Geogr. Helv., 80, 229–239, 2025
https://doi.org/10.5194/gh-80-229-2025

+ GEOGRAPHICA HELVETICA +

Aerial legacies of COVID-19

Francisco Klauser

Institut de Géographie, University of Neuchâtel, Espace Tilo-Frey 1, 2000 Neuchâtel, Switzerland

Correspondence: Francisco Klauser (francisco.klauser@unine.ch)

Received: 5 March 2025 – Revised: 28 May 2025 – Accepted: 2 June 2025 – Published: 25 August 2025

Abstract. Based on examples taken from Switzerland, the paper offers an exploratory analysis of how the fight against COVID affected the societal relevance of the air, in its (1) elemental, (2) embodied, (3) affective, (4) socio-technical and (5) power-related dimensions. Together, these levels highlight the fact that the fight against COVID-19 increased the air's relevance as a focal point of societal concern and judgement and of competition and dispute, which in turn produced novel ways of ordering the air through legally, practically and materially defined geometries, internal structures, and contours. As the paper shows, these geometries of the air were and still are socio-politically produced in highly unequal ways. To date, they remain inherently pluralistic and as such fundamentally conflictual. The aerial legacies of COVID-19 are invested by various power relations that need critical attention.

> Over 150 years ago, the risks of waterborne diseases such as Cholera were tamed by the public provision of clean water. We argue that similar efforts are warranted to provide clean indoor air for all by removing the threats posed by airborne diseases such as COVID-19, influenza and tuberculosis … Our panel of scientific experts strongly recommends that the clean air needs of offices, schools, theaters, public buildings, and mass transportation systems be assessed and that measures be taken to ensure clean air in all indoor environments. (Expert group "Pandemic-proof buildings", 2022:3)

The preceding quote underscores the centrality of the issue of the air in the legacies of the fight against COVID-19. Aiming to perpetuate the lessons learnt from the respiratory disease, the quoted white paper asks for the development and implementation of a wide range of novel and/or improved air-related technological solutions whilst also suggesting, on a more general level, the establishment in Switzerland of a National Research Programme on "Clean air for pandemic-proof buildings" and the creation of an "Indoor air competence center" (Expert group "Pandemic-proof buildings", 2022:4). The emerging post-pandemic policy agenda resonates with many other media-reported claims for long-term improvements of the indoor air quality in schools (Direction de la formation et des affaires culturelles, 2022; Eykelbosh, 2022), factories (Wirth, 2021), hospitals (Bourban, 2022) or trains (Monay, 2022). Also think of the ongoing debates about the wearing of face masks on public transport and other spaces of togetherness and micro-movements (Zhang and Zhai, 2022), and consider the discussions about the future usefulness of the materials deployed and lessons learnt from the access-control and social-distancing measures that created a patchwork of more or less hermetically enclosed and internally redesigned "bubbles of shared breathing" through which and in which movement was allowed to happen during the COVID years (Jubin, 2022; Lee and Eom, 2023).

These examples reiterate the aerial sensitivity that remains from the fight against COVID-19. Thus if we are to understand and question the legacies of the fight against COVID-19, such is my basic argument, the question of the air must be placed centre stage. More specifically, based on examples taken from Switzerland, the paper offers an exploratory analysis of how the fight against COVID affected the societal relevance of the air, in its (1) elemental, (2) embodied, (3) affective, (4) socio-technical and (5) power-related dimensions. Together, these levels highlight that the fight against COVID-19 increased the air's relevance as a focal point of societal concern and judgement and of competition and dispute, which in turn produced novel ways of ordering the air through legally, practically and materially defined geometries, internal structures, and contours. As the paper shows, these geometries of the air were and still are socio-politically produced in highly unequal ways. To date, they remain

inherently pluralistic and as such fundamentally conflictual. The aerial legacies of COVID-19 are invested by various power relations that need critical attention.

1 Objectives of the paper

My discussion of the aerial legacies of the fight against COVID-19 pursues three broad objectives. First, the paper adds, literally, a third dimension to existing studies of the ways in which the fight against COVID-19 affected the management of differing logics, means, places and infrastructures of social life (Klauser and Pauschinger, 2022). All too often, existing studies approach the concerned spaces as somewhat incorporeal networks of flows or enclaves of togetherness, hence forgetting the inherent volume of the geographical locales in which and through which social life is being governed. The present paper complements these literatures in addressing the concerned spaces of the everyday in a properly volumetric, i.e. three-dimensional, rather than in a merely flat, i.e. two-dimensional, way.

Second, the paper pursues the ambition to think more carefully about the interactions between the differing (elemental, embodied, affective, socio-technical and power-related) dimensions of the air 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, including in the context of respiratory disease. The different levels of analysis that structure the present paper can indeed be understood as one possible organising framework for a more comprehensive conceptualisation of the air as a multifaceted reality, which both affects and is being affected by everyday social life.

Third, my aerial take on the lessons learnt from the fight against COVID also contributes to our understanding of the concept of the "legacies", both in general and with regard to the fight against infectious disease more specifically. Namely, the paper shows that the legacies of the fight against COVID-19 must be understood not merely as a set of somewhat abstract lessons learnt or rearticulated ways of thinking and/or acting but as more or less stabilised, multi-layered assemblages of heterogeneous entities (ideas, practices, objects, people, technologies) in which space itself (here, in its aerial dimension) plays a fundamental role. This invites a conceptualisation of the legacies of COVID-19 as aero-material assemblages, whose assimilation is reconstituted and re-enacted through multiple channels and at multiple sites.

This relational and processual take on the concept of the legacy connects with a growing literature that foregrounds the complex procedures and relationships shaping and underpinning policy learning (Rose, 1991; Bennett and Howlett, 1992). Interventions by Larner and Le Heron (2002), Peck and Theodore (2001, 2010), and McCann (2011) have emphasised the need for research that adds empirical depth and theoretical nuance to our understanding of the process of policy circulation itself, thus drawing attention to the mediated processes and relationships through which policies are channelled, assembled and enacted. In the present paper I want to push this question further, in asking what role the relations to the air play in this. There are two main reasons why I hereby use the concept of "assemblage" as a heuristic tool.

The first reason is one of overall posture. My interest lies in the fundamentally relational and processual understanding of "assemblages" as stabilisations of socio-material relations (Müller and Schurr, 2016:220). As Anderson et al. put it, "assemblage terminology speaks of the processes of composition that produce durable orderings" (Anderson et al., 2012:175). Applied to the question of the aerial legacies of COVID-19, this relational sensitivity invites a focus on how the fight against the pandemic has produced novel, more or less stabilised, and socio-politically ordered ways of relating to the air.

