



The Antarctic Treaty: a unique governance for the environment and science

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The Antarctic Treaty is a unique example of the world's international governance of a region dedicated to peace, science and environmental protection. Born at the end of the International Geophysical Year 1957-1958, the Treaty was subsequently supplemented by various instruments, including its Protocol on Environmental Protection, or Madrid Protocol: perhaps the one that most influences access conditions and activities south of the 60th parallel south. Among the most well-known rules of the Protocol is the moratorium on the exploitation of mineral resources in Antarctica. The suspension of this moratorium in 2048 is unlikely to succeed, contrary to what many media reports are announcing. But climate change or activities such as tourism, which were not anticipated when the founding documents of the Treaty were drafted, need to be taken into account in the drafting of future rules applying to the white continent.

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1. The Antarctic Treaty: the realization of a utopia

1.What circumstances led to the signing of the Treaty?

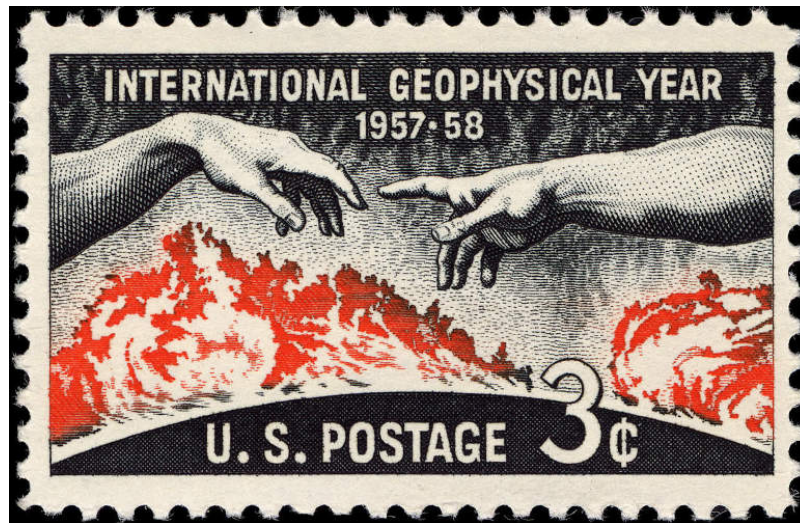


Figure 1. One of the many postage stamps issued for the International Geophysical Year 1957-1958. [Source: By Bureau of Engraving and Printing. Designed by Ervine Metzl. [Public domain], via Wikimedia Commons]

In 1957-58, the International Geophysical Year (IGY) brought together more than 25,000 scientists, grouped in 4,000 organizations from 67 nations, and drew the world's attention to Antarctica's scientific interest (Figure 1). New technological tools from the Second World War, particularly in the field of rockets and radiocommunications, were used. The success of this event demonstrated that there could be a place on the planet without partisan interests and commercial greed, where human activities could be reserved for science. It was an opportunity to extend the experiment politically with one main objective: to ensure that Antarctica could continue to be used only for peaceful purposes and to avoid being the scene or the subject of international discord. It must be admitted that the rigours of the environment left little scope for exploitation of this sixth continent, apart from that of the marine resources of the Southern Ocean, and that the commitment had few geopolitical consequences.

