Integrating Activities for Advanced Communities

D2.11- Report of INTERACT Science Stories 2

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Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the Consortium (including the Commission Services)	
CO	Confidential, only for members of the Consortium (including the Commission Services)	

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Publishable Executive Summary

Five years ago, INTERACT which is a network of 88 terrestrial research stations throughout the Arctic and neighbouring territories, published the book “Stories of Arctic Science”. The book became highly successful as it appeared at a time when the Arctic was changing dramatically and received global attention. Five years later, the changes in the Arctic have accelerated not only environmentally but also geopolitically. Consequently, new stories have to be told. The 2020 book follows the same principals as the 2015 book in telling topical and important stories in a standard and easily accessible format. INTERACT Science Stories 2 consists of an Introduction and seven chapters each of which has a short introductory text. The new INTERACT Science Stories book consists of 41 multidisciplinary and geographical diverse stories written by more than 100 scientists from all Arctic countries and beyond. These stories have been selected from numerous transnational access projects and they focus on societal challenges that were the inspiration for the INTERACT 3 project. Where thematic gaps were identified, we used the INTERACT network to source appropriate stories. Invitations were sent to potential authors and the resulting articles were edited to standardize presentations and to ensure the readability of often complex science stories for a non-science audience. Each story was then proof-read by the author and sent for lay-out by the designers to ensure an INTERACT style. The book has been through lay-out and is in the final proof-reading stage. Publication is imminent. An e-book is currently being developed which will add further information, videos and animations.

1. Introduction

Five years ago, INTERACT which is a network of 88 terrestrial research stations throughout the Arctic and neighbouring territories, published the book "Stories of Arctic Science". The book gave information on research that was mainly carried out by scientists from around the world working at INTERACT research stations. We adopted a format to tell stories of Arctic science in a simple and highly illustrated way to provide resources for education, outreach and policy makers. The inspiration of using stories to pass on information is based on the traditions of Indigenous Peoples who ensure knowledge is available to younger generations by telling stories. This knowledge has various forms and the knowledge related to changes in environment and biodiversity is being increasingly recognized as an important addition to science understanding.

The book became highly successful as it appeared at a time when the Arctic was changing dramatically and received global attention. The reasons for this were based on the amplification of global warming at high latitudes and the numerous impacts that affected local and Indigenous Peoples and potentially the global community through feedback loops from the Arctic's environment to the Earth's climate system and sea level increases. Five years later, the changes in the Arctic have accelerated not only environmentally but also geopolitically.

Environmental changes
If we look at environmental changes, the previously reported long term trends of warming, decrease in snow duration and ice extent, and ecosystem changes have continued. However, the previous trend of "greening" of vegetation (increased growth) has been replaced by a trend of browning (damage to vegetation and decreased growth). Some of the browning has been caused by extreme weather events both in winter and summer. New records of temperature have been experienced and the importance of specific weather events has been recognized far more than previously. Recent examples include the record temperature of 38 °C in Verkhoyansk, Siberia in June 2020, and an earlier seasonal start of wild fires. Turning to the cryosphere (ice, snow and permafrost), since the 2015 book was published, a glacier in Iceland and the St. Patrick Bay ice caps in Canada have disappeared. Furthermore, the southern distributional limit of permafrost has moved northwards by 25 km along the Alaska Highway in southern Yukon and northern British Columbia.

Direct impacts of people on the Arctic environment have continued but with a new recognition of the accumulation of plastics in the Arctic environment - and even in Arctic animals – and observations of how suddenly biodiversity and species' distribution ranges can change. The deposition of industrial pollutants such as "black carbon" on snow and ice is altering the micro-climate and, for example, accelerating the melt of glaciers. While the Arctic is impacted in these and many other ways by the rest of the world, the changes in the Arctic environment also have the potential to change global climate through a series of feedbacks. Since the publication of the 2015 book, research has proliferated on feedbacks such as emissions of carbon from areas of thawing permafrost in which vast amounts of carbon are stored. However, different stories are emerging: some researchers are revising their estimates of carbon emissions downwards whereas others maintain that carbon emissions will greatly exceed the ability of plants to capture carbon from the atmosphere. A continuing significant loss of sea ice, reduced glacier area, reductions in the length of the snow season and the polluted surfaces of snow and ice affect the ability of Arctic surfaces to reflect heat from the sun and lead to an amplified warming. Changes in the Arctic's environment also affect the rest of the world, particularly low-lying coastal areas including cities, through sea level rise largely resulting from

increased melt water from ice caps and glaciers: since the publication of the 2015 book, estimates of the contributions of Arctic glaciers to sea level rise have been refined.

