

A Geology of Film-Fossils: The survival images across time and space in the digital era

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ABSTRACT This article explores the relationship between the concept of fossils and contemporary non-fiction cinema. Focusing on the space-time of cinema, materiality, and eco-feminism, in the attempt to represent the natural environment, the human being is no longer at the centre of the representation. Contemporary film subjects range instead from the stones' iconography to the image's survival, the archive, and its activation in the digital age. By analysing selected works by contemporary film-makers – Barbara Hammer, Deborah Stratman, Ana Vaz, Adrián Balseca, Eloïse Le Gallo, Julia Borderie and many others – this research aims to cover contemporary productions from an aesthetic and narrative perspective and see how new strategies are established to represent the natural world in the Anthropocene.

KEYWORDS Materiality; fossilisation; intra-action; digital; eco-feminism; non-fiction cinema.

Introduction

In the age of the Anthropocene, where human activities indelibly mark the geological and ecological systems of the Earth, cinema emerges not only as a mirror reflecting our existence, but also acts as a vital medium that captures and preserves the fleeting interstices of time and nature. This article delves into the conceptual parallels between geology and cinema, exploring how films, akin to geological processes, fossilise moments of ecological and human significance, embedding them within the very fabric of cultural memory. This investigation extends into eco-feminism, shifting the anthropocentric narrative to encompass a more holistic view of nature's agency and resilience.

The digital age, characterised by its rapid technological advancements, offers new methodologies for viewing and interacting with these films' "fossils". These approaches enable contemporary non-fiction cinema to document and critique the environmental impacts of human enterprises, thus contributing to a broader understanding of our ecological footprint, including that of film-making. By employing aesthetic and narrative innovations, film-makers provide a dynamic platform for re-evaluating the conventional portrayals of the natural world, urging a critical reassessment of the human role within it.

Moreover, cinema's archival aspect, particularly in its digital manifestations, becomes a site of active memory, a repository where the past continually informs the present. This article explores how contemporary film-makers harness the archival power of film to forge new narrative paths and aesthetic forms, thus ensuring the survival of these images across time and space. Through a synthesis of film studies, geology, and eco-feminist theory, it seeks to illuminate the enduring nature of cinema as a geological force that not only captures but also critically engages with the shifting dynamics of our natural and cultural environments. This exploration invites scholars and audiences alike to reflect on cinema's potential to catalyse environmental awareness and action in the digital epoch. As we delve into the depths of film materiality and narrative, we unearth new ways of perceiving and interacting with the world around us, confirming cinema's role as a poignant and powerful medium in the discourse of contemporary ecology and feminist thought.

The article is divided into five main sections. In the first, I discuss how cinema's relationship with time immortalises past moments and individuals, challenging traditional narratives, as theorists like Laura Mulvey, Gilles Deleuze, Jussi Parikka and others explore the transformative nature of media and as film-makers address environmental concerns through tactile images. I, then, consider some primitive depictions that appeared before film-fossils, by approaching the work of American artist Orra White Hitchcock (Massachusetts, US, 1796-1863), whose detailed scientific illustrations of the natural world, including landscapes and fossils, served as educational tools and intellectual contributions. Hitchcock's drawings captured a time-focused chronicle of the Connecticut River Valley before cinema, akin to the pedagogical work of Prussian Gustav Hellman (Löwen, Germany, 1854-1939), whose *Scheekrystalle* highlighted a shared emphasis on

representing fleeting memories through visual mediums. The third section looks at land-art, landscapes and cameraless films to discuss the site-specific environmental artworks of American artists Nancy Holt (Massachusetts, US, 1938-2014) and Robert Smithson (New Jersey, US, 1938-1973), in particular her *Sun Tunnels* and his *Spiral Jetty*, which emphasised the viewer's perception of the environment, embodying a dialogue between space and consciousness. I also consider Jennifer West (b. 1966), whose film works, like *Salt Crystals Spiral Jetty Dead Sea Five Year Film* (2013), explore temporality and materiality, embodying gestures that convey meaning through movement and medium, resonating with Didi-Huberman's notion of phantoms (2002) in representing time and memory.

The last two sections take this conceptual framework many steps further. The fourth section adopts Laura Mulvey's concept of films as fossils (2006) in the context of feminist theory to explore how contemporary film-makers like Barbara Hammer (Los Angeles, US, 1939-2019), Deborah Stratman (b. 1967) and Ana Vaz (b. 1986) challenged traditional narratives by intertwining themes of gender, nature, and power, in a shift toward understanding films as entities that interact with broader ecological and non-human elements. The final section deals with Foucault's concept of the archive (1978), as interpreted by Senta Siewert (2020), which encompasses institutional storage, heterotopic spaces, and systematic analysis, evolving into a digital entity that blends physicality with intangibility. I discuss how this notion intersects with ideas from scholars like Lynne Huffer (2015) and Catherine Russell (2018) on cultural memory preservation, but also how the cinematic medium, influenced by thinkers like Karen Barad (2007) and Laura Mulvey (2006), embodies a trans-corporeal relationship with nature and human history, as demonstrated by contemporary film-makers like Adrián Balseca (b. 1989, Quito, Ecuador), Eloïse Le Gallo (b. 1989, Paris), and Julia Borderie (b. 1989, Paris), who explore the interplay between past, present, and future through the metaphor of film fossils.

A genealogy of film: memory and time fossilisation

Cinema has a unique relationship with time, preserving the moment the image is registered. According to Laura Mulvey, the cinema's uncertain relationship to life and death brings anyone it has ever recorded back to

life, from its great stars to fleeting extras, in perfect fossilised form (Mulvey 2006, 18). The weight cinema's past has acquired over time goes beyond that of image and of time. In this sense, attention must be paid to representing time-space and preserving the film itself over time. As new technologies seem to hurry ideas and their representations towards the future at full tilt, the concept of "delayed cinema" of Mulvey (2006, 8) is defined as slowing down the film's flow. This, along with the delay in time, meant that specific details remained unnoticed, as if they were waiting to be discovered. This concept gains further significance as outside events hasten the disappearance of the past and facilitate the political appropriation of time (Mulvey 2006, 23). In "delayed cinema", the fascination with time fossilised overwhelms the fascination with narrative progression (Mulvey 2006, 31). As the British film scholar points out, the "now-ness" of history re-updates all the images from before and allows them to acquire greater social, cultural, or historical importance. Cinema does not only present images; it surrounds them with a world.

