

Floating feelings: emotion in the affective-meteorological atmosphere

This article engages with a series of artistic and collective experiments in floating to explore how emotion is affected by, caught up in, and otherwise choreographed by the meteorological atmosphere. Floating is understood in a dual sense: as the achievement of buoyancy in the medium of air, and as the social-affective cohesion and endurance of a collective. The primary contribution of this article is to develop an attention to the meteorology of affect and emotion by highlighting impressions, traces and sensual registers implicated in breathable airspaces, aeolian movements and thermodynamic relations between air and Sun. I do so by employing Sara Ahmed's social model of emotions and telling stories of the free-floating practices of the *Aerocene Community*. This article demonstrates how an attention to floating as both aerostatic movement and social-affective state can foreground relations between the airy and affective, reworking and reimagining the meteorological in studies of atmosphere.

Keywords: Floating; Affect; Emotion; Air; Atmosphere; Aerocene

I Introduction

Storm clouds threatened over inland mountains, but they did not darken the skies of the Ekebergsletta campsite in Norway as a group of students, scholars and activists unfolded two black, balloon-like membranes and inflated them by running up and down the field, holding their ‘mouths’ open to the ambient air. The wind was calm, gusting only three or four knots from the west. Horses grazed nearby. The group shared *bolle* with sweet cheese filling. After an hour of meditative drifting a few inches above the grass and warming in the Sun, one aerostatic membrane launched, quickly rising more than thirty metres high. Within minutes, the second one reached sixty metres. For some time, the airy entities tugged at their tethers. Slowly, two human bodies pulled one membrane back down to the Earth, feeling its desire to be in the air. Then they released it again, watching it soar upward, lured into the blue.

This vignette tells of an experiment in floating. More specifically, it is an experiment in launching two *aerosolar sculptures* – pneumatic envelopes that float using only the energy of the sun and the convection of air – into Norwegian airspace (Figure 1). In an era of recreational drone use, such experiments may seem unusual, but they are a frequent exercise for an international artistic network known as the *Aerocene Community*.¹ In this community, practitioners make, launch and float aerosolar sculptures as vehicles for questioning the feedbacks between global aeromobility, advanced capitalism and fossil fuel extraction. In doing so, they make repeated, risky interventions into heavily regulated commercial airspace, all without burning carbon-based fuel or using helium gas. As such, to participate in the *Aerocene Community* is to move and be moved by fragile, temperamental entities that are pushed by winds and levitated by sunlight. It is to enter into emotional relationships with these entities, to feel their encounters with air currents, and to register the emotional intensity of *floating* in geopolitical airspaces where fuel-burning, aerodynamic flight is the prevailing rule.

This article follows several experiments in floating by the *Aerocene Community* in order to explore how emotion is moved by, caught up in, and otherwise choreographed by the

meteorological atmosphere. While acknowledging that affect and emotion have been defined in different ways in this journal and elsewhere, I probe the interstices of these terms by defining emotion as “an affect that leaves its mark or trace” (Ahmed, 2014a: 6). Following Ahmed, I understand the ‘mark’ or ‘trace’ as “what makes us sweat, shudder, tremble, all those feelings that are crucially felt on the bodily surface, the skin surface where we touch and are touched by the world” (Ahmed, 2014a: 171). Central for an interest in floating, emotions are as much about movement as they are “about attachments or about what connects us to this or that” (Ahmed, 2014a, 11). Ahmed’s framework allows me to attend to the traces and attachments that emerge during floating journeys while also grasping how they blur phenomenological registers and merge with “nonhuman forces of movement and sensation” adrift in the air (McCormack, 2003: 495).

In emphasising the emotional registers of airborne trajectories and meteorological processes, I build on work that foregrounds the “affective and aesthetic dimensions of *being in* and *witnessing* air and atmosphere” (emphasis in original; Engelmann, 2015: 431). A focus on the affective and aesthetic is not to neglect questions of the social and political that figure air as an ‘informed material’ (Barry, 2001), a securitised volume (Nieuwenhuis, 2016; Shaw, 2017) or a sovereign space (Paglen, 2010; Williams, 2007; 2011). Rather, alongside the rich work on atmosphere in this journal (e.g. Anderson, 2009; Bille et al., 2015; Buser, 2017) I advance a cultural-aesthetic perspective that understands experiences of affective intensity born by atmosphere as intrinsic to the formation of social, political and collective identities. In other words, a cultural-aesthetic approach foregrounds the multiple ways that atmospheres are sensed and made sense of. It also highlights the imaginative labour of renegotiating and re-envisioning airspace, a labour that I will argue is a form of floating. One promise of this approach is a more nuanced understanding of the emergence and persistence of communities like *Aerocene* and the aesthetic-political value of art in the atmosphere (see Engelmann, 2020).

In parsing these airy-aesthetic concerns, this article addresses two issues signalled by literature exploring the simultaneous meteorological and affective qualities of atmospheres

(Adey, 2013; McCormack, 2008; Adams-Hutcheson, 2017). The first issue involves how to conceive emotions as part and parcel of the affective intensities born by air and atmosphere without ontologising emotions or treating them as truthful representations of interior states. Indeed, as Sara Ahmed so poignantly shows, emotions are not ontological ‘givens’ but congeal through the “flow of sensations and feelings that become conscious” (2004: 29). Moreover, emotions can be miscommunicated, misread or unevenly shared between bodies (Ahmed, 2004; Trigg, 2020). The second issue concerns the role of atmosphere as a metaphor in these debates. For, as Verlie (2019) observes in this journal, discussions in the social sciences reveal a tendency to understand atmosphere as the morphological figuration or spatialization of affect, leading to a forgetting of the meteorological and climatic. As a corrective, Verlie proposes the term ‘climatic-affective atmosphere’ to attend to entanglements of “the meteorological, climatic, ecological, emotional and affective” (2019: 3). The primary contribution of this article is to further develop an attention to the meteorology of affect and emotion by tracing bodily impressions and sensual responses implicated in aeolian movements, meteorological systems and thermodynamic relations between air and Sun. Ultimately, I further debates in aero- and elemental geographies by outlining the role that floating can play in theorising atmospheres.