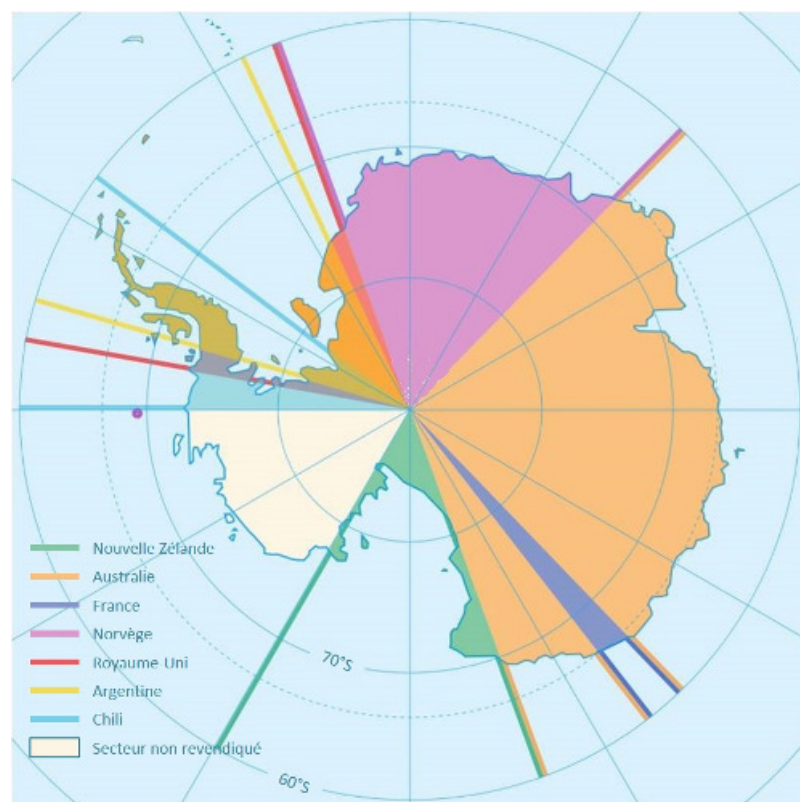


Figure 2. Land claims frozen by the Antarctic Treaty in the area south of the 60th parallel south. [Source: © Yves Frenot, IPEV]

That's probably why it was also easy for the seven so-called "possession" countries (countries claiming part of the continent: Argentina, Australia, Chile, France, New Zealand, Norway and the United Kingdom - Figure 2), joined by the United States, the

USSR, Japan, Belgium and South Africa, to sign the Antarctic Treaty on 1 December 1959 in Washington (Figure 3). It entered into force on 23 June 1961.

1.1 What does the Antarctic Treaty say?

First, **only peaceful activities are allowed in Antarctica**. Consequently, the Treaty prohibits all measures of a military nature (Article I). Similarly, any nuclear explosion is prohibited, as well as the disposal of radioactive waste in this region (Article V).



Figure 3. Signing of the Antarctic Treaty in Washington on December 1, 1959. [Source: By Herman Phleger (<http://www.teara.govt.nz/files/37206-pc.jpg>)[Public domain], via Wikimedia Commons]

It then makes Antarctica **a continent dedicated to science** where each signatory country can freely establish research stations wherever it wishes on the continent. It encourages **scientific cooperation** through exchanges of researchers and the free provision of scientific results (Articles II and III).

In addition, the **Treaty freezes territorial claims**. In other words, it does not ask the 7 possessed countries to renounce their claims, but it requires them not to mention them. Similarly, it prevents any further claims (Article IV).

Finally, the Antarctic Treaty applies to the entire region **south of the 60th parallel south**. **It has no scheduled end**.

1.3. Who are the States Parties to the Treaty?

It now has **53 signatory countries**, including **29 so-called "Consultative Parties"** which, having demonstrated their scientific activity in Antarctica, have acquired voting rights (Table 1). All these countries meet annually at the Antarctic Treaty Consultative Meeting (ATCC) to exchange information and advise their governments to further the objectives of the Treaty.

1.4. Other instruments in support of the Antarctic Treaty

The Antarctic Treaty has gradually been enriched by other instruments that together constitute the **Antarctic Treaty System**:



Figure 4. The Convention for the Protection of Antarctic Seals protects scientific research. [Source: © IPEV]

The Convention for the Protection of Antarctic Seals (CCAS [\[2\]](#), London, 1972) prohibits the hunting of these animals (Figure 4).

The Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR [\[3\]](#), Canberra, 1980) provides for the assessment and management of fisheries resources over a wide geographical area up to the limit of the Southern Ocean, represented by the Antarctic polar front at about 50° south latitude (Figure 5).

