

BNP Paribas Foundation will provide €6 million to advance climate change research

Between 2017 and 2019, the BNP Paribas Foundation will put an additional €6 million into its Climate Initiative programme to support eight international research projects. These projects focus on a diverse range of topics including the collection of new data on past climates in Antarctica and tropical areas, the expansion of the dry subtropics in South America, an assessment of the impact of climate change on the coral reefs and the carbon sequestration potential of agricultural soils in Africa.

Launched in 2010, Climate Initiative aims to develop our understanding of climate change and its effects on our environment. It has already enabled ten international research teams to study the climate and raise the awareness of more than 200,000 people about climate change.

8 projects, 178 researchers, professors and engineers, 73 universities and research organisations throughout the world

These global, interdisciplinary projects focus on a broad range of issues concerning the functioning of the climate system, its evolution and the effects it will have on our environment. They cover a total budget of €14.4 million, of which €6 million is provided by the BNP Paribas Foundation.

- Collecting unprecedented data to **model the evolution of East Antarctica**, a region still largely unexplored, and its possible consequences on ocean level rise. Project led by Barbara Stenni (Univerista CA' FOSCARI VENEZIA), Joël Savarino (LGGE (CNRS/ Université Grenoble Alpes)), Detlev Helmig (University of Colorado), Tas van Ommen (Australian Antarctic Division).
- Measuring the **impact of global warming on seabirds and marine mammal that inhabit the Arctic and Antarctic regions** or rely on them for their reproduction. Project led by Christophe Barbraud and Yan Ropert-Coudert (CEBC (CNRS/Université la Rochelle)).



- More closely accounting for IPCC projections and their **impact on economic, political and socio-cultural aspects of governance models in the countries most vulnerable** to climate change. Project led by Joost Vervoort (Utrecht University)
- Collecting **unprecedented data on tropical climates over the past 800,000 years** to better define regional climate changes and understand how the tropical forest has reacted to them. Project led by Marie-Pierre Ledru (ISEM (UM/CNRS/IRD/EPHE)).
- Measuring and predicting the **consequences of global warming on the coral reefs** and the services they provide (fishing, tourism, coastal protection). Project led by Valeriano Parravicini (Ecole Pratique des Hautes Etudes).
- Modelling **extreme climate change events in Africa and their effects** to help populations reduce their exposure to these phenomena. Project led by Mark New (University of Cape Town) and Friederike Otto (University of Oxford).
- Better understanding **the interaction between climate warming and the Hadley cell** (a large-scale atmospheric movement that redistributes heat from the equator to the tropics), which is expanding the subtropical dry zones in the Southern hemisphere. Project led by Valérie Daux (LSCE (CNRS/CEA/Université de Versailles Saint Quentin)).
- Better understanding **the mechanisms of soil carbon sequestration in tropical agricultural systems** and further improving practices in family-based agriculture. Project led by Lydie Lardy (UMR Eco&Sols - Montpellier SupAgro/CIRAD/INRA/IRD).

These projects were selected by a scientific committee comprised of renowned experts:

- **Franck Courchamp**, CNRS Research Director at the Laboratory of Ecology, Systematics and Evolution (CNRS/Université Paris-Sud), laureate of the Climate Initiative programme in 2014.
- **Philippe Gillet**, Vice Chairman of Ecole Polytechnique Fédérale de Lausanne. He leads the scientific committee and is a member of BNP Paribas Foundation's executive committee.
- **Joanna Haigh**, Professor of Atmospheric Physics at Imperial College London, Co-Director of the Grantham Institute for Climate Change and Environment.
- **Corinne Le Quéré**, Professor of Climate Change Science and Policy at the University of East Anglia, Director of the Tyndall Centre for Climate Change Research.
- **Thomas Stocker**, Professor and Head of the Climate and Environmental Physics department at the University of Bern, where he directs the Department of Climate and Environmental Physics.
- **Riccardo Valentini**, Professor of Forest Ecology at the University of Tuscia in Italy.
- **Jean-Pascal Van Ypersele**, a climatologist who holds a PhD in Physical Sciences and is a professor at the Université Catholique de Louvain, where he co-directs the Master's programme in Sciences and Environmental Management. He was Vice President of the IPCC until 2015.

Success for the Climate Initiative: a higher level of participation and more international projects

228 projects were submitted during the call for projects in 2016, compared to 65 in 2013 and 50 in 2010.



