



# National Center for Climate Research

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Strategy 2024-2028

Global insight, local value



Danish Meteorological Institute

# FOREWORD

As the National Center for Climate Research (NCKF) at the Danish Meteorological Institute (DMI) we are proud to establish, collect and communicate information as climate scientific advisor to the Danish government.

This strategy is a commitment to spearhead global climate insight and apply it to create local, societal value. We seek to be an internationally recognized climate research institution and deliver useful knowledge that support the robustness of the Danish society.

We have a great starting point. In 2023 an external review provided a favorable assessment of NCKF including useful recommendations. With this new strategy, we will continue our high-quality research and data provision, external collaborations and our engagement with stakeholders. We have had period of strong growth and will now work towards consolidation and sustainability. We will also pursue a number of significant changes.

*We will* document more of our scientific output, but we will focus more on raising the quality than the quantity.

*We will* prioritize scientific resources to support strategic goals. This implies increased effort in some areas at the expense of others resulting in a focused scientific direction, connected internal strengths and synergies.

*We will* continue our scientific strongholds in global, regional and polar climate, and engage in external research projects to amplify the outcomes of our basic funding. In the coming years, we will particularly prioritize advancing climate research, climate services and operational services tailored to meet societal needs in Denmark.

*We will* better understand and meet the growing demand for climate information from government, municipalities and key sectors in Denmark. We aim to establish non-research collaborations and strive to catalyze adaptation progress across key sectors of society.

*We will* develop a strong, common mind-set that we do both research and advice. Together, everyone in NCKF will do their part to bridge the gap between science and local knowledge application.

*We aim* at becoming world-class in selected key areas of climate science and simultaneously becoming world-class in using our insight to support a sustainable society.

We are proud to present our first multi-annual strategy. It is accompanied by a description of our research areas and approaches in "*Key Research Areas 2024-28*".



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## GLOBAL INSIGHT, LOCAL VALUE

### VISION

World-class in climate science, world-class in supporting society

### MISSION

The mission of NCKF is to carry out relevant high-quality and impactful applied climate research which through monitoring, modelling and analysis provide knowledge and data that is effectively communicated in support of informed decision-making and create value for society

### KEY RESEARCH AREAS

Future extreme weather and societal resilience  
Polar climate change and impacts  
Global warming and tipping points

### STRATEGIC OBJECTIVES

Higher research impact  
A stronger national climate science advisor  
Support societal climate transformation  
Stronger use of cutting-edge technology and more robust IT-support  
A more effective and dynamic organization

# INTRODUCTION

Climate change and extremes are among society's greatest current and future challenges. Addressing this entails a deep understanding of the state and changes of the atmosphere, oceans, water, land, ice sheets and sea ice. In pursuit of a sustainable future, emphasis must be placed on creating collective awareness, knowledge and ability to act. This involves not only unfolding the complexities of climate change and weather extremes but also communicating insights widely. By fostering a broad understanding, we can empower decision-makers and support a resilient society.

The National Center for Climate Research (NCKF) at the Danish Meteorological Institute (DMI) builds upon DMI's extensive experience in climate research and development, operational monitoring and forecasting and operating in close collaboration with other departments at DMI, as well as national and international agencies and institutions. NCKF contributes to elevating the level of knowledge through in-house and joint research projects and with an increasing pool of PhD-students in collaboration with universities, authorities, and various scientific institutions in the Kingdom of Denmark.

The research and data from NCKF serves a societal purpose of supporting transformations towards climate resilience, such as adaptation and mitigation of climate change. We adopt a broad understanding of climate research, which also includes operational aspects. Through monitoring, modelling, and analysis, we conduct impactful research and development to deliver authoritative scientific knowledge and data related to both long-term climate scenarios for planning and decision-making and provision of data for operational needs for society's safety and security. In this regard, NCKF supports DMI to provide better weather, ocean and sea ice warnings based on research in local impact, remotely sensed observations, forecast and prediction in order to support decision-making and preparations for hazardous events.

In collaboration with other parts of DMI, NCKF serves as the climate scientific advisor to the Danish Government, playing a crucial role in supporting informed decision-making at all levels of the Government and in the public domain. At a high level, we advise government decisions and initiatives and at a local level we support Danish municipalities.

