GOUVERNEMENT

Liberté
Égalité
Fraternité

EQUILIBRIUM IN EXTREMES

France's 2030 polar strategy

Concordia Station © Thibaut Vergoz / IPEV

"Man must aspire to noble causes or set himself great models lest he should lose some of his virtue, like a magnetic needle which has been drawn away from the world's poles for too long".

Paul-Friedrich Richter, also known as Jean-Paul

I would like to dedicate this first French polar strategy to **Michel Rocard**, the first ambassador for the poles (2009-2016) and to **Claude Lorius**, the great French glaciologist, to whom international polar research owes so much.

Olivier Poivre d'Arvor
Ambassador for the Poles and Maritime Issues

The Arctic tern (*Sterna paradisaea*) lives and finds a balance between the ends of the world. It breeds in the Arctic and once or twice a year, in the quest for two summers, it travels across the Southern Ocean and the Antarctic, covering more than 70,000 kilometres. A global and circumpolar migratory bird facing extreme conditions, the Arctic stern is proof that the polar antipodes are closely linked and a critical equilibrium depends on that link, for the future of our planet.

"Our country must develop an ambitious polar strategy, the first in its history. It will address both our commitment to the Antarctic and our work in the Arctic. From the outset, the strategy will be deployed in synergy with our European Union partners and other countries who share our willingness to treat the poles as a place of concord and progress. "

Jean Castex, Prime Minister, 15 June 2021

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WHY NOT?

WHY FOCUS ON THE POLES?

Far away though they may have seemed just a few decades ago, the poles have become surprisingly **close** to us. They used to be **inaccessible, immaculate and unusable**. They now face the threat of **overpopulation, greater erosion, increasing militarization and excessive exploitation**. The **uninhabited regions** of popular imagination have now become a familiar place for those in the north who **live and find renewed energy there, and assert their identity**, and of those in the south who increasingly want to "**research**" it or "**go and see**" it.

Likewise, the very **concept of time has changed radically in the poles**. The millions of years of world and climate history, measured in ice-cores – and the **assumption that poles were eternal** at both ends of the globe – have given way to urgency. Nature and humanity are now facing the **transformation** of polar regions and imminent adverse events generated by the climate catastrophe. The poles are witnesses, actors and in the end, victims of this catastrophe: their biodiversity is under threat, new and more profitable shipping routes are reshaping them and they are subjected to powerful financial, political, strategic, scientific and even military pressure.

For the first time in world history, humankind is perfectly aware of what can precipitate its downfall, in the space of one generation.

At the same time, and in view of these dire threats, **polar regions have become the object of close attention** from political leaders, the media, international and non-governmental organizations, public opinion and not least, younger generations of activists.

By choosing to conduct a military invasion in Ukraine, Russia, a key player in the Arctic of course, given its location, and also a key player in the Antarctic, has provided further evidence of an area of high tension north of the polar circle. Whereas, in the name of science and peace, the international community had hoped for equilibrium, the challenges relating to energy, industry, geopolitics and military operations make for uncertain, even worrying scenarios for the future. Looking to the south, China, which presents itself as a quasi-Arctic nation and adds its influence to that of Russia, could challenge the uniqueness of the Antarctic Treaty.

Far from being of concern solely to their inhabitants, the Arctic and the Antarctic are now very much **global issues**.

They inform us of the damage our planet is incurring and document the effects of serious upheaval, danger and destructive folly. Everything that happens in these gradually warming polar regions – raw material exploitation, industrial development, shipping traffic, sea ice melting, the rising level of the global ocean, loss of biodiversity, overfishing, massive release of CO_2 – is clearly of **primary importance to all the world's countries and citizens**.

The two poles are **asymmetric** and very different in nature. They are the object of **large-scale scientific research involving a rising number of countries with sharply increasing resources and varying degrees of commitment to international development**.

The poles are highly vulnerable resources of great significance in terms of heritage, culture, environment, climate, foresight. Each within the scope of their own governance, they must be regarded as **unique territories** which we must pass on to the younger generations, to provide **maximum protection for their environment**.

In this first quarter of the 21st century, the Arctic and the Antarctic are no longer the far reaches of our planet, they are its true outposts. In an era of immediate communications and satellite observations, their distance from us has become relative. Extreme conditions, however, place them **at the forefront of the search for innovative solutions – technological, environmental and financial solutions – to meet sustainable development goals**. As living indicators of our planet's equilibrium in terms of climate, ocean and biodiversity, their location and environment make them ideal observation posts for international research from which to assess the state of the globe.

In the past, the poles inspired awe. The last continent to be discovered, the Antarctic, and the last ocean to be named, the Southern Ocean, those mythical lands of exploits and the mirrors of our dreams have joined the Arctic and the Far North of adventurer and explorer legends. For more than a century, scientists have documented animals, plants, permafrost and all varieties of ice. And we are all now familiar with the vivid white and blue of the oceans and glaciers captured by photographers. **Today, the poles still fascinate us, but they are now a source of concern.**

Faced with geopolitical turmoil which seemingly needs to be added to climate degradation, what will countries choose to do?

This French polar strategy – **the first in our country's history** – intends to report on this **concern**, and to address it with solutions, action and resources in France, Europe and the international community.

WHY FOCUS ON 2030?

2030 is just moments away and we need to act fast. If anything is to happen, it will have to be in the present decade, which is already well under way. Because of climate change, exacerbating the crisis on a global scale, the poles are shifting alarmingly and undeniably, especially in the Arctic. The rate of warming here is three to four times greater than on the rest of the planet. "Arctic amplification", when ice melts and is replaced by seawater or vegetation, leads to warmer air and water, which in turn intensifies the general phenomenon of both sea ice and continental ice sheets melting. Added to irreversible melting of the ice cap, especially in Greenland, this massive increase in temperature is the reason for the creation of new shipping routes that serve globalization, and the extremely worrying rise in global sea levels. At the other end of the world, the possible disappearance of the Thwaites glacier in a matter of decades, together with that of all the glaciers in the western Antarctic region, could lead to tragic consequences: **urban areas with a combined population of close to two billion people could be submerged across the globe**.

The climate alert in these regions has been raised to **extreme urgency** for the planet as a whole. And yet, **the fragility of polar regions comes against conflicting interests, potentially leading to very tense situations by 2030**. They include exploiting resources and developing trade and economies, as opposed to preserving the environment and protecting biodiversity; militarization, as opposed to peaceful governance; the trend towards land take and tourism, as opposed to land preservation; and national ambitions and strategies, as opposed to international cooperation.

As of 2030, the die will be well and truly cast.

Complex though it may be, the Protocol on Environmental Protection to the Antarctic Treaty (the Madrid Protocol) allows a **revision of the moratorium on the exploitation of mineral resources in the Antarctic**, as from 2048. It could soon feature on the agenda of certain major powers and lead to an even deeper crisis in multilateralism regarding polar matters.

The issue of **traffic safety in these challenging areas** will be a crucial one in view of booming trade, tourism and climate degradation leading to extreme phenomena. In addition, scientific consensus shows that the Arctic could experience summers with minimal sea ice extent as early as in the 2030s, thus providing new commercial opportunities (oil and gas reserves, unexploited living marine resources). **Shipping traffic in the Arctic, made possible by ice melting in one, two or all three of the shorter key navigable routes linking the Pacific and Atlantic Oceans** is likely to reshape global trade significantly and will inevitably affect both people and biodiversity. The disappearance of summer sea ice in the North Pole will give way to a new ocean, the very ocean humans have sought to cross for five hundred years. It will also lead to significant disruptions in weather and climate in temperate latitudes and to an irreversible loss of Arctic biodiversity.[2] The loss is so alarming that a moratorium on fishing until 2037 has already been introduced by the Arctic Council. The effect of climate change on local populations fully justifies **new international scientific research – which naturally includes France – especially in Greenland, a witness to this drastic transformation**.

2030 is also the focus of European commitments. At European Union level, France is implementing "Fit for 55" proposals, so that, by 2030, the European Union can reduce its greenhouse gas emissions by at least 55%. The same deadline applies to the European Union plan to reduce its plastic waste, increasingly found in polar regions, by 50% and its microplastic waste by 30%. In the same way, France is working towards the "30x30" target which consists in protecting 30% of the Earth's surface and 30% of its oceans by 2030, by developing a network of protected marine areas and effective conservation measures. At the "One Ocean Summit" held in Brest on 11 February 2022, The President of France announced that the 30% objective regarding oceans had already been met in 2022, thanks to the entire natural reserve of the French Southern Lands being listed, making it **the largest protected marine area in the world** (1.66 million square kilometres, or two and a half times the size of France).

In France, this 2030 timescale will also be a time for the **necessary renovation of our Antarctic stations** (*Concordia* until 2035, *Dumont-d'Urville* from 2025 to 2035). It will also mark the end of operations of the oceanographic and supply ship in the French Southern and Antarctic Lands (TAAF), the *Marion Dufresne* (2032), and that of three other oceanographic ships operated by Ifremer, with an average age of 35 in 2035. Decisions also need to be made to **secure new resources on sea, ice and even air, without delay**.

For France, 2030 also means a recovery plan, based on investments for the future. Polar regions definitely fall within their scope.

WHY FOCUS ON FRANCE?

The many links between France and polar regions are **diverse and rich in history**. In the past two hundred years, French people have developed a **strong and persistent interest in both the Arctic and the Antarctic**, something which **can only be said of a very small number of countries**. From Jules Dumont d'Urville landing in Adélie Land on 22 January 1840 to *Le Commandant Charcot* – an advanced polar exploration ship – reaching the North Pole on 7 September 2021, they have felt the **two-fold attraction of both poles**. Evidence of this attraction lies largely in the French Polar Expeditions led by Paul-Émile Victor, from 1947. The missions he undertook then were later transferred to **the Institute now known as the French Polar Institute Paul-Émile Victor (IPEV)**, in 1992. The tales of French explorers and scientists, still ingrained in collective consciousness, also contribute to our fellow citizens' attachment to polar regions. The Cabot brothers, Jacques Cartier, Yves Joseph de Kerguelen, Marc Joseph Marion du Fresne, Jules Dumont d'Urville, Jean-Baptiste Charcot, Paul-Émile Victor, Michel Rocard[3], Claude Lorius, Jean Malaurie, Jean Jouzel, Laurence de la Ferrière, Jean-Louis Étienne and the Tara expedition's sailors and scientists are some of the more famous among the many and often very bold heroes of this French mission.

The presence of France in the poles was – and still is – **largely due to the excellence of its scientific research**. Many organizations work alongside IPEV, under the responsibility of the Ministry of Higher Education, Research and Innovation (MESRI). They include: the National Centre for Scientific Research (CNRS), the French National Museum of Natural History (MNHN), Ifremer, a large number of research laboratories in universities across the country, as well as the French Alternative Energies and Atomic Energy Commission (CEA), the French Space Agency (CNES) and the French National Committee for Arctic and Antarctic Research (CNFRA). Our six scientific stations in both poles and in French sub-Antarctic territories, the Polar Pod in the Southern Ocean and the Tara International Polar Station, are all a living legacy of this work, which will soon be extended in both polar oceans, each entity operating at their own level.

And we should not forget that the **great French glaciologist, Claude Lorius, is largely to be thanked for alerting to the magnitude of human impact on the quantity of greenhouse gas found in the atmosphere, across the globe**. At the end of the 1980s, he worked in collaboration with Russian researchers at the Vostok station in the Antarctic and Jean Jouzel, a French paleoclimatologist, armed with ice core samples and air bubble analyses, he revealed the outcome of these trends on global warming. Although essential, these international collaborations are currently suspended and may cease altogether.

A **major maritime power**, the French navy is also present in all these regions, especially in the south, where it carries out a vital sovereignty mission.

The polar regions are at the border of French overseas territories. Because of their location, **French Southern Territories (Crozet, Kerguelen, Saint-Paul and Amsterdam, the first two being considered to be sub-Antarctic) as well as Saint-Pierre and Miquelon (sub-Arctic) are important logistics outposts. They also represent key assets in terms of geopolitics, environment and science**. In particular, French Southern Territories and Adélie Land host important strategic activities: CEA stations in the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) surveillance network; a Galileo station in Kerguelen and another in Adélie Land in the next few years; and a CNES satellite monitoring station in Kerguelen.

At the cutting edge of environmental protection and the fight against climate change, France is a driving force in the protection of land and sea areas. In 2022, the French Southern Territories' national nature reserve was extended, making it now **the largest area recorded in the UNESCO World Heritage List since 2019**. France also works with the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) to create marine protected areas in the eastern Antarctic and in the Weddell Sea. Worryingly, their very purpose is systematically being challenged by Russia and China.

More broadly, the work of our researchers and technicians requires coordination with diplomats, civil servants, entrepreneurs, shipowners and sailors, which, notwithstanding institutional compartmentalization, can and will **make France a polar region**. To that end, it will **work collaboratively on projects led by companies, non-profit organizations and individuals** who have always been and still remain an important element of polar exploration.

Leaders, lawyers and diplomats were very industrious last century. France took an active part in crafting a unique legal framework application to polar regions: from the treaty concerning the Spitsbergen, signed in Paris in 1920, to the Madrid Protocol on Environmental Protection in the Antarctic adopted in 1991, following an initiative launched during the French Presidency of the Antarctic Treaty Consultative Meeting, France having been one of the latter's first twelve signatories in 1959.

In 2000, the same idea led France, a non-Arctic country, but a country boasting high-quality research, to be one of the very first observer states in the Arctic Council, a status it also enjoys in the Barents Euro-Arctic Council. In 2009, as part of its foreign policy, our country acquired an ambassador responsible for the poles, thus showing that it afforded equal importance to these regions.

The appetite for information on polar issues continues to grow in French society, as the effects of climate change and geopolitical turmoil provide evidence of the key role to be played by the Arctic and the Antarctic in the future of the planet. What better symbol can there be of ongoing global warming than the spectacular images recording the progressive disappearance of polar ice in all its forms?

France has large-scale science infrastructure in the Antarctic (Concordia and Dumont-d'Urville stations), in sub-Antarctic islands (Crozet, Kerguelen, Amsterdam and Saint-Paul) and in the Arctic (in Svalbard, in Ny Ålesund). It also relies on the logistical expertise of the French Southern and Antarctic Lands (TAAF) and IPEV to ensure facilities are operational for environmental protection missions, strategic activities and the support of innovative high-level scientific programs. However, **it does not yet have a global polar strategy over the long term, nor does it have a guarantee that resources will be made available to preserve its position at the forefront of research in the medium term and more generally, its position in the strategic world of great polar nations**.

A large number of recent parliamentary reports and resolutions[4], comparative studies with other great polar nations[5], especially European ones, auditions of more than a hundred experts and stakeholders in the field of French and international polar regions collected for the purpose of the present strategy document – they all attest to a **clear message** addressed to sponsoring agencies: there has been **significant disengagement from France**.

This disengagement began a good twenty years ago and presents the following characteristics:

- **a lack of formal global and strategic vision, poorly coordinated and low engagement regarding French government action, and complex and weakened scientific steering in need of an institutional focus.**
- **critical underfunding of scientific programmes and the inability to conduct them at an appropriate financial level over a period of time, especially in a European and international context;**
- **a lack of prospects for French researchers, especially younger researchers;**
- **a patent shortfall in infrastructure investment, insufficient interaction with corporate initiatives, two players (the TAAF and IPEV)[6] who have cohabited for decades without achieving any optimization – and even adopted a competitive approach regarding logistics.**

Though willing, IPEV has been undermined by insufficient financial and human resources and the scope of its action is limited to logistical support for scientific programmes. It is currently in need of an inspiring and meaningful project for its teams.

Members of Parliament Éric Girardin and Meyer Habib submitted a parliamentary report on France's commitment to the poles, in April 2021. The report emphasized that the economic recovery plan must contribute to "**significantly enhancing resources for French research in the Arctic and Antarctic and undertaking the renovation of our stations**". It concluded with a request for "**massive reinvestment from the State to serve both science and the influence that our country exerts on the world stage**".

