BETWEEN ABSENCE AND PRESENCE: THE CONVERGENCE OF AI, SENSING TECHNOLOGIES, AND ART

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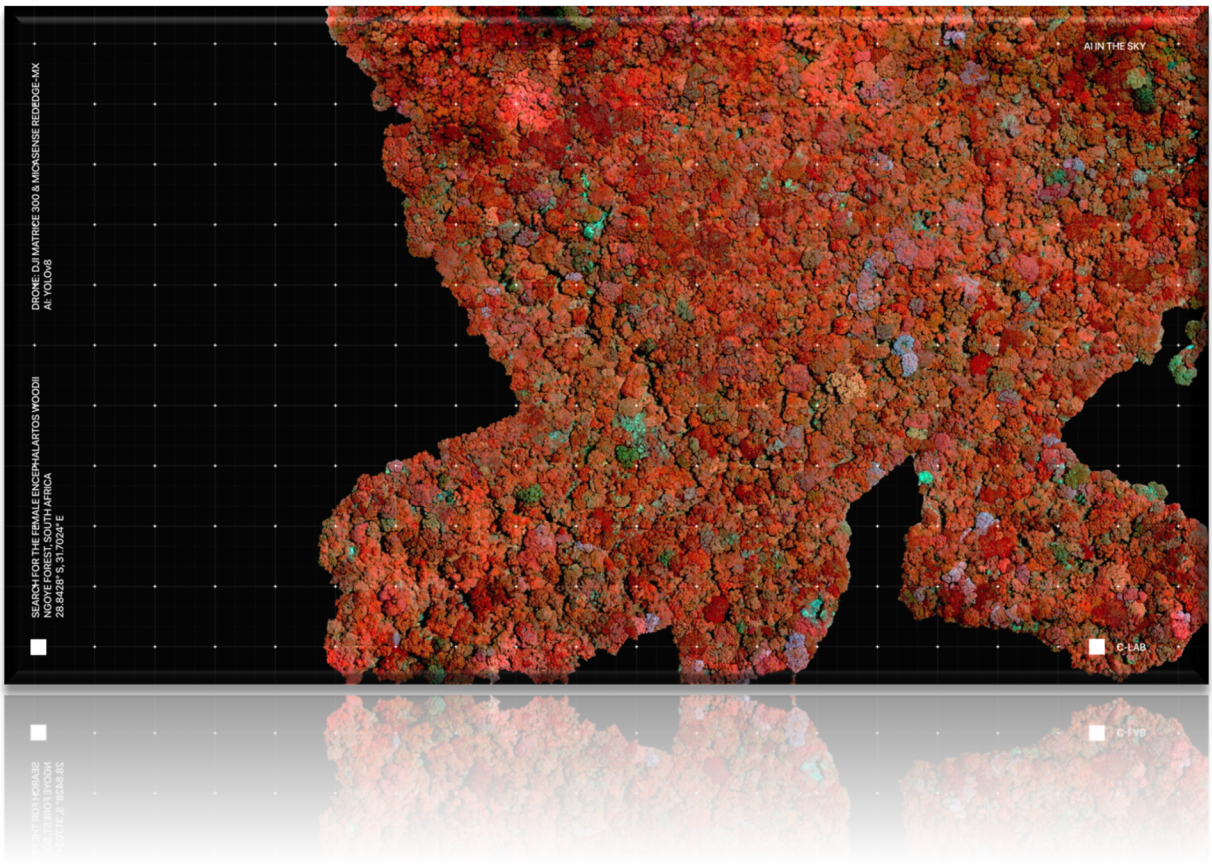

Fig. 1. *AI in the Sky* (2024), Film Still/Image.
Mosaic and multispectral map from 2024 drone mission search for Encephalartos woodii, Ngoye Forest, South Africa © C-LAB

Plants have determined man's history and they will determine his future. Whether they were suspended in the primeval soup of the oceans, or more firmly anchored after their emergence onto land, plants modified the earth's early atmosphere, fixing carbon dioxide (CO_2) and releasing oxygen (O_2), making possible the evolution of primitive animal life and, much later, of man himself. Plants are at the base of every food chain, supplying us with both building and clothing materials, with wood for cooking and heating, and with fuels to generate power. Such green threads connect our most fundamental activities yet, despite this, we have until very recently taken plant growth and health for granted. Many aspects of plant physiology remain a mystery to us, particularly where they concern plants under the variable conditions of the field – away from the controlled conditions of the laboratory.

