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Secure the volume: Vertical geopolitics and the depth of power

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A B S T R A C T

We all-too-often think of the spaces of geography as areas, not volumes. Territories are bordered, divided and demarcated, but not understood in terms of height and depth. 'Secure the area' is a common expression for the military and police, but what happens if another dimension is taken into account and we think what it means to 'secure the volume'? This article draws on the emergent literature on vertical geopolitics and Peter Sloterdijk's work on spheres, but also looks at what happens below the surface, with a particular focus on tunnels. Using Paul Virilio's work, and some examples from the West Bank and Israel's border with Lebanon, it demonstrates how we need to think volume—think about volume, through volume, with volume—rather than simply the vertical to make sense of the complexities of territory today.

Introduction

The phrase 'secure the area' is a common one in military and police situations. What happens if we take the vertical as a key question, taking the additional dimension into account, if security has to contend with *volume*? What would it mean to 'secure the volume'? How does thinking about volume – height and depth instead of surfaces, three dimensions instead of areas – change how we think about the politics of space? We all-too-often think of the spaces of geography as areas, not volumes. Territories are bordered, divided and demarcated, but not understood in terms of height and depth.

This article therefore builds on my claim that territory is a much more complicated and multi-faceted notion than it is usually understood to be. Standard political geographical definitions describe it as a 'bounded space' or the 'area controlled by a certain kind of power'. Previous work has challenged the former by suggesting that boundedness is a particular form made possible by a deeper and underlying determination of political space, as calculable (2005, 2010). This article challenges the latter definition – that it is simply an 'area controlled by a certain kind of power'. It first looks at work on verticality, then work on the subsoil, with a particular focus on tunnels. In sum, the aim is to take seriously, in a political register, what Jeremy Crampton has called the 'volumetric' (2010, 96), a term that is productive because of the dimension and calculable resonances it has. First, though, a brief rehearsal of the earlier argument concerning territory.

Territory is not merely a cognate of land, a political-economic term implying ownership, exchange and use value, distribution, partition, division. Nor is it sufficient, though it is necessary, to add a strategic, political dimension to the term, understanding the power relations in a narrow sense of contestation and struggle. This can be given the shorthand of the notion of terrain. Land and terrain are crucial elements, but not enough either alone or in combination. Rather, 'power' should be understood, following Michel Foucault, in a somewhat broader sense, as including, among other aspects, the legal and the technical.

The political–legal adds a crucial element into the understanding, because it raises the spatial element of notions of jurisdiction, authority, sovereignty, supremacy, superiority, administration and so on. Put crudely, we should ask where does the law apply, and where does it cease to apply. The political–technical, trading on work by Martin Heidegger and Foucault especially, understands the technical in a broad sense as an art or technique, but it looks at questions such as the relation between developments in mathematics, particularly geometry, in making possible the large-scale cartographic and land-surveying projects that contributed to the modern sense of territory. Political arithmetic, statistics and surveys all have important geographical elements—look for example at Matthew Hannah's work on the census in *Governmentality and the Mastery of Territory in Nineteenth Century America* and his more recent book *Dark Territory in the Information Age* (2000, 2010; see Legg, 2007; Mitchell, 2002).

Taking these four dimensions of the political into account—the economic, the strategic, the legal and the technical—does not provide a *better* definition of 'territory', in the sense of a fixed, ahistorical definition. But it gives a set of questions that might be

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asked in order to understand how territory has been understood, and practised, at different times and places. Territory is a process, not an outcome; not so far from what is increasingly being understood as an assemblage, continually made and remade. Territory can be understood as a political technology, or a bundle of political technologies, understanding both political and technology in a broad sense: techniques for measuring land and controlling terrain (see Elden, 2010, 2013a).

To suggest, then, that territory is a 'bounded space' under the control of a group of people invites the initial questions: what do we mean by bounded, and how is that possible; what do we mean by space, or what determination of space; and what power relations are at stake. It might be the beginning of the definitional work, but it is not the end. In other publications this way of approaching territory has been worked through in detail both politically and historically (2009a, 2013a). This article develops these arguments conceptually and politically, especially in terms of the problems that arise when space is reduced to a surface, a plane; when territory is reduced to an area.

From area to volume

One of the key thinkers of the notion of volume is the German philosopher Peter Sloterdijk. The first work of his in English that engages with these questions is a short book translated as *Terror from the Air* (2009b), but whose German title *Luftbeben* (2002) would more accurately be rendered as 'Airquake' or 'Air Tremors'. What Sloterdijk is seeking to analyse here is how the air itself, the air we breathe, becomes targeted. In a way it parallels the critique Luce Irigaray made of Heidegger—too tied to the earth, forgetting the air (1983, 1999). The material in Sloterdijk's book was first published in German as a chapter in volume two of the monumental *Spheres* trilogy. In German this is a three-volume, 2600 page work (1998, 1999, 2004), the first volume of which has recently been translated into English (2011b). The 'Airquakes' chapter appeared in *Society and Space* in early 2009 (2009a), closely followed by the separate book (2009b).

