather regimes, particles, VOCs and moisture;
B) PASPARTOUT will characterise VOCs and partially oxidised VOCs in an unprecedented way and improve the understanding of their degradation pathways and seasonal patterns;
C) PASPARTOUT will characterise the seasonal patterns of metals and rare earth elements, and Pb, Sr and Nd isotopes;
D) Understanding the seasonal variability in the sources of nitrate in Antarctica through the measurement of nitrate isotopes (δ15N, δ18O, Δ17O);
E) PASPARTOUT will determine the source regions and atmospheric transport pathways of organic and inorganic compounds;
F) PASPARTOUT will investigate implications and changes to the before-mentioned points within a changing global climate.

None of them is at this phase of the project accomplished.

In the following section 5.2 we describe per objective the tasks which contributed to the progress of accomplishing the objective

5.2. CONTRIBUTION OF THE SPECIFIC OBJECTIVES TO THE GOAL OF THE PROJECT

Briefly explain how the accomplished objectives drive the project closer to its goal. Signal which tasks and deliverables have led to their accomplishment. Mention the target groups reached. Duplicate the table as needed.

A) PASPARTOUT will establish an in-depth understanding of the links between atmospheric circulation patterns, weather regimes, particles, VOCs and moisture;

Task 4.2: Complementary data from atmospheric observatory at PES

task 5.1: Air mass tracing current climate/meteorology: applying Flextra and Flexpart to present-day conditions

task 5.2: Weather patterns and links with observations at PES: model data analysed and linked to observations

Data of the atmospheric observatory at PES (aerosols, clouds, precipitation) has been collected and partly been analysed. In addition, VOC data of previous campaigns have been analysed (see also section 9, publications). The Flextra backward trajectory model results have been analysed for the period 2010-2020 and related to aerosol properties. The atmospheric dispersion simulations have been done for 3 austral summer seasons up to now.

At partner KUL a master student finalized the analysis of linking weather observations at PES with large-scale atmospheric dynamics with SANDRA (simulated annealing and diversified randomization, https://doi.org/10.1175/JCL4175.1). A bachelor student has finished classifying the ceilometer cloud observations into different cloud categories.

task 5.3: Climate modelling of the cloud-aerosol interaction

We have studied the effect of different INP concentrations on the representation of clouds including the presence of liquid water in clouds and their radiative impact for an extensive set of cases. For this we used the regional climate model COSMO-CLM^2. Part of this work started in the CLIMB project, but was finalized in PASPARTOUT, and a peer-reviewed publication is currently available in as preprint in

atmospheric chemistry and physics (https://doi.org/10.5194/egusphere-2024-1341). The model setup used here will be applied to study the cloud-aerosol interaction for different weather types. The Flextra and FLEXPART calculations will be prolonged.
Target groups reached: scientific community by presentations at conferences and publications in journals (see section 9).

B) PASPARTOUT will characterise VOCs and partially oxidised VOCs in an unprecedented way and improve the understanding of their degradation pathways and seasonal patterns;

Sampling instrumentation has been set up (**task 2.1**). The development of a target method for VOCs and po-VOCs in TD-GC-HRMS is currently ongoing. Weekly air samples are being taken at PES and will be analyzed with the developed method once they are collected during the next research expedition. We are currently working on design improvements (i.e., air tightness and reduction in power consumption) for two new autosamplers that will be set up during the next research expedition; one at PES and another near the coast. Moreover, a literature review publication on VOCs and po-VOCs in polar regions, their reactivity, effect on secondary organic aerosol formation and future implications in a changing climate is being prepared. From this literature study and previous research a broad range of VOCs and po-VOCs has been selected for which the targeted analytical method will be developed and optimized. Analytical standards for these compounds are purchased when commercially available. Analytical method development is currently ongoing (Chromatographic separation, instrumental parameter optimization (temperature of primary and secondary (microtrap)desorption, temperatures of the interfaces, …), Linearity, Limits of detection and quantification).
Target groups reached: scientific community

C) PASPARTOUT will characterise the seasonal patterns of metals and rare earth elements, and Pb, Sr and Nd isotopes;

Sampling instrumentation has been set up (**task 3.1**).

