

RED SHIFT

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ABSTRACT

This paper evokes the dynamic colour space that results when a printed colour (subtractive) interacts with colour from video projection (additive).

Colour shapes our knowledge and adds mystery to our world as light and pigmented surfaces interrelate. In our recent work, *Breath*, we present a richly layered mural-sized print along with video projection and immersive sound; these interacting media enhance the effect of the printed composition. Light filtering and scattering the composition of the printed colour and the time-based superimposition of narrative moving images with spatialized audio combine to create a time-based immersive work that is fundamentally dependent on colour.

Since 2014, our experimental projects have used digital print on paper and projected video to evoke the natural environment, from both conceptual and perceptual perspectives; we highlight both environmental integrity and potential threats. In *Breath*, we consider one of the planet's most critical ongoing biological interactions: oxygen-producing marine phytoplankton and oxygen-consuming terrestrials. The mural-sized print uses saturated archival colour on a matte, bright white substrate. The video projection heightens the print's colour space, adding imagery and colour transitions. This paper describes how the fluid colour effect of light on pigment alters both content and viewer experience.

REDSHIFT

'Redshift, displacement of the spectrum of an astronomical object toward longer (red) wavelengths. It is attributed to the Doppler effect, a change in wavelength that results when a given source of waves (e.g., light or radio waves) and an observer are in motion with respect to each other.' (Encyclopaedia Britannica)

Colour creates both knowledge and mystery. In this article, we will discuss the basis in colour of one of our installations, *Breath*.

Colour is related to perception. It is the effect of light, emitted or reflected from objects, that strikes the eye and is then interpreted by the nervous system; it is a way we perceive the world (S. Buckley, 2022). Colour is not an inherent property of existing matter; our perception of it is related to conditions of light - to absorption, reflection, colour fields, and interferences of the surface. The

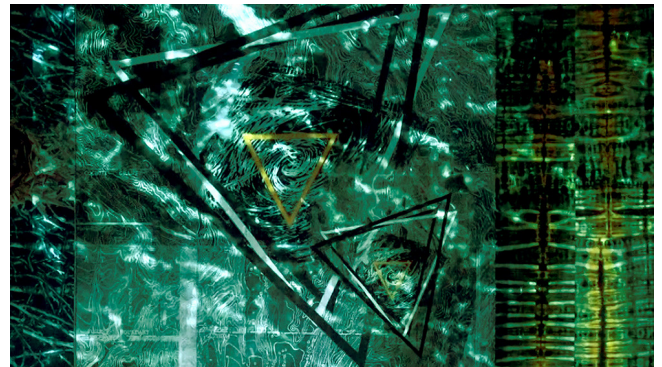


Figure 1

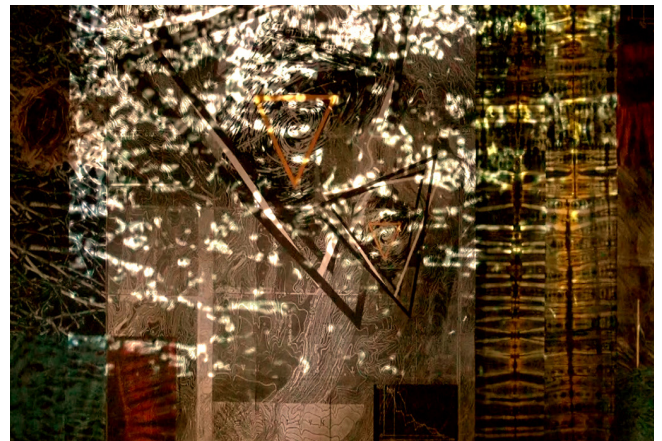


Figure 2

Figure 1. *Quiet Skies* (2014) by Deborah and Richard Cornell, Barbara Putnam, Nathaniel Wheelwright. Digital mural with two-channel video, 2750 mm x 3960 mm.

Figure 2. *Quiet Skies* (2014) by Deborah and Richard Cornell, Barbara Putnam, Nathaniel Wheelwright, 2014. Printed mural, with two-channel video and sound, 2750 mm x 3960 mm.

presence of colours generated by light and those filtered by pigment simultaneously informs and confuses the eye.

Our work invokes the natural environment, both conceptually and perceptually, at the nexus of environmental integrity and imminent environmental threat. Colour provides a compelling component.

Our installations employ the dialogue between printed and illuminated colours in time-based works that transform visual perception. Since 2014, our experimental and immersive projects have combined digital print on paper with projected video. These works invoke both the environment's physics and cultural actions' effects. The uncertainty of our future suggests the immensity of possible repercussions. A shifting perceptual experience in our work reflects this unstable ground. The perception of colour, so dependent on circumstance, is central to a relational presentation of these realities.

A DYNAMIC COLOUR SPACE

In our works *Quiet Skies*, *Eclipse/Phase*, and most recently, *Breath*, we have built a colour space by creating mural-sized prints printed with saturated archival colour. Heavily pigmented inkjet films are printed on a matte, bright white substrate. The compositions maximize strong colour fields, which are then activated by a second colour component using projected video. The video projection is often 'tuned' to resonate with the printed colours, highlighting layers of the print.

