

Censipam at COP30: advancing technological sovereignty and sustainable leadership in the Amazon

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The 30th United Nations Conference on Climate Change (Conference of the Parties) represents a turning point in global climate negotiations, especially because it takes place in Belém, Pará, in the heart of the largest and most important ecosystem of the Amazon. For the first time, a city located in the Amazon region will host the largest international forum on climate change, bringing together leaders, scientists, civil society representatives, and the private sector. The symbolism of this choice is immense: the Amazon, considered the largest tropical biome on the planet, takes center stage at a critical moment for the environmental future of humanity. With unique biodiversity and a central role in regulating the global climate, the Amazon rainforest also faces constant threats from deforestation, wildfires, illegal exploitation of natural resources, and environmental degradation. Amid these challenges, Brazil assumes an unprecedented geopolitical and environmental responsibility (UNFCCC, 2025).

The holding of COP30 on Amazonian soil emphasizes the need for assertive responses to the environmental issues affecting the forest. Deforestation, driven by activities such as agricultural expansion and illegal logging, remains one of the greatest threats to the integrity of the biome. In addition, forest fires, often deliberately caused, further worsen the situation, contributing to the release of large amounts of greenhouse gases and the destruction of essential habitats. International pressure for Brazil to act more strictly in combating these environmental crimes is increasing. At the same time, the country faces the challenge of promoting the economic development of the Amazon region, marked by deep social inequalities and lack of infrastructure, without compromising its biodiversity (IMAZON, 2023).

In this context, it becomes essential to present to the world concrete initiatives that articulate environmental preservation, sustainable development, and national sovereignty. The

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Management and Operational Center of the Amazon Protection System (CENSIPAM) emerges as a strategic actor in the environmental scenario. Linked to the Ministry of Defense, CENSIPAM's mission is to integrate information and technologies aimed at the protection and monitoring of the Legal Amazon. Among its technological products are SIPAM Hidro, the Fire Panel, Amazon SAR, and the pioneering mapping of the Amazon with remotely piloted aircraft. All these products offer effective and innovative tools, on different scales, to face the environmental challenges of the region, allowing the Brazilian State to exercise sovereign control over its territory, while promoting sustainable and responsible actions (CENSIPAM, 2025).

The use of drones for mapping the Amazon is an innovation incorporated by CENSIPAM in recent research for monitoring and preserving the ecosystem. Small unmanned aircraft equipped with high-resolution cameras are used to record detailed images of critical areas, such as border regions, conservation units, and indigenous territories. This technology has proven extremely useful for field operations, inspection actions, and data collection in hard-to-access locations. Drone mapping enables more accurate and agile surveillance, favoring the integrated action of different institutions and the engagement of local communities in environmental protection. During COP30, the demonstration of these technological capabilities can reinforce the importance of informational sovereignty over the forest and highlight Brazil's leadership in managing the Amazonian territory (Custódio; Abeledo, 2023).

Another important product is SIPAM Hidro. It is a climate monitoring platform in the Amazon, developed by CENSIPAM. This system represents a strategic advancement for environmental surveillance and facing climate crises. Riverside and urban populations can monitor flood areas during the rainy season as well as river levels during periods of water scarcity. This digital platform plays a central role in the collection, analysis, and dissemination of real-time meteorological data in one of the most sensitive and essential regions for global climate balance: the Amazon rainforest (Nogueira, 2023).

Associated with SIPAM Hidro is also the Fire Panel, which monitors in 'near real-time' the phenomena associated with forest fires in the tropical forest. In digital environments, the platforms developed by CENSIPAM assume strategic importance, as they allow more accurate climate monitoring of the Amazon, feeding databases that assist both in the planning of public policies and in emergency environmental protection and civil defense actions in the Amazon.



CENSIPAM's digital platforms, available in the Panorama system, integrate different sensors distributed in remote points of the forest, meteorological radars, satellite images, and climate modeling algorithms. This robust infrastructure allows the identification of temperature, humidity, precipitation, and wind patterns, generating forecasts that contribute to the prevention of natural disasters and the management of water and agricultural resources. In addition, these data are shared with international centers, such as the United States National Oceanic and Atmospheric Administration (NOAA), promoting essential scientific collaboration for global climate understanding (Amaral, 2025).

CENSIPAM's climatological monitoring platforms not only represent a technological advancement but also a geopolitical and environmental instrument essential for authorities attending COP30, reinforcing Brazil's role as a protagonist in the fight against climate change and in the protection of the Amazon. CENSIPAM's platforms promote a digital transformation of geoinformation, as they provide valuable climatic and environmental data for technical reports, scientific panels, and international negotiations, strengthening Brazil's position as a global environmental leader. In addition, they can support more ambitious commitments to reduce emissions and preserve biodiversity at COP30.

On another scale, the Amazon SAR product uses synthetic aperture radar (SAR) technology for forest monitoring and represents a significant milestone in the environmental protection of the Amazon. This product presents a differentiated methodology that allows the detection of deforestation even under adverse conditions, such as cloud cover, common in the region. This capability is crucial for continuous and effective inspection of tropical forest areas. Implemented with resources from the Amazon Fund, the project aims to complement existing systems, such as DETER, which depend on optical sensors and are limited by the presence of clouds. The SAR Project methodology analyzes high-resolution images during the day or night, regardless of weather conditions, enabling the generation of more accurate and near real-time deforestation alerts (Fundo Amazônia, 2025).

In the Amazon SAR satellite monitoring infrastructure, CENSIPAM's ground stations stand out, installed in strategic locations: Formosa (GO) and Manaus (AM). Currently, CENSIPAM's ground stations receive real-time images from NASA/NOAA Earth observation satellites: Suomi-NPP, JPSS-1, JPSS-2, Aqua, and Terra. The constellation of satellites from the Brazilian Air Force's Project *Lessônia*, and the Amazon I, CBERS 4, CBERS 4A, SCD-1, and SCD-2 satellites, operated by INPE, are also in operation at CENSIPAM's ground stations, providing relevant services to the security and defense of the Amazon.

Finally, the greatest and most important resource of CENSIPAM is its technical staff, which deserves special recognition for their high level of qualification and commitment in monitoring the Amazon. The team consists of engineers, geographers, biologists, remote sensing analysts, and other professionals from the Science and Technology careers. It is a high-level team, a multidisciplinary group that is fundamental to the success of strategic projects such as Amazon SAR. The integrated, inter-agency performance allows for precise analysis of geospatial data, the generation of reliable deforestation alerts, and the production of essential information for governmental decision-making. The technical competence of these professionals reflects the potential of science applied to environmental protection, reaffirming CENSIPAM's role as an institution of excellence in Amazon management.


The hosting of COP30 offers a unique opportunity for Brazil to present to the world a new model of Amazonian development, based on sustainability, innovation, and social responsibility. The integration of CENSIPAM's tools and its contribution to the event's agenda demonstrate that it is possible to reconcile environmental protection with economic progress, and sovereignty with international cooperation. Brazil stands out by showing how technological intelligence applied to environmental management strengthens public policies, increases resilience to climate change, and expands opportunities for sustainable investment. Furthermore, CENSIPAM's active presence during the conference creates new opportunities, partnerships, scientific exchange, and, most importantly, consolidates the country as a global reference in tropical forest monitoring.

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