We strive to bridge the gap between climate research, other disciplines, and practical applications by actively engaging with stakeholders, fostering interdisciplinary collaboration and delivering climate services as well as operational services. We aim to

provide knowledge, data, and advice that facilitate effective strategies for adaptation, the green transition, and societal security, and we engage in public outreach and communication to address the challenges posed by climate change and weather extremes.

With this strategy, we build on great achievements already made. We have achieved internationally competitive and in some areas internationally leading research. We have established a new organizational setup with a secretariat and advisory unit alongside three research units. It is vital to make the best of our new setup.


A number of new directions is set out in this strategy. Among other things, we raise our ambition in terms of leading climate research agendas and achieving high impact publications. We will ensure that our excellent scientists not only do research but also engage in informing policy makers and stakeholders to achieve tangible positive impact at a local level. We will ramp up our efforts to service the Danish society and key sectors. We will ensure that our research is relevant to stakeholders and lead our scientific work as a joint effort towards common goals. We will ensure team spirit and combine the minds of researchers and non-researchers to reach our goals.

This strategy looks ahead to 2028. We will evaluate ourselves, our efforts, and quantitative targets in 2028. We will further establish a roadmap with relevant and concrete initiatives within the following five prioritized strategic objectives and make quarterly reviews to track progress.









# Summary of Key Research Areas 2024-2028

## Future extreme weather and societal resilience

- Extreme weather in Denmark and attribution to climate change
- Climate Services, monitoring and impacts of climate change
- The green transition and greenhouse gas emission mapping

## Polar climate change and impacts

- Ice sheet retreat and the changing climate in Greenland and Antarctica
- Sea level rise – sources and impacts
- Sea ice decline, polar amplification and maritime safety

## Global warming and tipping points

- Global atmospheric dynamics and European weather patterns
- Ocean predictability – variability and long term change
- Risks and impacts of climate tipping points

“ *We aim at becoming world-class in selected key areas of climate science and simultaneously becoming world-class in using our insight to support a sustainable society.*

## STRATEGIC OBJECTIVES

## PRIORITIES

	<b>Higher research impact</b>	<ul style="list-style-type: none"><li>• Higher impact through scientific publications</li><li>• Stronger leadership in the international scientific projects</li><li>• Increased visibility of data and climate information</li><li>• More active engagement in IPCC</li></ul>
	<b>A stronger national climate science advisor</b>	<ul style="list-style-type: none"><li>• Enhance climate information to support governmental decision-making</li><li>• Increase public awareness through stronger communication</li></ul>
	<b>Support societal climate transformation</b>	<ul style="list-style-type: none"><li>• Enhance climate services in Denmark</li><li>• Engage in new strategic partnerships in Denmark to support societal impact</li><li>• Support climate services in selected African countries</li><li>• Cooperate in the Arctic, with Greenland and Nordic countries to strengthen climate services</li></ul>
	<b>Stronger use of cutting-edge technology and more robust IT-support</b>	<ul style="list-style-type: none"><li>• Expand the use of digital technologies and machine learning</li><li>• Invest in internal IT capabilities and best practices</li><li>• Increased and dedicated IT-support to researchers</li></ul>
	<b>A more effective and dynamic organization</b>	<ul style="list-style-type: none"><li>• A more attractive and inclusive workplace</li><li>• Improve administrative support and information flows</li><li>• Advance strategic leadership and personnel management</li></ul>





# 1

## Higher research impact

**We aim to maintain internationally competitive applied research and development, and will achieve higher scientific impact through scientific publications and increased visibility of datasets, analyzes, and assessments.**

NCKF produces high-quality research outputs, including scientific articles and datasets, to advance the scientific understanding of the climate system and provide the required knowledge to support decision-making for a climate resilient society. While we are internationally competitive in our research activities, and internationally pioneering in some areas, we have potential to achieve a higher research impact, including through publications and enhanced visibility.

## STRATEGIC PRIORITIES

### Higher impact through scientific publications

NCKF's peer-reviewed publications are key to document scientific excellence and robust scientific advances. While publication in scientific journals is a prioritized activity, we emphasize a balanced approach. We seek to publish in all NCKF's research areas and increase the number of publications, especially through publications in areas where we rarely publish today. However, we will put more emphasis on quality and impact over quantity at the individual and topical level. For our already well-developed and frequently published activities, we aim to achieve a higher scientific impact rather than publishing even more.