Sloterdijk suggests that this work, taken as a whole, should be understood as the counterpart to Heidegger's *Being and Time*, as *Being and Space* (1998, 345; 2011b, 342) which he describes as "the great unwritten book of Western Philosophy" (1999, 59 n. 17). Sloterdijk takes the Heideggerian idea of being-in-the-world and analyses the 'in' the way Heidegger expressly denied (1967, 53–54), as a spatial term, as a question of location, of *where* we are (2005, 308; 2011a, 175–176; see 1998, 336–345; 2011b, 333–342). For Sloterdijk, being is always being-with, not the isolated individual, but relations between; and being-with is always to be in a world. This is a spatial determination of our existence, and he suggests that a sequence of spheres help to make sense of this. They range from the bubbles of the first volume, where the first sphere is that of the womb, to the globes of the second volume, working through the family home, architecture, the polis, and the nation. In the third volume he pluralises this, using the idea of foam to capture the idea of interlocked spheres (see Elden, 2012, 7–8; Klauser, 2010). What is striking about Sloterdijk's work is the way that he tries to think space so seriously as a volume, with three dimensions, rather than merely an area. In terms of the work on terror, his examples are multiple, he is trying to show how poison gas attacks in World War I, the Holocaust, gas chambers, aerial bombardment, etc. share similar logics of assault. He broadens his analysis to include analysis of radioactivity, meteorology, pneumatology (spiritual beings)—means by which commanding the air can terrorise the earth, what he calls 'atmoterrorism'. This relates to long-standing discussions of the bomber aeroplane, and missile attack (see Gregory, 2006, 2011a; Grosscup, 2006; Herz, 1959).

In a related enquiry, the French theorist Paul Virilio has discussed how aerial warfare in World War I opened up new senses of battle*space*, rather than just a battle*field*, which cinema was quick to develop in its own aesthetic. As he suggests, "Distance, depth, three-dimensionality – in just a few years of war, space became a training-ground for the dynamic offensive and for all the energies it harnessed" (1989, 35). In World War II civilian populations became targets in ways they had not been before, with an impact even in countries that had not been invaded such as Britain and Japan. Equally, the advent of submarine warfare took warfare below the surface. War was now fought in a three-dimensional space, a volume. In Virilio's words:

> The conquest of the third dimension by the aerial forces and the extension of the submarine offensive gave to the Second World War its 'volume'. What was only yesterday the privilege of sea powers became the privilege of the entire military establishment: the control of the sky completed the control of the sea's depths… Space was at last homogenized, absolute war became a reality, and the monolith was its monument (1994, 39–40).

These arguments influenced some comments in my book *Terror and Territory* (Elden, 2009a, xxii). There the argument was that while attacks from truck or car bombs, or suicide bombers were challenges to the security of a state, there were means of prevention that could be erected—walls and fences being two of the most common. A whole range of such building projects have been conducted since 2001 (see Brown, 2010). Attacks from the air are much harder to prevent, and attempts to secure vertical space can be found in the barrage balloons of World War II to the attempts of a missile shield in the Cold War. The suggestion was that it was "not coincidental that two of the most extreme responses of the United States and its allies in the 'war on terror' have been to aerial attack: to the airplanes of September 11, 2001, and to Hezbollah's Katyusha rockets launched against Israel in 2006" (Elden, 2009a, xxii). However it is crucial to underline that the state responses, as state-terror, were also characterised by aerial assault. The 'Shock and Awe' initial attack on Iraq, not to mention earlier operations such as Desert Fox; the destruction of Fallujah; and attacks by Israel on Beirut or Gaza; NATO in the Kosovo War and Russia in Chechnya are all state-terror from the air. NATO's intervention in Libya more recently might be understood in a similar way. All these operations use the vertical dimension to assert domination, they use aerial supremacy to terrify the civilian population on the ground. The book suggested that:

> Recognizing the vertical dimension of territory shows that territory is a volume rather than an area, and noting that lines on maps have only a limited height when translated into lines on the ground showcases a new level of vulnerability: a vulnerability to imagined senses of a protected territory, the body of the state (Elden, 2009a, xxii).

Vertical geopolitics

These arguments link to ongoing work by a range of thinkers on what Stephen Graham has called 'vertical geopolitics' (2004a). As Foucault suggests in his examination of the *Dogs* series of paintings by Paul Rebeyrolle, "In the world of prisons, as in the world of dogs… the vertical is not one of the dimensions of space, it is the dimension of power" (2007, 170).

> It dominates, rises up, threatens and flattens; an enormous pyramid of buildings, above and below; orders barked out from up high and down low; you are forbidden to sleep by day, to be up at night, stood up straight in front of the guards, to attention in front

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> of the governor; crumpled by blows in the dungeon, or strapped to the restraining bed for having not wanted to go to sleep in front of the warders; and, finally, hanging oneself with a clear conscience, the only means of escaping the full length of one's enclosure, the only way of dying upright (Foucault, 2007, 170).