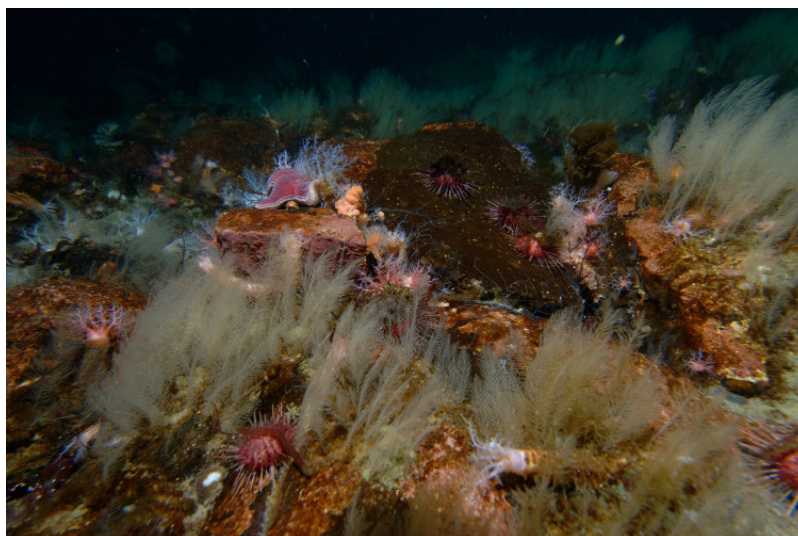


Figure 5. While terrestrial biodiversity is poor in Antarctica, it is extremely rich in the ocean as illustrated here by the luxuriance of the seabed on the coast of Terre Adélie. [Source: © Erwann Amice, IPEV]

The Convention on the Regulation of Mineral Resources Activities (Wellington, 1988). One year after its adoption, Australia refused to ratify this convention, which opened the door to the exploitation of Antarctic mineral resources. In her view, this was contrary to the principles of the Treaty. It is also possible that Australia has had some ulterior motives for fearing that this may harm its own mining activities, which are essential to its economy. In France, the then Prime Minister, Michel Rocard, joined the Australian position. Emphasizing the risks that such activities would pose



Figure 6. Antarctica is one of the last places on the planet that is still relatively untouched by the direct impact of man. [Source: © Gaetan Quere, IPEV]

run to the environment, Commander Cousteau then initiated an international campaign to oppose mining operations in Antarctica,. The lack of consensus among the Consultative Parties as a result meant that the Wellington Convention **never entered into force**.

The Protocol for the Protection of the Environment in Antarctica (also known as the Madrid Protocol) was drafted following the failure of the Wellington Convention. It refers to this region of the planet as a "natural reserve dedicated to peace and science". **Signed on 4 October 1991 and entered into force on 14 January 1998**, it is now one of the major tools around which the rules of human presence in Antarctica are organized (Figure 6).

2. The Madrid Protocol and environmental protection

2.1. The Protocol and its annexes: a strict framework for human activities

Pays	Traité sur l'Antarctique		Protocole de Madrid	CCAS	CCAMLR
	Entrée en vigueur	Statut consultatif			
Afrique du Sud	23 juin 1961	23 juin 1961	14 janv. 1998	X	X
Allemagne	05 fév. 1979	03 mars 1981	14 janv. 1998	X	X
Argentine	23 juin 1961	23 juin 1961	14 janv. 1998	X	X
Australie	23 juin 1961	23 juin 1961	14 janv. 1998	X	X
Belgique	23 juin 1961	23 juin 1961	14 janv. 1998	X	X
Brésil	16 mai 1975	27 sept. 1983	14 janv. 1998	X	X
Bulgarie	11 sept. 1978	05 juin 1998	21 mai 1998		X
Chili	23 juin 1961	23 juin 1961	14 janv. 1998	X	X
Chine	08 juin 1983	07 oct. 1985	14 janv. 1998		X
Corée Rép.	28 nov. 1986	09 oct. 1989	14 janv. 1998		X
Equateur	15 sept. 1987	19 nov. 1990	14 janv. 1998		
Espagne	31 mars 1982	21 sept. 1988	14 janv. 1998		X
Etats-Unis d'Amérique	23 juin 1961	23 juin 1961	14 janv. 1998	X	X
Fédération de Russie	23 juin 1961	23 juin 1961	14 janv. 1998	X	X
Finlande	15 mai 1984	20 oct. 1989	14 janv. 1998		X
France	23 juin 1961	23 juin 1961	14 janv. 1998	X	X
Inde	19 août 1983	12 sept. 1983	14 janv. 1998		X
Italie	18 mars 1981	05 oct. 1987	14 janv. 1998	X	X
Japon	23 juin 1961	23 juin 1961	14 janv. 1998	X	X
Norvège	23 juin 1961	23 juin 1961	14 janv. 1998	X	X
Nouvelle-Zélande	23 juin 1961	23 juin 1961	14 janv. 1998		X
Pays-Bas	30 mars 1967	19 nov. 1990	14 janv. 1998		X
Pérou	10 avr. 1981	09 oct. 1989	14 janv. 1998		X
Pologne	23 juin 1961	29 juil. 1977	14 janv. 1998	X	X
République tchèque	01 janv. 1993	01 avr. 2014	24 sept. 2004		
Royaume-Uni	23 juin 1961	23 juin 1961	14 janv. 1998	X	X
Suède	24 avr. 1984	21 sept. 1988	14 janv. 1998		X
Ukraine	28 oct. 1992	04 juin 2004	24 juin 2001		X
Uruguay	11 janv. 1980	07 oct. 1985	14 janv. 1998		X