– Peter Ayres, "The Aliveness of Plants"[1]

Plants dominate the Earth's biomass, yet their existence is often obscured by the more animated, perceptible life forms that surround us. In a world that prioritises movement and sound, how do we relate to beings that remain still, silent, yet critical to all forms of life? My practice delves into the paradox of how plant life, despite being fundamental to sustaining life on Earth, is often dismissed as mere background. By unravelling the intricate layers of these silent keepers of the biosphere, my research explores what shapes our perception of them and seeks to bring their overlooked presence into sharper focus.

This theme reflects a deeper philosophical inquiry into the unseen forces shaping our world, drawing attention to the gaps in human understanding of the nonhuman realm. My practice intertwines scientific methods with reflective inquiry to uncover the unique capabilities that plants possess to allow plants to thrive in their sessile existence. In doing so, the notion of the overlooked becomes a focal point, challenging traditional views and encouraging a more nuanced engagement with plant life.

While the concept of the overlooked serves as a unifying entry point, my practice has also engaged with a diverse array of themes from genetic manipulation, extreme environments, botanical interfaces and living imaging systems. These explorations, though varied, share a consistent aim - to bridge empirical investigation with artistic experimentation. By adopting scientific methodologies, my work establishes a rigorous foundation while simultaneously weaving in philosophical inquiry and storytelling to deepen the research perspective. The narrative element ties these inquiries together, opening up alternative ways to understand the entanglement of art, science, and technology.

More recently, my focus is on one of the most urgent challenges in conservation: species extinction and how emerging technologies, particularly artificial intelligence (AI) and multispectral imaging, can broaden our engagement with sustainability and biodiversity. My project, *AI in the Sky* [2] centers on our search for a female partner for an ancient and critically endangered male plant species. This project explores how the convergence of technology, conservation, and art can reframe our understanding of species loss and the broader ecological crises. By leveraging AI and multispectral imaging, the project pushes beyond traditional botanical exploration, inviting us to reconsider the possibilities of technological intervention in uncovering what remains unseen in the natural world.

Fig. 2. *E. woodii* and I (Laura Cinti), Temperate House, Royal Botanic Garden, Kew, September 2021 © C-LAB. The *E. woodii* in Kew Gardens is an offset of the only plant of this specimen ever found in the wild. It was sent to Kew in 1899.

AI in the Sky utilises remote sensing technologies to search for one of the rarest plants on Earth: the *Encephalartos woodii (E. woodii)*. This cycad, often referred to as the 'loneliest plant in the world', is classified as 'extinct in the wild',[3] survives through clones of a solitary male specimen found in the Ngoye Forest, South Africa, in 1895. It has since been propagated asexually in botanical gardens, and every specimen of *E.woodii* is a clone of this unique 'original' - and all are male. Despite efforts to preserve the species, it is unable to reproduce naturally due to the absence of a female counterpart. As dioecious plants, where each individual is exclusively male or female, cycads rely on pollinators to transfer pollen from male to female cones. Without a female, sexual reproduction is impossible and it remains the last of its kind.

The forest where the solitary male was discovered hasn't been fully explored as previous expeditions searching for the species were done on foot, limiting the ability to access secluded and densely vegetated areas. The project poses a speculative yet scientifically grounded question: could a female still be in the uncharted recesses of the Ngoye Forest? This project began with the aim of locating the missing female and unlike previous expeditions, this project uses remote sensing technologies and AI to assist in the search.

AI in the Sky examines how technology reshapes our perception and engagement with nature. Beyond the technical challenge of locating the missing female, the project navigates how the search transforms into an exploration of absence shaping presence. According to the philosopher Martin Heidegger, absence is not simply a void but a form of presence that influences how we experience reality[4]. This notion is particularly relevant in the context of *E. woodii*, where the absence of a female disrupts the completeness of the species, leaving the male as a symbol of ecological imbalance. By employing AI and sensing technologies, the project turns absence into an active site for exploration, revealing what typically eludes human perception.