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These 228 projects represent 1568 researchers from laboratories and universities based in 95 countries across the five continents. In comparison, only 28 countries were represented among the projects submitted in 2010.

95% of the leading European environmental science research institutes¹ submitted at least one project.

This major increase in participation highlights the Climate Initiative programme's growing recognition and establishment in the landscape of scientific philanthropy.

It can also be explained by the growth in scientific production on the theme of climate change (just under 15,000 scientific publications with the keywords "climate change" appeared in 2010 while nearly 25,000 were counted in 2015).

About the Climate Initiative

Launched in 2010 with the support of the BNP Paribas Corporate Social Responsibility Delegation, this programme has already enabled ten international research teams to study the climate and raise the awareness of almost 200,000 people about climate change.

In 2012, the BNP Paribas Foundation received the jury's special prize in the corporate philanthropy awards organised by the French Ministry of Ecology, Sustainable Development and Energy.

All the projects receiving support are presented on the BNP Paribas Foundation [website](#).

About the BNP Paribas Foundation – www.fondation.bnpparibas.com

Under the aegis of the Fondation de France, the BNP Paribas Foundation has been playing a key role in corporate philanthropy for 30 years. It also oversees BNP Paribas Group's international philanthropic growth in all countries where the bank does business.

The BNP Paribas Foundation's actions are part of a multi-disciplinary approach to philanthropy aimed at promoting innovative projects dedicated to culture, solidarity and the environment. The BNP Paribas Foundation pays close attention to the quality of its commitment to its partners, with the goal of supporting their projects over the long term. Since 1984, it has supported more than 300 cultural projects, 40 research programmes and a thousand social and educational initiatives in France and throughout the world.



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¹ Order based on the Nature Index: <http://www.natureindex.com/annual-tables/2016/institution/all/earth-and-environmental/regions-Europe>



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Project EAIIST

East Antarctic International Ice Sheet Traverse

If there is a place that represents the greatest unknown for future climate changes and sea level rise projections, it is Antarctica and, more specifically, East Antarctica. Its mass balance, or the difference between water mass gained through snowfall and lost through coastal melting and icebergs, remains highly uncertain. This uncertainty is far from being a solely academic issue, as a loss of just 1% of this mass would lead to a sea level rise of around 60 cm. It is therefore crucial to determine whether East Antarctica is gaining or losing mass and in what proportion.

For this reason, between 2018 and 2020, a team of French, Italian, American and Australian scientists will make a 3,500-kilometre round-trip journey by tractor between the French-Italian Concordia Research Station and the American Amundsen-Scott station in the South Pole. This traverse through the most arid zones of the continent, which are largely unexplored and poorly understood, has several objectives: to assess snow accumulation and its trends; to study the dynamics of this part of the ice cap in order to better understand how ice cores extracted from the continent can allow us to reconstruct past glacial conditions; and to set up automatic observation stations in various locations. Precise data collected from the interior of the continent, taking into account the variability from one site to the next and the ways in which local parameters influence data collected *in situ*, will enable us to more effectively decipher climate archives, to more accurately predict the future by fine-tuning climate models and, finally, to help determine Antarctica's possible impact on sea level rise in the coming decades.

This project is co-led by Joël Savarino (IGE (CNRS/Université Grenoble Alpes)), Barbara Stenni (Univerista CA' FOSCARI VENEZIA), Detlev Helmig (University of Colorado), and Tas van Ommen (Australian Antarctic Division).

It is carried out by a team of around 60 scientists from research institutes and universities from 4 nations: France, Italy, United States and Australia.

For its logistics, it will be supported by polar institutes from France (Institut polaire Paul-Emile Victor), Italy Agenzia Nazionale per le Nuove tecnologie, l'Energia e lo Sviluppo economico sostenibile – ENEA), France (Université Grenoble Alpes, CNRS, IGE, IPEV, LSCE, CEREGE; IPGS), the United States (National Science Foundation – NSF) and Australia (Australian Antarctic Division – AAD).



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Joint attribution of biophysical and economic impacts of hydroclimatic extremes: For an Africa less vulnerable to global warming

Africa is particularly vulnerable to extreme climate and weather events such as droughts and floods. This vulnerability is in part due to the warming itself: in many arid regions, extreme events such as waves of drought and flooding are more frequent and last longer. But this vulnerability is also exacerbated by what is known as “adaptation deficit”: ill-adapted responses to changes underway (rapid urbanisation, a surge in population growth, farming methods, deterioration of natural environments, unsuitable infrastructure, etc.).