The second reason relates to the concepts of mediators and mediation, which are placed centrally in assemblage thinking as we find in actor network theory (Jasanoff et al., 1995; Callon and Law, 1997; Callon et al., 2001; Latour, 2005). Mediators are conceived of as the human and non-human entities that participate in the relational composition of a given reality. If mediators make relations possible, it is argued, they also condition and limit them. Mediators are "endowed with the capacity to translate what they transport, to redefine it, redeploy it, and also to betray it" (Latour, 1993:81). For my purposes, one of the advantages associated with the concept is that it entails attention to the ideas, values, tools and technologies (thus immaterial and material mediators) that contribute to the stabilisation and ordering of the aero-relational configurations that remain from the fight against COVID-19 and that tie together in novel ways the governance of the air and the governance of human movement.

2 Governance of the air

The paper's interest in the aerial legacies of the fight against COVID-19 connects with a growing body of work that highlights and questions the manifold connections between power and the air. There are two particular strands of investigation to foreground. On the one hand, there is a rapidly growing literature that approaches the aerial realm as a geopolitical space that is lived and socio-politically produced in highly unequal ways (Adey, 2014, 2015), whilst also pointing at the ways in which the air is bound up with and mediates the exercise of power onto and on the ground

(Adey, 2010; Elden, 2013). Studied examples range from aerial warfare (Graham, 2016; Kaplan, 2018) and defence (Williams, 2007, 2011a, b, 2013) to various techniques of policing from and through the air such as drones and other air-bound surveillance technologies (Klauser, 2021). Portraying the air as an object, stake and perspective of techno-mediated practices of control and power (Dodge and Kitchin, 2004), these investigations connect neatly with the aerial sensitivity adopted in the present paper. They exemplify that the control of populations through "technologies that are fundamentally predicated on their relationship with air" (Feigenbaum and Kanngieser, 2015:81) is nothing new. Yet the fight against COVID-19, I claim, has made the air ever more present and deeply rooted in the governance of everyday life, in both frequency and relevance. The aim of the present paper is to discuss how (mediated through what) and on what levels (elemental, embodied, affective, socio-technical and power-related) this has happened.

In recent years, this concern for the ways in which the air is bound up with power has also been addressed in political ecology, which has insisted for example on the politics of air pollution (Veron, 2006; Ghertner, 2020) and dust (Nieuwenhuis and Nassar, 2018). Furthermore, there has been an increasing sensitivity to the "politics of enclosed air", as we see it in shopping malls and other air-conditioned environments (Marvin and Rutherford, 2018). Together, these literatures underscore the importance of a properly multi-scalar approach to the "political ecologies of air" (Graham, 2015).

Whilst I take up the relational and power-sensitive problematic of the air from these literatures, I push it beyond the often predominant focus on the military and politico-legal realms, insisting instead on the everyday engagements with the air by differing public and private actors in the aftermath of the exceptional measures adopted in the fight against COVID-19. Pursuing Peter Adey's claim "to expand our knowledge of airspaces and the social relations they enhance and make possible" (Adey, 2010:15), the paper affords insight into how COVID-19 transformed the ways in which the air is encountered and inhabited as a contested space of risks, opportunities and power in daily life. This allows a conceptualisation of the techno-mediated knowledge practices that bring the air into being as an individually and collectively lived reality. Conceptually speaking, this means that the aerial legacies of the fight against COVID-19 are set in relation not to politics exclusively but to power in a Foucauldian sense more broadly (Foucault, 1982).

Furthermore, the paper is interested not merely in the air as socio-political and politico-ecological reality, but also in the elemental and affective dimensions of the aero-spatial volumes within, through and on which social life is governed. In this endeavour, the paper draws upon a second line of engagement with the governance of the air, which approaches the air in its simultaneously meteorological, elemental and affective dimensions (Ingold, 2006; Adey et al., 2013). Of particular importance here is Derek McCormack's analysis of the hot-air balloon, as a mediator that renders the air explicit not only as a meteorological, but also as a socially relevant, political, techno-scientific and affectively loaded reality (McCormack, 2008, 2018). A similar, if more generalist, reflection can be found in Peter Sloterdijk's work on situations where air becomes explicit as an object, perspective and mediator of power (Sloterdijk, 2016). Connecting with these literatures, the paper's interest in the ways in which COVID-19 has made the air relevant follows in particular the path outlined by Peter Adey's search for an "elemental geography of air" (Adey, 2015:71). As Ade 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, 2010:207). Thus, Adey asks for an account of the air that foregrounds the materialities, imaginations, knowledges, and sensations through which the air is being experienced as a volume, i.e. in which people feel properly immersed. In what follows, this is how the aerial legacies of the fight against COVID-19 will be approached, as a (1) elemental, (2) embodied, (3) affective, (5) socio-technical and (6) power-related reality.

3 The air as elemental reality

The initially quoted white paper on "Pandemic Proof Buildings" draws a number of air-related lessons from the fight against COVID-19, ranging from the wearing of face masks (to prevent the release of pathogens into the air) to ventilation (to dilute contaminated air), filtration (to remove aerosols) and disinfection (to purify the air, for example through UV light). What these recommendations have in common is that they approach the air as an elemental reality that embraces and impacts on social action, given its role in the virus' transmission. Rather than being understood as a passive background structure, the air is understood as an active conveyor of things, whose qualities (freshness, composition, circulation, etc.) must be managed in careful ways, as an object and stake of governance. Health policy thus becomes an affair of "control in the air" (Weizman, 2002), which aims to measure and monitor the very composition of the air's elemental, bio-chemical infill.

In addition, policy recommendations during and after the COVID years not only focused on the air's elementality as an issue of governance in itself, but also included novel regulatory measures of the ways in which people were allowed to inhabit the air's elementality, for example in terms of how many breathing individuals were allowed to enter into a specific air bubble or how far away from each other these individuals had to keep. As the Swiss government put it,

> The risk of infection is increased when you are in close contact with other people. This is because when they sneeze or cough, and even when they just speak or breathe more heavily, people release

> more droplets and aerosols into their immediate vicinity. So by keeping your distance from others, you can reduce your risk of infection. (Federal Office of Public Health, 2023)

In the quote, the air's atmospheric infill is not taken as something stable or fixed but set in relation to human presence, action and movement. The aim is to minimise the risks associated with joint breathing in confined spaces of togetherness, such as trains, buses, railway stations and other publicly accessible buildings. By way of example, consider the discussions of the Swiss Federal Railways about the future usefulness of the plexiglass walls installed in travel centres for the physical separation of micro-aerial environments.

