



## DRONES CAUGHT IN THE NET: PILOTING ABOVE INFORMATION INFRASTRUCTURE

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### Abstract

*This short experimental essay reflects upon our video Points of Presence. In producing the video we used unmanned aerial drones to visually and vertically examine undersea fibre-optic cables of the North Atlantic. We reflect upon how the drone's flying technologies allow pilots to creatively engage with the atmospheric element. We argue that the drone's optical and object-avoidance technologies share similarities with the mammalian senses. In concluding, we examine how drones and information infrastructures reflect each other as complex and imperfect systems designed to extend the human body and senses across geographies.*

### Résumé

*Ce court essai expérimental se penche sur notre vidéo Points of Presence. En produisant la vidéo, nous avons utilisé des véhicules aériens sans pilote pour examiner visuellement et verticalement les câbles de fibres optiques sous-marins de l'Atlantique Nord. Nous réfléchissons à la façon dont les technologies de navigation du drone permettent aux pilotes d'interagir de manière créative avec l'aspect atmosphérique. Nous soutenons que les technologies optiques et d'évitement des objets du drone partagent des similitudes avec les sens des mammifères. En conclusion, nous examinons comment les drones et les infrastructures d'information se reflètent comme des systèmes complexes et imparfaits conçus pour prolonger le corps humain et les sens à l'échelle de la planète.*

This short experimental essay reflects upon our video *Points of Presence*. The core production strategy was to employ unmanned aerial vehicles – drones – to examine undersea fibre optic cables of the North Atlantic. We reflect upon how the drone's aerial capacities allow pilots to engage creatively with the atmosphere. We encounter surprising similarities between the drone's optical and object-avoidance technologies and other non-human sensibilities. This experiential orientation challenges more utilitarian drone methods and proposes a more intimate relationship between humans, drones, and the environment. In what follows, we examine how drones and information infrastructures parallel each other. They are both complex communication systems situated in elemental forces and designed to extend the human body and senses across geographies.

### I. CANTAT-3 Tjørnuvík, Faroe Island

*"What is commonly called environmental consciousness could be described as subterranean consciousness – the awareness that we are in a very real sense not living on the earth but inside of it."  
—Rosalind Williams (213)*

The video above is an experiment in apprehending information infrastructures from a unique perspective using camera-equipped unmanned aerial vehicles or drones. This view from the air is novel not only because the drone's motility renders previously un-sensed atmospheric volumes but also because we are able to move through them with extreme flex-

ibility. We chose to inhabit this particular volume in order to trace a system of communication between landing stations and data centres in the North Atlantic, stretching from Iceland to the United Kingdom and following the under-sea cables CANTAT-3, DANICE, and FARICE-1. Though these cables extend in myriad directions, we are interested in the cables that connect Iceland and the Faroe, Shetland, and Orkney islands, because of their unique geographical locations as communication archipelago and the interconnected geopolitical connotations that arise from their terrestrial “landing sites”—also known as “points of presence” (PoPs) in the telecommunications industry. Yet the landing sites, like the cables, reveal little about their function as they provide no beginnings nor endings but instead act as mediating nodes in a net of evolving technologies. They transmit the hopes, dreams, and fears of millions of people and do so impartially alongside a child’s homework or a president’s tweet. As drone pilots exploring these cables and the beaches that harbor them, we encounter local histories embedded in the environment, a cache of stories mediated by geographic proximity to this infrastructure. Surrounded by data, stories, and narratives travelling at light-speed under the Earth and beneath the sea, we linger in the atmosphere on quadcopter props—navigating a different information infrastructure—and scrutinize the (often imagined) materiality of the media assemblage. Framing one infrastructure within another, we pull back and pass over the volume containing the cables in an attempt to render it, tracing and etching the information infrastructure with movement. In the process, we encounter parallel sense regimes in animals, drones, and cables.