The second contribution I make in this article is both analytical and stylistic and involves the (re)presentation of stories of floating. For this article, floating is understood in a physical sense as the achievement of buoyancy in the medium of air, and in a social-affective sense as the cohesion and endurance of a collective. Using Ahmed’s (2004; 2014) social model of emotions, I tell ‘circumstantial stories’ (McCormack, 2014) of aerosolar sculpture journeys, showing how these journeys leave lasting traces on bodies along the way. To tell circumstantial stories is to develop an “episodic form, in a kind of ongoing enclosing and opening along a skin, surface or membrane” (McCormack, 2014: 610). In resonance with a special issue on ‘traces’ in this journal, this approach resists the “desire to ‘straighten’ our stories, as if slant-wise knowledge is flawed” (Wyatt et al., 2016: 38). Rather, these narrative openings tell of high-intensity labour, gradations

of feeling-in-common, and extended awareness of the gaseous, convective and electro-magnetic atmosphere. In this way, stories become ‘amplifiers’ through which to grapple with the complexities of elemental spacetimes moving in and out of recognisable affective territories (Neimanis, 2017). Importantly for this article, telling stories of aerosolar entities also balances accounts of the ‘achievements’ of artistic initiatives with an awareness of the social and emotional labour that underpins their realisation.

For these reasons, this article is organised in the shape of a ‘free-floating’ aerosolar sculpture journey. The following section analyses the emotional vectors of tropospheric weather through two aerosolar *launches*. The subsequent section considers the process of *following* aerosolar sculptures through the ‘corridors’ of the lower stratosphere. It is the intervention into commercial airspace and the tracing of higher altitude aeolian currents that works in part to define and to ‘surface’ the *Aerocene Community* (Ahmed, 2004). Then, I turn to the emotional intensity of the *recovery* of aerosolar membranes, often hundreds of kilometres from their launch site. I conclude with some insights on the growth of the *Aerocene Community* from a collective endeavour to a global movement and suggest how an attention to floating as both aerostatic movement and social-affective state can foreground relations between the airy and affective, re-centring the meteorological in studies of atmosphere.



Figure 1: Double *Aerocene* launch at Ekebergsletta campsite, Oslo, Norway, 2019
As part of the *Aerocene* contribution to the 2019 Oslo Architecture Triennale on the Architecture of Degrowth, curated by Matthew Dalziel, Phineas Harper, Cecilie Sachs-Olsen and Maria Smith
Photograph by Sasha Engelmann, 2019.
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II 51 *Pegasi B*

The first time I drove to the German countryside with Tomás Saraceno, Adrian Krell, Sven Steudte, Odysseus Klissouras and Odysseus' son Ikarus in order to launch an aerosolar sculpture, we failed. It was 19th September 2014, and we left Berlin at four o'clock in the morning to catch the first light of dawn. We had a silver-coated radar reflector, a basic GPS tracker, and all of the will and energy to release a fragile, pneumatic membrane into the atmosphere. During our drive to the launch site, we drank warm maté and speculated about the weather. We discussed every change in the colour of the sky and the arrangement of clouds. We stopped to guess the direction of the wind. Steudte, a radio amateur, probed other dimensions of the weather: updates from Air Traffic Control and the weather radar. Yet, no matter how much we speculated, a thick layer of stratus clouds obscured the sun's rays, and rain threatened. Animated conversation turned into protracted silences. We half-heartedly unfurled the sculpture

beside the road, perhaps hoping this act would magically clear the skies. After several hours we drove back to Berlin where, ironically, the sun came out for the whole afternoon.

Despite our failure to launch, on that day I learned that experiments in (aerosolar) floating intensify sensations of air, atmosphere and weather. Unlike heavier-than-air craft or helium-filled balloons, aerosolar sculptures depend on several factors to become airborne: solar irradiance, temperature, convection, humidity, cloud coverage and the albedo of Earth's surface. In other words, these floating entities do not enter the atmosphere like objects in neutral space; rather, "they [are] immersed in a kind of force field set up by the currents of the media that surround them" (Ingold, 2011: 93). This 'force field' is not only the material medium of air, however. An aerosolar sculpture is affected by what Philippopoulos-Mihalopoulos (2013: 36) calls the "expansive *institutional affect*" of the law: launch site parameters, insurance schemes, weight restrictions and air traffic authorizations. Hence, despite the fact that the weather frustrated the launch, floating in the air is not only a physical feat of crafting a 'disagreement' between an enveloped air mass and the ambient air around it; it is simultaneously a feat of reaching an 'agreement' with the rules of the logistical, governed air/space that regulate 'free' movement in the troposphere and stratosphere.

More specifically, the affective and emotional textures of this failed launch were bound up with the capacities of a particular kind of 'atmospheric thing' (McCormack, 2018). As we unfolded the membrane on the shoulder of the road, we felt how our anxieties 'stuck' to the envelope (Ahmed, 2014a). Our feelings had an 'aboutness': they were oriented toward the capacities of the membranous object, stirring listlessly in gusts of air from passing cars (Ahmed, 2014a). However, in being oriented toward the aerosolar sculpture, our affective responses were also directed toward what would animate the sculpture: the atmosphere. As we looked up into the skies, seeing and hearing airplanes crossing through the clouds, the seeming absurdity and futility of our actions *impressed* upon us. For Ahmed, thinking with impressions "allows us to associate the experience of having an emotion with the very affect of one surface upon another,

an affect that leaves its mark or trace” (Ahmed, 2014a: 6). In this anecdote, the sky, crossed by lines of aerodynamic activity, was a surface that weighed on our bodies. The impression of this sky-surface intensified in bodily sensations and conscious emotional states. I felt physically weary as well as defeated, frustrated and foolish. I secretly thought: why try to enter the air with a vehicle that is so temperamental, so dependent on factors beyond our (human) control? Why stake so much emotional energy on the highly unlikely occurrence of floating without fuel, in other words, floating using only the ‘elemental infrastructure’ of the air and the sun (McCormack, 2017)?

