

## Providing ourselves with the means for excellence: French polar research on the eve of the International Polar Year

Report by Mr. Christian GAUDIN, Senator from Maine-et-Loire

*Mr. Christian GAUDIN's report is in response to a case submitted to the Parliamentary Office for the Evaluation of Scientific and Technological Choices (OPECST) by the Senate Committee on Economic Affairs regarding "France's role in those issues surrounding polar research."*

### Principal conclusions and proposals

#### 1. Strategic regions

The polar regions are of strategic importance for two main reasons:

- They are at the center of the great climatic changes that will determine our future and allow for very sophisticated research that is likely to change our way of life and view of the world.
- Because of global warming and technological progress, these regions are becoming increasingly accessible. The northwest and north-east passages, as well as the natural resources of the Arctic and Antarctic oceans are important issues.

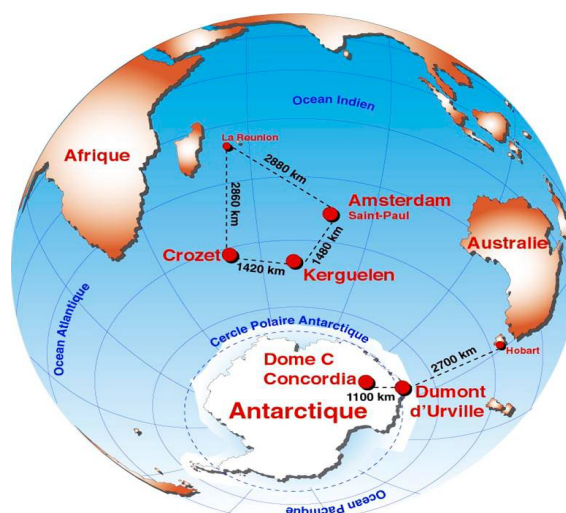
#### 2- Regions to protect

The polar regions are fragile and subject to increased climatic changes. Some of their defining characteristics, as well as their particular flora and fauna are threatened.

While the Washington Treaty and the Madrid Protocol will protect the Antarctic from mining for another 40 years, they cannot prevent a rapid rise in tourism.

Our country, which played a decisive role in 1989 in protecting the Antarctic, must oppose an unregulated growth in tourism marked by the use of ships carrying over 3,000 passengers and the construction of permanent, land-based infrastructure.

This report is also opposed to the growth of tourism in Adélie Land, which would use for commercial purposes logistical means reserved for research and would force scientists to participate in commercial activities.



#### 3- Essential regions for understanding climate change

The ice cores taken from the Vostok Station and by the EPICA at Concordia represented a great scientific windfall, allowing scientists to study the evolution of the earth's climate over the past 850,000 years and by demonstrating the influence of man's actions. This data is also used by climatic models as a yardstick for predicting future climate change.

Sustained climatic research in the polar regions is necessary because it will lead to important discoveries:

- Through ice coring, allowing scientists to study the earth's climate for over the past 1.2 million years and to recreate ancient periods (the Eemian), as well as more recent periods in order to model the future climate.
- Through oceanography, allowing scientists to understand the determining factors of the world's oceanic circulation - in particular, the formation of deep cold waters and the ocean's ability to absorb carbon.
- Through an observation of the large glacial regions in order to predict their future evolution and the consequences this will have on the climate and biodiversity.

#### 4- Life in the polar regions: of great value to humanity

The biological polar research conducted by France is among the most sophisticated in the world. It has allowed scientists to take advantage of a network of research bases that form an exceptional climatic gradient extending from the Antarctic to the subtropical regions and incorporating the polar front. This research has also led to the creation of a database covering over 40 years of research, which today enables scientists to pursue studies of great value.



Emperor penguins

The two main subjects of adaptation to climate change and adaptation to extreme environmental conditions are of great interest, as much for future biodiversity as for human health. They are therefore at the center of important societal issues and represent a real economic opportunity.

Today, this innovative

research is increasingly turned towards the most advanced technologies, similar to biomedical technologies.

Its financial means, as well as its organization (more multidisciplinary teams) must therefore be adapted. This research must also establish stronger national synergies so as to develop its international collaborations.

#### 5- The polar regions: an observatory for the Earth

A great many geophysical observatories are located in the polar regions, either in order to complete a world-wide network or because the two poles provide unique conditions for observation (Earth-Sun relations or the ozone layer).

These observation activities are symbolic of the scientific community's collaborative work.

Therefore, France must fully support these activities in order to maintain them in the long-term at the international level.

#### 6- Strongly support the development of astronomy at Concordia

Astronomy is the new frontier for French polar research. Concordia could rapidly become one of the planet's top sites, in competition with or as a supplement to space-based sites.

The United States, at the South Pole station, supports important ground-breaking research, such as its study of the depths of the universe and the detection of neutrinos; these two scientific domains received the Nobel Prize in 2006 and 2002, respectively.

Our country, in cooperation with Italy, must therefore develop a scientific and logistical strategy that takes into account activities already undertaken at the South Pole station, as well as those that could be pursued at Dome A once the Chinese have constructed a permanent base there.

This report proposes, first of all, to develop projects that provide great scientific value-added,

but are also realistic given the current infrastructure, in order to, secondly, place Concordia in a position to receive large international instruments thanks to properly adapted logistics.

