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Ea h a d Life Scie ce

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Quality of the findings

The visibility of the (New) Netherlands Polar Programme in the Dutch scientific community is successful. The programme is well organised and clearly structured by means of four themes that tie in with national and international research agendas. With respect to the size of the themes there appears to be an imbalance between themes 1, 2 and 3 and the fourth theme "Human sciences and changes in polar areas".

The themes and policy priorities are an updated continuation of the previous NPP and IPY themes and that has ensured continuity within the programme. This has had a stabilising effect on the implementation and realisation of the NNP/NNPP. Due to the ongoing support, the Netherlands has become an important, sought after and clearly visible research and discussion partner with respect to polar activities. This is borne out, for example, by the chairmanship of the Legal & Institutional Working group of the Antarctic Treaty Consultative Meeting, the observer's role in the Arctic Council and the recent housing of the European Polar Board.

Via existing partnership agreements and sustainable mainly logistical collaboration with a number of countries, the NNP/NNPP has acquired access to both polar areas and to a high-quality research infrastructure. The construction of the Dirck Gerritsz Laboratory has met the existing need for a higher contribution to polar logistics and infrastructure particularly well. The further opening up of the North Pole area, as a result of which even more research will take place there, could be a reason for preserving funding for a new Dutch polar station on Spitsbergen.

The interaction between researchers and policy makers does not occur automatically and there is too little matching and active communication. In this regard a clear discrepancy was encountered between what many researchers think is relevant for policy and what the policy makers expect to receive as information to support or adjust their policy. Matching and interaction can be improved in various phases: in the drafting phase of an application, during the assessment of the policy relevance and in the realisation phase of research awarded funding.

NWO is a very suitable and successful administrator of the NNP/NNPP. Various stakeholders have explicitly stated their appreciation of the manner in which the NNP/NNPP is being realised and have said that the realisation of the NNP/NNPP in period 2009-2014 has been professionalised. It is positive that several government ministries are actively involved in the NNP/NNPP.

The division of funds across science-driven and policy-driven research is disproportionate but in view of the origin of the funding understandable.

The choice to invest relatively little in an own large infrastructure has had positive effects: it stimulates researchers working with other countries and has led to the development of new productive partnerships. The involvement in campaigns organised by other countries has also led to a broader dissemination of insight and ideas and facilitates a global overview of the research. The costs of good

2 Introduction

2.1 Background and objectives

For scientific, national, and foreign policy reasons, the Netherlands aims to fund a clearly visible and respectable scientific research programme for the purpose of acquiring knowledge about the polar areas and the effects of changes in these regions on our own living environment. The Netherlands has a consultative status to the Antarctic Treaty since 1990 and highly values its observer status in the Arctic Council. Four ministries are involved in the Netherlands' polar policy: the Ministries of Education, Culture & Science, Infrastructure & Environment, Foreign Affairs, and Economic Affairs.

2.2 The Netherlands Polar Programme

Dutch scientific research in the polar areas is organized and implemented through a national research programme. This Netherlands Polar Programme (NPP) originates from 1984, when it only comprised Antarctica. In 2002 an Arctic component was added, the Netherlands Arctic Programme. In 2010 the NPP (the Antarctic and Arctic component) was financially and administratively restructured to become the current New Netherlands Polar Programme (NNPP), which aims to encourage, fund and coordinate high-quality scientific research in and into the polar areas. The NNPP is jointly financed by the ministries responsible for the Netherlands' polar policy and the Netherlands Organisation for Scientific Research (NWO). The NNPP operated with an annual budget of 3.7 M€.

