

COP 21 / CLIMAT / SATELLITES

**BIODIVERSITY...
HIGH STAKES FOR HUMANITY
100, 000 animals tracked for 30 years by satellite**

Global warming in the Arctic means that ice fields are forming later and later in the year. Polar bears linger for longer on the coastlines. Their hunger pushes them to venture increasingly into Inuit villages, rummaging through dustbins, ravaging landfill sites, prowling around houses in search of food. As this phenomenon grows more frequent, the Inuit believe the species is not at risk. It's easy to jump to this kind of conclusion if you don't study a species in its entirety, if you don't have perspective. This is where CLS and satellites come into play. The study of highly migratory species or animal populations living in extreme environments can in fact only be done from space. Each month, CLS tracks over 8,000 animals. More than 100,000 have been monitored since the 1980s. Here is an overview of the impact of climate change on biodiversity, as seen from space.

How can we observe the biodiversity from space?

In 1978, CNES, NASA and NOAA created the ARGOS satellite location and environmental data collection system. Data from the system is acquired, processed and shared by CLS with the international scientific community. CLS implanted in more than 23 countries, delivers to the international scientific community all the movements of the biodiversity of our planet and informations on its habitats.

Bears on borrowed time

900 bears have been observed from space, with over the equivalent of 300 years of tracking data by CLS. The conclusion is that since the '90s, the polar bear's hunting habitats have been altered, reduced and spread out considerably. To find food, the bear must travel further afield. In the 90s, he travelled a few hundred kilometers, but today a polar bear can cover over 1,000 km in a single week of hunting, costing him considerable energy expenditure. The distribution of female bears' dens has also changed. Since the quality of snow has deteriorated, the dens do not last as long. All this data led to the polar bear, *ursus maritimus*, being classified as an endangered species in 2008. Despite this measure, scientists forecast that between now and 2050, the population of the polar bear will diminish by three quarters, dropping from 25,000 individuals to 5,000.

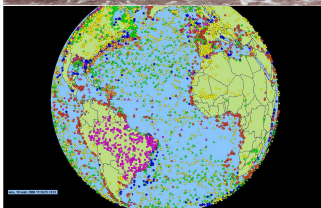
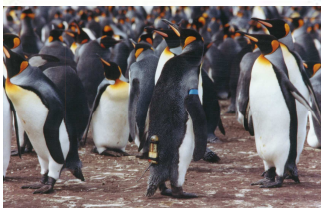
Manchots, éléphants de mer et albatros bilan climatique

Based in Chizé, in the Deux-Sèvres region of eastern France, their real field of investigation is thousands of kilometers away from mainland France. In the French Southern and Antarctic territories, made up of the Crozet and Kerguelen islands and Adélie Land, these far-flung researchers are studying unique regional biodiversity. First of all we find Henri Weimerskirch, director of the 'marine predators' team from CEBC/CNRS and a specialist on albatross, next Christophe Guinet, the elephant seal expert and Charles-André BOST, alias Charly, the king penguin man. Between the three of them, they track almost 400 animals via the ARGOS system. Together, they've discovered the 'positive' or negative effects of global warming on the three populations endemic to these southern territories.

Henri Weimerskirch has proved that accelerating winds, a secondary effect of global warming, cause the albatross to expend less energy during its fishing expeditions. Larger birds are more resistant. The winds have also redistributed their feeding zones. These new, unexploited zones are less dangerous for the albatross. Indeed, industrial fishing lines equipped with fishhooks are a great threat to the species when they have to feed in fishing zones. Christophe Guinet has discovered that global warming shifts the elephant seal's feeding zones to deeper waters. These mammals therefore spend more time and energy in diving for food. Consequently, the females build up less reserve, and give birth to offspring that are less equipped to face life's challenges. They also wean them in worse conditions. As a result, mortality rates could reach 70 to 90 % in unfavourable oceanic and climatic conditions. Charles-André Bost has placed nearly 200 Argos transmitters on king penguins, and his conclusion is clear. Using data collected from the Argos satellites, scientists have established predictive models which show that if man continues using fossil fuels as he does today, king penguins will have disappeared from the north of their distribution area (Crozet and Marion islands) by 2100. This disappearance would be a dramatic loss for the biodiversity of these regions. It would also entail the loss of a link in the food chain, with a still unknown impact on the Southern Ocean.

All these studies and results allow us to evaluate the expected effects of climate change on the mythical populations around the South Pole.

**100 000 animals equipped with Argos transmitters, tracked by satellite, from the 80's
6 ARGOS satellites – 2 CLS processing centre – 80 terrestrial receiving station**



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