The Funding Partners herewith announce a joint call for proposals on

The Changing Arctic Ocean: implication for marine biology and biogeochemistry

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1. Summary

Proposals are invited for submission to a jointly funded activity between funding agencies in the UK and Germany on the Changing Arctic Ocean: implications for marine biology and biogeochemistry.

The overarching objective of this call is to improve our understanding of how changes in the physical environment (ice and ocean) will affect the large-scale ecosystem structure and biogeochemical functioning of the Arctic Ocean, to understand the potential major impacts, and to provide projections for future ecosystem services.

It is expected that this announcement will lead to the funding of up to 10 proposals that will address the programmes objective. Proposals will have a maximum duration of 36 months and will be expected to start within 12 months of the publication of this announcement. Each proposal must include at least one Principal/Co Investigator from each of the funding partner countries and researchers are restricted to being named on only one proposal. Up to €8M is available for this call to fund proposals with a maximum cost of €800K for each proposal.

2. Introduction

This call is being issued as a jointly funded activity between UK and German funding agencies to derive a better understanding of how the changes in the physical environment (ice and ocean) will affect the large-scale ecosystem structure and biogeochemical functioning of the Arctic Ocean and the potential major impacts.

The Arctic is the most rapidly changing environment on the planet[1] supporting diverse yet still poorly understood ecosystems. The Arctic Ocean, whilst relatively small in size, has extensive shelf regions and contributes 5-14% to the global balance of CO_2 sinks and sources[2]. The Arctic is also intrinsically tied to global processes, whether they are climatic, environmental or socio-economic. Consequently, the Arctic is responding in unknown ways to profound changes in the physical environment as well as to multiple natural and anthropogenic stressors. The scale of these challenges facing the Arctic is immense and is further compounded by the rate of change.

Arguably the clearest evidence of change in the Arctic Ocean is the continued decline in extent and thinning of the summer sea ice. Satellite-derived estimates of sea-ice thickness and age have shown a fundamental shift from thick multi-year to thinner first year ice[3, 4] and some climate models have predicted an ice-free summer Arctic Ocean within a few decades[5]. There has been a significant change in the persistence and distribution of open water and leading to modification of water column structure, stability, chemistry and circulation[6, 7]. Other impacts on the marine environment arise from increased riverine discharges altering the nutrient balance, pollutant loads and optical properties.

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[1] IPCC (2014) Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, IPCC, Geneva, Switzerland, 151 pp.
[2] Bates, N. R. & Mathis, J. T (2009) The Arctic Ocean marine carbon cycle: evaluation of air-sea CO2 exchanges, ocean acidification impacts and potential feedbacks. Biogeosciences, 6,10 2433–2459.
[3] Stroeve, J. C., et al. (2012) The Arctic's rapidly shrinking sea ice cover: a research synthesis. Climate Change 110, 1005–1027.
[4] Swart, N.C., et al. (2015) Influence of internal variability on Arctic sea-ice trends. Nature Climate Change 5, 86-89.
[5] Wang, M. & Overland, J.E. (2012). An ice free summer Arctic within 30 years: An update from CMIP5 models. Geophysical Research Letters 39, L18501, doi:10.1029/2012GL052868.
[6] Giles, K.A., et al. (2012). Western Arctic Ocean freshwater storage increased by wind-driven spin-up of the Beaufort Gyre. Nature Geoscience DOI: 10.1038/NGEO1379.
[7] Rainville, L., et al. (2011). Impact of wind-driven mixing in the Arctic Ocean. Oceanography 24,136–145.

Arctic marine ecosystems are responding to changes in ice, water and light availability, nutrient cycling, pollutants, and acidification[8, 9, 10]. Collectively, these multiple stressors are acting on the distribution of organisms[11, 12,] and the structure and functioning of food webs[13, 14, 15], and biogeochemical processes[16]. This is further exacerbated by stresses caused by human activities in the Arctic e.g. changes in resource extraction, maritime traffic, and noise[17.] Against this background of stress and change there are still fundamental questions relating to animal lifecycles and ecosystem function that remain unknown.