The Earth and Life Sciences division of NWO (in short: NWO) is responsible for the coordination of all NNPP-activities, including logistic support and maintaining an international network. For research funded within the NNPP a distinction is made between science-driven and policy-driven research. The NNPP focuses on four main research themes

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3.1 O li e a d c ai

The CWTS analysis discussed below indicates that Dutch polar publications are well cited and relatively often appear in top-tier journals. It is also consistent with studies from Aksnes et al 2009⁵ and Ji et al 2014⁶. The committees' positive view of Dutch polar projects was further supported by the policy representatives who were interviewed: results from Dutch polar research are used in (inter)national

In terms of output, the CWTS analysis shows that the annual number of Dutch polar publications has increased from 37 in 2000 to 104 in 2012 (Figure 1). In total the Dutch polar community published

Top 10 Polar citations, normalized for field and year

	Country	Score
1	Switzerland	1,73
2	USA	1,64
3	Netherlands	1,51
4	United Kingdom	1,50
5	France	1,27
6	Australia	1,27
7	Germany	1,20
8	Belgium	1,16
9	Austria	1,16
10	Canada	1,14

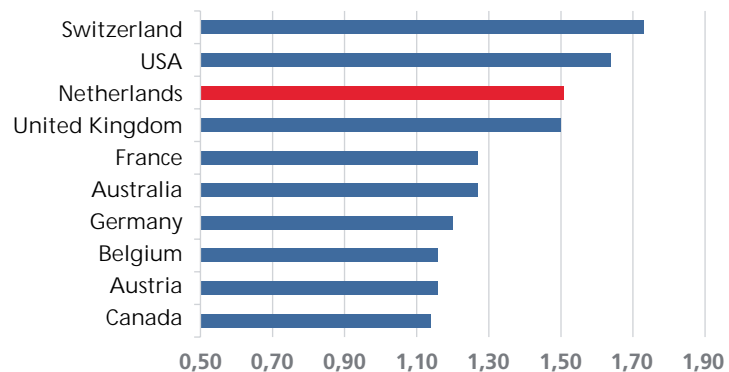


Fig e 2 Citation impact MNCS. The average number of citations of the polar research publications of a country. Citations have been normalized for field and publication year. An MNCS value of 2 for instance means that the polar research publications of a country on average have been cited twice as frequently as the average of their field and publication year.

Top 10 proportion of 10% most frequently cited polarpublications in a field

	Country	% in top	Total #
1	Switzerland	20,5	514
2	USA	18,1	13631
3	Netherlands	16,7	826
4	United Kingdom	16,1	4882
5	France	13,4	2094
6	Ireland	12,8	103
7	Australia	12,7	2162
8	Germany	12,6	3772
9	Belgium	12,5	499
10	Austria	12,1	201

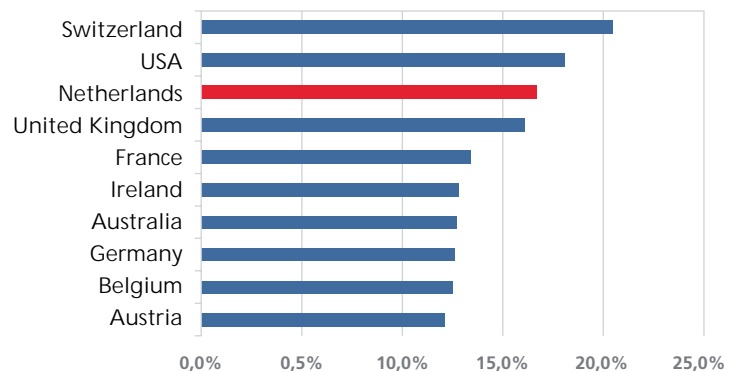


Fig e 3 Citation impact PP: The proportion of the polar research publications of a country that belong to the top 10% most frequently cited of their field and publication year.

Top 10 citation of journals in which polar publications appeared, normalized for field and year

	Country	Score
1	Switzerland	1,54
2	Netherlands	1,42
3	USA	1,38
4	France	1,37
5	United Kingdom	1,37
6	Germany	1,22
7	Australia	1,22
8	Ireland	1,22
9	Denmark	1,17
10	Sweden	1,16