Our process originated in 2014 with the work *Quiet Skies*, which addressed our concern for the decline of songbirds and based on the research of ornithologist Nathaniel Wheelwright. [1] We experimented with images printed on fabric to determine the effects of added light projection. Our original intention was to create a sense of time and movement, but instead what occurred was the visual occlusion of some images and alternately the illumination of other images, the result of light plus printed colour. Pigments - being matter and not light - reflected the colour of the light wavelengths that they did not absorb. The shifting chromatic light waves altered the visible content. (Figures 1 & 2)

We discovered that a particular intensity is created when the tonality of a printed image—pigment as delivered by ink—is illuminated by colour from projected light—as delivered by video. This intensity resembles that in natural settings, particularly at dawn and dusk, when longer wavelengths of light illuminate the landscapes and clouds. We have observed this effect in the American Southwest in canyons of red sandstone, in Iceland on glaciers, and in the shoreline cliffs of Western Australia.

Light reveals hue, intensity, and saturation. According to Philips (2024),

As sunlight - which is a combination of all wavelengths - hits an object,



Figure 3

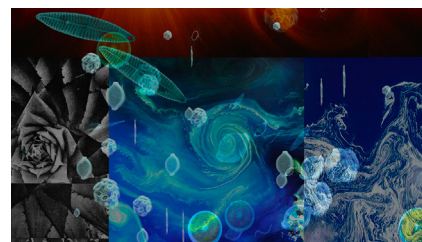


Figure 4

Figure 3. *Breath* (2024) Deborah and Richard Cornell. Archival Inkjet print and single channel video, 2085 x 3658mm. Mural

Figure 4. *Breath* (2024) Deborah and Richard Cornell. Archival Inkjet print and single channel video, 2085 x 3658mm. Mural with video, stills.

some materials will absorb specific wavelengths. The wavelengths that aren't absorbed get reflected. This reflected light then reaches our eyes and makes us perceive the reflecting object as being a particular colour. (K. Philips, 2024)

If a red light is shown on a green surface, all the available light waves are absorbed by the pigment, and no green light is reflected; it appears black. However, when similar colours of light and colours of pigment overlay, there is a perceived intensification of vibrance. In our work, this interaction enhances the presence and power of the images. Our recent work, *Breath*, maximizes this effect. [2] *Breath* is an interactive installation centring on the worldwide flow of oxygen, produced by an immense number of oceanic organisms. The pervasiveness of this vast process is crucial to humans having enough air to breathe (even more vital to our breathing than the earth's forests). The immersive qualities of colour are a vital component. The visual transformations in *Breath* depend on a crafted colour structure in the mural and an overlaid 2-channel video that selectively activates this underlying colour (Figure 3).

The mural's composition includes references to the ocean, atmosphere, and oxygen-producing life forms. The upper third of the printed image shows the sun's intense corona, a saturated field of yellow, orange, and red, anchoring the importance of sunlight in the photosynthesis of phytoplankton. The lower two-thirds of the mural represent earth's processes in oxygen production (spiralling tidal currents in the Labrador Sea, a gyre created by cyanobacterial bloom in the Baltic Sea, [3] and the helix-shaped growth of an Aloe, representing the photosynthesis of plants), using intense tonalities in a cooler spectrum. The mural provides the stable conceptual and colouristic matrix for the work, but the two videos generate the narrative elements for *Breath* and contain references to progressive threats to the health of our oxygen-producing systems. (Figure 4)

The two layers of video vary in colour. The first video incorporates the elements of water, air, and fire that interact with the mural colours. The narrative sequences begin with pale, cool aerial views of clouds and storms over the ocean (Figure 5) that sink progressively to darker, bluer undersea images with plankton, then proceed to layered multicolour sequences representing human presence, breathing, and the introduction of cultural icons. (Figure 6)

These are overcome first by the climatic rhythms of forest and storms and then by illuminated intrusions of fire, which build to an inferno. A rain of ashes initiates the return to the ocean, with shadowy consequences for plankton.

The second video layer includes animated images of phytoplankton floating in a black field of varying densities. (See Figure 7) These diatoms show intensified luminosity and sharp definition. The video is only activated by an infrared sensor, which responds to the random motion of viewers. This luminous blue-green imagery overwhelms both

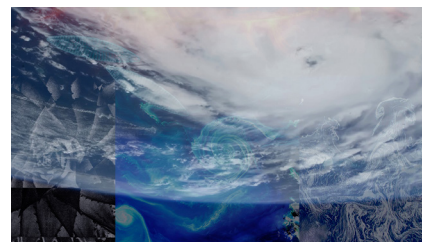


Figure 5

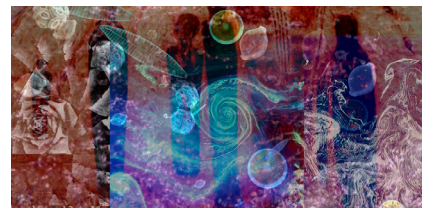


Figure 6

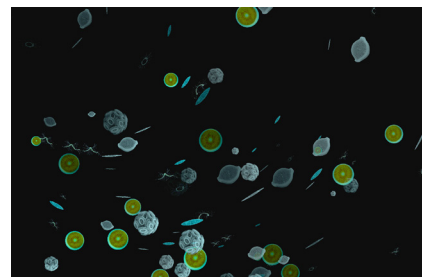


Figure 7

Figure 5. *Breath* (2024) by Deborah and Richard Cornell. Mural with video, still, Archival Inkjet print on paper and two-channel video with sound, 2085 x 3658mm. Time stamp: 00.00.15.08.