*1.1 Publish at least three scientific publications per year in high-impact-journals*

*1.2 Increase average scientific publications to at least one per researcher per year*

### Stronger leadership in the international scientific projects

NCKF aims to keep our research relevant and fit-for-purpose in order to strengthen state of the art knowledge and provide the best advice to decision makers and the public. We will at all times engage in a high level of externally funded projects to amplify our core funding and key research areas, but not too high in order to avoid a vulnerable financial situation. To achieve a higher research impact, we will engage in scientifically leading roles in projects and themes where we have scientific strongholds. NCKF will contribute with more leading roles in application processes and research consortia, and engage actively in working groups and fora defining global research goals in our key research areas. This requires appropriate research planning, organizational support for applications and research projects, and training of research leadership at all levels. This applies especially to younger researchers to strengthen their skills and the chain from being executing researchers to eventually, take on leading roles in connection with work packages or at consortium levels.

*1.3 Achieve above 30 percent, but no more than 50 percent external funding of total funding on average*

*1.4 Lead at least five large research projects*

### **Increased visibility of data and climate information**

We will enhance the accessibility of our scientific knowledge, research findings, code, and data to ensure transparency, applicability, visibility, and re-use and compilation of data for multiple purposes. We work in line with the FAIR principles and aim to make data permanently accessible and citable on updated versions of internal platforms (NCKF.dk, Klimaatlas.dk, Polarportal.dk, ocean.dmi.dk, research.dmi.dk – or future alternatives) as well as through international solutions (e.g. *ESGF* for *CORDEX* and *CMIP*, *Copernicus Climate Data Store*). Further, we want to produce more graphical material as a way to better communicate and achieve higher impact in both the scientific community and the wider society.

*1.5 All relevant and robust datasets are accessible, documented, and increasingly graphical*

### **More active engagement in IPCC**

NCKF aims to better utilize and align DMI's role as the Danish IPCC Focal Point with NCKF research and the broader Danish climate community – thereby using our focal point role as a stepping-stone for national as well as international collaboration, including increasing the visibility of climate research from NCKF and Denmark more widely. We aim to increase NCKF's research impact by engaging in the seventh cycle of the IPCC, and to include relevant IPCC focus areas in NCKF research planning. Through this, we aim to increase our visibility and authorship in IPCC.

*1.6 Achieve at least 30 citations in IPCC reports*









# 2

## A stronger national climate science advisor

**We aim to excel in supporting decision-making as the Government's climate scientific advisor as well as informing the media and the public through clear, science based advice and communication.**

We aim to strengthen engagement and value creation as the Government's climate scientific advisor and as a climate science advisor on behalf of the Danish Government. As such, we have two important roles that we seek to bolster. Our formal role as government advisor is still a new addition to our work and there is potential to improve and increase information dissemination.

## STRATEGIC PRIORITIES

### Enhance climate information to support governmental decision-making

We will support informed governmental decision-making in all levels of government – state, regions, and municipalities. We strive to provide evidence-based recommendations, timely knowledge sharing, and insight to multiple areas of government decisions and planning. We will be proactive in sharing scientific advances and core insights, and we engage professionally as a government authority in policy areas requested by relevant ministries, agencies, and stakeholders. When information is called for, we will respond fast, in time, and with accessible information. NCKF will also engage directly in research and advice in new areas such as science-based warning of drought, risk assessments of sea level rise for adaptation purposes, and greenhouse gas emissions monitoring. We will continue to develop our climate services in dialogue especially with the Danish municipalities, emergency management authorities, key sectors, and other stakeholders to make our knowledge of climate risks relevant in a context of policymaking and planning.

*2.1 Support informed governmental decision-making through at least 10 proactive climate information briefs per year*

*2.2 Maintain 100 percent fulfilment of 'mål og resultatplan' of NCKF items each year*

### Increase public awareness through stronger communication

We will communicate our knowledge and results as well as international scientific advances widely. We will engage in proactive public outreach and communication, via the media and directly to stakeholders addressing the challenges of climate change and weather extremes. This communication effort will support a more general informed decision-making, a higher level of knowledge, and climate literacy throughout society. We will continue to deliver authoritative, evidence-based scientific knowledge and be responsible for a balanced communication on the impacts of climate change. We seek to make our knowledge more accessible by communicating more with infograms, key numbers etc.