> For the time being, we are not planning to dismantle the plexiglass panels in our travel centres. But what is for sure: The plexiglass panels will not be disposed of but stored, so that they can be reinstalled swiftly if need be. (Swiss Federal Railways, cited in SRF, 2022, my translation from German)

The example underscores the ongoing, COVID-mediated encounter with the air as an earthbound, more or less stretched elemental volume, streaked with internal barriers and external material contours (walls in buildings, plexiglass separations, predefined corridors, etc.) that affect the air's circulation and freshness and thus "animate agency" (McCormack, 2008:415) in the virus transmission. These volumes remain relevant in the post-COVID era in their specific elemental qualities and place-related limits and shapes. Put simply, what remains is a sensitivity about, and relation with, the air, as an elemental volume that has all kinds of qualities and that is linked in manifold ways to the grounded fixities of the built environment. This "vertical reciprocity" between the air and the ground (Adey, 2010:3) exemplifies the point that a study of the legacies of COVID-19 must consider both the earthly and the aerial realms in their imbrications. This point is dramatically underplayed in existing scholarly research.

4 The air as an embodied reality

Debates in the aftermath of COVID-19 about the continued usefulness of face masks in places of togetherness and movement (Quiquerez, 2022; Toninato, 2022; ATS, 2023; Walter, 2023) underline that the post-pandemic policy concern and popular awareness of the air not only plays out on an elemental level, but also approaches the air as an embodied volume that registers in and through sensing and breathing bodies. Also consider the recommendations included in the ongoing COVID campaign, funded by the Swiss Federal Office of Public Health with over CHF 51 million for the period of 2023–2026 (Simap, 2022).

A first aspect to highlight from the poster shown in Fig. 1 relates to the policy recommendations with regards to the "right" way to sneeze and/or cough. In educating people how

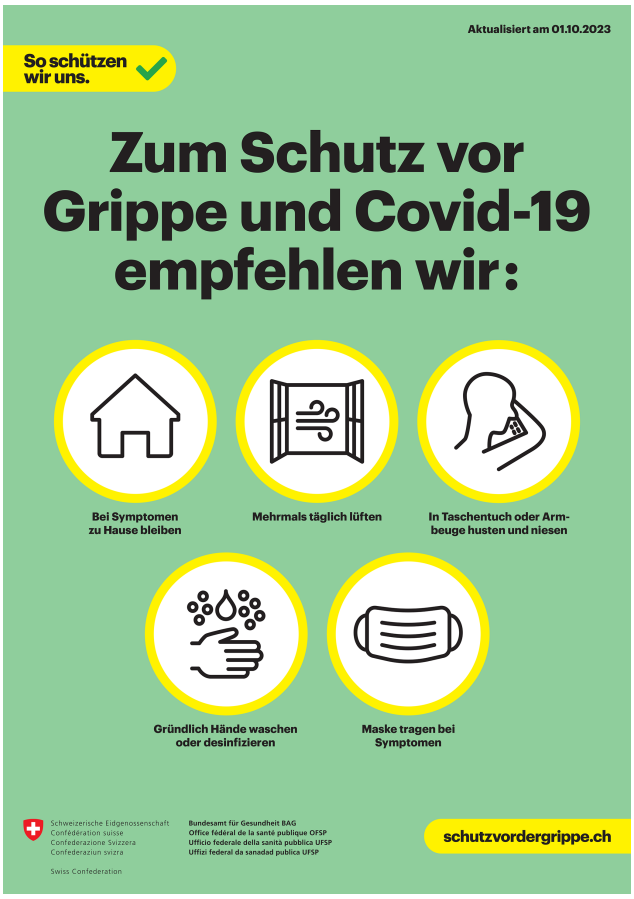

Figure 1. Ongoing COVID campaign in Switzerland in 2023 (BAG, 2023).

to behave in case of sickness, in their corporeal positionality and gestures, the point is to instil the population not only with an air-bound mind (the air as a cognitive reality), but also with an "air-minded body" (Adey, 2010:33) (the air as an embodied reality). People find themselves immersed in a bodily sense within the air's "force field" (Stewart, in Gandy, 2017:360).

A second aspect, symptomatic of the legacies of COVID-19, is that the above quote standardises COVID- and influenza-related recommendations. In both cases, it appears that the qualities and riskiness of the air also depend on people's earthbound positioning and corporal gestures. In transposing the COVID recommendations and lessons learnt to the fight against influenza, the post-COVID health campaign provides the population with a continued sense of immersion within a complex volumetric geometry that makes them think about all kinds of things, such as how to cough or sneeze, when to wear a face-mask, what situations to avoid, or how to position themselves. All of these aspects play out on a markedly individual, body-related level. An investigation of the aerial legacies of the fight against COVID-19 must look not only at how the air is engaged in specific practices, per-

ceptions and imaginations, but also at how it continues to be established as a "persistent material or meteorological presence, either real or imagined, which envelops or unsettles the human subject" (Gandy, 2017:355).

5 The air as an affective reality

During the COVID years, according to a survey conducted in 2021 in several European countries (Vaisala, 2021), 60 % of the population asked for better information regarding the air quality in indoor public places. For 65 %, risky indoor air was considered an important factor that prevented them from travelling. These numbers underline the extent to which the fight against COVID invested the aerial realm with an affective value of fear and concern, risk imaginaries, practical considerations, and strategic choices. Whilst there are currently no large-scale surveys available that could elucidate the extent of public concern that remains after the COVID years, there are some indications to be found in more specific studies, which suggest that the air's affective connotations have not vanished completely. For example, an exploratory survey conducted in the canton of Basel-Landschaft shows that 39.58 % of schoolteachers still asked for the default use of air purifiers in schools after the exceptional COVID measures were lifted, whilst an additional 20.14 % expressed a need for the use of purifiers in special situations (Steffen, 2022:18). A similar picture arises from a survey, funded by different Swiss trade unions in the field of public transport, which points at a remaining concern about the air quality in buses and trains by public transport personnel (Bärlocher, 2022).

