

# Policing with the drone: Towards an aerial geopolitics of security

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## Abstract

This article explores in empirical detail the air-bound expectations, imaginations and practices arising from the acquisition of a new police drone in the Swiss canton of Neuchâtel. The study shows how drones are transforming the ways in which the aerial realm is lived as a context, object and perspective of policing. This tripartite structure is taken as a prism through which to advance novel understandings of the simultaneously elemental and affective, sensory, cognitive and practical dimensions of the aerial volumes within, on and through which drones act. The study of the ways in which these differing dimensions are bound together in how the police think about drones and what they do with them enables the development of an ‘aerial geopolitics of security’ that, from a security viewpoint, approaches interactions between power and space in a three-dimensional and cross-ontological way.

## Keywords

Airspace, drone, geopolitics of security, policing, power, security studies

## Introduction

In Switzerland, as elsewhere, camera-fitted drones are becoming standardized tools of policing. More than half of the 26 cantonal police corps across the country are now deploying unmanned aerial vehicles for purposes of aerial photography, observation and surveillance (Klauser et al., 2017). The cantonal police of Zurich alone use ten drones of differing types, weighing between 26 grams and 3 kilos (Wertheimer, 2018a).

The present article shows that this development generates novel ways for the police not only to look down from above and from afar, but also to look up from below. Drones establish the air as an explicit object of imagination, concern and practice, generating novel ways of understanding it, of experiencing it and of acting on it. The control of populations through ‘technologies that are fundamentally predicated on their relationship with air’ (Feigenbaum and Kanngieser, 2015: 81) has long existed. But, the article shows, the low cost and simplicity of drone usage today make the air evermore present in both frequency and relevance in the police’s everyday. Furthermore, drones also bring the air ever closer to the police’s everyday in a spatial sense. They fly lower than helicopters,

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and they can be used in places that other aerial technologies can not. Thus, as aero-technical assemblages that operate both ‘in the skies and in the minds’ (Bolman, 2016: 150), drones contribute to making the third dimension ever more relevant in the police’s thoughts and activities.

In addressing this problematic, this article explores in empirical detail the air-bound expectations, imaginations and practices arising from the acquisition of a new police drone in the Swiss canton of Neuchâtel. As part of a four-year research project on civil drone usage in Switzerland, the case study allows exploration of how the technology transforms the ways in which the aerial realm is lived, in its materialities and meanings, gaseous and affective dimensions, as (1) a context, (2) an object and (3) a perspective of policing.

Following this tripartite structure, and further pursuing an investigation initiated elsewhere (Klauser, 2021), the article makes two wider conceptual contributions to the development of a properly three-dimensional, aerial geopolitics of security. First, the drone problematic is taken as a prism through which to advance novel understandings of the multidimensionality of the volumetric spaces within, on and through which drones act, and which they contribute to perform as imagined and experienced realities. The article asks: What kinds of volumes do drones make the police inhabit?

Second, and connected with the first point, the article aims to understand more fully the role of the aerial dimension in the projection of power across and within space (Adey et al., 2013; Williams, 2013: 231). What do police drones tell us about the relation between (air)power and (air)space?

Bringing the two conceptual objectives together, the article also pursues a wider theoretical project, initiated elsewhere (Klauser, 2017), consisting in the development of a properly ‘three-dimensional approach’ to the study of the contemporary spatialities of surveillance and power in the fields of security and policing, and beyond (Klauser and Pauschinger, forthcoming).

## **Aero-volumetrics of security and power**

Academic engagements with camera-fitted drones focus predominantly on the technology’s downward-looking gaze. This provides important insight into the power dynamics conveyed by the drones’ aerial view as it falls on the ground (Crampton, 2016) and into the specific ways in which the vertical dimension makes a difference to the exercise of power and control, which Lisa Parks names ‘vertical mediation’ (Parks, 2016: 227). Yet it reduces drones to a merely downward-oriented ‘vertical geopolitics’ (Elden, 2013; Graham, 2018; Graham and Hewitt, 2013; Weizman, 2002) and misses the more complex volumetric and multidirectional spatialities (Williams, 2011b) of the technologies’ encounter with the air, which are fundamental if we are to understand fully the functioning and implications of drones as ‘unmanned aerial vehicle assemblages’ (Williams, 2011a).