*2.3 Publish one "state of the climate" report in Danish per year*

*2.4 Publish 30+ updates per year on future NCKF SoMe channels and nckf.dk in Danish and in English*

*2.5 Achieve 100+ media citations per year to increase public awareness of climate change*

*2.6 Engage in at least 20 civil society presentations aimed at the public per year*





# 3

## Support societal climate transformation

**We aim to increase interdisciplinary partnerships and stakeholder engagement to support societal transformations towards a climate resilient society, climate adaption in municipalities and the green transition.**

Societal transformation requires our climate knowledge and services. We have the potential to disseminate relevant knowledge to key partners and sectors but still lack several bridges to potential important partners and key sectors. We strive to substantially improve our value creation especially in the Danish society by improving our current services and establishing new partnerships.

## STRATEGIC PRIORITIES

### Enhance climate services in Denmark

We will improve our climate services to meet Danish needs even better. We will bridge the gap between science and practical applications in key sectors and areas of our society that are in need of climate knowledge. Through climate services – such as *Klimaatlas*, interdisciplinary partnerships, and projects with stakeholders – NCKF seeks to support various sectors in making informed decisions when addressing extreme weather and climate change. A key focus is to support the Danish municipalities in their climate adaptation planning. While we aim to consolidate most NCKF research areas, we will diversify and deepen in climate research and services relevant to Denmark.

*3.1 Add at least 10 indicators in an improved Klimaatlas*

*3.2 Achieve at least a 90 percent satisfactory rating in a Klimaatlas survey for municipalities*

### Engage in new strategic partnerships in Denmark to support societal impact

Creating societal impact requires that we make our knowledge useful for a wide range of applications. The increasing demand for advice in areas adjacent to NCKF's current and traditional expertise can be addressed through interdisciplinary research approaches and non-research projects together with the users of the services and stakeholders in key sectors. This will be achieved by broadening the scope of collaboration in order to address 'great societal challenges' in Denmark. We will develop partnerships, projects, and engage with stakeholders in addressing climate impacts, adaptation, and mitigation. We aim to establish partnerships in the areas of financial climate risks, costs of impacts, and environmental, social, and governance reporting (ESG), as well as in the area of defense and security issues. We will explore needs and opportunities in other areas such as vulnerability and risks assessments for adaptation and early warning and advancing operational services; health impacts and capacity planning; agriculture; emissions monitoring; green transition in wind, solar and hydropower. In doing so, it is crucial that we do not decrease the focus on our key research areas, but rather focus on co-creation with other experts or stakeholders.

*3.3 Formalize at least three interdisciplinary partnerships or networks in key sectors*

*3.4 Publish five products with interdisciplinary content (science or policy)*

### **Support climate services in selected African countries**

We strive to make our experience useful for vulnerable developing countries in much need of planning for future extremes and changes. In alignment with the Danish strategy for development cooperation, 'The World We Share', we will cooperate with relevant African countries, including our existing cooperation in Ghana, to support certain climate services, such as *Klimaatlas*.