Geopolitical changes
The Arctic has become a focus for global attention due to its vast resources, increasing ease of access to them and the opening-up of new transport routes. Geopolitically, there have been advances in diplomacy. For example, the Arctic Council has signed an agreement to enhance international cooperation in science. Importantly, it maintains a dialogue among the Arctic nations and other nations with Arctic interests at a time of growing tensions. These tensions can be seen in a greater militarization of the Arctic and political maneuvering for influence in Arctic territories as well as failure to agree on and recognize the importance of climate change impacts on the Arctic. There are also steps forward and backwards in national political situations. Examples are mainly from the way people use the Arctic, by damaging ecosystems through extracting resources as opposed to conserving sensitive environments, and non-compliance with regulations over pollution that have recently led to major pollution events. On the other hand, there has been increasing recognition of the rights of some Indigenous Peoples, for example in fishing and hunting.

Science diplomacy and networking
At this unprecedented time, it is extremely important to unite international scientific effort not only to increase our understanding of change, but also to help diffuse political tensions. By reaching out to all sectors of society over the years through various INTERACT activities, we found a general interest and concern but the focus by many stakeholders and decision makers remains firmly on economic values rather than on environmental protection. As the INTERACT network annually hosts more than 15,000 scientists, has facilitated research by more than 1000 scientists from around the world, has underpinned the work of more than 150 global, regional and thematic networks and has extensive outreach, it has an enormous possibility -and responsibility- to increase awareness and mutual understanding of how to collaborate internationally to respond to Arctic change.

The research station staff work closely together to understand and share experiences of ways of operating and to explore ways of collaborating internationally. To improve international cooperation even further, INTERACT offers Trans-National Access whereby scientists from around the world can apply for funding to visit research stations in countries other than their own. This immediately improves the potential for international collaboration and gives a greater understanding of the cultures in different countries. An important improvement in diplomacy between East and West was achieved by opening up many Russian research stations to western scientists and by enabling Russian scientists to visit western research stations. In addition, INTERACT helped to form the Siberian Environmental Change Network (SecNet). Together, these two networks have brought decision makers, Indigenous and Local Peoples and researchers together to improve their interactions and dialogue on environmental change. This science diplomacy has been recognized by government ministers, Ambassadors, and Embassies. and.

New stories of Arctic Science
Without the research stations in INTERACT and the Trans-National Access projects, we would know far less about the dramatic changes occurring in Arctic environments, biodiversity and ecosystem processes. Many of the stories in this second edition of “Stories of Arctic Science” for the 2020s give examples of new developments over the past five years and present projects, the results from which will inform us of changes over the next decade. We add to many of the stories in this book by publishing an e-book version with many extra resources for all readers. By providing educational resources to students from primary schools to universities, we actively support the next generation who can be empowered to act in the future

while taking some immediate action now. Based on the rapid developments in the last five years, it is timely to tell these new stories of Arctic science!