Table 1. Main countries acceding to the various instruments of the Antarctic Treaty System (status as at 29 March 2018) [Source: Antarctic Treaty Secretariat (www.ats.aq)]. For an updated table, maintained by the Treaty secretariat, visit https://www.ats.aq/devAS/ats_parties.aspx?lang=f

The Protocol on Environmental Protection in Antarctica is a governance tool like nowhere else on the planet, setting out the principles that apply to all activities in Antarctica to ensure that they respect the environment.

From the outset, it was supplemented by four **annexes** that establish fundamental principles and binding rules applicable to human activities in Antarctica. They deal respectively with **impact studies**, the **protection of fauna and flora**, **waste management** and the **prevention of marine pollution**. Subsequently, a fifth annex on the **management of specially protected areas** was added to the Protocol in 2002. Finally, in 2005, a sixth annex was adopted, which specifies the **liability** regime for **environmental damage**. The latter annex will only enter into force once it has been ratified by all the Consultative Parties.

More specifically, some elements of these annexes illustrate the spirit in which the countries acceding to the Madrid Protocol are trying to minimize the impact of human activities in Antarctica.

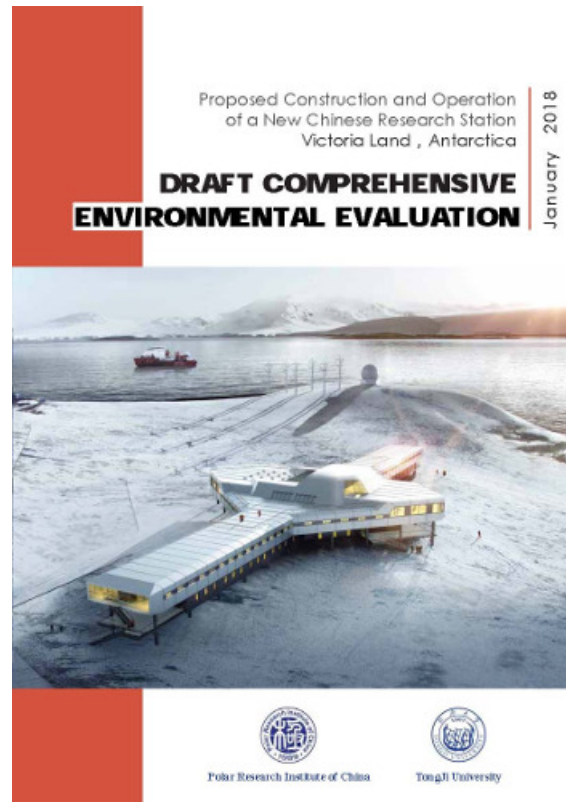


Figure 7. EGIE project prepared by China in 2018 for the construction of a new research station in Victoria Land. This EEIG was reviewed by the Committee for the Protection of the Environment and the Consultative Meeting of the Antarctic Treaty in May 2018 in Buenos Aires. [Source: © CHINA Draft CEE 2018, available on <http://www.chinare.gov.cn/en/CEE2018/>]

Annex I provides that any activity in the Treaty area must first be subject to an environmental impact assessment. If this impact is considered "at least minor or transitory", the activity must be subject to an authorization issued by a competent national authority (in France, it is the Superior Administrator of the French Southern and Antarctic Lands). If the expected impact is estimated to be "more than minor or transient", a detailed impact study is prepared (**EGIE [4]**), made public and evaluated at the international level (Figure 7). This impact assessment and licensing procedure is fundamental because it is the only tool for regulating activities in the Treaty area. However, it has the weakness of being based on relatively vague and ill-defined concepts that can be interpreted differently in different countries.

Annex II aims to protect fauna and flora through measures such as issuing permits for scientists working on these organisms or **prohibiting any deliberate introduction of plant or animal species**. As a result, dog sledding in Antarctica is a thing of the past and only above-ground cultivation is allowed (Figure 8).