Figure 6. *Breath* (2024) by Deborah and Richard Cornell. Mural with video, still. Archival Inkjet print on paper and two-channel video with sound, 2085 x 3658mm. (Both channels activated.)

Figure 7. *Breath* (2024) by Deborah and Richard Cornell. Second interactive video channel alone, still, 2085 x 3658mm.

the original mural colour and the original video sequences. The effect fades over several seconds; it serves theoretically as an interruptive presence reflecting the invisible, continuous action of the ocean that ensures our well-being, and also a reminder of its fragility. (Figure 8) The large scale and the intense shifting colour forms create an immersive visual experience; the sound is also immersive, diffused by an array of speakers that can effectively model the shape of the sound environment in response to the video movements. [4] (Figure 9) The videos, about 8 minutes long, convey a sense of progression and transformation. Colour is a powerful experiential and symbolic agent for us. Our work with projection and print introduces a multi-dimensional capability to our concepts.

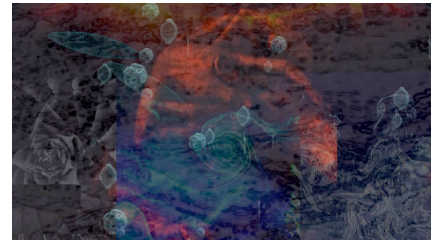


Figure 8

The use of these physical and visual structures in our work echoes the experience of the environment – the physics and poetics of colour vision become another way to immerse the viewer in the vast movements we are interested in evoking. (Figure 10) With colour, we emulate the complexity of our experience of observing the natural world, where appearances are deceiving, and layered perceptions interconnect to form our awareness of the environment.

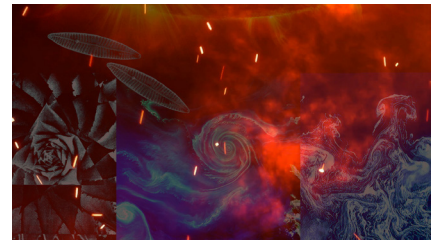


Figure 9

FOOTNOTES

[1] Quiet Skies, a collaboration of Deborah and Richard Cornell, Barbara Putnam, and Nathaniel Wheelwright, was premiered at Kala Gallery, Kala Art Institute, Berkeley CA, for the 2014 Southern Graphics Conference in San Francisco CA.

[2] The matrix for this work is a large-scale high-resolution digital print, approximately 3 to 4 meters in width with an aspect ratio of 16:9. Depending on the optics and the type of projector, the throw distance is about 6.5 meters to allow the projected image to register with the printed image. A small amount of ambient light does not disturb the illusion.

[3] 'Algae bloom' is the term used to describe the rapid multiplying of phytoplankton – microscopic marine plants that drift on or near the surface of the sea...The Baltic Sea faces many serious challenges, including toxic pollutants, deep-water oxygen deficiencies, and toxic blooms of cyanobacteria affecting the ecosystem, aquaculture and tourism. (European Space Agency, 2019)

[4] The projection uses colour as a filter to reveal and focus a particular layer of the print. This is similar in many ways to the way audio filters are tuned to emphasize frequency regions of sound. As a particular wavelength of colour is intensified, others are attenuated to reveal a particular colour layer.

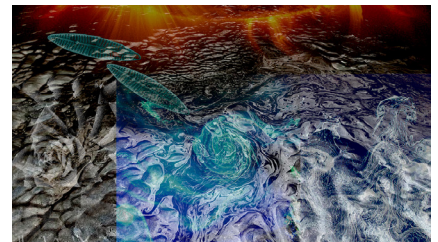


Figure 10

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Figure 8. Breath (2024) by Deborah and Richard Cornell. Mural with video, still. Archival Inkjet print on paper and two-channel video with sound, 2085 x 3658mm. Time stamp: 00:01:04.13.

Figure 9. Breath (2024) by Deborah and Richard Cornell. Mural with video, still. Archival Inkjet print on paper and two-channel video with sound, 2085 x 3658mm. Time stamp: 00:05.33.17.

Figure 10. Breath (2024) by Deborah and Richard Cornell. Mural with video, still. Archival Inkjet print on paper and two-channel video with sound, 2085 x 3658mm. Time stamp: 00:05.27.05.

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AUTHORS

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Deborah Cornell's prints and multimedia collaborations have been presented at New York Town Hall, Krakow Print Triennial, Hangzhou China, Proyecto ACE (Buenos Aires), Hong Kong, Perth Australia, and the International Symposium on Electronic Art in Dubai, Paris, Brisbane and Vancouver.

Awards include the Grand Prix, Krakow Print Triennial and a Bunting/Radcliffe Fellowship, Harvard. Collections include Boston Museum of Fine Arts, Krakow Print Triennial, Turku Art Museum Finland, Da Nang Museum, RISD Museum, and RMIT Melbourne.