For instance, multispectral imaging can detect subtle differences in plant health that are invisible to the naked eye, while AI models trained on these images can pinpoint potential locations of the missing female cycad. In this sense, technology becomes more than a tool - it acts as a bridge, making the unseen seen. The search itself becomes a means of mediating absence, with data and algorithmic processes stepping in to suggest possibilities where none were previously considered. This approach resonates with wider discussions by scholars like Donna Haraway[5] and Jussi Parikka[6], who argue that the convergence of the nonhuman and technological open up new ways of understanding our relationship with the environment.

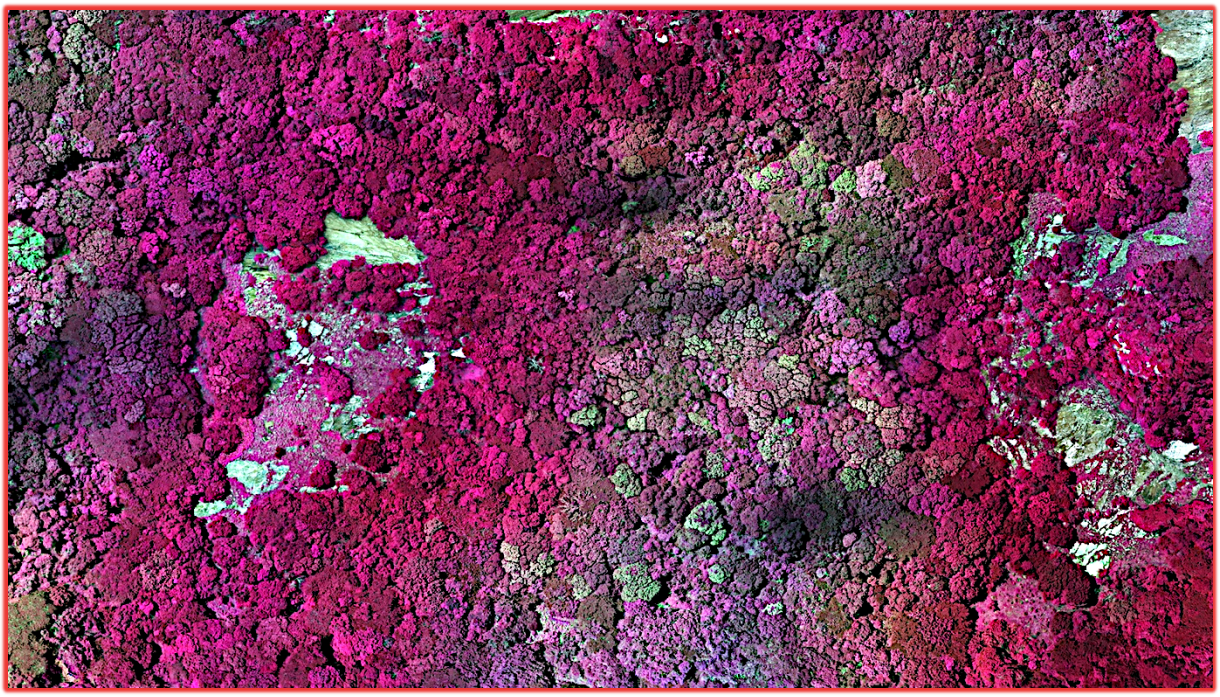

Fig. 3. *Living Dead: On the Trail of a Female* (2022)[7], Film Still/Image. Mosaic & multispectral map from the 2022 drone mission search for E. woodii, Ngoye Forest, South Africa © C-LAB.

In bringing these ideas to the fore - our first glimpse of the forest was obtained through an aerial survey using a lightly manned aircraft flight, which provided information on potential locations for our upcoming drone-based missions. Our initial drone mission focused on a small area where cycads are most likely to be found on the edges of the forest, near the original *E.woodii* site. Flying 80 meters above and following pre-programmed flight paths, our drone equipped with multispectral sensors enabled us to capture thousands of high-resolution and overlapping images that could be processed into detailed mosaic maps.