Figure 8. On his expedition to the South Pole in 1911, Scott brought ponies and sled dogs with him. Although the ponies proved to be perfectly unsuitable, the dogs were not enough for him to carry out his business, which was less well prepared than that of his competitor, Amundsen. Annex II of the Madrid Protocol now prohibits the introduction of animals such as these. [Source: By Herbert G. Ponting[Public domain], via Wikimedia Commons]

This same annex also provides for the possibility of listing particularly threatened Antarctic species on a list of "**specially protected species**". To date, only Ross's seal (*Ommatophoca rossii*) has this status. Fur seals, which had been close to extinction due to overexploitation until the early 20th century, were removed from the list in 2006 (Figure 9).



Figure 9. Sea lions were practically exterminated by sealers during the 19th and early 20th centuries. They were mainly hunted for their fur. After the cessation of hunting, due to their depletion, their populations increased very rapidly, no longer justifying their classification as specially protected species in 2006. [Source: © Gildas Lemonnier, IPEV]

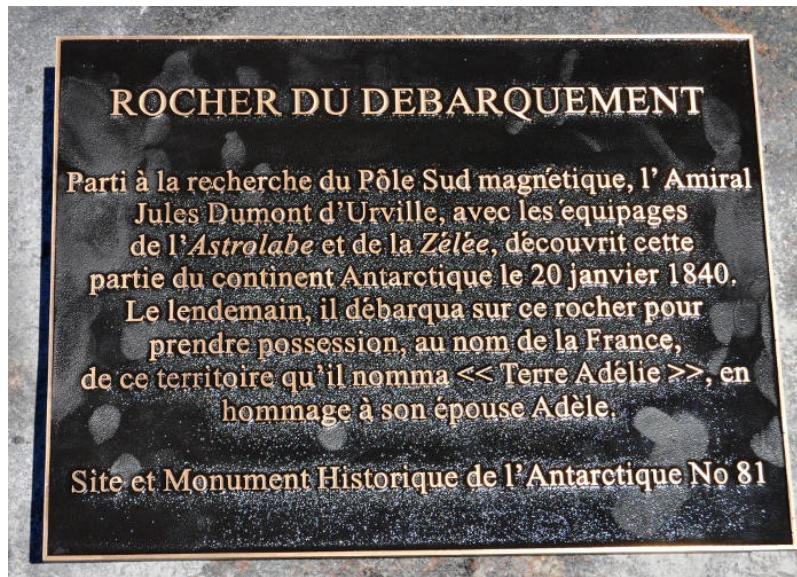


Figure 10. Plaque commemorating the discovery of Antarctica by Jules Dumont d'Urville, placed on the islet known as the "D-Day Rock", which constitutes Antarctica's Historic Site and Monument No. 81, in Adelie Land. [Source: © TA60, IPEV]

Annex III provides that no waste produced by human activity may be stored in Antarctica. All waste must therefore be repatriated or, in some cases, disposed of by methods that do not cause adverse effects on the environment.

Annex IV prohibits the discharge at sea by ships of oil, harmful substances, garbage or waste water not previously treated.

Finally, **Annex V** makes it possible to classify certain sectors as "**specially protected areas of the Antarctic**" because of their exceptional environmental, scientific or aesthetic values. Access to these areas then becomes regulated and a management plan specifies the access procedures and precautions to be taken to respect the values for which the classification is based. The same applies to **sites or monuments classified for historical reasons** (Figure 10).

2.2. The Committee for the Protection of the Environment

The Madrid Protocol establishes a special body, the Committee for the Protection of the Environment (**CPE**), which **provides RCTA with opinions on** the state of the environment and the measures to be taken to ensure its protection. The EPC is composed of representatives of the countries that have acceded to the Protocol (**39 in 2017** - see Table 1) as well as three permanent observers:



Figure 11. Members of the Committee for the Protection of the Environment at its 20th meeting in Beijing in 2017. [Source: Antarctic Treaty Secretariat Image Bank]

the **Scientific Committee for Antarctic Research (SCAR)**,

the *Council of Managers of National Antarctic Programs (COMNAP)* and the *Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)*.



Figure 12. Nassauvia magellanica is a plant native to South America (Chile) discovered by chance in 2010 in the Bay of Whalers, on Deception Island, in the Antarctic Peninsula. The plant was eliminated as soon as it was discovered by the scientists present. This illustrates the new capacity to introduce and establish non-indigenous species in Antarctica as a result of global warming and increased human use. [Source: © Peter Convey, British Antarctic Survey]

Several other international organizations or non-governmental organizations may be invited to provide technical or scientific advice as experts.