For its part, the Parliamentary Office for the Evaluation of Scientific and Technological Choices in the spring of 2021 summarized the state of French research in polar regions with a few blunt words: France needed to be "**back with the big boys**".

The present polar strategy, based on sustained and high-level contributions whose authors were **unanimous in stating that France was being increasingly outpaced by a number of international players**, includes many of their proposals.

On the occasion of the 43rd Antarctic Treaty Consultative Meeting in June 2021, taking all these elements into account, and considering global polar issues as well our country's interest in polar research to be an important tool in policy decision-making, the President and the Prime Minister requested that France finally acquire **a proper strategic road map for our mission in polar regions, serving European and international cooperation, together with the instruments and resources required to achieve it**.

Olivier Poivre d'Arvor
Ambassador for the Poles and Maritime Issues, Paris,
March 2022

SUMMARY OF COMMITMENTS

1

LEADING A GLOBAL AND BALANCED POLAR STRATEGY

France's universal commitment to the poles

As a comprehensive and committed polar actor and a force for equilibrium, France wants to develop a strategic prospective study of the polar regions, to be shared as widely as possible with the international community. The study will make a robust and concerted assessment of and response to safety and stability risks, especially those associated with climate change and geopolitical tensions.

In view of this, **France proposes to organize an international conference on the poles on home ground, in consultation with the countries concerned, in the spring of 2023**. The conference will bring together all the players who are ready to become involved in issues relating to science and climate topics, as well as compliance with governance in these regions.

In the same way, **France intends to propose the launch of a "Decade for Polar Regions"** to the United Nations, the World Meteorological Organization and its member States as well as the International Council of Scientific Union and organizations of the Antarctic Treaty System (ATCM and CCMALR). This initiative could take place **in 2025–2035.** It would enable international scientific research to acquire significant resources via concerted efforts, in order to better understand the mechanisms that operate in the poles and increase the scope of observations. The most plausible scenarios of how the planet will evolve in the future could then be outlined, given the effect of climate change impact in polar regions, new shipping routes, the exploitation of natural resources, the loss of biodiversity and its consequences on humans and the world's equilibrium.

Promoting research on the land-sea / cryosphere-ocean continuum

The French Polar Institute Paul-Émile Victor and Ifremer, both located on the Plouzané site in Brittany, must engage in stronger interaction to jointly offer **a dynamic approach to research on the land-sea continuum in polar regions, as part of the present polar strategy.**

This rapprochement will also represent an opportunity to jointly consider resources for seafaring equipment and the **renewal of the French Oceanographic Fleet**.

Setting up an Interministerial Committee for the poles

In order to ensure political steering, to have an overall goal, to plan activities and administer resources, it is proposed that **the Interministerial Committee on the Sea become the Interministerial Committee on the Sea and the Poles (CIMER-POLES)**. This committee will be tasked with setting government policy guidelines in all areas of polar activity, nationally and internationally.

Once a year, **CIMER-POLES, chaired by the Prime Minister, will bring together** the Ministry for Europe and Foreign Affairs, the Ministry for the Armed Forces, the Ministry for the Ecological Transition, the Ministry of Marine Affairs, the Ministry of Higher Education, Research and Innovation, the Ministry for Overseas France, the Ministry of the Economy, Finance and Recovery, the Ministry of Agriculture and Food, the Ministry of National Education, Youth and Sport and the Ministry of Culture.

An interministerial delegate for the Arctic and the Antarctic, placed under the authority of the Prime Minister, combining this position with that of ambassador for the poles and maritime issues could, together with the General Secretariat of the Sea, prepare CIMER-POLES meetings and ensure that decisions taken regarding the poles be implemented. They will be backed by the Ministry for Europe and Foreign Affairs department which has the remit of leading delegations in polar authorities.

Developing polar culture and education

A proactive policy of culture and education needs to reach all audiences, using all available methods both in and out of school curricula. They include teaching programmes, publications, events, institutions, cultural programmes, film collections, international exchanges and so on. **This bridging mission among scientists, polar actors and civil society will be undertaken by IPEV with active support from the Ministry of National Education, Youth and Sport and the Ministry of Culture.**

Thought will need to be given to a permanent exhibition on polar regions, or possibly a museum, involving the "Espace des mondes polaires" museum in Prémanon, the National Maritime Museum and the various French collections and archives, both public and private, on the poles and their history. In the meantime, there will be a series of major exhibitions in heritage sites in France in 2022-2024.

Lastly, France and Germany, via their polar institutions (the Alfred Wegener Institute and the French Polar Institute Paul-Émile Victor) have offered to create **an innovative programme, "Polar Villas"**, a kind of artist's residence, to enable creators and designers to work in some dozen scientific stations and ships in both the Arctic and the Antarctic.

2

SUPPPORTING AN INNOVATIVE AND EXEMPLARY STRATEGY OVER THE LONG TERM, IN EUROPE AND FURTHER AFIELD

Designing a large-scale research project over the long term

IPEV will encourage stakeholders to **devise a coordinated response to third-wave invitations to tender for Priority Research Programs and Equipment (Exploratory PEPR)**. This could lead to a **major ten-year project**, to evaluate the risk of glacier disintegration in the Antarctic, specifically the area facing the D'Urville Sea. The future of global sea levels will chiefly play out in the Antarctic, which is why studying its ice sheet is so important. Wilkes Land, Oates Land and George V Land are all hot spots.

Favouring European and international cooperation

France supports the idea and existence of research that is carried out primarily in an international cooperation framework. It will always favour a research mission that is shared with its partners.

French research forms part of the European polar research community, which benefits from the EU-PolarNet 2 project (2020-2023), as part of Horizon 2020 and Horizon Europe (2021-2027). Nevertheless, **France, as a leading player, should undoubtedly be encouraged to contribute more actively to the European Commission's programmes** and to engage more fully with the EU Polar Cluster.

France invites the European Union and its member States to lead a network of programmes, scientific stations and marine equipment (oceanographic ships, icebreakers, etc.) for the two poles.

Concerning the pooling of resources, France will seek to **develop an exchange of services by promoting its stations in the sub-Antarctic and in the Antarctic, in order to gain access to our partners' stations and ice-class ships in the Arctic**.

Ensuring that research is exemplary in terms of environmental considerations and innovation

The study of polar regions requires rigour in research methods to "understand without damaging", especially by avoiding land take in polar regions and reducing the environmental impact of scientific stations, ships, as well as land and air travel. Innovative solutions in terms of circular economy, local energy production and waste processing are preferred.

Polar research should also enable technological progress, including in space.

3

A STRONGER FRAMEWORK AND MORE RESOURCES FOR SCIENCE IN THE POLAR REGIONS

Building a polar organization with extended scope

A resized IPEV will be tasked with the following three main missions:

- **Coordinating polar science in France and responding to European and international requests and offers (new mission mentioned above): Responsibility for this coordination could be entrusted to the president of the IPEV Public Interest Grouping.**
- **Managing its own administrative functions, logistics and other support functions required to conduct research projects and to maintain and update the infrastructure associated with these projects (recruiting and supervising staff involved, stating needs in terms of research and infrastructure projects, drawing up technical specifications). Support will also be provided, as part of concerted and coordinated efforts, for field operations relating to the State's needs. The coordination of logistical operations, which are *de facto* carried out by IPEV and the TAAF in the same area in the sub-Antarctic zone, must be optimized. The tasks associated with logistical support for research are entrusted to IPEV.**
- **Developing polar education and cultural mediation, information and guidance for the general public, communication, archives and commemoration (a broader mission that depends on MENJS support, as mentioned above).**

These broader missions can be accommodated in the current structure of a Public Interest Grouping.

Ensuring that the balance in resources between the two poles is redressed

IPEV will be tasked with ensuring that the number of projects conducted in each pole is balanced, by **reinforcing its presence in the Arctic** (taking care not to penalize French research in the Antarctic and sub-Antarctic, where it excels).

The **number of scientists** that the French Polar Institute deploys in both hemispheres **could rise from 320 to 500**.

In view of the new objectives to be met, these numbers represent **a proportionate adjustment of IPEV's staff and budget. It justifies that consideration be made of a specific budget increase for MESRI.**

Lastly, IPEV will encourage stakeholders to devise a coordinated response to third-wave invitations to tender for Priority Research Programs and Equipment (Exploratory PEPR).

All these missions combined should, in the end, enable the French polar community to come together, with IPEV and its broader scope for action, to focus on an ambitious and collaborative project, in an appropriately international environment.

Securing resources on sea and air

In order to remedy the lack of adequate marine equipment, depriving French scientists of the research instruments readily available to the rest of the international community, **a coastal polar icebreaker would be needed**. However, this would not necessarily solve the issue of access to the open sea, especially in the Arctic, where a sea-going icebreaker would be needed. France will be examining various solutions (construction, renovation of a former patrol ship, using partners' fleets). In the meantime, France will proactively develop solutions for splitting ship time between its own oceanographic fleet and international partners' polar ships.

As is the case for many countries, France will seek to secure its own airborne equipment to ensure territorial continuity between Hobart and the Dumont d'Urville and Concordia stations.

Optimizing the mission mix between the TAAF and IPEV

Once IPEV is established in its new mission, it is important that the Prime Minister give a ruling at a **CIMER-POLES** meeting on how to optimize our presence in the sub-Antarctic zone to avoid duplications, redundant costs and tensions between French Southern and Antarctic Lands and IPEV. The TAAF could definitely provide comprehensive logistical support in the sub-Antarctic zone. A specific study will be needed to provide a basis for more ambitious restructuring.

Creating a French foundation for the poles

This strategy **supports the creation of a French foundation for the poles** which could raise funds estimated at some ten million euros each year. A leading international figure, a visionary and powerful sponsor, is offering to provide financial support and, in the early years of this foundation, patronage.

4

RENEWING A STRONG PRESENCE IN THE ARCTIC

Trebling resources for the Arctic

A **trebling of the resources in the Arctic seems essential** in view of the critical climate and strategic issues in the region. However, there should be no lowering of the guard in the Antarctic and sub-Antarctic islands, given the excellence of French research in those regions.

Reinforcing France's presence in the Arctic Council

France will systematically reinforce its participation in the Arctic Council with the coordinated and optimized presence of experts in its six work groups.

France also supports the European Union's request to be granted official observer status in the Arctic Council. More generally, reinforcing the role of Council observer States, beyond their strictly scientific input, could provide a platform for developing more interaction.

Protecting the environment and promoting sustainable development

France supports the creation of marine protected areas, both in the OSPAR Maritime Area and in the future, in the central Arctic Ocean.

With regard to existing French companies' contracts for sea and air transport and port facilities in the new Arctic routes, **this strategy insists on the vital need for a virtuous approach in terms of environmental protection on both sea and land. In addition, it fully subscribes to the European Union recommendation to no longer exploit fossil fuels.**

Being actively engaged in think tanks and international events

More generally, France wishes to be present and active in think tanks and prospective studies on the Arctic

with its researchers in social sciences, geopolitics and politics, as well as its own think tanks and scientists. In addition to the Arctic Council, regional coast guard agency meetings and the Arctic Economic Council, French contribution to various international forums with regional reach such as the Arctic Circle or Arctic Frontiers will be strongly encouraged and supported, with a view to organizing an international polar conference in France in the spring of 2023.

The fourth Arctic Science Ministerial (ASM4) was to be held in France early in 2023 and the intention was to bring together the science ministers of the Arctic Council's member and observer States. However, with the Arctic Council currently being chaired by Russia, the organization of ASM4 has been suspended until further assessment of the geopolitical situation, and the threat posed by the Russian partner.

Returning to a high standard of academic research and interaction

There will be more emphasis on human and social sciences in French research in the Arctic. With fewer technical and logistical requirements, these sciences address equally important issues.

In the Arctic, the joint design of research programmes must systemically include consultation with inhabitants, to both benefit from their local knowledge and observations and to ensure their proper engagement in the research.

French researchers and students are to be much more active in university courses relating to the Arctic. France will also **suggest the idea of a White Erasmus to the European Commission**.

French laboratories and universities are encouraged to join the UArctic network.

Acquiring new facilities on land and sea

Complementing the installation in Svalbard, **the development of other permanent research facilities must be examined with our Arctic partners, especially in Greenland**, once the cradle of French research and now both actor and victim of serious climate degradation. This option needs to be examined more thoroughly with Greenlandic authorities without delay. **Naturally, it will be important to design scientific programmes jointly with indigenous peoples and to provide them with the results and benefits of research**.

Funding for the Tara International Arctic Station from government agencies, together with the Brittany and Normandy regions, is seen as strategic. Funds totalling 13 million euros have been requested as part of the France 2030 plan.

Capitalizing on scientific infrastructure in Saint-Pierre and Miquelon

The Saint-Pierre and Miquelon islands enable France to actively contribute to sub-Arctic and even Arctic research. This contribution can be based on the Interdisciplinary and International Platform for Research and Higher Education in Sub-Arctic Ecosystems and Societies (PIIRESS). The focus on cross-cutting disciplines should be used to develop exchanges with other countries.

5

LEADING THE WAY ON PROTECTING THE ANTARCTIC

Defending the Antarctic Treaty System

France will continue to ensure that no activity undermine the principles of the Antarctic Treaty System.

With authority based on history, political and diplomatic weight and scientific reputation, it holds a leading position in operating and preserving the international legal system which governs the Antarctic continent and the ocean that borders it.

France will therefore increase its efforts with a view to adopting the most stringent and ambitious regulations possible in terms of tourism in the Antarctic.

Protecting biodiversity

France, along with very nearly all the members of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), **is reiterating its request to adopt the marine protected area projects in the eastern Antarctic Ocean and in the Weddell Sea** and inviting all party States to work to that end, in accordance with the Convention's aims.

Supporting research and renovating our land, sea and air equipment

France will **be undertaking the renovation of its two stations in the Antarctic, Dumont d'Urville and Concordia, as soon as possible**, with the highest standards, to reduce environmental impact. **It will reassess its sea and air logistics requirements.**

Having played an important part in the Scientific Committee on Antarctica research (SCAR) from the time it was created in 1958 to 1962, and especially later with Claude Lorius from 1986 to 1994, it is important that France should once again hold a key position in this scientific organization.

Constantly learning more about the Southern Ocean

In order to remain at the cutting edge of knowledge on the Southern Ocean, France will assess the need for an oceanographic ship in accordance with the various options identified: an increase in the *Astrolabe*'s functionalities, the purchase of the old *Astrolabe*, or the construction of a dedicated ice-class ship.

France also supports Jean-Louis Étienne's Polar Pod project, a silent and zero-emission oceanographic platform, which can be described as a vertical boat.

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LEADING A GLOBAL AND BALANCED POLAR STRATEGY

*Devising a **global strategy** was felt to be essential for the French authorities who commissioned it, given that none had previously existed in this form, a sure sign of a gap in public policy on this topic. In 2016, the first French **National Road Map for the Arctic** was made public by the Ministry for Foreign Affairs and the ambassador for the poles. Similar documents were offered by other Arctic Council member and observer States and the European Union itself published a document on the Arctic in the autumn of 2021.*

At the same time, several countries in the southern hemisphere wrote their own strategy for the Antarctic. These strategies often come from countries with a pole as "neighbour", mindful of a proximity that takes into account their inhabitants, their economic and strategic interests and their environmental concerns.

A GLOBAL STRATEGY FOR A GLOBAL TOPIC

Only a small number of countries are able to produce a "global" strategy. This holistic vision – and not just the sum of a set of actions in both poles – requires that a country's ability to do so meet at the very least four criteria. In addition to a long history in the poles, these criteria include: belonging to the Arctic Council (as permanent or observer member), being a party to the Antarctic Treaty, taking part in its work as a consultative party, and operating scientific stations in both the Arctic and the Antarctic. Some fifteen countries, including the United States, Russia and China, meet these "polar power" criteria, as indeed does France[7].