A clutch of interventions have sought to describe the materiality of global communication infrastructures. For instance, as Stephen Graham outlines in the introduction to *Disrupted Cities: When Infrastructures Fail*, infrastructures have been framed as “complex assemblages that bring together all manner of human, non-human and natural agents into a multitude of continuous liaisons” (11). Through the lens of political ecology, Matthew Gandy argues that these networks blend the social, the technical, and the natural through processes of cyborgization. The politicization of infrastructure—thinking about questions of access and supply as well as frailty and security—have challenged tendencies to relegate “infrastructures to an apolitical context or backdrop, as not noteworthy of attention, too hidden from view” (McFarlane and Rutherford 364). Anthropologists have worked towards an ontology of infrastructure, suggesting that infrastructures are “matter that enable the movement of other matter; they are both things and the relation between things” (Larkin 329). This is where the revelation of infrastructure shocks, when their mute operations take shape. Mundane yet alluring, data packets moving through a fibre-optic cable, for instance, play this mysterious double game of twinning the banal and the awe-inspiring.

Interest in infrastructures is by no means monopolized by researchers. As Shannon Mattern writes, in the desire to develop infrastructural taxonomies, “a new wave of Cloud explorers are pushing the limits of the field and the work they do in it—from drone spotting to algorithm forensics to global infrastructure expeditions” (Mattern np). Seeking to elucidate the spatial arrangement of communication nodes with reference to their oft-overlooked geography, fragility,

and temporality, these investigations can be renewed and reworked through the use of atmospheric platforms such as drones. By ascending into the atmosphere and allowing us to sense celestial space remotely, drones offer vantage points that are not only novel for the purposes of tracing and recording but also challenge our understanding of how phenomenological boundaries are complicated by emerging assemblages of bodies, technologies, and spaces. The drone, a data-collecting and transmitting device, relies on its own infrastructure to operate. Drone piloting is therefore a methodology for understanding cable network ontologies in a parallel circuitry. It is from this standpoint, or rather hover-point, that we begin our journey into a newly reconfigured Earth-computer.

Although the drone as an object has a lineage aligned with visual and physical violence, articulated by scholars such as Derek Gregory, Ian Shaw, and Lucy Suchman, the new technology also enables us to see and imagine differently. Drones have the capacity to bring antipodal, alien, under-represented, incongruous, and inscrutable spaces into a dialogue with an audience. Flying drones around the PoPs further accentuates the parallels between the two objects, as information systems in the air and information systems under the sea. This parallelity refers both to the movement of the objects and to a transferability of a speculative geographic consciousness where the scalability of theory and experiment is confronted by different assemblages. Economist Vernon Smith explains parallelity by discussing how laboratory experiments with gases gave scientists purchase on understanding the atmospheric constitution of celestial bodies (Smith 936). The mirroring of bodies by other bodies

does not “reveal” those bodies as much as it mediates our awareness of them through a repeated coupling and uncoupling of the assemblage that forms the parallelism.

Ours is a *relative parallelism*, following recent work that uses the term to theorize experimental methodologies. Drone piloting over North Atlantic information infrastructures enables us, through our machines, to see and sense in ways that traditional, terrestrial approaches unavoidably omit. In developing this process, we found ourselves, our tools, and our techniques transforming in tandem with the objects and environments we sought to interrogate. Drone mobility, visibility, and fallibility allowed us, however humbly, to move and see in parallel alongside the animals, landscapes, and infrastructures encountered on our journey. A reflection takes place, both on the subjective and the intersubjective level, but we do not envision a mirrored relationship between the drone and the networked object under investigation, nor between the videos and the environs depicted (Barad). Rather, parallelity for us refers to how drone methodologies situate us and our drones in an indexical relationship with our subjects and environments. The “reflective” surfaces transmitted by the drone are not replications or accurate representations but rather distorted in-situ performances of the function of the observed object.

Our experiments with piloting above information infrastructures suggests a sensorial parallelity with a range of phenomena including, strangely enough, local Indigenous hunting techniques as well as the undersea fibre-optic cables. By entering the elements, particularly air and water, and tracing the communication infrastructures that run

alongside and through these places, it is apparent that the elemental *is* an infrastructure—the matter facilitating matter alluded to above—and that there are more porous boundaries between the cable and the sea as well as the drones’ senses and our human senses (McCormack). Emphasizing the elemental and historical continuities that link the material and immaterial, atmospheric and terrestrial, and the technological and biological, thus mitigates perceived dualities.