The CPE meets annually, in parallel with the RCTA (Figure 11). Its discussions cover a wide range of fields and have resulted in the production of many Recommendations (non-binding) or Measures (binding) that are now binding on member countries and that regulate the daily lives of visitors to Antarctica, including scientists. The priorities currently set by the EPC concern in particular:

understanding the **consequences of climate change** on the Antarctic environment, both terrestrial and marine, and the possible responses to them at least locally.

the risks to Antarctic biodiversity from the **introduction, natural or accidental, of non-native species** (Figure 12).

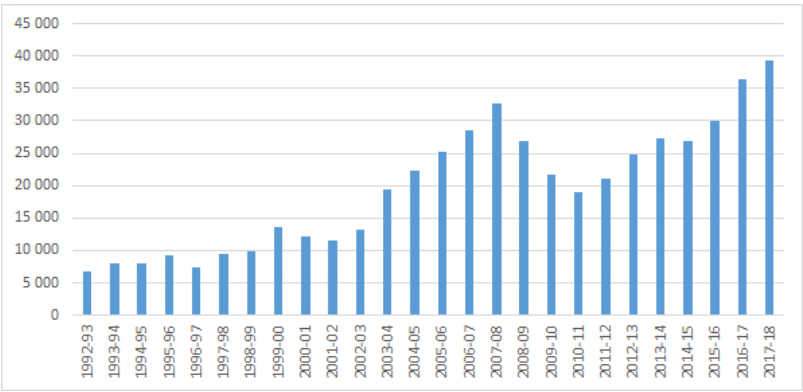


Figure 13. Evolution of the number of tourists transported by ship and disembarking in Antarctica between the early 1990s and today. While nearly 40,000 tourists visit the 6th continent every year between November and March, at the same time there are less than 7,000 scientists and associated logisticians. [Source: IAATO data[5] 2017 - http://www.ats.aq/documents/ATCM40/fp/ATCM40_ip163_rev1_e.doc; author edited graph]

the **most appropriate management of tourism** and other non-governmental activities whose environmental impacts are expected to increase with the dramatic increase in the number of visitors, mainly to the Antarctic Peninsula, during the short southern summer (Figure 13). It should be noted that when the Treaty or Protocol was drafted, tourism activity remained marginal and it was not expected that it would increase to such an extent in the future. As a result, no specific rules governing this activity were anticipated in these founding documents.

the protection of areas representative of the large ecosystems present in Antarctica, both terrestrial and marine (in collaboration with CCAMLR for the latter).

2.3. Inspections: a tool for monitoring compliance

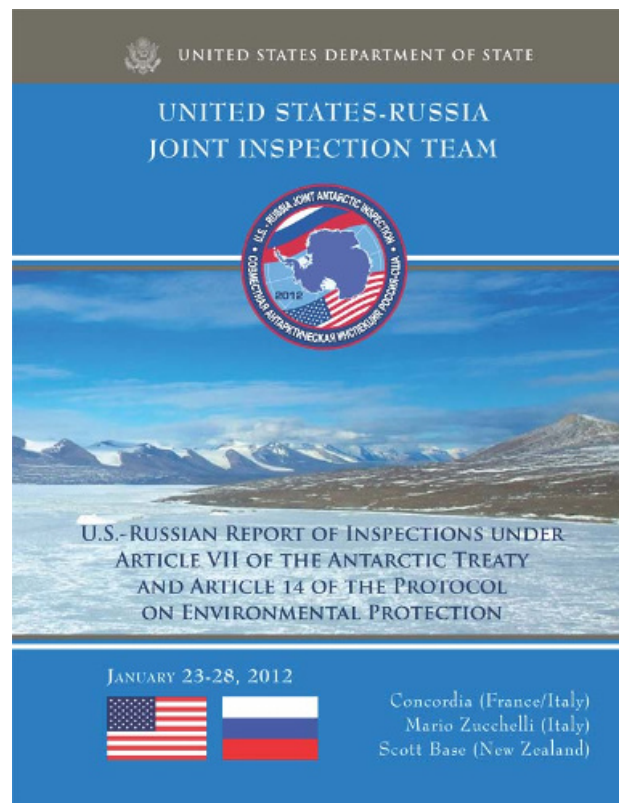


Figure 14. Report of joint US-Russia inspections at Concordia (France-Italy), Mario Zucchelli (Italy) and Scott (New Zealand) in 2012. [Source: © Antarctic Treaty Secretariat: : http://www.ats.aq/documents/ATCM35/att/ATCM35_att069_e.pdf]

In order to ensure compliance with the rules of the Antarctic Treaty and the Madrid Protocol, signatory countries may appoint observers who have free access at any time to stations and their facilities, as well as to ships and aircraft travelling to Antarctica. After being commented on by the countries concerned, the reports of these inspections (Figure 14) are then presented to the CPE and the RCTA, which can make recommendations. While these inspections have long concerned government scientific research stations, they are now increasingly targeted at tourist vessels or shipments dependent on private operators.