D) Understanding the seasonal variability in the sources of nitrate in Antarctica through the measurement of nitrate isotopes (δ15N, δ18O, Δ17O);

First snow samples taken. Analyses have been started (**tasks 3.1 and 3.2**).

E) PASPARTOUT will determine the source regions and atmospheric transport pathways of organic and inorganic compounds;

task 5.1: Air mass tracing current climate/meteorology: applying Flextra and Flexpart to present-day conditions.
The air mass origins and pathways have been analysed for the period 2010 to 2020. The connection for aerosols and air mass origin has been analysed, however, not yet for the (in)organic compounds. These also have yet to be analysed, and also the Flextra and FLEXPART calculations will be prolonged.
Target groups reached: Respective results have been presented eg by Alexander Mangold at the EGU2024 conference (see section 9): Scientific community; and at the Belgian science for climate action conference 2024: stakeholders like Belgian Climate Centre, public authorities, private companies.

F) PASPARTOUT will investigate implications and changes to the before-mentioned points within a changing global climate.

Analyses still have to be done.

6. REPORT ON INCIDENCES

6.1. OBJECTIVES OF THE PROJECT

Name any of the Specific Objectives stated in Annex I that have been cancelled or subjected to any changes, explain why and provide alternative(s) if any.

Task 4.1 **Complementary data at coastal site: data from optical particle sizer, disdrometer, meteorology**	
Cancelled / Changed?	Changed
Reason:	To install a disdrometer and an optical particle sizer (OPS) at the coastal site appeared too much energy-demanding; In addition, the OPS was not ready for the campaign due to necessary repairs. However, the meteorology sensor has been installed as planned at the coastal site.
Alternative:	For the particle number, results of the observatory at PES can be used as proxy. For the disdrometer, proxy data from the nearby weather station (wind, snow height, radiation) can be used instead.

NO other tasks or objectives have been cancelled and no changes in schedule and planning.

6.2. COMPLETED TASKS & DELIVERABLES

Tasks completed:
Task 1, Reporting activities for year 1: initial report, progress meetings and annual report submitted.

Task 2.1.1 Operational sequential sampler for (po-)VOCs: one such sampler has been successfully installed at PES during Belare 2023-2024 and is still operational. For the coming Belare campaign, two new autosamplers (with improved design) will be set up, one at PES and another at the coastal site.

Task 3.1.1: Operational sampling system for inorganic airborne particles and snow pit samples taken: During the Belare 2023-2024 campaign, the respective sampling system has been set up successfully at the coastal site and samples from a snow pit have been taken. During the following Belare campaign, further such samples will be collected.

A. Have the tasks been completed as they were intended to?	☒	Yes	☐	No
B. Do deliverables comply their intended characteristics?	☒	Yes	☐	No
C. Have deliverables been handled as described in the DMP?	☒	Yes	☐	No

If your answer is 'no', explain why they have been modified, and how this impacts the rest of the project using the table here below. Duplicate the table as needed. Do NOT include tasks and deliverables that have been completed as intended, which fulfil their intended characteristics, and which have been handled as described in the DMP.

T.X.X.	
D.X.X.X.	
Comments	

6.3. DELAYED TASKS & DELIVERABLES

A. Have any tasks or deliverables been delayed?	☒	Yes	☐	No

If your answer is 'yes', explain the reasons for the delay, how this impacts the rest of the project, and it the delay puts at risk the outcome of the project, possible solutions. Include information regarding the compliance of delayed deliverables with their intended characteristics and state if they are being handled as described in the DMP. Duplicate the table below as needed.

T.5.1.	**Air mass tracing current climate/meteorology: applying Flextra and Flexpart to present-day conditions**
D.5.1.1 and 5.1.2	Back trajectory and dispersion modelling for present-day climate
Comments	Delay in hiring personnel; new personnel will start in M17 of project; model calculations will then be priority and results will be available by M20 (instead of M15); no impact for delay on other deliverables; deliverable still complies with intended characteristics and will be handled as described in DMP.