This article is not the only one advancing this argument, however. In recent years, a small but growing body of work has started to relate drones more systematically to the aerial realm. Scholars have shown how drones, as ‘aero-visual techniques of power’ (Klauser and Pedrozo, 2015: 290), redefine the aerial sovereignty and supremacy of the state (Neocleous, 2013), and how they operate within, and affect, the national and international struggles between various powers over airspace (Aubout, 2011; Lacoste, 2011). Yet although questions are being asked about drones and the air, discussions on the topic remain almost completely devoid of empirical depth, and thus frustratingly speculative and generalist in tone and scope. One of the rare exceptions to this can be found in Williams’ (2007, 2011a, 2011b, 2013) longstanding investigation of military drone operations in Britain. Showing that drone-related strategies of aerial control and defence are as much about looking up from below as they are about looking down from above, Williams highlights that the drone-mediated, aero-visual ‘power projections’ (2011b: 254) must be approached in their

multidirectionalities and multidimensionalities, and encourages us to think more carefully through the complex volumetric politics of the air enacted through and acting on differing drone practices and representations. This foregrounds the instrumentality of airspace in its acting on contemporary drone practices, while also emphasizing how this very airspace is inhabited and performed by drones. In sum, Williams opens up a truly relational problematic that focuses on drones in their interaction with the volumetric spaces of the air as carefully managed sociopolitical realities in a Lefebvrian sense (Lefebvre, 1991).

Moving beyond the drone problematic, Williams' approach falls within a broader literature that has in recent years started to take seriously the question of 'what happens if . . . security has to contend with volume' (Elden, 2013: 35; also see Adey, 2010b; Graham, 2018; Graham and Hewitt, 2013; Weizman, 2004). As Peter Adey puts it, 'securing the megacity is a battle of dimensions' (Adey, 2010b: 53). This line of investigation has great merits, not only in that it opens up a wider reflection on the aerial realm as a geopolitical space that is lived, experienced and sociopolitically produced in highly unequal ways, but also in its attention to the ways in which the air is bound up with and mediates action on the ground (Adey, 2010a; Elden, 2013). Regarding the latter, consider Steve Graham's work on the USA's aerial bombing of Baghdad (Graham, 2018) or Adey et al.'s (2011) analysis of the dynamics of distance and reach implied by aero-mediated remote control systems, which change both the conception of and action on the terrestrial 'air target' (2011: 174). This power-sensitive investigation of the unavoidably earthbound digitization of the air is pushed yet further in Dodge and Kitchin's study of the aerial logics of software, relating to airtravel (Dodge and Kitchin, 2004). The aerial realm is here depicted implicitly as an 'electrosphere' (Weibel, 2012) – i.e. as an orbital environment of circulating data that is linked intrinsically to informational infrastructures on the ground.

Despite this growing body of work, however, issues of airpower in general (Butler, 2001; Campbell, 2009; Grosscup, 2006; Omissi, 1990), and in connection with drones or other digital technologies more specifically (Neocleous, 2013; Williams, 2011a, 2011b), are approached almost exclusively on macro and meso scales, revolving around the policing of populations as a whole (Neocleous, 2013; Shaw, 2016), volumetric geometries of military occupation and conflict (Gregory, 2011; Kaplan, 2006), issues of state sovereignty and the organization of global flows, or communication and transport systems. There is now also a growing body of empirical research that focusses on specific moments and practices in the making of aerial geopolitics, such as military air shows (Rech, 2015), trade fairs of aerial weaponry (Jackman, 2016) or artistic engagements with the air and issues of air power (Engelmann, 2019).

Yet these existing accounts of the 'geopolitics of air' (Adey, 2015: 56) usually lack the degree of close empirical detail necessary to unravel the complex volumetric spatialities of control and power as they play out in more mundane situations and moments of everyday life. Addressing this specific research lacuna, this article foregrounds the ways in which thinking about and using drones enables the police to discover the complex voluminosities of the more mundane micro-spaces of day-to-day policing, from the confined interior spaces of buildings to be searched for explosives or hidden criminals, to the micro-spaces above and around car accidents or buildings on fire. Pursuing Peter Adey's claim regarding the need 'to expand our knowledge of airspaces and the social relations they enhance and make possible' (Adey, 2010a: 15), the Neuchâtel case study affords insight into how digital technologies transform the ways in which the air is encountered and inhabited as a contested space of risks, opportunities and power. This allows a more nuanced conceptualization of the techno-mediated knowledge practices that bring the airspace into being not only as a problem of governance or state security, but as a lived, everyday reality. As Adey puts it, 'airspaces are uneven, distributed, vertical and horizontal. They are domains and doings, performing different shapes and geometries of insides and outsides. Furthermore, they are particularly environmental,

vital and immersive' (Adey, 2010a: 207). This is exactly how the drone-mediated 'aerial geographies' (Adey, 2010a: 11) of Neuchâtel police are approached here.

In this endeavour, this article is particularly sensitive to another literature, which has in recent years started to take the matter of the air more seriously in its simultaneously meteorological and affective dimensions (Adey, 2015: 55; Adey et al., 2013; Ingold, 2006). In particular, this article connects with Derek McCormack's seminal analysis of the hot air balloon, as a mediator that renders the air explicit as a meteorological, but also as a socially relevant, political, techno-scientific and indeed affectively laden reality (McCormack, 2008, 2018).