The key thinker of the vertical dimension, and an inspiration for many of those working in this area, is the Israeli architect and theorist Eyal Weizman. In a call for an understanding of what he calls 'the politics of verticality', Weizman has shown how we must grasp the fractured spaces of the West Bank as three-dimensional, with tunnels, bridges, hilltops, and airspace central to understanding the conflict, as much as land, terrain, and walls (2002, 2003, 2007; Segal & Weizman, 2003). An extended quotation from Weizman illustrates his key argument:

> Two-dimensional maps, fundamental to the understanding of political borders, have been drawn again and again for the West Bank. Each time they have failed to capture its vertical divisions.
>
> In the understanding and governing of territories, maps have been principal tools. The history of their making relates to property ownership, political sovereignty and power.
>
> But maps are two-dimensional. Attempting to represent reality on two-dimensional surfaces, they not only mirror it but also shape the thing they represent. As much as describing the world, they create it.
>
> Geo-politics is a flat discourse. It largely ignores the vertical dimension and tends to look across rather than to cut through the landscape. This was the cartographic imagination inherited from the military and political spatialities of the modern state. Since both politics and law understand place only in terms of the map and the plan, territorial claims marked on maps assume that claims are applicable simultaneously above them and below….
>
> Traditional international borders are political tools dividing the land on plans and maps; their geometric form, following principles of property laws, could be described as vertical planes extending from the centre of the earth to the height of the sky. The departure from a planar division of a territory to the creation of three-dimensional boundaries across sovereign bulks redefines the relationship between sovereignty and space.
>
> The 'Politics of Verticality' entails the re-visioning of existing cartographic techniques. It requires an Escher-like representation of space, a territorial hologram in which political acts of manipulation and multiplication of the territory transform a two-dimensional surface into a three-dimensional volume (Weizman, 2002, 2).

In his 2007 book *Hollow Land* Weizman works that through in detail. He examines the situation of the security barrier or wall in the West Bank, and the way that this cuts off communities from

Fig. 1. Transport sovereignties in the West Bank.

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each other. Much of the work of his study, and the earlier *A Civilian Occupation* (Segal & Weizman, 2003) looks at the architecture and urban planning of Israeli settlements, and especially their situation on mountains and hilltops as strategically powerful positions. These demonstrate the ways that height plays an important role in the power relations of this fractured and contested space, and he uses the examples of roads that run over and under each other, with an Israeli highway superimposed over the Palestinian road to mark out different transportation sovereignties (2007, 179–181) (Fig. 1).

Taking into account airspace and overflight rights, which the Israelis control for the entire West Bank, and the water and sewage systems below the surface, shows that it is not enough to think in terms of three dimensions. Rather, Weizman argues, there are three Israeli and three Palestinian dimensions at stake (2007, 15).

A few examples will be used here to think about the two-dimensional and three-dimensional elements of geopolitical space. Part of the old border between Israeli-occupied land and Jordanian-occupied land, the 'green line' which lasted from 1948 to 1967, is now traced by a major arterial road in Jerusalem. The road, Chel Handasa street (Fig. 2), leads north from the Old City, and the new Jerusalem light rail runs along this route (between Damascus Gate and Shivtei Israel stations).

While most traces of the previously contested nature of this space have been removed, some of the buildings still expose the past. The buildings in the top right of Fig. 2 are effectively turned away from the road; the exposed façade shows service ducts and ventilation for air conditioning units. This was previously the frontline: the architectural traces show this legacy today (Fig. 3).

Close by these buildings is a remarkable museum. Appropriately named the 'Museum on the Seam for Dialogue, Understanding and Coexistence' (see www.mots.org.il/Eng/Index.asp), it is housed in a building which was formally an army outpost next to the Mandelbaum Gate between the two parts of the city. One of the major exhibitions it has shown was entitled 'Bare Life' and used the work of Giorgio Agamben, among others, to think through the imbrications of biopolitics and geopolitics in this contested space (Etgar, 2007) (Fig. 4).

Another contested site is the area known as 'E1', short for 'East 1'. This is a large space between Jerusalem and Ma'ale Adumim, intended to be a Jewish settlement. If completed it would almost completely separate the West Bank into a northern and southern section, largely cut off from each other. It would entirely isolate Arab East Jerusalem. The area is ready to go if given the green light, but the Obama administration is set against it (on this plan see Shalev, 2009). At the moment there is extensive infrastructure there, including roads, roundabouts, street lights, road signs, powerlines and presumably irrigation and sewage tunnels—things on the surface, above it, and below it (Fig. 5).

But as yet there are no buildings, with one exception, the police station on top of the hill, the Samaria and Judea Police District Headquarters, said to be the biggest in the West Bank (Fig. 6).

Fig. 2. Chel Handas street, looking towards the Old City.

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Fig. 3. Buildings on Chel Handasa street.

Throughout Jerusalem, the West Bank and elsewhere, what is below the surface is mined for its historical artefacts and the political significance they have. Historical traces can help to justify arguments for previous habitation and politically and legally build cases for land control today. As Weizman notes, "archaeology attempted to peel this visible layer and expose the historical landscape concealed underneath. Only a few metres below the surface, a palimpsest made of five thousand year-old debris, traces of cultures, narratives of wars and destruction, is arranged chronologically in layers compressed with stone and by soil" (Weizman, 2002, 8). These examples help to explain what he means by the notion of "a political volume" (Weizman, 2004, 189).[1]