The answers to these questions get at the core of the meanings of floating I develop in this article. Although there are many ways in which the *Aerocene* project is activated and presented around the world, from public exhibitions to environmental monitoring campaigns, the aerosolar journey or ‘free float’ is at the heart of this ‘ecology of practices’ (Stengers, 2013). Aerostatic, fossil fuel-free floating is what gathers, coheres and inspires the collective of individuals who make up the *Aerocene Community*. In other words, the ‘floating’ of the community – its cohesion, togetherness and endurance – is intimately related to journeys of floating in the air, the shapes of which are dependent on the meteorological and ‘more-than-meteorological’ (socio-political and institutional) atmosphere (see: Neimanis and Hamilton, 2018). In order to understand the relationships between the *Aerocene* community and aerosolar journeys, and between interlinking aerostatic and social-affective forms of floating, it is useful to examine a successful aerosolar launch. One such launch occurred not far from the ‘failed’ event, in the region of Schönefelde, outside of Berlin, on the morning of March 4th 2017.

It was an overcast and misty morning. Around twenty people met at Studio Tomás Saraceno in East Berlin at 4am, piled into cars and vans, and drove out of the city, drinking instant espresso and sharing biscuits. When we arrived at the edge of a small wood next to a furrowed, unplanted field that had been arranged as the launch site, it was still too dark to launch, so we played a football match next to a river. As the sky brightened, we unrolled several

sculptures. There were two membranes meant for free flight that day: *51 Pegasi B* and *Schellin*. While four people inflated the membranes, a ‘payload’ team, composed of radio amateurs Sven Steudte and Thomas Krahn, architect Alexander Bouchner and Studio Saraceno members Adrian Krell and Erik Vögler began readying a series of devices to be attached to each sculpture. For each sculpture this included: a Pican Pica tracker, a SPOT satellite GPS tracker, a GoPro camera, an APRS enabled device, and a radar reflector. The various tracking technologies would ensure that the floating sculptures could be followed and recovered, while the radar reflectors, made of silver-coated diamond-shaped boards, would make the sculptures ‘visible’ to local Air Traffic Control. In addition, *Schellin* was equipped with a ‘cut-down’ mechanism invented by Bouchner that would trigger the descent of the sculpture once it crossed a virtual ‘geo-fence’ in the air. In contrast, and like all other aerosolar sculptures, *51 Pegasi B* would be launched without the imposition of such a border, its movement fully dictated by Sun, wind and air.

Even in acceptable weather conditions, the launch of an aerosolar sculpture requires a significant amount of waiting. This is because the sculpture must absorb enough solar energy to create a temperature differential between the air inside the envelope and the ambient air outside it. Following the principle of Archimedes, intensification of a difference in temperature and pressure between inside and outside is what generates lift (a float) in the airy medium. In the period of waiting that followed the inflation and preparation of *51 Pegasi B* and *Schellin*, there was excited conversation and constant attention to the sculptures. It was important that, in warming up, the membranes were not torn by bushes or blown into trees. Participants took turns holding the sculptures’ tethers as they continued to absorb photons descending through the clouds.

Then, there was a moment when the affective intensity and meteorology of the shared atmosphere shifted. *51 Pegasi B* was the first to float. The sculpture rose twenty meters above the field and was pulled horizontally by higher wind currents. On the ground, bodies sprang into action. They double checked the cameras, reflectors, and tracking devices. Steudte called local Air Traffic Control to register the imminent release of the sculpture and to confirm its radio

callsign: DL7AD. Others, holding the increasingly strained tethers, moved with the sculpture as it circled and spiralled erratically over the field. In these moments, the sculpture's airy drifts were impressed upon those holding the tethers and those readying the payload. Mistakes made by fumbling hands caused feelings of unease to consciously and unconsciously ripple between bodies. Unable to focus during the action, my anxious thoughts flitted from different probabilities of the sculpture's crash or clumsy release. Indeed anxiety, understood as 'uneasy suspense' is often when, "one's thoughts often move quickly between different objects, a movement which works to intensify the sense of anxiety" (Ahmed, 2014a: 64).

Building on the account of affect and emotion in the 'failed launch' narrated earlier, this event demonstrates two additional qualities of floating experiments. First, the floating aerosolar sculpture and the atmosphere together choreograph the affective qualities of the launch: the membrane causes sudden bodily reactions, it jerks out of reach of the payload team, and responds unpredictably to tropospheric winds. For bodies on the ground, this requires constant vigilance of what is happening to the sculpture and to the meteorological atmosphere. It also involves precise, collaborative work by those involved in the final preparations, work that is hampered by the feelings of tension that course among bodies. Physical and social-affective modes of floating are deeply implicated: the synchronised, emotionally charged activities of human bodies move in immediate relation to an aerostatic entity. Second, the different kinds of expertise that are required for the launch create a situation in which hands and bodies are physically touching each other as reflectors are held in place, tethers are clenched, antennas are secured, and batteries are checked. Working in close proximity, yet moving in relation to the floating sculpture, bodies literally and affectively *press* upon each other as the sculpture *presses* upon them (Ahmed, 2014a). Equally, the sculpture itself is *impressed* by the adjustments made to its payload, tethers and fragile surfaces. These impressions, or traceable affects, propagate and intensify between human, nonhuman and technical entities until the crucial moment at which the sculpture is released.