By analogy, this article highlights how drones raise police awareness of the air, as both a 'turbulent zone of gaseous matter' and as 'a quality of environmental immersion that registers in and through sensing bodies while also remaining diffuse, in the air, ethereal' (Adey et al., 2013: 301). Moreover, the article shows how these two levels intersect with the more practical and pragmatic dimensions of the air, as an object and perspective through which to 'structure the possible field of action of others' (Foucault, 1982: 790), i.e. as a 'space of power' in a Foucauldian sense. Put differently, the present investigation of how drones mediate the police's relationship with the air pays attention not only to how the air is engaged in specific practices, perceptions and imaginations, but also to how it is embodied as a 'persistent material or meteorological presence, either real or imagined, which envelops or unsettles the human subject [here: the police]' (Gandy, 2017: 355). Theoretically speaking, this then leads to a conceptualization of the air that cuts across diverse ontological – affective, elemental and practical – realms.

## Case study of Neuchâtel police

Under Switzerland's federalist structure, each cantonal police corps decides itself what technology to deploy, how and for what purposes, based on the canton's needs and specific cantonal police legislation. The country's federalist structure thus designates a particularly high degree of autonomy to the regional (cantonal) level in matters of policing, which stands in stark contrast to other countries such as the UK and France, for example. However, there are also some mechanisms and institutions, such as the 'Conférence des commandants des polices cantonales' (KKPKS) [the federation of cantonal police commanders in Switzerland], which support nation-wide policy coordination in public safety matters. With regard to police drones, in 2017 the KKPKS produced a confidential report on the usage of the technology, resulting in a series of recommendations that were acknowledged by interviewed police officers from Neuchâtel police.

In the canton of Neuchâtel, the first police drone was bought in 2012 for the police's intervention squad (Pedrozo and Klauser, 2019). Other drones were added in the following years, mostly for the purpose of aerial photography of car accidents, based on the cantonal police law, revised in 2014. However, restrained by their restricted flight autonomy and by the absent possibility of real-time monitoring, the deployment of these drones remained limited and sporadic, leading the police in 2015 to set up a working group, with a view to acquiring a technically more sophisticated drone that could serve a wider range of purposes, from law enforcement to surveillance and rescue missions (Police Neuchâteloise, 2016). Thus between 2015 and 2018, drones became a strategic police priority on both a cantonal and national level in Switzerland.

A total of six representatives from differing police units took part in this working group, including the police's intervention, tactical operations, traffic security, forensic sciences, anti-narcotics and law enforcement units, leading to a police-wide reflection on the usefulness of the technology. On 20 September 2018, based on the working group's final report (Police Neuchâteloise, 2016), the cantonal police authorities allocated 60,000 Swiss francs for the purchase of a new drone (République et Canton de Neuchâtel, 2018).

Facilitated by long-term research relations with the Neuchâtel police, the author of this article was allowed insight into all of the stages of the Neuchâtel police's working group, alongside a PhD student engaged in a four-year research project on drones, funded by the Swiss National Science Foundation (2016–2020). A total of ten in-depth interviews were conducted with members of the working group and other police representatives linked to the use of the technology. More specifically, the interviewees were chosen from the following police units, all of which played an explicit role in the police's drone usage:

- Traffic Security Unit
- Tactical Operations Unit
- Anti Narcotics Unit
- Forensic Science Unit
- Law Enforcement Unit
- Intervention Squad
- Unit for the Security of the Watchmaking Industry.

Furthermore, the case study also included extensive non-participant observational research (partly video-recorded) in a variety of settings, from presentations given by drone sellers to internal training sessions and deployments of the older drones.

The information collected on these empirical grounds was completed through the study of (1) official documents, reports and grey literature from the police, (2) local, national and international media articles and (3) websites of relevant stakeholders. Finally, conversations held with other police forces, for example in the canton of Bern and on a federal level, also provided important information about a range of contextual issues and debates surrounding the police usage of drones in Switzerland. While these will not be explored in detail in this article, they provide essential background insights for the analysis outlined below.

## Analysis

The police officers who were interviewed and observed during the working group meetings, training sessions and actual drone operations made constant reference to the air. Drones gave them all kinds of reasons to relate to the air, as a space that becomes police relevant in various ways. Consider the following quote, taken from the working group's final report:

Undeniably, the 'view by the airs' [vue par les airs] offers an interesting perspective, because it modifies the appreciation and apprehension of a space that is at present barely accessible in the police's everyday. The view from above offers an angle of vision extraordinarily different from that on the ground. Drones dispel the exceptionality of this perspective and make the third dimension truly accessible, given that they are now easily available and deployable in numerous types of missions. (Police Neuchâteloise, 2016: 14)

The quote's testimony to the air's novel, drone-mediated relevance to the police coincides with findings from a quantitative survey conducted in 2017 among 920 professional drone users in Switzerland (Klauser et al., 2017). Of the survey participants from the police, 58% indicated that they would not use the airspace without their drone. For 88% of the same respondents, drones have since become indispensable as a professional tool. The technology, and with it the air, has truly made its way into the police.