The present French global polar strategy, which covers both the Arctic and the Antarctic, takes into consideration the similarities in both regions without ignoring their differences. **Just as the Arctic tern links one pole to the other, so does this strategy intend to find "equilibrium in extremes"**.

This approach derives from the very history of French polar exploits which were, from the start, based on equal interest in both poles, making France a well-known country at both ends of the world. Many famous and less famous researchers have worked in both poles and their work there continues. Another reason for this strategy is the desire to **deal with issues holistically**, by looking for synergy and complementary action to secure instruments and resources that are both renewed and increased in terms of scope and effectiveness. In addition to governance bodies, legal systems, and platforms specific to each pole, it also seeks to **encourage the international community and other players from civil society to now think of the polar regions combined as a priority for action.**

By definition, geographic characteristics, weather conditions and the dominance of the cryosphere in all its forms link the two poles together. Yet**, the drastic effects of climate change and the major part played by the poles in regulating the world's temperature amply justify the idea of concerted and global efforts, that factor in the level of urgency**.

The very high levels of warming noted in parts of the Antarctic and the Southern Ocean, as well as on Greenland's ice sheets, are now encroaching on ice of considerable thickness, north and south, despite the well-known differences between the cryosphere systems of the two poles.

Concerning the Arctic – and naturally without challenging the sovereignty, universally recognized, of the countries located north of the Arctic circle together with their marine areas – **the international community cannot be mere bystanders of significant environmental risk and of the no less worrying effects of geopolitics, neither of which know any boundaries**. As an Arctic Council observer State, France leads projects that promote ecosystem resilience in the face of climate change.

Internationally, this approach involves taking into account the common good and seeking support from all parties concerned via consultation. Precisely this method had led to the signing of the Antarctic Treaty, the uniqueness of which remains an inspiration. Challenging it would sound the death knell of multilateralism.

BUILDING A WORLD OF EQUILIBRIUM

France fully intends to see its values prevail in the polar regions, as it does everywhere else. It will do so first by upholding and applying international law, be that by respecting the sovereignty of Arctic States and applying international conventions and treaties – including the United Nations Convention on the Law of the Sea (CNUDM) – and by engaging effectively with multilateral institutions. It will also contribute actively and responsibly to international security and stability, in line with its commitments, against the backdrop of a shifting geopolitical landscape and increased militarization, especially in the Arctic. Finally, it will also seek, in a holistic and coordinated fashion, to develop innovative solutions contributing to sustainable development goals that are **mindful of the environment, natural resources and people**.

In this regard, and because they play a part in the acceleration of climate warming, the poles are vital to meeting the objectives of the 2015 Paris Agreement.

The new French strategy, cutting across industry sectors and ministries, is based on the **absolute primacy of scientific research and a virtuous approach to environmental protection in polar regions**.

France carries these messages, and will continue to do so, all the more resolutely that these are areas with low resilience levels, where irreversible damage could lead to dire consequences in the rest of the world. As is the case elsewhere, its work is carried out strictly in accordance with its international commitments, by virtue of its participation in the United Nations Framework Convention on Climate Change (CCNUCC) and the Convention on Biological Diversity (CBD), as well as its membership of the European Union.

In addition, France's political and strategic guidelines in the poles cannot be separated from those it has adopted in other regions and oceans. **Commitment to the climate issue would not be taken seriously if it failed to include the polar issue, especially after COPP 21**. Contribution to data collection *in situ*, as well as international negotiations, compel France to take effective action. The same holds true for biodiversity protection, as shown by the driving force of France's involvement in the international movement for the creation of new marine areas in the Southern Ocean.

A permanent member of the United Nations Security Council, a member State of the North Atlantic Treaty Organization, of the Organization for Security and Co-operation in Europe and of the European Union, France bases its action in the Arctic and in the Antarctic – including in conjunction with the sub-Arctic and the sub-Antarctic zones – on its **north Atlantic commitment** as well as on its **Indo-Pacific strategy**. It aims to make polar regions a place for peaceful multilateral cooperation against a background of low geopolitical tension.

Up until early 2022, our exchanges with Russia on the Arctic, which we had maintained in a challenging bilateral and European context, had been an illustration of our approach. These exchanges addressed strategic issues, environmental challenges, scientific cooperation and financial aspects. The proposal to organize the fourth Arctic Science Ministerial (ASM4) in France in early 2023 was a good example of a positive dialogue. Ongoing exchanges with Russia on the Arctic will need to be reviewed in light of the conflict in Ukraine. Exchanges with other Arctic countries, NATO members or not, are a precious source of comfort. The same mindset continues to characterize France's cooperation with Australia in the Antarctic and interactions with countries like Italy, Argentina, Chili and New Zealand.

Lastly, France can claim to provide balance when upholding the interests of non-polar countries in the United Nations or in regional and issue-based organizations, especially the interests of small island countries facing the direct threat of rising sea levels. It also upholds the interests of the "silent majority" of countries, which are subjected to power struggles between nations, and whose relative influence would be weakened in the absence of an effective multilateral system.

In addition to scientific research, France also naturally relies on the resources of the Ministry for the Armed Forces and its ability to deploy in polar region, both to fulfill their primary sovereignty missions of protection, intelligence and anticipation regarding the TAAF and to support civil operations such as search and rescue operations, scientific research and combating pollution. The use of these resources in the Arctic and Southern Oceans is fully consistent with the **missions of the French Navy in the sub-Arctic and sub-Antarctic zones** as well as in other oceans. Regular deployment in challenging waters is essential to affirming France's polar vision and to reinforcing the nautical and operational know-how of the French Navy. In addition, the Ministry for the Armed Forces equips the icebreaker and supply ship, the *Astrolabe*, the property of the French Southern and Antarctic Lands, under the operational authority of IPEV in its logistics operations in the Antarctic.

In the same way, **presence in these zones via the TAAF**, the headquarters of which are located in Saint-Pierre de la Réunion, with three of its five districts in particular (southern districts, Adélie Land – in Antarctic Treaty terms – with no associated marine area) and **Saint-Pierre and Miquelon** means that France is present on close to 1.7 million square metres of exclusive economic zone, located in regions around the poles.

More generally, as a comprehensive and committed polar actor and a force for equilibrium, France wants to develop a strategic prospective study of the polar regions, to be shared as widely as possible with the international community. The study will make a robust and concerted assessment of and response to safety and stability risks, especially those associated with climate change and geopolitical clashes.

In view of this, **France proposes to organize an international conference on the poles on home ground, bringing together all the public and private players who are ready to become involved, in the spring of 2023**.

France also intends to propose to the United Nations, the World Meteorological Organization and its member States, as well as the International Council of Scientific Union, the launch of Decade of Polar Regions, which could take place from 2025-2035, in the exact same spirit as the Decade of Ocean Science for Sustainable Development (2021-2030).

Given that the "polar years" initiative (which had been held since 1882 every 25 or 50 years and in 1932, 1957 and 2007) is no longer fit to address the urgency of the speed at which environments are changing and the extent of the problem, this Decade would involve all member States, as well as civil society, and raise significant "white funds". It would enable international scientific research to acquire significant resources via concerted efforts, in order to conduct ambitious international projects, to better understand the mechanisms that operate at the poles and increase the scope of observations. The most plausible scenarios of how the planet will evolve in the future could then be outlined, given the effect of climate change in polar regions, the loss of biodiversity, its consequences on humans and the world's equilibrium and the drastic rise in sea levels across the world.

AN APPROACH BASED ON THE LAND-SEA / CRYOSPHERE-OCEAN CONTINUUM

This French approach is also global in that it insists on joint treatment for both oceans and poles. The land-sea continuum and the cryosphere-ocean continuum are inextricably linked for research purposes. The two poles are linked by the same oceanic phenomenon. The melting of ice caps in both the Antarctic and Greenland automatically raises sea levels, to an extent that is still probably underestimated. Global ocean circulation leads to significant exchange of energy between the two poles and changes as ice melts, with potentially serious impact on European weather patterns. The inevitable emergence and development of new shipping routes in Arctic, the large-scale trading that will derive from them, fishing and the development of tourist cruises in both north and south all contribute to the **"maritimization" of the poles**. In that regard, the fact that a Polar Code has been in place under the authority of the International Maritime Organization (OMI) since 2017 and that it is applicable to freight and passenger ships operating in polar waters clearly shows that common rules apply to common operations.

Because **France** is the second maritime power in the world in terms of exclusive economic zone, and is physically present in all oceans, it **can provide balance where partisan and national interests might be claimed in both the poles and at sea**. The Southern Ocean surrounds the Antarctic continent, whereas Arctic countries surround the Arctic Ocean. Present in the sub-Antarctic zone, with the French Southern and Antarctic Lands, and in the sub-Arctic zone, with Saint-Pierre and Miquelon, **France is much closer to the poles than could be thought, in the traditional representation of remote or even inaccessible regions**. The French Navy, together with the French Oceanographic Fleet (in sub-Antarctic and sub-Arctic zones) and cruise ships navigate these seas, contribute to their security and link the various communities together.

As we know, oceans, and especially the Southern Ocean, play a major part in the climate system by absorbing solar energy and human-made CO_2 emissions, all the way down to abyssal depths. Out of the five billion tonnes of human-made carbon dioxide stored in the oceans, a good half is stored in the Southern Ocean, of which France has in-depth knowledge.

Nevertheless, the future of this natural carbon dioxide sink remains highly uncertain and indirectly underpins the greenhouse emission trends that human societies will be able to tolerate, to meet targets in terms of average global temperature increases. **In addition, the poles, together with the cryosphere, are drivers in climate dynamics**. Part of the uncertainty on future sea levels is due to a poor understanding of the physical processes that come into play between the ocean and ice shelves. **The poles also make a decisive contribution to the activation of global ocean circulation**, where warm water masses turn into cold ones. Polar oceans are subjected to huge constraints (warming process, sea ice disappearing, changes to the supply of continental fresh water in the Arctic) with the possibility that their capacity to absorb atmospheric CO_2 emissions decreases, that global ocean circulation is disrupted and that the biodiversity it hosts comes to harm.

As to the Arctic Ocean, it is in a critical state: warming here is three times higher than the global average. Since the late 1970s, it has lost three quarters of its volume of summer ice. By 2030, its summer extent will have transformed the global sea landscape. Opening Arctic routes is certain to bring significant economic opportunities to the Boreal region, including shipping and new fishing activities, but at a considerable cost, with the inevitable erosion of biodiversity, an increase in marine pollution and a loss in local people's quality of life and lifestyles.

Although it covers a wide range of marine environments, based on remarkable research facilities, France suffers from an approach that is spread too thinly across disciplines and laboratories and institutions. And this despite the fact that, overall, it is well integrated in many partnerships such as the Ocean & Climate Platform and plays an active part in the expert reviews of the Intergovernmental Panel on Climate Change (IPCC) and in the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES).

This polar strategy therefore recommends more focused scientific steering of the land-sea / cryosphere-ocean continuum. **IPVEV and Ifremer, both located on the Plouzané site in Brittany, must engage in stronger interaction to jointly offer a dynamic and long-term work programme**. This *rapprochement* will also represent an opportunity to jointly consider resources for seafaring equipment. The French Oceanographic Fleet is one of the most important and comprehensive in the world, acting under the authority of Ifremer since 2008, and it complements the land-based resources of Arctic and Antarctic stations. **However, at this stage, it does not possess an icebreaker, unlike like most polar powers, and all G7 countries. The present strategy will therefore propose a plan for increasing resources on sea and air**.

STRATEGIC POLITICAL STEERING

The French polar strategy must cut across industry sectors and ministries. The topic of the poles is currently dealt with by many government departments with no real coordination, decision-making or sharing of the financial burden. **Strong political steering, once it has taken the form of cross-sectoral and inter-ministerial coordination**, is essential to a truly robust and global vision of the two poles. It also serves to incorporate legal, diplomatic, strategic, financial, scientific, climatic, education and cultural aspects in territorial and marine sovereignty as well as defence and security policies. Lastly, it is instrumental in setting out guidelines and allocating resources, especially for the medium term.

The Ministry of Higher Education, Research and Innovation (MESRI) is currently in charge of all scientific aspects, infrastructure investment and maintenance in the Arctic and Antarctic stations as well as most of the sub-Antarctic shelters. The Ministry is also responsible for IPEV operations, including chartering the *Astrolabe.* The French Southern and Antarctic Lands (which provide infrastructure logistics, investment and maintenance in the southern districts, own two supply ships in the Antarctic and sub-Antarctic and manage fisheries in the south), together with Saint-Pierre and Miquelon, depend on the Ministry for Overseas France. The Ministry for the Armed Forces equips the polar patrol ship and icebreaker, the *Astrolabe* (mentioned above), and the French Navy is a vital element of France's presence in the poles. The Ministry for the Ecological Transition (MTE) leads the way in the field of biodiversity and the environment. The issues linked to fossil fuel exploitation and transport in the Arctic zone – liquefied natural gas in particular – tourism and public-private technology partnerships are all of direct relevance to the Ministry of the Economy, Finance and Recovery. The Ministry for Europe and Foreign Affairs ensures that the interests of France are upheld in international bodies dealing with polar regions and also with tourism. For its part, the Ministry of Maritime Affairs is concerned with many pole-related topics, as is the Ministry of Agriculture and Food.

This insufficiently coordinated grouping offers a range of methods and resources but makes it impossible to carry out strong and effective action or to assess it. Complementarity brings with it the problems of duplication, especially between operators, and resources that are both insufficient and spread too thinly.

In the spirit of CIMER which regularly brings together all the ministries that deal with maritime affairs, under the chairmanship of the Prime Minister, the proposal is that the **Interministerial Committee on the Sea become the Interministerial Committee on the Sea and the Poles (CIMER-POLES) and that it is tasked with discussing the Government's policy in the polar field in all its national and international aspects and to set governmental guidelines in all areas of polar activity**.

Chaired by the Prime Minister, it could bring together each year:

- the Minister for Europe and Foreign Affairs,
- the Minister for the Armed Forces,
- the Minister for the Ecological transition,
- the Minister of Maritime Affairs,
- the Minister of Higher Education, Research and Innovation,
- the Minister for Overseas France,
- the Minister of the Economy, Finance and Recovery,
- the Minister of Agriculture and Food,
- the Minister of National Education, Youth and Sport
- the Minister of Culture.

CIMER-POLES will deal with Arctic and Antarctic issues, including in sub-Arctic and sub-Antarctic zones. It will coordinate and arbitrate the work of the various departments and operators concerned and will take all the measures liable to improve the effectiveness of their joint work. In particular, it will be able to **schedule over time grants for infrastructure investment, maintenance and creation**. With the added position of ambassador for the poles and maritime issues, an **Interministerial Delegate for the Arctic and Antarctic, placed under the authority of the Prime Minister and the Secretariat-General for the Sea** could undertake its preparation and ensure that decisions made are executed.

THE POLES ARE EVERYONE'S BUSINESS: EDUCATION AND CULTURAL MEDIATION

Nationally, there is general agreement that knowledge of the current situation in the poles is lacking, despite numerous tangible initiatives locally, and strong demand from civil society. To tackle this problem, a **proactive educational and cultural policy aimed at all audiences** will need to make use of every available method, including teaching curricula, publications, events, cultural programmes, film collections and international exchanges. Special emphasis will be placed on using virtual reality in mediation and training, to reconcile the objective of sharing knowledge with a broad audience and the unique nature of polar regions, which are fragile and not suited to mass visits.

This mission of communication among scientists, polar stakeholders and civil society is currently only very partially fulfilled by IPEV and should be extended significantly by the latter. It will be tasked with increasing its efforts on the collation of all data relating to French exploration – archives of all kinds (archives of the French Polar Expedition have been partially transferred to the National Archives and the Brittany Film Library) and collections – and showing them to a broad audience.

Support from the Ministry of Culture and the Ministry of National Education, Youth and Sport (from education boards, and specific to each education cycle) will be required to develop these new teaching programmes for both middle and high schools.