When this moment arrived, three bodies began to move with *51 Pegasus B*. Following the direction of the wind, the three figures ran, one of them holding the payload and a short tether as the sculpture gained altitude over the field. Finally, they released the sculpture into the air. It shuddered and turned sideways, causing stomachs to churn and hands to clasp over eyes. Then it righted itself and rose higher. As three bodies continued to run in its shadow, and fifteen more watched from afar, the sculpture cleared the nearest treetops and entered a higher current (Figure 2). It moved upward, becoming smaller until only a shimmer remained. Then it disappeared into the matte, grey sky.

As these events unfolded, the active pressing of atmospheres, devices and bodies onto each other dissipated, but the important impressions made by the launch did not disappear. Rather, consistent with Ahmed's (2004; 2014a) accounts of impressions, bodies retained the traces of the moments that led to the release. Palms were worn rough from grasping tethers and sweat cooled into salt on the surfaces of skin. The adrenaline rush of the final few minutes made bodies hyper-aware and excitable. Shouts echoed across the fields. A mix of happiness, accomplishment and relief circulated among the group. These feelings manifest what Trigg calls the "co-constitution of shared emotion": a combination of "mutual self-other awareness" and the "experience of a joint concern" (2020: 2). Nevertheless, we should recognise that these impressions, attachments and concerns did not always register as lasting marks or traces. Indeed, while bodies did "sweat, shudder, tremble" (Ahmed, 2014a, 11) they also experienced fleeting feelings that did not linger, yet contributed to the collective atmosphere of the launch. In other words, there were qualities of the social-affective experience of floating that cannot be entirely captured with a vocabulary of marks and traces. In this way, floating invites us to remember the miscibility of affect, emotion and feeling and to acknowledge the limits to conceptual frameworks that stabilise these terms. Following the floating sculpture offers further insights, for, at the moment of launch the floating experiment is far from complete. Once *51 Pegasus B* disappeared into the sky, another phase of work began to unfold.



Figure 2: *15 Pegasi B* launches across the field at Schonefelde, Germany while a trio of Aerocene sculptures float in the foreground, on 4th March 2017. “After running with the Pegasi, it soon began to rise. It was released into the sky, rapidly lifting and floating with the wind, away from sight” (Aerocene). Photograph courtesy of Aerocene Foundation, 2017. Licensed under CC BY-SA 4.0.

III *De-NO_x*

Once successfully launched, an aerosolar sculpture is no longer directly sensible for ground-based practitioners. It joins tropospheric and stratospheric winds, passes through clouds, and gains altitude by absorbing the energy of the Sun. As it floats, the sculpture communicates vital signs. It transmits its location and altitude via the Automatic Packet Reporting System (APRS) on a 144.8 MHz carrier wave. APRS is the primary means of sensing a sculpture’s movements once it enters higher altitude winds and crosses into airspace employed by heavier-than-air craft. In other words, via APRS, the radio spectrum is used to create an ‘invisible map’ legible to those with the right tools and capacities (Braidotti, 1994). The creation of this map works through a mixture of FM radio signals, transmission protocols, listening stations, and digital ‘repeaters’: an assemblage that, in William Rankin’s terms, is “selectively visible, semi-permanent, and always

flirting... with conventional forms of physicality” (2014: 625). Aerosolar sculptures are not the only aerial or mobile objects using the APRS network. Rather, viewing the online APRS map in any location reveals a multiplicity of moving entities, from high altitude balloons to gliders, ships, trucks and passenger cars: a living inventory of wind, water, and fuel-driven nomads.

Powered only by the solar energy trapped in their membranes and by the wind that carries them onward, the movements of floating aerosolar sculptures are also the movements of the atmosphere. These movements can prove surprising to earth-bound practitioners, and they have specific consequences for the emotional experiences of aerosolar journeys. Let us turn to another aerosolar event. The *De-NO_x* sculpture was launched by a group of *Aerocene Community* members from the beach of Flakensée on June 21st 2019. The transparent and silver-coated sculpture took off over the lake in the brilliant summer sun, quickly gaining altitude. However, only twenty minutes after the moment of launch, but long after the sculpture had ceased to be visible in the blue sky, the APRS log showed that *De-NO_x* was turning around after reaching several hundred meters in altitude and six kilometres to the west. The sculpture was coming back over the launch site. Since my amateur radio callsign (M6IOR) was attached to the sculpture and registered on the APRS network, several group members turned to me with questions: is this *possible*? Is it truly *coming back*? Will we be able to *see it*? Overly confident, I replied that the sculpture was returning but it would be far too high; we certainly wouldn't be able to sense its arrival. This answer was inflected with an assumption: having watched so many aerosolar sculptures disappear into the elements over my years as a member of the *Aerocene Community*, I assumed, once launched, the sculptures became spectres, 'visible' only via their signals in the ether.

Yet, to my surprise, as I looked skyward, I saw a tiny silver particle flying past in the opposite direction from the sculpture's initial path. As I checked the APRS map against the visible position of the floating particle, still questioning my senses, I was profoundly moved. I felt a sense of wonder at the sight of the lighter-than-air sculpture crossing the sky above me.

This feeling of wonder included an expansion of my “field of vision and touch” (Ahmed, 2014a: 179) as I learned to see, and to believe I was seeing, *De-NOx*. My wonder was also linked to the fact that the sculpture had now entered German airspace, penetrating a realm ruled by fuel-burning commercial and military vehicles.

