



European
Polar
Consortium

The landscape of European Polar Research

**VOLUME I: An assessment of current strategic management,
polar programme definition and processes**



The European Polar Consortium (EPC) is a Coordination Action financed by the European Commission under framework RTD programme 6 EUROPOLAR ERA-NET ERAC 517842.

The European Polar Consortium is composed of 27 government ministries, national funding agencies and national polar RTD authorities from 19 European countries and of the European Science Foundation/European Polar Board.

With the combined European critical mass of national programmes reaching approximately € 300 million per annum, it is the most significant initiative to coordinate European polar RTD programmes ever attempted. The European Polar Consortium will exert a massive and positive impact on this domain and lead to long-term durable partnerships within Europe and internationally and will also deepen and strengthen the interactions between countries with large polar RTD programmes and nations with evolving polar programmes in central and south-eastern Europe, encouraging exchange of experiences and the best practice on management and financing of programmes and infrastructures.

The long-term goal of the European Polar Consortium is the development of a «European Polar Entity» that will be established through dialogue on a political level beyond the EPC and will enable Europe to maximize and direct its critical mass at the global level.

The EUROPOLAR project partners are:

- Institut Polaire Français Paul Emile Victor (IPEV) – France
- European Polar Board – European Science Foundation (ESF)
- Fonds zur Förderung der Wissenschaftlichen Forschung (FWF) – Austria
- Fonds de la Recherche Scientifique (FNRS) – Belgium
- Research Foundation - Flanders (FWO) – Belgium
- Belgian Science Policy (BELSPO) – Belgium
- Ministry of Foreign Affairs (MFA) – Bulgaria
- Bulgarian Antarctic Institute (BAI) – Bulgaria
- Ministry of Education, Youth and Sports (MSMT) – Czech Republic
- Danish Polar Center (DPC) – Denmark
- Danish Agency for Science, Technology and Innovation (DASTI) – Denmark
- Estonian Science Foundation (ETF) – Estonia
- Ministry of Transport and Communications (MITOC) – Finland
- Alfred Wegener Institute for Polar and Marine Research-in the Helmholtz Association (AWI) – Germany
- Federal Ministry of Education and Research (BMBF) – Germany
- Department of Culture, Education, Youth and Church (KIIP) – Greenland
- Ministry of Universities and Research (MUR) – Italy
- Netherlands Organisation for Scientific Research (NWO) – Netherlands
- The Research Council of Norway (RCN) – Norway
- Norwegian Polar Institute (NPI) – Norway
- Ministry of Science and Higher Education (MSHE) – Poland
- Institute of Geophysics - Polish Academy of Sciences (IGF-PAN) – Poland
- Arctic and Antarctic Research Institute (AARI) – Russian Federation
- Ministry of Education and Science (MEDC) – Romania
- Ministry of Education and Science (MEC) – Spain
- Swedish Research Council (VR) – Sweden
- Natural Environment Research Council (NERC) – United Kingdom

For further information on the European Polar Consortium please see: <http://europolar.esf.org/>

Introduction

This report summarises the current status of strategic processes, management practices, investment, evaluation and granting procedures of the 27 government agencies (19 countries) that are partners in the European Polar Consortium an ERA-NET funded under Framework Programme 6 by the European Commission. Its conclusions are based on the most comprehensive analysis ever carried out of funding agencies and ministries who manage and own polar research programmes, infrastructures and activities in Europe. The report proposes a number of strategic questions and recommendations for the development of polar research programmes in Europe in the context of the European research area and indicates the possibilities for new approaches to developing European cooperation.

This analysis of the practices of the major polar research funding agencies covered the following important issues.

- Identification of the current status of European polar programmes, including strategic areas, investment strategies, administrative practices and identification of European capabilities and leadership.
- The acquisition of a complete overview of all relevant polar programme elements and activities in Europe.
- Definition of implementation guidelines and funding for the necessary polar RTD activities harmonised in a coherent and co-coordinated way.
- The acquisition of a complete overview of European polar infrastructures (detailed in volume II of this report).

The results of this assessment report of research programmes (volume I) and infrastructural capacity (volume II) will be used to identify issues of common priority and to actively develop trans-national activities including the launch of joint calls for proposals in a small number of strategic test cases. A core element of this report is the construction of an idealised model for a European polar framework programme and the essential characteristics that it should be composed to add value and benefit to national efforts and ensure cost effective and high quality scientific outputs for the decades to come.

The analysis compiled across the 19 countries and the trends that are identified provide a basis for the proposal of this idealised model. This model does not represent any specific existing programme, but it introduces the concept of programme convergence and harmonisation of processes at a European level that will be the subject of deeper analysis.



Dr Gérard Jugie
Chairman
European Polar Consortium



Dr Paul Egerton
Executive Director
European Polar Consortium



Objectives

The objectives of this analysis were to identify and characterise critical elements for deepening the collaboration between European polar research agencies, harmonising management processes and to strengthen European polar coordination in a global context. To obtain this result, an extensive platform of information was needed to highlight the current European strengths and weaknesses and to develop strategies and suitable instruments for future planning. It can thereby increase the possibilities for new collaborations, strategic activities and exchange of infrastructure elements and also provide an overview of the future needs in the RTD landscape. Multinational and interconnected long-term planning between European countries is potentially very powerful and will significantly contribute to establish collaborative programmes and policies. The main strategic conclusions are presented in this report.