This concept of Mulvey is related to Anna Everett and John T. Caldwell's (2003) notion of "film time", which allows the expansion of the "now-ness", both in the narrative of the film itself and in the time in which the film production is developed. Looking at the different nuances of both terms, the "film time" concept shows how cinema can defy chronological constraints in the narratives, and similarly "now-ness" focuses on the resulting experience of being absorbed in the cinematic moment, free from the linear progression of time. This breaks down the barrier between past, present, and future, allowing viewers to experience time more fluidly and dynamically. The space and time encapsulated in images and their nature in the availability of the real and the imaginary, or the present referred to the actual and the past associated with the virtual.

However, the actual and the virtual cannot occur in the same space. Gilles Deleuze (1987) refers to the "crystal image" as a way of describing how images in cinema can present a direct image of time rather than merely representing movement in space. The "crystal image" blurs the lines between the virtual and the present, the actual, creating a loop where each continuously feeds into and reflects the other. This duality of the "crystal image" mirrors the dual nature of cinematic images as both representations of reality related to the actual and constructs of artistic vision associated with the virtual. Taking this concept of

crystallisation, Jean-Michel Durafour (2018, 51) relates the cinematic images to the crystals. In this sense, the author affirms that the “images are crystals that film”. As Deleuze (1987) discovers an indiscernibility between the actual and the virtual of this “crystal image”, Durafour (2018, 44) states, “Like crystal, cinema holds its reality (its reality, which is to maintain a more ambiguous relationship with reality) from its abstraction”. Durafour (2018, 44) explores the term impediment; it is well known that the montage, also related to the “now-ness” of the film by Mulvey (2006), is characterised by one image being continuously replaced by another, with each new image effectively erasing the previous one. In this case, the montage unfolds even without visual content, moving from one image to the next, bridging the gap between an image and all that it is not.

As Durafour, Deleuze, Mulvey, but also Siegfried Zielinski (2006) assert, audio-visual media create a space of action for constructed attempts to connect what is separated. In this case, discernability is impossible. Zielinski (2006, 271) develops this idea under the banner of “anarcheology of seeing and hearing”, where “the magical, scientific, and technical praxis do not follow in chronological sequence; on the contrary, they combine at particular moments in time, collide with each other, provoke one another, and, in this way, maintain tension and movement within developing processes”. Concerning the “collision” concept that Zielinski tells us about, there is a connection with this term, as Giovanna Fossati (2011) exposes her conception of the archive. According to Fossati (2011), they are not static repositories but active sites where films experience material, historical and cultural relationships, which is why they are considered from this perspective as transition sites in the history of cinema. She considered them dynamic spaces where film’s meanings, interpretations, and cultural values are continuously re-negotiated and re-defined.

Following Fossati’s (2011) discussions, archives are critical to understanding cinema’s ongoing evolution, highlighting their role in preserving, restoring, and disseminating film heritage. Both Zielinski (2006) and Fossati (2011) argue that media and archive history are not a linear progression but a series of emotional moments that reveal new possibilities for old technologies. Zielinski (2006) introduced the concept of “variantology,” which refers to the diverse array of images in the digital era and the various time periods they encapsulate. These images are consolidated within media and archives. Fossati (2011)

describes these collections as a “transition site,” where the content itself can be utilised. For Hito Steyerl (2009), digital images lose their genealogy and are only copies beyond analogue and digital. According to her (2009), the low resolution of the images allows their democratisation and circulation, insofar as a “poor” materiality enriches and mobilises the image. Instead, following Zielinski’s “variantology,” we can study the changes in the fetishism paradigm related to Steyerl’s ideas, where there is no longer the resolution of the images, so the pleasure of seeing is associated with the film format, the materiality, which the analogue cinema aesthetics prevails over the digital.

Moreover, Jussi Parikka (2015, 74) discusses how the process of “recrystallisation” is far from being similar to Deleuze’s concept and how “decrystallisation” shapes digital culture, highlighting that computers, cameras and other film materials comprise highly organised minerals. By examining the methods of “recrystallisation” and “decrystallisation”, we can trace the material origins of these apparatus, akin to exploring the deep history found in geological layers. “Recrystallisation”, in the context of Parikka’s thought (2015, 74), is understood as the process through which media technologies, practices, and artefacts undergo transformation and reconfiguration over time. This involves the physical or technological aspects and the media’s conceptual, cultural, and affective dimensions. So, by “recrystallisation”, we can detect this process where the analogue cinema is transmuted into the digital sphere, which takes on a new purpose and is integrated into other media, losing some inherent materiality.

Nevertheless, “decrystallisation” refers to breaking down, dissolving, or deconstructing established media forms, practices, and technologies (Parikka 2015, 74). It highlights media’s fragility and transience, pointing to the moments when media systems and artefacts lose their coherence, functionality, or relevance. In this case, “decrystallisation” can be seen in the obsolescence of technologies, the decay of physical media, and the disintegration of cultural practices associated with specific forms of media. Therefore, this comprises the loss of sense of materiality, for example, the use of analogue cinema in the digital era, all the celluloid wasted and then destroyed; the digitalisation of the film due to most exhibition places extending the use of digital film projectors. “Recrystallisation” and “decrystallisation” form a dialectical pair that captures media technologies and practices’ dynamic and ever-changing landscape. These concepts encourage a deeper engagement with the

materiality of media, urging us to consider how technologies are transformed, repurposed, or fossilised over time.

Concerning materiality, the representation of what is filmed in the natural world has an inherent value. Non-fiction film-makers often use *natural* imaginary references such as rocks, water, and soil to create a “haptic visuality”. Laura U. Marks (2000, 112) confirms that the feeling of touch conveyed visually occurs when the camera tenderly glides across the surface of an image, exploring for memories. Even when cultural dislocation obstructs these memories, they persist, are anchored and experienced through the senses. The texture and essence of the film itself facilitate this persistence. These tactile images present a political aesthetic and persistent experience relevant to the Anthropocene, emphasising the importance of exchanging images that will most likely disappear due to climate change and other causes related to the impact of humans towards the environment. As Scott MacDonald (2004, 108) states, there is a tradition of film-making which uses “technology to create the illusion of preserving Nature, or more precisely, that provides an evocation of the experience of being immersed in the natural world”. Following MacDonald’s (2004, 108) ideas, many film-makers provide visual/auditory training in appreciating the transitory, which proves what is disappearing around us and what it is preserving. Those images retain aspects of the environment dissolved and changed. They can be considered phantoms because of their ability to evoke memories and emotions from the past that can continue to exist in the present. Didi-Huberman’s theory of the image as a phantom (2002) could be related to the concept of film as a fossil, which refers to the ability of films to contain inside images from the past and thus continue to exist in the present as spectrums and ghosts.¹

¹ Following the hauntology theory (Derrida 1995, 1, my translation), “the spectre becomes a certain thing that is difficult to name: neither soul nor body, and both. For it is the flesh and the phenomenality that give the spirit its spectral appearance, although they immediately disappear in the appearance, in the very coming of the (re)appeared one or in the return of the spectrum”. With this quote I mean to say that what is filmed is always a ghost of reality that is duplicated from its real referent and that is endowed by the loss of materiality. Moreover, the mentioned materiality is only present in reality’s visual representation, which can also be related to the primordial concept of the film as a fossil.