Through advances made in modelling extreme events, and drawing on a wealth of field data in South Africa, a cross-disciplinary team led by Friederike Otto of the University of Oxford and Mark New of the University of Cape Town, South Africa, hopes to distinguish the influence of greenhouse gas emissions from that of human activity on the vulnerability of African countries. For while it is difficult to influence the evolution of greenhouse gas emissions, it is possible to choose how we adapt on the ground. This project seeks to identify to what extent this risk of extreme events is increasing in certain regions, and to assess the effectiveness of different types of response in order to reduce the sensitivity of African countries to climate change. Ultimately, it aims to prompt the development of concrete and effective adaptation programmes for the future.

This project is led by Mark New – University of Cape Town and Friederike Otto – University of Oxford.

It is carried out by a team of six researchers and professors based in South Africa (University of Cape Town), the United Kingdom (University of Oxford – Environmental Change Institute) and the United States (Lawrence Berkeley National Laboratory in Berkeley).



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Project SOCA

Beyond climate: Soil C sequestration to sustain family farming in the tropics

Thanks to plants and living organisms, soil is the largest reservoir of terrestrial carbon. An estimated 1500 Gt of carbon, or twice the amount present in the atmosphere, is stocked in the upper meter of soil. In 2015, France launched the international “4 per 1000” initiative, which aims to offset quantities of CO₂ released into the atmosphere through a very slight increase (by approximately 4‰, hence the initiative’s name) in the quantities of organic carbon stocked in the upper 30 to 40 centimetres of the soil. This is a win/win objective, as more carbon in the soil means more organic matter and therefore improved agricultural production. However, carbon sequestration in soil depends on many factors including the local climate and the type, use and management of soil, etc. Many of these factors are understudied, particularly in family-based agricultural systems in tropical areas, though the challenges are greater in these regions than elsewhere.

A cross-disciplinary team of French researchers, in partnership with researchers and students of the Southern countries, will conduct a three-year-long analysis of the impact of these factors on carbon transfer from the atmosphere to the soil in Sub-Saharan Africa, while collecting socio-economic data in the various fields of study. This unprecedented database should allow researchers to better understand the dynamics of carbon sequestration in the tropics and to provide indicators for improving agricultural practices, with the long-term goals of combating global warming and contributing to improved food security.

The project is led by Lydie Lardy – UMR Eco&Sols (Montpellier SupAgro/CIRAD/INRA/IRD).

It is carried out by a team of 20 researchers based in France (IRD-UMR Eco&Sols, INRA-UMR Eco&Sols, CIRAD-UMR Eco&Sols), Cameroon (IRAD, CIRAD-UMR Eco&Sols, ICRAF), Senegal (IRD-UMR Eco&Sols) Madagascar (IRD-UMR Eco&Sols, Univ. Antananarivo – LRI), Benin (INRAB), the Ivory Coast (CNRA) and Uganda (IITA).



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Project THEMES

The mystery of the expanding tropics: From past to future

No extreme climate event affects as many people around the world as drought. In the past 30 to 40 years, drought frequency has increased in subtropical regions. However, predicting hydroclimatic shifts remains one of the major difficulties of future climate modelling. The subtropical climate is largely dependent on what is known as the Hadley cell or Hadley circulation, a large-scale atmospheric movement that redistributes heat from the equator to the tropics on opposite sides of the globe. In recent decades, this cell has expanded towards the poles: observations show it has gained between 0.5 and 1 degree of latitude in each hemisphere per decade since the 1980s, modifying the local climate and expanding the subtropical dry zones, especially in the Southern hemisphere.

The underlying mechanism of this phenomenon remains unknown: is it caused by the products of human activities, such as green house gases and stratospheric ozone depletion, or natural climate variability? It is this question that a team of European, North American and South American researchers will address. Their observation tool? The growth rings of trees located in the Andes, from Bolivia to Patagonia. By counting these rings, measuring their width and density and analysing their chemical composition (notably the oxygen and carbon isotopic signatures), the team hopes to retrace the growth conditions of these trees, in particular changes in precipitation and temperature, over the past millennium, and to use this data to reconstruct the Hadley cell's evolution in size and intensity over time. Ultimately, the project aims to increase understanding of the interaction between the climate and this atmospheric cell and to advance climate simulations by 2100.