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1. Polar programme ownership, strategy and geopolitical drivers

In the European context, it is important to highlight that there are many bodies and agencies involved or contributing to the «national polar activity», and that communication between these bodies was essential to obtaining an accurate picture of the national landscape. The bodies managing research programmes are diverse and many of them are organised under general umbrellas of environmental research. However, there are significant exceptions to this trend with some countries having strong geopolitical interest for their presence in the Polar Regions. These different behaviours determine a diversity of funding sources and implementation mechanisms that constitute a stimulating area for the development of common procedures or systems.

STRATEGIC QUESTIONS

There is a high diversity of organisations that manage and fund research in the Polar Regions in Europe. A key challenge in the overall system is that management strategies are not sufficiently harmonised. Can a future framework be proposed which enables long term connected planning and an enhanced approach to internal and external coordination?

The majority of European agencies that were analysed indicated that their national polar research is based on a formalised strategic plan and these are often combined with other research and implementation plans. Many of the planning documents cover both Polar Regions. The most common time spans for the strategy plan is between three to four years. It is apparent from the data that strategies in relation to the Antarctic region are more developed at a European level perhaps pointing to the existence of a formalised structure (the Antarctic Treaty and related bodies such as SCAR and COMNAP) which requires parties to carry out national programmes and formally exchange information on their scientific and strategic activities. The Arctic region currently lacks the same degree of formal agreement and only a limited number of countries develop Arctic strategies. This can be explained by their direct interest in the Arctic territory and to fulfil political requirements (e.g. the Arctic Council). In the case where countries developed bipolar strategies these generally have very well developed and financed polar activity, which allow inter-comparison between their research activities in both Polar Regions.

] Drivers to developing a national strategy [

When defining national strategies it is often a combination of scientific and political considerations, which define investments, their characteristics, and the priorities of such strategies. The definition of a national strategy also has to take into account external global issues that enter into the policy arena through ministries, especially in relation to foreign affairs, environment and defence. The issue of climate change has now broad geopolitical and economic considerations and therefore a large number of the countries publish their plans in public encouraging the sharing and communication of polar research priorities between countries. Many countries have a variety of agencies and ministries that produce comprehensive strategy plans that includes polar elements. There is a trend for moving towards a greater inter-agency cooperation in polar research within the country. The harmonisation of strategic plans in Europe may help to simplify and streamline the negotiation process with international partners, especially in programmes which require multinational engagements and strategic investments.

STRATEGIC QUESTIONS

Could elements from these strategic plans be assembled into common European priorities so that they could produce added value in the international context?

Geopolitical aspects in polar research have some important relevance, especially in relation to the Antarctic Treaty or to the Arctic Council.

For the Arctic, geopolitical aspects are related to the geographical settings of the nations. The Arctic is increasingly becoming an arena for diplomatic discussions for energy, hydrocarbon and territorial delimitation. In this respect the following examples can be stressed:

- The Svalbard treaty.
- The Northern Sea route and the North East passage, which has connections with commercial traffic through to the Pacific. Increased exploration and transportation of hydrocarbon in the Arctic which would have consequences on environmental legislation.

For the Antarctic the regulation of the Antarctic Treaty System:

- ongoing issues related to environmental protection
- fisheries and conservation of marine living resources
- application of the law of the sea and specificities related to the Antarctic Treaty System.

STRATEGIC QUESTIONS

The existence of national strategy plans for polar research in the individual countries is encouraging. Is it possible to propose mechanisms to identify overall European common priorities and strategies in the Polar Regions and roadmaps to the efficient financing and implementation of trans-national programmes?



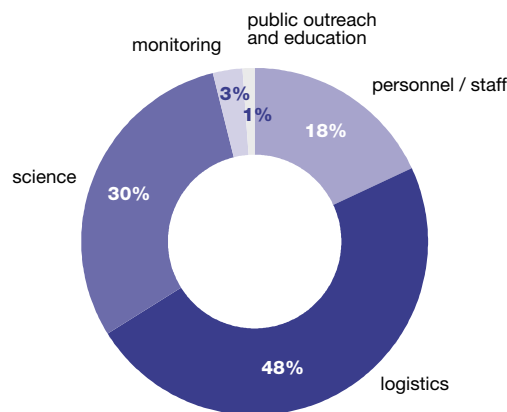
2. Overview of European investment in research programmes in Polar Regions

This is the first analysis of research investments by European nations in the Polar Regions and is a critical important component when considering any future co-operation. It is necessarily very difficult to obtain accurate figures on total research and asset investment. However, a baseline has been established to facilitate information exchange between funding agencies/programme managers to build a mutual trust and knowledge for planning.

The survey among the 27 partners gave an estimate of slightly less than € 300 million for the total national annual investment in polar research by the 19 consortium countries. This includes management of polar research activities, infrastructures, project grants and outreach activities. The funding by the individual countries has a very broad range depending upon the magnitude of the programme. Several large countries have high investment in research programmes and especially infrastructures (> € 25 million), with a maximum per individual country of € 70 million, whilst a cluster of countries have lower investments (significantly less than the average of € 15 million).

General percentage breakdown of EPC partners investment in polar research programmes and infrastructures per year

(Approx. amount used for...)



The infrastructure (logistics and monitoring) totals on average € 120 million per annum, project grants to approximately € 70 million, polar research management € 41 million, education and outreach to approximately € 2.5 million. Comments by the agencies providing the data suggest that the way in which the agencies allocate funding is not uniform and requires deeper investigation to determine the sources and processes that control national investment profiles. It is interesting to note that the total combined annual investment for European countries is of the same magnitude of countries such as the United States. The International Polar Year has had a marked effect on the polar research investment profiles of selected European countries and which have important geopolitical drivers for such injection of funding at international programme level.