Before film-fossils arise, other primitive depictions

Orra White Hitchcock was an American scientific illustrator who created hundreds of illustrations for her husband Edward Hitchcock's scientific publications, including detailed landscapes of the Connecticut River Valley for his geological reports. Her art gave a thorough and colourful look at rock formations, fossils, landscapes, and living specimens. She used dramatic colour and simple line techniques to illustrate and describe fossil records, the puzzling living creatures around them, and local landscapes marked by change.

Before cinema could reproduce the surroundings, Hitchcock's illustrations depicted the natural world in colourful detail. She drew large-scale drawings that were created for classroom use. Her work is a time-focused chronicle of the scenic, botanically, and geologically diverse, Connecticut River Valley in western Massachusetts. A parallel could be drawn with the work of Gustav Hellman called *Scheekrystalle: Beobachtungen und Studien* (1893). Hellman's work contains the microphotographs by Richard Neuhauss, or also the engravings presented in the encyclopaedia *Meyers Großes Konversations-Lexikon* about the anomalies of the snowflakes; all these works are related and have the same pedagogical use of the medium. These photographs and engravings managed to conceptualise a delayed memory and register a landscape through the image before the cinema arrived.

In addition, we cannot forget a crucial reference for the examination and capture of snowflakes – *Snow Crystals* (1931), made by Wilson Alwyn Bentley – which is considered one of the most extensive and detailed photographic works. The author took around 2500 clichés to create a kind of atlas of snow crystals (cf. Durafour 2018, 94). In addition to their scientific and research function, these microphotographs were linked to the aesthetic theory of Jean Louis Schefer (1999), who deployed the concept of *flocons*, or “snowflakes”, to explain cinema as a crystalline network from which all the images and sounds that make up a film operate and propose looking at cinema as we look at snowflakes (cf. Durafour 2018, 98).

All these works use their medium (drawings, photographs) to capture a fleeting memory and represent it in its physicality as images. They all take into their aesthetic the concept of crystallisation of the image, making it meta-referential. These artists and printed publications interpret and present images through their unique perspectives, transforming them into enduring representations, a phantom, from Didi-

Huberman's (2003) perspective in time and space and are configured as a memory, a fossil that has reached us from a specific time.

Across the medium: land-art, landscapes and cameraless films

In an opposing manner, Nancy Holt's creation of site-specific environmental works focused on how viewers perceived the artwork rather than the object itself. She aimed to create a deep connection between the environment and the viewer by making her pieces about their locations. Completely, and inherently, Holt's work conveys two experiences: the physics of the site-specific environmental works and the audio-visual experience of perceiving that space within the film itself. Like fossils, they have different nuances, present in individual perception and depending on the environment. In this way, she manages to revive in her audio-visual works a set of ghosts that are noticeable in the physicality of site-specific works but that, inevitably, time passes. This conception of the relation between memory, film apparatus and stones can be found in Yi-Fu Tuan's work on space and time (1977), where the Chinese-American geographer explores the relationship between people and their environment, examining how individuals experience space through their senses and emotions. Tuan's work emphasises the importance of understanding the subjective experiences of individuals concerning their physical surroundings.

Still aligned with Tuan's theory, one of Nancy Holt's best-known pieces is *Sun Tunnels* (1973-1976), which sits on 40 acres in Utah's Great Basin Desert and is one of the examples of his concept of spatiality and sense of place. For Tuan (1977), a sense of place emerges from the dynamic interaction between the physical environment and human consciousness. This includes how individuals and communities perceive, remember, and imagine places. In *Sun Tunnels*, Nancy Holt marks and points out the solstices. The tunnels are installed so as to enable visitors to experiment physically with the yearly extreme positions of the sun on the horizon—the tunnels being aligned with the angles of the sun's rising and setting on the days of the solstices, around June 21st and December 21st.² On those days, the sun is centred through

² For references and other information, see the text written by the artist in 1977: <https://holtsmithsonianfoundation.org/sun-tunnels-0> (last accesses 21/3/24).

the tunnels and is nearly centred for about ten days before and after the solstices. Each tunnel has a different configuration of holes corresponding to stars in four constellations. This connection to universal human themes—such as the passage of time and our relationship to the cosmos—adds meaning to the place, aligning with Tuan's (1977, 12) idea that places become meaningful through the values and symbols attached. Most of the films by Nancy Holt, such as *The Making of Amarillo Ramp* (1973-2013), *Utah Sequences* (1970) and *Pine Barrens* (1975), constitute fossilisation of a specific time and space because their purpose is to conjure a particular landscape, but not specifically related to another work that occupies a physical space as *Sun Tunnels* does. Instead, they serve as works that explore cinematographic language from a testimonial and memory point of view.

In this sense, Smithson, before the artist herself, had already pointed towards a similar gesture regarding the cinematographic apparatus and the medium. Before *Spiral Jetty* (1970), Robert Smithson had written a brief text called *The Crystal Land*, published in 1966. One of the most essential quotations is what he expressed in the text: "In fact, the entire landscape has a mineral presence. From restaurants with gleaming chrome to the windows of shopping centres, a sense of crystalline prevails". *Spiral Jetty* (1970) consists of a piece of land art made in Salt Lake, Utah, consisting of mud, precipitated salt crystals, rocks, and water. Smithson also produced a film to document the work. Built at the mouth of a terminal basin rich in minerals and nearly devoid of life, *Spiral Jetty* is a testament to Smithson's fascination with entropy. Its precarious location lends itself to the structure's inevitable disintegration, yet its impressive size and deliberate shape command the surrounding landscape. Constructed from 6,650 tons of rock and earth, the spiral continuously changes form as nature, industry, and time take effect. Robert Smithson made the film *Spiral Jetty* about returning to New York from Utah after completing his landmark earthwork of the same name in April 1970. Smithson described the thirty-five-minute film as "a set of disconnections, a bramble of stabilised fragments taken from things obscure and fluid, ingredients trapped in a succession of frames, a stream of viscosities both still and moving."³ The film starts

³ As Robert Smithson (1970) stated and reproduced at his foundation website: <https://holtsmithsonfoundation.org/spiral-jetty-film>.

with an image of the sun, moving to a bumpy drive to the Great Salt Lake to tear pages from an atlas discarded on the ground.