Over the following minutes it became obvious that these feelings of wonder were not only my own but were shared in the group, corporally and inter-corporally (Trigg, 2020). Necks craned and bodies twisted, our poses reflecting the difficulty of making out the evanescent, air-filled body (see Figure 3). Outbursts of laughter, disbelief and incredulity propagated through the group. Many spoke animatedly about the fleeting passage through the sky, a sky that had seemed so languid and ‘empty’ minutes before. The fact that the sculpture had re-entered our field of vision, and was moving stealthily through commercial airspace, became ‘real’ and elicited wonder. Ahmed writes:

Wonder opens up a collective space, by allowing the surfaces of the world to make an impression, as they become see-able or feel-able *as* surfaces. It is not so much that the feeling of wonder passes (so that I feel wonder, in the face of your wonder). Rather, the very orientation of wonder, with its open faces and open bodies, involves a reorientation of one’s relation to the world. Wonder keeps bodies and spaces open to the surprise of others. But we don’t know, with such bodies, what we can do. (2014a: 183)

Although Ahmed is writing specifically about feminist collectives and pedagogies, I believe these sentiments apply to the gathering I am illustrating in this vignette. The passage of *De-NOx back* through the sensible range affected the group of bodies as the ‘surfaces’ of the air became ‘see-able’ and ‘feel-able as surfaces’. This included a shift in our awareness of the meteorological atmosphere: we could *feel* the complexity of the currents of wind, and we could *grasp* that the direction of wind at a lower altitude was directly opposite to that at a higher altitude. Bodies and faces ‘opened’ to the atmospheric event and to this experience of ‘feeling-in-common’ (Ahmed,

2004: 34). The sensing of the tiny silver particle enlarged a ‘collective space’, re-oriented our relationship to the atmosphere and elicited wonder and humility within and among us.

As it gained altitude over the next few hours, *De-NO_x* turned north-eastward and crossed the border into Poland, before returning westward, back into Germany once again. The trajectory appeared to make a swerving ‘S’ shape. On that day of the summer solstice, the sculpture reached over 21,000 meters in altitude: not only was it flying in an altogether circuitous route, it was also surpassing the cruising altitudes at which many fuel-burning, heavier-than-air craft fly (Bagshaw and Illig, 2019). Trigg (2020) repeatedly uses metaphors of ‘free-floating’ to contrast an atmosphere that is apparently directionless and overtly nebulous with an atmosphere that is “delimited by the grip it exerts on bodies, both human and nonhuman” (4). Yet the story of *De-NO_x* shows that ‘free-floating’ atmospheres can have ‘grip’ too. Indeed this ‘grip’ is a large part of the social-affective floating experienced by practitioners. In tracing *De-NO_x*’s path, it became possible to observe and to feel the curves, patterns and twists of the atmosphere over a particular period of time. It also became possible to trace affective and emotional responses that were mediated by the wandering path of *De-NO_x* and hence by the speed and direction of the winds.

A significant part of the affective and aesthetic force of aerosolar journeys is related to the fact that the destination of a specific sculpture cannot be determined in advance. To be sure, a variety of predictions are employed in preparation for each launch. The *Aerocene Community* has collaborated with Lodovica Illari, Glenn Flierl and Bill McKenna in the Earth, Atmospheric and Planetary Sciences Department at the Massachusetts Institute of Technology to produce the *Aerocene Float Predictor*: a tool that enables prediction of aerosolar journeys depending on starting coordinates and live wind data derived from National Oceanic and Atmospheric Administration (NOAA) datasets.² A variety of other tools, from the Windy App to the Weather Underground website are used for wind and weather forecasts. Nevertheless, the floating path of an aerosolar sculpture depends on such a large variety of factors, from the quality of the sculpture’s

construction to the albedo of Earth's surface, that it is impossible to determine its trajectory in advance. In this space of contingency between prediction and outcome, much can occur that has not been anticipated.

In addition to effecting practicalities, such as the chasing of the sculpture or the alerting of local air traffic authorities, these uncertainties have significant influence on the affective politics of aerosolar practices. In the mutual condition of *not-knowing* that characterizes aerosolar journeys, different objects, ideas and events can elicit feeling. For example, different forms of data, from altitude to pressure differentials, produce feelings of hope, fear or unease. During the journey of *DeNOx*, as a group of us ate lunch at the edge of the lake, our conversation was punctuated by announcements of the sculpture's trajectory. As the sculpture neared 20,000 metres in altitude, reports became more frequent, and feelings of suspense intensified. Under the lunch table, I furtively refreshed the log attached to M6IOR on the APRS webpage on my phone. Others attempted to refocus the conversation. The affective atmospheres of the lakeside were palpable, if unevenly 'angled' for participants (Ahmed, 2014b). They were also intimately linked to distant airy masses and wind vectors. While *DeNOx* travelled in a stratospheric current, bodily positions and emotions entered relationships mediated in part by the aerial elements, and by the fragile, membranous entities that drifted within them. Thus, we cannot separate the physical floating of the sculpture from the social-affective state of the Aerocene community: hundreds of kilometres apart, the sculpture and the moving air masses in which it was immersed moved, impressed and surfaced in the collective of bodies sitting quietly by the lake.

At a certain stage in an aerosolar journey, the sculpture may stop reporting its position on the APRS network. At this point, the location of the sculpture is only accessible via a 'spot tracker': a manual radio device designed to pick up the signal at closer range. Often, two or three members of the *Aerocene Community* follow the sculpture in a car, using the spot tracker to gage its position. Increasingly, however, the community has collaborated with networks of radio amateurs living along the 'wind corridor' that the sculpture is likely to follow. These radio

amateurs form a temporary coalition with the *Aerocene Community* that is oriented around the ‘surfacing’ and ‘mattering’ of the wind (Howe and Boyer, 2015). Just as bodies become sensitive to other bodies and objects in the corridors of urban landscapes and ‘lawscapes’ (Philippopoulos-Mihalopoulos, 2013), so too do these relations unfold as a result of transboundary convection. In doing so, radio amateurs also affect and are affected by the emotional arc of the aerosolar journey. In the following section I narrate the *recovery* of an aerosolar sculpture to unpack the shared affective responses that emerge in the tracing of something in the wind.



