Paper ID: 94878
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IAF BUSINESSES AND INNOVATION SYMPOSIUM (E6)
Public-Private Partnerships: Traditional and New Space Applications (2)

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AGROSPACE BUSINESS: A NEW FRONTIER FOR ECONOMIC AND ENVIRONMENTAL REGENERATION THROUGH SPACE AND OCEANIC TECHNOLOGIES IN GLOBAL AGRIBUSINESS

Abstract

The increasing frequency of climate-related disasters and environmental degradation threatens global food security and economic stability, particularly in agribusiness-dependent nations like Brazil. Integrating space technologies, regenerative agriculture, oceanic farming, and extraterrestrial agricultural infrastructures presents a transformative solution.

The Agrospace Business paradigm combines satellite monitoring, AI-driven geospatial analytics, space-based farming, and oceanic food systems to rehabilitate degraded lands, enhance productivity, and create sustainable markets. This approach ensures economic resilience, food sovereignty, and technological leadership, positioning Brazil as a leader in sustainable agribusiness.

With vast biomes such as the Amazon, Cerrado, and Pantanal, Brazil is an ideal testing ground for space-driven agricultural solutions. Remote sensing, hyperspectral imaging, and machine learning optimize precision farming, mitigate climate risks, and foster a circular bioeconomy through regenerative soil management, bio-based inputs, and carbon credit systems.

Extraterrestrial farming, including orbital greenhouses and hydroponic systems, advances sustainable food production on Earth and in space. Oceanic infrastructures, such as mariculture, offshore aquaponics, and floating farms, expand food production while reducing land pressure. These systems integrate space-based monitoring and AI-driven climate models to optimize aquafarming and lessen freshwater dependence.

The Agrospace Business model enhances security by reducing fertilizer dependence, stabilizing supply chains, and optimizing costs through real-time space analytics. Aligning with global sustainability commitments, such as EU deforestation-free supply chain regulations, ensures competitiveness. Reports indicate regenerative agriculture could increase crop production by 13% by 2040, while 63% of major agribusiness companies are exploring its adoption. Investment in regenerative aquaculture and seaweed farming is also gaining traction.

By integrating space-based agriculture and oceanic farming, Brazil can lead a new economic sector, attracting private investment, fostering AgriTech innovation, and strengthening food security amid climate change. This paper outlines a roadmap for implementing the Agrospace Business model, covering technological frameworks, investment strategies, regulations, and case studies.

It also proposes an Agrospace and Oceanic Farming Innovation Hub, uniting space agencies, agribusiness leaders, marine researchers, and policymakers to accelerate the adoption of these technologies.