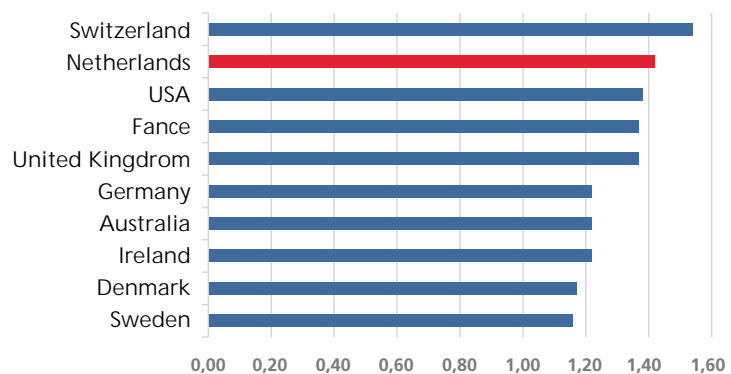


Fig e 4 Citation impact MNJS. The average number of citations of the journals in which the polar research publications of a country have appeared. Citations have been normalized for field and publication year. An MNJS value of 2 for instance means that the polar research publications of a country have appeared in journals that on average been cited twice as frequently as the average of their field and publication year.

To examine international collaboration involving Dutch polar scientists, the proportion of the Dutch polar research publications that involve collaboration with one or more other countries was calculated. With a proportion of 77.2% the Netherlands are among the top 10 most collaborative nations in polar research, the top three being Greenland followed by Ireland and Switzerland. While the value of collaboration in science is clear, the extent of collaboration necessary may differ per country. For instance, the Netherlands has a limited number of research groups engaging in polar research, international collaboration is therefore of great importance. At the same time nations such as the United States have sufficient manpower and facilities to operate individually. Taken together, the high collaborative nature of Dutch polar research is crucial for the quality of Dutch polar research and a prerequisite for its success.

3.2.2 Realisation of the ambition

Considering the ambitions regarding the quality of research as expressed in the Masterplan Pole position-NL, the following has been achieved during 2009-2014.

All calls for proposals, both science-driven and policy-driven, have had a focus on the four themes (mentioned in Chapter 2). The selection process resulted in a funding of proposals with the highest scientific quality in science-driven calls. The main application areas for the policy-driven calls for proposals that were specified in the Masterplan Pole position-NL were not applied specifically. The

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3.2.3 Highligh

Over the years the Dutch polar research community has made excellent contributions to priorities set on national and international polar research agenda's, such as climate change and sea-level rise, and the impact of human activity on the cryosphere, on the polar marine and terrestrial ecosystems. In addition to a substantial number of high profile papers, several scientific highlights were mentioned by the PIs representing the different research themes. Among others, the achievements in theme 1 were praised by the committee. For instance, important internationally recognized steps were made in interpreting satellite data, new proxy benchmarks were established in ice core measurements for climate change, and advances were made in modelling of regional sea level rise. The latter are now used by the Intergovernmental Panel on Climate Change (IPCC). In October 2014 one of the top researchers within this theme was awarded the Louis Agassiz Medal of the European Geosciences Union 2015.

Within theme 2, major progression has been made regarding trace element research and relating unique facilities; among others within the international project GEOTRACES that has resulted in a special issue of the journal *Deep Sea Research*. One of the labs in the Dirck Gerritsz Laboratory is an ultra-clean lab specifically designed to conduct trace element-research. For this purpose ultra-clean equipment was developed, such as a titanium winch for taking water samples in Marguerite Bay, close to Rothera Research Station. One of the PhD students whose research was funded by specific International Polar Year (IPY)-funding within the Netherlands Polar Programme received the Heineken Young Scientist Award in October 2014.

The scientific representatives of theme 3 are particularly positive about their research in cluster I, which is supported by their attractiveness as collaborative partner for other international research groups including the British Antarctic Survey. Considering the limited manpower within this theme the output has been high. A yearly symposium is held to facilitate collaborations, but the researchers stress that collaboration in the field is paramount.

The representatives for theme 4, who both have a legal background, stressed that the *Netherlands Institute for the Law of the Sea* (NILOS) from Utrecht University has strong scientists who contribute to the NNPP. Highlights made possible by the NNPP-funding include the book *"Interactions between Global and Regional Regimes: Trends and Prospects"* and an international workshop in 2012 on sea law that discussed the relationship between global regimes and the specific regimes in the polar areas. These results enhance the profile and prestige of Dutch researchers in the international research field and illustrate that within legal research significant results can be achieved with a relatively modest budget. Nonetheless, the committee notes that while sufficiently strong individual researchers, including anthropologists, tourism and legal researchers, are active within this fourth theme, focus and mass beyond the Arctic Centre seems limited. The NNPP could play a role here in organizing a conference on theme 4 to bring together the different research fields that potentially could be financed within theme 4.