Ideas of verticality have been developed by Stephen Graham in a number of pieces (e.g. 2004a, 2011), culminating in the major work *Cities Under Siege* (2010a, see also 2004b, 2010b) Graham has worked through, in detail, what it means for warfare to become urban. This relates to the argument made by Virilio, where war becomes even more fully a question of volume, battlespace, rather than a battlefield. Of course, siege warfare, catapults and tunnels, ditches, walls and ramparts have long been important, and classic accounts such as those by Thucydides, Caesar and Machiavelli show the importance of an understanding of terrain. But Graham refers to Major Peters who analysed the challenge of urban warfare compared to what the US was used to, back in 1996: "At the broadest level, there is a profound spatial difference. 'Conventional' warfare has been horizontal, with an increasing vertical dimension. In fully urbanized terrain, however, warfare becomes profoundly vertical, reaching up to towers of steel and cement, and downward into sewers, subway lines, road tunnels, communication tunnels, and the like" (1996, 2; part cited in Graham, 2004a, 14). More recently Graham and colleague Lucy Hewitt have called for an explicitly vertical sensibility to shape ongoing research in urban geography (Graham & Hewitt, 2012). This is of equal importance in political geography.

Other geographers have taken the vertical in account in important ways—take, for example, Derek Gregory's work on the history of aerial bombardment (2011a), unmanned drones (2011b) and the everywhere war (2011c); work on aerial sovereignty, security and the projection of military power (Monmonier, 2010; Williams, 2007, 2011a, 2011b); Trevor Paglen's work on secret sites for the war on terror, many of which are underground or otherwise hidden, and which often relate to spy plane technologies (2010); and Peter Adey's studies of aerial life (2010a, 2010c) and on aerial surveillance by helicopters over the contemporary megacity (2010b). Much of this work has concerned the target, and the targeting of that target from above (see also Sebald, 2003; Zehfuss, 2011). The control of volume can be found in the idea of no-fly zones, of providing security for the ground through a mechanism from the air. This has been seen, most recently, in Libya, continuing an earlier model from Iraq (Williams, 2007). Chris Harker has

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Fig. 4. The Museum on the Seam.

suggested that we equally need to theorise what he calls "ordinary topologies" in order to understand the lived practices of people in some of these fractured, hierarchical and urban spaces (2012; see Secor, in press). In a more historical register Mark Whitehead's important work on the government of the air (2009) shows how technology, policy and practice interrelate, how the atmosphere became an object of government, and demonstrates the essential vertical dimension of the geographies of the modern state. In this work he takes the idea of a spatial history and adds the vertical dimension (see Carter, 1987; Elden, 2001). Several of these researchers have collaborated in a recent project that seeks to analyse 'from above' (Adey, Whitehead, & Williams, 2011, 2013). Taking a view from above includes the importance of aerial photography in archaeology, surveillance and bombing in warfare, satellite images, and Google Earth, alongside architecture and urban design, and military surveillance and bombardment. A whole range of strategies are used to secure the air, and through that, the ground.

The depth of power

Yet this work, predominantly, has been orientated up, even if looking down and seeking to understand what implications this has on the ground. Peter Adey tells us that "both the ground and the air reside in vertical reciprocity" (2010a, 3). But what happens below the surface, and does how this impact on questions of security? How should we think depth as well as height?

The underground has long been seen as hidden, dangerous, risky or insecure. Biographer of London Peter Ackroyd has recently turned his attention to what happens beneath its streets, and describes 'London Under' in this way:

> It is an unknown world. It is not mapped in its entirety. It cannot be seen clearly or as a whole. There are maps of gas facilities, of telecommunications, of cables and of sewers; but they are not available for public perusal. The dangers of sabotage are considered to be too great. So the underworld is doubly unknowable. It is a sequestered and forbidden zone (2012, 2).

The underground is essentially associated with danger, risk, undermining and subterfuge. Subterfuge means, of course, to flee below or underground, to be undercover. To be undercover is to be covert, hidden, clandestine. As Ackroyd points out, "Radical political groups, characteristically using terror and violence as their weapons, are still known as 'underground' movements" (2012, 12).

Such concerns are magnified when it is an enemy city being discussed. This can range from Hitler's bunker and other underground defences, to more contemporary concerns with Osama bin Laden's cave complex in Tora Bora, or Iran's nuclear programme. One important study of ways used to challenge this is by Ryan Bishop on the US 'Transparent Earth' project. As Bishop outlines, this is a project which attempts to "read beneath the earth's surface… harnessing lightning (natural and artificial), radio signals and complex algorithms to 'see' through other sensorial means"

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Fig. 5. Area E1.

(2011, 272; see Graham & Hewitt, 2012, 16). What is intriguing, and which links this project to those discussed already, is the attempt to see the below from above. Bishop quotes Mark Smith of the Geospatial Corporation as saying that "underground is truly the final frontier" (Geospatial Corporation, 2010; cited in Bishop, 2011, 277).

> The use of combinatory senses to render a visible image of that which could not be seen (the underground) provides yet another attempt to remove the ground of error for military observation and control, re-inscribing the desire of mastery operative in the view from above (Bishop, 2011, 273).

The military implications thus extend from the wall, the walled city, and ramparts, to the moat, the trench, bunker and fortifications of other kinds. Peter Nyers has recently discussed how the remaking of the landscape in border regions through earthworks, both construction and destruction, filling and ramping, can be used for security reasons (2012). This is reshaping a three-dimensional landscape as part of a securitised terrain.

