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Target Call or Funding Programme

· Call Name: BG-09-2016: An integrated Arctic observation system

· Call Topic: Blue Growth

· Call Deadline: 17.02.2016

Your contributions

Your Proposed Contribution:

We are interested in becoming a partner in a consortium for this bid. Our team consists of an international interdisciplinary team of researchers from Aarhus University, Denmark;, DCU, Ireland; Lund University, Sweden with partners from McGill University, Canada; NUIG, Ireland (Atlantos link) and Google Earth Engine. Our team can offer a Pan Arctic Net Ecosystem Exchange (PANEEx) model that delivers high spatial and temporal resolution data to assess NEE across the Arctic using a combination of Earth Observation and in-situ measurements. PANEEx has been in development since summer 2014 and was funded by a Google Earth Engine Research Award. The PANEEx model is implemented in Google Earth Engine and preliminary results are very promising. The integration of PANEEx within a consortium will aid the development of effective monitoring methods to improve understanding of the Arctic climate system and ecosystem change. These are important prerequisites for effectively assessing climate change adaptation and mitigation strategies in the Arctic and Elsewhere. Our team has excellent experience in Arctic research and consists of PIs, experienced researchers & several early career researchers as well as partners in the EU Horizon2020 funded Atlantos project and in industry (Google Earth Engine). Our team has extensive experience with EU-funded projects including FP7, Marie-Curie and Horizon2020 as well as with the NSF funding in the USA. In relation to this call we have strong research profiles and links to industry and can contribute significantly to the call topic and deliver impact in several areas including:

1. PANEEx increases the temporal and geographic coverage and usefulness of observational data in the Arctic which will aid improvement of assessment and prediction capacity across the Arctic. The integration of ESA Sentinel data within PANEEx may provide a near-real time ecosystem monitoring service.
2. The PANEEx model can improve a sustained integration of space-based and *in-situ* Arctic observations with increased temporal and spatial resolution, particularly when Sentinel-1, 2 and 3 are in full operation. It will offer cost effectives benefits to the Copernicus monitoring and climate change services.
3. It can contribute to the long-term improvement of Arctic observation systems.
4. There is a strong potential for integration of PANEEx outputs with existing pan-Arctic monitoring networks.
5. The PANEEx model incorporates freely available EO data and thus will improve the cost-effectiveness of data collection in support of Arctic-related economic and societal activities
6. It will contribute to the WMO Programme Year of Polar Prediction (YOPP) and Theme 1 of the Global Carbon project.
7. Several PANEEx researchers are at an early stage in their research career; therefore inclusion will enhance their professional skills and competences and build European research capacity.
8. The PANEEx team includes researchers from Sweden, Denmark, Ireland and Canada as well as partner links to the EU Horizon2020 AtlantOs project and an industry partnership with Google Earth Engine.

Specific Challenge:

The Arctic is a theatre of profound transformation. Climate change is significantly affecting the extent and thickness of sea-ice, on snow cover on ice-sheet melting, on **permafrost thawing**, and on marine and **land ecosystems**. These changes are bringing with them both risks and opportunities, and **an integrated and multi-disciplinary Arctic observation system is becoming essential for studying**, forecasting and assessing changes that support the region's sustainable development. **Improving** and coordinating **current capabilities for assessing and predicting Arctic environmental change requires the provision of data on a number of key variables of Arctic meteorology**, climatology, oceanography, **ecosystems** and pollution **at various scales**. **Monitoring and improved understanding of the Arctic climate system** and its teleconnections, as well as of **ecosystem change** and the socio-economic impacts on offshore operations, new shipping routes, mining activities, tourism etc. are important prerequisites for **effectively assessing** climate change adaptation and mitigation strategies in the Arctic and elsewhere.

Scope:

An integrated Arctic observation system should close critical gaps with **innovative solutions**, as well as **improve the integration and inter-operability of existing observation systems**, **also in view of data assimilation into models**. The activity shall be based on **co-operation** between the existing European and international infrastructures (**in-situ and remote including space-based**) and the modelling communities, with the **active participation** of relevant stakeholder groups. In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), the action should contribute to implementing the Transatlantic Ocean Research Alliance, the **Sustaining Arctic Observation Networks (SAON) and the Cold Region Initiative of the Group on Earth Observation (GEO).**