Figure 3: DeNOx returns over the beach of Flakensée.
Photograph by Sasha Engelmann, 2019. Ethical approval acquired.
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IV Cyanophyta

To recover an aerosolar sculpture is to be attuned, through a variety of technical and sensual registers, to a floating, quasi-imperceptible entity. It is also to participate in a kind of treasure

hunt in which the atmosphere, bodies of water and difficult terrain may trick or frustrate one's best efforts. Since APRS data is open and free to employ, and since radio amateurs frequently track entities for 'direction finding' or geolocation practice, members of amateur radio clubs north-east of Berlin have volunteered in tracking *Aerocene* sculptures. This coalition also saves carbon emissions associated with *Aerocene Community* members following the sculpture all day in a car. One recovery event occurred during the journey of the sculptures *Cyanophyta I* and *Cyanophyta II* launched on June 9th 2018. The 'launch' in this case had multiple meanings: *Cyanophyta I* carried a copy of the newly published *Aerocene* book, which it lifted into the skies. *Cyanophyta I* and *II* were launched at the same time, and interestingly, they floated side-by-side for many kilometres, as if tethered together, immersed in the same current of wind. Some hours later, the sculptures separated. *Cyanophyta I* landed in the backyard of an elderly couple, and *Cyanophyta II* landed deep in a coniferous forest.

Radio amateurs from Klub Łączności Ratunkowej SP6ZWR in Poland, namely Przemysław Bienias SQ6ODL, Włodek Tarnowski SQ6NLN and Michał Lewiński SQ6KXY participated in locating *Cyanophyta II*. While I have not engaged directly with these radio amateurs and therefore have a limited understanding of their involvement in the recovery of *Cyanophyta II*, a short video they posted on social media documents the minutes before the sculpture was found. The video shows Bienias and Tarnowski driving through narrow dirt roads in a conifer forest as the sun is setting, talking excitedly while the audible bursts of APRS data emanating from a transceiver on the dashboard grow more distinct. One has the sense of a sounding-out of something that is only a burst in the radio spectrum yet is increasingly palpable as something concrete. The trackers turn down a smaller dirt road, branches caressing the sides of the vehicle. This leads them meandering among the pines until they agree they are close enough to walk. As they leave the car, enter the dim forest, and finally discover the sculpture hanging deflated half-way up a tall pine tree, they exclaim "*Mamy mamy mamy!*" or "*We found it, we found it, we found it!*" (Klub Łączności Ratunkowej, 2018). A sense of their elation is tangible through the high-pitched

tones of their voices and the wobbling of the camera. They grin excitedly and give thumbs-up and high-fives to the lens. After reporting their success to the *Aerocene* coordinators, they retrieved the sculpture and its payload (including all reflectors, the GoPro, solar batteries and tracker) from the tree, and eventually brought it to a house where the components were meticulously weighed, and damage was assessed, before the assemblage was mailed back to Berlin.

How can we understand the visible and audible elation of the radio amateurs from Klub Łączności Ratunkowej? Is it a product of the chase? Are their feelings related to the re-materialisation of an entity that floated to the stratosphere and back? If, as Ahmed (2014a; 2014b) shows, emotions are mediated by memories, the amateurs' elation is perhaps a result of previous experiences in radio-based tracking and chasing. In other words, "feeling is shaped by contact with the memory" as Bienias and Tarnowski locate an aerosolar sculpture that is not dissimilar from other high-altitude balloons frequently tracked by radio clubs (Ahmed, 2014a: 7). Nevertheless, in their display of emotion in the short video, Bienias and Tarnowski show how intensities of attachment to processes or entities "work to align individuals with collectives" (Ahmed, 2004: 26). Like the aerosolar practitioners who launched and followed the *Cyanophyta* twins, so too were the radio amateurs affected by the emotional arc of the aerosolar journey, and therefore temporarily 'aligned' with the collective of *Aerocene*. This 'alignment' shows that novel coalitions, however fragmentary, may take shape in the sharing of common attachments to atmosphere irrespective of a common language, cultural references or equivalent politics.

In the hours after the recovery, news of the success spread across aerosolar networks in Europe and around the world. Some felt relief and went to bed, while others celebrated long into the night. For an evening, members of Klub Łączności Ratunkowej participated practically and affectively in the experiment; in doing so, they contributed to the endurance and cohesion of the *Aerocene Community*. To better understand the significance of these achievements and alignments, it is important to consider social-affective attachment and cohesion in greater detail, crucial to

the dual senses of floating and to the choreography of emotion in the affective-meteorological atmosphere.

V Airy Impressions

In September 2016, *Aerocene* practitioners and colleagues gathered at Studio Tomás Saraceno in Berlin to hear the results of the free float of the *Aerocene Gemini*, a two-part aerosolar sculpture launched several days prior. In a room on the second floor of the studio, bodies settled into chairs pulled out from nearby desks. In the presentations that ensued, Nick Shapiro, who was a summertime *Aerocene* resident and collaborator, talked about open-source licensing and sharing protocols for *Aerocene* datasets. Sven Steudte and Thomas Krahn presented the transmitters and camera-boards they had adapted for the *Gemini*. Daniel Schulz spoke about the construction of the sculptures. Then Tomás Saraceno made a presentation of his own. Instead of highlighting the GoPro videos collected by the sculptures while they drifted to the edge of the stratosphere, he sped through photographs showing the long drive to the launch site, the unloading of cars, membranes spread on the field, many smiling faces in various poses, a sunny afternoon at the lake and a scene of waiting in his Kreuzberg apartment. He presented the social-affective texture of the day's experiment: an equal part, he suggested, of the achievement. *What we are really doing here*, he said, *is relearning how to float in the air*.