Other subterranean issues have important security and geopolitical aspects. The resources below the earth's surface or under the sea bed are, of course, a major source of conflict and contestation. There is a whole body of geographical research on mining, oil and gas reserves. Some of these raise important challenges to traditional ways of thinking about territory and its borders. As Bridge suggests, "the punctuated, discontinuous geographies of extraction do not coincide well with notions of national territory or development" (2009, 46). One example would be slant drilling, which was one of the claimed grievances of Saddam Hussein before the invasion of Kuwait which led to the first Gulf War of 1991. The claim was that Kuwait was not drilling directly down, but at an angle which meant they were entering Iraqi territory below the surface. Other issues where what goes on below the surface impacts across boundaries would be the pollution or draining of underground aquifers, and above the surface the implications of acid rain, climate change (Kythreotis & Paul, 2012) and what Thom Kuehls called "the space of ecopolitics" that takes us "beyond sovereign territory" (1996).

Here, the focus will be on urban infrastructure and then, via a discussion of Paul Virilio's early work, the question of tunnels.

Urban infrastructure

Geographical research has long looked at the ways cities work, and the infrastructure projects that make them possible. One key example is Matthew Gandy's book *Concrete and Clay* on the reworking of nature in New York City (2002), which especially provides an analysis of the infrastructure necessary to provide water to the city. Gandy suggests that "the clouds of steam rising from the street remind us that the possibilities for urban life are sustained by an unseen web of structures, connections, and relationships" (2002, 234; see Solis, 2005). In a later piece he examines the sewers of Paris (2004). In a similar vein, Chapter 2 of

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Fig. 6. Samaria and Judea Police District Headquarters.

William Cronon's *Nature's Metropolis* (1991) examines 'Rails and Water' and their role in the modern city.

Stephen Graham's *Cities Under Siege* (2010a, 2010b) is also important here, as it looks at the destruction of infrastructure facilities, among other aspects of the new military urbanism. But on infrastructure, his most important book is the earlier work with Simon Marvin *Splintering Urbanism* (2001) and the edited collection *Disrupted Cities: When Infrastructure Fails* (2009). Graham's work has therefore moved from providing an analysis of how cities work to how they are prevented from working, from the construction to the destruction of infrastructure as a weapon of war. In terms of security, one of the things that the US and Israel are most concerned about at present is the perceived threat from Iran. In terms of the effectiveness of a strike against Iranian facilities there is a need to get beneath the surface. Conventional weapons will not suffice. There is therefore discussion of the potential of bunker busting bombs. Graham reports on how the US has been developing a 'Robust Nuclear Earth Penetrator', a tactical nuclear warhead of limited kilotons, that can annihilate a bunker complex (2004a, 19). The irony of using a nuclear weapon to prevent nuclear proliferation is profound.

In a slightly different register there is the continual need for renewal and repair of infrastructure systems (see Graham & Thrift, 2007). A related analysis, with its focus on breakdown rather than intentional damage, is Jane Bennett's discussion of the disruption that followed the New York City blackout of 2003 (2010, chap. 2).

Work on the underground elements of cities is, of course, extensive. Pike (2005) provides a discussion of underground railways, catacombs and other burial sites, sewage and ruins (see Solis, 2005; on the last, see also Edensor, 2005). There is work from archaeology on the ancient burial sites of Rome and other cities (Rutgers, 2000). There has been some work on the subterranean in a colonial context (Braun, 2000; Pike, 2007; Scott, 2008), and on the large number of literary works that have significant subterranean elements (Ackroyd, 2012; Williams, 2008). There is also a growing body of work on practices of urban exploration, where activists enter into working or abandoned sites to see the working of cities or military installations. The Jinx group in New York have catalogued their own exploratory practices, They have a particular aesthetic to their work, presented in the book *Invisible Frontier* (Deyo & Leibowitz, 2003), and found on their website (http://www.jinxmagazine.com/), where the operatives dress in sharp suits or cocktail dresses and pose for photographs in some of the places they have accessed. In a statement of their intent they talk of the physical geography below the streets of New York City:

> New York City stands anchored in five-hundred-million-year-old igneous bedrock, in compressed strata of shale and stone. Since the seventeenth century this bedrock has been dug,

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entrenched, drained, tunnelled, and blasted to accommodate the roots of a growing infrastructure. As of the summer of 2001, the streets conceal a labyrinth 780 miles in area, and over eight hundred feet deep.

Four hundred forty-three miles of train tracks carry the subways and commuter trains beneath New York. Cars access the city through twenty-two tunnels.

Three hundred forty-six miles of aqueducts and six thousand miles of water mains and tunnels carry 1.5 billion gallons of water beneath the city each day. Most of the city's water mains were built before 1930, and they fail at the rate of 90.11 breaks per one thousand miles per year.

Seven hundred and fifty thousand manholes access the utility grid. New York City power runs through 83,043 miles of underground cable, enough to encircle the globe three and a half times. Thirty-three thousand underground transformers step down the charge for consumer use. One hundred six million telephone calls connect each days through New York's one hundred million miles of telephone cables, which, if stretched end to end, could reach the sun (Deyo & Leibowitz, 2003, 1).