As the drone moves through its designated flight path, the multispectral sensors fire rapidly at carefully calculated intervals, collecting not one but five images across distinct wavelength bands, including those beyond the visible spectrum, allowing us to distinguish specific landscape features that are otherwise inaccessible. As a method, it effectively distinguishes cycads from other vegetation, as each

species reflects and absorbs light uniquely across various wavelengths, augmenting our ability to perceive the forest's ecological complexities.

By overlaying these multispectral mosaic maps, we can interactively navigate through various spectral layers, and use false colouring to reveal specific features of the forest. However, manually fine-combing these maps for individual cycads can feel like finding a needle in the haystack especially as we expand our search area. To make this process more efficient, we turned to artificial intelligence.

AI plays a critical role in streamlining this process. Initially, we experimented with existing models designed to detect palm trees, which are commonly used in the palm oil industry. While these models showed promise, we soon realised that to optimise it for our specific viewpoint and the unique shape of cycads, we needed to train our own image recognition algorithms. This process involves collecting hundreds of cycad images from online databases and the laborious task of manually annotating each image to create the datasets necessary for training our models. Since *E. woodii is* believed to be 'extinct in the wild' - we also generated synthetic images of cycads (or AI generated images of cycads in forest settings) to improve the AI model's ability to recognise cycads within diverse ecological contexts. Our process involved using Convolutional Neural Networks (CNNs) from YOLO, a model well suited for detailed image recognition tasks, particularly for identifying fine details in complex aerial imagery[8]. The generation of synthetic data, allows the AI to recognise cycads in landscapes where they might otherwise go unnoticed. The detection mechanisms are applied to the mosaic maps for automated identification of potential cycad locations.

The project itself is rooted in technological intervention, combining drone-based sensing and AI to explore landscapes in unique ways. The AI model parses data that is otherwise beyond human perception, revealing ecological layers we

couldn't access through traditional methods. It expands the possibilities of environmental monitoring, especially for species on the brink of extinction.