] The diversity of polar financing models [

The funding mechanisms vary between two extremes. In one case all funding is directed through specific polar research programme within a ministry, agency or institute and at the other end of the spectrum funding is granted through research funding agencies on a competitive project basis. The most common is an intermediate financing model where institutes or agencies provide research funding and sometimes also infrastructure, and these resources are integrated by additional funds for research projects coming from research funding agencies.

This model reflects a more complex model of inter-agency cooperation. Based on the survey data, the large countries with more developed programmes have a more complex financing system. Experience from these systems can be transferred to those countries only recently developing their polar programme activities. A majority of the countries provide research funding over a period of three or more years (multi-annual) and that allocation of funds often can be extended when needed. Legislation and policies on transferring funding to other countries differs within the Europolar consortium partner countries have been analysed. Eight of the countries report the funding to be essentially national, which means that it can be awarded only to the countries citizens. Funding can follow researchers abroad only in nine of the consortium countries.

Actual transfer of funds to support research in another country is only possible for six of the consortium countries. This type of situation is reflected at a general level within the European research area. The issue of direct transfer of funding across borders is being actively debated at the present time in the European research area, and has complex legal implications. An example of transnational funding model is the EPICA programme (1996-2006, European Project for Ice Coring in Antarctica), where ten countries pooled funding together for deep ice coring the Antarctic plateau. It provided coordination for deep drilling activities at Dome C Concordia and Kohnen Station, which was supported by the European Commission Framework Programme, the European Science Foundation and significant national contributions from Belgium, Denmark, France, Germany, Italy, the Netherlands, Norway, Sweden, Switzerland and the United Kingdom. Such a successful model should be envisaged for other scientific domains. The development of a framework for coordinating funding for research calls in polar research is an innovative way forward to build financial and scientific commitment across the different European countries.

STRATEGIC QUESTIONS

The assessment indicates that direct financing models for research in Polar Regions are complex. There are a multitude of systems operating in the current polar RTD landscape. Can an efficient and streamlined mechanism be developed to enable the financing of multinational programmes?

Can a mechanism be identified which links together strategic and purely competitive systems to construct multinational programmes at a European level?

3. Legal frameworks and collaborative agreements covering Polar Regions

The majority of national polar programmes (61%) require certain types of activities to comply with specific legislation. The legislation refers to limitations on scientific sampling, invasive monitoring activity, logistics and operation, social science, ethics and other aspects. Countries carrying out research in Antarctica are committed to make it in compliance with the Madrid Protocol on Environmental Protection to the Antarctic Treaty. It requires action that must be regulated at a national level by the legislation of each country that ratified the treaty. In order to integrate more easily the polar activities of the European countries, an uniform legislation at European level for the application of the Protocol of Madrid could be favourable.

STRATEGIC QUESTIONS

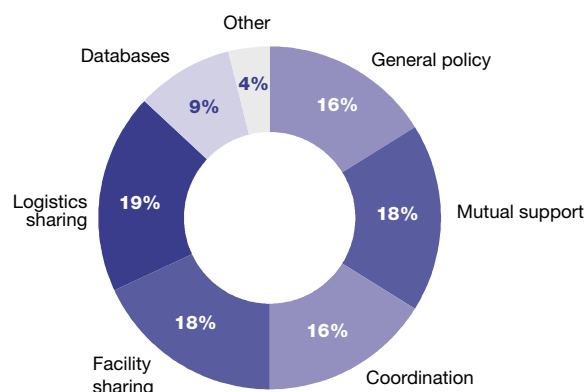
National regulations and legislation is applicable in relation to obligations under the Antarctic Treaty System. As European countries adopt common positions is there a need to assess the applicability of European legislation in the Polar Regions?

Official cooperative agreements and collaboration on common research programmes

Memoranda of understanding (MoU) represent the current internal or external cooperation agreements. They are important as a basis for building common European approaches in cooperative agreements because they provide the description of national relationship system that could be expanded into a higher level of multilateral cooperation. The majority of the 19 consortium countries (83,33%) declared to have memoranda of understanding. The countries which do not currently have MoUs are those which have very new programmes and still need to establish the basis for logistical or scientific cooperation with other European countries or international partners.

This underlines that the memoranda of understanding are basic building blocks of cooperative polar activities, which requires wide relationships with other logistic and scientific bodies at national and international level. The main areas covered by such existing agreements are general policy, mutual support, databases, logistics sharing, coordination and facility sharing. The statistics indicated that general policy, databases and facility sharing could be areas for expansion.

Percentage of MoUs per activity areas



The most common time-span for a MoU is three to five years and the MoU covers equally Arctic and Antarctic regions. These agreements are often linked to the programme cycle, however longer-term cooperation agreements exist for strategic purposes cross-cutting the programme cycle. Generally speaking, a memorandum of understanding is expected to have a confidential nature. The analysis of the agencies indicate that currently are not favourable to make information easily accessible as they may contain elements of bilateral issues.

The agreements that can be commonly found on the Internet are those international and very comprehensive (i.e The Antarctic Treaty System's Conventions, the Madrid Protocol on Environmental Protection to the Antarctic Treaty). At European level this kind of multilateral agreements for polar research are still rare, while there are already official cooperative bilateral agreements on a national basis.