More recently, the film-maker Jennifer West made the experimental film *Salt Crystals Spiral Jetty Dead Sea Five Year Film* (2013), which explores temporality and materiality by filming a 70mm film negative that was floated in the Dead Sea and given a healing clay bath in extreme heat in 2008.⁴

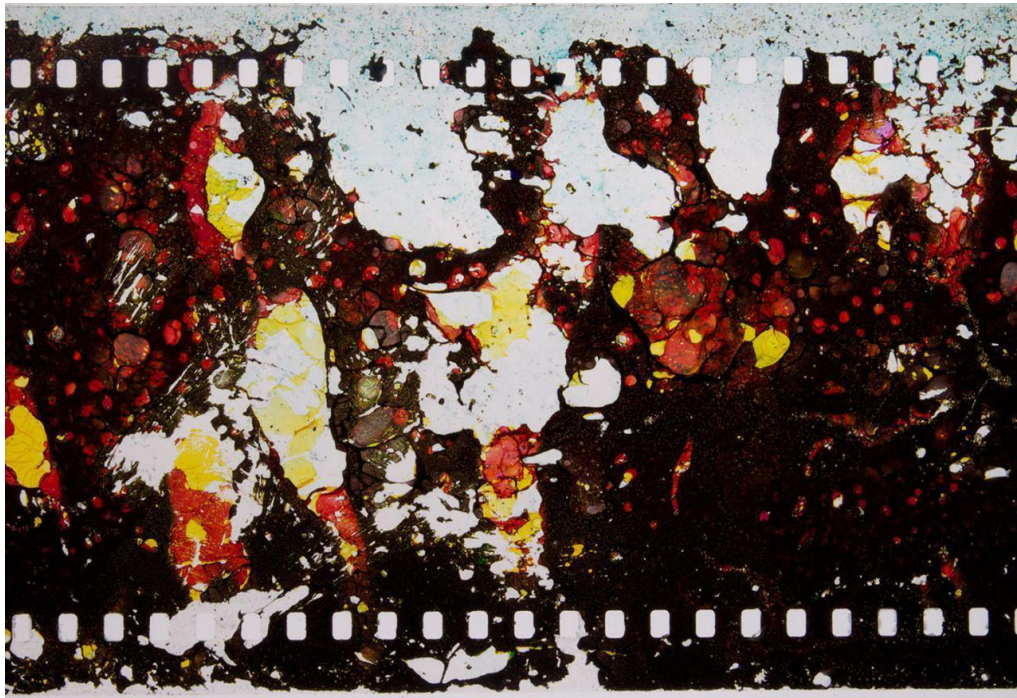


Image 1: Frame of *Salt Crystals Spiral Jetty Dead Sea Five Year Film* (2013). | (c) Jennifer West.

The film also features footage of the *Spiral Jetty* being thrown into the pink waters of the Salt Lake in minus 10-degree Celsius weather. Both artworks explore materiality and medium. Smithson's *Spiral Jetty* uses natural materials found on-site to create artwork that interacts with its environment. One's downward gaze picks out the salt crystals on the inner and outer edges of the spiral (Smithson 1972). West's *Salt Crystals*

⁴ Abstracted by the introduction of Quinn Latimer at: <https://www.vdrome.org/jennifer-west-salt-crystals-spiral-jetty-dead-sea-five-year-film/>.

Spiral Jetty Dead Sea Five Year Film uses film to capture her artwork's temporal nature.

The film apparatus is also an essential aspect of both artworks. Smithson's *Spiral Jetty* was documented using film, which allowed him to capture aerial footage of his artwork and create a poetic sequence that explored temporality. West's *Salt Crystals Spiral Jetty Dead Sea Five Year Film* uses buckets filled with water from saline bodies to create her artwork. A camera-less film floated in the Dead Sea, soaked in clay, then returned to LA to sit in studio buckets full of mud and salt for five years. The film apparatus Jennifer West and Robert Smithson used in their respective works differs significantly because of *the gesture*. In Agamben's definition (2009), the gesture shows or makes visible the potentiality and dynamics of human social and individual practices. It is not about the act but the possibility and process the act reveals. Both works explore materiality, medium, and film apparatus to configure their gesture. While Smithson used natural materials found on-site to create his artwork, West used buckets filled with water from saline bodies as her medium. Both artists used film to document their artworks' temporal nature. They interacted with their surroundings using different methods, embodying a form of communication or expression that conveys meaning through movement or posture rather than through an explicit act meant to result in a definite consequence, in Agamben's sense (2009). Moreover, as Smithson states in his text *The Crystal Land*, in his films and West's there are plenty of crystals. The films are in contact with the minerals and represent them iconographically. According to Durafour (2018), the cinematic image is like a crystal, even if the representation in both works by West and Smithson represents a crystal.

While Smithson's work uses natural materials to create a physical intervention in the landscape, West uses the materiality of the film medium to explore the relationship between materiality and memory. Other contemporary film-makers, such as Tomonari Nishikawa or David Gatten, also do this to achieve an abstract exploration and the microscopic portrait of a determined and relevant landscape (cf. Knowles 2020). Although Smithson's work uses landmarks for performance, the film prompts a trace in the landscape throughout the screen. The audience's imagination mainly focuses on a gesture of time, a fossil which endures a performance beyond its degradation, like MacDonald's (2004) conception of eco-cinema practices.

There are several connections between Didi-Huberman's (2003) ideas of phantoms and ghosts in representing the stones in the Spiral Jetty. On one hand, the Spiral Jetty can be seen as an example of "anachronism", as it references ancient earthworks and symbols (such as the Mound Builders and the Nazca Lines) while also embodying the concerns of its creator.⁵ Spiral Jetty is a work represented in images in his homonymous film but created from its physicality in stones in space. It remains alive and immersed in time and the changes the space experiences. Smithson captured his Spiral Jetty on film, in a fossil, retaining images against the forms of devouring time, which has precisely introduced into them the time itself, as states Jean Louis Schefer (1997), referenced by Durafour (2018, 43). In their reproduction, these images become phantoms, as Didi-Huberman's (2003) conception and spectrographs in Derrida's (1995) terms of the precise and determined moment where the film was done. In Didi-Huberman's (2003) view, it involves a productive dialogue between different periods. This dialogue allows contemporary viewers to find new meanings and relevance in Holt's, Smithson's and West's works and enables historical artworks to comment on the present.

On the other hand, what is present in Smithson's and Holt's films is the idea of *the skin of the film*, which Laura U. Marks (2000) described as the way film signifies in terms of the dynamic materiality of the audio-visual medium. Nevertheless, in this case, we should consider "the skin of the film" not as a screen but as a membrane that brings its audience into contact with the material forms of memory (Marks 2000, 243).