Current and future changes in the Arctic marine ecosystem and associated biogeochemical cycles will potentially have far-reaching implications for the environment and economies, including direct impacts on climate and migratory species, and therefore possible impacts on industries such as fisheries and tourism. The ability to understand and predict these changes is therefore critical to enable political/societal/intergovernmental responses to these challenges.

Arctic ecosystems are both highly heterogeneous and connected. Changes in the ocean and sea ice environment of the Arctic will generate major but unknown changes in Arctic ecosystems, affecting biological processes at every level of organisation from genetics and physiology to food webs, biogeochemical cycles, species distribution and whole ecosystems[18, 19].

The focus of this programme is on developing the fundamental, and quantified, understanding required to generate projections of the impacts of future change on biological and biogeochemical processes affecting productivity, species distributions, food webs and ecosystems and the services they provide.

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[8] Arrigo, K.R. & Dijken, G. L. V. (2011) Secular trends in Arctic Ocean net primary production. Journal of Geophysical Research 116, C09011.

[9] Tremblay, J.-E. & Gagnon, J. (2009) The effects of irradiance and nutrient supply on the productivity of Arctic waters: a perspective on climate change In: Influence of climate change on changing Arctic and sub-arctic conditions. Pp. 73–89, Springer

[10] AMAP (2013) AMAP Assessment 2013: Arctic Ocean Acidification. AMAP, Oslo.

[11] Hollowed A.B., et al. (2013) Potential movement of fish and shellfish stocks from the sub-Arctic to the Arctic Ocean. Fisheries Oceanography 22, 355–370.

[12] Johansen G.O., et al. (2013) Seasonal variation in geographic distribution of North East Arctic (NEA) cod – survey coverage in a warmer Barents Sea. Marine Biology Research 9, 908–919.

[13] Grebmeier, J.M., et al. (2006) A major ecosystem shift in Northern Bering Sea. Science 311, 1461–1464.

[14] Li, W. K. W., et al. (2009) Smallest algae thrive as the Arctic Ocean freshens. Science 326, 539.

[15] Lee, S. H. et al. (2013) Contribution of small phytoplankton to total primary production in the Chukchi Sea. Continental Shelf Research 68, 43-50.

[16] Levasseur, M. (2013) Impact of Arctic meltdown on the microbial cycling of sulphur. Nature Geoscience 6, 691-700.

[17] Fort, J , et al. (2013) Multicolony tracking reveals potential threats to little auks wintering in the North Atlantic from marine pollution and shrinking sea ice cover. Diversity and Distributions 19, 1322-1332.

[18] ART (2014) Priority sheet - Arctic Biodiversity, http://istas.sciencesconf.org/resource/page/id/11

[19] Wassmann,P. (2011a) Arctic marine ecosystems in an era of rapid climate change. Progress in Oceanography 90, 1-17
Wassmann, P. (2011b) Footprints of climate change in the Arctic marine ecosystem. Global Change Biology 17, 1235-1249.

Bundesministerium für Bildung und Forschung

NERC SCIENCE OF THE ENVIRONMENT

3. Scientific Scope

The overarching objective of this call is to fund joint UK-German projects that will improve our understanding of how changes in the physical environment (ice and ocean) will affect the large-scale ecosystem structure and biogeochemical functioning of the Arctic Ocean, to understand the potential major impacts, and to provide projections for future ecosystem services and will be addressed through the delivery of two key research challenges:

Challenge 1: To develop quantified understanding of the structure and functioning of Arctic ecosystems.

To generate projections of the impacts of change requires quantitative and experimental analyses of the key processes that affect the distribution of Arctic organisms, structure of food webs and interactions with biogeochemical cycles.

1.1 Characterization of food webs and biogeochemical cycles in contrasting regions of ice cover.

There are major structural differences in Arctic food webs that reflect the relative abundance of high Arctic ice-associated organisms compared to sub-Arctic/boreal species[20] and changes in sea-ice are expected to have a major impact on species distributions and ecosystem structure[21, 22, 23, 24, 25, 26, 18.] Differences in productivity and zooplankton community composition associated with the influence of Arctic ice-covered waters are known to affect which species of fish, seabirds and marine mammals can be maintained in regional food webs[21, 22]. Sea-ice is also a critical habitat for a wide range of species as an area of feeding and as a substrate. Loss of sea-ice can affect access to prey and hence the breeding biology of seabirds that occur in large land-based colonies[27, 28] and habitat availability for marine mammals, such as seals, which haul out onto the ice using it as a resting area and

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[20] Wassmann, P. (2006) Structure and function of contemporary food webs on Arctic shelves: an introduction. Progress in Oceanography 71, 123-128. doi:10.1016/j.pocean.2006.09.008.