STRATEGIC QUESTIONS

The existence of official cooperative agreements in the Polar Regions are dominated at the present time by logistical and asset support on a bilateral basis. Is there a need in the future to develop firm agreements on a multi-lateral basis on areas of common research planning and prioritisation of themes?

Several stations in Antarctica and in the Arctic are operated as common platforms supporting research programmes with shared objectives – both in Europe and with other partners worldwide. Joint stations with only European partners are Samoylov (Germany and Russia), AWIPEV (France and Germany), Ny-Ålesund Marine Laboratory (Norway and other nations) and Eiscat (Sweden, Finland, Norway, China, France, Germany and others) in the Arctic and Concordia (Italy and France) and Wasa (Sweden and Finland) in Antarctica.

Stations which are jointly managed between a European country and other international partners are Dallmann Laboratory (Germany and Argentina), GARS-O'Higgins (Germany and Chile) and Law-Racovita (Australia and Romania), all of them in Antarctica. An additional example of previous European multilateral cooperation in polar science infrastructure is the European Economic Interest Group "Geophysica", which provides the strategy, the technical feasibility, the coordination and the field operations for stratospheric research based on the Russian M55 Geophysica aircraft. The analysis of the agencies indicates that for the future there is a great value of constructing cooperative agreements to enhance polar research and operations. There is a need to explore future partnerships which connect Europe and international partners on areas of mutual interest.

STRATEGIC QUESTIONS

Should there be a consideration of harmonisation and efficiency by putting in place mechanisms for reciprocal opening and sharing of facilities in the Polar Regions?

4. Research granting processes

There are large differences when it comes to the granting processes for polar research programmes in Europe and the three steps of submitting, evaluating and implementation. Almost all agencies (83%) require to complete a special form (paper and/or electronic version with a range of 1-26 pages) which is most commonly in English and/or bilingual. The 2/3 of the partners who answered the questionnaire require to separate the budgets for science and logistics. Half of the partners have a national operator who provides logistic support to the projects basing on a specific budget. In many cases the logistic operator evaluates the operational costs.

] Ethical issues [

Regarding ethical issues, in the pre-submission phase a sum of ten partners answers that they do require special procedures, but they are based on very different rules and sources, such as national legislation, international agreements or declaration, internal guidelines. Ethical committees are often also actively involved. The 38% of these regulations are published by some means (half of them on the Internet). The countries which do not require special procedures for ethical issues do not have a clear common background. A trend towards an extending of procedures to manage ethical issues could be expected in the future.

STRATEGIC QUESTIONS

Extension of ethical issues is expected into polar science management, should there be a consideration of harmonisation looking for a common European Ethical Chart that could be agreed as common minimum level by European countries?

] Dissemination, administration and selection [

A significant number of consortium countries (70%) have a pre-qualification round for the proposals, using procedures similar to the expressions of interest. The majority of the polar programmes (55%) diffuse the information throughout Internet, downloadable from a web site. In general, the proposals are stored in databases but they are not accessible by the public. The proposals are then evaluated by reviewers. The most common evaluation system is a competitive process based on a peer review panel. In several cases there are variants to this scheme, where the evaluation process looks even more comprehensive including a State Committee or/and Administrative Committee in addition to the peer review panel. In two cases only, an Administrative Commission is appointed for reviewing the proposals.

The evaluation process takes different time periods between the European partners. It varies between four weeks up to eight months, with the most common time of twelve weeks.

Applicants receive the decisions usually by postal letter or, in few countries, by email. In addition, the management of the successful proposals follows different path to be publicised. A small number of European countries run multi-year statistics on the polar programme proposals in addition these countries list the proposals into an executive plan or into an annual report.

] Funding awards and post-award reporting [

The time-span for the transfer of funding varies from days to months - both comparing the countries and within the country itself. The most common is the electronic transfer but also other ways of transfer takes place, like bank cheques and wires. The actual transfer mechanisms seem to be well accepted by all the partners, since none considers that a change is needed. The great majority of funding agencies pay special attention to activity report and tracking results. The kind of written feedback that is generally required is an activity progress report to funding agencies and programme management, a final activity report to funding agency and the published peer-reviewed publications resulting from the funded activity. Reports to administrations and logistic services seem to be less important. This result shows that generally national European polar programmes have a strong scientific orientation, and that logistics is viewed as a fundamental tool to achieve the scientific objectives of the national programmes and strategies.

STRATEGIC QUESTIONS

Even though the administrative procedures for polar programmes granting and transfer of funds to successful applicants are very diverse among the 19 countries, a strong attention to formal management procedures and scientific results control is evident. Is it possible to develop a roadmap towards common procedures on funding management and reporting of results at the European level ?

] Polar programme outreach activities and participation in the International Polar Year [

A significant number of consortium countries (67%) national programmes carry out outreach activities at a political level and also to the public, media and governmental institutions. This is an increasingly important activity in programmes such as the International Polar Year, where education, outreach and communication are vital elements. European countries have been actively involved in leading outreach to the public and it is viewed as critical for explaining how investments are used in an efficient, justifiable and transparent way.



5. Specificities and geographical aspects of polar research programmes

] Arctic research [

The Arctic is a key region for scientific research. A significant portion of the Arctic area lies within the territory of European countries and therefore it has a natural and very close connection to the European scientific community. The Arctic countries (Denmark, Iceland, Finland, Greenland, Norway, Russia and Sweden) have stronger national strategic interest in conducting scientific activity in these regions. An increasing number of other European countries are carrying out Arctic research programmes.