As we cruise the PoPs, strafing them with the cyclops’ camera-eye, the drone asserts its presence, which also affects us as researchers, since we sense through the machine. The volumetric sensibility enabled by the drone situates the viewer at an atmospheric stratigraphy between satellite views and the human field of vision. We can imagine “the cloud” from here as a relatively clear stratigraphic domain of global connectivity trenched into the geological and archaeological matrix; the two ideas dovetail, though neither is strictly revealed. Piloting challenges vision. Often the drone flies at such a distance that it can no longer be seen by the ground-level human eye. Instead of looking at the hovering craft, referred to as “line of sight” flight, the pilot scrutinizes video on a tablet sutured to a radio controller or through first-person-view goggles, thus sensing via the drone’s “payloads” of sonar, 4K, and infrared video, GPS, and altimeter. The drone, levitating in the atmosphere, may in fact be relaying sensorial data from hundreds of metres away. This would be an existentially disconcerting experience were it not for the immersive capacities of the aircraft, remote controller, transmitting WiFi, and tablet interface. The interaction with the drone, via these tools working in concert, begins to condition not just how the human body acts with the drone but

also how the body imagines one can act. In her ethnographic work with the NASA Jet Propulsion Laboratory Mars Rover team, Janet Vertesi writes that the “body work involved in simulation, and the embodied imagination that practitioners must gain about their objects of study as part of their training” (Vertesi 398) also retrains the body of the human (we might also look here to the post-phenomenology of Don Ihde or James Ash who refers to human-technology interfaces as “envelopes”). This concept clearly demonstrated than in the now all-too-ubiquitous swiping gesture of the touchscreen that children attempt to use on glossy “dumb” surfaces they encounter (Mowlabocus).

Moving past the novelty of drone piloting to see whether it harbors potential for thinking differently is key. What does the aerial perspective and its intrinsic mobility really show us? Does it have the potential to reveal the Janus-faced nature of the technology (Chamayou), to ground the “cloud” (Starosielski), to imaginatively dive under the waves of the sea as we move with the cable (Wright)? Or does it simply skim across the maritime and terrestrial surfaces, revealing little more than the cartographic representation we used to locate the site? (Figure 1).

Among other sites, the video above examines the undersea internet cable CANTAT-3, which connects the PoPs of Vestmannaeyjar, Iceland and Tjørnuvík, Faroe Islands. The edit, which includes some limited archival layering—the place-based speech, sound, history, and labour that revolve around the object—is spatially ordered but temporally motley, much like the information it depicts. The video thus operates at a range of registers, reworking geographical and cultural

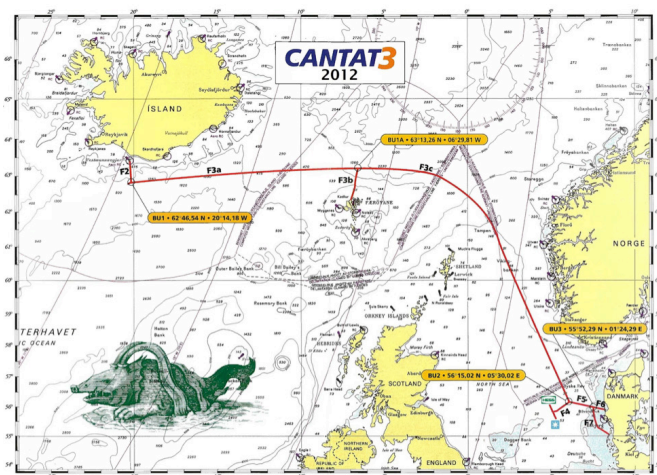


Figure 1. Cartographic depiction of CANTAT-3, Faroe Islands in the center of map

imaginations. The volumetric sensibility of the drone as a remote-sensing infrastructure, from which lenses and sensors focus, exposes the ecological situatedness of the information infrastructures stretching between the geographical isolation of Vestmannaeyjar in Iceland to the environmental expansiveness of Tjørnuvík in the Faroe Islands. Tjørnuvík has a permanent population of only 64 human inhabitants, yet it has cultural saliency as more than just a landing site for an international communication cable. The *Færøsk Anthologi* (Hammershaimb) describes how, once upon a time, the giants in Iceland decided that they wanted to obtain the Faroe Islands. A giant and a witch were sent there to retrieve the fragmented landmass. The witch tied a rope to Eiðiskollur Mountain and gave it to the giant to pull towards Iceland. As