2.4. Mineral Resource Development: Let's get the truth straight about the post-2048 period

Among the provisions of the Madrid Protocol that are best known to the general public is the moratorium on the exploitation of mineral resources (Article 7). It specifies that "any activity relating to mineral resources, other than scientific research, is prohibited". But it is also the most misunderstood provision in the media, which generally wrongly claims that this moratorium will end 50 years after the Protocol enters into force in 2048.

Indeed, like the Antarctic Treaty, the Madrid Protocol has no scheduled end in its text. However, its Article 25 provides that it may be amended at any time with the unanimous agreement of the Consultative Parties, or that after 50 years, a Consultative Party that so wishes may request that the subject be discussed at a specific conference. This would then trigger an extremely

cumbersome and binding process of adoption and ratification by States, which would require, in order to be effective, that three-quarters of the Consultative Parties, including **all countries that were Consultative Parties in 1991** (26 countries at the time), approve the proposed amendment.

In other words, the drafters of the Protocol have taken such precautions to ensure its robustness that **a change in its content from 2048 onwards, and in particular the end of the moratorium on mineral resource exploitation, remains highly unlikely.**

3. CCAMLR: fisheries resources and marine protected areas



Figure 15. Krill, at the base of the marine animal food chain in the Southern Ocean, is increasingly being fished, mainly for use as fish farm food. The quantities taken and especially the fishing methods are a source of concern for the sustainability of marine ecosystems around Antarctica. [Source: By Uwe Kils I am willing to give the image in 1700 resolution to Wikipedia Uwe Kils[CC BY-SA 3.0 (<https://creativecommons.org/licenses/by-sa/3.0>) or GFDL (<http://www.gnu.org/copyleft/fdl.html>)], via Wikimedia Commons]

If the exploitation of mineral resources is prohibited, Antarctica has other resources currently exploited: marine living resources. In response to the growing commercial interest in krill and the overexploitation of several marine species in the past, CCAMLR was established in 1982 with the objective of conserving these resources. It now has 25 Members (24 States plus the European Union) and 11 acceding countries that undertake to comply with the provisions of the Convention without having signed or ratified it. It is applicable to all populations of fish, molluscs, crustaceans and seabirds encountered south of the Antarctic convergence [6] (Figure 15). CCAMLR adopts an ecosystem-based management approach, which does not exclude exploitation, provided that it is conducted in a sustainable manner and takes into account the effects of fishing on other components of the ecosystem.

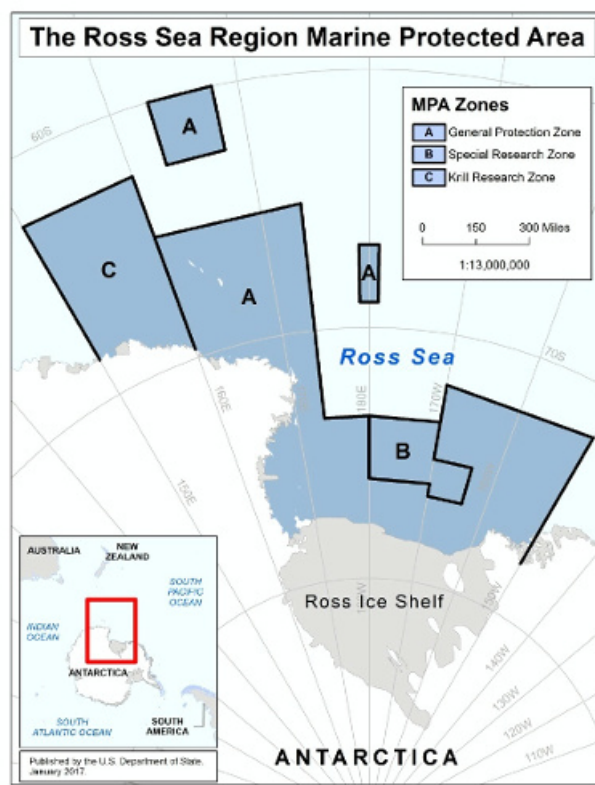


Figure 16. Ross Sea Marine Protected Area, showing the adopted zoning: integral protection area (A), scientific research area (B) and krill fishing area only. [Source: © U.S. Department of State. OES/OPA. January 2017. <https://www.state.gov/e/oes/ocns/opa/ross/index.htm>]