In 1991 eight Arctic countries (including Canada and the United States) approved the «Arctic Environmental Protection Strategy» (AEPS) with the aim to improve the understanding of the critical environmental issues and the implications to the inhabitants of the Arctic and its surroundings. Five years later, in 1996, Foreign Ministers of those Arctic states agreed to form the Arctic Council with a mandate to undertake a broad programme to include all dimensions of sustainable development. The Arctic Council is a high-level intergovernmental forum. The core members are Canada, Denmark, Finland, Iceland, Norway, Russian Federation, Sweden, and the United States of America. Europe has a great regional interest for the Arctic since it is a crucial area for climate change studies as well as environmental, social, and industrial policies. The International Arctic Science Committee (IASC), the non-governmental organisation established in 1990 for facilitating cooperation in all aspects of arctic research, comprises now eighteen members, thirteen of which are European (including Russia). On behalf of the Arctic Council and the International Arctic Science Committee (IASC), an international project (ACIA the Arctic Climate Impact Assessment) whose purpose was to evaluate and synthesise knowledge on climate variability, climate change, and increased ultraviolet radiation and their consequences was launched. The results of the assessment were released in Reykjavik, Iceland in November 2004.

Currently the main current studies of the European countries focus on quantifying the role of the Arctic in global climate; predicting and monitoring changes in Arctic environment and ecosystems, developing new technologies and improving human and social health.

In recent years many joint European and international programmes have been launched. Examples of specific large-scale research collaborations supported by the European Commission in the Arctic are DAMOCLES, IPY-CARE, GRIP, ENVINET.

DAMOCLES is an integrated ice-atmosphere-ocean monitoring and forecasting system funded by the European Union under the 6th Framework Programme, designed for observing, understanding and quantifying climate changes in the Arctic.

The overall objective of IPY-CARE, funded by the European Commission (International Polar Year - Climate of the Arctic and its Role for Europe) is to create, co-ordinate and prepare a pan-European science and implementation plan for Arctic climate change and ecosystems research programme as contribution to the International Polar Year. IPY-CARE is an endorsed project by the IPY Joint Committee with more than 66 partners from many different countries.

GRIP: within the framework of the joint European Greenland Ice Core Project (GRIP), supported by the European Science Foundation and national commitments, a 3029m long ice core was drilled in Central Greenland from 1989 to 1992 at 72° 35' N, 37° 38' W.

The objective of the GRIP effort was to reveal the broad spectrum of information on past environmental, and particularly climatic, signal that are stored in the ice. This information will help investigators understand the major mechanisms of the earth and man's potential impact.

ENVINET constituted a network of European polar and alpine infrastructures focusing on multidisciplinary environmental research in Northern Europe. The network involved 17 research stations from the European Alps to the Arctic. Each station participated with representatives from its operator and their scientific users. The participating stations covered a broad range of environmental sciences, primarily within atmospheric physics and chemistry, and marine and terrestrial biology.

] Antarctic research [

The total number of the international Antarctic facilities is 65 (source : COMNAP). 28 of these are European stations, including 7 Russian stations. The European stations are distributed all over the Antarctic and in most cases provide landing facilities which allow aerial connections. The European polar infrastructures also include over 30 polar vessels many of which are or could be used in Antarctica. A common appropriate use of these resources could overcome the cost of carrying out research in Antarctica, which is several times higher than in the Arctic due to the larger scale of infrastructural and logistical support required. These integration potentials are not yet adequately exploited and the European countries act independently on the basis of specific scientific and logistic interests.

Several large scientific projects, with European participation, are carried out in Antarctica; for example the research of climate history performed by deep core ice drilling, evolution and biodiversity programmes and studies by the inter-hemispheric interactions and space studies. EPICA, supported by the European Commission, the European Science Foundation and national contributions, was a multinational European project for deep ice core drilling in Antarctica. Its main objective was to obtain full documentation of the climatic and atmospheric record archived in Antarctic ice. Evaluation of these records are providing information about the natural climate variability and mechanisms of rapid climatic changes during the last glacial epoch. This was a well coordinated effort to pool and connect resources to obtain maximum scientific and political impact.

Deep drilling has taken place at two sites in Antarctica: Concordia station, Dome C (coordinates 75°06'S; 123°21'E, 3233m above sea level) and Kohnen station, Dronning Maud Land (coordinates 75°00'S; 00°04'E, 2892m above sea level).

The Antarctic Muon And Neutrino Detector Array (AMANDA) was the largest currently operational detector for studying neutrinos. It consisted of 19 «strings» of optical detectors connected to cables buried between 1500m and 2000m below the surface of the South Pole ice cap, with a total of 677 optical sensors. AMANDA is just the beginning, though.

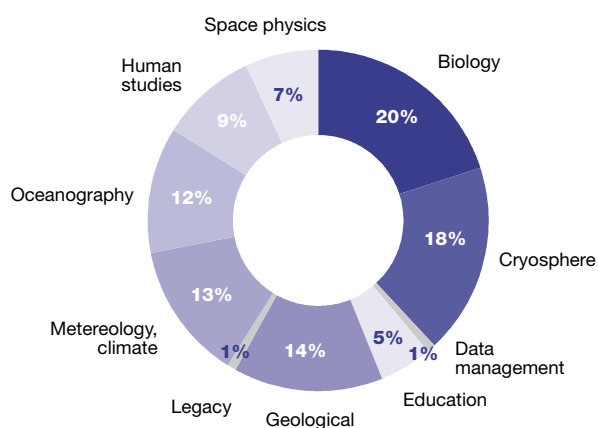
Currently under construction at the US Amundsen Scott station at the South Pole is the massive IceCube detector. Like AMANDA, IceCube will consist of a series of strings buried in the ice. Both larger and more advanced than its predecessor, IceCube will greatly improve upon AMANDA's potential for scientific discovery. Consisting of a total of approximately 5000 detectors and with a volume of a cubic kilometer, IceCube will monitor one billion tons of the Antarctic ice cap for traces of neutrinos.