This project is led by Valérie Daux – LSCE (CNRS/CEA/Université de Versailles Saint Quentin)

It is carried out by team of 21 researchers, professors,engineers and technicians and 4 PhD and post-doc based in France (LSCE-CNRS/CEA/University of Versailles Saint Quentin) in Gif-sur-Yvette, LOCEAN-UPMC in Paris), the United Kingdom (School of Geography & Geosciences/University of Saint Andrews, Scotland –), Argentina (IANIGLA/CONICET in Mendoza, Museo de Historia Natural de San Rafael), the United States (Columbia University – Lamont Doherty Earth Observatory in Palisades), Chile (Universidad Austral de Chile in Valdivia) and Switzerland (University of Bern).



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Re-imagining anticipatory climate governance in the world's vulnerable regions

Faced with the reality of climate change, adaptation has become a key concern. Governments and other political leaders are left with no choice but to set up future-focused working groups to look at different climate scenarios and their potential economic, political and socio-cultural impact. The intergovernmental Panel on Climate Change (IPCC) has drawn up a set of climate and socio-economic scenarios to serve as reference for decision-makers. However, using knowledge of future climate issues to establish governance that anticipates these challenges is easier said than done.

This research project aims to ensure that the approaches to understanding future uncertainties can lead to appropriate and effective modes of governance, and that they can be used as practical decision aids in the world's most vulnerable regions, i.e. developing countries. To do so, climate, macro-economic and agricultural research needs to bridge with policy and governance research. UK researchers will work with local partners to carry out their analyses in four regions: West Africa, Central America, South Asia and South-East Asia. Ultimately, the goal of the programme is to produce, on a regional and global scale, tangible recommendations and guidelines to improve the role of forecasts in anticipatory climate governance. The publication of these plans for action for the science community and regional and national decision-makers is planned for 2019.

This project is led by Joost Vervoort - Utrecht University, the Netherlands.

It is carried out by a team of ten researchers based in the United Kingdom (Oxford University - Centre for the Environment), the Netherlands (Wageningen University and Research Centre, Utrecht University), Costa Rica (University for International Cooperation), Indonesia (Deutsche Gesellschaft für Internationale Zusammenarbeit), Bangladesh (International Centre for Climate Change and Development) and Mali (International Crops Research Institute for the Semi-Arid Tropics).



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Project TROPICOL

Colônia drilling project: Long-term climate cycles in the Wet Tropics

In the heart of the Brazilian rainforest is the Colônia crater, a depression with a diameter of 3.6 km, likely formed by meteoric impact. This rare geological structure offers a unique opportunity to access the paleoclimatic archives of the tropics of the Southern hemisphere. A 14-meter-deep sediment core on this site has already allowed researchers to analyse the hydraulic changes and the variability in temperatures and biodiversity over the last 250,000 years. Now, an international team of researchers from five countries, coordinated by Marie-Pierre Ledru of the Institut de Recherche pour le Développement, wants to take this project further: by drilling up to 50 meters deep in order to study the last 800,000 years, they can access the record of several glacial-interglacial cycles. The main objectives are to characterize the impact of extreme changes in thermal energy and pCO₂ on tropical biodiversity; to evaluate the influence of the low latitude climatic patterns on global hydrological cycles for the last ~ 800,000 years, including one major scientific enigma, the mid Pleistocene revolution (800 ka); to investigate the long-term extent and metabolism of microbial life under climate variability. The research involves a multidisciplinary and international team with specialists of deep drilling, geochronology, geochemistry, paleoecology, sedimentology, microbial biosphere. New insights on evolutionary responses of tropical plants to changes in climate and methodological developments are expected.

This project named TROPICOL is led by Marie-Pierre Ledru, UMR ISEM (UM/CNRS/IRD/EPHE), France.

It is carried out by a team of 17 researchers and professors and 4 engineers based in Brazil (University of São Paulo, University of Campinas, Federal University of Minas Gerais in Belo Horizonte, University of State of São Paulo in Rio Claro), France (CEREGE-Université Aix-Marseille, Collège de France, IRD, Université de Savoie-UMR EDYTEM, C2FN-Continent, INSU), Switzerland (University of Geneva – Earth and Environmental Sciences Department), Germany (Museum für Naturkunde de Berlin, Humboldt University – Museum of Natural History in Berlin), the United Kingdom (Oxford Brookes University) and the United States (University of Nebraska, Lincoln).