The following analysis studies in more detail how, and as what, drones have led the police to discover the air. This investigation is divided into three main parts, relating to the air as (1) a volu-

metric context, (2) an object and (3) a perspective of policing, i.e. as a police-relevant three-dimensional space in which, on which and through which to act.

Connecting with Michel Foucault's aforementioned understanding of power as 'a way in which certain actions modify others' (Foucault, 1982: 788), this offers a tripartite structure to empirically and conceptually address the relation between (police-)power and (air-)space. In turn, as outlined in the article's final section, this suggests a possible starting point for the development of an 'aerial geopolitics of security', understood as a research agenda and approach that advocates a distinct 'aero-spatial curiosity' and 'power sensitivity' for the investigation of the functioning and implications of security and surveillance.

### *The air as a volumetric context of policing*

When asked about the obstacles that most limit their drone usage, the key issue brought up by the police officers interviewed was the weather, particularly the wind. This highlights an initial, practical type of discovery of the air, as a more or less agitated 'field of moving materiality' in which to act (Ingold, 2006). The air is encountered as a set of elemental processes such as wind and rain, the lack of uniformity, stability and predictability of which become relevant to the police in new ways.

What's difficult is to have the right time, in a meteorological sense . . . But there's some stability in its [the drone's] position and altitude. . . . Gyroscopes will compensate for the strength of the wind so as to maintain the drone's position. That's what makes the strength of this model. We can take pictures with up to 40 kilometres per hour of wind and we can still fly with up to 50 kilometers per hour of wind. That's quite enormous for this kind of machine. (Interview 4)

The account sets two types of agency into relation with each other: the drone's software-mediated ability to fix and stabilize its position, and the air's 'animate agency' (McCormack, 2008: 415) that unsettles the technology's compensating efforts. The air is being discovered 'because of what it does' (Adey, 2014: 16). Its existence is felt because of its effects and is lived as a 'force field' (Kathleen Stewart, quoted in Gandy, 2017: 360) in which the police find themselves, but which they cannot fully control or tame. There is always something of the air that is withdrawn from the police's techno-mediated possibilities of action, which affects the ways in which they attempt to inhabit it.

Talking some more about the obstacles to the police's drone usage, the interviewee quoted above continues:

There's plenty of places where we cannot go with the drone: Into tunnels, under bridges. If there's a forest, there's often trees that surmount the street. So, we will have to be at 20 metres altitude and the trees might be at 4 metres or 4.50. But we won't see anything at 20 metres' height if there are trees below. And over a bridge, we won't see anything that's beneath it either. . . . In general, we're not flying in the city, because there's too many people and it's not permitted to overfly people. Normally we go on streets with little traffic. We try to avoid the traffic, although we can fly above it. But in case it [the drone] falls down, it's for your security. (Interview 4)

As the quote stresses, the air becomes an important concern of policing not only because of its volatile atmospheric infill (as a more or less agitated volume), but also because of its material contours (as a large or small, high or low volume). Tunnels, bridges and trees, as well as narrow city streets (mentioned by other interviewees), impact on the police's drone usage. This reiterates two main points. Firstly, we see that the drone-air assemblage necessarily relates to and indeed comprises the ground. The air is lived as a situated volume, and as such linked intrinsically to the

'grounded fixities of landscape' (Ingold, 2006: 17). In the preceding quote, this 'vertical reciprocity' between the air and the ground (Adey, 2010a: 3) is not only related to the materiality of the ground, but also expressed in regulatory terms, referring to the interdiction to fly above gatherings of people. There are 'uneven skies' (Adey, 2010a: 74) even for the police, which led some of the interviewee police officers to claim the need for a permanent and ubiquitous permission for drone usage, analogous to emergency services' exemptions from traffic rules (Interview 5). In short, through the technology, the police discover the air as a legally regulated volume.

This leads to the question of the spatial limits of the aero-grounded volumes discovered and appropriated by the police. Besides the place-related (material and legal) limitations of where drones can be flown, there are also a range of other factors that condition how far drones can be flown, and that limit the width and height of the volumes created by the vehicles' aerial trajectories.

What is limiting, well, is the [drone's] autonomy. And then, there's [the issue of] distance. As we must fly in visual line of sight, we must move about on the ground. If we cover a forest, we can only do a part of the forest, then we must move. We are limited. We are very precise [with the drone], but in a limited sector, whereas helicopters do searches more widely but across enormous distances. (Interview 1)

What seems to be a minor episode in the interviewee's account provides a series of significant insights with regard to the police's drone-mediated relationship with the air, i.e. 'aeriality'. Firstly, the quote reiterates that the shape and reach of the drones' volumetric spheres of action depend on the materio-legal conditions on the ground, here exemplified by the forest's obstruction of the drone's legally required visibility. Secondly, the depiction of the officers moving along the ground while looking at the sky underscores powerfully that drones instill their users not only with an air-bound mind, but also with an 'air-minded body' (Adey, 2010a: 33). As confirmed by the extensive observational research conducted in the Neuchâtel case study, the police also find themselves immersed within the air's force field in a bodily sense. In their moving corporeal positionality, they both co-perform and embody the aero-technical assemblages created.