*3.5 Enable publication of at least 10 indicators in 'Climate Atlas Ghana'*

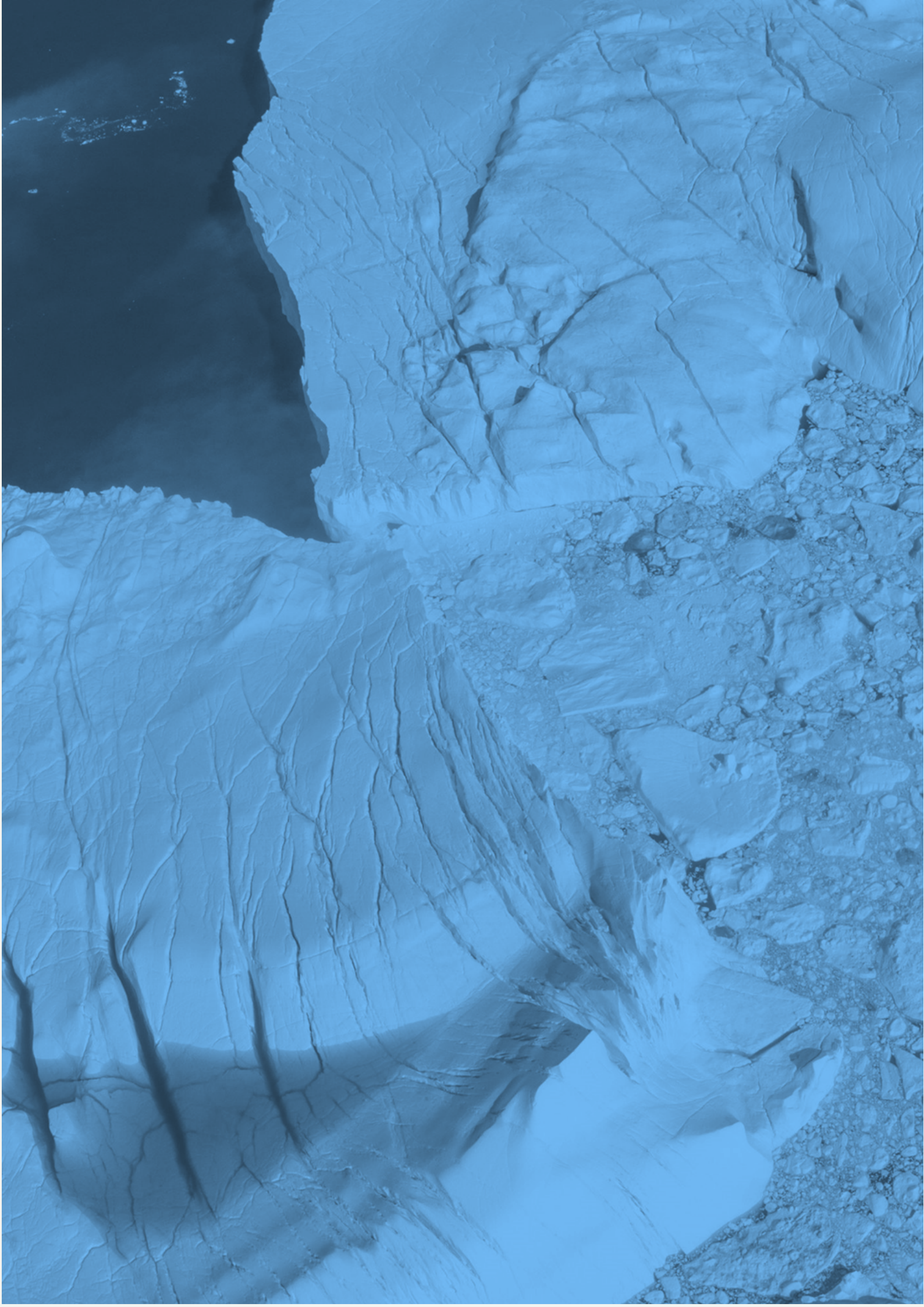
### **Cooperate in the Arctic, with Greenland and Nordic countries to strengthen climate services**

We will engage with Nordic countries to assist in strengthening their climate services and we will have a particular focus in the Arctic. A key area is security, safety and defense in Denmark and the Arctic. In Greenland, climate changes are ongoing with an impact on transportation, infrastructure, energy production, and way of life. When called for, we will engage with Greenland, Iceland and Faroe Islands to develop local climate services and operational services. Additionally, we will deepen our work with internationally oriented climate services, such as *Copernicus Climate Change Service (C3S)*, *EUMETSAT SAF's*, *ESA Climate Change Initiative* and *Space Climate*. Finally, we will increase participation in relevant international fora, including efforts to take leading roles in the Danish, Greenlandic and Faroese *UN Ocean Decade Committee* and the *Arctic Monitoring and Assessment Programme (AMAP)*.