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Richard Cornell composes symphonic and chamber music, sound art and installation. Awards are from the National Endowment for the

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Collaborative installations include Hafnarborg Museum (Reykjavik), Taipei Biennale, ProyectoACE (Buenos Aires), Boston's Institute of Contemporary Art, SuperComputing, NYC Electroacoustic Music Festival.

Richard Cornell is Professor of Music at Boston University.

IMAGE GALLERY

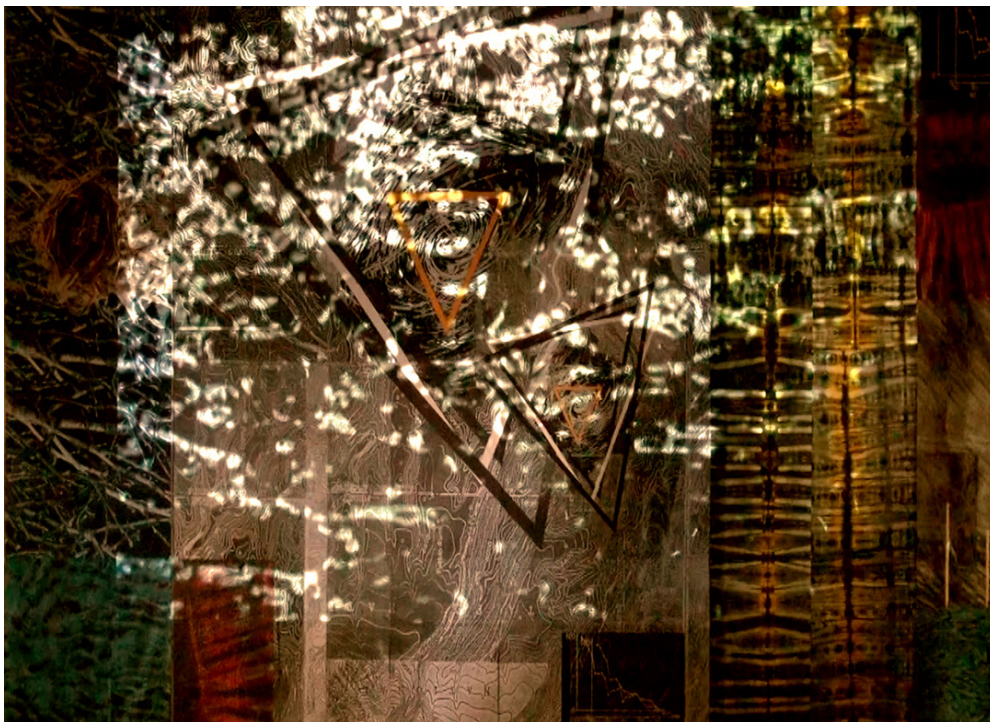
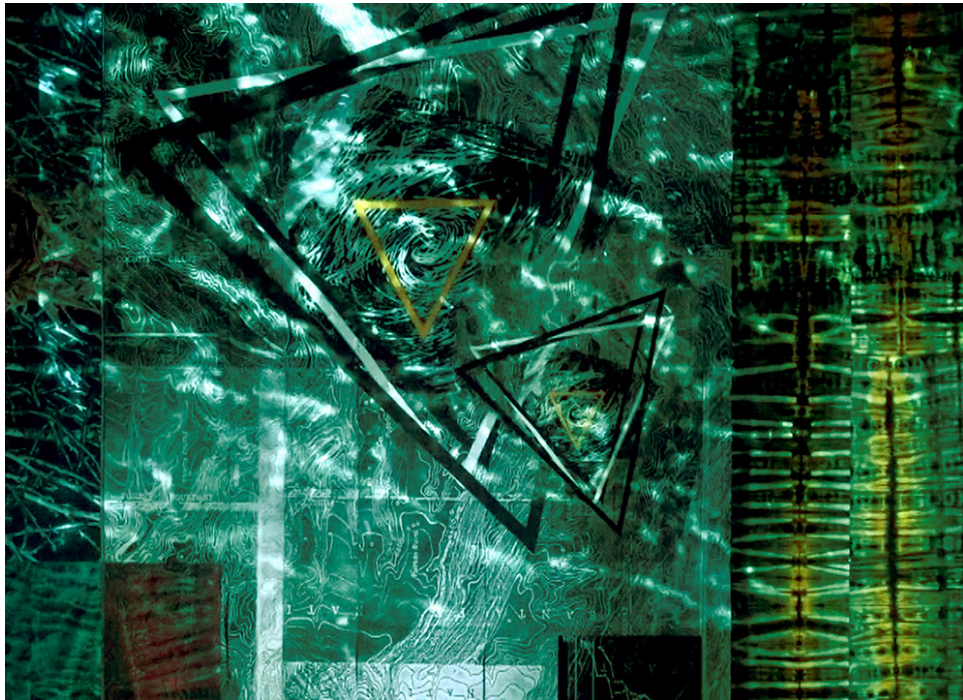