Denaturalising feminist approaches to contemporary conceptions of films as fossils

As explained at the beginning of the text, feminist theorist Laura Mulvey (2006) presented the idea that films can be conceived as fossils. Beyond the problem of androcentric historiography, there has been an accepted invisibilisation of women as film-makers, as Lis Rhodes (1979) has

⁵ According to Encyclopedia.com: "Mound Builders were prehistoric American Indians, named for their practice of burying their dead in large mounds. Beginning about three thousand years ago, they built extensive earthworks from the Great Lakes down through the Mississippi River Valley and into the Gulf of Mexico region" (consulted at: <https://www.encyclopedia.com/social-sciences-and-law/anthropology-and-archaeology/archaeology-general/mound-builders>) and "[m]ost of the Nazca Lines were constructed more than 2,000 years ago by the people of the Nazca culture (c. 200 BCE–600 CE), though some clearly predate the Nazca and are considered to be the work of the earlier Paracas culture" (consulted at: <https://www.britannica.com/place/Nazca-Lines>).

argued (Rhodes 1979, 2). Contemporaneity is an excellent moment to look into the recesses of the stones and fossils to explore feminist perspectives in cinema as objects of memory and how a set of fossil films crystallises from the feminine.

The philosophical re-privileging of nature and the biosphere has produced new ways of imagining life, from “innovative scientific and phenomenological accounts of corporeality to trans-species political theories or to new cosmologies of space and time” (Huffer 2015, 125). In this way, those favouring re-naturalisation are now directing their attention towards various subjects that hold feminist significance, replacing the human. As contemporary theory moves toward a post-human perspective, there’s a shift toward understanding films not just as artefacts of human memory but as entities that interact with broader ecological and non-human elements. This shift involves a philosophical privileging of nature and the biosphere, leading to innovative thinking about corporeality, political theories across species, and new cosmologies. These include animals, the universe, subatomic particles and waves, the brain, and the dynamic force of biological life (Huffer 2015, 125).

Concerning Haraway’s concept of the Chthulucene (2019), it refers to a time when humans were no longer at the centre of the world and instead recognised their interconnectedness with other species. Following the idea of “we are all lichens”, Haraway (2016) has suggested that her ideas be read in the strata of the rocks. This relation between lichen and rocks, stones or fossils is not casual because this is the space where lichens, that which are microscopic, are configured and physically exist.

Barbara Hammer’s work can be seen as an early representative of this feminist conception of film as fossils. Her film *Stone Circles* (1983) mainly explores the relationship between women and nature through images of ancient stone circles. The film suggests that women created these circles to connect with the natural world and assert their power. Barbara Hammer’s film *Stone Circles* is a film poem that celebrates ancient pre-patriarchal standing stones, mounds, and circles, including Stonehenge and Avebury. The film draws parallels between the earth and the body, between these stones and the body.

Hammer animates scientific “scale models” by filming colourful arrangements of small stones, clods of dirt, sticks, and grasses. A remarkable interpretation of the feminist conception of film as fossils is that films are artefacts that reflect their time’s social and cultural values.

In this way, the feminist theory emphasises the importance of connecting different forms of oppression, including those related to gender, race, class, and ecology.

In the narrative and film techniques, following Everett and Caldwell's (2003) concept of "film-time", there is a non-correlation of time between the filmed stones (an ancient and tangible symbol) and the women appearing in the film by modifying the time and space, by the film apparatus. Stones in this film are objects of time structured in the correct order, rethinking space and time in a circular direction, emulating the cycle of nature. The women in this work operate from some contact with the rocks, forming part of the animism that the work proposes, in contact with the stones and slightly occupying the spaces that represent that pre-patriarchal. Hammer's film highlights the importance and beauty of these ancient structures. In her movie, Hammer may suggest they are still relevant today. These pre-patriarchal standing stones, mounds and circles should be appreciated as part of our shared cultural heritage. As Haraway (2019) affirms, films can convey their nature, expanding nature from the inside to the exterior of its nature.

Returning to this perception and vindication of stones, the mineral, as a source of memory from which to question the positioning and centrality of the gaze. This decentralisation of all humanity in the view of nature, as Haraway states (2019), can also be observed in Deborah Stratman's film, *Last Things* (2023), and Robert Hazen's work, *The Story of Earth: The First 4.5 Billion Years, from Stardust to Living Planet* (2013). From an update of media and narratives, Stratman's film is set in a post-apocalyptic world where humans have disappeared, and nature endures. This is in connection with Hazen's (2013) research, which connects mineral evolution to the origin of life by investigating how minerals are formed by organic chemicals found in living things.

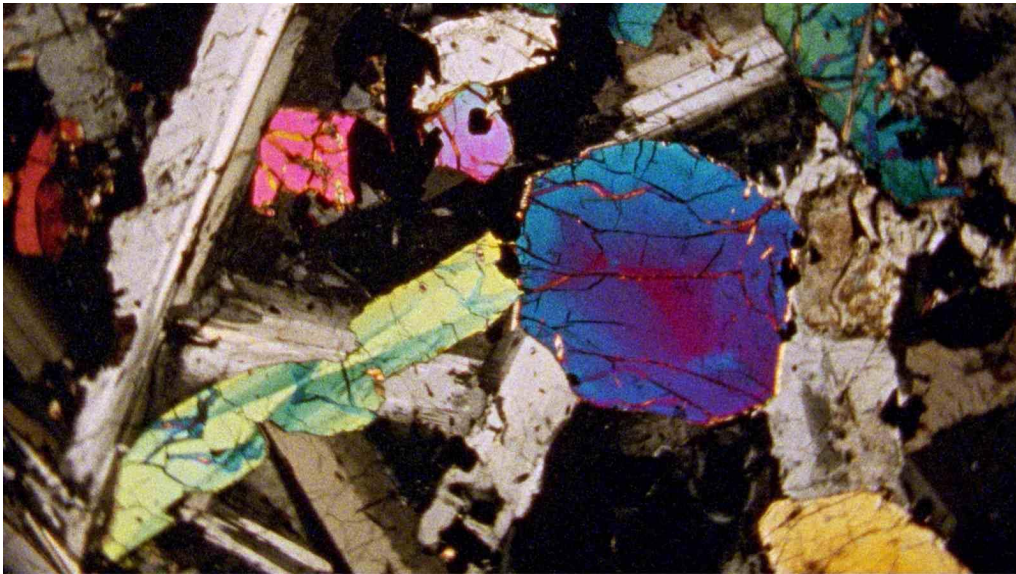


Image 2: Frame of *Last Things* (2023). | (c) Deborah Stratman.

Hazen's theory of mineral evolution posits that the mineralogy of the Earth and the moon evolves due to varied physical, chemical, and biological processes. In this film, the witnesses of an extended life are minerals, the same stones Roger Caillois had studied (1986), and where Stratman gets most of his ideas for this film.