One important aspect of this COVID-induced, affective reterritorialisation of the air lies in the perceived uncontrollability of the air's agency in the virus transmission. As the Federal Office of Public Health put it, "if configured well, the cleaning effect of air filter devices on particles in the room air is undisputed. The actual impact of these additional measures on the risk of infection in a specific real-world setting is currently difficult to assess" (BAG, 2021:4, Google translation from German). Thus, air-related measures are seen to help reduce the risk of virus transmission but not to fully prevent them. There is always something of the air that is withdrawn from the health authorities' possibilities of action, which affects the ways in which they attempt to govern it. The air always remains a troublesome space in its affective perception, which cannot be fully controlled or tamed.

Another important aspect to highlight concerns the way in which the perception of the air as a space of fear and risk is tied up with more general, diffuse feelings of social mistrust towards other breathing and speaking people, often called the "cave syndrome" in its pathological expression (Nebe, 2021). A study conducted by Sanasearch amongst 129 health therapists across Switzerland provided testimony thereof.

> At the request of SonntagsBlick, Sanasearch asked 129 therapists whether they noticed an increased fear among their clients of returning to normality. 47 % of the experts surveyed – almost half – answered yes; 40 % also notice that their clients are increasingly thinking about how they should manage their free time after Corona. (Eisenring, 2021, Google translation from German)

This portrays the aerial realm as an "envelope of atmospheric experience" (McCormack, 2018:10), which is being invested with 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 Peter 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 aerial legacies of COVID-19 within a wider societal problematic of troublesome togetherness.

Moving beyond this first affective dimension of the air, the COVID years have also led to an increased investment in the air as an economically coveted space of competition and thus commercial hope. Think of the many companies that now offer "COVID-proven air ventilation systems", aiming to establish themselves as professional experts of the air (see for example (https://airfresh-schweiz.ch/, last access: 18 August 2025). This underlines that the air not only became relevant as a space of political and popular concern, but also was fought over as a space in which and through which all kinds of other interests were being conveyed (for example of a commercial nature). Undoubtedly, a more detailed study would be necessary to generate a clearer picture of how the fight against COVID-19 has contributed to inscribing the air in a spiralling dynamic of monetisation, economic specialisation and professionalisation. In particular, it would be fascinating to study how the experiences from the fight against COVID-19 are today being instrumentalised by companies that aspire to sell their technical expertise and practical skills in an attempt to establish themselves as "obligatory passage points" (Latour, 1987) in the organisational settings and coalitions of authority that underpin the governance of the air.

6 The air as a socio-technical reality

Referring to the fight against COVID-19, there are now many studies that recommend continued and routine monitoring of the air quality in places of togetherness and movement, such as public transport and schools.

> Our results suggest that infection control measures can reduce the transmission of respiratory infections in school rooms. Future studies may use our multiple-measurement approach to assess the ef-

> fectiveness of infection control measures in reducing the transmission of respiratory infections. Ideally, these data should be collected routinely in sentinel schools, thus continuously monitoring transmission risks and alerting health authorities when infection control measures should be taken. (Banholzer et al., 2023)

The quote testifies to the continued ambition to make the air "visible" through all kinds of technologies of measurement and monitoring. Health authorities are made to "see" the air in ways defined by techno-scientific tools and knowledges, which underscores that the aerial legacies of COVID-19 must also be understood as an ongoing socio-technical constellation of things, ideas, technologies, etc. These constellations must be studied in detail if we are to understand the aerial legacies of the pandemic. In this, attention must be paid not only to the role of specific objects such as filtering units, software applications, UV-C devices, sensors and/or chemical disinfection systems, but also to the stakeholders and their air-related knowledge practices, ranging from risk calculations to technical questions, that intervene in the continued fight against COVID and influenza more generally. Thus, the aerial legacy of COVID-19 emerges as a complex "socio-technical assemblage" of the air, in a Latourian sense, i.e. as a reality composed of combined and co-constituted technical and social elements (Latour, 1993:62). An interesting example thereof can be found in the project of the municipality of Adliswil to generalise the installation of CO_2 air filtration systems in classrooms, based on the experiences gained from the fight against COVID-19 (Adliswil, 2023). The following quote, taken from an interview conducted with the person in charge of the pilot study for the project underlines the complex imbrication between the technical and social dimensions of the project.

> We have found that both the logistics and enforcement of air purification in classrooms using mobile devices are non-trivial. If there are teachers or people in the school management who don't like the air purifiers [because they are perceived of as too loud or unnecessary], and if this person simply unplugs the cable, then the device is switched off and even the possibility of remotely turning it on again no longer helps … The caretaker also asked who would have to maintain the devices (vacuum or change the filters every few months) and who would take on the additional hours, because he had no time … So … I then advised the municipality to install automatic CO_2 ventilation in all school rooms. (Michael Riediker, 23 April 2024)

The quote underscores that the aerial legacy of the fight against COVID-19 is inscribed within a multi-layered assemblage of myriad human and non-human entities. These must be considered in their complex interactions if we are to understand the "complex geography of airspace management" (Adey, 2010:14) that remains after the COVID years. The necessary empirical response to such a mediation-focused understanding of the aerial legacy of COVID-19 is the detailed study of the interplay between the involved "actants" (Latour, 1993:33) in the planning, conception, development and operation of the systems deployed.

7 The air as a reality of power

In principle, each of the examples provided above – ranging from the stored plexiglass separators for future use in travel centres of the Swiss Federal Railways to the ongoing policy campaign about how best to behave in shared air – could be taken as an entry point for a more nuanced, long-term analysis of the ways in which the lessons learnt from the fight against COVID-19 continue to create specific ways and logics of ordering the air and, consequently, of ordering everyday social life. At this point, it shall suffice to open up such a reflection through the example of air purification systems.

Towards the end of the exceptional measures in the fight against COVID-19, Economiesuisse, the umbrella organisation for the Swiss business sector, proposed that companies using CO_2-measuring devices should be exempt from virus-related business closures (Wirth, 2021). This economically driven request portrays the aerial realm as a space whose access and use depend on the technical and practical efforts invested in its measurement, purification and/or filtering. Investments in aerial ventilation and purification are seen as a criterion for socio-economic privilege. Whilst Economiesuisse's proposition has not been adopted by the Swiss health authorities, the fight against COVID-19 has in fact led to all kinds of other logics of ordering the air, i.e. to a novel regime of aerial governmentality, in which differing ways of accessing and using the air required differing tools, skills and legal authorisations. For example, only restaurants with a certain volume and certain technical equipment were allowed to stay open at some stages of the fight against the pandemic, only some categories of people (for example those who were vaccinated) were allowed to access specific bubbles of joint breathing, etc. In manifold ways, health measures related to, focused on, and projected into and onto the air became inscribed there and in the process contributed to the very production of the aerial volumes concerned, as legally re-territorialised spaces of societal relevance, concern and, indeed, power. This exemplifies that the aerial realm is not neutral but the product and producer of all kinds of power relations in a Foucauldian sense (Foucault, 1982).