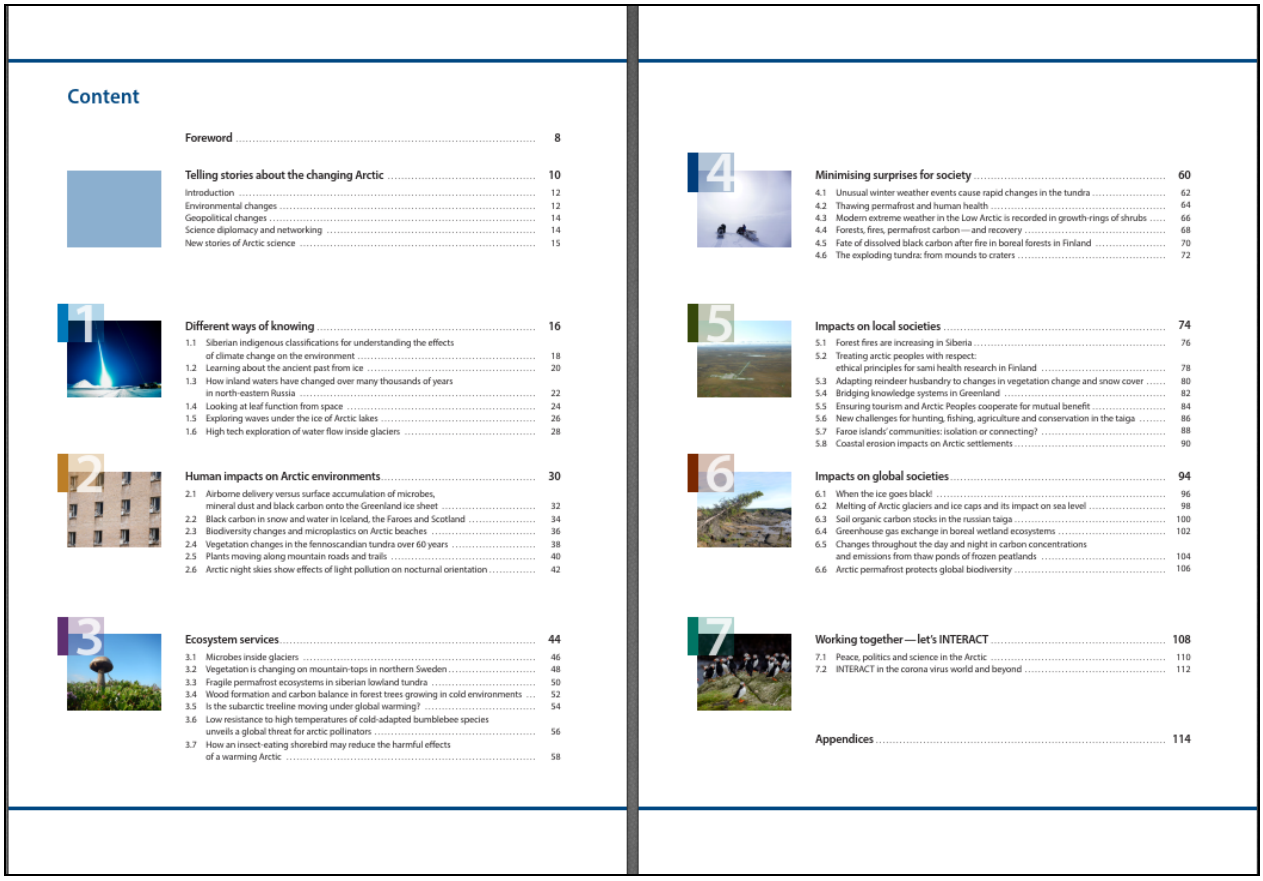
2. Process

The 2020 book follows the same principals as the 2015 book in telling topical and important stories in a standard and easily accessible format. These stories have been selected from numerous transnational access projects and they focus on societal challenges that were the inspiration for the INTERACT 3 project. Where thematic gaps were identified, we used the INTERACT network to source appropriate stories. Invitations were sent to potential authors and the resulting articles were edited to standardize presentations and to ensure the readability of often complex science stories for a non-science audience. Each story was then proof-read by the author and sent for lay-out by the designers to ensure an INTERACT style. The book has been through lay-out and is in the final proof-reading stage. Publication is imminent.

3. Outline of INTERACT Science Stories 2

INTERACT Science Stories 2 consists of an Introduction and seven chapters each of which has a short introductory text (Figure 1). The chapters include stories of how new knowledge is discovered – "Different ways of knowing", how people are directly impacting Arctic environments, how ecosystem services to people are changing, how local and global societies can be impacted by often "surprising" changes, and finally how we should work together and "INTERACT" (Figure 2). To illustrate the wide societal outreach of the book, we have a preface from her Royal Highness Crown Princess Victoria of Sweden. The book ends with appendices containing author details, list of funded transnational access projects and further reading.