6.4. ABANDONED TASKS & DELIVERABLES

A. Have any tasks been abandoned?	☐	Yes	☒	No
B. Have any deliverables been abandoned?	☐	Yes	☒	No

If your answer is 'yes', explain why, how this impacts the rest of the project, if it puts at risk the outcome of the project and what is planned to do instead, if applicable. Duplicate the table below as needed.

T.X.X.	
D.X.X.X.	
Comments	

7. REPORT ON DATA MANAGEMENT PLAN

If your DMP has been modified, please submit the new DMP together with this report.

A. Has your DMP been modified?	☐	Yes	☒	No

8. REPORT ON FOLLOW-UP COMMITTEE

8.1. COMPOSITION & ROLE

A. Has the composition and/or role of the Follow-up Committee changed?	☐ Yes	☒ No

If your answer is YES, please fill out following table. Otherwise, delete tables A. COMPOSITION and B. WAY OF WORKING.

8.2. MEETINGS AND DECISIONS TAKEN IN CONCERTATION WITH THE FOLLOW-UP COMMITTEE

PASPARTOUT project members stayed in contact with members of the follow-up committee and discussed also PASPARTOUT related topics. Below we give an overview per member of this committee.

Dr. Somporn Chantara, Chiang Mai University, Thailand, Chemistry Department and Environmental Science Research Center
A meeting is planned for August 2024 to discuss de analytical method development.

Prof. Roland Kallenborn, Norwegian University of Life Sciences, As, Norway, Faculty of chemistry, biotechnology and food science
A meeting is planned in August 2024 to discuss de analytical method development.

Dr. Heike Wex, Leibniz Institute for tropospheric research, Leipzig, Gemany:
Discussion during writing submitted paper of Sauerland et al (Ice-nucleating particle concentration impacts cloud properties over Dronning Maud Land, East Antarctica, in COSMO-CLM²) between Florian Sauerland, Nicole van Lipzig and Alexander Mangold with Heike Wex on the results of the INP measurements and how INP can influence clouds and ice crystal formation.

Dr. Stefania Gili, Princeton University, USA, Geoscience Department
A call was organized in November 2023 for the planning of new sampling and analyses; a new meeting online is planned end of July 2024 to discuss the development of the publication strategy and analysis strategy.

Prof. Yann Sivry, Université Paris Cité, Institut de Physique du Globe de Paris, UMR-CNRS;
E-mail exchange was performed with Prof. Y. Sivry during the Fall 2023. A future meeting will be planned in August 2024 for the samples to be sent to Paris and preparation of the nano-particle analyses at IPGP.

Dr. Ruth Mottram, Danish Meteorological Insitute, Denmark
Dr Ruth Mottram visited KU Leuven on 12 December 2022 and we discussed the project. She also gave a seminar entitled: "Ice sheets in the climate system: becoming comfortable with uncertainty".

9. REPORT ON VALORISATION ACTIVITIES

9.1. PUBLICATIONS

Peer-reviewed publications:

Sauerland, F., Souverijns, N., Possner, A., Wex, H., Van Overmeiren, P., Mangold, A., Van Weverberg, K., and van Lipzig, N.: Ice-nucleating particle concentration impacts cloud properties over Dronning Maud Land, East Antarctica, in COSMO-CLM^2, EGUsphere [preprint], https://doi.org/10.5194/egusphere-2024-1341, 2024.

Van Overmeiren, P., K. Demeestere, A. Mangold, A. Delcloo, H. Van Langenhove and C. Walgraeve, Year-round measurement of atmospheric volatile organic compounds using sequential sampling in Dronning Maud Land, East Antarctica, Atmospheric Environment, 2023), doi: https://doi.org/10.1016/j.atmosenv.2023.120074, 2023.

Van Overmeiren, P., P. De Wispelaere, K. Demeestere, S. Gili, A. Mangold, K. De Causmaecker, N. Mattielli, A. Delcloo, H. Van Langenhove and C. Walgraeve, Four years of active sampling and measurement of atmospheric polycyclic aromatic hydrocarbons and oxygenated polycyclic aromatic hydrocarbons in Dronning Maud Land, East Antarctica, Environ. Sci. Technol., https://doi.org/10.1021/acs.est.3c06425, 2024.