The legacies of this socio-political re-ordering of the air, as a lived and socially produced and instrumentalised reality in a Lefebvrian sense (Lefebvre, 1991), are manifold and evolving. On a policy level, for example, there is today a strong, COVID-derived consensus that indoor-air purification must be further developed in future years. As the Federal Office of

Public Health put it, in a position paper co-authored in 2022 by a range of public and private organisations,

> The Corona pandemic has highlighted the benefits of ventilation and the need for ventilation concepts. However, it has also become clear that the hygienic and health potential of ventilation is not being used in all buildings today. Increased efforts are required to increase awareness of the benefits of ventilation and to deepen and consolidate skills for implementing ventilation concepts on all sides. The construction and real estate industry is called upon to initiate measures together with building operators and authorities to improve and ensure good indoor air quality. The spectrum ranges from training and further education to future research. (BAG, 2022:5, Google translation from German)

This evolution contributes to an "aerial divide" between the "haves" and the "have nots" of techno-mediated clean air, from which all kinds of advantages or disadvantages for the organisations concerned might arise. Just consider the following quote, taken from the website of a producer of air purification systems:

> Even after the pandemic, the general risk of airborne infections has not gone away, as recurring flu waves show every year … As a result, a good range of food and drinks in an attractive ambience alone will no longer be enough in the future to achieve the economic "pre-pandemic status". The quality of well-being in gastronomy is becoming increasingly important. Only if guests feel safe will they return to the guest rooms and restaurants! … With Trotec high-performance air purifiers, restaurateurs can set a positive example for worry-free dining – a clear "safer dining signal"! Clean the air in your restaurant with Trotec high-performance air purifiers and create a calming, virus-proof air space for your guests – come in, breathe, enjoy the moment. (Trotec, 2024, Google translation from German)

The quote underscores the point that efforts invested in, and benefits arising from, air purification might not necessarily be legally driven but marketing related, playing out as a competitive advantage for restaurants with "virus-proof air space for guests". This is but one example of how the fight against COVID-19 has made the air more explicit in the long run for social, political and economic reflection and action and of how this societal, techno-mediated re-territorialisation of the air affects societal power relations (here, relating to the competition between restaurant owners). Again, a much more substantial analysis would be necessary to provide a more solid picture of how the fight against COVID-19 has led to novel pressures towards continued micro-level air management and of how these pressures then result in novel orderings of the air that create an unevenly lived aerial geography that is bound up intrinsically with social practices and relationships of power on the ground.

8 Conclusions

The preceding analysis shows that the fight against COVID-19 has contributed in manifold ways to establishing the air as an object of imagination, concern and practice, generating novel ways of understanding it, of experiencing it and of acting on it. From this, a series of important insights are derived with regard to our understanding of the "air" as a realm of reality that is dramatically underplayed in socio-spatial theory and with regard to the possibility of a properly three-dimensional conceptualisation of the concept of the "legacies". By way of conclusion, these two main points shall be discussed in more detail below.

First, my analysis opens up a reflection on how the governance of the everyday relates to the air, thus inviting a more systematic analysis of the concerned spaces of togetherness and movement in a properly three-dimensional way. It has indeed been shown above that both during and after the COVID years, access to, passage through and movement within specific places has been tied up intrinsically with the question of the air. Examples range from the proposition to keep companies running if air filtration units are installed to current discussions about the future use of face masks or plexiglass separators to protect and spatially move apart breathing individuals. In manifold and complex ways, the very point of all these measures is that togetherness and movement do happen in and through volumetric spaces that must be regulated in their elemental, embodied, affective, socio-technical and power-related dimensions.

The analysis of the legacies of COVID-19 can thus be taken as a prism through which to advance our understanding of the multidimensionality of the aero-volumetric spaces within and through which social life happens and is being governed. Namely, the air has been described not only as an economically contested, coveted and instrumentalised space and as a problem of governance, but also as a vertically and horizontally organised volume that is being invested with all kinds of expectations, imaginaries, fears and hopes, and forms of expertise and practices. The paper also highlights how the fight against COVID-19 raised awareness of the air as both an elemental volume of gaseous matter and a quality of environmental immersion that registers in and through breathing bodies. The pandemic increased the air's relevance as an everyday reality that has corporeal volume, shape and agency; that is experienced as an immersive environment; and that is lived as a situated, delimited and internally structured reality, invested with affective and cognitive meaning, objectified and instrumentalised through specific intentions and practices, related to the bodily positioning and sensory

experiences, and ultimately invested by all kinds of power relations.

This reiterates that the air should be understood not only in its elementality, but also as an embodied, affective, socio-technical and power-related reality, which is connected with the material, administrative and social reality on the ground and bound up with all kinds of actors and technologies that are situated on varying geographical scales. The emerging assemblages of the air are not value-free but shaped by complex relationships and interactions, which intersect with the governance of human movement in complex and manifold ways. From this, a wider ambition for future research is derived, which is to think more carefully about the interactions between the differing dimensions of the air 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, including in the context of respiratory disease.

Second, and following from the above, my discussion can be taken as a starting point for a wider theorisation of the concept of the "legacy", as a dynamic socio-technical assemblage of human and non-human, real and imaginary, and animate and inanimate entities, i.e. as a more or less stabilised relational configuration of things and people, ideas and objects, which cuts across diverse ontological – affective, elemental and practical – realms. Legacies, therefore, must be understood not merely as abstract lessons learnt or policies kept, but also as heterogeneous ensembles of various entities which are always "in the making" and which are fundamentally "more than human", in the sense that they not only are composed of individuals and/or social groups but also comprise all kinds of things, devices, technologies and so on. In this more-than-human understanding of "legacies", it is of critical importance to also focus on the role of space (here, in its aerial dimension) because space contributes in many ways and on many levels to the functioning and impacts of the considered assemblages. Some of the aero-spatial legacies from the fight against COVID-19 have been discussed above, providing an initial portrait of the ways in which the air remains relevant after those exceptional years.

The framing of these legacies as assemblages implies that our focus should be not restricted to whether specific means are useful and/or desirable per se but extended to the interplay between the different human and non-human and social and technical entities assembled: who will be using the devices and the information generated, and how? What interests and rationales are involved, and how are these shaping and in turn shaped by the functionalities of the deployed technologies? How exactly will specific technologies modify the relationships between the actors involved? Studying such questions is essential for an understanding of the benefits and problems implied by the air-bound measures, regulations, knowledges and collaborations that remain after the pandemic years and that continue to affect everyday social life.