Figure 1. Each section is introduced by a section overview.



Content

Figure 2. Table of content of INTERACT Science Stories 2.

4. Individual stories

The new INTERACT Science Stories book consists of 41 stories written by more than 100 scientists from all Arctic countries and beyond. The stories consist of an introduction which sets the scene, followed by the "Aims of the project", "What did we do?", "Where did we work?", "What did we find?", "Why are the results important?", "The adventure". All the stories are highly illustrative with photos and figures that enhance the story (Figure 3). Furthermore, while the stories give a multidisciplinary view of important ongoing science, they also have a wide geographical and environmental perspective. A balanced inclusion of Russian stories highlights the science diplomacy success of INTERACT that is presented in the Introduction and concluding chapters.

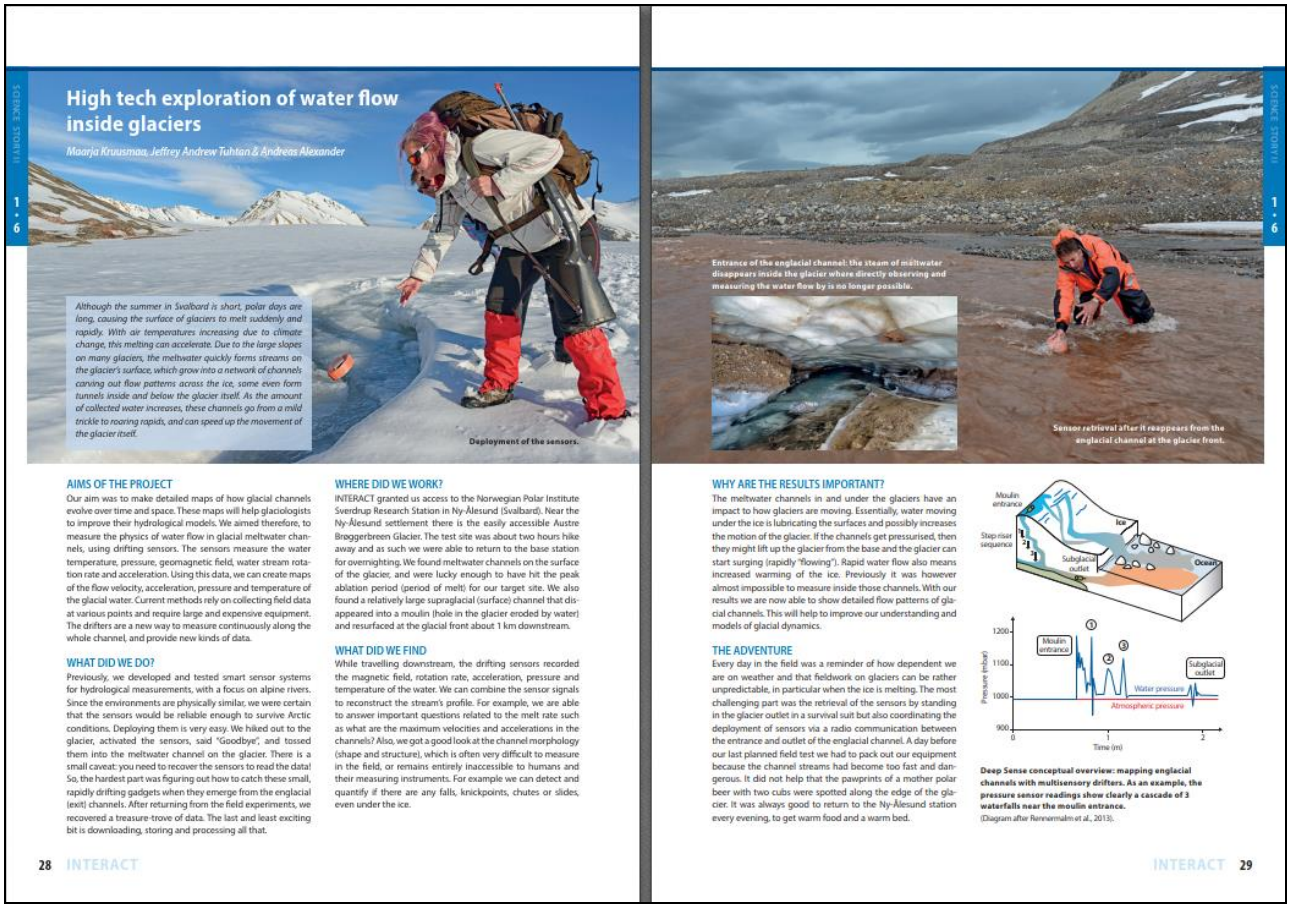


Figure 3. An example of a story from the INTERACT Science Stories 2.