It should have links to the relevant Copernicus and European Space Agency (ESA) programmes and infrastructure in order to **maximise the synergies** other European efforts to develop an integrated Arctic observation system. In particular, strong coordination with the on-going Horizon 2020 project which aims to develop an **Integrated Atlantic Ocean Observation System** [[AlantOS, www.atlantOs-h2020.eu/]] should be sought and with the relevant ESFRI research infrastructures. **The activity shall support and promote the integrated use of Arctic land**, ocean, ice and **atmosphere *in-situ* and space-based observations from Europe, the USA, Canada and other international partners.** Community-based observation programmes that draw on indigenous and local knowledge should be included and should form the basis for participatory research and capacity-building within Arctic communities. **The action should ensure data interoperability through internationally recognised standardisation and quality assurance/quality control (QA/QC) processes, promote database integration and allow free and open access to all data and data products, following the GEO data sharing principles.** It should make best use of reference sites (supersites) and should contribute to **filling *in-situ* observational gaps through novel technology development**, with particular attention to the gaps that may help improve the accuracy of predictive models. In line with the strategy for EU international cooperation in research and innovation [[(COM (2012)497)]], actions will contribute to implementing the Transatlantic Ocean Research Alliance. Due to the specific challenge of this topic, in addition to the minimum number of participants set out in the General Annexes, **proposals should benefit from the inclusion of partners from the USA and from Canada** [Please note that participants from developed countries are not eligible for Horizon 2020 funding.]. **International cooperation with partners from other Arctic** and non-Arctic third countries would add further value.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 15 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction [[Beneficiaries of projects participating in the pilot on open research data are should follow the **Global Earth Observation System of Systems (GEOSS) Data Sharing Principles** and to register in GEOSS the geospatial data, metadata and information generated as part of the project. Further information on GEOSS can be found from: http://www.earthobservations.org.]].

Expected Impact:

- **Increase temporal and geographic coverage and usefulness of observational data in the Arctic with a view to improving the assessment and prediction capacity of Arctic and planetary changes;**
- Support standardisation and calibration/validation activities, and improve the inter-operability of Arctic observational data;
- **Improve the sustained integration of space-based and *in-situ* Arctic observations into process models and forecast systems showing benefit to the Copernicus monitoring services**;
- **Contribute to the long-term improvement of Arctic observation systems and related services**;

- **Integrate with existing pan-Arctic monitoring networks by building additional capacity and adding monitoring parameters to current programmes;**
- **Improve the cost-effectiveness of data collection in support of Arctic-related economic and societal activities**;
- **Lead to better-informed decisions and better-documented processes within key sectors** (e.g. local communities, shipping, tourism, fishing);
- **Support international assessments of global challenges such as climate change, scarcity of natural resources and global scale hazards;**
- Strengthen the societal and economic role of the Arctic region and support the EU strategy for the Arctic and related maritime and environmental policies [[COM(2008) 763 of 20 November 2008; JOIN(2012) 19 of 26 June 2012]];
- **Contribute to the GEO Cold Region Initiative and to the Transatlantic Ocean Research Alliance;**
- Contribute to the ongoing and possible future OSPAR actions in Arctic waters;
- **Contribute to the Sustaining Arctic Observation Networks (SAON) process**;
- **Contribute to the WMO Programme Year of Polar Prediction (YOPP)[**
- **Improve the professional skills and competences for those working and being trained to work within this subject area.**

Experience and Skills Relevant to the Call/Topic:

We have world leading Principal Investigators, early career researchers links to the AtlantOs project and industry partners who are keen to contribute to this call topic:

- Prof. Torben Christensen – Lund University, **Sweden**. Arctic and Subarctic terrestrial feedbacks to climate. Co-ordinator of the Nordic Centre of Excellence DEFROST (2010-2015). Google Scholar Profile
- Dr. John Connolly – St. Patrick's College, DCU, **Ireland**. Earth Observation, GIS, northern peatland carbon dynamics. Marie Curie Fellow. Google Scholar Profile
- Dr. Magnus Lund – Researcher, Aarhus University, **Denmark**. Greenhouse Gas flux in northern Peatlands. Google Scholar Profile
- Dr. Herbert N. Mbufong – Researcher, Aarhus University, **Denmark**. Arctic Ecosystem Ecology. Google Scholar Profile
- Dr. Mikkel Tamstorf - Aarhus University, **Denmark**. Arctic Ecosystem Ecology. Google Scholar Profile
- Dr. Andreas Persson – Lund University, **Sweden**. Hydrology, remote sensing, GIS and Subarctic. Google Scholar Profile

Partners:

- **AtlantOs Partner**: Dr. Brian Ward – School of Physics, NUIG, Ireland. Consortium Member in WP1; WP3; WP6 & WP9.
- **Canadian Partner**: Prof. Nigel Roulet – McGill University, Canada. Integration of climate, hydrology and biogeochemical cycles in northern ecosystem Google Scholar Profile
- **Industry Partner**: David Thau - Senior developer, Google Earth Engine. Computer Science, software development and geospatial processing.