3.2.4 NNPP cie i

"Scientific quality of the research team" is one of the criteria used in the assessment of NNPP applications. As such, the procedure facilitates the selection of high quality researchers. Indeed, in the field of polar research the NNPP laureates are internationally well respected and their work is frequently cited. Furthermore, the available output indicates that NNPP researchers are highly collaborative and have a strong international presence. As such, they are important for the visibility of Dutch polar research in the (inter)national arena.

During the stakeholder interviews several participants underlined that the individual excellence of the researchers is essential to conduct research in the polar areas. Due to the isolated position of, and extreme circumstances in the polar regions, polar research necessitates intensive preparation and

collaboration to gain access to specific facilities and infrastructure. The excellence of the researchers is an important prerequisite to act as an equal partner to international collaborators that own these facilities.

The evaluation committee subscribes to the high quality of research executed by Dutch polar researchers. A potential pitfall is, however, that a number of these scientists tend to act on highly individual basis. This may impede inter-institutional and interdisciplinary collaboration within the Netherlands. Indeed, the committee has seen only limited evidence for cooperation between different disciplines or coordination between the awarded projects. As is further discussed in section 3.3.2, over the last five years small steps have been taken to stimulate collaboration within the NNPP by means of the core programme call for proposals in 2012. The committee recommends using the NNPP to increase collaboration and stimulate interdisciplinarity within Dutch polar research.

3.3 Quality of the programme

The funded NNPP projects range from focused to holistic approaches, span both polar areas and were financed from both cluster 1 (science-driven research) and cluster 2 (policy-driven research). In this diversity of projects, theme 1 "*Ice, climate and sea level*" is most dominantly present.

In the interviews, the different stakeholders commended the professionalization and rationalization of the modus operandi of the NNPP that was realized by NWO over the last five years. Aside from some criticism that is addressed below, the NWO operation of the NNPP is widely supported by the stakeholders. The programme as a whole is well structured, creates unity, and promotes international visibility. The calls for proposals were relevant and have been formulated in consultation with the stakeholders. The assessment procedure for science-driven proposals is well accepted. The assessment for policy-driven proposals is less accepted by the research community, however, important improvements have been made: A separate policy assessment committee was founded composed of

With the involvement of four ministries the programme is strongly anchored in the Dutch government. Furthermore, by signing the Antarctic Treaty the government is obligated to execute Antarctic research. Through renewed memorandums of understanding (MoU) with the British Antarctic Survey and Alfred Wegener Institute, in addition to the realization of the Dirck Gerritsz Laboratory at Rothera Research Station, durable access to polar facilities is ensured.

There is no doubt that NWO is the appropriate assignee to execute the New Netherlands Polar Programme. At the same time NWO is open to constructive partnerships and collaborations to further strengthen the programme. Capacity from outside (Dutch researchers) was hired to support a number of policy-related activities.

Maintaining continuity in scientific themes has contributed to the stability of the programme, and allowed the Netherlands to become an important research partner and interlocutor in polar activities. This international role is further emphasized by the recent decision to host the European Polar Board Secretariat in the NWO headquarters. Overall, the polar programme has successfully enhanced the international visibility of Dutch polar research; it has resulted in high quality output and increased focus and mass within Dutch polar research.

3.3.2 S e g a d b a l a c e i h i h e g a p e

The selection of four overarching research themes was necessary to guarantee the continuity of Dutch polar research. The decision to focus on these themes was logical and just, given that the themes are based on areas of expertise within the Dutch Polar research

Taken together, it appears that the interface between polar research and policy is underdeveloped in the Netherlands, which hampers knowledge exchange. As such, the different perspectives of the scientific community on the one side and the policy representatives on the other are a crucial issue that needs to be dealt with in order to secure the success of the policy-driven cluster of the NNPP.