In 2009, the first High Seas Marine Protected Area (MPA), covering 94,000 km² on the southern plateau of the South Orkney Islands, was launched. CCAMLR then continued its work to propose the classification of other MPAs. In October 2016, Member countries agreed on a proposal by the United States and New Zealand to establish the world's largest marine protected area, covering 1.55 million square kilometres in the Ross Sea. Some activities will be limited to meet specific conservation, habitat protection, ecosystem monitoring and fisheries management objectives (Figure 16). 72% of the GPA will be a "no catch" area, in which all fishing activities will be prohibited, while in other parts, fishing for fish and krill will be allowed, but only for scientific research purposes. Negotiations are continuing on other classification proposals, notably in East Antarctica, a project led by France and Australia.

4. Scientific research, a recognized value of Antarctica

Since its discovery, Antarctica has remained an inexhaustible reservoir of scientific discoveries, a place that concentrates all the issues of current societal interest: climate change, ozone depletion, biodiversity erosion, etc. The Antarctic Peninsula, for example, is probably, along with the Arctic, the region of the world where warming is most sensitive: between 2 and 4°C over the past 50 years. This directly affects food resources at sea, which in this sector, in conjunction with poorly regulated krill fishing practices, leads to the decline of some bird populations (Figure 17).



Figure 17. Adelie penguins. This species is declining in the Antarctic Peninsula, due to the combined effects of climate change, krill fishing and tourism. On the other hand, in the Adelian Land where these environmental pressures do not exist, populations of this species tend to increase. [Source: © Clotilde Dubois, IPEV]

Climate change is also responsible for the retreat of many glaciers or the break-up of ice shelves floating on the edge of the continent. According to the IPCC, the resulting acceleration in the flow of land glaciers is likely to significantly increase the contribution of the 6th continent to global sea level rise in the coming years.

This scientific value of Antarctica is specifically recognized by the Madrid Protocol, Annex V of which on Specially Protected Areas specifies that any region, including any maritime region, may be designated as an "Antarctic Specially Protected Area" to protect outstanding environmental, scientific, historical or aesthetic values, or the wild state of nature, or any combination thereof, as well as any ongoing or planned scientific research.

5. A single governance, but will it stand the test of time?



Figure 18. The flags displayed at the Dumont d'Urville station in Terre Adélie in January 2014 attest to the presence of researchers of various nationalities working together. [Source: © Philippe Apelt, IPEV]

The Antarctic Treaty and its associated instruments therefore offer a unique international legal system which, since its creation and through successive improvements, has worked rather well, demonstrating that it is possible for States to agree on such noble objectives as scientific research or environmental protection (Figure 18). But since decision-making is based on consensus, it is not always easy to make rapid progress on major issues such as the regulation of tourism activities, the establishment of new research stations, the creation of marine protected areas, etc. The rise of certain nations that have hitherto been quite discreet in Antarctica, such as China, which is constantly increasing the number of its research infrastructures throughout the continent and does not hesitate to use terms such as "use of Antarctica" (RCTA 2017 in Beijing) publicly, may also in the future disturb somewhat the well-established game of this atypical governance. The future will tell whether the tools of the Antarctic Treaty System and its current mode of operation are robust enough to respond to these new pressures.

References and notes

Cover image. Emperor penguins in Adelie Land at the end of the breeding season in December. [Source: © Alain Mathieu, IPEV]

[1] This article is based on and supplements an article by the same author published in the Revue Australe et Polaire No. 82 of December 2017 published by the AMAEPF (<http://www.amaepf.fr/>)

[2] CCAS - *Convention for the Conservation of Antarctic Seals*

[3] CCAMLR - *Commission for the Conservation of Antarctic Marine Living Resources*

[4] EGIE - Global Environmental Impact Assessment

[5] IAATO - International Association of Antarctica Tour Operators

[6] Cetaceans are considered by the International Convention for the Regulation of Whaling, signed in 1946 and therefore prior to the establishment of the Antarctic Treaty. It is the International Whaling Commission that therefore deals with whale issues in the Southern Ocean.

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