Data availability. No datasets were used in this article.

Competing interests. The author has declared that there are no competing interests.

Disclaimer. Publisher's note: Copernicus Publications remains neutral with regard to jurisdictional claims made in the text, published maps, institutional affiliations, or any other geographical representation in this paper. While Copernicus Publications makes every effort to include appropriate place names, the final responsibility lies with the authors.

Acknowledgements. The literature review of the paper draws upon and further develops a previously published piece of work relating to the territorialisation of the air by civil drones (Klauser, 2022). Some ideas of the paper have been outlined previously in a blog post (Klauser, 2023).

An earlier version of the paper was presented in 2024 at the Conference "Rethinking Regimes of (Im)Mobility Through Its Past, Present and Future Legacies", funded by the research project "Towards a Novel Mobility Regime? The Legacies of the COVID-19 Pandemic Regarding the Governance of Human Movement", as part of "NCCR on the Move" at Neuchâtel University. The event was co-organised with my colleagues Christin Achermann, Sélim Clerg, Janine Dahinden and Eloise Thompson, whom I thank for the valuable feedback provided on the paper and for the very fruitful research collaboration from which it partly emerges.

Review statement. This paper was edited by René Véron and reviewed by two anonymous referees.

References

Adey, P.: Aerial Life, Oxford, Wiley Blackwell, 296 pp., ISBN 9781444391343, 2010.

Adey, P.: Air/atmospheres of the megacity, Theory, Culture & Society, 30, 291–308, https://doi.org/10.1177/0263276413501541, 2013.

Adey, P.: Air: Nature and Culture, Reaktion Books, London, 224 pp., ISBN 9781780232560, 2014.

Adey, P.: Air's affinities: Geopolitics, chemical affect and the force of the elemental, Dialogues Hum. Geogr., 5, 54–75, https://doi.org/10.1177/2043820614565871, 2015.

Adey, P., Brayer, L., Masson, D., Murphy, P., Simpson, P., and Tixier, N.: "Pour votre tranquillité": Ambiance, atmosphere, and surveillance, Geoforum, 49, 299–309, https://doi.org/10.1016/j.geoforum.2013.04.028, 2013.

Adliswil: Ergänzender Bericht der Schulpflege zur Luftqualität in den Adliswiler Schulräumen, https://www.schule-adliswil.ch/download.php?action=download&doc_id=32hmmlyhgwb2hu0apz537p2mj5f5nwru0vte&download_type=3 (last access: 2 March 2025), 2023.

Anderson, B., Kearnes, M., McFarlane, C., and Swanton, D.: On assemblages and geography, Dialogues Hum. Geogr., 2 171–189, https://doi.org/10.1177/2043820612449261, 2012.

ATS: La Confédération cherche à éviter la destruction de dizaines de millions de masques sanitaires, Le Temps, https://www.letemps.ch/suisse/confederation-cherche-eviter-destruction-dizaines-millions-masques-sanitaires (last access: 1 March 2025), 29 January 2023.

BAG: Luftfiltergeräte zur Bekämpfung des neuen Coronavirus, https://www.bag.admin.ch/dam/bag/de/dokumente/chem/wohngifte/gesund-bauen/lueftung-von-gebaeuden-in-pandemiesituationen/luftfiltergeraete-zur-bekaempfung-des-neuen-coronavirus.pdf.download.pdf/Luftfilterger%C3%A4te%20zur%20Bek%C3%A4mpfung%20des%20neuen%20Coronavirus.pdf (last access: 1 March 2025, no longer available online), 2021.

BAG: Lüftung von Gebäuden in Pandemiesituation, https://suissetec.ch/files/PDFs/News/2022/221114_Positionspapier_Lueftung_von_Gebaeuden_in_Pandemiesituationen_DE.pdf (last access: 1 March 2025), 2022.

BAG: Zum Schutz vor Grippe und Covid-19 empfehlen wir, https://www.schutzvordergrippe.ch (last access: 1 December 2023), 1 October 2023.

Banholzer, N., Zürcher, K., Jent, P., Bittel, P., Furrer, L., Egger, M., Hascher, T., and Fenner. L.: SARS-CoV-2 transmission with and without mask wearing or air cleaners in schools in Switzerland: A modeling study of epidemiological, environmental, and molecular data, PLOS Med., 20, e1004226, https://doi.org/10.1371/journal.pmed.1004226, 2023.

Bärlocher, M.: Corona-Comeback: ÖV-Personal besorgt um Luftqualität, Nau.ch, https://www.nau.ch/politik/bundeshaus/corona-comeback-ov-personal-besorgt-um-luftqualitat-66216663 (last access: 1 March 2025), 7 July 2022.

Bennett, C. J. and Howlett, M.: The lessons of learning: Reconciling theories of policy learning and policy change, Policy Sci., 25, 275–294, https://doi.org/10.1007/BF00138786, 1992.

Bourban, N.: Levée des mesures Covid-19: Vous êtes une majorité à vouloir garder le masque à l'hôpital, 24 Heures, https://www.24heures.ch/vous-etes-une-majorite-a-vouloir-garder-le-masque-a-lhopital-712283107578 (last access: 1 March 2025), 31 March 2022.

Callon, M. and Law, J.: L'irruption des non-humains dans les sciences humaines : quelques leçons tirées de la sociologie des sciences et des techniques, in: Les limites de la rationalité. Tome 2: Les Figures du Collectif, La Découverte, edited by: Reynaud, B., Paris, 99–118, https://doi.org/10.3917/dec.reyna.1997.01.0099, 1997.

Callon, M., Lascoumes, P., and Barthe, Y.: Agir dans un monde incertain. Essai sur la démocratie technique, Seuil, Paris, 368 pp., ISBN 9782020404327, 2001.

Direction de la formation et des affaires culturelles: Port du masque à l'école : abandon de l'obligation en deux étapes, Etat de Fribourg, https://www.fr.ch/dfac/actualites/port-du-masque-a-lecole-abandon-de-lobligation-en-deux-etapes (last access: 2 March 2025), 27 January 2022.

Dodge, M. and Kitchin, R.: Flying through code/space: the real virtuality of air travel, Environ. Plann. A, 36, 195–211, https://doi.org/10.1068/a3698, 2004.