In their work much of this infrastructure, the subterranean city as well as buildings and other structures above the surface, becomes a place of exploration. Their sites include the tunnel for an aqueduct, an abandoned smallpox hospital, and bridges. Further work has been done by Bradley Garrett, who has documented in detail urban exploration in Paris, London and elsewhere in his writings (2010, 2011) and his excellent Place Hacking website (www.placehacking.co.uk).

Luke Bennett has labelled some of these urban exploration practices as 'bunkerology', with a particular focus on people who explore "abandoned Cold War bunkers" (2011, 421).[2] What is intriguing about these explorations are that they enter into sites which were often created for security purposes at an earlier time, but which raise security issues in the present. Bennett is careful not to suggest that those who enter sites are causing damage, or to read this "solely from a sociology of deviance or cultural criminology perspective", but he does note that it "certainly appears that many urbex practitioners enjoy the uncertain legality of their practice and relish the `cat and mouse' game of gaining access and evading the attention of site owners or their security guards" (Bennett, 2011, 426). Indeed Jinx's *Invisible Frontier* is, in a sense, an elegy. In April 2003 they made the following statement:

> Jinx has ceased its unlawful trespassing activities for the duration of the present period of war and heightened alert in the United States; though neither odious nor evil, the activities of urban exploration create the hazard of false alarms and could potentially divert police resources from serious matters. Obedience of just laws is not a private matter. Every crime undermines our safety by making the staggering task of law enforcement harder in this period of terrorism and war (reproduced in Deyo & Leibowitz, 2003, vii).

While the choice of date is perhaps surprising—the time of the Iraq war, rather than the aftermath of the 2001 attacks in New

Fig. 7. Atlantic Wall Bunker in Audinghen, Pas-de-Calais, France.

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York—their concerns would fit with those of the security services. It is worth remembering that while the attack that brought the twin towers of the World Trade Center down came from the air, the 1993 attack was from an underground car park. In London, the security risks of the underground Tube have long been known, with the bombs of 7th July 2005 adding to the security concerns (see Murphy, 2012). Across the Atlantic, and by road rather than rail, John Updike's novel *Terrorist* revolves around a plot to blow up the Lincoln tunnel linking New Jersey to Manhattan (Updike, 2006; see Amoore, 2009).

Bunker archaeology – beyond the vertical

Bennett refers in passing (2011, 422) to Paul Virilio's early work *Bunker Archaeology* (2008 [1975]) which examined the structures of the Atlantic Wall. The Atlantic Wall was built along the Dutch, Belgian and French coast by German forces to defend against an Allied invasion (Fig. 7).

Virilio, who was born in 1932, grew up in Brittany and saw the war at close hand as his city of Nantes was subjected to Blitzkrieg. As he says in an interview, "war was my university. Everything has proceeded from there" (Der Derian & Virilio, 1995).[3] In the late 1950s Virilio studied the architectural work of the Atlantic Wall fortifications in the area near where he grew up, though most of the work was not published until the 1970s. Virilio was fascinated by what he described as "these heavy gray masses with sad angles and no openings—excepting the air inlets and several staggered entrances…" (1994, 13). Virilio found these of interest for a range of reasons. In part they were of recent political interest, but also because of the links he saw with other architectural forms from the past. Yet as Gane outlines (1999, 86–87), Virilio was not interested in this simply for historical, critical reasons, but he found inspiration in the inclined planes and oblique angles for his own architecture. This was brought to fruition in his collaboration with the architect Claude Parent. Parent and Virilio proposed that conventional architecture had been too concerned with the flat and the straight-forwardly vertical. They were interested in angles, tangents, and the implications of military practices for urban design:

> Urbanism will in future have much more to do with ballistics than with the partition of territories. In effect, the static vertical and horizontal no longer correspond to the dynamics of human life. In future, architecture must be built on the oblique, so as to accord with the new plane of human consciousness (Parent & Virilio, 1996, 65).

As Gane puts it, "The emphasis was insistent: conventional architecture had condemned humanity to horizontality and therefore to stasis" (1999, 88). Virilio suggests that the project was designed to challenge ideas of the inside and outside, and to move to questions of the above and below (Virilio & Lotringer, 2002, 22). But it was not merely a shift from a two dimensional, this or that side of a line, way of thinking. In their argument, and their architectural practice, it was also a challenge to ways of thinking the vertical, straight-forward ways of conceiving height and depth.

The way they did this was to force us to think of angles, orientation and slopes. Virilio suggests that:

> … the ruled surface is Euclid. In a post-Euclidean space, it goes without saying that surfaces are orientated… Most architects limit themselves to Euclidean forms: the orthogonal. They put

Fig. 8. Closed border crossing at Rosh Hanikra.

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needles on top of towers, and this became the Gothic, or whatever you like. But my particular concern was to enter into topology, in other words, into non-Euclidean spaces, to use vaguer forms, including at the level of the floor (Virilio & Lotringer, 2002, 22, 29).

A crucial part of this is that, despite the opening up of the above and below dimensions, Virilio claims that the horizontal remains important and it is actually the vertical that is challenged by the transformation: "the horizontal plane remains, it is not negated. What is negated is the vertical" (Virilio & Lotringer, 2002, 34). He suggests that this comes from his analysis of the Atlantic Wall structures.