Another aspect to consider is the use of film medium in this work. there is a demonstrated convergence of film materiality such as 16mm celluloid, 3D footage from research machines, graphics, and other digital footage. This film is not considered a fetishization of analogue cinema, but there is an excellent example of "decrystallisation" and "recrystallisation" in Parikka's terms. Stratman's *Last Things* uses sound to create an eerie, unsettling atmosphere. The film is largely silent, with occasional bursts of noise and music that jolt the viewer out of their sense of security. These soundscapes emphasise the film's themes of isolation and the physical distance taken by Stratman's gesture. As if the director were speaking from the emptiness of space, she narrates this work from a time before definite, from an abstraction where narration and aesthetics conjure a totality of "crystal image" in Deleuzian terms (1987) understood as one that reflects and distorts reality, fusing the real present with the imagined present, allowing them to coexist in a single plane. At *Last Things* converge the feminine researchers and artists like Clarice Lispector's *Hour of the Star*, the Symbiosis theory of Lynn Margulis, multi-species scenarios of Donna Haraway, Hazel

Barton's research on cave microbes and it is constantly mentioned Marcia Bjørnerud's geologist theories present and ideas, about the history of our planet and how they can inform our understanding of the present and future throughout the rocks.

Deborah Stratman and Barbara Hammer use formal experimentation in their works to explore the themes of women, nature, and power. In *Last Things*, Stratman uses sound design and visual imagery to create a sense of unease around the natural world. Using film to explore these themes, both film-makers can make a record of feminist thought and environmental consciousness that can be preserved for future generations. Thomas Elsaesser (2018) famously argued that cinema is not just a medium for representing reality but also a way of thinking about it. In his view, films can shape our understanding of history and memory and help us make sense of our place in the world. Elsaesser gives as example Hammer and Stratman's formal experimentation in their films, which also allows them to push the boundaries of traditional perspectives, narratives and film-making techniques and explore new ways of representing complex ideas on screen. According to Elsaesser (2018), these films transform our understanding of our history and create new memories that become part of our collective consciousness.

Another contemporary relevant film-maker who explores the different relationships between power, gender, ecology, and colonialism from an experimental perspective is the Brazilian director, Ana Vaz. Her work often involves a combination of found and shot materials that combine ethnography and speculation with exploring the f(r)ictions imprinted upon cultivated and savage environments. Through her unique film-making process, Vaz explores collective memory and the trauma experienced by marginalised communities concerning environmental issues. This suggests a focus on exploring power structures and control, a common theme in feminist film theory. The film *The Age of Stone* (2013) embarked on a journey to the harsh western landscapes of Brazil, exploring the vast and desolate back lands, a region as expansive and arid as the area the capital now encompasses. She discovered a quartzite quarry in this setting, where the cliffs shimmered white under the sunlight. Her filming in this location culminated in *A Idade da Pedra* (*The Age of Stone*), presenting a surreal and fantastical depiction of urban construction where modernism is imbued with the essence of prehistoric times.



Image 3: Frame of *The Age of Stone* (2013). | (c) Ana Vaz.

In this case, Vaz's focus pushed the boundaries further, blurring the lines between nature and society, geology, and architecture. It is suggested that digging might uncover a modern city that existed ten thousand years ago, challenging the distinctions we commonly make between the natural and the constructed. As Nancy Holt with the *Sun Tunnels* and as Yi-Fu Tuan's work (1977) posits, 'space' becomes 'place' when it acquires meaning and significance through human experiences and perceptions. Vaz's film does this literally and metaphorically: the expansive and arid quarry is transformed into a place of deep narrative and visual significance, focusing on the terms of ruins. By documenting the quarry and its transformation through labour and digital manipulation, Vaz layers the space with historical, cultural, and imaginative meanings, echoing Tuan's idea that places are not merely physical locations but are charged with the history of exploration, prophecy, and myth of those interacting with them.

Similarly, Jessica Sarah Rinland's *Sol de Campinas* (2021) traces the work of archaeologists as they uncover a central square in a Brazilian territory known as Território do Acre. Both films highlight the importance of understanding our relationship with traces and the past and how it can be rethought in terms of socio-political structures. Both film-makers explore the future of the human condition throughout the past, which is underneath, trapped by geological layers and by unequal resources and destabilisation in Brazil, where adopting gender-responsive approaches

makes environmental interventions longer-lasting and more transformative, as state Givens, Huang and Jorgenson (2019).

Rinland's film explores themes related to geological history, human interaction with nature over time, environmental consciousness, and conservationist approaches to film-making. A precise "haptic visuality" engenders a sense of physical touching of those hands working and revealing what is hidden (like cinema) and being touched by foregrounding the material presence of the film image, which is digging a persistent memory. In her films such as *Expresión del Ciego*, *Black Pond*, *Those That, At a Distance, Resemble Another* and *Sol de Campinas*, among others, she pursued this quasi-physical impact using methods such as iconography of hands and touching surfaces, objects and manipulation strictly transferred to the rhythm and construction of the gesture in her filmography. The mentioned hapticity requires the viewer to actively participate in constructing meaning from the film image, using their field of sensations to complete the content of the image it offers.

Laura Marks's (2000) work on haptic visuality synthesises a theory of embodied, tactile, and multisensory visuality. With the spotlight in her hands, she establishes a bridge with the caress of the rocks, of what is touched in her films, with the viewer and that which is microscopic and the "dynamic force of biological life" (Huffer 2015, 125). One of these clear examples is that although Rinland perceived cinema as a constant confluence by Zielinski's (2006, 271) "anarcheology of hearing and seeing", Rinland is connected to the nature of the "fossil-film" concept, which gives another perspective on the iconographic representation of stones as ruins and outlines our anthropogenesis in the natural environment.

The archival fossilisation of matter: an archive of intra-action

Foucault's (1978) archive idea, which evolves based on historical context, compels us to interact with the physical remnants of history. These remnants shape our self-perception as individuals and as part of a larger collective. According to Michel Foucault, as Senta Siewert (2020, 19) points out, the concept of "archive" responds to three different aspects. It is the institution that registers, stores, processes and provides data. At the same time, the term also refers to the space that belongs to socially and historically constructed spaces known as "heterotopias" by Foucault (1978). Thirdly, his epistemology conception of the archive is

systematic and analytical, as Siewert (2020, 19) concludes. Foucault's conception considers the archive as a mixture of these three aspects. The archive responds to these three concepts simultaneously in the digital age. The archive is also online from the institution or space where information is stored and preserved. It is both physical and intangible. Although shared in the memory of a community, networks and the online expand it; it has nuances and extensions, and at the same time, it is incomplete, hidden, and unknown. It is that which becomes visible when it is activated, shared, and made available to the public, and even though we know that it does not exist, it is still there. It can be a ghost stored in some unspecified place.