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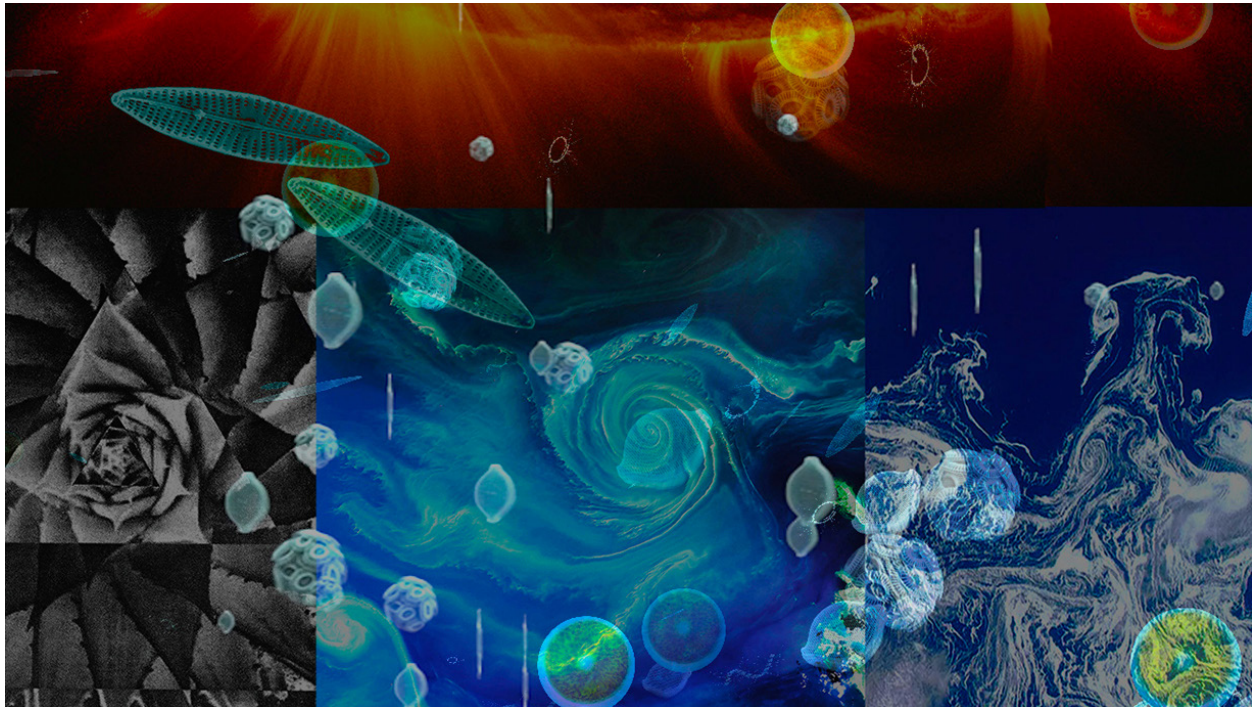
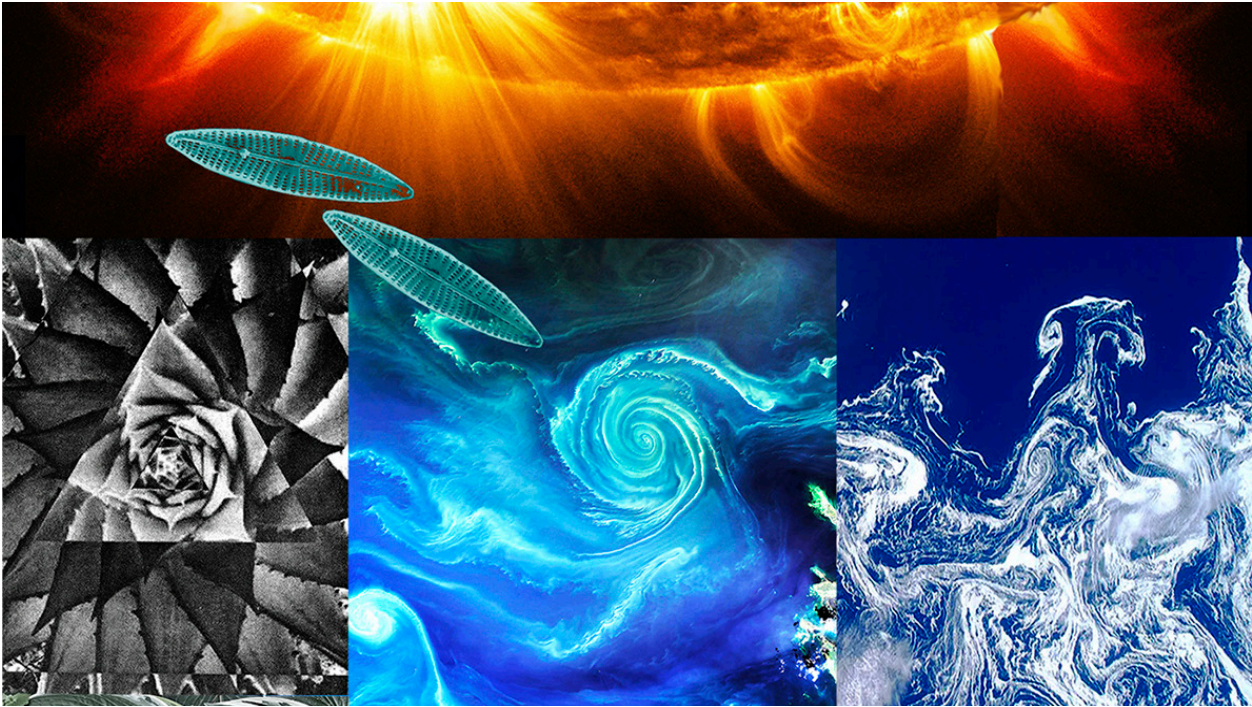