3.3.4 P l a i f a c e

An ongoing discussion is whether to invest in polar infrastructure. As was addressed earlier, the limited investment in infrastructure is seen as a strength of the New Netherlandtk.6l.rog. Fromes of9ur

Unfortunately, it remains largely unclear to the committee how knowledge transfer between the different projects is organized in the NNPP. In general, valorisation of results and mechanisms to support valorisation are matters that deserve more attention in the NNPP. Lessons can be learned from best practises from other countries, such as Belgium.

In order to increase the yield of the NNPP budget, focus and mass within the Netherlands Polar Programme was pursued. In the Masterplan this goal was envisioned by means of core-programmes. This instrument was expected to facilitate integration and interdisciplinarity in the Dutch polar research community. Unfortunately, the actual received NNPP budget was lower than calculated and therefore the NNPP-core programmes were downsized. The committee supports this choice and indicates that directing funds to the core-programmes should not jeopardize independent research. A negative consequence of downsizing the core-programmes is that their impact could not live up to the ambitions of the Masterplan. To fulfil their full potential, additional funding is required. Furthermore, each project within a core programme was assessed individually. To facilitate synergy, however, the core-programmes should be assessed as a whole.

NWO takes part in the economic priority areas-policy (Topsectorenbeleid) of the current Dutch government. Within nine designated sectors, the collaboration between companies, researchers and the government is being encouraged. Within the Dutch polar research, several activities are ongoing that fit within (one of) the economic priority areas. There is also clear interest from the industry, however collaboration is still limited. As such, it is worthwhile to explore the opportunities the economic priority area-policy may offer. Nonetheless, the scientific community indicates that caution is warranted and fundamental research and scientific independence should be protected. The committee agrees that the economic priority area-policy can only be included as an addition to the Netherlands Polar Programme and should not threaten the already limited budgets for fundamental research. As outlined in section 3.4.1, the committee sees a clear role for the Ministry of Economic Affairs here.

3.4 Di b i f f d

The Masterplan Pole position-NL requested the budget for the NNPP in the period 2010-2015 to be 10 million euro annually, including a five-year "rolling contract". A budget of this size would be required for the Netherlands to be regarded as a strong international collaboration partner, it would allow crucial long-term investment agreements, and it would secure continuity for the programme.

Although the Terlouw Committee advised an annual investment in polar research of 6.5 million euros, the actual budget achieved was 3,7 million euro per year. While this is significantly lower than the budget proposed in the Masterplan Pole position-NL, the funding-level was such that it could sustain the level of funding realized during the IPY. However, as is elaborated on in the next section, there is much concern regarding the continuity of funding.

Researchers stress that NNPP-funding is important for the branding of Dutch Polar research, that is, for the international visibility of Dutch Polar research. In addition, NNPP-funding is crucial for maintaining and building expertise and for creating focus and mass within polar research in the Netherlands. For many PIs, the NNPP funding is indispensable for their polar research. Others have additional sources of funding, but rely on the NNPP to complement and extend their research. Overall, funding from the New Netherlands Polar Programme is crucial to maintain continuous high quality polar research in the Netherlands.

It is clear that due to the difference between the requested and the actual budget, some of the ambitions from the Masterplan could not be realized. For instance, the number of core-programmes was reduced: only one call for proposals was organized to finance core-programmes and this concerned

only science-driven research. Also no specific calls for proposals were organized specifically aimed at 'innovative research', and less investments were made than envisioned in international collaboration: the collaboration with Norway concerning an ESFRI-project (SIOS) was not executed and the NNPP did not take part in transnational calls for proposals. Investments made for international collaboration were mainly aimed at deepening the already existing partnerships with the United Kingdom and Germany. The committee supports the choices that were made to secure the integrity of the programme within the reality of limited funding. Furthermore, it underscores that despite the limitations, the amount of activities that was executed and the research projects that were funded was quite large.