[21] Berge, J., et al. (2015) First records of Atlantic Mackerel (Scomber scombrus) from the Svalbard archipelago, Norway, with possible explanations for the extension of its distribution. Arctic 68, http://dx.doi.org/10.14430/arctic4455

[22] 22 Karnovsky, N. et al. (2010) Foraging distributions of little auks Alle alle across the Greenland Sea: implications of present and future Arctic climate change. Marine Ecology Progress Series. 415, 283-293.

[23]Joiris C.R. (2011) A major feeding ground for cetaceans and seabirds in the southwestern Greenland Sea. Polar Biology 34, 1587-1608.

[24] Grémillet, D., et al. (2015) Arctic warming: nonlinear impacts of sea-ice and glacier melt on seabird foraging. Global Change Biology 21, 1116-1123 doi:10.1111/gcb.12811.

[25] 25Leu, E., et al. (2011) Consequences of changing sea-ice cover for primary and secondary producers in the European Arctic shelf seas: timing, quantity, and quality. Progress in Oceanography 90, 18-32.

[26] Durbin, E.G. & Casas, M.C., (2013) Early reproduction by Calanus glacialis in the Northern Bering Sea. Journal Plankton Research 10.1093/plankt/fbt121.

[27] Gaston, T & Irons, D. (2010) Seabirds – murres (guillemots), Arctic Biodiversity Trends 2010, Conservation of Arctic Flora and Fauna, Iceland.

[28] Fort, J , et al. (2013) Multicolony tracking reveals potential threats to little auks wintering in the North Atlantic from marine pollution and shrinking sea ice cover. Diversity and Distributions 19, 1322-1332.

refuge[29]. However, the composition and interactions within Arctic food webs are poorly described in most regions and particularly in areas of ice to open water transit.

The sea-ice environment influences the water column structure, light field, carbonate chemistry and nutrient supply experienced by plankton, as well as the potential for air-sea exchange of biogenic gases. Ice melt, snow melt and rainfall play key roles in controlling phytoplankton community structure of under-ice and ice edge blooms, impacting biogeochemical cycling in the water column. Vertical mixing, overturning, upwelling and oceanic transport are all intimately related to the presence and seasonality of the ice, yet there are major gaps in our understanding of how the sea-ice environment impacts food web structure, processes of energy and flows of carbon, nitrogen and phosphorus (including feeding interactions at all trophic levels and pelagic-benthic ecological links). There is also little quantification of these links and interactions or the functional roles of species and levels of redundancy in food webs. Food web structure influences the magnitude of primary production, respiration, vertical export and ultimately sequestration of carbon. Hence, a major effort is required to fill gaps in knowledge of food web structure (microbial to seabirds and marine mammals) and functioning in a range of ice-ocean ecosystems that provide the basis for modelling the impacts of change.

1.2 Description of changing seasonality and its subsequent impact on biological and biogeochemical processes and ecosystems.

As the extent of sea-ice cover declines, the seasonal dynamics of regional Arctic ecosystems is changing. In many areas there is an earlier melt and later freeze with potentially multiple-freeze-melt events during a season. As the open water period extends, this increases the growing season of planktonic organisms and can change the balance of autotrophic and heterotrophic production[30]. This will affect the transfer of energy to higher trophic levels [25] and flux of carbon into the deeper ocean. The ice edge position and its timing will also affect vertical fluxes affecting pelagic-benthic links and hence benthic community structure. There is extensive knowledge of summer open-ocean processes and there have been some important international efforts to understanding winter time dark processes in high Arctic marine ecosystems (e.g. *Mare Incognitum Program* of the University of Tromsø), spring plankton dynamics[31] and how winter processes impact the nutrient inventory of the Arctic Ocean with knock-on effects for spring and summer dynamics. There are still significant and important knowledge gaps in our understanding of the transitional seasonal dynamics. The marked seasonality and strong advective regime also requires an understanding of the sensitivity of the seasonal development and spatial connectivity of food web processes. Developing an understanding of the complete seasonal biogeochemical and ecosystem dynamics over a range of different ice conditions through a combination of observations, experiments and modelling is crucial to provide a