Support may also be made available to inspiring initiatives that are already in place nationally, such as the "Polar Summer" and the VICTOR prizes, recognizing excellence in several polar-related fields.

Proof of cultural institutions' interest in this topic lies in an **unprecedented number of major exhibitions on the poles to be organized from 2022 to 2024** at the Oceanographic Museum of Monaco, the National Archives, the French National Museum of Natural History, and the National Maritime Museum. An exhibition on the discovery of the Crozet and Kerguelen Islands, in the search for *Terra Australis Incognita,* is also planned at the National Maritime Museum in 2022.

Thought will need to be given to a permanent exhibition on polar regions, or possibly a museum, involving the "Espace des mondes polaires" museum in Prémanon, the National Maritime Museum and the various French collections and archives, both public and private, on the poles and their history. **A museum that paid tribute to Charcot and the French Polar Expeditions and explained the current transformations the poles are experiencing is likely to be popular with the public**.

Lastly, France and Germany, via their polar institutions (the Alfred Wegner Institute and the French Polar Institute Paul-Émile Victor) have offered to create an innovative programme, "**Polar Villas**" (with limited numbers so as to avoid greater environmental impact), **to enable creators and designers to work in some dozen scientific stations and ships in both the Arctic and the Antarctic**.

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SUPPORTING AN INNOVATIVE AND EXEMPLARY STRATEGY OVER THE LONG TERM IN EUROPE AND FURTHER AFIELD

Scientific research is and will increasingly become central to France's commitment. In addition, France will encourage the mobilization of the international community by all means available in order to limit the impact of climate change and protect biodiversity*. Knowledge of these phenomena and of many ecosystems and species, together with their main stress factors, remains fragmentary in these regions, with important gaps, largely due to the difficulty in accessing them. Collaborative scientific action undertaken Europe-wide and further afield is the only way to establish credible facts.*

LEADING MAJOR PROJECTS OVER THE LONG TERM

Many processes come into sharper relief in the poles, as they are the focus of scientific developments on several counts.

The poles are places where global warming gains momentum. They are also places with exceptional biodiversity, adapted to these regions' extreme conditions, and they require us to better understand them so that we can protect them more effectively. This is where we find the largest number of new species appearing. Key to the preservation and understanding of these environments, marine protected areas represent an area-based management tool that enables usage to be regulated in the entire water column and on the sea floor.

Whether it affects the atmosphere, oceans or land, pollution is exacerbated in the poles, as the low temperatures help concentrate pollutants.

The rapid transformation of arctic polar environments will have a huge impact on the carbon stores locked in the permafrost (the re-release of which in the form of CO_2 or methane will lead to intensifying the ongoing climate warming) and more broadly on the indigenous peoples of these lands, who need to be provided with adequate support as they adapt to this new situation.

Thanks to increased investment to support research, France wishes to contribute to a science-based understanding of the changes in climate change and biodiversity in the poles, as well as an understanding of their interaction with human development in the Arctic. The high quality of French scientific research is recognized in all these areas.

A key asset for France in the Arctic, sub-Antarctic and Antarctic lies in the quality of its permanent facilities and its long-term monitoring operations which make it possible to develop robust predictive models that can be shared with foreign teams and fed into international databases. Since 1992, continuous measurement of the conditions of the water column surface (temperature and salt content) on the route from Hobart to Dumont d'Urville – carried out by the *Astrolabe* several times a year – has provided the longest continuous measurement of the Southern Ocean's surface and intermediate depth conditions. It has shown sharply changing trends over the course of the past 25 years. France also has remarkable data on atmospheric chemistry thanks to its monitoring operations. In addition, France develops precise monitoring programmes for plants, insects and more recently, the microbiome in sub-Antarctic islands (especially the development of invasive species), which enables it to be a major player in the study of change in polar terrestrial ecosystems facing environmental change. Monitoring populations of birds and land-based marine mammals are other obvious examples of the importance of observations in predicting the future of these species and the ecosystems they depend on. Observations rely on innovative technological methods such as embedded sensors, robotics, etc.

It is therefore important that France continue to support these long-term monitoring operations and increase their scope, both for their scientific value and for their contribution to decision-making in international scientific bodies.

Research in a polar environment covers a vast field of scientific enquiry: geography, geology, climatology, paleoclimatology, astronomy and so on. In addition to Earth and universe sciences, legal, human and social sciences represent another field of French academic expertise, one that is less costly but equally important. **In the various regions of the Arctic, research programmes must ensure that they are jointly designed with inhabitants, to both benefit from their local knowledge and observations and to ensure their proper engagement in the research**.

To achieve this, tools of the right scale are needed, be they human resources, equipment, facilities, programmes or collaborative projects. Their proper use first requires optimization upstream of the research to be undertaken in extreme environments. This road map aims to identify them and to draw the operational conclusions of this stock take.

However, in both the Arctic and the Antarctic, **France sees its action as complementing that of its European partners and other countries sharing its objectives. Reinforcing international cooperation cannot be separated from optimizing its work. Faced with challenges that outstrip a national or even a regional framework, an effective national strategy can only be devised by adopting an international and multilateral outlook, if only to lead major projects over the long term**. A number of projects can be mentioned in that regard: Beyond EPICA, an ice-core sampling programme that measures the effects of climate change and MOSAIC (Multidisciplinary drifting Observatory for the Study of Arctic Climate), which sailed on the Arctic Ocean between the summer of 2019 and the autumn of 2020. This was an Alfred Wegener programme, funded by the German government for half of its 170 million euro budget, which enabled 600 experts representing 80 institutions and 20 countries to undertake exceptional work on board the German icebreaker, *Polarstern*, drifting in the ice of the Arctic Ocean.

France's strong commitment to the Ice Memory Foundation, created under the aegis of the Université Grenoble-Alpes Foundation, is a good ongoing example of this approach. The Arctic glaciers are the custodians of both the climate of the past and the active elements of the current climate system, given the role they play in the rise in sea levels. They are being subjected to a higher rate of warming than other regions and chapters of the Earth's history are being lost, as recorded in their internal layers. Ice-core sampling will enable precious ice-cores to be preserved, the unique relics of glaciers that will disappear in a few decades, and then be used by future generations of researchers and tomorrow's science. The samples will be transported to the Antarctic for long-term storage in the French-Italian station, Concordia. The following Arctic and peri-Arctic targets can be mentioned: Mount Logan in Canada, the Russian glaciers in Graham Bell Island, Akademii Nauk and Bennett Island and certain glaciers in the Norwegian archipelago, Svalbard, each operation being associated with glaciologists from host countries.

More than ever, scientific observation needs time to establish itself. France therefore needs to have the resources and partners required to develop new and ambitious multi-annual observations, to which public-private initiatives may be added, such as the Polar Pod for instance, which will be making *in situ* measurements of the Southern Ocean over a long period, and the Tara International Arctic Station.

The embodiment of this new ambition could take the form of a call for **an Exploratory PERP, via or with IPEV, which would bring together all the scientific communities involved in assessing the risk of glacier degradation in the eastern Antarctic**, more precisely in the zone facing the Dumont-d'Urville Sea – the second at-risk region in this regard after the western Antarctic – with the issue of future sea levels being a constant focus of attention. France and Australia are both ideally placed to deploy the necessary logistics (on land, sea and air) in consultation with other countries.

RESEARCH AT THE FOREFRONT OF INNOVATION AND ENVIRONMENTAL EXEMPLARITY

The study of polar regions requires improvements in research methods such that "understanding" doesn't come at the cost of "damaging". More precisely, the challenge is to expand series of observations in both space and time for multiple physical, chemical and biological variables, using **innovative methods that both improve data collection and limit the environmental impact of sensors**. This requires overcoming technological barriers linked to energy availability, robotics, automation, sensor autonomy and making sensors biodegradable once they have reached the end of their lifecycle. The issue of cost containment is another challenge to be met, to ensure that these methods can be deployed on a large scale. Polar research is an area that is particularly conducive to advances in technology and their economic impact, the benefits of which extend far beyond the polar field. The innovation capabilities of France need to be fully deployed in this context.

Polar regions, especially the Arctic, are also places where innovative solutions can be found. They include connectivity, the circular economy, local energy production, waste disposal and telemedicine.

Regarding space technology and the commercialization of satellite data, France is undeniably in a strong position, together with CNES and associated research teams. The national polar strategy must enable these capabilities to be extended to topics as important as the measurement of temperature and altimetrics, methane and CO_2 in the atmosphere, salt content in the Southern Ocean and its oceanic currents, as well as radar measurements (in sea and ice).

In 2020, IPEV was the first scientific polar operator to have established its carbon footprint. It has a duty to be exemplary in environmental matters, especially by ensuring that its stations are fully compliant with the Madrid Protocol. For their part, the TAAF have just started to develop a Climate Air Energy Territorial Plan (PCAET) which covers its five districts, in order to set the strategic objectives for their ecological transition and sustainable development.

In the Antarctic, by encouraging the pooling of its scientific stations, IPEV will seek to restrict land take, waste generation and emissions and develop useful but less damaging scientific research in both its stations and on board supply ships. A zero carbon target for the research stations appears to be attainable by 2050.

TOWARDS A EUROPE OF POLES

Within the European Union, France wants to help create a shared polar conscience, ambitious programmes and concerted action with the European Commission and member States.

The European Union exists in the Arctic. It has a geographic presence, with three member States (Denmark, Finland and Sweden) and strategic and economic presence, with two member States of the European Economic Area (Iceland and Norway). In October 2021, a Joint Communication of the European Commission and the High Representative of the Union for Foreign Affairs and Security Policy asserted that there was "a stronger engagement of the Union for a peaceful, sustainable and prosperous (Arctic) region". The EU recognizes the region's requirements for resources and goods and is indirectly responsible for climate warming in the Arctic, because of its presence. It commits strongly to supporting sustainable development in the region, for the good of inhabitants, especially indigenous peoples. As a member State, **France subscribes to the EU's commitment to "exerting pressure" (...) to ensure that oil, coal and gas remain underground", supporting the Arctic Council as it works to reduce black carbon emissions, helping the "zero emission" and "zero pollution" shipping project come to fruition, creating marine protected areas and introducing studies on how to combat the plastic and microplastic invasion.**

Still on the topic of the Arctic, the EU – the main external funder of the Arctic Council, as part of the Horizon 2020 programme with the EU Polar Cluster – supports France's request to **obtain observer status in the Arctic Council**. Concerning the Antarctic, ten member States, to which Norway and the United Kingdom could be added, have facilities totalling more than 20 permanent and seasonal stations, the remoteness and location of which enable a large part of the region to be covered. **European research is likely to find it helpful that it can tap into a network, by pooling programmes and facilities, whereas countries from other continents express their ambitions by increasing the number of their permanent and seasonal stations**. For reasons of governance specific to this continent, there is no current move towards flying the European flag above these stations in the Antarctic, although it does fly above Concordia, which is a French-Italian station.

France does not lag behind when it comes to European scientific research. Out of the three stations in polar regions maintained by France, two of them are shared with European countries: AWIPEV, at Ny Ålesund in Svalbard, with Germany, and Concordia in the Antarctic, with Italy. **In the same way, regarding new installations in the Arctic, especially in Greenland, France will seek partners from the EU, to build a truly collaborative project.**

More broadly, French research forms part of the European polar research community, which benefits from the EU-PolarNet 2 project (2020-2023), as part of Horizon 2020 and Horizon Europe (2021-2027). Given what is at stake, France, as a leading player, should undoubtedly be encouraged to contribute more actively to the European Commission's programmes and to engage more fully with EU Polar Cluster bodies. **A French Polar Institute, tasked with scientific steering and equipped with human resources that can invest in co-building a European area for polar research will be able to make a difference**. Among other projects, it could lead the lobbying required to ensure that a European road map on research infrastructure in polar environments would result in its inclusion in the priorities of ESFRI (European Strategy Forum on Research Infrastructures). This would enable French facilities to be accredited and enhanced, in exchange for services with other infrastructures from the ESFRI consortium or by charging user fees so that researchers from European countries which have no polar stations could access these facilities.

Having abandoned the programme for the construction of the research ship *Aurora Borealis*, a project which had been launched in 2002, at this stage, it would be premature to believe that the European Union would commit to leading a network of programmes, scientific stations and marine equipment (oceanographic ships, icebreakers, etc.) for the poles. However, it is very much to be hoped that it will move in that direction one day and the chartering of one or several icebreakers for scientific purposes by the European Union would make sense.

Lastly, Europe can promote all forms of "pooling" in terms of infrastructure. Should France not choose to invest in the purchase of an icebreaker, it would be well advised to **approach the Alfred Wegener Institute which is starting the construction of a ship of that kind – the successor of the *Polarstern* – for an estimated one billion euros.**

SOLIDARITY AND INTERNATIONAL COOPERATION

Regarding polar research, France gives preference to values of solidarity.

With the infrastructure it has in both poles, France will make sure that it will negotiate exchanges in kind with a number of countries, so that it can have the use of icebreakers for example. This would also minimize the number of stations built. Partnerships in the Arctic with Canada and Denmark, which are **non-consultative parties** to the Antarctic Treaty, could enable them to benefit from special access to French sub-Antarctic and Antarctic facilities, avoiding additional land take on the continent and a carbon footprint that does not meet the high standards of scientific research.

More generally, exchanges of services, based on a "North Pole/South Pole" approach represent the best way of capitalizing on French sub-Antarctic and Antarctic facilities and indirectly extending its presence in the Arctic. All of this is to be undertaken in the spirit of the agreements governing scientific operations in the poles, in other words, **collaboration rather than competition, to help minimize the environmental impact of research projects**.

A list of countries with which it would be helpful to cooperate, beyond exchanging services, would surely be headed by **Germany**, even though France is not currently able to match it in terms of financial commitment.

Cooperation with Russia, now suspended, was critical, and organizing ASM4 during the Russian Chairmanship of the Arctic Council provided an opportunity to reinforce it, including in areas of research which produced new scientific knowledge, cooperation on nuclear cleanup operations, and important progress in ecological and economic issues.

There remains the question, an open one, of how France will be able to develop exchanges on the Antarctic and the sub-Antarctic with the strategic and long-standing regional partner that **Australia** represents in the Polar South.

Other natural partners committed to scientific excellence, such as the Prince Albert II of Monaco Foundation and the Oceanographic Institute of Monaco are also obvious contenders.

3

A STRONGER FRAMEWORK AND MORE RESOURCES FOR SCIENCE IN POLAR REGIONS

Structured around IPEV – now with a broader scope and additional resources – which will provide proper scientific steering, and mediation and education on the poles*, in addition to its logistics role, the national framework will operate in a strategic and effective coordination involving the TAAF, Ifremer and the French Oceanographic Fleet.*

SIGNIFICANT RESIZING FOR THE FRENCH POLAR INSTITUTE

As soon as it was created in 1992, the French Polar Institute Paul-Émile Victor led many projects and infrastructure deployment in the Antarctic, with the Concordia station and in the Arctic, with AWIPEV, demonstrating shared European engagement in each instance. In doing so, it was resuming the work of the French Polar Expeditions and the TAAF's research mission. There was a four-fold increase in the number of scientists (360) and technicians and logistics coordinators (170) deployed each year in a total of six stations (five of them located in the south) and 40 shelters in sub-Antarctic regions.

With these ongoing commitments, and resources remaining practically at the same level, **IPEV gradually experienced a shortage of human resources, given the support needed for field work and the management of polar infrastructure. It also had little capacity for investing in the maintenance and modernization of this infrastructure**. IPEV had never been in a situation where it could lead a scientific polar strategy, restricted as it was to logistical support and to the final approval of projects.

France still makes important contributions to polar research, measured in the number of scientists deployed and the quality and ranking of its publications. However, for years, the work undertaken in particularly challenging and costly environments has relied on a weakened operator. The comparison with the majority of polar countries that invest in their operators was minutely documented in every expert and parliamentary report. The OPECST report published in April 2021, ("Recherche française en milieu polaire: revenir dans la cour des grands" - French Research in Polar Environments: Back with the Big Boys), clearly points to "chronic underinvestment in both research and logistics". Exactly thirty years after it was created, the time has come for this organization – as well as its teams – to be strengthened by both broadening its scope and providing it with **a planning framework, via the embodiment of interministerial political steering that it had previously lacked**.