Vanderstraeten, A., Mattielli, N., Laruelle, G. G., Gili, S., Bory, A., Gabrielli, P., Boxho, S., Tison, J.-L., & Bonneville, S. (2023). Identifying the provenance and quantifying the contribution of dust sources in EPICA Dronning Maud Land ice core (Antarctica) over the last deglaciation (7–27 kyr BP): A high-resolution, quantitative record from a new Rare Earth Element mixing model. *Science of the total environment*, 881, 163450. doi:10.1016/ j.scitotenv.2023.163450

Other publications than conference proceedings

The ceilometer and micro-rain radar data have been submitted to the KU Leuven research data repository: https://rdr.kuleuven.be/
Sauerland et al., Ceilometer and MRR observations taken at Princess Elisabeth station, Dronning Maud Land, East Antarctica, doi: 10.48804/07SS6R, 2024.

Nadine Mattielli, Stefania Gili, Sibylle Boxho, Aubry Vanderstraeten, Steeve Bonneville, Christophe Walgraeve, Preben Van Overmeiren, Goulven Laruelle, Aloys Bory, James King, Paola Formenti, Andy Delcloo, Kristof Demeestere, Herman Van Langenhove, Alexander Mangold, Past and Modern Mineral Dust in East Antarctica: faithful tracers of the atmospheric circulation and climate variability through time, ARSOM (Académies Royales de Belgique, Classe des Sciences et Techniques) publication, to be accepted.

9.2. PARTICIPATION / ORGANISATION OF (INTER)NATIONAL SEMINARS, CONFERENCES…

Date	14-19 April 2024		
Name of Event	EGU General Assembly 2024		
Type of Event	☐ National	☒ International	
Contribution as…	☐ Organizer	☒ Speaker	☐ Attendant
Participant(s)	Alexander Mangold		
Institution	IRM-KMI		
Contribution	Mangold, A., K. De Causmaecker, Q. Laffineur, P. Van Ovemeiren, C. Deramaix, C. Walgraeve, N. Mattielli and A. Delcloo, Atmospheric aerosol characterisation at Princess Elisabeth station, East Antarctica, and identifying source regions using backward trajectory modelling, EGU General Assembly 2024, Vienna, Austria, 17-19 April 2024, EGU24-17439, https://doi.org/10.5194/egusphere-egu24-17439, 2024		

Date	14-19 April 2024		
Name of Event	EGU General Assembly 2024		
Type of Event	☐ National	☒ International	
Contribution as…	☐ Organizer	☐ Speaker	☐ Attendant
Participant(s)	Florian Sauerland		
Institution	KU Leuven		
Contribution	Co-Converner of session AS1.13, Clouds, Moisture and Precipitation in the Polar Regions: Sources, Processes and Impacts		

Date	19-20 February 2024		
Name of Event	Belgian Science for Climate Action Conference 2024		
Type of Event	☐ National	☒ International	
Contribution as…	☐ Organizer	☐ Speaker	☒ Attendant
Participant(s)	Alexander Mangold		
Institution	IRM-KMI		
Contribution	Mangold, A., A. Delcloo, N. van Lipzig, C. Walgraeve and N. Mattielli, The PASPARTOUT project: pathways of particles, VOCs and moisture into East Antarctica in a changing climate, Belgian Climate Centre, Belgian Science for Climate Action Conference, 19-20 February 2024, Brussels, Belgium		

Date	16 January 2024		
Name of Event	SEGH seminar		
Type of Event	☐ National	☒ International	
Contribution as…	☐ Organizer	☒ **Speaker**	☒ Attendant
Participant(s)	Nadine Mattielli		
Institution	SEGH		

Contribution	Nadine Mattielli, Stefania Gili, Sibylle Boxho, Aubry Vanderstraeten, Alexander Mangold, Christophe Walgraeve, Preben Van Overmeiren, Goulven Laruelle, Aloys Bory, Andy Delcloo, Steeve Bonneville. Past and Modern Mineral Dust in East Antarctica: faithful tracers of the atmospheric circulation and climate variability through time, recorded Talk online (available on https://segh.net/seghlive-videos), 16th January 2024.