> As soon as one starts to incline planes and to get rid of the vertical, the relationship with the horizon changes. Gravity does not come into play in the perception of space in the same way at all. When one stands on an inclined plane the instability of the position changes the relationship with the horizon. The idea is that as soon as a third spatial dimension (the oblique) is brought into the relationship with regard to space and weight changes, the individual will always be in a state of resistance… The idea of the oblique comes from such inclined bunkers (2001, 53).

A number of diagrams and schemas illustrate their claims. Virilio's work is useful in forcing us to think of the complexities of volume that cannot be simply measured along a third axis. Issues such as reach, instability, force, resistance, incline and depth matter alongside the simply vertical. These have geometric, physical and political aspects. But Virilio is suspicious of the idea of politics that is not at the same time a geopolitics. He is asked by interviewer Enrique Limon if his oblique function, as a "critique of the vertical and horizontal norms in architecture and urbanism at the time" is a 'political' space (2001, 54):

> A political space is a geopolitical space. 'Political' means nothing. A political space applies to a piece of land, whether small (a city) or large (the nation-state). It is geopolitical in the 'political geography' sense, but also in the 'geometry' sense. There is a political geometry. Bentham's Panopticon for instance is a police-state political geometry… This is geopolitics, i.e., political geometry, not political geography. A space is always political through geography and geometry. Geostrategy and war brought me to this conclusion. For the military only strategies matter (2001, 55).

These are useful, and productive, suggestions that can be taken much further. Virilio came to believe that speed was the key to understanding social and political processes, and moved away from a focus on space (Virilio & Lotringer, 2002, 53; see Virilio, 1977). He suggests that this is due to a change in military and political techniques:

Fig. 9. Welcome to Rosh Hanikra.

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Fig. 10. Israel–Lebanon border at Rosh Hanikra.

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> Fortification, which was geophysical in the ancient times of the Great Wall of China or the Roman *limes*, has suddenly become physical and even 'micro-physical', no longer located *in the space* of a border to defend, or in the covering or armor of a casement or tank, but *in the time* of instantaneous electromagnetic countermeasures (1994, 203–204).

But this early work on war and architecture bears careful examination (see also Hirst, 2005). It makes more sense to think of the developments Virilio is tracing as working with, alongside and in tension with, geophysical fortification, rather than as its replacement. What is intriguing is that while his work is certainly attuned to the above and below, what we might call the vertical in a simple sense, it actually challenges that approach to become more profound. If the horizontal is inclined, then what we customarily call the vertical is simply the horizontal at a particularly steep angle. In challenging the simply vertical, Virilio forces us to think of volume, in all its dimensions, angles other than the perpendicular, and with all its orientations. It is something of a disappointment that he turned away from this line of inquiry:

> At that time I was interested in geomorphology, syncline, anticline, everything that goes into geology. Those were the books I was reading then—today they would bore me to death—and I had noticed that there is practically nothing flat on the surface of the Earth. Nothing. There are many more inclined planes (Virilio & Lotringer, 2002, 34).

What this work provides is the potential for getting away from the straight up and down that characterises some work on the vertical. Thinking angles rather than the vertical is a potentially more powerful challenge to the flat, planar understanding.

Tunnels

Tunnels provide a possible example here, since they rarely go directly down, but use entrance shafts to gain access to a range of sites (Bridge, 2009). Mining for coal and mineral resources is part of the industrial past or present for many regions, and subsidence, access and reclamation projects raise questions of dimensionality alongside political-economic concerns. With the focus on security, however, some rather different questions are raised. Tunnels provide the possibility of moving things in or out of locations that are otherwise secured. In World War Two, many prisoner of war escapes were through tunnels; today they are raised as security concerns between Egypt and the Gaza strip, and between Mexico and the US. Given the blockade of Gaza, these tunnels are the means by which vital building materials, fuel, food and medicines can be brought into the strip without much scrutiny. Of course, this lack of regulation means weapons can also be moved, and are certainly noted by Israel as a threat. There is continual demolition of suspected sites by the Israelis (see Weizman, 2007, 254–258), and at the time of writing (August 2012), use of these tunnels was being limited by security concerns in the Sinai peninsula.

Fig. 11. Tunnel at Rosh Hanikra.

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Between the US and Mexico walls and fences are being erected, and can be adapted for various purposes (Rael, 2011), but beyond the idea of a 51 foot ladder for every 50 foot fence (Rael, 2011, 415), there is the possibility of going beneath them. Both people and drugs are moved, and while the US–Mexico border gets the most notice, tunnels have also been used for drug smuggling between the US and Canada, and for cigarettes between Ukraine and Slovakia.[4]

In the West Bank, as Weizman has shown, roads often use bridges or tunnels to enable crossing points between Palestinian villages and between Israeli settlements. Given the importance of contiguity to territorial viability, these are sometimes discussed in potential future settlements, linking otherwise disconnected parts of a future Palestinian state, either within the West Bank, or, more ambitiously, to Gaza. Yet these few pockets of Palestine are not simply enclosed by Israeli-controlled land on their borders, but also above and below. Israel has refused to handover control of airspace even after its disengagement from Gaza, and as Weizman notes, the same is true for what is below the surface:

> During the Oslo and Camp David negotiations, Israel insisted on keeping control of the underground resources in any permanent resolution. A new form of subterranean sovereignty, which erodes the basics of national sovereignty, is first mentioned in the Oslo Interim Accord (Weizman, 2002, 7).