## 7- Take advantage of the polar regions' complementarity with space missions

Today, many space missions are in need of work undertaken in the polar regions during their preparation, operations and validation phases.

The Antarctic is increasingly recognized as a favourable site for the preparation of men and materials for long-duration missions to explore the solar system.

This scientific and technological aspect is quite promising, even if the scheduling of the exploration programs does not make it a current priority.

## 8- Strengthen France's presence in the polar regions

Historically strongly present in the South, our country has built for itself an international, scientific legitimacy there which can only strengthen our positions.

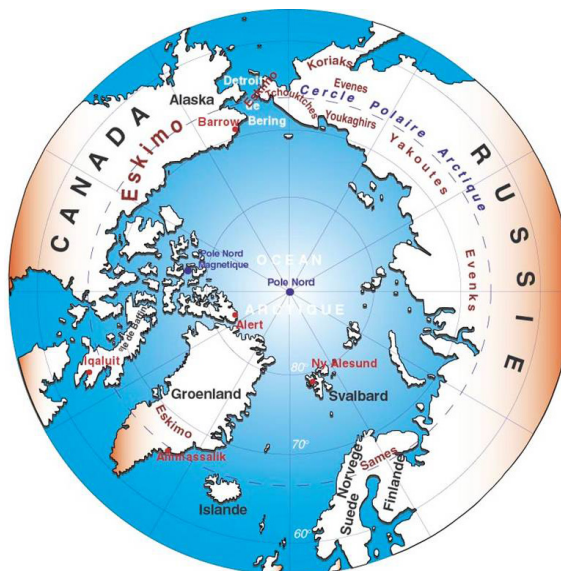
France has again started to develop its research activity in the Arctic, where traditionally it has been less present. This change of strategy must be strongly supported, considering the scientific and political interest of these regions, as well as the bi-polar nature of most scientific subjects and international collaborations.

## 9- Reorganize France's presence in the polar regions

The bi-polar aspect of France's presence in the polar regions suffers from a lack of direction and permanency.

This report therefore proposes to designate a coordinator for the French presence at the two poles, by assigning this mission to either the French Polar Institute – Paul-Émile Victor or

the Ministry of Foreign Affairs through the naming of an ambassador-at-large in charge of polar-related issues.



In the southern regions, France suffers from disagreements between the two main players: the TAAF and the IPEV. Following the example of the national audit office, this report proposes better separating the two missions (particularly in terms of logistics) while, at the same time, bringing their objectives closer together (the promotion of the territories through research, sustainable resource management, and defense of French interests in these regions).

## 10- Better coordinate polar research

While the polar-institute model, an agency with both skills and means, seems suited to the French research environment and our objectives, the IPEV must, in the future, be provided with real means and coordination abilities.

It must be the site where our priorities are established and where the coherency of our research project is built, with regard to its means at the national level and its partnerships at the international level.

It must help in the training of young researchers, even though its American counterpart is already recruiting postdoctoral researchers.

Finally, it must act as a reservoir of human resources for the management of European and international programs.

### 11- Remedy the under-financing of logistics

While it may be impossible to put a figure on French funding of polar research, due to its particular organization, it is clear, however, that polar logistics are under-financed.

Today, the IPEV is shifting from being a polar institute to mainly an oceanographic institute, specialized in deep ice-coring due to the rising cost of the *Marion Dufresne*. If this change were to become permanent, the institute would progressively lose its character as a polar-research center.

Despite significant funding by the Ministry of Research, this oceanographic ship weighs heavily on the entire IPEV budget. It is urgent to find a coherent solution with the IFREMER, the principal administrator of the French scientific fleet.

This financial burden prevents the IPEV from undertaking the urgently needed renovation of the Dumont d'Urville station, many of whose buildings are quite dilapidated.

On this occasion, we must pursue a long-term consideration in order to rethink our presence at Dumont d'Urville, taking into consideration the opening of Concordia.

Finally, this burden also prevents our recognizing the fact that France suffers from the weakest logistics among the great Antarctic nations, having neither a real icebreaker nor an airplane.

### 12- Define a French strategy for European and international cooperation

Finally this report argues that it is essential to formulate a cooperation strategy at both the European and international level.

A European strategy is necessary for a fundamental research domain that is logistically costly and covers vast geographic areas. It is

also necessary because as isolated countries, the European nations cannot compete with the United States, Russia and, tomorrow, China.

If the plan of establishing a European agency must be abandoned in the mid-term due to opposition from the European Commission and the current level of cooperation, it is still possible to construct the following three-part strategy:

- Making use of synergies between European programs (EPICA, DAMOCLES).
- Taking into full account our partners' constraints and imperatives.
- Strengthening bi-polar cooperation between Italy, Germany and France, while keeping the partnership open to other countries.



The franco-italian station of Concordia

With this in mind, this report recommends that the new French President reconsider our country's decision to participate only marginally in the German project for a European icebreaker, the *Aurora Borealis*.

At the international level, this report argues that France should have two main priorities. Firstly, France must give priority to those structured, permanent relations that are most likely to offer opportunities for collaboration and target our more important partners. Secondly, France should be able to exercise its leadership in those domains in which it excels at the international level.

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