At the time, the statement struck me as enigmatic. It made me think: when did 'we' ever float? The directness of the statement, and the all-encompassing 'we', felt too abstract for the constellation of subjectivities gathered in the studio that day. I glanced around and saw tired-looking architects sitting next to production staff with knots of thread still trailing from their wrists and pockets. I remember thinking that for some people in the room and beyond it, floating was a euphemism for precarity: more than a collective feat, it evoked the inequalities of art work in Berlin at a time of neoliberal governance, rising rent prices and the erosion of artist and freelancer collectives. In Elvia Wilk's novel *Oval* (2019), staged in a near future Berlin of

artist-consultants, drug-induced generosity and dulled politics, fancy eco-homes float above the city on The Berg, an artificial mountain built on Tempelhofer Feld (the former military airfield). At the American Association of Geographers' conference in Washington DC in 2019, the three-part session on 'Floating Life' featured presentations on transient living, economic vulnerability and perennial melancholia. These examples suggest that the concept of floating is necessarily informed by the politics of location and axes of difference, not unlike notions of *weathering* (Neimanis and Hamilton, 2018). This was just as true for the post-launch art studio gathering.

In another sense, I later reflected, maybe Saraceno's statement accesses a longer, deep-time sense of floating. 'We' may have floated long ago, as other forms of life, as bacterial, spore-like, metazoan or amphibian creatures. 'We' may re-learn how to float by experimenting in the principles of buoyancy that would have enabled our ancient ancestors to surf the sulphurous oceans, ride the bubbles of pooling, shadowy rivers, or lift temporarily into the air. Indeed, the name *Cyanophyta* is a reference to the earliest micro-organisms that oxygenated Earth's atmosphere (Dór, 2018). In this sense, then, to re-learn to float would be to engage the ancient, raw and 'inexhaustible' forms of life and creativity that Rosi Braidotti (2019) calls *zoe*. It would be to re-learn a form of movement more consistent with this *zoe*-centred life, rather than the fuel burning, aerodynamic and polluting tactics cultivated by *bios*, or contemporary social life. To do so in a way that also respects difference, however, would mean attending as well to multiple dimensions of the *Aerocene* Community: to its internal differentiation, its socio- and cultural geographies, its economies of affect and emotion. It would mean privileging forms of governance that support all of the subjects and entities that join together in this community, an effort that has been the focus of dialogues in the *Aerocene* Forum and in internal discussions since the last *Aerocene* Community Summit on June 20th 2019.

By asking these questions, the dual aerostatic and social-affective meanings of floating can be further unpacked. Following Ahmed, Astrida Neimanis employs the figuration of "the trace" or "a mark, an impression" as a means to discuss "the work of politics... that signals the

imaginary that one hopes to build and sustain” (Neimanis, 2017: 176). For Neimanis, politics encompasses the invention of actions, tasks and practices needed to confront problems, however difficult this may be. To think of the work of politics as a trace that signals an imaginary is to link the confrontation of problems to imagined alternatives. Neimanis continues: “the ‘doing’ of an imaginary can’t present an imaginary wholesale, but engages the work required to keep negotiating it, and proposing it anew” (Neimanis, 2017: 176). This work of negotiation and proposing-anew is, I wager, a form of floating. To elaborate: the ‘doing’ of an aerosolar journey across continental Europe cannot on its own represent the imaginary of a post-fossil society. But as a work of negotiating the atmospheric lawscape and proposing fuel-free, wind-borne mobility, the aerosolar journey is simultaneously an experiment in aerostatic buoyancy and an effort in building and sustaining a political imaginary that also keeps many bodies, aerostatic and human, afloat.

Furthermore, for Neimanis following Ahmed, “to think about politics as a trace that marks or impresses reminds us that these traces work on bodies, situations and worlds” (2017: 176). The ‘doing’ of any political imaginary, however radical, leaves traces on those who enact this work. Just as bodies do not float in the same way or to the same degree, so too are they diversely marked by the actions, tasks and materializations of political projects. The traces of aerosolar journeys are not only registered in sore muscles and in the affective-emotional drama of the chase; they operate on the relations of bodies to subjectivities, situations and worlds. In my six years as a member of the Aerocene Community, I have witnessed how the Aerocene project weighs unevenly on different shoulders. I have also seen how the impressions left by a single aerosolar journey can cohere relationships as well as modes of working. The doing of particular tasks can nurture new efforts and investments as much as they can reproduce hierarchies, gender binaries and assumptions about the value of particular kinds of knowledge. Thus, the aerosolar journey is not reducible to the floating trajectory of an air-filled membrane; it is also the impressions of this journey on those who are trying, in so many different ways, to

float. This observation about floating is thus intimately tied up with the daily workings of the Aerocene project. For me, as a long term member of the community, it also leads to a practical insight: the future of *Aerocene as a movement* depends on a different approach to its method that asks not *whether* a sculpture will fly or *where* it will land, but *how* a nomadic and aerosolar journey can facilitate equitable outcomes for those who are doing the political and imaginative work, thus increasing the buoyancy of the community as a whole.

V Floating feelings

What is the value of floating for scholarly attentions to affective, climatic and elemental atmospheres? In this article, through the ‘free-floats’ of aerosolar sculptures, I attended to states of aerial levitation, suspension and drift. I showed how the physics, materiality and affective dimensions of aerostatic floating are intensified, absorbed, and shaped by non-aerostatic bodies. An attention to floating as the durational process of becoming-buoyant and becoming-aerial could extend to a range of other entities, from particles of dust to bubbles to the spores of fungi. While the object or mechanism is important, floating generates wider opportunities for linking an atmospheric materialism with the meteorology of affect and emotion. In other words, floating gives us a set of granular, physical descriptors for atmosphere while at the same time enlarging apprehension of the conditions of sensing and feeling. This was illustrated in the story of *15 Pegasus B* when the affective weather of the launch propagated to and from the erratic movement of the aerosolar sculpture immersed in the force-fields of the windy morning. Indeed, for Philippopoulos-Mihalopoulos, atmosphere can be understood as “a floating ontology of excess” (2013: 41) shaped by “fractal feelings that ripple across the shared skin” of body and world “without discernible origin” (2013: 39). An attention to floating sharpens our awareness of the complex ripples and affective pressures of air and atmosphere, as well as the skin-surfaces where these impressions are inevitably registered. As Trigg succinctly states: “an atmosphere is not only in the air but also under our skin” (2020: 3).