[29] Kovacs, K. M., et al. (2011), Impacts of changing sea-ice conditions on Arctic marine mammals, Marine Biodiversity, 41, 181-194.
[30] Wassmann, P. & M. Reigstad. (2011) Future Arctic Ocean seasonal ice zones and implications for pelagic-benthic coupling. Oceanography 24, 220–231.
[31] 31Søreide J.E., et al. (2010) Timing of blooms, algal food quality and Calanus glacialis reproduction and growth in a changing Arctic. Global Change Biology 16, 3154-3163.

mechanistic understanding of major underlying processes necessary for generating projections of the potential impacts of future change.

Challenge 2: To understand the sensitivity of Arctic ecosystem structure, functioning and services to multiple stressors and the development of projections of the impacts of change.

Although sea-ice is the characteristic feature of Arctic ecosystems, changes are also occurring in other fundamental drivers of habitats in these regions. This includes aspects of ocean physics (temperature, stratification and circulation), chemistry (pH and nutrients), light levels [8], and toxic contaminants such as persistent chemicals and mercury[32]. The behaviour of long-lived contaminants with changing ice-regimes and exposure of organisms living in ice during ice formation and melt are currently unknown but may contribute to contaminant residues in biota within Arctic marine ecosystems[33, 34].

Development of projections requires quantified understanding of the biogeochemical and biological processes that determine the relative success of different species, and their sensitivity and resilience, and that of the food webs in which they occur, to changes in multiple drivers.

2.1 Assessment of the impact of changing inorganic and organic nutrient supply on ecosystem structure and function.

Changes in ice formation, consolidation and subsequent melt, glacial melt, freshwater input, shelf exchange and mixing rates are expected to change the concentrations and elemental stoichiometry (C:N:P:Si:Fe) of inorganic and organic material in the Arctic Ocean. This will lead to unknown impacts on plankton autotrophic and heterotrophic community structure and therefore the balance between carbon storage and production of CO_2.

River discharge to the Arctic is disproportionately high; 10% of the global total enters 1% of the ocean volume annually. Around 60% of Arctic dissolved organic matter (DOM) is terrestrial in origin, and there is increasing evidence that these inputs are extremely labile and thus may be an important resource for Arctic microbial communities with potential implications for food webs and CO_2 production. The annual delivery of riverine DOM is expected to increase with increasing river discharge[35]. Increased DOM supply is also envisaged via increased coastal upwelling and potentially through changes to phytoplankton community structure and thus excretion rates. As much of this DOM is strongly light absorbing[36, 37] there are additional implications for ecosystem structure via

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[32]Ma, J.M. et al. (2011) Re-volatilisation of persistent organic pollutants in the Arctic induced by climate change. Nature Climate Change 1, 255-260.
[33]Bustnes, J.O., et al. (2012) Temporal Dynamics of Circulating Persistent Organic Pollutants in a Fasting Seabird under different environmental conditions. Environmental, Science & Technology 46, 10287-10294.
[34] McKinney, M.A., et al. (2013) Global change effects on the long-term feeding ecology and contaminant exposures of East Greenland bears. Global Change Biology 19, 2360-2372.
[35] Frey et al. (2007) Impacts of climate warming and permafrost thaw on the riverine transport of nitrogen and phosphorus to the Kara Sea. Journal of Geophysical Research 112, G04S58, doi:10.1029/2006JG000369.
[36] Bélanger, S. et al. (2013) Light absorption and partitioning in Arctic Ocean surface waters: impact of multiyear ice melting. Biogeosciences 10, 6433–6452.

modification of the surface water light field, as well as a wider biogeochemical aspect related to production and fate of photo-products including climate-active gases[38].