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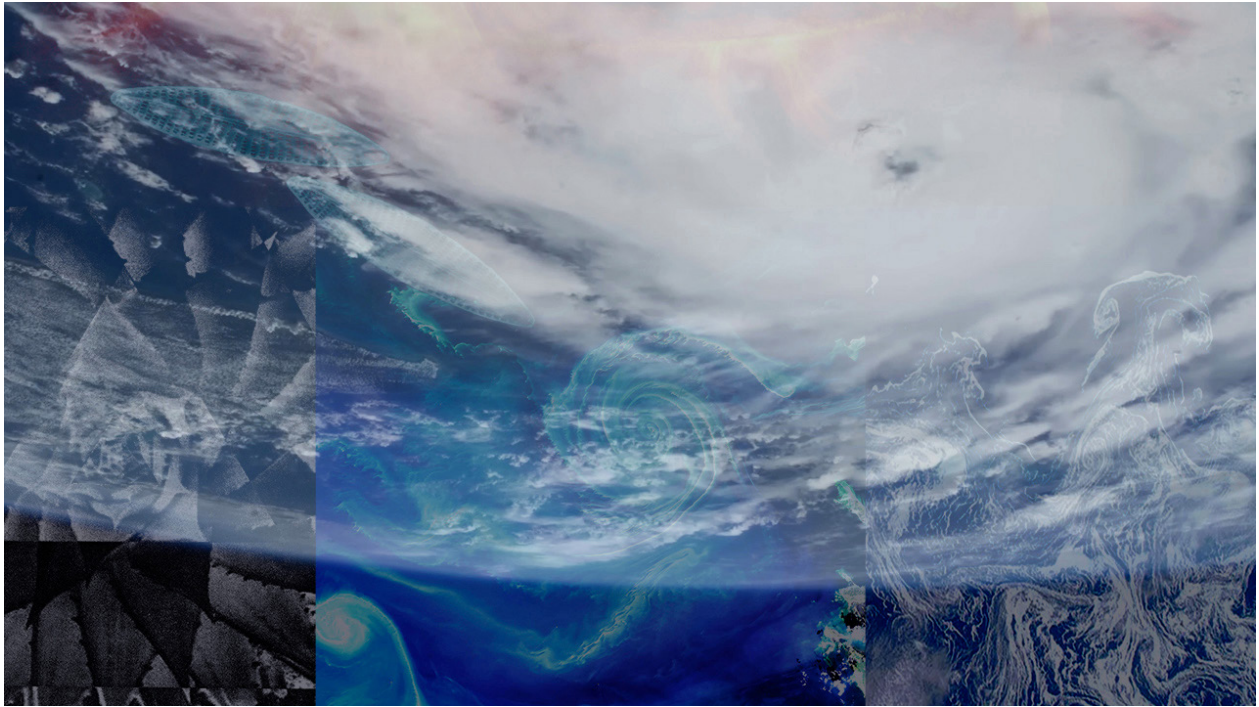