6. Common scientific priorities within the European Polar RTD landscape

The European agencies that were analysed across the 19 countries listed a total of 55 prioritised themes in research and / or topics within the national strategic plans. Whilst compiling the themes there was no ranking or indication of relative importance. These themes have then also been clustered into basic / free research priorities and also thematic / strategic research priorities.

Prioritised themes	Thematic / Strategic research priorities	Basic / Free research priorities
Arctic ecosystems and effects of climate change	Arctic ecosystems and effects of climate change	Astrophysics
Arctic technology innovation	Arctic technology innovation	Atmospheric chemistry
Astrophysics	Climate and atmosphere	Atmospheric physics
Atmospheric chemistry	Climate and environmental monitoring, long time-series	Biology
Atmospheric physics	Climate changes – natural and anthropogenic	Earth observatory
Biodiversity	Climate changes and their effects	Geodesy
Biology	Climate dynamics (past, present and future)	Geography
Climate & atmosphere	Climate research	Geology
Climate and environmental monitoring, long time-series	Cultural encounters and globalisation	Geophysics
Climate changes – natural and anthropo-genically induced	Cultural History	Glaciology
Climate changes and their effects	Ecosystem monitoring	Health and Nutrition
Climate dynamics (past,present and future)	Ecosystem research and biodiversity	Human biology
Climate research	Effects of human activity on ecosystems and society	Human health
Cultural encounters and globalization	Environment and Climate	Juridical sciences
Cultural History	Living conditions	Language
Earth observatory	Long-distance contamination of food chain	Oceanography
Ecosystem monitoring	Marine & Terrestrial ecosystems	Paleo research
Ecosystem research and biodiversity	Marine ecology	Sun-Earth interactions
Effects of human activity on ecosystems and society	Marine ecosystems - and the human dimension	Technology
Environment and Climate	Marine resources and products	
Geodesy	Medicine	
Geography	Mineral resources	
Geology	Terrestrial ecosystems	
Geophysics	Natural Resources	
Glaciology	Non-renewable energy resources	
Health and Nutrition	Polar environment chemistry	
Human biology	Polar history	
Human health	Societal and juridical changes in the Arctic	
Juridical sciences	Renewable and nonrenewable resources	
Language	Social Conditions	
Living conditions	Societal development	
Long-distance contamination of food chain	Socio-economic development	

Prioritised themes	Thematic / Strategic research priorities	Basic / Free research priorities
Marine & Terrestrial ecosystems	Technological developments	
Marine ecology	Technology and living conditions	
Marine ecosystems - and the human dimension	Thematic monitoring and prospecting	
Marine resources and products		
Medicine		
Mineral resources		
Terrestrial ecosystems		
Natural Resources		
Non-renewable energy resources		
Oceanography		
Paleoresearch		
Polar environment chemistry		
Polar history		
Societal and juridical changes in the Arctic		
Renewable and nonrenewable resources		
Social Conditions		
Societal development		
Socio-economic development		
Sun-Earth interactions		
Technological developments		
Technology		
Technology and living conditions		
Thematic monitoring and prospecting		



European expressions of interest – International Polar Year 2007-2009 (IPY)

This figure shows the distribution of the expression of interest in IPY. The distribution among the disciplines highlights the bottom to top priorities and capacities of the Europolar scientific community in polar science.

Within the research stations in Antarctica the highest percentage of scientific activities focus on climate change research. Additionally geo-science studies are also numerous. Astrophysics/astronomy is a developing area for Europe that it requires high infrastructural investments. The recent increase of interest in astronomy in Antarctica is due to the discovery of unique observational conditions that can be found on the Antarctic plateau.

ANTARCTIC STATIONS

	Ohridski	Aboa	Dallmann	Gars	Kohnen	Neumayer	Concordia	Zucchelli	Troll	Arctowski	Law racovita	G de castilla	Juan carlos i	Svea	Wasa	Bellingshausen	Mirny	Novolazarevskaya	Progress	Vostok	Halley	Rothera	Signy	Dumont d'Urville	Total	
Climatology, climate change	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	22
Glaciology	•	•		•	•	•	•	•			•		•	•	•	•	•	•	•	•	•	•				18
Geology and sedimentology	•	•				•		•		•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	18
Geophysics	•	•	•	•	•	•	•	•	•			•	•		•		•	•		•		•	•		•	17
Environ. sciences, pollution	•				•	•	•	•	•	•	•	•	•			•	•	•		•	•	•	•		•	17
Geodesy	•	•		•		•	•	•				•	•	•	•	•	•	•	•				•			15
Atmospheric chemistry & physics		•		•	•	•	•	•	•				•		•	•	•	•				•	•		•	15
Terrestrial biology, ecology	•		•					•		•	•	•	•		•	•	•	•	•	•			•	•	•	15
Human biology, medicine	•					•	•	•	•	•	•	•				•	•	•		•					•	12
Mapping, GIS	•			•				•		•	•	•	•			•	•		•				•			11
Marine biology			•					•		•	•	•				•	•	•	•				•	•	•	12
Sun-earth interactions						•	•	•			•		•		•		•	•		•	•	•			•	12
Astrophysics							•	•			•						•	•		•					•	7
Oceanography and fishery			•					•					•			•	•		•				•			7

When examining the statistical trend the focus in the Arctic stations is a strong concentration on atmospheric sciences.