5. E-book

In addition to the hard copy book, an e-book is also being developed. The E-book will be presented with swipe-out pages on the top and bottom of each story. Here the reader will learn more about the research station where the research was carried out and where the researchers where travelling from (top pages; Figure 4). The e-book will also provide additional information in the form of animations, other stories, films from the field etc which will be divided into three different sections "Did you know that?", "Between the lines - How does it work?", "For younger readers - Get active!" (Lower pages; Figure 5). The e-book will be available at eu-interact.org

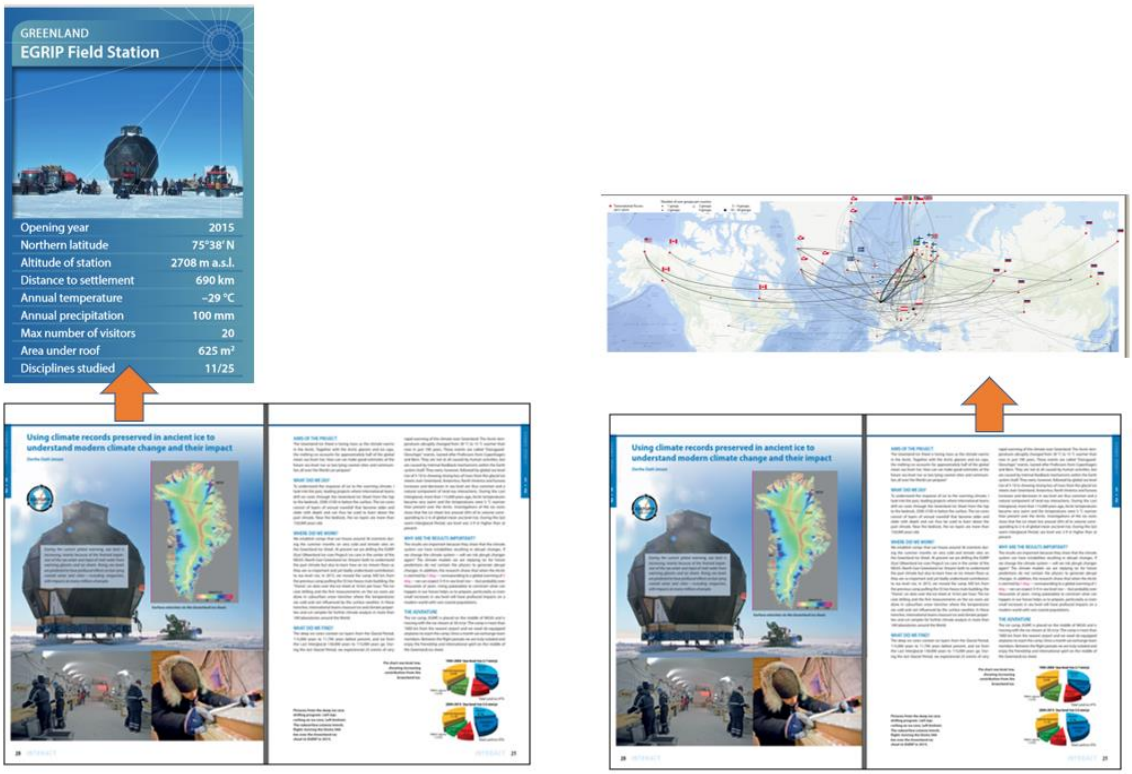


Figure 4. When the reader uses the upper swipe out pages, they will learn more about the research station/s that the researchers visited and also where the researchers came from.

Figure 5. Lower swipe out pages with additional information.