Regarding the projects that received NNPP funding, it is clear that the available resources have not been evenly distributed over the four themes. The theme

Advisory Committee

Evaluation Committee

Dr Hessel Speelman (chair)	The Wadden Academy
Prof. Magda Vincx	Gent University
Mrs. Maaïke Vancauwenberghe	Belgian Science Policy Office
Prof. Arjen Stroeven	Stockholm University
Prof.dr. Jurian Edelenbos	Erasmus University Rotterdam
Liesbeth Noor/ Dr Jelte Wouda (ex. Secretary)	NWO Earth and Life Sciences

Stakeholder Involvement

Dr R.S.W. van de Wal	Utrecht University, PI theme 1
Prof. H.A.J. Meijer	University of Groningen, PI theme 1, member NPC
Prof. H.J.W. de Baar	University of Groningen, PI theme 2
Dr J. Stefels	University of Groningen, PI theme 2, member NPC, national delegate in SCAR
Dr M.J.J.E. Loonen	University of Groningen, PI theme 3, Station manager Dutch polar station Spitsbergen
Prof. J. Rozema	VU University Amsterdam, PI theme 3, former member NPC
Prof. A. Oude Elferink	Utrecht University, PI theme 4, member NPC
Prof. C.J. Bastmeijer	Tilburg University, PI theme 4
Prof. H.J.P. Eijsackers (em)	VU University Amsterdam, Chair BOC policy-relevance/ chair new strategy NNPP
J.M. de Vries	Chair NPC
Dr J. Rokx	Ministry of Education, Culture and Science, member IPO
J. Splinter	Ministry of Foreign Affairs, ex. secretary IPO
D. van der Kroef	NWO-ALW, Manager NNPP, member EPB and COMNAP

Abstract

Scientific Evaluation of the Netherlands Polar Programme (NNPP) 2009-2014

The quality of the Netherlands Polar Programme is regularly evaluated. The period 2000-2004 was covered by the Report on the Scientific Evaluation of the Netherlands Polar Programme 2000-2004. After that an internal evaluation of the programme took place for the period 2005-2010. In March 2010 another evaluation of the Netherlands Polar Programme (NPP) 2007-2010 was published by the Terlouw Committee. In this evaluation the emphasis was on policy aspects. As recommended by the Terlouw Committee, the NPP was continued in the line of the Master Plan Pole Position NL. With this, considerable changes took place during the period 2010-2014 in the organisational structure, policy and scientific content. In view of the focus of the Terlouw committee on the policy aspects it is important that the current evaluation focuses on the scientific aspects.

Read the following

Periodic evaluations of the scientific quality are vitally important to encourage the highest quality and safeguard and improve the quality within the (New) Netherlands Polar Programme (NNPP). In this regard NWO distinguishes the following explicit reasons:

- An Antarctic research programme is a condition for being a Consultative Party to the Antarctic Treaty. The Arctic research is vitally important for the position of the Netherlands as a discussion partner in the Arctic Council. To safeguard these positions the Netherlands has an obligation to carry out high-quality polar research. Furthermore, an evaluation has been made compulsory under Article 7 of the Ministry of Education, Culture and Science's Decree Antarctic Research from 9 March 2010.
- In 2015 the theme period 2011-2015 of the NNPP will end. The evaluation is therefore important for the scientific and financial considerations that must be made with respect to the continuation of the NNPP.

Additional objectives

- The evaluation should provide an assessment of the scientific quality, relevance and impact of the NNPP.

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Table of Reference

The questions that the evaluation will have to answer are:

1. What is the quality of the research funded?

- What is the quality and quantity of the publications emerging from the NNPP?
- What is the quality of the polar researchers awarded funding?
- Which scientific results have been achieved?

2. What is the quality of the programme?

- In the Master plan four themes were given priority. Was this the right choice?
- What is the scientific impact of the NNPP from a national and international perspective?
- Has the right balance been found between science-driven and policy-driven research?
- Have the recommendations of the Terlouw Committee that fall within the scope of this scientific evaluation been implemented?
- How does the programme relate to national and international research programmes and knowledge agendas?
- To what extent is there synergy within the NNPP?
- Are the organisational structure and the policy surrounding the NNPP adequate?

3. Have the available funds been well used?

- Was the financial contribution to the NNP/NNPP effective and sufficient?
- Is the balance between the policy-driven and science-driven research in line with the objectives?
- Do the main themes sufficiently tie in with the scientific expertise and the gaps in knowledge?
- Less money was available than had been budgeted for. What were the consequences of this?
- There was a need to contribute more to logistics and infrastructure. Has this been realised?
- Is there sufficient continuity in the funds available and does that also hold for the future?