This steering should quickly overcome the significant and chronic problems IPEV has experienced because of underfunding – a dozen CNRS posts having been lost over a period of 15 years, without these being compensated by internal recruitment, and too narrow a management scope.

Taken as a whole, this national scientific polar strategy relies on the existence of a powerful and central organization, one that embodies national policy on the poles and that is able to steer it, working alongside the relevant research institutes and universities, as is the case for all the countries that matter in this field.

The currently fragmented activity, weakened chains of command and compartmentalized projects have been clearly identified. It is now up to IPEV to become the place where this vision can become reality. It will do so with a broader scope for action, with the flexibility characteristic of operators, enjoying the confidence of government agencies and a higher level of resources. It will also be subjected to assessment.

Its development should be very **simple to incorporate in the current legal framework of the "French Polar Institute Paul-Émile Victor" Public Interest Grouping (GIP)**, which offers the required degree of administrative flexibility with no significant changes needed and staff assigned to their institutions as previously.

In the new national organization, backed up by this road map, IPEV is the entity in charge of addressing polar issues and will be tasked with the following three missions:

- **Coordinating polar science in France and responding to European and international requests and proposals. Responsibility for this coordination could be shared by the Director / the President of the IPEV GIP, simply by recording this arrangement in the new founding agreement.**
- **Managing its own administrative functions, logistics and other support functions required to conduct research projects and to maintain and update the infrastructure associated with these projects (recruiting and supervising staff involved, stating needs in terms of research and infrastructure projects, drawing up technical specifications).**
- **Developing polar education and cultural mediation, information and guidance for the general public, communication, archives and commemoration (a broader mission that depends on MENJS support, as mentioned above).**

Like most important foreign institutes, IPEV will coordinate and steer the French scientific polar strategy, in addition to selecting the research projects to be conducted in its facilities, a task it already undertook. It will do so by liaising with the *ad hoc* Thematic Group in the National Alliance for Environmental Research, AllEnvi, in close coordination with the Ministry of Higher Education, Research and Innovation, in which the National Research Agency (ANR) is the funding entity in charge of financing project-based research.

AllEnvi has already brought together a number of players involved in polar issues (France Universités, CNRS, MNHM, Ifremer, CEA, CNES, INRAE, INRIA, Météo-France, BRGM) and IPEV will also need to ensure proper coordination with the French National Committee for Arctic and Antarctic Research (CNFRA) which is affiliated with the French Academy of Sciences. Support will also be provided, as part of concerted and coordinated efforts, for field operations relating to the State's needs. The coordination of logistical operations, which are *de facto* carried out by IPEV and the TAAF in the same area in the sub-Antarctic zone, must be optimized. The tasks associated with logistical support for research are entrusted to IPEV.

IPEV and Ifremer, both located on the Plouzané site in Brittany, will work together to propose concerted action regarding the land-sea continuum to AllEnvi.

IPEV will be tasked with ensuring that the number of projects conducted in each pole is balanced, by reinforcing its presence in the Arctic, taking care not to penalize French research in the Antarctic and in the sub-Antarctic zone, where it excels. From 2019 to 2020, **out of 92 projects, only 30 concerned the Arctic. The number of scientists that IPEV deploys in both hemispheres could rise from 320 to 500**. This is a proportionate adjustment of IPEV's staff and budget in view of the new objectives to be met. It justifies that consideration be made of a specific budget increase for MESRI.

Lastly, IPEV will encourage stakeholders to devise a coordinated response to third-wave invitations to tender for Priority Research Programs and Equipment (Exploratory PEPR).

All these missions combined should, in the end, enable the French polar community to come together, with IPEV and its broader scope for action, to focus on an ambitious and collaborative project, in an appropriately international environment.

LINKING AND EXPLORING: NEW SUPPORT ON SEA AND AIR

The present polar strategy proposes that **France address the lack of adequate sea-going equipment which currently deprives its scientists of instruments that are available to international competitors**. Regarding coastal operations on the Arctic continental shelf especially, the specifications sheet would be such that **a medium-class icebreaker would be required. However this would not guarantee access to the open sea, where a high-class icebreaker would be needed**. Failing that, **France needs to be proactive in encouraging shared ship time between its own oceanographic fleet and international partners' polar ships**.

Requests for aircraft will be addressed to the French Air and Space Force in the first instance.

At the same time, **this strategy encourages public funding for the Tara International Arctic Station project of drifting across the Arctic Ocean, as part of the France 2030 plan**, just like the **Polar Pod project developed by Jean-Louis Étienne, thanks to a public-private funding scheme, which serves to explore the Southern Ocean**.

However, there are fewer international partnership opportunities in the Southern Ocean and France needs to be able to conduct its own ambitious oceanographic campaigns in an environment which has varying quantities of sea ice.

French sub-Antarctic and Antarctic stations are served by the following ships, owned by the TAAF:

1. The *Marion Dufresne* (the second of this name), based in La Réunion, launched in 1995, equipped by Louis Dreyfus Armateurs (LDA) since May 2017. In 2020, it was used by the TAAF for 129 days and sub-chartered to Ifremer for 208 days of oceanographic missions. A research ship, the *Marion Dufresne* is one of the largest ships in the world and covers all aspects of oceanography (excluding sea fishing): marine geoscience including geology, geophysics, sedimentology and paleoclimatology; biological oceanography including biology and biochemistry; physical oceanography including physical chemistry and water mass dynamics. Its expertise in sediment-core sampling and paleoclimatology is recognized worldwide. Thanks to its huge ice-core facility, CALYPSO, it is one of the only ships capable of collecting sediment-core samples as long as 60 metres. **It is, however, incapable of navigating sea ice.**

2. The *Astrolabe*, equipped by the French Navy, is the only public French ship with icebreaking capacity (PC5 in the Polar Code) which is able to navigate in ice approximately 70 centimetres thick. It was built as part of a partnership comprising first its owner, the French Southern and Antarctic Lands (TAAF), together with the French Polar Institute Paul-Émile Victor, which has operational authority in logistics operations in the Antarctic and second, regarding equipment, the Ministry for Armed Forces (the French Navy). This polar patrol ship, which entered into service in 2017, has two missions:

- Logistics support in the Antarctic between Hobart and Tasmania (Australia) and the French Antarctic scientific station, Dumont d'Urville (Adélie Land), with 5 trips for each campaign in the south;
- Sovereignty and State Action at Sea (AEM) missions in the Indian Ocean, especially in the French Southern Territories and in the Scattered Islands.

Being a supply ship, it can only provide very limited support to oceanography operations, not being equipped with the necessary scientific tackle. As such, it is officially affiliated with the Concordia Station and not with the French Oceanographic Fleet.

Unlike many other Arctic Council member and observer States and parties to the Antarctic Treaty, to date, France has not chosen to equip itself with an icebreaker to support polar oceanography. **For its part, the Alfred Wegener Institute commands a significant budget for the construction of *Polarstern 2*,** the successor to an icebreaker that has enabled Germany to bring together a very large number of researchers from around the world in the course of several major expeditions. This new PC2 icebreaker will be equipped with a methanol propulsion system and a highly sophisticated underwater laboratory.

The work of French researchers in polar regions has been hampered by having to design scientific campaigns in Arctic and Antarctic marine environments that systematically rely on joining projects from other countries. It is also difficult for them to claim primacy on the results achieved.

The cost of operating an icebreaker is high (around 50,000 euros a day for a ship measuring 80-100 metres) and a ship designed to navigate in both north and south would constitute an excessive financial burden, not to mention initial investment costs. **It therefore seems important to draw up agreements with the countries represented in the Arctic Council as member States to facilitate French researchers' access to the Arctic and possibly allow them to coordinate a specific expedition**. Canada and its icebreaker, the *Admunsen*, together with Université de Laval and Sweden, could be willing to engage in collaborative projects, based on the exchange of services, with French resources in the Antarctic and sub-Antarctic being added to the mix. The idea is currently being discussed with the French Oceanographic Fleet.

Alternatives could be explored, such as the replacement of the Saint-Pierre and Miquelon-based *Fulmar* patrol ship with a high-class ocean patrol ship, when the *Fulmar* comes to the end of its service in 2027.
In the Southern Ocean, an option would be to equip the *Astrolabe* with dedicated scientific tackle and an additional twenty days of ship time, with IPEV acting as operator, so that oceanographic and hydrographic campaigns could be conducted in the Southern Ocean, especially in the Dumont-d'Urville Sea, like the campaigns IPEV used to conduct with the former *Astrolabe* in the 2000s.

Another option would be to build an ice-class ship, measuring around 50 metres, with a budget of 35 million euros and operating costs of one million euros per month of oceanographic campaign, which could be shared with another country. It would navigate in the Antarctic from November to March and in the sub-Antarctic from March to November.

Specific capacity which can be deployed in polar regions includes Land Army capacity (Mountain Infantry Brigade specialized in extreme conditions), amphibious equipment and certain special forces units. The Land Army can intervene in polar regions for rescue missions, area surveillance and other operations.

The French Air and Space Force can also intervene in polar regions and contribute to transporting scientists in military aircraft for the more remote areas, in both poles. Space-based facilities are used in pole surveillance, especially optical space components. In the space sector, cooperation with Scandinavian countries is a key issue.

The three 20-day traverses (20 days there and 20 days back) between the coast and the Concordia Station for each campaign in the south, are currently conducted by IPEV, in partnership with Italy. By re-using some of the older convoy vehicles, France has returned to the major exploratory traverses of the early 2010s. Four such traverses have been conducted in the eastern Antarctic, resulting in an abundance of scientific results. The convoys are nonetheless heavy, slow and expensive. Research on the Antarctic requires that IPEV be equipped with fast and autonomous land-based transport (like the Arctic Trucks used by some tourism operators), for space-based surface observations in a short space of time.

Regarding airborne equipment, **there would be justification for France to acquire an intercontinental fleet of aircraft equipped with skis** (with a capacity of two tonnes or 16 passengers), given the isolation of the two French stations on the Arctic continent (Dumont-d'Urville and Concordia), the need for them to be linked, the great distance between Hobart and Dumont-d'Urville as well as scientists' need to travel in an Arctic zone outside of the Svalbard Station. For its part, the German Alfred Wegener Institut possesses two planes based in its Bremerhaven headquarters. The fleet would be located in Brest and its purpose would be to provide support in both poles, depending on the seasons, in the same way that German aircraft operate.

Territorial continuity being a key issue for research, it seems important that IPEV be capable of reaching Hobart, Dumont-d'Urville and Concordia by air for the transport of staff at the beginning and end of the summer campaign. This would avoid having to depend on other countries' aircraft (United States, Australia, Italy) for staff transport or emergency medical evacuations, which are the object of negotiation and financial or in-kind compensation. In addition, as some of the *Astrolabe*'s journeys are almost exclusively used to transport passengers, a similar air link with Adélie Land would free up time for the *Astrolabe* during the summer campaign, enabling it to focus on a scientific mission, especially an oceanographic one.

It would also be a way of lessening the carbon footprint of staff transfers, sailing being less energy-efficient than flying in this particular case.

ENSURING COMPLEMENTARITY BETWEEN THE TAAF AND IPEV

There are two French logistics operators on the same sub-Antarctic territory. One is IPEV, its resources having to date been used to implement research projects. The other is the TAAF, representing the State's powers in safety, security, health, communications, land and sea traffic, supply for stations and overseeing operators. The TAAF also share in strategic activities, satellite monitoring with the Global Satellite Agency as part of the Galileo programme, especially in the Kerguelen Islands, infrastructure management and daily life in the stations. **All these elements have led to organizational duplication, misunderstandings, redundant costs and tension** in the sub-Antarctic islands, where IPEV manages research laboratories in the stations as well as the forty or so shelters spread throughout these remote locations.

Tension may also occur in Adélie Land, not because logistics missions are duplicated (only IPEV is in charge of these) but because, in line with its founding agreement, IPEV provides logistics support solely for research purposes whereas, in Adélie Land, other State powers may require specific operational support. The question of identifying the right operator was recently posed when the decision was made to host a Galileo station, requested by the European Union, in Dumont d'Urville.

It is important that the Prime Minister give a ruling in order to optimize this presence, in the framework of CIMER-POLES. **Relations between the two management teams are good but there needs to be a more rational distribution of tasks. This will be achieved by amending the agreement linking both entities, with the TAAF taking precedence in the sub-Antarctic zone for logistical aspects and IPEV taking precedence in the sub-Antarctic zone. However, this should not lead to exclusivity for IPEV in the Antarctic and the exclusion of the TAAF from this area, as this would result in poor use of logistics resources. It would be helpful to have this rationalization adopted in the framework of CIMER-POLES, under the aegis of the Prime Minister.**

A FOUNDATION TO SUPPORT FRENCH POLAR SCIENCE

Historically, the polar endeavour was built on the exploits of entrepreneurs, adventurers and explorers. Dumont d'Urville, Charcot, Paul-Émile Victor and more recently, Jean-Louis Étienne and Tara Expeditions first drew on their strengths and financial means, which often benefited from sponsorship, before public institutions gave them their blessing or funding.

As is the case with many major polar countries, private initiatives were often and still are the starting point for large-scale projects. **It seems important to support the creation of a French foundation for the poles, in addition to public funding, which could raise funds estimated at some ten million euros each year**. A leading international figure, a visionary and powerful sponsor, is offering to provide financial support and, in the early years of this foundation, patronage. This would lighten the burden of public financing and support transformational projects over the long term.

4

RENEWING A STRONG

Without land or marine sovereignty north of the polar circle, France is naturally no Arctic State, nor can it can claim to be "quasi-Arctic". Nonetheless, it intends to remain a responsible player and partner in this region, with its waters directly connected to the North Atlantic and Pacific Oceans and part of it located in the European Union.

France's contribution to the Arctic is primarily based on strong and long-standing presence in the region and also on its legislative and political involvement in the regulation and cooperation activities that apply to public and private stakeholders. It forms part of the European Union's reinforced commitment to a peaceful, sustainable and prosperous Arctic region. In that regard, France agrees with all the statements and commitments in the Joint Communication of the European Commission and the High Representative of the Union for Foreign Affairs and Security Policy of 13 October 2021.

The war waged against Ukraine by Russia, which currently chairs the Arctic Council, has already had an impact on regional stability and represents a direct threat in this area, especially regarding energy, the economy, shipping traffic and security and the development of Arctic routes. Looking beyond the work of the Council, the entire region is prey to tension, the severity of which cannot be ascertained at this stage.

SUPPORTING BALANCED AND RESPONSIBLE GOVERNANCE IN THE ARCTIC

An area already significantly affected by climate change, the Arctic is set to witness major shifts deriving from this ongoing process and its impact on biodiversity, people, economic activity and related geostrategic issues. The Arctic is a very significant repository of fossil energy, visited by the greatest military powers and crisscrossed by routes that will make it an even more strategic zone in the coming decades, but it does not enjoy the same degree of protection as the Antarctic. The Arctic has an abundance of extraordinary potential – it also faces massive and wholesale disruption.

These challenges are interlinked and they require global solutions and international cooperation. Arctic biodiversity is being eroded, the permafrost is still melting and the albedo effect continues to decrease.

However, decisions taken now could contribute to preserving vast and relatively untouched ecosystems such as the tundra, mountains, fresh waters and seas, as well as the valuable services they offer.

In the Arctic, the severe threat of geopolitical disruption comes on top of climate disruption. The decision taken on 3 March 2022 by seven of the eight Arctic Council member States (Canada, the Kingdom of Denmark, the United States, Finland, Iceland, Norway and Sweden) to suspend their participation in meetings chaired by Russia creates uncertainty as to the future of circumpolar exchanges and cooperation. In the medium term, it will weaken the position of the Arctic Council as a multilateral body and a way of promoting and protecting the region. It is in France's interest to remain active and open to any form of temporary, alternative or additional cooperation.

