PIRATA, the observatory in the Tropical Atlantic

Tropical oceans play a key role in the Earth's climate mechanics, and require constant monitoring and dedicated instrumentation if they are to be understood.

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PIRATA buoy being launched into the Atlantic Ocean.

In 1960, very little was known about tropical ocean circulations... until currents were measured at various depths in the Equatorial Pacific from Nouméa, revealing the existence of unsuspected undercurrents and countercurrents. At the same time, the United States were turning their attention to the Tropical North Atlantic, source of hurricanes that ravage the Caribbean and its coasts.

In 1974, France and the United States decided to join forces to identify the circulation of the Equatorial Atlantic and understand how heat from the ocean was transmitted to the atmosphere. Water samples were taken from the first 500 metres of depth during the GATE campaign, followed by the FOCAL/SEQUAL programme in 1982-1983. The consortium showed the influence of ocean temperatures on the African monsoons and rainfall in Brazil.

In 1997, the United States, France and Brazil went even further by setting up a network of weather and ocean buoys in the Tropical Atlantic, called PIRATA (Prediction and Research Moored Array in the Tropical Atlantic). Since 2006, this network has been made up of 18 buoys, which have to be replaced every year. They measure surface meteorological and oceanographic parameters at depths of up to 500 m in real time. France maintains six of these buoys and three moorings

"The PIRATA programme's success is the result of sustained international commitment and scientific cooperation, a willingness to evolve in line with research and monitoring needs, and a desire to share data with the scientific community and operational centres. The observational system continues to develop in order to meet a growing set of research priorities and operational and climate challenges."

Hervé Giordani, Météo-France

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Weather and ocean buoy for the PIRATA campaign.

that measure the current between the surface and 300 m depth along the Equator. Though maintenance is expensive (€5-6 million per year in total, including €1.5 million for France), it is absolutely necessary to maintain the quality of weather forecasts. But that is not all this network provides...

••• A network of scientific buoys allows scientists to understand and monitor the Tropical Atlantic •••

Over the last 27 years, and thanks to solid collaboration with partners in the Global South, Brazil, West Africa and South Africa, PIRATA has made it possible to understand the link between cooling waters in the Gulf of Guinea and the onset of African monsoons in the boreal summer, as well as the influence of freshwater from the Amazon and the Congo on ocean-atmosphere heat exchanges. PIRATA also provides essential data for understanding the influence of small-scale (diurnal) variability on air-sea exchanges, validating satellite measurements and feeding weather and climate models.

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