Thirdly, the quote highlights that the dimensions and qualities of the air masses in which the police operate also depend on the drone's technical specificities, and especially on the battery's endurance. As with any mediator, drones have their own scope and limits, and as such condition both perception and practice (Raffestin, 1984). They create, yet also shape and limit, the police's 'envelopes of atmospheric experience' (McCormack, 2018: 10). As such, drones cause the police to live the air as a more or less stretched volume, streaked with internal barriers and external contours. This provides the police with a sense of immersion within a complex volumetric geometry that makes them think about all kinds of things, such as how far and how high to fly, what obstacles to avoid, how to position themselves, and so on, which complicates their 'ongoing process of imagining and re-imagining' the air (Millward, 2008: 18). In this respect, consider the drone's sonar impact on the police's spheres of action:

The problem with a drone is . . . a drone has a particular noise and everybody knows . . . ah, well, they [the police] have taken out their drone. (Interview 6)

Thus the police are well aware of the extent to which drones delimit, shape and indeed (sonorously) fill the aerial volumes in which they fly, and how this in turn then also affects the modalities of use, popular perception and efficiency of the technology.

In sum, we find here a first type of drone-mediated relationship with the air, as a volumetric context in which to act. The resulting volumes have specific elemental, sociopolitically and legally

produced qualities, place-related and drone-related limits and shapes and are connected to specific places in specific ways. They are both performed (named, imagined, practically lived and sensorily experienced) and embodied by the police and thus intrinsically bound up with power in a Foucauldian sense, as both the product and producer of police action.

### *The air as an object of policing*

The proliferation of drones for recreational and commercial purposes makes the air available not only for the police, but for social reflection and action more generally. Yet the increasing societal co-production of the air as a 'vertical public space' (Parks, 2013: 63) also raises all kinds of tensions, threats and fears. Media-reported incidents of civil drones narrowly avoiding collisions with commercial airliners powerfully illustrate this problematic (Whitlock, 2014).

From the population's viewpoint, not all drones are perceived in the same way. As shown by a public opinion poll conducted in 2015 (Klauser and Pedrozo, 2017), the majority of the population is supportive of the use of unarmed military and police drones (65% and 72% respectively), whereas relative numbers of approval decrease to 23% and 32% with regards to commercial and hobby drones respectively. As Klauser and Pedrozo conclude:

[O]f major importance here are privacy concerns and perceived security threats. It appears that the population at large perceives private drones as harmful or intrusive rather than beneficial. [ . . . ] In contrast, the appropriation of the aerial realm for public benefits – here referring in particular to military surveillance and policing purposes – is widely and somewhat uncritically accepted. (Klauser and Pedrozo, 2017: 237)

Thus, public opinion is that 'seeing like a state', to use James Scott's expression (Scott, 1998), should remain the state's exclusive privilege.

The police, as the Neuchâtel case study underscores, are well aware of this societal unease with regard to the increasing commercialization and 'hobbyfication' of the air:

It [private drone usage] is not seen positively. As people are more and more afraid of other people, it's always the same: if somebody's going to stop you to ask a question while you're driving your car, you're quickly worried, given the current context [of fear]. You're asking yourself if he's not going to rob you. So [with private drones], you might think 'will he observe me?' 'Why does he use a drone? It's noisy!' The negative aspects come out immediately. Because the mission isn't clear, I think. Because it's just for somebody's amusement. For private, commercial drone users, I think it's because they're not public entities. That's my impression. (Interview 2)

The popular perception of private drones is here set in relation to a wider, more generalized atmosphere of fear. Drones are said to be seen as intrusive, because their purposes are not clear and their benefits are not collectively defined. In contrast, drones used by public entities are presented as socially more acceptable 'inhabitants' of the air. This portrays the aerial realm as a socially contested and unequally accessible space, which is being invested with more diffuse societal feelings of suspicion and mistrust. The air is seen as a focal point of wider affective meaning, societal judgements and value projections. As Adey puts it, 'the air is more than just air but constitutive of the material affective relations that animate the experience of the city in a way which we might say is atmospheric' (Adey, 2013: 293). This inscribes the police's relation with the air within a wider, societal problematic of troublesome togetherness.

In contrast, the police interviewees themselves adopted a more pragmatic approach towards the drone-populated sky, channelled through specific risk considerations and concrete actions of control and intervention. Thus the air was seen not only as a volumetric context, but also as an object

and concern of policing (Garrett and Fish, 2016). This resonates, on a national level, with the multitude of counter-drone solutions developed and adopted by various police corps across Switzerland. Geneva police are currently awaiting a federal authorization for the employment of its two baby eagles to fight drones (Wertheimer, 2018b). In the canton of Vaud, cantonal police have bought anti-drone guns that eject nets to catch and descend other aircraft (Le Matin, 2019). And, since 2017, an anti-drone defence shield has been put in place for the World Economic Forum in Davos, including Counter-UAV Jammers that aim to incapacitate arriving drones (Moon, 2017).