Eisenring, E.: Nicht wenige fürchten sich vor den Öffnungen: "Nun fällt die Corona-Ausrede weg", Blick, https://www.blick.ch/schweiz/nicht-wenige-fuerchten-sich-vor-den-oeffnungen-nun-faellt-die-corona-ausrede-weg-id16613867.html (last access: 2 March 2025), 20 June 2021.

Elden, S.: Secure the volume: Vertical geopolitics and the depth of power, Polit. Geogr., 34, 35–51, https://doi.org/10.1016/j.polgeo.2012.12.009, 2013.

Expert group "Pandemic-proof buildings": Clean air for pandemic-proof buildings, a white paper, Swiss Centre for Occupational and Environmental Health, Winterthur, 19 pp., https://www.svlw.ch/images/aktuell/2022/2022-06-21b_Clean_air_for_pandemic-proof_buildings_copy.pdf (last access: 2 March 2025), 2022.

Eykelbosh, A.: Pandemic experiences with manual ventilation and CO_2 sensing in schools, National Collaborating Centre for Environmental Health, Vancouver, BC, 30 pp., https://ncceh.ca/resources/evidence-reviews/pandemic-experiences-manual-ventilation-and-carbon-dioxide-co2-sensing (last access: 2 March 2025), 2022.

Federal Office of Public Health: Protect yourself and others from respiratory infections, https://www.bag.admin.ch/bag/en/home/krankheiten/krankheiten-im-ueberblick/coronavirus/covid-19/so-schuetzen-wir-uns.html#:~:text=Top%20of%20page-,Keep%20your%20distance,aerosols%20into%20their%20immediate%20vicinity (last access: 2 March 2025, no longer available online), 2023.

Feigenbaum, A. and Kanngieser, A.: For a politics of atmospheric governance, Dialogues Hum. Geogr., 5, 80–84, https://doi.org/10.1177/2043820614565873, 2015.

Foucault, M.: The Subject and Power, Crit. Inquiry, 8, 777–795, https://doi.org/10.1086/448181, 1982.

Gandy, M.: Urban atmospheres, Cult. Geogr., 24, 353–374, https://doi.org/10.1177/1474474017712995, 2017.

Ghertner, D. A.: Airpocalypse: Distributions of life amidst Delhi's polluted airs, Public Culture, 32, 133–162, https://doi.org/10.1215/08992363-7816329, 2020.

Graham, S.: Life support: Political ecologies of urban air, City, 19, 192–215, https://doi.org/10.1080/13604813.2015.1014710, 2015.

Graham, S.: Vertical: The City from Satellites to Bunkers, Verso, London, 416 pp., ISBN 9781781687932, 2016.

Ingold, T.: Rethinking the animate, re-animating thought, Ethnos, 71, 9–20, https://doi.org/10.1080/00141840600603111, 2006.

Jasanoff, S., Markle, G. E., Petersen, J. C., and Pinch, T. (Eds.): Handbook of Science and Technology Studies, SAGE Publications, Inc., London, https://doi.org/10.4135/9781412990127, 1995.

Jubin, S.: La question verte: Covid-19: que va-t-on faire de tout ce plexiglas? 24 Heures, https://www.24heures.ch/covid-19-que-va-t-on-faire-de-tout-ce-plexiglas-255186928748 (last access: 2 March 2025), 1 June 2022.

Kaplan, C.: Aerial Aftermaths:Wartime from Above, Duke University Press, Durham, NC, 312 pp., https://doi.org/10.1215/9780822372219, 2018.

Klauser, F.: Policing with the drone: Towards an aerial geopolitics of security, Secur. Dialogue, 53, 148–163, https://doi.org/10.1177/0967010621992661, 2021.

Klauser, F.: Commercial drones and the territorialisation of the air: Towards an aero-volumetric understanding of power and territory, in: Territories, Environments, Politics: Explorations in Territoriology, edited by: Brighenti, A. M. and Kärrholm, M., Routledge, London, 55–69, ISBN 9781003196365, 2022.

Klauser, F.: The Connections Between Governance of Human Movement and Governance of Breathing Air During the COVID-19 Pandemic, NCCR Blog Series, https://nccr-onthemove.ch/blog/the-connections-between-governance-of-human-movement-and-governance-of-breathing-air-during-the-covid-19-pandemic/ (last access: 18 August 2025), 2023.

Klauser, F. and Pauschinger, D.: Searching for the right balance between openness and closure: Spatial logics of crisis management and control in the policy response to pandemic disease such as COVID-19, J. Conting. Crisis Man., 30, 32–40, https://doi.org/10.1111/1468-5973.12392, 2022.

Larner, W. and Le Heron, R.: The Spaces and Subjects of a Globalising Economy: A Situated Exploration of Method, Environ. Plann. D, 20, 753–774, https://doi.org/10.1068/d284t, 2002.

Latour, B.: Science in Action, Harvard University Press, Cambridge, Massachusetts, 274 pp., ISBN 9780674792913, 1987.

Latour, B.: We Have Never Been Modern, Harvard University Press, Cambridge, Massachusetts, 168 pp., ISBN 9780674948396, 1993.

Latour, B.: Reassembling the Social: An Introduction to Actor-Network-Theory, Oxford University Press, Oxford, 320 pp., https://doi.org/10.1093/oso/9780199256044.001.0001, 2005.

Lee, K.-S. and Eom J. K.: Systematic literature review on impacts of COVID-19 pandemic and corresponding measures on mobility, Transportation, 51, 1907–1961, https://doi.org/10.1007/s11116-023-10392-2, 2023.

Lefebvre, H.: The Production of Space, translated by: Nicholson-Smith, D., Wiley-Blackwell, Oxford, ISBN 9780631181774, 1991.

Marvin, S. and Rutherford, J.: Controlled environments: An urban research agenda on microclimatic enclosure, Urban Studies, 55, 1143–1162, https://doi.org/10.1177/0042098018758909, 2018.

McCann, E.: Urban policy mobilities and global circuits of knowledge: Toward a research Agenda, Ann. Assoc. Am. Geogr., 101, 107–130, https://doi.org/10.1080/00045608.2010.520219, 2011.

McCormack, D. P.: Engineering affective atmospheres on the moving geographies of the 1897 Andrée expedition, Cult. Geogr., 15, 413–430, https://doi.org/10.1177/1474474008094314, 2008.

McCormack, D. P.: Atmospheric Things: On the Allure of Elemental Envelopment, Duke University Press, Durham, 304 pp., https://doi.org/10.1215/9780822371731, 2018.