he did so, the resistant landform split. In their labours, the giant and the witch failed to notice the sun rising and they were both turned into stone at the mouth of the fjord, where they still stand as a warning to those who would threaten the sovereignty of the Faroes.

In the shade of a Faroese fishing hut, we stared at the tablet, directing the path of the drone with a delicate nudging of the joystick along the trajectory of the cable stretching out to sea. The novelty of this method was quickly subsumed by the locativeness of the act of flight. This prompted archival research and rumination in an effort to depict the convergence of human, mammalian, and technological senses at play on the beach at Tjørnuvík. The stories we heard here about the laying of the cable were a knotty cultural stratigraphy of place paralleling the complications we encountered through flight. Even those images (captured in 4k resolution no less) were archival, for as Rebecca Solnit writes in *River of Shadows*, photography may be history's most paradoxical invention since each image produced is already the past (Solnit). This is especially relevant in the case of the consumer drone, a technology that from its inception has been subjected to profitable planned obsolescence. The temporarily extended perception enabled by the drone, while opening out new perspectives, also furthers the displacement of space and memory that is triggered by photography. In contrast to recorded intimacies at ground level, in the air our memory and experiences of the Earth becomes detached and differently tangible. This may lead us into unknown places with a new sense of shared familiarity.

The black basaltic sand in Tjørnuvík is a site for the annual grindadráp, where pods of pilot whales (grind) are stampeded to land and killed for food. The beach is ideal for herding pods because of its proximity to the open sea where the grind ambulate and because of its sandy shore, which absorbs the sonar of the whales instead of bouncing it back and informing the whales of the shore's location. The result is that they do not sense the shore and thus swim into villagers, where lances are stuffed into blowholes, lacerating spines and providing ample cetacean meat for the dark winter months. Like the whales, our drone has sonar, which feeds back information about its proximity to the shore, telling it to rise autonomously from surfaces to avoid fatal collision. The sonar kicks in several times during the videoing at Tjørnuvík and does indeed prevent us from crashing—unlike the previous



Figure 2. The laying of the CANTAT-3 in front of the witch and the giant

three drones which lacked this payload and all met their end slamming into trees, mud embankments, and lava outcrops. Drone and whale sonar is an imperfect adaptation.

Watching archival video after our departure, we see that had we staged a modest excavation below the black beach we would have indeed “found” the cloud. Under the sand another form of sensing and communicating, light pulsating in data packets, coursed through the fibre-optic cable. These pencil-lead-thin cables are prone to failure; they break because of errant anchors, shark bites, and ill-plotted digging. When breakage occurs, electrons are absorbed into the salt water, never arriving to their sender, like a 19<sup>th</sup>-century postal letter on a sunken steamer. Yet the elements here act as bridges as much as barriers. Information travels by using the elements as conductors and insulation (Starosielski 19). The boundary between the infrastructural and elemental cannot be clearly cleaved along human/nonhuman lines.

Piloting a drone in this location—a site of great aesthetic beauty that many also consider a locus of brutality—slots us and the drone into a historical stratigraphy of place, sand, sea, and sonar. The drone becomes a “boundary object” (Star) where sensorial resonances meld the communication systems of machine and mammal. The data being relayed to us on our sutured touch-screen transfers more-than-representational information (Lorimer). It relays important signals and bridges the gap between animal and technological ontologies at the locus of ethnographic and phenomenological experience. Traditionally, in surveillance activities, technology (whether architectures or predator drone flights) allows those in power to watch those without the means to

avoid surveillance. More recently, the popularization of drone technology allows for new forms of sousveillance, where the watched watch the watchers. This was evident, for instance, at the 2016 Standing Rock protests in South Dakota, USA, where protesters used drones to track police movements. Yet one more step removed here, the drone, experienced through the tablet, allows us to inhabit two positions at once, watching ourselves as the watchers, thus prompting two parallel phenomenologies of place, one displaced through the drone by sensorial extension and one displaced through the tablet because of virtual simulation.