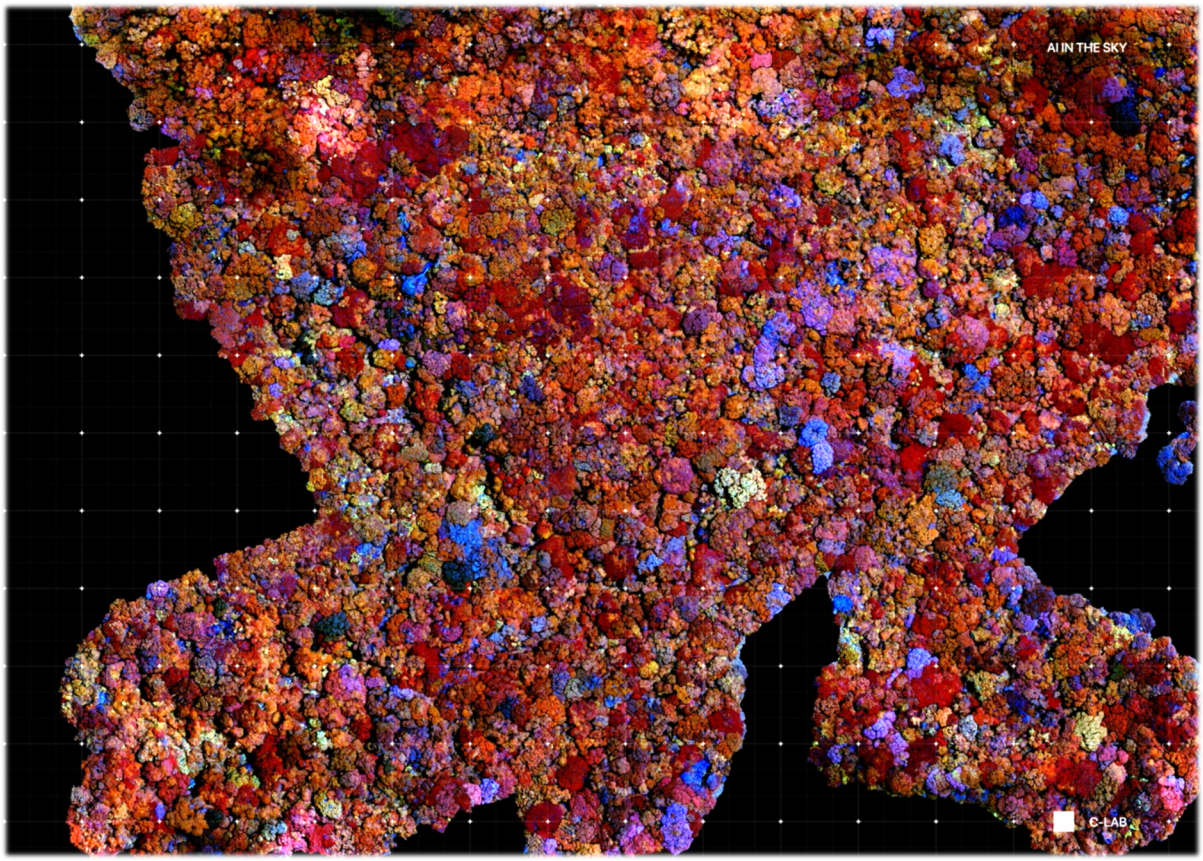

Fig. 4. *AI in the Sky (2024),* Film Still/Image. Mosaic and multispectral map from 2024 drone mission search for Encephalartos woodii, Ngoye Forest, South Africa © C-LAB

The artwork represents a distinct outcome of this process and reflects on the broader question: How do these technological tools reframe our relationship with the environment? In the artwork, the AI is used as a narrative device, making visible the layers of data and technology that underpin our search. The raw material derived from the drone flights - the mosaic maps, the AI outputs, the synthetic imagery - are woven into a narrative that tells the story of the search and its processes. The drone footage transitions into data, illustrating how the landscape becomes computational - processed, segmented, and reassembled by algorithms. The visuals shift from recognisable forest forms to spectral visual layers, offers a glimpse into how

multispectral technology uncovers elements otherwise invisible to the human eye and then proceeds into a view of how the AI interprets the environment - as seen through the eye of the AI. It's not about presenting an untouched landscape but rather exploring how technology mediates and manipulates that environment in the act of searching for specific species. This narrative of transformation - natural forms becoming data - is key to the artwork. It underscores the entanglement between ecological exploration, storytelling, and the machines we now rely on to extend our capacities - illustrating the interconnectedness of human, nonhuman, and machine. It is a reflection on the broader implications of using AI and data-driven tools to engage with species loss.