As shown by the following quote from one of the Neuchâtel interviewees, the main purpose of these strategies of aerial defence is not privacy protection, but the prevention of accidents and terrorist strikes:

The public is largely mistaken about what you can actually see on drone images. Fears [about privacy] are unjustified in most cases. Frankly, you can't recognize much with a drone. They take panoramic photos, as if you'd go on a tower and then take a picture, which doesn't bother anybody. But because it's a drone, it bothers people. . . . The interdiction to overfly event venues or other gatherings is a question of security, and not a question of privacy or image rights, related to this place. . . . The Swiss Federal Office of Civil Aviation is very clear about what they want, and that's no accident. We'll report frauders because they put people at risk, and not because they take pictures. (Interview 1)

This quote is of interest not only because it highlights the police's apprehension regarding drone accidents, but also because it underscores the police's connection with other actors' air-bound agendas and concerns, here relating to the interviewee's alignment with the Swiss Federal Office of Civil Aviation and distancing from societal concern with the drones' gaze from above.

Yet, while the interviewed police officers left little doubt as to their main object of concern, they were equally clear about the actual impossibility of their task of policing the air. This brings us back to the problematic of the air's ultimate uncontrollability, here arising from the scope it offers for drone pilots to evade police action. As stated in the working group's final report, 'it must be admitted that the police in general (and this applies to Neuchâtel) do not have the means to intercept or identify the flying engine in the act' (Police Neuchâteloise, 2016: 4). Expressed as a fundamental problem in the quote, the issue at stake became a more gradual one in the observed drone operations and working group meetings. Here, various facets of the problem and solutions were discussed, from novel legislation to anti-drone operations, technologies and, indeed, public denunciations:

We're not doing any 'witch hunt', going very far up and reporting. This would require a lot of time and we don't really have this, but if there's a denunciation of a drone that's seen over a major gathering, for example, if we receive a call, we will for sure send a patrol and try to localize the pilot. (Interview 1)

Highlighting another aspect of the police's drone-related connection with the population at large, the quote reiterates that other individuals and organizations, agendas, motivations, knowledges and practices also intervene in the police's relation with the air. These actor networks must be studied in detail if we are to understand the 'complex geography of airspace management' (Adey, 2010a: 14) hence produced. Attention must also be paid to the role of specific objects such as remote controls, maps, software applications or additional sensors, that intervene in the police's drone usage. In principle, each of these entities could provide the focus of a detailed analysis of the police's aeriality 'in action', to paraphrase Bruno Latour (1987). But since it is not possible to give an exhaustive account here, just consider the example of additional sensors mounted on the drone:

We'll focus on something [a drone] that's polyvalent. Something that can transport different sensors, not only cameras, but also sensors, for example, for air measurements above devastated zones, explosions, in

factories, I don't know, there can be so many things. We can go as far as to think about transporting objects, whether for securing somebody in an inaccessible site or for crisis situations. (Interview 5)

Here, policing the air not only relates to the control of other drones in the air, but also to the very composition of the air's elemental infill. Thinking about the places, types and purposes of 'control in the air' (Weizman, 2002) made possible by adding other sensors to the drone leads the police to discover the air in yet novel, biochemical ways. Thinking through additional sensors changes the very elementality of the air, as it is imagined and perceived by the police.

In sum, through drones, the police approach the air not only as a volumetric context in which to act, but also as a pragmatically defined object and concern of policing. Hence, territorialized as a space on which all kinds of intentions and practices are focused, the aerial realm is newly invested with affective values (of fear or of hope, for example), risk imaginaries, practical considerations and strategic choices. These are connected, fundamentally, to other actors, on other societal scales, and mediated by the technical specificities of the deployed drone system. The police's aerialities of security, in both their elemental and affective dimensions, must be understood as the outcome of complex processes and interactions of people and things, ideas, intentions, values and affects. It is from and through these sociotechnical assemblages that the air becomes something on which to act.

### *The air as a perspective of policing*

As tools for aerial transportation, monitoring and other measurements, drones enable the police to act not only in and on the air, but also through it. Drones inscribe and establish the air as a three-dimensional 'conveyor of things' (Adey, 2014: 37) that changes the existing decision-making processes and practices of policing on the ground.