*3.6 Publication of at least three reports on relevant information related to Greenland and the Arctic*









# 4

## Stronger use of cutting-edge technology and more robust IT-support

**We aim to use advanced technology and ensure a robust IT environment and support that enables world leading climate research.**

The use of advanced technology, high performance computational resources, and efficient data management are all crucial components for the success of NCKF. With the ambition to conduct world-class climate research comes a demand for a robust, high-end IT infrastructure that can support researchers in their daily work and help exploring new efficient ways of processing and analyzing climate data and projecting future climate changes. Particularly, there is a need to ensure access to adequate IT support to researchers as well as improvements in the ability to share and distribute datasets.

## STRATEGIC PRIORITIES

### Expand the use of digital technologies and machine learning

NCKF will contribute to climate model development and expand the use of big data and machine learning methodologies to combine and analyze vast amount of data or to use new technologies for model predictions and satellite data management.

*4.1 At least 25 percent of climate researchers have obtained ML/AI/deep learning competences*

### Invest in internal IT capabilities and best practices

We possess significant IT skills within NCKF and sharing knowledge can improve competences and prevent challenges. In NCKF we will internally pursue and establish best practices and implement them in our daily work. We aim to enhance code sharing, documentation, cross-platform compatibility, model interoperability, and coding versatility for seamless collaboration, innovation, and resource optimization. We aim for generalized solutions that are coordinated and established in dialogue with DMI's IT departments, and we will network with, and learn from, IT colleagues.

*4.2 80 percent of NCKF climate researchers participate in internal organized IT knowledge sharing each year*

### Increased and dedicated IT-support to researchers

A well-functioning IT infrastructure allows researchers to work efficiently in producing, processing and analyzing climate data, and manage and share data. Furthermore, the IT infrastructure should also allow for efficient document sharing to strengthen our national and international collaboration and facilitate efficient proposal writing. Our strategic aim is to ensure that needed support is accessible for all researchers as easy as possible, both for daily operations and for prioritized IT-development. We will work with the IT departments at DMI to ensure smooth communication and dedicated IT-resources for our research.

*4.3 Achieve a score above three out of five in an 'IT support satisfaction survey'*





# 5

## A more effective and dynamic organization

**We aim to foster an inclusive, dynamic and professional organization underpinned by sound leadership, strategic direction, and an attractive work environment.**

We have increased efforts to achieve a professional and an effective organization significantly. Increasing the quality of our research, climate advice, and societal impact requires a robust organization that supports the daily operations for researchers and management. DMI's organization and personnel development follows that of government agencies. We will seek to make sure that our workplace and career development embrace researchers as well as non-researchers in NCKF. Additionally, it is important to maintain a group of PhD students that can ensure a pipeline of future researchers in NCKF.

## STRATEGIC PRIORITIES

### **A more attractive and inclusive workplace**

NCKF strives to maintain a professional and dynamic work environment that places significant emphasis on maintaining a diverse and skilled workforce with a very high degree of workplace satisfaction. We aim to foster an inclusive workplace, and have a workforce diverse in age, competencies, personality, gender and cultural background.

NCKF aims to attract and retain skilled researchers and PhD students. This requires a great work environment with a good work-life balance, and it requires a clear structure for assessing and progressing career paths. We will support an attractive environment for our PhD students and ensure that both they and their work is an integral part of NCKF activities and priorities through organized knowledge sharing and networking and by including PhD students in projects and daily operations.

*5.1 Create a clear career path for researchers within the state structure*

*5.2 Achieve 80 percent attendance in NCKF organized PhD network events*

*5.3 Enhance diversity and robustness of workforce composition through a more equal gender and robust age balance*

### **Improve administrative support and information flows**

We will ensure robust processes for the necessary information flow to management and information sharing to and among employees. We will ensure a robust organization that administratively supports the daily operations for researchers and management and facilitates increased quality of the research and climate advice. Further, we seek to strengthen knowledge sharing and cooperation across DMI.

*5.4 Establish a management information system, including a dashboard on budget, publications, grants and projects*

*5.5 Establish new initiatives for administrative support for researchers*

**Advance strategic leadership and personnel management**

We will scale up leadership development, implementing 'daring leadership' to pursue our strategic goals, and we prioritize close personnel leadership. All NCKF staff will participate actively in our activities aligned with the strategy. To support this, we will ensure proper management, resource allocation, and prioritization in the units.

*5.6 Maintain an average leadership evaluation score of at least four out of five*



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