More generally, the new conditions created by Russia as it wages war on Ukraine, and the international reaction this has generated, mean that the Arctic needs to be seen as a potential international zone of conflict once again.

From a strategic point of view, the Arctic is also the longest border between Russia and NATO countries, facing each other. Given Moscow's recent defence and security investments on its northern coast, there are fears of escalation on this front too. Applying principles of international law and honouring France's commitments are therefore of particular importance and require renewed attention.

At the same time, financial issues linked to the development of the north-eastern shipping route and the

exploitation of oil in the Russian Arctic take on new significance in the context of Russia's international isolation. The part played by French institutional and economic players will need to be reassessed and new directions to be set, depending on how the local and international situation evolves.

Arctic issues being what they are, France wants to renew a strong presence in the field of science and foresight in the region.

Financial statements show a significant imbalance in the resources allocated to each pole. In the Antarctic and sub-Antarctic, the combined contributions of the TAAF, IPEV, the French Navy and the fleet operating in the Southern Ocean represents 90% of resources allocated to polar regions by public bodies.

A trebling of the resources in the Arctic seems essential in view of the region's critical challenges. However, there should be no decrease in investments in the Antarctic and sub-Antarctic islands, given the excellence of the French research conducted there.

There are many topics that extend beyond the strict boundaries of the Arctic in a marine area five and a half times the size of the Mediterranean, a large part of which is under the sovereignty of coastal countries via their exclusive economic zone, in a land area inhabited by four million people, 500,000 of whom are indigenous people.

In this region, France calls for a mission of responsibility, reliability and foresight. In the field of security and stability, it first recalls its attachment to international law, starting with the United Nations Convention on the Law of the Sea (CNUDM). Maintaining and guaranteeing the freedom of movement on the Arctic Ocean is of strategic importance for France. Its membership of NATO (with five coastal States being full members and another two of the eight Arctic Council States being partners) and its full agreement with the European Union's marine strategy make France a very attentive partner in the region.

On the topic of "combating climate change and safeguarding the environment", and despite the activities of the Arctic Council work groups that France contributes actively to, real progress in the face of climate change leading to major transformation can only be achieved with more vigorous international governance in environmental matters. In that regard, **France wants to engage strongly with neighbouring partners to protect OSPAR** (Convention for the Protection of the Marine Environment of the North-East Atlantic) marine areas in the Arctic ocean zone, the only organization whose remit it is to create such areas. Once the BBNJ negotiations have been completed, **France will also support the creation of protected marine areas on**

the high seas, especially in the Central Arctic Ocean.

France is particularly grateful for the involvement of inhabitants in decision-making, approval, governance and cooperation processes relating to the Arctic. Faced with the unbridled exploitation of resources, the looming threat to the environment, the serious damage to a common good and the disruption to the planet's equilibrium, the urgency is to avoid the tipping point, the point at which **humans could be harmed irremediably**.

Stakeholders in the Arctic have, it is true, been able to come to an agreement on several topics such as sea rescue, combating oil slicks, the exploitation of fish stocks and territorial boundaries.

However, the possibility that an ocean be transformed from an enclosed area into a potential major route serving globalization necessarily raises a number of questions. **Standards that are more mindful of the environment for ships that sail in particularly sensitive areas, and more responsible cruise tourism, are some of France's demands**.

The environmental, financial and geostrategic aspects that enter into Arctic security cannot be considered separately. Arctic States are the front runners in responding to the security challenges they are faced with, but other countries, and the European Union, are not going to walk away from these issues or ignore their own responsibilities in this regard. France intends to play a greater role in this area.

The Arctic Council represents the main regional body. In this intergovernmental cooperation forum with eight member States (part of its territory being located north of the Polar Circle) as well as six organizations representing Arctic peoples, thirteen States have observer status in the Arctic Council, including France since 2000.

The work of the Arctic Council relies on six working groups, open to active participation from observer Sates. France will systematically reinforce its participation, based on the coordinated and optimized presence of its experts to consolidate its influence in preparing for strategic decision-making. However, after Russia's chairmanship of the Arctic Council (May 2021–May 2023), which will have sounded the alarm on potential serious tensions in the region, France will rely on Norway, which will be next to chair the Council (May 2023–May 2023), to find the critical balance both for the organization's operations and regional order.

A VIRTUOUS AND SUSTAINABLE APPROACH TO RESOURCE MANAGEMENT

The rise in fossil fuel exploitation and mining, chiefly in the Russian Arctic, leads to increasingly heavy traffic in shipping routes. It raises the question of natural resource exploitation capacity and the need for a strict regulatory framework to be established. With the majority of oil fields and 95% of mineral fields being located in the exclusive economic zone of Arctic countries, exploitation decisions fall to these countries.

The shipping volumes of dry bulk (coal and other minerals) and liquid bulk (oil, natural liquefied gas and derived products) are so high that the Northern Sea Route is expanding very rapidly and the tankers that navigate it are usually escorted by nuclear-powered icebreakers. In order to shorten transit times between Europe and Asia, it is possible that, by 2030, a small but growing proportion of container shipping operators will choose the alternative route and bypass the Suez or the Panama Canal.

France is aware of what is at stake for some of the Far North countries, with their significant global reserves in oil, gas and rare earth and the part these resources play in their GDP and exports. Yet, as a responsible climate player, it fully agrees with the request from the European Union to put an end to the extraction of remaining fossil fuel reserves in the Arctic. The government will incorporate these points as it revises its strategy on export guarantees in 2022.

Concerning Central Arctic waters and resources, the Arctic Council should be praised for having drawn an agreement (concluded in 2018 and in force since 2021) among Arctic States, South Korea, Japan and the European Union, by virtue of which the signatory States commit to prohibiting ships flying their flag from fishing in Central Arctic waters, for a period of 15 years, in the absence of an international agreement. This moratorium will need to be renewed in the absence of a regional fishing organization.

Three trans-Arctic sea routes are appearing, with varying degrees of navigability: the North-East passage (along the northern Russian coast), which is by far the easiest, the North-West passage, through the northern Canadian islands, and the most direct route, which passes through the North Pole and can only be negotiated with icebreakers, which many countries possess.

On the topic of opening commercial routes and the outlook for economic development, France wishes to see a think tank and consultation process being established with the international partners concerned, chief among which is Russia, which will need to show a spirit of cooperation that it is currently lacking. Concerted regulation of human activity, together with pollution prevention, due to both long-distance transport and local sources, are clearly shared issues. With regard to existing French companies' contracts for sea and air transport, port facilities, and logistics and industry infrastructure, **this strategy insists on the vital need for a virtuous approach in terms of environmental protection on both sea and land**. Nevertheless, in order to avoid giving free rein exclusively to the *Snow Dragon* (China is the first external investor in Arctic countries and their first client), it would be counterproductive to discourage French investment in the Arctic, especially the laying of optical fibres via underwater cables, provided that this operation took the fragility of the regional ecosystem into consideration. French companies are naturally eligible for the InvestEU Programme, in which the European Investment Bank has an important part to play, raising public-private investment capital for the ecological transition, digital connectivity, research and innovation, health care and new technologies.

Already, significant progress has been achieved thanks to this collaborative and international regulatory framework. The International Code for Ships Operating in Polar Waters, more simply known as the "Polar Code" entered into force on 1 January 2017. The code was made compulsory following the amendments of the International Convention on Maritime Search and Rescue (SAR), the International Convention for the Prevention of Pollution from Ships (MARPOL) and the Standards of Training, Certification and Watchkeeping (STCW) for seafarers. The Polar Code consists in a set of binding rules on ship design, building, safety equipment, operation, as well as on training, search and rescue and environmental protection. Applying the IMO Polar Code is the responsibility of the flag State and also of the port State, in certain conditions. The Polar Code, which applies to all commercial and passenger ships in polar zones, contributes directly to navigation safety in sea water covered in ice.

The Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic, drawn up by the Arctic Council, came into force in 2013 and represents another key regulatory framework in this region. French skills and resources in this area are called on to take part in relevant international cooperation as well as in the fight against pollution and radioactive decontamination in the Arctic.

THE OUTLOOK POR A POST-POLAR SPACE

The Arctic has long been a highly strategic area because of its geographic location, between the American and Euro-Asian continents, and also because of its connections with the Atlantic and Pacific Oceans. In the past few years, its strategic importance has grown. Issues of sovereignty, defence and security in Arctic countries, their allies and even in other countries, have recently led to heightened interest in military resources and exercises deployed there. The poles are increasingly being subjected to power competition and we need to be prepared for new tensions to surface.

The impact of climate change on the freeing up of Arctic sea routes and their navigability, and the impact of technological advances on the prospect of finding new natural resources, give credence to the emergence of an increasingly competitive approach. Competition, which is linked to optimizing and securing resources, transport routes, supply and connectivity, is likely to change the geopolitical status of the ocean and make the Arctic a place where tension occurs, in varying degrees, and consequently a place where strategic surprises can occur.

Issues of military security are not addressed by the Arctic Council, but they remain crucial for France, which deploys its navy in the region and insists on freedom of movement, in strict compliance with the United Nations Convention on Sea Law. It does so with an approach that is collaborative, interchangeable and has operational capability, especially in the field of anti-submarine warfare.

More generally, France wishes to be present and active in think tanks and prospective studies on the Arctic with its researchers in social sciences, geopolitics and politics, as well as its think tanks and scientists. Looking beyond the Arctic Circle, the Barents Euro-Arctic Council and the Arctic Security Forces Roundtable (ASFR), French participation in various international platforms with regional reach such as the Arctic Circle and Arctic Frontiers will be strongly encouraged and supported, as early as in 2023, including with a view to organizing an international polar conference in the spring of 2023.

2022-2023, WHAT COMES AFTER RUSSIA'S CHAIRMANSHIP?

The Russian Chairmanship of the Arctic Council (spring 2021–spring 2023) had suggested that France join it in organizing this major scientific event. **The fourth Arctic Science Ministerial (ASM4) was to take place in France, probably in Paris, early in 2023.**

This represented strong recognition of the long-standing work produced by French researchers in the Arctic and of the responsibility entrusted to an Arctic Council observer country. It would also have been **an opportunity for France to reaffirm the prime importance of scientific facts** relating to climate change and biodiversity, in a geographic area impacted by major shifts.

This meeting, which would have brought together ministers from the eight Arctic Council member countries; the representatives of indigenous peoples and 13 observer countries, was to be steered by the Ministry of Higher Education, Research and Innovation, with the support of the Ministry for Europe and Foreign Affairs. After Washington in 2016, Berlin in 2018 and Tokyo in 2021, the organization of this fourth meeting in Paris has been suspended, as has all the work of the Arctic Council, because of the war that Russia is waging against Ukraine. For the next chairmanship of the Arctic Council in May 23, it will be incumbent on Norway to take on the heavy burden of reintroducing the proper operation of this organization, circumstances permitting.

REINFORCING ARCTIC RESEARCH AND ACADEMIC EXCHANGES

With more than 200 researchers working in the Arctic and sub-Arctic regions, France boasts a high level of expertise which is both long-standing and recognized worldwide. Researchers study the cryosphere (snow, ice, permafrost), the oceans, ecology, geomorphology and geology of the Arctic basins and their continental margins, biogeochemistry, social and cultural transformation, environmental risk, climate change adaptation, human and social sciences, indigenous languages, geopolitics, environmental law and so on. An approach based on cross-cutting disciplines, best suited to addressing Arctic issues, is strongly encouraged.

French research in the Arctic relies on several European and bilateral facilities, in order to carry out a range of missions including ice-core sampling, long-term observations, as well as many European and international collaborative projects with Arctic (Russia, Canada, Norway, etc.) and non-Arctic countries. More collaborative projects with Russia take priority, especially regarding studies on the impact of climate warming on permafrost and the effects of climate disruption in the Arctic Ocean. They could focus on one or two large-scale projects in both the Arctic and the Antarctic, as happened previously. It should also be noted that these collaborations would make it easier for French researchers to access the Russian Arctic. Regarding Canada, exchanges can only occur as part of the Takuvik International Research Laboratory (CNRS – Université Laval in Québec City), the France-Quebec Maritime Institute or as part of the future convention between the French Oceanographic Fleet and Amundsen Science, so that researchers can access the Canadian icebreaker of the same name.

In Ny Ålesund, an international scientific village located north-west of the Spitsbergen Island (Svalbard archipelago), the Alfred Wegener Institute (AWI) and the French Polar Institute (IPEV) work jointly in a French-German research station, AWIPEV, with around 20 people. Here, French research addresses mainly the ecology and biology of animal species, internal geophysics, atmospheric science, glaciology and oceanography.

The historic scientific research station, Jean Corbel, is located five kilometres away from Ny Ålesund and was created by France in 1963. It now forms part of AWIPEV and can host up to eight people in the summer. This is an example of highly successful French-German cooperation.

The hosting capacity at AWIPEV is unlikely to increase significantly in the coming years and does not permit the work of many French researchers, including young researchers, to be supported. Their aim is to work over the entire Arctic zone but they lack organizational support, agreements with host countries and medium- and long-term funding.

And in the tradition of Jean Malaurie, there will be more emphasis on human and social sciences in French research in the Arctic. With fewer technical and logistical requirements, these sciences address equally important issues. The French contribution to research on cultural, linguistic and human heritage as well as legal, economic and political sciences in Arctic regions must be preserved and promoted.

More generally, and where possible in the European Union as part of its Horizon Programme, there are to be many more French researchers and students in university courses relating to the Arctic. France will also suggest the idea of a "White Erasmus" to the European Commission. Lastly, French laboratories and universities are encouraged to join the UArctic network, with its 200 members throughout the world and too few French institutions involved so far.

RE-ENGAGING FRENCH SCIENCE IN THE ARCTIC

In addition to the Svalbard installation which it will be important to make permanent, with our Norwegian partner, the development of other permanent research facilities must be examined with Arctic partners. **This possibility could be examined with Greenlandic authorities**, at the same time as the establishment of a European Commission office in Nuuk is announced.

By the end of the century, Greenland could have lost more than 4.5% of its ice. And even in the event that greenhouse emissions were to stabilize, the ice cap seems certain to disappear. Greenland is the area of the globe where the signs of climate change are most visible and devastating.

Renewed engagement in Greenland would be all the more valuable that historically, France had a presence in the Disko Bay zone, on the west coast, during the first French Polar Expeditions (EPF) led by Paul-Émile Victor in 1948.[8]

This is also the place where Jean Malaurie's calling originated, as he took part in the 1948 and 1949 expeditions and then settled in Thulé, leading the first geographic and ethnographic survey throughout northern Greenland, on behalf of CNRS. He was particularly praised for his study of Inuit peoples, which he documented in his *opus major*, *The Last Kings of Thule*, published in 1955. However, in the 1960s, French presence in Greenland weakened considerably.

There are several ways to remedy this situation, including setting up a logistics bureau, installing facilities in a station already run by universities, or creating a new facility in consultation with Greenlandic authorities and municipalities.

It will be important to design scientific programmes jointly with indigenous peoples and to provide them with the results and benefits of research.

LEADING A STUCTURING AND COLLABORATIVE SCIENTIFIC PROJECT ON THE ARCTIC OCEAN

The Tara Ocean Foundation is developing a new concept for polar research – a drifting station – for the future of climate research. It will also serve to raise awareness of the challenges faced by this part of the world with the general public. This new drifting scientific station, presented as an "International Arctic Station", will be deployed over a period of 20 years, enabling 10 successive missions to be conducted, as from 2024. They will be carried out by CNRS and CEA, liaising with IPEV and collaborating with several neighbouring Arctic States (Canada, United States, European Union member States), with the aim of establishing common ground to justify protecting the Arctic Ocean in the future. This "Arctic look-out" programme, operating under the French flag, will play a key part in our understanding of this part of the world. It will also stand as a witness of how the Arctic is changing, day-by-day, and reinforce France's influence in the region via its scientific and technological expertise. Funds totaling **13 million euros have been requested as part of the recovery plan**.

