



National press release

02/12/2024

# 1,100 km in Antarctica to better understand the evolution of the ice cap

- The physical processes behind cloud formation and snow precipitation above the Antarctic ice cap remain poorly understood.
- Co-directed by the CNRS, the CEA, the EPFL, and l'École Polytechnique, the AWACA project will deploy innovative equipment with support from the French Polar Institute, in order to better characterize the atmospheric water cycle above Antarctica.
- These measurements will help better predict the future of the Antarctic ice cap in a hotter climate.

From early December 2024 until mid-January 2025, a series of observation systems will be deployed by the AWACA project in Antarctica. Autonomous and capable of operating continuously for three years in extreme weather conditions, these innovative instruments will be installed along a 1,100 km transect between the Dumont d'Urville and Concordia stations. They will make it possible to study—for the first time on such a scale—the meteorological processes involved in the accumulation of snow in Antarctica, with a view to better predicting the evolution of the ice cap over the next 100 years.

This ambitious mission is overseen by scientists from the CNRS, CEA, l'École polytechnique of Paris, and the Swiss Federal Technology Institute of Lausanne (EPFL). The deployment of these instruments, a genuine logistical challenge, is managed by teams from the French Polar Institute. This research received funding from the European Research Council.

## Field measurements of unprecedented scope

Rising water levels in the future, in the context of global warming, mostly depend on the quantity of water stored in the form of snow and ice within the Antarctic ice cap. But through which atmospheric processes does snow accumulate each day on the ice cap's surface? The AWACA project<sup>1</sup> will make field measurements of unprecedented scope in order to improve our knowledge of the atmospheric aspects of the water cycle and snow formation in Antarctica. The observations made

regarding our climate will greatly improve climate models, with the goal of eventually reconstructing the climate variability for Antarctica over the last millennium, and predicting that of the next 100 years.

### **A long-distance scientific trek stretching 1,100 km**

From 2 December 2024 until mid-January 2025, a scientific trek conceived by the French Polar Institute will deploy measurement and observation instruments along a 1,100 km transect representative of the various climate regions of East Antarctica, from the Dumont d'Urville station on the coast to the Concordia station in the middle of the Antarctic Plateau. This transect is aligned with the typical trajectory of the air masses that transport humidity from the ocean toward the continent's interior. The fruit of a three-year technical and instrumental effort, the observation systems specially designed for the project will provide accurate data for the properties of the droplets and crystals that form clouds and precipitation, as well as for how they contribute to the accumulation of snow on the surface. A major component of the project will also focus on studying water isotopes, invaluable sources of information on the origin of air masses and their successive changes of state. The results will also refine our interpretation of measurements made in ice cores, in addition to our knowledge of past climates.

### **A logistical challenge to optimise next generation climate models**

Once in place, the observation systems located along the transect will make readings continuously, and for those located outside of permanent stations entirely autonomously as well, including with respect to the 1000 W of energy needed for their functioning. They can operate for at least three years in the extreme weather conditions of Antarctica, a technical feat! Annual maintenance will be provided by the teams during Antarctic summer campaigns via the deployment of long-distance control treks. The collected data will be analysed to help optimise next generation climate models.

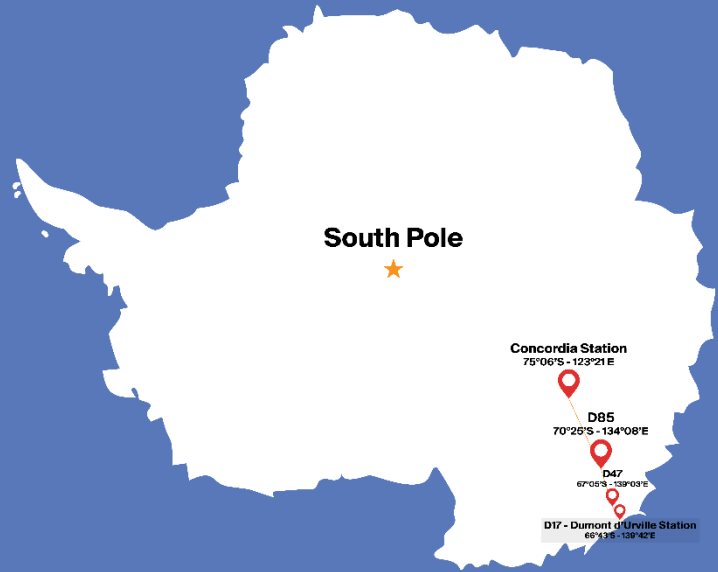
The AWACA project is co-directed by scientists from the CNRS, the CEA, l'École polytechnique of Paris, and the Swiss Federal Technology Institute of Lausanne working in the Dynamic Meteorology Laboratory (IPSL<sup>2</sup>, CNRS/Ecole polytechnique/ENS – PSL/Sorbonne Université), the Laboratory of Climate and Environmental Sciences (IPSL, CEA/CNRS/Université Versailles Saint-Quentin), and the Atmospheric Space Observations Laboratory (IPSL, CNRS/Sorbonne Université/ Université Versailles Saint-Quentin) in France, in addition to the EPFL's Environmental Remote Sensing Laboratory in Switzerland. A true logistical challenge in polar weather conditions, the deployment of instruments was made possible thanks to the know-how and experience of the French Polar Institute.

The research project involves technicians, engineers, and researchers, in addition to specialists in meteorological observations, instrumentation in extreme conditions, and atmosphere and climate modelling.

This research received funding from the European Research Council in the form of an ERC Synergy Grant<sup>3</sup>.

Follow AWACA on [the project's website](#).

# Antarctica



1000 KM

**Transect measuring 1,100 km in length along which the AWACA project's measurement and observation instruments will be deployed.** It connects the Dumont d'Urville station on the coast with the Concordia station in the middle of the Antarctic Plateau. This transect is aligned with the trajectories of the large air masses that transport ocean humidity toward the continent's interior. © Clément Olivier / EPFL



**Installation of a radome (antenna protection) on the roof of one of the observation units. Once installed on sleds, the observation units will be transported by tractor to sites D17, D47, D85 and Dome C.** © Nicolas Perin / French Polar Institute



**Departure of the AWACA convoy from the Adélie Coast.** The sledges which carry the observation units, the living unit for the personnel and the fuel reserves are hitched to the tractors that will take them to the project's various observation sites. © Nicolas Pernin / French Polar Institute

**Additional photos available upon request.**

### Notes:

1 - Atmospheric water cycle over Antarctica: past, present & future. AWACA was launched on 1 September 2021, for a duration of 7 years. A 3-year phase of technological and instrumental development preceded the deployment of instruments in Antarctica.

2 - IPSL: The Pierre-Simon Laplace Institute includes eight Île-de-France laboratories (and three associated teams) in climate and environmental sciences, three of which are involved in the project.

3 – European Research Council (ERC) Synergy Grants are awarded in connection with the Horizon Europe programme dedicated to research and innovation.

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