In other words, the drone offers a methodology which both parses and multiplies vertical stratigraphies. The result of “seeing” (or more accurately sensing) from here may be that stratigraphy becoming more complicated. Every lift-off is an “opening” or a renewal of the attempt to differentiate temporal layers from and within the aerial atmosphere. As we saw, the efficacy of drone and whale sonar is disrupted by the sonar absorbent sand. We are right to be nervous, given that the technology is based on animal mimicry. These machines bring with them their own sets of vulnerabilities reproduced from the biological for the technological. Yet at some point the machines exceed the limits of the biological organism and a speculative evolution kicks in, where the machines sense in ways bodies cannot and thus offer an indication of what bodies might one day do. In this sense, flying the drone is clearly a kind of extra-sensorial experience in which we are assisted in sensing by technologies. This harkens back to the intertextual roots of cinema, as when Dziga Vertov buried cameras in railroad tracks to capture trains driving over them, or filmed the process of making a film only to replay

that footage in a theatre where the audience was also being filmed. Likewise, we are obsessed not by what the technology does, but in how it might change the way we think, if we allow it to. This is the nature of this meta-methodological experiment.

Ultimately, positioning the drone into the sensorial assemblage—where the technological apparatus enables us to inhabit parts of space otherwise inaccessible—partially melds us into the stratigraphy of place where we are attuned to the PoPs but also more conscious of how the cable creates a space of mobility and flow as the drone does. As we fly people talk to us, sometimes initially out of wonder or outrage; tracing the connections across moments triggers conversations, as people offer up unsolicited memories and archives. In the process, the cable itself gets dredged up through a refrain when the novelty of the flight reinvigorates an interest in places, myth, story, and memory—and how these things flow across space.

Rather than a mere methodological novelty, the new technology causes us to return to the old technology, conforming to Marshall McLuhan’s theory of the tetrad of media effects, an archaeological cycle of enhancement, death, and resurrection that occurs with the development of each new technology (McLuhan and McLuhan). The spatial and temporal mobility invoked by piloting uncovers a stratigraphy in the context of the volumetric which runs in parallel or, as Gilles Deleuze and Felix Guattari put it, along horizontal lines (Deleuze and Guattari). The inclusion of the atmospheric gaze into future ethnographies, we argue, may also serve to identify undiscovered balance-points between so-



cial, geographic, and technical circuits—a climate’s view of the Earth’s anthropocentric arrhythmia.

When we began this project, we were inspired by those scholars and artists who encouraged us to improve our infrastructural literacy through visiting, seeing, and visually documenting the terrain-based systems of communication around us. In so doing, it is hoped, citizens will become empowered to understand how infrastructure works (Graham and Marvin), to assume responsibility for governance of these systems (Mattern), or, at the least, to take more interest in how individuals, governments, and corporations build and maintain these systems (Garrett). This shift in attention raises important social, cultural, economic, and even geopolitical questions. An important question not examined in this brief essay is the relationship between seeing or sensing the actual information infrastructure and the virtual and potentially malicious forces that use these systems, such as big-data crunchers, high-frequency traders, personalization programmers, drone commanders, and mobile-mast-enabled pilot-whale fishermen. Can parallelity bridge the actual and the virtual, the pragmatically wicked and the symbolically circumstantial? In this video and essay we have reflected upon how socio-technical and mammalian systems of communication run parallel to each other. This tenuous theory is based on experiments with drones, information infrastructures, and human and non-human senses and sensing. This realm of trial and error is a call to return to the field, to fold ourselves back in the variegated volumes of place.

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