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Climate change and ecosystem services provided by coral reefs

The coral reefs are home to the world's greatest marine biodiversity and provide many services to humans: fishing, tourism, coastal protection, etc. More than 500 million people rely on them for their subsistence. The problem: these oases of life are extremely sensitive to changes in their environment (warming, acidification, pollution, overfishing, etc.) and we are now seeing the unfolding of a massive and worldwide coral bleaching event linked to a disruption of the symbiosis between the coral and its microalgae. In 2016, 93% of the Great Barrier Reef suffered from bleaching and approximately 80% of the coral in Kiribati, Samoa, Fiji and Tonga was already dead. In 2017 the same Pacific reefs are bleaching again: it is the first time in history that two worldwide events of this kind have occurred in two consecutive years.

There remain major unknowns regarding the impact of this bleaching on the functioning of the ecosystem and the services it provides to humans. For this reason, a team of French, British, American and Australian researchers, led by Valeriano Parravicini of the École Pratique des Hautes Etudes (EPHE), will carry out, between 2017 and 2019 in the French Polynesian islands, an exhaustive assessment of the role of each coral reef fish species in the different ecological services (supply, support and cultural). Moreover, by drawing on observations accumulated over more than thirty years in the Pacific sites monitored by the CRIOBE (Centre de Recherches Insulaires et Observatoire de l'Environnement), the researchers will reconstruct and quantify the impact of environmental perturbations. This will allow them to more accurately predict the consequences of current global warming on the services provided by the reefs.

This project is led by Valeriano Parravicini, Ecole Pratique des Hautes Etudes.

It is carried out by a team of 12 researchers based in France (Université de Montpellier, IRD, Ecole des Hautes Etudes in Perpignan, CNRS, Université de Perpignan), Australia (James Cook University – ARC Centre of Excellence for Coral Reef Studies in Townsville), the United Kingdom (University of Lancaster – Lancaster Environment Centre) and the United States (SymbioSeas in Wilmington, Smithsonian Institution in Washington).



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Project SENSEI

Sentinels of the sea ice

The poles are warming much faster than the rest of the planet, with drastic consequences on sea ice, the ecosystem most vulnerable to global warming. Since the 1980s, the area of sea ice has decreased by 3.8% per decade in the Arctic and has increased by 1.5% in Antarctica. Yet this unique ecosystem is poorly understood, as it is difficult to study *in situ*. Therefore, the consequences of global warming on species that rely on this ecosystem to live, hunt and/or reproduce remain largely unknown. The aim of the SENSEI project (SENTinels of the SEa Ice) is to use marine top predators as indicators of the sea ice ecosystem: the Adélie penguin, the hooded seal and the black guillemot among others. Researchers will analyse long-term datasets on the demography of these species, tag a number of animals with miniature recorders, take blood samples and collect environmental data in order to determine how sea ice changes influence these sentinel species and to identify current adaptations and capacities for resilience, which will ultimately facilitate the development of future scenarios. A consortium of 13 research teams from six countries will lead this research simultaneously in the Arctic and Antarctica, with the support of the Institut Polaire Français Pau-Emile Victor (IPEV), the Norwegian Polar Institute (NPI), Fisheries and Oceans Canada, McGill University and Friends of Cooper Island. Finally, a partnership with Luc Jacquet's Wild Touch association will allow these findings to be broadly distributed to the wider public.

The project is led by Christophe Barbraud and Yan Ropert-Coudert (CEBC (CNRS/Université la Rochelle)).

It is carried out by a team of 28 researchers, engineers, professors and filmmakers based in France (CEBC (CNRS/Université la Rochelle) in Villiers-en-Bois, Institut Pluridisciplinaire Hubert Curien (CNRS/Université de Strasbourg), LOCEAN (UPMC) in Paris, Université de La Rochelle), in the United Kingdom (University of Saint-Andrews), in Norway (Norwegian University of Science and Technology in Trondheim, Norwegian Polar Institute in Tromsø), in Canada (McGill University in Winnipeg, Fisheries and Oceans Canada in Québec), in the United States (Woods Hole Oceanographic Institution, Friends of Cooper Island in Seattle) and in Japan (National Institute of Polar Research in Tokyo, Center for International Collaboration and Advanced Studies in Primatology in Aichi).



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