Monay, P.: Lutte contre le Covid-19 – Vous êtes nombreux à vouloir garder le masque dans le train, 24 Heures, https://www.24heures.ch/vous-etes-nombreux-a-vouloir-garder-le-masque-dans-le-train-660428404627 (last access: 4 March 2025), 4 April 2022.

Müller, M. and Schurr, C.: Assemblage thinking and actor-network theory: conjunctions, disjunctions, cross-fertilisations, T. I. Brit. Geogr., 41, 217–229, https://doi.org/10.1111/tran.12117, 2016.

Nebe, T.: "Cave-Syndrom": Das Post-COVID-Sozialleben, Ärzte Zeitung, https://www.aerztezeitung.de/Panorama/Cave-Syndrom-Das-Post-COVID-Sozialleben-421282.html (last access: 4 March 2025), 14 July 2021.

Nieuwenhuis, M. and Nassar, A.: Dust: perfect circularity, Cult. Geogr., 25, 501–507, https://doi.org/10.1177/1474474017747252, 2018.

Peck, J. and Theodore, N.: Exporting workfare/importing welfare-to-work: exploring the politics of Third Way policy transfer, Polit. Geogr., 20, 427–460, https://doi.org/10.1016/S0962-6298(00)00069-X, 2001.

Peck, J. and Theodore, N.: Mobilizing policy: Models, methods, and mutations, Geoforum, 41, 169–174, https://doi.org/10.1016/j.geoforum.2010.01.002, 2010.

Quiquerez, F.: Lutte contre le Covid-19: Masques, gestes barrières et vaccins sont là pour durer, 24 Heures, https://www.24heures.ch/masques-gestes-barrieres-et-vaccins-sont-la-pour-durer-724699778673 (last access: 4 March 2025), 1 February 2022.

Rose, R.: What is Lesson-Drawing?, J. Public Policy, 11, 3–30, https://doi.org/10.1017/S0143814X00004918, 1991.

Simap: Kommunikationsmandat Bevölkerungsinformation Covid-19, Project ID 242461, Notice no. 1298073, https://www.simap.ch/de (last access: 2 May 2024), 23 November 2022.

Sloterdijk, P.: Foams: Spheres Volume III: Plural Spherology, Semiotext(e), translated by: Hoban, W., Cambridge, Massachusetts, 912 pp., ISBN 9781584351870, 2016.

SRF: Corona – Was passiert mit dem ganzen Plexiglas?, Play SRF, https://www.srf.ch/play/tv/10-vor-10/video/corona---was-passiert-mit-dem-ganzen-plexiglas?urn=urn:srf:video:77dd3a99-d3c3-48ca-9e39-961295cda4a8 (last access: 4 March 2025), 1 April 2022.

Steffen, T.: Evaluation des Piloteinsatzes von Luftreinigern in Schulen des Kanton Basel-Landschaft, Steffen Consulting GmbH, Basel, 25 pp., https://bl-api.webcloud7.ch/politik-und-behorden/direktionen/bildungs-kultur-und-sportdirektion/medienmitteilungen/luftreiniger-an-schulen-ohne-einfluss-auf-corona-infektionen/dateien-1/20221028_bericht_luftreiniger-bl.pdf (last access: 4 March 2025), 2022.

Toninato, A.: Épidémie du Covid-19 à Genève: Le masque redevient obligatoire aux HUG, 24 Heures, https://www.24heures.ch/le-masque-redevient-obligatoire-aux-hug-260116097153 (last access: 4 March 2025), 28 June 2022.

Trotec: Virenfreie Raum- und Atemluft in Restaurants, Speiselokalen und Kantinen, https://ch.trotec.com/anwendungen/luftreinigung-staub-viren/keimfreie-raumluft-in-restaurants-und-kantinen/ (last access: 4 March 2025), 2024.

Vaisala: Umfrage zeigt: Die COVID-19-Pandemie hat die Sorge um die Luftqualität in Innenräumen erhöht, https://www.vaisala.com/de/pressemitteilungen/2021-08/umfrage-zeigt-die-covid-19-pandemie-hat-die-sorge-um-die-luftqualitaet-innenraeumen-erhoeht (last access: 4 March 2025), 8 September 2021.

Veron, R.: Remaking urban environments: The political ecology of air pollution in Delhi, Environ. Plann. A, 38, 2093–2109, https://doi.org/10.1068/a37449, 2006.

Walter, N.: Wirksamkeit von Masken: Und sie schützen doch!, Tages-Anzeiger, https://www.tagesanzeiger.ch/corona-masken-und-sie-schuetzen-doch-zeigen-neue-studien-374275370626 (last access: 4 March 2025), 7 November 2023.

Weizman, E.: Control in the air, Open Democracy, https://www.opendemocracy.net/en/article_810jsp/ (last access: 4 March 2025), 1 May 2002.

Williams, A. J.: Hakumat al Tayarrat: The Role of Air Power in the Enforcement of Iraq's Boundaries, Geopolitics, 12, 505–528, https://doi.org/10.1080/14650040701305690, 2007.

Williams, A. J.: Enabling persistent presence? Performing the embodied geopolitics of the Unmanned Aerial Vehicle assemblage, Polit. Geogr., 30, 381–390, https://doi.org/10.1016/j.polgeo.2011.08.002, 2011a.

Williams, A. J.: Reconceptualising spaces of the air: performing the multiple spatialities of UK military airspaces, T. I. Brit. Geogr., 36, 253–267, https://doi.org/10.1111/j.1475-5661.2010.00416.x, 2011b.

Williams, A. J.: Re-Orientating Vertical Geopolitics, Geopolitics, 18, 225–246, https://doi.org/10.1080/14650045.2012.717237, 2013.

Wirth, D.: Corona-Management: Wo die Luft rein ist, sollen die Türen auch in der vierten Welle offen bleiben: Firmen fordern, dass Luftqualität stärker beachtet wird, Aargauer Zeitung, https://www.aargauerzeitung.ch/schweiz/corona-management-wo-die-luft-rein-ist-sollen-die-tueren-auch-in-der-vierten-welle-offen-bleiben-firmen-fordern-dass-luftqualitaet-staerker-beachtet-wird-ld.2166277 (last access: 4 March 2025), 23 July 2021.

Zhang, T. and Zhai, Z.: Toward Immune Buildings: Lessons Learned from the COVID-19 Pandemic and Its Aftermath, Buildings, 12, 1440, https://doi.org/10.3390/buildings12091440, 2022.