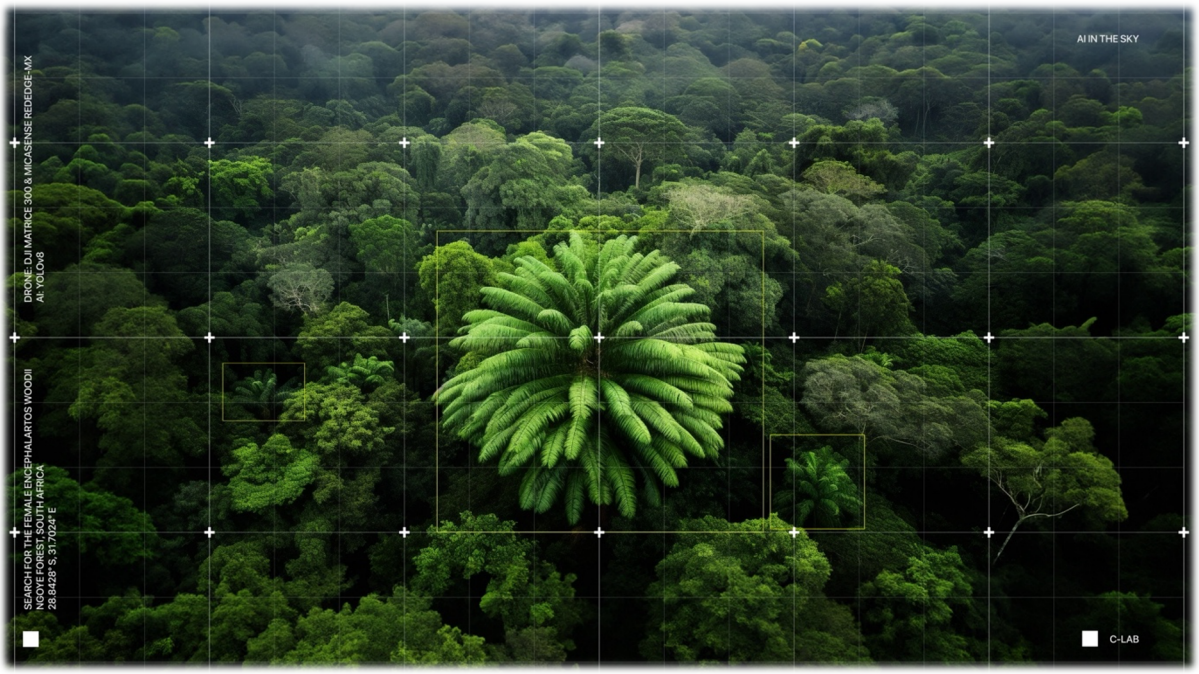

Fig. 5. *AI in the Sky* (2024), Film Still. AI-generated image using diffusion model demonstrating the use of synthetic data to train AI to detect cycads. © C-LAB

CYCADS IN CRISIS

AI in the Sky also serves as a platform to highlight the broader and often overlooked plight of cycads. This situation, termed the "cycad extinction crisis,"[9] underscores the urgent need for conservation as many cycad species have been driven to the brink of extinction by overcollection and the horticultural trade. Cycads are the most endangered plant group on our planet [10] and are among the most threatened living organisms[11]. As the oldest surviving seed plants, often referred to as 'living fossils,' cycads have an evolutionary history dating back to the Carboniferous period, approximately 250 – 66 million years ago. They have endured the extinction of the dinosaurs, multiple geological epochs, and significant environmental transformations. Their striking appearance and ancient lineage make them highly sought after in ornamental horticulture, commanding exorbitant prices.

The *E. woodii* species, in particular, is so rare that it is protected in botanical gardens with stringent security measures, including microchipping, cages and surveillance. While *E. woodii's* plight is unique, it reflects broader challenges faced by plant and animal species worldwide due to human intervention and environmental change. My hope is that the project serves as a call to action, prompting us to consider the delicate balance between technology and nature. By using AI to search for *E. woodii*, the project situates itself at the intersection of conservation and critique. It invites reflections on the role of technology in species preservation while questioning the ethics of human intervention in ecosystems. The search itself becomes a metaphor for the broader search for balance in our relationship with nature - a balance that remains elusive in the face of technological advancement and ecological degradation.

Fig. 5. *AI in the Sky* (2024), Film Still. AI-generated image using diffusion model demonstrating the use of synthetic data to train AI to detect cycads. © C-LAB

Art may not always be the most direct way to engage with environmental and biodiversity issues. While it can inspire responses and offer alternative perspectives, its impact on tangible action is often indirect or abstract. The challenge in purely speculative or aestheticised approaches is that, while they may invite reflection, they may also oversimplify complex issues.

In *AI in the Sky*, the integration of scientific research and technological interventions attempts to move the artwork beyond a conceptual approach to one that has the potential for lasting impact.[12] The challenge is to balance art's ability to raise awareness and pose critical questions while recognising that it may not always be the most effective tool for driving concrete change. However, by staying with the complexity of the issues and acknowledging the entanglement of human, nonhuman,

and technological forces, art can play a critical role in fostering deeper understanding, recognising that such an engagement requires not just creative exploration but rigorous inquiry and sustained effort.