CAPITALIZING ON SCIENTIFIC INFRASTRUCTURE IN SAINT-PIERRE AND MIQUELON

The Saint-Pierre and Miquelon Islands enable France to contribute actively to sub-Arctic research (even Arctic research, despite these islands' latitude, as many Arctic species can be found there). This contribution can be based on the Interdisciplinary and International Platform for Research and Higher Education in Sub-Arctic Ecosystems and Societies (PIIRESS), the forerunner for which was completed in the first semester of 2021. The focus on cross-cutting disciplines should be used to develop exchanges with other countries, including most of the Arctic Council member States, which share the same areas of Arctic and sub-Arctic research.

The islands are also often used as a base or stopover during oceanographic and marine research missions, where warm currents from the Caribbean Sea meet the cold currents coming down from Baffin Bay. Based in Saint-Pierre and Miquelon, the French Navy can engage in operations relating to State action at sea and also in international cooperation in the Northwest Atlantic zone, including off the coasts of Canada and Greenland. In that regard, specific attention needs to be paid in due course to the replacement of the *Fulmar*, the Saint-Pierre and Miquelon-based patrol ship, with a ship that is better suited to this environment.

For its part, the European Union will adopt a new InterReg regional cooperation programme for the Northern Periphery and Arctic regions in 2021–2027. Saint-Pierre and Miquelon has already taken part in some of the programme's projects, led by Sweden. This shows how interested the community and France are in stronger European cooperation, in a strategic part of the world. Specifically, there will be a need to consider and examine possible cooperation with Greenland, via this European programme or on a strictly bilateral basis.

5

LEADING THE WAY ON PROTECTING THE ANTARCTIC

The Antarctic region is home to 14 million square kilometres of land area, representing 2.7% of the surface of the globe, making it larger than Europe and 25 times the size of France. It is also home to the Southern Ocean, eight times bigger than the Mediterranean Sea. Much of this region is yet to be explored and it is set to become even more strategic in terms both of climate and governance.

Geography and the absence of continuous human settlement characterize the uniqueness of this region, which plays an essential part in our knowledge of the Earth's history and our observation of the Universe from the South Pole.

The Antarctic is a major climate game changer. *According to the latest IPCC report, which predicts ice cap flow and retreat, it is probable that Antarctic sea ice will continue to melt steadily,* ***potentially leading to sea levels rising to four metres in three centuries****. The Southern Ocean is the world's largest heat pump but it also constitutes a carbon dioxide sink, making it a key element in combating climate change.*

In view of the current international situation, Russia and China's systematic refusal to partition protected marine areas off the coast of Antarctica raises serious questions on the willingness of certain countries to put an end to the consensus on this region's governance.

FRENCH ENGAGEMENT IN THE ANTARCTIC

The work of IPEV, together with the TAAF community and the French Navy, clearly makes France a key Antarctic player, in the same way as other countries are. This is a place France is familiar with and it assumes its status of a country with possessions. Among the countries that operate Antarctic research stations, it is ranked fifth for its scientific activity, based on the number of publications relating to the Antarctic, second, based on the number of citations, and first, for its work on sub-Antarctic environments.[9] In addition to their geological and geomorphological characteristics, these territories constitute biodiversity and atmospheric observatories, recognized worldwide, to monitor the resilience of ecosystems and the way these are evolving in the face of global changes and human impact. The longevity of measurements is an important asset, especially regarding the measurement of greenhouse gas emissions, which has been carried out by the TAAF since 1981, and the monitoring of solar activity and the Earth's space environment, contributing to space weather research.

The Crozet and Kerguelen Islands were discovered in 1772 and they have been French for the past 250 years. In 1955, together with the Saint-Paul and Amsterdam Islands (themselves UNESCO heritage sites) and Adélie Land they joined the newly created TAAF, as a community with administrative and financial autonomy. Regarding the sub-Antarctic islands, the entirety of their land area and a large part of their exclusive economic zone is listed as a national natural reserve (RNN) and a protected marine area respectively. As a result, any scientific activity that takes places in the Alfred Faure, Port-aux-Français and Martin de Viviès stations, as well as the in the dozens of IPEV and TAAF shelters, requires approval from the TAAF prefect, on the advice of the RNN Scientific Council.

The strict rules set out by the Madrid Protocol and the CCAMLR do not prevent commercial activity to be carried out, nor do they prevent tourism. A dozen or so countries have fishing operations in this zone. The assessment of fish stocks complies with strict rules. The expertise of MNHN scientists in the delegation at CCAMLR (which supervises fishing) enables fish stocks (tooth fish, lobster and krill) to be monitored with complete transparency and, for the French part, to regulate fishing activity. This task falls chiefly to the TAFF prefect, who approves a Total of Allowable Captures (TAC) and issues fishing permits, including to the Réunion operators in the exclusive economic zone of the Kerguelen and Crozet Islands. France's determination to combat illegal, unreported and unregulated fishing in the 2000s, and the methods put in place to control our exclusive economic zone have seen off the threat in the zones we are responsible for, even though pressure remains high. The coordinated pooling of sea-going ships among several countries could be a first step to addressing this problem.

The current 86 stations, 68 of which are officially open, are very different in nature and they are maintained by the Antarctic Treaty signatory States. France is keen to encourage an international approach to scientific research and to promote cooperation among nations. Because of the longevity of its installations and the extent of its research, it has the duty to contribute actively to collective research and protection efforts.

France will be particularly vigilant in ensuring that scientific activity can only be undertaken for peaceful purposes. Faced with potential undermining of the principles of the Antarctic Treaty, as well as the **exponential rise in uncontrolled tourism**, France's authority – based on history, political and diplomatic weight and scientific reputation – gives it **a leading position in operating and preserving the international legal system which governs the Antarctic continent and the ocean that borders it**.

DEFENDING THE ANTARCTIC TREATY SYSTEM

The Antarctic Treaty, which was signed in Washington on 1 December 1950 and entered into force on 23 June 1961 can be seen as an exemplary model of success in multilateralism[10]. At the height of the cold war, twelve countries active in the Antarctic, with conflicting views and sometimes incompatible land claims, were able to overcome divisions to reach a joint solution, preserving everyone's interests, and the planet's interests first and foremost. Cooperation among party States led to the Protocol on Environmental Protection to the Antarctic Treaty being signed in Madrid, on 4 October 1991. It referred to the Antarctic as a "natural reserve dedicated to peace and science." The protocol established the principle that activities in this region should be undertaken "so as to limit adverse impacts on the Antarctic environment and its ecosystems" and prohibited "any activity relating to mineral resources".

France was one of the first signatories of the Antarctic Treaty and the initiator, together with Australia, of the Madrid Protocol. At the Antarctic Treaty Consultative Meeting, chaired in Paris for the third time in June 2021, it reaffirmed, in the person of the President and the Prime Minister, its strong attachment to the legal and governance system which had been developed. France is keen to preserve the spirit and proper functioning of this system by taking an active part in the work of multilateral organizations and by constantly engaging in discussions with other countries.

The first of these duties is to strictly respect the exclusively peaceful nature of the activities carried out in the Antarctic.

The Washington Treaty prohibits non-peaceful activities in the Antarctic, especially those of a military nature such as setting up bases, engaging in maneuvres and weapons testing. The treaty also prohibits any nuclear explosion in the Antarctic and any disposal of radioactive waste in this region.

The treaty promotes scientific research and cooperation, as well as the dissemination of research output.

Like its European Union partners, France also remains vigilant regarding the proper functioning of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), which was established in 1982 by an international convention with the aim of preserving marine life. Unfortunately, in the absence of a consensus, its work has been held up in the past few years. **It is particularly concerned about the significant blockage and adverse delay in setting up a network of protected marine areas around the Antarctic.**

PROTECTING THE ANTARCTIC ENVIRONMENT

Protecting the polar environment is particularly critical in Antarctica, a continent in which humans need to remain **visitors and whose stay needs to be responsible and mindful of nature**. Protecting the environment leads to preserving areas that have not been impacted by humans, to serve as reserves and benchmarks. In this regard, all human activities must follow the Madrid Protocol on environmental protection in the Antarctic.

Until now, and despite ongoing discussions, the consultative party States of the Antarctic Treaty have not yet reached a consensus for the adoption of legislation and regulation on cruising and tourism in the Antarctic. As we await an agreement that now seems essential, **France supports the presence of an observer accredited by the Scientific Committee on Antarctica Research (SCAR) on board each cruise ship** and will work very closely with the International Association of Antarctica Tour Operators to ensure that this become the rule.

In addition, France will encourage its national tour operators working in the Antarctic to adopt the most virtuous practices, so as to reduce the impact of their activities as much as possible. In this regard, Ponant, a cruise operator in both poles, has a particular ambitious strategy, even investing in new units (including the *Commandant Charcot*), so that it can host scientists and their work, with true added value.

France will therefore increase its efforts to see the Treaty party States adopt the most ambitious and protective legislation possible in the field of Antarctic tourism, given the inevitably excessive number of cruise ships. The aim is also to ban any landing, long-term stay or activity on the continent, which certain countries authorize via their travel companies.

The western part of Antarctica is already badly affected by significant climate warming, and the peninsula even more so. The fact that the sea is free of ice over an increasingly long period gives the impression that sailing in this region is easy. However, emergency services and rescue missions at sea are a long way away from the continent. Given the number of ships that sail in the peninsula's waters, there is a significant risk of accident. Beaching or collision with a block of ice could lead to highly damaging oil slicks.

In addition to protecting the Antarctic environment, biodiversity is a key concern for France and the international

community, especially the Antarctic community.

In 2008, the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) decided to create a **network of protected marine areas (PMAs) in the Southern Ocean to ensure the resilience of its ecosystems**. The network was meant to be operational in 2012 and a protection measure setting out a general framework had been adopted. Of the five protected marine areas planned, only those in the South Orkney Islands and the Ross Sea have been adopted to date, the latter in 2016. **Plans to designate East Antarctica** as a protected marine area (0.95 million square kilometres), initiated by France and Australia, **and the Weddell Sea** (1.9 million square kilometres), initiated by Germany and New Zealand – the scientific basis for which was formally approved by the CCAMLR Scientific Council as early as in 2011 – **inexplicably remain at a standstill**. Despite exceptional mobilization on the part of the European Union (Joint Ministerial Declaration of 28 April 2021) involving many countries, including Antarctic countries, the latest CCAMLR meetings are a clear sign of admission of failure, undermining the Antarctic Treaty System, which had run smoothly so far.

As we await for the rapid approval of these requests, the creation of protected marine areas in the area could see France resuming oceanographic exploration, which has largely long been abandoned. It could also acquire a ship that would study and monitor the marine area, facing Adélie Land, which has been proposed for designation as a protected marine area. Proposals to that end have been set out above.

SUPPORTING RESEARCH AND MAINTAINING INFRASTRUCTURE

Another major area which needs to be preserved in the management of the Antarctic naturally covers scientific activity and output.

The vast majority of the 12 original consultative party States to the Antarctic Treaty have undertaken the renovation of their stations or are considering it.

Reports all attest to a **lack of maintenance in French continental stations (Dumont-d'Urville and Concordia) and a shortfall in investment for territorial continuity** (icebreakers and aircraft). CNFRA has shown that countries like South Korea, Australia, New Zealand, Germany and the United Kingdom **invest in their stations three times more than France**, with comparable activity. Even Italy, which arrived in the region 40 years after France, is far better funded.

As one of seven countries with possessions in the Antarctic, France needs to **start renovating its two stations as soon as possible, with the highest standards for low environmental impact. It also needs to assess sea and air logistics requirements**.

Created in 1956**, the Dumont-d'Urville Station** (DDU) is located on the Adélie Land coast and constitutes a real science campus with around 50 facilities: accommodation, research laboratories and technical rooms. It can host up to 120 people in the summer and 20 people overwintering. IPEV oversees the station's operations and manages scientific projects. The TAAF maintain sovereignty and continue to provide public services (radio, healthcare, postal services). Research on biodiversity (especially underwater) and on its evolution and adaptation to climate change is a large part of the station's work. **Dumont-d'Urville is also a platform renowned for its observations of the atmosphere, the icecap and the Earth's geophysics**. The station is also the gateway for research and logistics on the continent, especially via the French-Italian Robert Guillard Station in Cap Prud'homme, where supply convoys are prepared and serve the continental Concordia Station as well as the scientific exploration traverses in the Antarctic.

Whereas the tip of the Antarctic peninsula has around 35 seasonal and permanent stations distributed over a distance of just 500 kilometres, Dumont-d'Urville is very isolated, facing Australia, and can **carry out observations in a location with no neighbours and no other countries collecting samples**.

The Dumont-d'Urville Station represents **a unique environment and an outstanding site for continuous observations because of its location at the crossroads of land, sea and coast**. As such, it is ideally placed for observing the land-sea continuum made up of the Antarctic continental margin and its opening towards the ice cap and the ocean. The Dumont-d'Urville Station is unique in the Antarctic. It experiences the strongest katabatic winds on the planet, it has several glaciers close to a specific magnetic environment, it is located at the edge of the polar vortex in winter – enabling stratospheric dynamics to be observed, as well as its impact on the shrinking levels of stratospheric ozone in the spring – and it contains marine ecosystems, their specificities largely yet to be explored, as well as large colonies of sea birds.

The permanent and sustainable observations at Dumont-d'Urville represent an unparalleled legacy for science in the fields of climate, environment, the Earth and living beings. The continuity of existing observations, made possible thanks to overwintering in the station, the duration and high quality of these observations, (Dumont-d'Urville being one of the oldest stations in the whole of East Antarctica) contribute to the uniqueness of this legacy. Much of the cutting-edge equipment in the station forms part of the national and internal research infrastructure networks, adding an essential polar element to these networks.

In the future, **it would be useful to achieve greater automation levels for data acquisition and transmission, in real time where possible and with researchers able to work remotely**. In addition, advances in robotics, be they robots operating underwater, on land or in the air, could lead to less physical input from humans when it comes to studying living beings and physical and geological objects.

The renovation of the Dumont-d'Urville Stations is now considered a priority for health, environmental and scientific reasons, as the station is in a poor state of repair. The necessary work should therefore be scheduled without delay, given the expectations of the scientific community. The lack of planning tools in the nearby marine environment and the influence Concordia has gained in the past 15 years mean that fewer scientific projects are being carried out. Dumont-d'Urville, despite its research potential, has become Concordia's "rear base". The cost of the renovation, estimated at 70 million euros for the three stages planned from 2027 to 2050, will require specific funding, perhaps as part of the Investments for the Future programme. With the new Astrolabe supply ship being larger than the old one, port maneuvers are now more dangerous in high winds when attempting to reach the pier. Funding for a new pier enabling easier and more secure mooring at the end of aerodrome needs to be examined.

The planned implementation of a Galileo station at Dumont-d'Urville will also add a European dimension to the station, representing a strategic point in the network of European satellites in the southern hemisphere. Discussions are ongoing between the European agency tasked with managing the Galileo stations and the TAAF and IPEV, to bring this project to fruition in the coming years.

Concordia, which was built on an ice cap 3,300 metres thick is a French-Italian station operated by the French Polar Institute Paul-Émile Victor and its Italian counterpart, the National Antarctic Research Program. Continuously settled since 2005, with some 15 people overwintering and up to 70 in the summer, **this is the only binational station in the Antarctic and one of the three permanent stations located within the Antarctic continent, as well as being the only European one**. Among other factors, its geographic location makes it an important site for the world's seismic and geomagnetic observation networks and its position at such a height makes it possible to track the terrestrial climate of past years, using ice-cores.

The European Project for Ice Coring in Antarctica (EPICA), funded by 10 European countries and the European Commission as part of the Horizon 2020 programme, which will end in 2026, has provided a record of the climate in the past 800,000 years. The high altitude, low humidity levels, limited light and atmospheric pollution make Concordia an ideal site for astronomy and the study of atmospheric physical chemistry.

