

From Bitumen to Silicon: How Photographic Systems Reshape the Geography of the Visible

This paper reframes the relationship between photography, geography, and spatial representation by proposing that the photograph—whether analog, digital, or generative—functions as a geographic placeholder: a structure that preserves the *form* of space while its *substance* is deferred, displaced, or consumed. Rather than treating photography as an optical record of a pre-existing landscape, I explore it as a geological and computational operation that materially participates in the erosion, redistribution, and recoding of place. This approach positions photography within the broader ecology of proxies and substitutes that define contemporary spatial media, highlighting the latent infrastructures that shape what counts as “place” today.

1. Latent Geographies: From Representation to Infrastructure

Modern spatial thought has long been anchored to optics. The camera obscura and its derivatives aligned the intelligibility of space with visibility, framing places as coordinates to be captured, transported, and replicated. Yet in the contemporary era of digital platforms, remote sensing, and generative imaging systems, what appears to us as “landscape” is increasingly the surface expression of deeper operations—mineral, energetic, logistical, algorithmic. I therefore propose to shift from the notion of *landscape* as a representational category to geography as a latent field, composed of forces that remain invisible in the image but nonetheless condition its emergence.

“Latent geography” signals the energetic and material substrata—geological deposits, petrochemical derivatives, rare-earth minerals, electricity, server infrastructures—that allow images to circulate as spatial artifacts. The photograph is not merely a window onto the world; it is an interface shaped by absences, substitutions, and controlled exposures. In this sense, photography creates place by reorganising the terms under which visibility becomes possible.

2. From Bitumen of Judea to the Mask Token: Retaining Form, Deferring Content

The first photographic gesture already anticipates this dynamic. Joseph Nicéphore Niépce’s *View from the Window* (1826) was fixed using bitumen of Judea, a fossil substance—petrochemical residue, geological secretion—that binds combustion to vision. Bitumen acts as a material placeholder: it retains the shape of light while its temporal content evaporates. The resulting image is a form of delayed visibility, a trace of a presence already gone. The photograph thus emerges from a process of subtraction: a portion of the world must disappear for the image to appear.

This dynamic resonates with contemporary computational placeholders, particularly the mask token [MASK] used in machine learning models. The mask token maintains the position of meaning while deferring its instantiation; it creates a productive absence that inference later fills. Bitumen and [MASK] perform structurally similar operations: both preserve the *form* of a site while withholding, suspending, or transforming its *content*. In each case, representation is achieved through managed disappearance.

This parallel allows us to read photography as a form of ecological inference: a representational act conditioned on loss. The visible is not simply what remains, but what is produced through the regulated removal of matter and meaning.

3. Extractive Scaffolding: Photographic Matter and Computational Matter

If early photography relied on fossil chemistry, contemporary imaging relies on computational geology. There is no rupture between bitumen and silicon; the extractive logic is continuous, only displaced. Analog emulsions and synthetic polymers find their current equivalents in:

- rare-earth elements in sensors and GPUs,
- electrical grids supporting image circulation,
- data centers storing photographic and generative archives,
- training datasets that pre-shape visual categories,
- geofences and spatial protocols defining visibility and exclusion.

Analog emulsions once determined a photograph's sensitivity to light; now datasets determine a system's sensitivity to semantic categories, deciding what becomes legible and what is discarded as noise. Exposure times and apertures once constrained what could appear; today, filtering, quantisation, spatial metadata and access protocols fulfil similar functions.

Seen together, these elements constitute infrastructural scaffolds, not neutral tools. Both photographic and computational matter function as operational geologies that regulate the visibility of the world. Every image—whether chemical or algorithmic—is sedimented within chains of extraction, computation, and energy consumption. The photograph is thus less a depiction of geography than a geological transaction, redistributing terrestrial materials and computational resources to produce a proxy of place.

4. From Landscape to Operative Geography

Understanding photography as a geographic placeholder requires abandoning the representational paradigm in favour of an operative one. In this view, the photograph does not document the world; it reorganises it. It does not reveal the place; it participates in its transformation, rendering it fungible, portable, and ready to be automated or recombined.

This displacement aligns with the broader ecology of proxies that characterises contemporary spatial media. Digital images, platform logistics, satellite sensing, and generative models produce places that are both anchored and deterritorialised: rooted in material infrastructures yet infinitely substitutable. The tension between localisation (site-specificity, situatedness) and fungibility (circulation, abstraction, automation) is the fundamental condition of today's geographies.

By reframing photography as a placeholder, we can better understand how images condition the possibility of place—how they stabilise certain geographies while eroding others, how they enable orientation while facilitating displacement, how they support memory while participating in extraction.

5. Contributions

This paper offers three main contributions:

1. It reconceptualises photography as geographic infrastructure, rather than as a representational surface.
2. It traces a continuum between photographic geologies (bitumen, silver, polymers) and computational geologies (silicon, minerals, datasets), highlighting their shared extractive logic.
3. It develops an eco-theoretical and post-photographic framework in which images are understood as operations of erosion, substitution, and latency—central processes within the theme of *Placeholders* and the subtopic *Latent Geographies*.

Five Keywords

1. Latent geographies
2. Photographic materiality
3. Extractive infrastructures
4. Ecological placeholders
5. Post-photography