

# **Epistemology and Metaphysics of Technoscientific Environments: Knowledge Production, Planetary Management, and the Digital Gaze**

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## **Abstract**

Technoscientific practices have fundamentally reconfigured both how we know the environment and what we take the environment to be. This paper examines the epistemological and metaphysical dimensions of these transformations across four interconnected domains. First, it analyzes how technoscientific practices (understood as the entanglement of scientific inquiry with technological intervention) reshape knowledge production about the environment, drawing on Federica Russo’s informational approach to philosophy of technoscience. Second, it explores the metaphysical implications of viewing Earth as an engineered system, examining the tension between Lovelock’s living Earth and the spaceship Earth metaphor through Heideggerian critique of technological enframing. Third, it investigates how digital technologies (particularly Earth observation systems, AI, and digital twins) transform environmental perception and understanding, creating what might be termed a new epistemic interface with the planet. Fourth, it examines the philosophical underpinnings of scientific models and simulations in environmental decision-making, focusing on questions of uncertainty, validation, and the distinctive epistemology of synthetic environments. The paper argues that these developments collectively constitute a shift from passive observation to active planetary intelligence, raising fundamental questions about the relationship between human purposes and Earth’s own purposiveness, the ontological status of digital representations, and the normative commitments embedded in technoscientific modes of environmental governance.

**Keywords:** technoscience, epistemology, metaphysics, digital twins, geoengineering, instrumental rationality



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