Date	11-20 July 2023		
Name of Event	IUGG General Assembly 2023		
Type of Event	☐ National	☒ International	
Contribution as…	☐ Organizer	☒ Speaker	☐ Attendant
Participant(s)	Heike Wex		
Institution	Tropos Leipzig, Germany		
Contribution	Wex, H., S. Henning, A. Mangold, P. Van Overmeiren and F. Stratmann, The Antarctic continent: quite devoid of ice nucleating particles, IUGG General Assembly 2023, 11-20 July 2023, Berlin, 2023		

Date	24-28 April 2023		
Name of Event	EGU General Assembly 2023		
Type of Event	☐ National	☒ International	
Contribution as…	☐ Organizer	☒ **Speaker**	☒ Attendant
Participant(s)	Sibylle Boxho, Nadine Mattielli		
Institution	ULB		
Contribution	Sibylle Boxho, Nadine Mattielli, Aubry Vanderstraeten, Goulven Laruelle, Sibylle Boxho, Aloys Bory, Paolo Gabrielli, Stefania Gili and Steeve Bonneville: Reading dust provenance record in Epica Dome C Ice Core (EDC) of Antarctica reveals a shift from Patagonian to African sources through the last deglaciation (2.9 – 33.7 kyr), EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023.		
Date	24-28 April 2023		
Name of Event	EGU General Assembly 2023		
Type of Event	☐ National	☒ International	
Contribution as…	☐ Organizer	☐ Speaker	☒ Attendant
Participant(s)	Sibylle Boxho, Nadine Mattielli		
Institution	ULB		
Contribution	Steeve Bonneville**,** Aubry Vanderstraeten, Goulven Laruelle, Sibylle Boxho, Aloys Bory, Paolo Gabrielli, Stefania Gili and Nadine Mattielli: Unveiling the provenance of dust in the EPICA Dronning Maud Land Ice Core (Antarctica) throughout the Last Deglaciation (7–27 kyr BP): A Quantitative Record Using a Novel Rare Earth Element Mixing Model, EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023.		

Date	24-28 April 2023		
Name of Event	EGU General Assembly 2023		
Type of Event	☐ National	☒ International	
Contribution as…	☐ Organizer	☒ Speaker	☐ Attendant
Participant(s)	Florian Sauerland		
Institution	KU Leuven		
Contribution	Sauerland, F., Souverijns, N., Possner, A., Wex, H., Van Overmeiren, P., Mangold, A., Van Weverberg, K., and van Lipzig, N.: Simulating the effects of Ice-nucleating particles in Antarctica in COSMO-CLM², EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023, EGU23-14418, https://doi.org/10.5194/egusphere-egu23-14418, 2023		

Date	10 February 2023		
Name of Event	ARSOM seminar		
Type of Event	☒ National	☐ International	
Contribution as…	☐ Organizer	☒ **Speaker**	☒ Attendant
Participant(s)	Nadine Mattielli		
Institution	Académies Royales de Belgique, Classe des Sciences et Techniques		
Contribution	Nadine Mattielli, Stefania Gili, Sibylle Boxho, Aubry Vanderstraeten, Steeve Bonneville, Christophe Walgraeve, Preben Van Overmeiren, Goulven Laruelle, Aloys Bory, James King, Paola Formenti, Andy Delcloo, Kristof Demeestere, Herman Van Langenhove, Alexander Mangold, Past and Modern Mineral Dust in East Antarctica: faithful tracers of the atmospheric circulation and climate variability through time, ARSOM Assembly, 18 Feb 2023.		