ARCTIC STATIONS

	Arctic station	Zackenbergl	Koldewey	Samoylov	Kiss	Dirigibile italia	Sverdrup	Hornsund	Abisko	Eiscat sodankylä	Eiscat svalbard	Eiscat tromsö	Tarfala	Barentsburg	Ostrov dikson	Tiksi	Amderma	Pevok	Charles Rabot	Jean Corbel	Total	
Climatology, climate change	•	•	•	•	•	•	•	•	•	•			•	•	•	•	•	•	•	•	•	18
Atmospheric chemistry & physics			•	•		•	•	•		•	•	•	•	•	•			•	•			13
Geophysics			•				•	•			•	•	•	•		•	•	•	•	•		12
Marine biology	•	•	•			•	•	•						•	•	•		•	•			11
Oceanography and fishery	•	•	•				•	•						•	•	•		•				9
Terrestrial biology, ecology	•	•	•	•	•		•	•	•				•							•	•	11
Environmental sciences, pollution			•	•	•	•	•	•					•									8
Sun-earth interactions						•	•	•		•	•	•			•	•					•	9
Glaciology	•		•		•		•	•					•			•		•				8
Geology and sedimentology	•	•			•		•	•					•								•	7
Astrophysics						•	•	•							•	•						5
Mapping, GIS				•		•	•	•													•	5
Human biology, medicine						•	•															2
Geodesy							•	•														2



Based on the comprehensive survey data during the analysis of the European agencies managing polar research programmes an overall picture of how Europe is currently deciding on priorities within the RTD landscape can be described in a multi-directional manner. Strong common efforts at a European level already exist or are rapidly developing and are mainly directed towards research topics like climate change, deep ice core drilling, and new frontier research (astronomy ARENA, life sciences Life in Extreme Environments Initiative CAREX and CCPMAL).

] European possibilities and obstacles in polar RTD landscapes [

Europe is in a phase where many possibilities for the development of polar research strategies and logistics are emerging. This is due to already existing collaborations between partners and countries - both within Europe and with other international partners. Examples of existing collaborations are the sharing of polar research stations, both in the Arctic and in the Antarctic, and the use of research vessels such as icebreakers.

In particular, this is more evident in the Arctic because it is more easily accessible, in terms of distance, and because many regions belong to European countries.

However, even if significant elements play in favour of an increase in mutual cooperation and integration at a European level, a number of obstacles persist and should be removed.

As it has been already highlighted earlier in this report, a number of countries use complex models of multi-annual funding. This funding is distributed cyclically and is dependent upon on external and internal drivers. These drivers cannot be removed since they belong to national strategies; however, other common drivers can be identified and endorsed to enhance sharing capacities and strengthen common efforts in polar science and technology.

One of the obstacles for some countries in the RTD landscape is to facilitate transactions of research funding across borders which narrows the science and logistical possibilities. Another obstacle, partially related to the previous point, is a general fragmentation of scientific activities and infrastructures which may cause overlapping and increase of costs of research in European polar regions. Despite the above mentioned observations, it is possible to stress an indicative trend of national polar programmes or activity in Europe. This trend must not be considered as an existing entity, but should be interpreted as a possible reference which could inspire the partners towards a common approach in polar sciences.

] Developing a European polar framework programme and model for harmonisation [

On the basis of the European wide analysis of polar programmes, an idealised European polar framework programme could have the following characteristics:

Strategy definition

- The European partner is representative of the national polar research in its country.
- The European programme is based on a current strategy plan (78%) that is integrated with other national or international plans.
- There is an action plan associated with the current strategy plan (68%).

- The plans are distributed and available by different means (post, internet) also in English language (54%).
- The European programme can be applied for only by nation's own citizens (55%). Nevertheless there is a significant tendency towards a change in this policy (44%).
- The European programme launches initiatives to increase national public awareness.

Funding attribution

- The European programme does not acquire additional funding from non-governmental sources (61%) and requires certain types of activities to comply with specific legislation.

International cooperation

- The European programme has MoUs on the national or international level (83%). The main aspects are logistics sharing (61%), mutual support (61%) and facility sharing (56%).

Programme calls

- The European programme announces a call for proposal from a website (56%). It accepts proposals on free research (83%), thematic research (72%) and long-term monitoring (72%). Proposals must use a special form (83%) and forms are in English or bilingual (61%). They must include separate budgets for science and logistics (67%). The European programme management offers assistance in the pre-submission phase (61%).
- European programme organises proposals into a restricted access database (94%).

Scientific evaluation

- Proposals are evaluated by a peer review panel (78%) or a competitive process (72%). Special evaluation procedures are adopted for protected areas (55%).
- Instruction and deadlines for progress report (78%). The European programme allows successful applicants a posteriori refinement.