Appendix 4 Antarctic

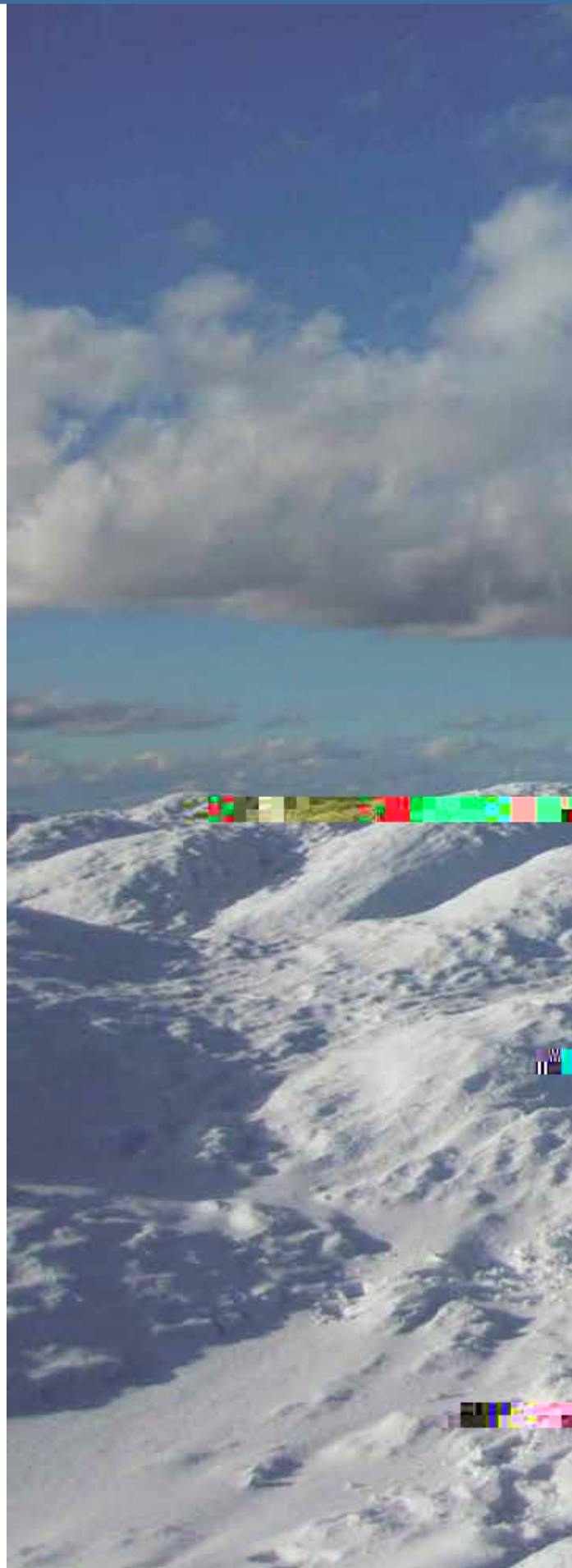
AIV	Advisory Council on International Affairs
ALW	(NWO Division) Earth and Life Sciences
AMAP	Arctic Monitoring and Assessment Programme
AWI	Alfred Wegener Institute
BAS	British Antarctic Survey
BOC	Assessment Committee in a call for proposals
CAFF	Conservation of Arctic Flora and Fauna
COMNAP	Council of Managers of National Antarctic Program
CWTS	Centre for Science and Technology Studies
EPB	European Polar Board
ESFRI	European Strategy Forum on Research Infrastructures
IPEV	Institut Polaire Français Paul Emile Victor
IPO	Interdepartmental Polar Consultation
IPY	International Polar Year
NNPP	New Netherlands Polar Programme
NPC	Netherlands Polar Committee
SCAR	Scientific Committee on Antarctic Research
SDWG	Sustainable Development Working Group
SIOS	Svalbard Integrated Earth Observing System

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Visiting address:
Laan van Nieuw Oost-Indië 300
2593 CE The Hague

Postal address:
P.O. Box 93510
2509 AM The Hague
T: 070 344 07 82
E: alwnpp@nwo.nl
W: nwo.nl/npp

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