Resonating with Lisa Parks' work on 'vertical mediation' (Parks, 2016: 232), the airspace is being established as a realm of policing that mediates action on other action, i.e. the exercise of power in a Foucauldian sense. Moving beyond this initial account, it is necessary to study in more detail the actual spatial and temporal logics of the drone-mediated instrumentalization of the air, to understand more fully the volumetrics of policing and the wider implications it produces. The following quote starts this discussion with an emphasis on two main points:

In a crime scene, with a corpse lying in a corner, we have to preserve all traces. So what will we do? Before entering to take samples, because this is irreversibly destructive, we will use a drone to fix the site, conserve it visually. We'll recharge it [the drone], take its memory stick, and we'll have our scene in 3D. There's a company in Lausanne developing this. They've just got an award of 1 million Swiss Francs. They open up the path for machines that go into nuclear power plants, in case of an accident, into dams, tubes . . . wherever you wouldn't send a human, who'd risk his/her life or who simply couldn't go because he/she's too big, physically. . . . We're talking about miniature drones. For the police, there's important advantages to be gained here. (Interview 6)

For one, this account highlights that drones in some cases allow action on the ground simply because they do not touch it. The technology's additional value arises from its mere positioning in the air. In addition, drones are portrayed as making spaces newly accessible to police action because they can go where humans cannot. The list of examples given in the quote is of course not exhaustive. Other examples discussed in the interviews related to kidnappings and terrorist-related situations as well as criminals on the run (Interview 3; Interview 4). Taken together, the examples show not only that drones open up novel spaces of policing, but also that they qualitatively improve and functionally extend the spectrum of potential police action in these spaces. Through drones, the

police actualize more fully the potential of action they have in particular places, because these can be approached as aerial volumes.

Focusing more specifically on the aerial gaze conveyed by camera-fitted drones, it is striking to notice the variety of spatial logics of vision and visualization from above and from afar that were associated with drones by the interviewees. Taken together, these carve out a set of contrapuntal pairs of spatial logics of vision that are fundamentally intertwined and mutually beneficial, relating to fixity and mobility, verticality and angularity, linearity and scalar modulability and two- and three-dimensionality.

In the case of traffic security, for example, the drone's ability to take stable and perfectly vertical pictures of accidents at differing zoom levels was seen to offer a major advantage for the coding and analysis of an accident's logics and structure (fixity, verticality, scalar modulability). As one interviewee put it, drones offer an 'aerial perspective that shows the situation truly as it is', as opposed to the distorting view of cameras on the ground or imprecisions of eyewitness accounts (Interview 4). In contrast, most relevant from a tactical operations and intervention viewpoint were the abilities to observe particular sites or situations from different angles without being discovered (mobility and angularity), to screen larger zones in rescue missions and to follow individuals or groups on the ground (linearity and mobility) (Interview 1; Interview 3).

Thus, different purposes of drone usage are tied up with different spatial logics of watching, resulting in different types of engagements with the air through practices of control and observation. In this respect, also think back to the preceding quote's reference to the possibility to visualize and reconstruct three-dimensional scenes with drone imagery. Here, the drones' spatial logics of vision and visualization are approached not merely as a downward-looking aerial gaze, but as a way of seeing that provides a multi-dimensional and thus more immersive experience and understanding of the observed and visualized reality on the ground. Rather than a mere downward-looking, vertical perspective, drones offer a complex 'distanciated volumetrics of surveillance' (Williams, 2013: 238) that mediates action on the ground in varied and variable ways.

A similar conclusion can be drawn with regard to the temporal logics of the police's use of the drone gaze. Consider the following quotes:

For the fire department, as much as for the police, drone images can orient the angle of attack of a fire. So here we're in the present, for the fire fighters. But retrospectively, for the police, it would without doubt allow the understanding of the origin and evolution of the fire. From the ground, what do we see when we see a fire? We see big flames on top, we don't see what happens on the ground. . . . This would also help us, for example, to film the onlookers. With acts of arson, the incendiary is often amongst the onlookers. So for different aspects, just considering the case of fire, a drone offers a vision that is quite extraordinary. (Interview 5)

This would be to take pictures from buildings to prepare intervention scenarios in advance. That's the essence. Or maybe, if we prepare a public rally . . . if we have time to do it, we could go before with the drone and take pictures of the sector that interests us. (Interview 1)

The two quotes show that drones also inscribe the air in specific temporal logics of action relating to the present, past and future, and articulate these in particular ways. As mentioned in the first quote, drones can be deployed in real time, with or without the intention of using the images later for the elucidation of a crime or for a better understanding of the inherent logics of the events observed. Furthermore, as shown in the second quote, images can be taken to mediate future action relating to an event that is either planned, as with a public rally, or more hypothetical and imagined. Regarding the latter, a striking example of anticipatory drone usage observed in the Neuchâtel case

study consisted in the aerial photographing of a local prison, to establish more detailed intervention scenarios and plans to be used in case of a prison escape.

Thus, differing temporal logics of drone usage are bound up with differing ways of channeling the actions of other police units or of acting on the actions of other individuals or groups. Yet although drones were often praised as tools for more focused and relevant policing, they were also seen to have their own limits and thus inscribed within wider dispositifs of policing. Regarding the problematic of visibility, in particular, the complementarity of differing tools and positions of vision offered by drones, helicopters, CCTV or handheld cameras on the ground was stressed.