Following Lynne Huffer's (2015, 124) statement, "nature's archive, the fossil record, is an archive of extinction", the film archive has to be irremediably seen as a disappearing archive where the archivist's role is to preserve fossils over time. However, they must also continue to discover other fossils, and their access to the public should continue to be highlighted. The concept of "archiveology", developed by Catherine Russell (2018), is related to preserving and accessing cultural memory. Russell (2018, 1) affirms that "the archive as a mode of transmission offers a unique means of displaying and accessing historical memory, with significant implications for the ways that we imagine cultural history".

On the other hand, Giovanna Fossati's (2011) archive concept refers to the need for film archives to preserve films in their original form while making them accessible for research. It aims to understand how archives shape our understanding of the past and present. In summary, both Fossati's archive and "archiveology" concepts deal with preserving cultural memory through archives. Those latent memories, the films, do not have to be taken only as an interaction by contact or by its nature of being movies. Nevertheless, as the physicist Karen Barad (2007) argues in her theory of "intra-action" related to the denaturalisation perspective, films must be seen as this relationship affluence. While interaction assumes that separate individual entities precede their interaction, "intra-action" suggests that entities (such as particles, people, objects, etc.) emerge through their relationships. In other words, entities do not exist independently but come into being through their mutual relationships.

This concept of "intra-action" aims to affect cinema's naturality between tangibility and the idea of "film-fossil" developed by Mulvey (2006), a

complex relationship with multiple layers and aspects to consider. In this sense, Barad's (2007) concept of "intra-action" relationships between the cinematographic apparatus, its gesture, the image, that which represents and that outside the cinema has a non-tangible or physical form in the archive. As well as those aspects related to the visible and the invisible and the screening make all the matter that makes up the cinema itself (from the minerals that make up the cameras, lenses, etc., to the conceptualisation of the film as a fossil buried in time and a given space).

In this sense, the archive, the "film-fossils", has a relation of "trans-corporeality", the "contact zone between human corporeality and more-than-human nature" (Alaimo 2010, 2). Although when they are representing nature or through an "eco-cinema" perspective understood in terms of Scott MacDonald (2004) or also in the iconographical representation of the stones, what is mineral or crystal, there is a confluence of "intra-actions" of images in a "trans-corporeality" context. Even these images have non-defined materiality because of their convergence and the loss of the naturality of the cinematic medium. Although Parikka (2018) deals with this perception of the medium from his conception of "media natures", in this work, the term "film" is glimpsed from a nature intrinsic to the concept of fossil. Since the duality between the analogue and the digital has been lost, it seems that the origins of these films are lost, both in what they represent in themselves as films and in all the traces they contain. In addition to everything they expand in their projection (from iconography to its representation of a given reality), we have to look carefully and study any fossil, any film, to abstract part of its interior matter and thus understand what has led that fossil and for what purpose and in what time and space we take charge of our "intra-action" with it.

Most non-fiction films representing the natural environment are presented dialectically between what they represent and the medium used. We would find ourselves with a work of an experimental nature that provokes a constant pulse between what it makes visible and wants to show and the hidden mineral nature that houses its cinematographic apparatus. As in *Last Things* or Vaz's and Rinland's films, hands or the haptic image are the leftovers in a "trans-corporeality", as mentioned by Alaimo (2010), of human presence through this landscape. According to Haraway's theories, there is no longer the representation of a human in the centre of this scope. One of the most disturbing issues these works

suffer from is the inability to emerge what is microscopic or inert, hidden in their works. This causes other aesthetic and archival strategies to be sought to represent what must be transmitted.

If Deborah Stratman with *Last Things* (2023) predicted this idea of rocks, stones and their representation in contemporary non-fiction cinema converging with other aspects of astronomy and geology, mixing analogue with digital and landscape with 3D recreations of the invisible, film-makers such as Adrián Balseca or Eloïse Le Gallo and Julia Borderie, among others, are exploring in contemporary times and recently released in festivals what seems like an object of meta-cinematographic study throughout the archive due to their interest in the fossil, in geology and the extractive. Adrián Balseca, in his project *Elogio a la oscuridad* (2012-2023), deals with two processes on the same aspect on a double screen: he films the obsidian abstraction in Ecuador and, on the other screen, in a self-representation of the artist, the incursion of a real ocular prosthesis with obsidian itself.

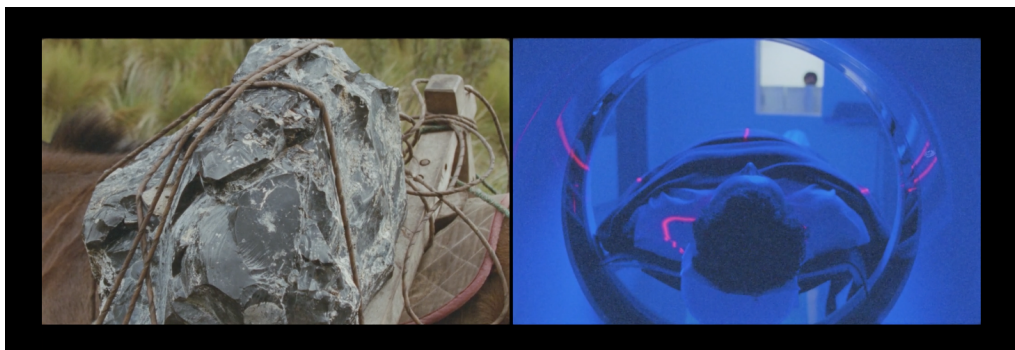


Image 4: Frame of *Elogio a la oscuridad* (2012-2023). | (c) Adrián Balseca.

Here, the stone is at the film's centre and in the very nature and myth of the stone as a protector against the evil eye. Structured as if two narrative times intervene simultaneously in the "film-time" (Everett and Caldwell 2003), the film-maker seems to constantly play with the past and the future, from the abstraction of the obsidian to its treatment and incursion of the stone into the eye. Filmed in 16mm, then digitised, and its post-production carried out digitally, it loses all its physical nature by mixing the film mediums, crossing over footage from different forms and being projected into digital. However, this does not stop it being a film fossil. This medium encapsulates a specific time and place, questioning itself in the representation and the simultaneity of times

that represent this “intra-action” from the archive in a “trans-corporeality” united by a mineral, obsidian, which settles in the eye and unites that which is human with that which is “more-than-human nature” (Alaimo 2010, 2).