The freshening of Arctic surface waters from increased river discharge and sea-ice melt leading to strengthened stratification and shoaled mixed layer depths has already led to a decrease in phytoplankton community size structure[39]. The expected changes in microbial community structure[37, 40] due to changes in the concentration and composition of organic and inorganic nutrients will alter the pathways of nutrient regeneration, respiration and photochemical transformation and sinking fluxes of particulate and dissolved material in currently unknown ways [31]. This in turn will impact mesopelagic food webs, carbon sequestration, benthic food supply, and the supply of nutrients back to the surface layer. Addressing these important changes will require process studies that focus on external supply and internal cycling of carbon, nitrogen and phosphorus, and the interactions between particulate and dissolved material and mesopelagic food webs from microorganisms to fish.

2.2 Sensitivities to multiple stressors and development of models of the life-cycles of key species, food-webs, biogeochemical cycles and whole ecosystems.

To understand the responses and the resilience of species and food webs in Arctic ecosystems exposed to multiple drivers of change requires detailed understanding of the responses, adaptations (genetic, physiological, behavioural and ecological) and resilience of individual species throughout their life histories[18]. Arctic ecosystems are dominated by species with complex life histories that are long-lived and highly adapted to the strongly seasonal environments. Many of these species are likely to be sensitive to change and their future distribution and abundance will depend on their genetic and physiological capacities to adapt or behavioural and life cycle processes that allow them to move [18]. The timing of key life history events and the potential mismatch between phenology and physical cycles could have major impacts to ecosystem function[41]. Lipid-based efficient food webs adapted to the near freezing environment are more vulnerable to environmental change than their mid-latitude analogues[31]. The advective nature of the Arctic[42] and long life spans of the key species[20] result in a strong connectivity of the basins and ecosystems, and fast downstream propagation of

[37] Fichot, C. G. et al.. (2013) Pan-Arctic distributions of continental runoff in the Arctic Ocean. Scientific Reports 3 doi:10.1038/srep01053.
[38] Bélanger, S. et al. (2006) Photomineralization of terrigenous dissolved organic matter in Arctic coastal waters from 1979 to 2003: Interannual variability and implications of climate change. Global Biogeochemical Cycles 20, GB4005, 5623-5640, doi:10.1029/2006GB002708.
[39] Li, W. K. W., et al. (2009) Smallest algae thrive as the Arctic Ocean freshens. Science 326, 539.
[40] Lee, S. H. et al. (2013) Contribution of small phytoplankton to total primary production in the Chukchi Sea. Continental Shelf Research 68, 43-50.
[41] Hovinen J.E.H. et al. (2014) Climate warming decreases the survival of the little auk (Alle alle), a high Arctic avian predator. Ecology and Evolution 4, 3127-3138.
[42] Popova, Ekaterina E., et al. (2012) What controls primary production in the Arctic Ocean? Results from an intercomparison of five general circulation models with biogeochemistry. Journal of Geophysical Research 117, C00D12. (doi:10.1029/2011JC007112).

localised changes to the food webs[43]. Changes in any one of the above web-forming factors will lead to a major change in the food web and ecosystem structure and function. Understanding the spatial and temporal operation of these life cycles (across multiple trophic levels including plankton, fish, seabirds and marine mammals) will be crucial for developing projections of the impacts of change.

Multiple drivers of change will impact biogeochemical processes. The combined and interacting effects of increasing temperature, changing light, carbonate chemistry, organic and inorganic nutrients and metals will likely have differential impacts at different levels of ecological organisation affecting productivity and ecosystem structure, carbon storage and hence the role of these ecosystems in climate-related processes[19].

Arctic and sub-Arctic food webs support globally significant fisheries, which have expanded over the last decade[44]. Changes in sea ice and oceanic conditions are resulting in shifts in the distributions of exploited species[21] and an increased influence of lower latitude species in Arctic food webs is expected to increase the accessibility and availability of fishable populations in higher Arctic regions[11, 12]. Such fisheries directly affect exploited species, but they also indirectly affect the species (e.g. seabirds and marine mammals) that depend on the same resources as prey.