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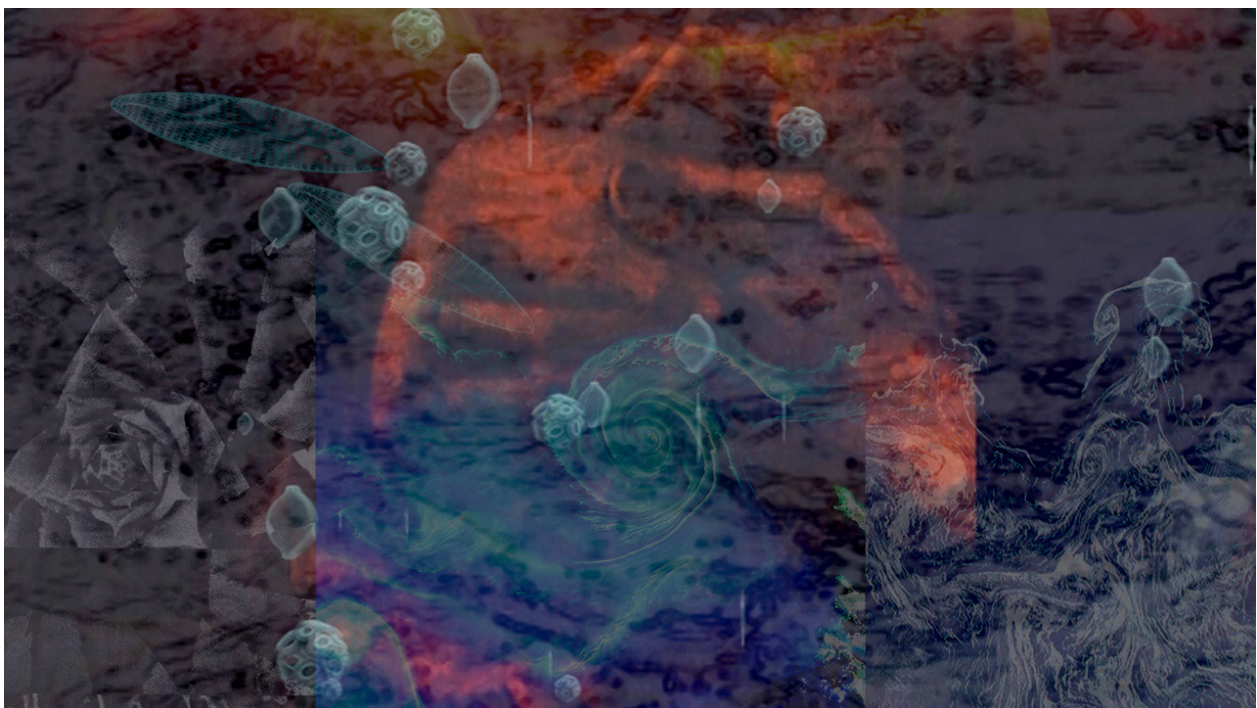
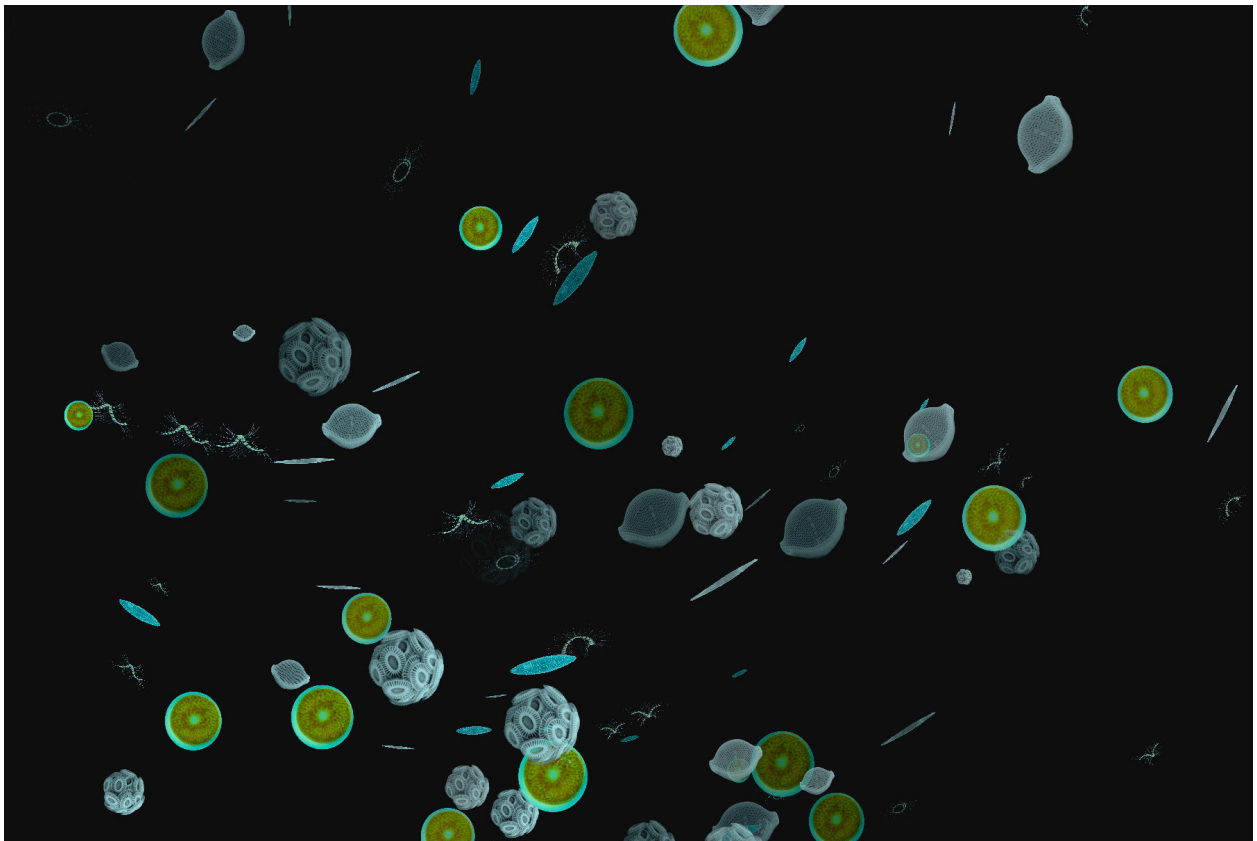