There is a growing concern towards the ecological issue and turning a look, not at humanity when it finds itself in crisis due to its environment, but turning the spotlight towards the tiny, the invisible, to “matter-energy”, or the substantially more inert because in that apparent silence, in the solid and permanent lies the truth and the complex, in what is hidden from the eye or what remains to be explored.⁶ At the crossroads of cinema, performance, sculpture, and science, *ÆQUO* (2023) by Eloïse Le Gallo and Julia Borderie activates the imagination of geological narratives in the context of climate emergency.

The sound of an alpine horn can be heard; meanwhile aboard an oceanographic vessel geologists are delving into the unseen depths of the ocean floor. The ice and salt converge from the digital and performed recreations. In this film exploration, which combines different techniques to capture the haptic, the film-makers play with the metaphor of what is off-screen, hidden under the glaciers, under the ocean, simulating the tectonic plates with the movement of their arms, touching each other. The medium bets on a game of the hidden and what will soon be seen for what the climate crisis will reveal from a geological perspective, from the fossilisation of time and space in a fossil. In the attempt to immerse the viewer into that which cannot be seen following MacDonald’s ideas (2004) of what is invisible to the eyes, of what is hidden underground, the film finds in its possibilities, in the narrative and the aesthetics. In its way of re-creating, re-generating, in the “intra-actions” in the media and the film-makers’ gesture, it forms a “film-fossil” of a “trans-corporeality” nature.

As the past is merely there, Deleuze’s concept of “radioactive fossil” can be interpreted as a metaphor that brings together the traces of the past (the fossil) and a process of ongoing transformation (radioactivity) (cf. Marks 1994). This concept suggests that the past is not static or dead but actively involved in becoming and transforming. The past is not merely

⁶ Bennett’s concept of “matter-energy” (2010, 122) blurs the conventional distinctions between life and non-life, suggesting that all matter (not just organic or sentient beings) possesses a form of vitality or agency. She argues that matter is not passive or inert but dynamic and interactive, capable of influencing human and non-human outcomes.

a record to be read but continually interacts with and influences the present. *ÆQUO* (2023) is characterised by a concrete gesture that answers the question about time, which is hidden under the rocks and the sea, present inside in the stones and objects that cross space and time, just as the images do.

Conclusion

In exploring the “genealogy of film-fossils”, this article has sought to bridge the vast expanse between the geological and the cinematic, intertwining the persistence of natural forms with the enduring images of film. This research has proved how film, like a geological layer, captures and fossilises moments of time and space, embedding them within its material and narrative structures. Through the lens of eco-feminism, this analysis has highlighted how contemporary non-fiction cinema shifts focus from human-centric narratives to more inclusive, ecological representations, reflecting a profound interconnection with the natural world. The perspectives of the authors, filmmakers and artists that I have reviewed draw from an eco-feminist tradition that has tended to emphasise humility about the role that human beings occupy in the immensity of natural history. Indeed, the contemporary filmmakers I selected for this essay have been shown to employ innovative aesthetics and narrative strategies to document and interpret the environment in the Anthropocene, an era when human activities’ impact on the Earth is more pronounced than ever. These cinematic practices challenge traditional ways of seeing and understanding the natural world and foster a critical reevaluation of humans’ role within it.

By engaging with the concept of film as a medium that fossilises time and memory, the article has uncovered the layers of meaning that cinema adds to our understanding of both past and present environments. This genealogical journey through film highlights its dual role as a preserver of temporal fragments and an active participant in shaping and re-shaping ecological and feminist discourses. Ultimately, this exploration underscores the transformative power of cinema to represent and critically engage with the changing dynamics of our natural surroundings. In doing so, it invites audiences and scholars alike to reflect on the profound implications of looking at films as a dynamic archive of ecological memory and a catalyst for environmental awareness and action in the digital age. This transformative power of

cinema is a fascinating aspect that we delve into in this essay, hoping to spark curiosity and interest to amplify its intent.

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Filmography

- ÆQUO* [16mm transfer, digital, 3D, colour, sound]. Eloïse Le Gallo and Julia Borderie. 2023. Duration: 16 minutes.
- Elogio a la oscuridad* [16mm transfer, colour, sound]. Adrián Balseca. 2012-2023. Duration: 15 minutes.
- Last Things* [16mm transfer, digital, b/w, colour, sound]. Deborah Stratman. 2023. Duration: 50 minutes.
- Pine Barrens* [16mm film, colour, sound]. Nancy Holt. 1975. Duration: 31 minutes, 21 seconds.
- Salt Crystals Spiral Jetty Dead Sea Five-Year Film* [70mm, colour, silent]. Jennifer West. 2013. Duration: 54 seconds.
- Sol de Campinas* [16mm transfer, colour, sound]. Jessica Sarah Rinland. 2021. Duration: 26 minutes.
- Spiral Jetty* [16mm, colour, sound]. Robert Smithson. 1970. Duration: 35 minutes.
- Stone Circles* [16mm, b/w, colour, sound]. Barbara Hammer. 1983. Duration: 11 minutes.
- Sun Tunnels* [16mm film, colour, sound]. Nancy Holt. United States, 1978. Duration: 26 minutes, 31 seconds.

The Age of Stone [16mm transfer, colour, sound]. Ana Vaz. 2013. Duration: 29 minutes.

The Making of the Amarillo Ramp [16mm, film, colour, sound]. Nancy Holt. 1973-2013. Duration: 31 minutes.

Those That, At a Distance, Resemble Another [16mm transfer, colour, sound]. Jessica Sarah Rinland. 2019. Duration: 67 minutes.

Utah Sequences [16mm, b/w, silent]. Nancy Holt. 1970. Duration: 10 minutes.

Uma Geologia de Filmes-fósseis: As imagens de sobrevivência através do tempo e do espaço na era digital

RESUMO Este artigo explora a relação entre o conceito de fósseis e o cinema de não-ficção contemporâneo. Centrando-nos no espaço-tempo do cinema, na materialidade e no ecofeminismo, na tentativa de representar o ambiente natural, o ser humano deixa de estar no centro da representação. Os temas contemporâneos vão desde a iconografia das pedras até à sobrevivência da imagem, ao arquivo e à sua activação na era digital. Ao analisar obras selecionadas de cineastas contemporâneos – Barbara Hammer, Deborah Stratman, Ana Vaz, Adrián Balseca, Eloïse Le Gallo, Julia Borderie e muitos outros –, esta pesquisa pretende percorrer produções contemporâneas a partir de uma perspectiva estética e narrativa num Antropoceno e ver como novas estratégias são estabelecidas para representar o mundo natural.

PALAVRAS-CHAVE Materialidade; fossilização; intra-ação; digital; eco-feminismo; cinema de não-ficção.

Recebido a 15-01-2024. Aceite para publicação a 06-05-2024.