Other outreach activities (General talks, press releases, etc)

- La première radio rtbf interview by Sophie Leonard – 04/12/2023 https://www.rtbf.be/article/nouvelle-mission-en-antarctique-meme-de-tres-loin-on-peut-potentiellement-impacter-lantarctique-11295933
- Quel temps pour la planète émission 12h – 06/12/2023 https://auvio.rtbf.be/media/quel-temps-pour-la-planete-quel-temps-pour-la-planete-3128657?autoplay=true
- BX1 émission 12h30 interview by Vanessa Lhuillier – 08/12/2023 https://bx1.be/categories/news/nouvelle-mission-en-antarctique-rencontre-avec-la-geologue-sibylle-boxho/
- myScience article selon communiqué de presse ULB – 11/12/2023 https://www.myscience.be/fr/news/wire/mission_en_antarctique_de_la_neige_pour_comprendre_le_climat-2023-ulb https://www.myscience.org/news/wire/mission_en_antarctique_de_la_neige_pour_comprendre_le_climat-2023-ulb
- Blog IRM – December 2023 to February 2024 https://ozone.meteo.be/projects/paspartout/expedition-2023-2024

- Journée de la femme ULB portrait – 11/02/2024 https://actus.ulb.be/fr/actus/recherche/mission-antarctique-sibylle-boxho-chercheuse-en-geosciences?fbclid=IwAR3DGUlOV3LniIdGH3E5s6OiOLEePFgEUiZpEoM1Vo41WC6t4wOlGpNAlxo
- JDE interview Cédric Jacqmin – 07/03/2024 / Journal digitale pour les 9-13 ans https://www.lejde.be/journal-digital/
- RTL JT 19h interview Claire Carosone – 26/02/2024 https://www.rtl.be/page-videos/monde/mission-en-antarctique-rencontre-avec-la-jeune-geologue-sibylle-boxho/2024-02-26/video/642194 https://twitter.com/PolarFoundation/status/1762494147741753804
- Animation asbl Jeunesse Scientifique – 16/03/2024
- Athena Magazine interview Thibault Grandjean – not yet diffuse

- Nadine Mattielli, Stefania Gili, Sibylle Boxho, Aubry Vanderstraeten, Alexander Mangold, Christophe Walgraeve, Preben Van Overmeiren, Goulven Laruelle, Aloys Bory, Andy Delcloo, Steeve Bonneville. Past and Modern Mineral Dust in East Antarctica: faithful tracers of the atmospheric circulation and climate variability through time, recorded Talk online (available on https://segh.net/seghlive-videos); 16th January 2024
- Publication "12 mois 2024 - 12 experts - ULB", Camille Stassart du Daily Science, https://www2.ulb.ac.be/liseuse/12_mois__12_expert-es_2024/
- Sibylle BOXHO[1], Nadine MATTIELLI[1], Paula LAMPREA PINEDA[2], Christophe WALGRAEVE[2], Florian SAUERLAND[3], Nicole VAN LIPZIG[3], Andy DELCLOO[4], Alexander MANGOLD. Paspartout project in the BELARE 23-24 focus on ULB part - Pathways of particules, VOCs and moisture into East-Antarctica in a changing climate, (Talk), AABBAA - 21/03/2024, ULB, Belgium.
- Mangold, A., Onderzoek in Antarctia en aan het Prinses Elisabeth station, Talk (in Dutch) to students of 5th and 6th school year from Dilbeek, Belgium, 26 February 2024, Uccle, Belgium
- Mangold, A., Ozone and UV in Antarctica, Asgard XI, European Space Education Resource Office, weather balloon launch competition for schools, talk and discussion with students from international secondary schools, 23 March 2023, Uccle, Belgium

9.3. SUPPORT TO DECISION MAKING (IF APPLICABLE)

The connection between scientific research on Antarctica and policy is largely managed by the Scientific Committee on Antarctic Research (SCAR). Belgium is a Full Member of SCAR, represented by the Belgian National Committee on Antarctic Research (BNCAR, http://www.bncar.be/bncar/). Profs. Nicole van Lipzig, C. Walgraeve and N. Mattielli, and Drs. Alexander Mangold and Andy Delcloo are members of BNCAR and have been following the meetings to ensure that all scientists involved are aware of the on-going research.