To generate projections of the impacts of change requires quantified understanding of the multiple processes involved in determining responses to change. This will involve process and experimental studies focused on the critical phases of life-cycles and adaptive capacities of key species, developing mechanistic understanding of the interactive effects of change on biogeochemical and biological processes and how these impact food web structure. No single model can be used to address all the issues of interest, instead a range of models will be required that focus on different scales of biological organisation, such as the life-cycles of key species, food webs and whole ecosystem processes, including biogeochemical influences on productivity and nutrient cycling.

2.3 Projections of the impacts of change.

Development of projections of the impacts of Arctic change on species, biogeochemical cycles and whole ecosystems is required for the development of mitigation and adaptation measures for managing the impacts of change on human communities and economic systems. Projections of the impacts of physical and biogeochemical changes in Arctic systems are being developed through IPCC processes. The UK Earth System Model (ESM) based on NEMO-MEDUSA[45] will provide a series of circumpolar scenarios of physical and biogeochemical change over the next century. These studies can provide the basis for developing projections of the impacts of change on key species and food webs. The generation of such projections will be a major contribution to the development of the

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[43] Hop, H., et al. (2006) Physical and biological characteristics of the pelagic system across Fram Strait to Kongsfjorden. Progress in Oceanography 71, 182-231.
[44] Christiansen, J.S. et al. (2014) Arctic marine fishes and their fisheries in light of global change. Global Change Biology 20, 352-359.
[45] Yool, A., et al. (2013) MEDUSA-2.0: an intermediate complexity biogeochemical model of the marine carbon cycle for climate change and ocean acidification studies. Geoscientific Model Development 6, 1767-1811.

International Platform on Biodiversity & Ecosystem Services (IPBES) process assessing the impacts of future change on biodiversity and ecosystem services[46].

Analyses are required that examine resilience, sensitivity and thresholds of biogeochemical cycles, species and ecosystem processes. Projections of future change will assess the sensitivity of key species to multiple drivers and examine changes in the distribution and abundance of key species, the interaction of biogeochemical and ecological processes and the structure and functioning of ecosystems under different climate change scenarios. Development of projections should include appropriate analyses of model sensitivity and associated uncertainty. Understanding how future changes in food webs will impact key ecosystem services will be crucial for sustainable exploitation of these resources. Activities under this challenge are expected to include analyses of how changes in Arctic ecosystems will impact, and be affected by, human activities (including fisheries, transport and resource exploitation) and develop understanding and projections of potential ecological and socio-economic impacts of change.

This overarching objective will be addressed through multidisciplinary science projects that have substantial bilateral partnerships. Fieldwork, laboratory studies and modelling are all in scope as is cutting edge application of new sensors and autonomous systems. Stand-alone technology development is, however, out of scope. Dedicated socio-economic proposals are not eligible for submission to this call, however, proposals can contain an element of socio-economics.

All costs associated with proposals must be covered by the funding available for each project (i.e. up to €800k). No additional funding will be available to cover any additional costs associated with projects (e.g. services and facilities costs, ship-time costs).

In order to calculate the UK contribution to the overall proposal budget, for consistency between proposals, an exchange rate of **£1 = € 1.17** should be used. The NERC contribution for proposed projects will be at 80% FEC with the exception of NERC Services and Facilities which will be paid at 100%, and it is these figures which should be used when calculating the total cost of the proposal. For example, if an €800K proposal were submitted, where the funding were divided with € 500k for the German partner and €300k for the UK partner, the € 300k would cover the UK partners 80% FEC cost plus any exceptions to be paid at 100% FEC.

Applicants are encouraged to have strong project partnerships, where appropriate, with active and/or planned fieldwork programmes to leverage off existing activities and to gain quick and low cost access to Arctic infrastructure (letters of support are required to confirm access, e.g. berths on a cruise, has been agreed – see section h). Applicants are also encouraged to include early career scientists in their proposals to support capacity building in this research area.

[46] Eamer, J., et al. (2013). Life Linked to Ice: A guide to sea-ice-associated biodiversity in this time of rapid change. CAFF Assessment Series No. 10. Conservation of Arctic Flora and Fauna, Iceland.