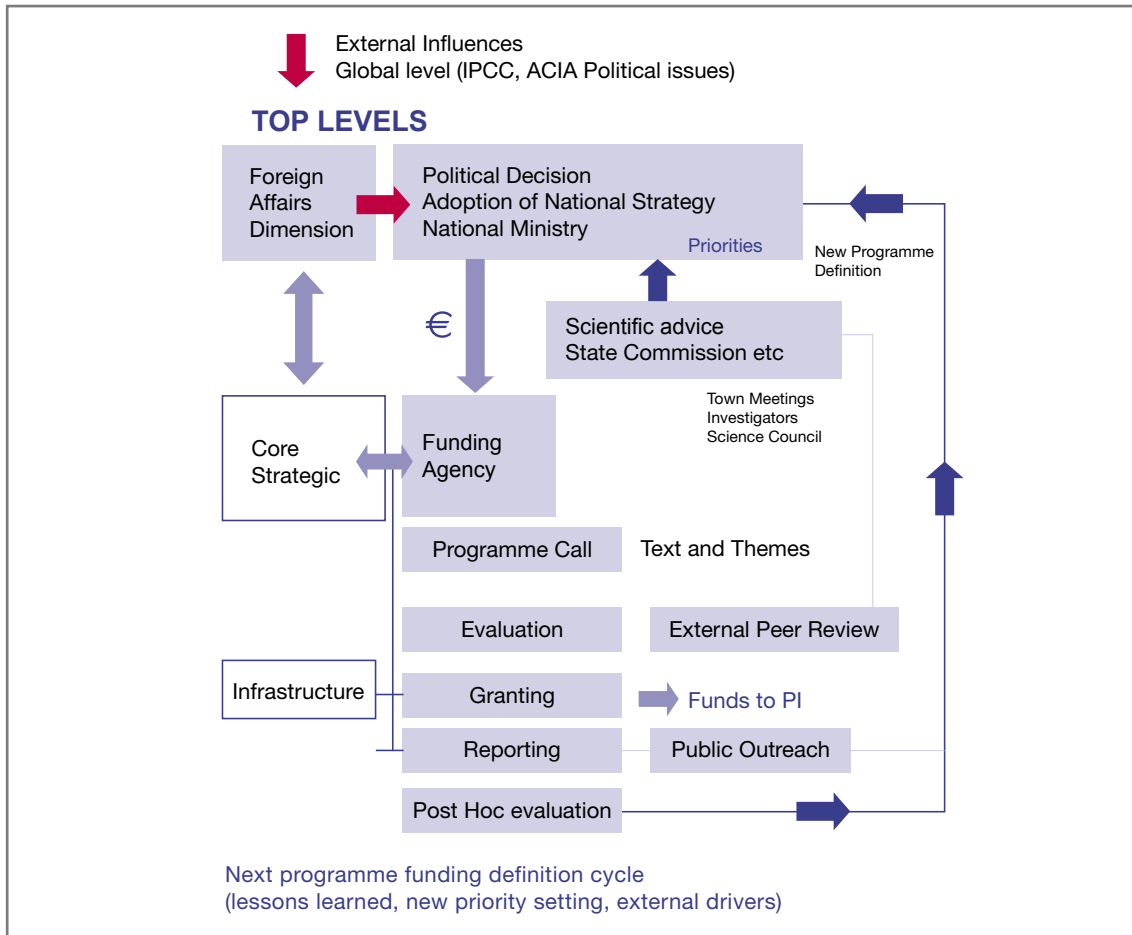
Granting

- The European programme gives a legal text to be signed (61%) and specific account procedures to be followed (67%).
- Funds are electronically transferred (61%), being this the most requested procedure (61%).

Post-hoc programme evaluation

- The European programme requires a final report (83%) on funding utilisation. In order to produce a harmonised process the following diagram is proposed to represent the current average polar programme definition and implementation cycle. This diagram takes into account the data characteristics identified above and could be the basis for the construction of an idealised European polar framework programme.

Polar programme definition and implementation cycle (idealised model)



European Polar Consortium partners in Brussels



7. Concluding remarks and recommendations

Even though there are some obstacles within Europe to transfer research funding across national borders, there are also some serious intentions and collaborations already set up for future actions. This includes the development of strategic test case programmes in research domains mature for joint financing Eg: polar climate change.

This assessment of the European Polar RTD landscape indicates that the system is very diverse and fragmented however there are significant possibilities to enhance collaborations between the partners. There is a need for commitment to connected planning and identification of common research strategies between the European countries and alignment to international partners. This should be achieved in a gradual and stepwise process, identification of best practices and also highlighting weaknesses of the current management system will necessarily help to reach the milestones for a stronger and interconnected approach in the polar RTD domain.

] Strategic summary [

This analysis has underlined the requirement for national commitment to connected approach at the European level this will include the following:

- Identification of strategic test case programmes for joint implementation.
- Harmonisation of management system and processes for polar programmes.
- Connected long term planning and prioritisation.

The current diversity in the mechanisms and procedures of support for national funded research activities in Polar Regions point to the need for harmonisation and identifying some common operational procedures.

Bilateral agreements are common, however it would be desirable to encourage the development of European multi-lateral partnerships, with common priorities and elements of shared investment. This is particularly important in building future joint programmes. In this respect, the possibility of connected planning and long-term prioritisation of research topics at a European level needs to be further examined - strategic test cases in areas such as climate change should be pursued.

Programme planning is intimately linked with the availability and suitability of supporting research infrastructure (see volume II of this report "European Polar Capacity"). It is therefore essential that at the time when joint activities are prioritised or planned, the information flow between national programme managers from funding agencies and infrastructure managers is optimised at all stages of the planning process. Therefore, there is a great need of sharing information, which can be enhanced using common information systems and global scheduling to forecast researcher demand and utilisation of research assets.

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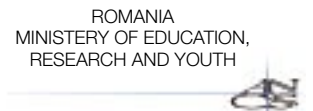
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