To summarize, through drones, the police discover the air as a functionalized perspective of policing that contributes to wider dispositifs of security and surveillance. The air is engaged in specific ways in which certain actions modify others. This instrumentalization of the air is vital to the process of claiming it as relevant to the police. In particular, the visual functioning of drones engages the air in variable spatial and temporal logics of policing, relating to fixity and mobility, verticality and angularity, linearity and scalar modulability as well as to the past, present and future. These logics must be placed centre stage if we are to understand how drones intervene in specific situations as aero-visual techniques of power, and the wider implications of this.

## **Towards an aerial geopolitics of security**

Taken together, the three levels of analysis above highlight the complexity of factors that contribute to the police's drone-mediated relation with the air as a volume (1) in which, (2) on which and (3) through which to act. As shown, the appropriation of the air as the object of specific practices, knowledges, and intentions of the police, plays out in spatially and temporally differing ways, depending on the specific purposes of policing involved.

In addressing this problematic, the research approach adopted here was to focus on the micro-scale, exploring the drone-mediated encounter with the air on the level of the police's everyday. Yet the aim pursued was not only to provide isolated insights into the volumetrics of policing in particular settings and sites, but also to reinstate this question as part of a broader problematic: the role of the air in contemporary policing. From this, a yet broader ambition can be derived, consisting in the development of a properly 'aerial geopolitics of security', understood as a research agenda and approach that advocates a distinct 'aero-spatial curiosity' and 'power sensitivity' for the investigation of the functioning and implications of security and surveillance. Relating to this endeavour, three main points can be highlighted. These should be considered as preliminary arguments that need to be further refined and substantiated through future empirical studies and conceptual engagements.

Firstly, the Neuchâtel case study highlights the multifold and complex ways in which the air and the ground are tied together in mutual reciprocity. As shown, the usage of camera-fitted drones not only allows action on the ground in differing spatio-temporal ways, but also depends on the material and legal conditions of the ground, which delimit and shape the drone-mediated aerial volumes. The very functioning of drones combines entities in the air and on the ground. Analogous to Peter Adey's study of air travel, drone flight 'is both constituted by and expressed in a set of geographies, infrastructures, relations and processes that connect both land and air' (Adey, 2010a: 8). This exemplifies and reiterates that a study of how policing permeates and works through specific settings and places must take into account both the earthly and aerial realms in their mutual imbrications.

Secondly, the Neuchâtel case study underlines powerfully that the 'air' must be approached simultaneously in its elemental and affective, cognitive, practical and embodied, performed and performative dimensions. The drone-mediated aerial volumes studied above have corporeal volume, shape and agency, material and sonar infill; they are touchable and experienced as immersive environments, lived as delimited and internally structured realities, invested with affective and

cognitive meaning, objectified and instrumentalized through specific intentions and practices, related to the bodily positioning and sensory experiences of the subject on the ground, and ultimately experienced as reaching beyond the police's scope of control and influence. In sum, the article sheds light on the complex relational configurations of material and immaterial realms, practices, affects and imaginations, from a wide range of actors, that co-produce and result from the present-day encounter of police drones and the air. From this derives a wider ambition for future research, which is to think more carefully about the interactions between these differing levels and dimensions, and to gain a more elaborate understanding of the pluridimensionality of the volumetric spaces in which, on which, and through which power is today being exercised by – but not only by – the police.

Thirdly, and of central importance to the article's programmatic claim regarding the possibility of an aerial geopolitics of security, the Neuchâtel case study established in differing ways a relation between the air and power. The very structure of the article can be read as an initial organizing framework for a more systematic engagement with the ways in which the air is bound up with the exercise of power, as the context, object and perspective of action on other action. More specifically, the case study has again and again depicted the aerial realm as a space of power that is lived, experienced and sociopolitically produced in highly unequal ways, and that mediates the exercise of power in differing ways and on many levels. The airspace appears not only as a locus and object, but also as a tool and producer of power.

For future research, one central challenge in this respect will be to think more systematically about the vocabulary needed for capturing the multi-dimensional, volumetric power geographies of the air and of the ground (and indeed of the underground) that shape everyday life in the digital age. Indeed, the drone problematic reiterates powerfully the need to think of the spatial logics of security and surveillance not only on the basis of two-dimensional spatial figures, which prevail in existing literatures, but also in terms of three-dimensional metaphors. Securitization and surveillance strategies do not just separate and organize distinct physical surfaces; they also create and maintain carefully defended spherical volumes, in both elemental and affective senses. The importance of this point has not been fully appreciated by literatures dealing with issues of power and space, and the present article has but started to address this issue. The path is as yet lightly travelled, and the adopted perspective on police drones must of course be broadened in future work. This will also allow a move beyond the advocated 'aerial geopolitics of security', to develop a proper 'aerial geopolitics', more generally speaking.


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