The outlook for research in Concordia covers a large spectrum of scientific priorities. In the field of life sciences, Concordia is a laboratory for human space exploration and astrobiology. In the field of glaciology and paleoclimatology, a record of the climate covering one and a half million years could be achieved within five years, thanks to the Beyond EPICA's ice-core sampling activities. In the geophysical field, Concordia is well placed to address the main uncertainties that still exist concerning the study of the ice cap (internal mechanical properties and interface with the base), seismic and geodesic observations being important elements of a global network. The Concordia station is also renowned for astronomy and astrophysics (especially infrared observations and the search for extrasolar planets) as well as atmospheric science. The study conducted at Concordia of the atmosphere's chemistry and physics, together with its impact on atmospheric circulation and on the export of oxidants to the lowest latitudes, make a valuable contribution to our understanding of climate change.

Looking beyond 2030 – the station has reached half its lifespan – new options for the Concordia Station are being examined by the French Italian consortium and have been submitted to the ministries concerned. Renovation costs amount to 30 million euros. Italy appears to be ready to share these costs but it is important for this to be confirmed.

The project incorporates a strong desire to reduce the station's environmental impact, with increased reliance on renewable energy and there seems to be significant solar potential. However, there are some technology barriers to overcome to ensure that a surplus of solar energy captured over the summer can supply the station with renewable energy in the winter months.

With a view to sharing the station's operating costs, and positions for foreign researchers being available, it would be possible to have other partners join the consortium. Australia and Germany could be approached to that end.

Finally, it should be noted that certain research activities on objects outside the continent also need to carried out in the Antarctic. This is the case for observations requiring a geographic location or a pure environment that can only be found in the South Pole, for example. The Antarctic is also used for isolation training for human spaceflight preparation. Over the past 15 years, experiments have been conducted with great success, in partnership with the European Space Agency.

The efforts deployed by the governments and institutions that build scientific stations in the Antarctic, and in particular, the staff who work in extreme weather conditions in a remote region, deserve to see the legacy of the Antarctic Treaty bearing fruit. **International cooperation, with even broader scope, will increasingly become the norm in terms of research and science on this continent**.

In this regard, having played an important part in the **Scientific Committee on Antarctica research (SCAR)** from the time it was created in 1958 to 1962, and especially later with Claude Lorius from 1986 to 1994, **it is important that France should once again hold a key position in this scientific organization**.

LEADING THE WAY IN OUR KNOWLEDGE OF THE SOUTHERN OCEAN

Knowledge of the Southern Ocean is clearly of significant scientific importance, an area in which France and the unique land and sea of its French Southern and Antarctic Territories could lead the way. The Southern Ocean represents a large part of ocean surface, absorbs three quarters of ocean warmth, acts as the main – and still poorly understood – climate regulating mechanism and captures close to half the quantity of CO_2 removed from oceanic atmosphere each year, making it a carbon sink for the entire planet as well as driving global ocean circulation.

In 2022, the construction of Jean-Louis Étienne's Polar Pod, a drifting, silent and zero-emission oceanographic platform, also described as a vertical boat, will be an important milestone in France's commitment to the polar regions. From late 2023 to 2026, powered only by the circumpolar current, the Polar Pod will gather valuable scientific data, which is currently either lacking or very fragmentary, on phytoplankton, marine biodiversity and fauna (using acoustic methods), plastic pollution and the rate of carbon absorption, an essential data point for climate modelling. A schooner, the *Persévérance*, is planned for supply operations. The relationship between ocean and atmosphere will therefore lie at the heart of this mission.

The support provided by the government via the General Secretariat for Investment and the French National Research Agency, as well as the part played by Ifremer should be highlighted, representing an exemplary model of public-private cooperation.

Nevertheless, the need for an oceanographic ship remains intact, in accordance with the various options identified (an increase in the *Astrolabe*'s functionalities, the purchase of the old *Astrolabe* or the construction of a dedicated ice-class ship).

NOTES

[1] **Jean-Baptiste Charcot** (1867-1936), often called Commander Charcot, was a doctor, a naval officer and a French polar explorer. Not raised in a family of sailors, legend has it that his answer to those who asked what prompted his vocation was: " Pourquoi pas ? " (Why not?) That was the name he gave to his four oceanographic ships. He died on board the *Pourquoi Pas IV ?* in a violent storm off the coast of Iceland in 1936.

[2] **Arctic biodiversity** is being affected by changes in the physical conditions of land and sea in the Far North, leading in particular to competition between Arctic species and species from more temperate latitudes. It is also being affected by chemical changes in the ocean, evidenced by increasingly acidic water, the consequence of higher levels of dissolved CO_2 (carbon dioxide is an acid gas). The adverse impact extends to all Arctic environments, as evidenced by an increase in human-generated pollution, especially heavy metals and persistent organic compounds, some of which are endocrine disruptors affecting the reproduction capacity of certain species.

[3] **The "rebirth" of France's polar ambition owes much to former Prime Minister Michel Rocard**, the First French ambassador "in charge of international negotiations on the Arctic and Antarctic poles" who was succeeded by Ségolène Royal from 2017 to 2020. From his appointment in March 2009 to June 2016, when he submitted an Arctic road map just a few days before his passing, Michel Rocard was able to turn polar commitment, a topic that government agencies and society at large considered to be "niche", into a truly "political" issue. The French Presidency of the Council of the European Union had paved the way, with a conference organized in Monaco with Prince Albert II and minister Jean-Louis Borloo, in November 2008: *l'Arctique : un observatoire pour relever les défis des changements environnementaux* ("The Arctic – An observatory to tackle environmental change"). Michel Rocard started to engage in polar issues when, as Prime Minister, he led the second French Presidency of the Antarctic Treaty Consultative Meeting, organized in Paris in 1989, which, thanks to the rapport he had built with Australian Prime Minister Bob Hawke, would lead to the advent of the Madrid Protocol. In November 2021, in honour of the first "polar" ambassador, a plaque was placed in Port Martin on the Antarctic continent and in Adélie Land, which was named '"Michel Rocard Bay".

[4] **Parliamentary reports**

Praise should be given to Members of Parliament Maïna Sage and Jimmy Pahun who, on 29 0ctober 2021, managed to obtain an amendment resulting in five additional FTE positions for IPEV and the implementation of project management support for the modernization of Dumont d'Urville. For the past decade or so, several committed members of parliament have been documenting polar issues, as well the weakness of France's response in terms of both vision and resources. A resolution "inviting the Government to support the creation of protected marine areas in the Antarctic and to take on the role of front runner in promoting it, internationally" was tabled by Member of Parliament Frédérique Tuffnell in the spring of 2021.

Lastly, in the spring of 2021, the Parliamentary Office for the Evaluation of Scientific and Technological Choices summarized its contribution on the state of French research in polar regions with a few blunt words: France needed to be "back with the big boys".

Senate

André Gattolin. *Arctique: préoccupations européennes pour un enjeu global* ("The Arctic – European concerns and global challenges"), 2013-2014.

André Gattolin. *Le Groenland, un carrefour entre l'Europe et l'Arctique ? ("*Greenland, where Europe and the Arctic meet?*"),* 2014-2015.

André Gattolin. *Union européenne et Arctique: pour une politique ambitieuse et étoffée*, ("The European Union and the Arctic – An ambitious and comprehensive policy), 2016-2017.

National Assembly

Study Group on Polar Issues: "Arctic, Antarctic, French Southern and Antarctic Territories, deep seabed and the law".

Hervé Gaymard, Noël Mamère, *Le monde au miroir des pôles "(The world reflected in the poles") Les enjeux du changement climatique en Arctique et en Antarctique* ("Climate change issues in the Arctic and in the Antarctic"), 2015.

Éric Girardin and Meyer Habib, *La France et l'Union européenne face aux nouveaux enjeux géostratégiques et environnementaux des pôles*, ("France and the European Union in the face of new geostrategic and environmental issues in the poles"), 2021.

Parliamentary Office for the Evaluation of Scientific and Technological Choices (OPECST)

Christian Gaudin, *La place de la France dans les enjeux internationaux de la recherche en milieu polaire: le cas de l'Antarctique (*France's position in international research: Antarctica, a case study*"),* 2006-2007.

Huguette Tiegna. Angèle Préville, *La recherche française en milieu polaire : revenir dans la cour des grands*, ("French research in polar environments: Back with the big boys") 2021.

[5]**Mean comparative data on polar issues per country**

Countries owning one or several icebreakers in the Arctic or in the Antarctic: Argentina, Australia, Canada, Chili, China, Germany, Finland, Italy, Japan, New Zealand, Norway, Poland, Russia, United Kingdom, United States, South Korea, Sweden.

Country	Annual operating infrastructure and logistics budget (million euros)	Recent or forthcoming investment in permanent and seasonal stations and polar ships (million euros)
France	18	48[1]
Germany	53	1,000[2]
United Kingdom	42	275[3]
Italy	18	24[4]
Poland	20	21
Russia	N.C	56 plus 220 (via Novatek)
United States	N.C	345
Australia	88	615[5]
South Korea	45	75
New Zealand	61	202

Portion of the budget exclusively used for infrastructure and logistics management

[1] Purchase of an icebreaker, the *Astrolabe* (a supply and rescue patrol ship and a sovereignty ship)

[2] Purchase of an icebreaker, *Polarstern 2*

[3] Includes the new station, Rothera, in addition to the Halley VI Station, as well as the new icebreaker, the *Sir David Attenborough*

[4] Second-hand purchase of a British Antarctic Survey ship, the *Ernest Shackleton*, now *Laura Bassi* (€18m) and building of a permanent landing strip close to the Mario Zucchelli Station (€6m)

[5] Renovation of three coastal stations (Casey, Davis, Mawson) amounting to €275m; construction of the *Nuyina* icebreaker amounting to €340m

[6] **Introduction to the TAAF and IPEV**

The French Southern and Antarctic Lands (TAAF) are overseas territories mentioned in article 72-3 of the French Constitution, a community with a specific status, governed by a general jurisdiction clause. the TAAF are placed under the authority of a prefect, a senior official who is both the representative of the State in this constituency and the Territories' Executive.

The French Southern and Antarctic Lands are made up five districts: the Crozet Archipelago, the Kerguelen islands and the Saint-Paul and Amsterdam Islands (these three being the southern districts) as well as Adélie Land in Antarctica and the Scattered Islands. The latter comprise the tropical islands of the Glorieuses Archipelago, Juan de Nova, Europa and Bassas da India in the Mozambique Channel and Tromelin Island north of La Réunion.

In terms of public works, the TAAF have built two Galileo Stations in Kerguelen, with the permanent station due to be incorporated in the Galileo network in the spring of 2022. The TAAF are also tasked with building a new Galileo station in the Dumont d'Urville Station, in Adélie Land.

The TAAF oversee logistics and infrastructure management, including certain shelters, in three southern districts. The TAAF also own the *Marion Dufresne* and the *Astrolabe*, supply ships serving the southern districts and Adélie Land respectively.

The French Polar Institute Paul-Émile Victor (IPEV) is a Public Interest Grouping set up in 1992, following the merger of the French Polar Expeditions – Paul-Émile Victor missions and the TAAF's research missions. A national agency providing resources and expertise, it undertakes the public service mission of implementing scientific research in Arctic and Antarctic polar regions and in sub-Antarctic zones. Under the powers delegated by the TAAF, IPEV is responsible for logistics and infrastructure in Adélie Land (given the expertise acquired by the French Polar Expeditions and passed on to IPEV, the latter is also the operator of the supply patrol ship, the *Astrolabe*, during the summer campaign, also known as the "Support Mission for Antarctic Logistics – MSLA"), the station's energy and water, waste disposal, vehicles, infrastructure, station activities, etc., with the TAAF maintaining responsibility for the overall governance of the district and communication and healthcare services.

In southern districts, IPEV is also responsible for managing research facilities (laboratories, as well as around 40 shelters, including food supplies and "tenancy" duties in the stations' buildings).

It should be noted that the delegation of powers from the TAFF to IPEV concerning logistics (and infrastructure) in the Antarctic is mentioned in the operational agreement between the TAAF and IPEV but not in the legislative documents, nor does this delegation of powers entail any funding. This form of delegation devoid of funding probably goes back to the decisions made in the 1990s, with the result that the responsibility for Antarctic logistics remaining with IFRTP (the forerunner to IPEV) was confirmed, as was the transfer of the "research support" mission from the TAAF to IFRTP.

Lastly, it should be noted that IPEV reimburses half of the loan taken out by the TAAF for the *Astrolabe*, which is used one third of the time for the MLSA. IPEV pays for all chartering costs during the MLSA.

It operates a call for projects with an independent scientific committee. These projects represent the chief part of the research activity carried out by France in the poles and in the sub-Antarctic Islands.

IPEV represents France in the Council of Managers of National Antarctic Programs (COMNAP) and in the Forum of Arctic Research Operators (FARO). It is also a member of the European Polar Council.

[7] If owning an icebreaker for scientific purposes were to be a condition for belonging to the great polar powers, then France would be excluded from that group, even though it does possess a polar patrol ship (the *Astrolabe*) and Ponant, a private company, has just launched an icebreaker at the cutting edge of technology and environmental protection, with capacity for hosting scientific programmes (the *Commandant Charcot*). Although this is no real alternative to owning an icebreaker for scientific research, being able to access this ice-class cruise ship is a very welcome addition This hybrid ship (powered by liquefied natural gas and batteries), which has high-quality facilities for researchers, processes all its waste and emissions and uses no single-use plastic items, is the first French ship to have reached the North Pole, in September 2021. The company that fits it out is renowned throughout the cruising world for its very strict compliance with environmental standards and its virtuous approach to responsible tourism in polar regions. It is currently implementing a scientific support policy, based on the most demanding international standards for the selection of on board projects.

[8] The historic cabin – which would merit restoration – is still there, just a hundred metres or so above Port Victor. This is where Paul-Emile Victor deployed the land-based convoys travelling towards the Greenlandic ice sheet, during the International Glaciological Expeditions of the 1950s. INUA FUND is an endowment fund which has been set up to restore the base camp of the French Polar Expeditions in Greenland.

[9] The high quality of French scientific research is recognized in all scientific disciplines. France ranks third in the world for the number of articles on the Antarctic published in *Nature, Science* and *PNAS*. Concerning the Arctic, it ranks seventh in the world for its 422 most highly cited articles. In sub-Antarctic regions, France is the world leader in the number of scientific publications, ahead of the United States and Australia. A pioneer in cryosphere research in the 1980s, France also has long-established databases of enormous value. These include monitoring data for emperor penguins in Adélie Land (since 1952) for instance, or changes to certain physical parameters in the Southern Ocean (since 1992).

[10] Since then, the first three articles of this treaty have established the basis for human activity in the Antarctic: only peaceful activities are permitted; the freedom of scientific investigation and cooperation to that end shall continue; and observations and scientific results are exchanged and made freely available. Its fourth article, which blocks any territorial claims or litigation have made this a unique continent with a multilateral and peaceful governance that currently involves 54 party States to the treaty.

Sources / Appendices:

Le grand défi de l'Arctique ("The great Arctic challenge") Feuille de route nationale sur l'Arctique ("A national road map for the Arctic") Paris: Ministry for Foreign Affairs and International Development, June 2016.

Paris Declaration on the sixtieth anniversary of entry into force of the Antarctic Treaty and on the thirtieth anniversary of the signing of the Madrid Protocol on Environmental Protection of the Antarctic in 1991. Paris, 23 June 2021

Un engagement renforcé de l'UE en faveur d'une région arctique pacifique, durable et prospère ("A stronger EU engagement for a peaceful, sustainable and prosperous Arctic") – *JOIN (2021) 27*. Joint Communication of the European Commission and the High Representative of the Union for Foreign Affairs and Security Policy to the European Parliament, the Council, the European Economic and Social Committee and to the Committee of the Regions. Brussels: 13 October 2021

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