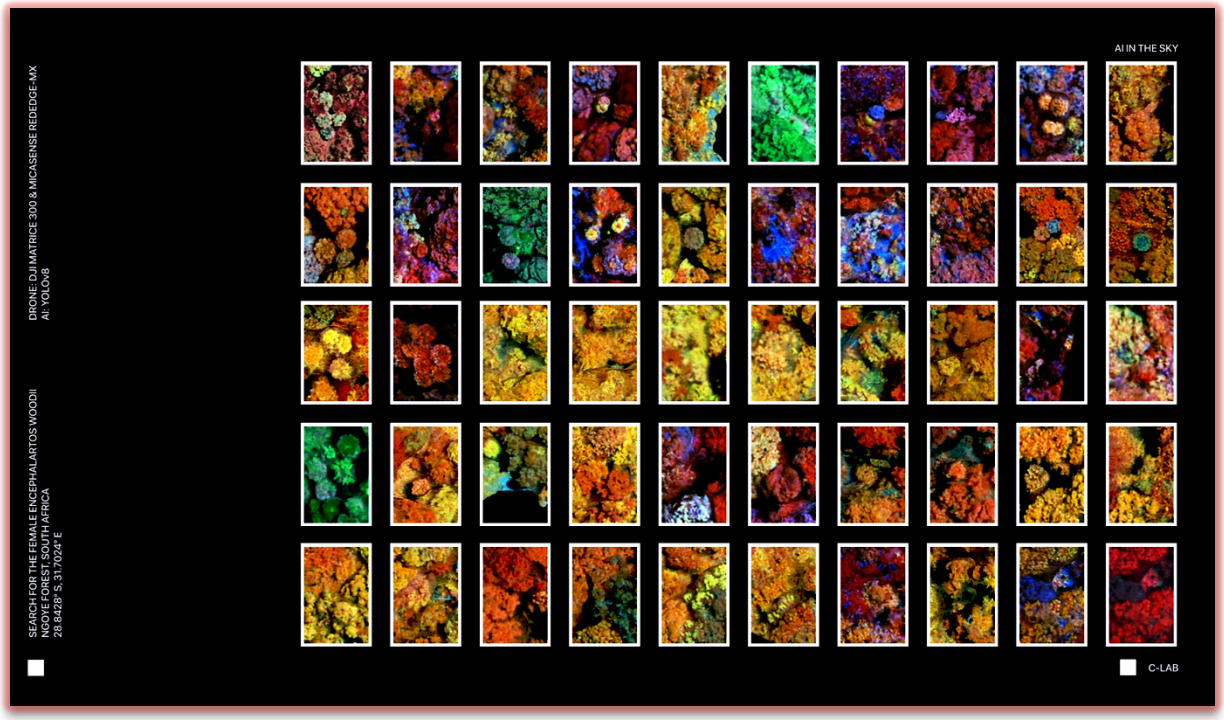

Fig. 6. *AI in the Sky* (2024), Film Still. The story highlights the process and visually dissects the map into potential areas that could harbour the plant. © C-LAB

AI undoubtedly offers vast possibilities for artists, particularly at the intersection of art and science, but for me, the true opportunity isn't just about generating new materials or visuals. It is a chance to rethink how we engage with complex systems - ecological, technological, and social. I believe artists working with AI will move beyond the spectacle of machine-generated art and focus on the deeper implications of the technology.

One of the biggest opportunities, I believe, lies in understanding the algorithms and tools themselves. Artists who grasp how these systems work - who stay with the complexities and ethical questions of AI - will be able to create work that not only reflects the world but actively interrogates it. This could mean using AI to reveal the

hidden structures of our ecosystems, or to explore the human-machine relationship in ways that provoke critical questions about creativity, authorship, and responsibility.

AI is not just a tool for making art; it's another lens through which we can reconsider our place in the world, how we relate to nonhuman systems, and the future we're shaping. The opportunity is in the tension - between creation and critique, between human and machine, and between artistic expression and ethical responsibility.

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[12] As Félix Guattari argues in *The Three Ecologies*, ecological thinking must move beyond environmental conservation alone to include the technological and social spheres. My work aims to embody this expanded notion of ecology, using AI and sensing technologies not merely as tools but as conceptual frameworks for interrogating our relationship with nature. Félix Guattari, *The Three Ecologies* (New York: Continuum, 2000).

KEYWORDS

_____ Cycads, *Encephalartos woodii*, drones, AI, art, remote sensing.