Therefore, if understood as both aerostatic buoyancy and social-affective attachment, floating offers tools to re-centre the meteorological in affective studies of atmosphere. Going one step further, however, floating has purchase for foregrounding the “ecology and materiality of the climatic... in full when we use the term ‘atmosphere’” (Verlie, 2019: 3). To recentre the climatic in studies of atmosphere, Verlie (2019) finds resources in the affective-meteorological studies of Derek McCormack, Pete Adey and Tim Ingold, yet also suggests these scholars’ attentions are too “local” and too “consistently patterned” to have “analytical relevance to a planet whose climate is undergoing rapid reconfiguration” (2019: 2). According to this logic, my attentions to floating may also have limited relevance for ‘acclimatizing’ atmosphere (Verlie, 2019). At the same time, adhering too strictly to distinctions between local and planetary, patterned and un-patterned is unhelpful. Like Susanne Gannon’s (2016) stories of ‘minor weather events’ or Timothy Choy’s (2011) ethnographic accounts of ‘air’s substantiations’, the stories I presented in this article are situated, yet they are also an ongoing refrain. This fact allowed me to diagram the ‘free float’ in stages, using vignettes from different events spread over several years. Thus, the affective and emotional texture of a floating journey – the way it impresses and traces upon bodies and subjectivities – is not only entangled with the singularities of meteorological weather but also the climatic ‘container’ or ‘stabiliser’ within which weather operates (Hulme, 2015). The affects of launching, tracing and recovering are climatic-affects: the impressions of climatic-affective atmospheres. These atmospheres are “more-than-human forces which can literally accrete, sediment, blossom, disperse, mushroom, melt, condense and precipitate” (Verlie, 2019: 3) and, I would add, hover, drift, levitate, suspend and float.

An attention to the interstices of affect and emotion as well as weather and climate through the concept of floating may inform elemental geographies, marked by a focus on categories of matter (earth, air, wind, fire, wood, metal, etc), environmental milieus (envelopes of life), volumetric media (spheres of communication) and the composition and decomposition of molecules (see e.g. Adey, 2015; Squire, 2016; Engelmann and McCormack, 2021). However, as

Peters and Steinberg observe, in the move from material to elemental, “politics and history may be left on the beach” (Steinberg and Peters, 2019: 335). Although I am unsure of the fairness of this diagnosis, it is likely that elemental geographies have not done enough to show that the elements are not abstract forces or substances: they are profoundly personal and political. Thus, taking cues from feminist theorists’ elaboration of *weathering* as a figuration, tactic and ethic (Neimanis and Walker, 2014; Neimanis and Hamilton, 2018), an attention to *floating* may advance considerations of politics, power and history as they are propagated by elemental “currents in a weather-and-water world of planetary circulation” (Neimanis, 2017: 36). In this project, figurations of floating would complicate static notions of location and difference. As Neimanis argues, due to myriad forces including those of the climate crisis, “we cannot calculate a politics of location according to stable cartographies” (Neimanis, 2017: 36). The promise of floating for elemental geographies therefore lies in its reimagining and reworking of what it means to be located and affected. Floating may help us better recognize that, as elemental beings, we are continually impressed, marked and traced by force-fields of vast reach and scope while remaining firmly planted in place and gazing upward from the ground.

Notes

¹ Initiated by Tomás Saraceno in 2015 with the launch of the first fully certified, human-carrying solar balloon – the *D-OAEC Aerocene* – at the White Sands National Monument in New Mexico, *Aerocene* has grown into an international network of practitioners from Buenos Aires to Berlin. *Aerocene* has been exhibited internationally and was featured in Tomás Saraceno’s carte blanche exhibition *On Air* at the Palais de Tokyo in 2018. It has won major commissions as exemplified in the recent *Aerocene* Festival in Munich in September 2019. In January 2020, *Aerocene Pacha* featured in an indigenous community-led protest against Lithium extraction and broke several solar and aerostatic world records when Leticia Marques piloted the *D-OAEC Aerocene* across the Salinas Grandes, Argentina. In claiming a modest role in the project, I must emphasise that I

have always worked dialogue with many other practitioners. For example, since 2014, I have worked with others to develop educational tools and pedagogies with *Aerocene* sculptures for academic and public-facing venues. I co-curated *Aerocene* Symposia at the Haus der Kulturen der Welt in Berlin; the Royal College of Art in London and the Palais de Tokyo in Paris. I was fortunate to represent the *Aerocene* Community at many museum colloquia, to author texts for the *Aerocene Newspaper, Volume I* and to co-edit the *Exhibition Road Aerocene Reader*.

² The *Aerocene Float Predictor* incorporates real-time information from 16-day forecasts of wind speeds at different altitudes. This aerosolar-float trajectory interface is a navigational tool used to plan journeys in the Aerocene. Based on a concept by Tomás Saraceno, the Aerocene Float Predictor was developed by the Aerocene Foundation in collaboration with Lodovica Illari, Glenn Flierl, and Bill McKenna from the Department of Earth, Atmospheric and Planetary Sciences at the Massachusetts Institute of Technology (MIT), with further support from Imperial College London, Studio Tomás Saraceno, Radioamateur organisations, and the UK High Altitude Society. Atmospheric data is gathered from NOAA's Global Forecast System (GFS), a numerical weather prediction system containing a global computer model and variational analysis run by the US National Weather Service (NWS). The code is open source and available via GitHub: <https://github.com/Aerocene/float-predictor>

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