The UK has just funded 4 projects under the first round of the Changing Arctic Ocean research programme, which will have major field campaigns in the summers of 2017, 2018 and 2019. More details on these projects can be found in project summary documents – ARISE, ChAOS, DIAPOD, PRIZE. Applicants are encouraged to develop complementary project proposals and to avoid any duplication.

4. Procedures and Criteria

Proposals should address at least one of the challenges in the call text. Applicants are advised to consult with their national contact points for this call prior to planning and submitting proposals (see section (g) Further Information).

a) Eligibility

This call is open to proposals that meet the following criteria:

- The proposal addresses at least one of the two challenges in the call text;
- Researchers/institutions eligible to apply for funding from their national participating Funding Partner are eligible to apply for funding within this call for proposals;
- Each proposal must involve at least one Principal or Co Investigator from each of the Funding Partner countries;
- Principal/Co Investigators may only be named on one proposal;
- Funds being provided by NERC cannot be used on the funding of PhD studentships, however for BMBF funding national funding regulations apply;
- Project duration should be a maximum of 36 months;
- Projects should preferably start no later than May 2018;
- The maximum funding available for each proposal is €800k, where the NERC contribution will be at 80% FEC with the exception of NERC Services and Facilities which will be paid at 100%;
- The general eligibility criteria specified by the respective Funding Partners have to be followed. For details please contact the national contact for further advice.

b) General Procedure

The following procedures will apply:

1. Proposals are submitted to the Lead Agency (NERC)
2. Proposals are sent to independent, international peer reviewers for assessment.
3. PI's given the opportunity to respond to reviewer comments.
4. An Evaluation Panel, consisting of independent, international experts, rank the proposals based on the peer review comments and written responses from applicants. The Evaluation Panel will recommend the top ranked proposals for funding.
5. The Funding Partners will jointly decide on a short-list for funding based on the recommendations of the Evaluation Panel.

The composition of the Evaluation Panel will be made available on the website of the Lead Agency after the funding procedure has been completed. Strict confidentiality is maintained with respect to the identities of the peer reviewers, applicants and the contents of the proposals throughout. The list of funded projects will be published on the websites of all Funding Partners.

c) Evaluation

Potential applicants are advised to take careful notice of the aims and scope of the call as described above. The assessment criteria to be used will be as follows:

Main criteria

- Research Excellence
  - including scientific quality, novelty, originality and innovation, feasibility, potential for application.
- Fit to the Programme Requirements
  - relevance to the call, especially added value of transnational collaboration.

Additionally

The following criteria will also be considered when ranking the proposals:

- Level of integration and collaboration
- Inter-/transdisciplinary
- Project governance
- Justification of resources requested
- Networking and disseminations activities

In addition, in determining proposal success the funding partners will select a balanced portfolio of projects that collectively address the key gaps in the aims of the programme that are not currently being addressed

d) Management

Funded investigators will be required to report to their national funding agency under the administrative rules of the relevant funding organisation. The Principal Investigator will be required to submit a final report, in English, to all Funding Partners within six months of the end of the project. This report should cover all the work undertaken by all of the proposal partners.

A Science Meeting will be organised half way through the funding period and a final event will be organised at the end of the funding period. Participants of funded projects will be expected to participate in both events. The Funding Partners will provide additional funding to attend these meetings, so the cost of attendance does not need to be included in proposals.

Projects are expected to include appropriate project management and travel and subsistence costs into their proposal budget.

e) Data Management

Data collected by funded projects will be required to be made publically available and deposited in a relevant data centre. It is expected that data collected as part of this programme will be made available to other funded project PI's in a timely manner. Applicants should consult the Data Policy of both Funding Partner countries to ensure that they are adhering to their countries specific requirements.

f) Funding

A combined total of up to €8 million has been allocated to this call by the Funding Partners from the UK and Germany. Each participant in a funded consortium will be funded by their national partner organisation (see section g). The Funding Partners aim to fund as many top ranked proposals as possible.

g) Eligible budget items

Eligible costs are governed by national guidelines. Specific questions should be addressed to the national partner organisations in advance of submitted a proposal.