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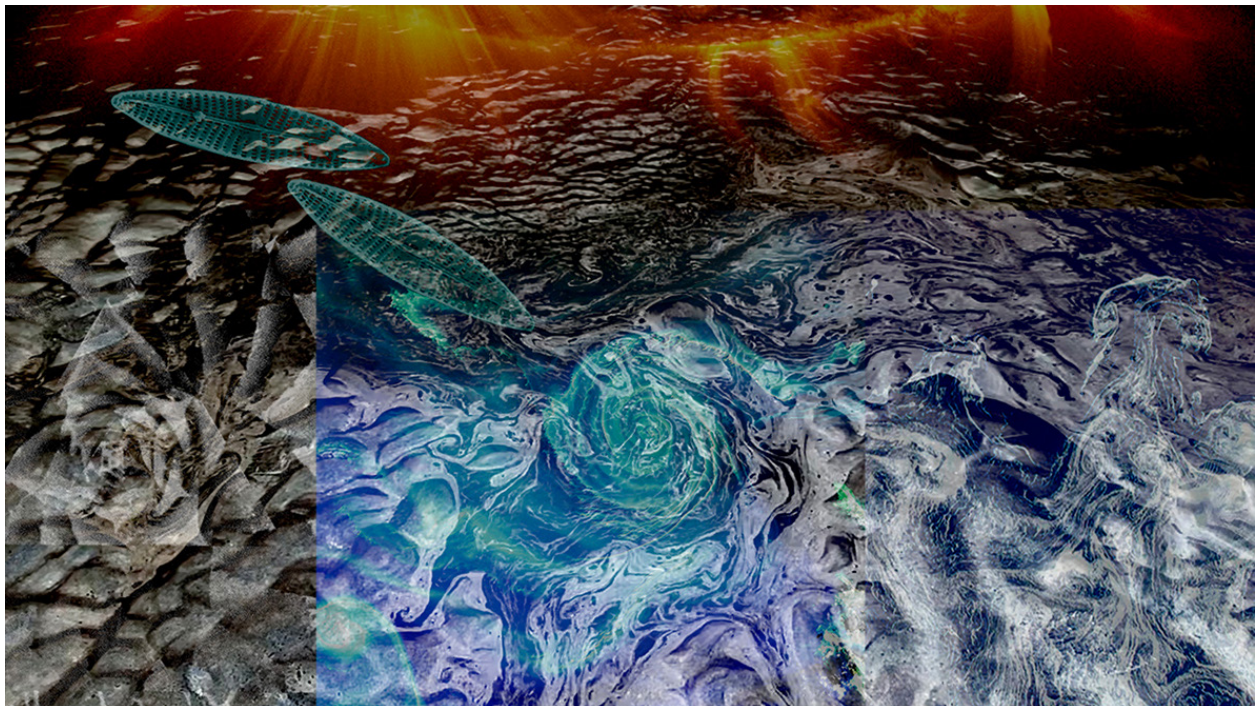
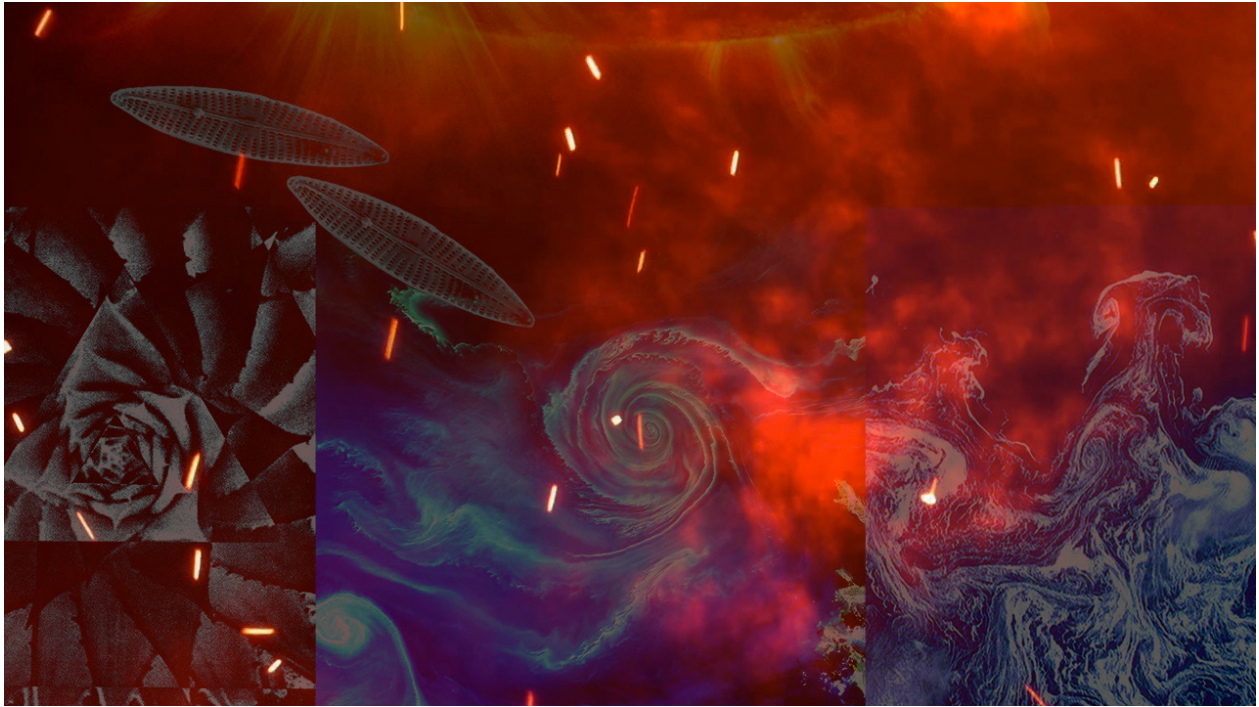


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