NERC Facilities

Prior to submitting a proposal, applicants wishing to use a NERC service or facility must contact the facility to seek agreement that they could provide the service required. Applicants wishing to use a NERC facility will need to submit a mandatory 'technical assessment' with their proposal (including aircraft but excluding ships and HPC). For NERC, this means a quote for the work which the facility will provide. A full list of the Facilities requiring this quote can be found here on the NERC website. The costs for the service or facility (including NMF costs) must be included within the Directly Incurred Other Costs section of the Je-S form and also within the facilities section of the Je-S form. Further information on NERC services and facilities can be found on the NERC website.

h) Submission of Proposals and Deadline

All submissions must be in accordance with the proposal preparations requirements of the Lead Agency (NERC) and comply with the NERC Research Grants and Fellowship Handbook. The language of the proposals is English. Applications should be submitted electronically through JeS, the RCUK electronic submission system.

Proposal must be submitted using the Research Councils' Joint Electronic Submission system (Je-S). Applicants should select Proposal Type - 'Standard Proposal' and then select the Scheme – 'Directed' and the Call – 'The Changing Arctic Ocean SEPT 2017'.

Applicants must ensure that their proposal is received **by NERC by 4pm on the 14 September 2017**. Applicants should leave enough time for their proposal to pass through their organisation's Je-S submission route before this date. Any proposal that is received after the closing date, is incomplete, or does not meet NERC's eligibility criteria or follow NERC's submission rules (see NERC Grants Handbook), will be returned to the applicant and will not be considered.

All attachments, with the exception of letters of support and services/facilities/equipment quotes, submitted through the Je-S system must be completed in single-spaced typescript of minimum font size 11 point (Arial or other sans serif typeface of equivalent size to Arial 11), with margins of at least 2cm. Please note that Arial narrow, Calibri and Times New Roman are not allowable font types and any proposal which has used either of these font types within their submission will be rejected. References and footnotes should also be at least 11 point font and should be in the same font type as the rest of the document. Headers and footers should not be used for references or information relating to the scientific case. Applicants referring to websites should note that referees may choose not to use them.

Applicants should ensure that their proposal conforms to all eligibility and submission rules, otherwise their proposal may be rejected without peer review. More details on NERC's submission rules can be found in the NERC research grant and fellowships handbook and in the submission rules on the NERC website.

Proposals for this call should be submitted in standard grant format following the requirements outlined in Section F of the NERC research grant and fellowships handbook.

The UK applicant should list all international collaborators as Project Partners (PP). The PP is the organisation and there might be multiple PI/Co-s from each PP. If this is the case the PP need only be entered once naming only one PI/Co-I. The required organisation letter should confirm the names of all others involved. PP entries should indicate the value of the non-UK requested funding in the project partner in-kind support section of the proposal form.

The following additional attachments must be provided on the lead proposal :

- CVs for each of the named International collaborators (maximum 2 pages per person) should be combined into one document as attachment type 'Non-UK Components'.

- Separate descriptions of each countries contribution to the proposed research as attachment type 'Non-UK Components', which should include:

  - a separate document for each country not exceeding more than 2 sides A4;
  - an outline of the roles and responsibilities of the countries researchers in achieving the overall aims of the proposed research;
  - a breakdown of funding required for each country (include relevant Funding Partner financial tables).
- Letters of support from any active and/or planned fieldwork programmes applicants are proposing to leverage off to gain access to Arctic infrastructure (e.g. berths on a cruise) to confirm that this has been agreed (maximum 2 sides A4 per letter).

Please note that on submission to council ALL non PDF documents are converted to PDF, the use of non-standard fonts may result in errors or font conversion, which could affect the overall length of the document.

Additionally where non-standard fonts are present, and even if the converted PDF document may look unaffected in the Je-S System, when it is imported into the Research Councils Grants System some information may be removed. We therefore recommend that where a document contains any non-standard fonts (scientific notation, diagrams etc), the document should be converted to PDF prior to attaching it to the proposal.

i) Call Secretariat

The call will be run by NERC. The call secretariat is responsible for organising the assessment process and for all communication regarding submission process.

5. Timetable

Call Publication	16th May 2017
Deadline for submitting proposals	14th September
Decision communicated to applicants	late January 2018

6. National Contact Details

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