He also notes how struggles above the surface now travel beneath as well, with Israeli and Palestinian sewage systems becoming politicised, and becoming weapons through deliberate spillage (Weizman, 2002, 7; 2007, 21–22). Similar concerns around shared infrastructure can be found in other divided cities, such as the Cypriot capital Lefkosia/Nicosia (see Hocknell, 2001). It also has important implications in the city of Jerusalem. Weizman suggests that "subterranean Jerusalem is at least as complex as its terrain. Nowhere is this more true than of the Temple Mount/Haram al-Sharif" (Weizman, 2002, 9). This site combines the third holiest Muslim site after Mecca and Medina, the Al-Aqsa Mosque and the Dome of the Rock, but one of its retaining walls is the Western Wall of the Jewish Second Temple, part of which is known as the Wailing Wall. As Weizman explains, there is a dispute as to whether this wall was built as a structural support or as free-standing, and whether the temple was built at the same or a lower elevation than the mosque. If at the same elevation then the remains of the temple have been lost; if below then the remains may be underneath the Muslim holy site. Division of this location along standard two-dimensional boundaries would therefore lead to either Muslim or Jewish holy sites within the territory of their neighbour. Weizman explains Bill Clinton's proposed solution at Camp David as "a daring and radical manifestation of the region's vertical schizophrenia":

Fig. 12. Blocked tunnel at Rosh Hanikra.

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> The border between Arab East and Jewish West Jerusalem would, at the most contested point on earth, flip from the horizontal to the vertical – giving the Palestinians sovereignty on top of the Mount while maintaining Israeli sovereignty below the surface, over the Wailing Wall and the airspace above the Mount. The horizontal border would have passed underneath the paving of the Haram al-Sharif. A few centimetres under the worshippers in the Mosque of al-Aqsa and the Dome of the Rock, the Israeli underground could be dug up for remnants of the ancient Temple, believed to be "in the depth of the mount" (Weizman, 2002, 9; see 2007, 54–55).

This was a proposed boundary that has, to date, not been realised—between 1948 and 1967 the entire site was held by Jordanian forces; since 1967 it has been occupied by Israel. Yet the proposal is one that demonstrates the three-dimensional complexities of the situation on, above, and below the ground.

A similar dimensional complexity can be found in Rosh Hanikra, at a site just north-east of the kibbutz of that name on Israel's northern border with Lebanon. A wall at the border shows the distance between Beirut and Jerusalem, and the border post itself in the middle. The notice above the border gate says "Welcome to Rosh Hanikra Border Crossing". Yet the border has long been closed, and has a United Nations presence (United Nations Interim Force in Lebanon – UNIFIL) in the zone immediately to the north of the crossing, in Southern Lebanon (Fig. 8).

This is a popular tourist site, despite the military presence in the area. One of the reasons is because of its location on a cliff face, with tunnels and grottoes formed by geological processes and erosion by rain and sea water. A cable car—said to be the steepest in the world, at an angle of 60°—takes visitors down to visit these (Fig. 9).[5]

But this terrain also shows why it cannot be reduced to a simple two-dimensional boundary line, a divided area. Rather we need to remember this is one of the areas where the 2006 war between Israel and Hezbollah was fought, with Katyusha rockets fired into Israel, and Israel sending troops, tanks and its airforce across the borderline. Traces of the security apparatus can be seen in this area, with the antennas and bunker fortifications (Fig. 10). Indeed, much of the difficulty Israel had in that war was due to the fortifications built underground by Hezbollah and its Iranian allies north of the border (Weizman, 2007, 258; see Graham & Hewitt, 2012, 17–18).

At this site you can also see the remains of a railway line, built during the British Mandate period, linking Haifa with Beirut and Tripoli (Fig. 11).

Some of the tunnels are still passable, while the point at which it left the cliff face and passed over a bridge is closed and blocked with sandbags (Fig. 12).

The railway bridge was destroyed by Jewish Haganah forces in March 1948, to prevent this route being used to transport arms from Lebanon into the disputed territory of mandate Palestine in the 1948–1949 war. This is another example of the need to think above and below, to conceptualise space in three dimensions, in terms of the bordering and securing of territory.

Conclusion

While it is well known that biopolitics works on the basis of calculation and metrics geopolitics works with similar operative principles. Just as population did not displace territory as the object of government, but both categories emerged at a similar historical juncture as new ways of rendering, understanding and governing the people and land, so too with the current moment (Elden, 2007, 2013c; see Shah, 2012; Thompson, 2007). Biopolitics *and* geopolitics can be understood through processes and technologies of bio-metrics and geo-metrics, means of comprehending and compelling, organising and ordering.

Geo-metrics might therefore be a term worth retrieving from the rather bland sense of modern geometry. The original geo-metricians were land surveyors, sent into the fields on the banks of the Nile to redraw their borders after the floodwaters had subsided. Geometry became an abstract science, but the works of the Roman land surveyors—the *Corpus Agrimensorum Romanorum*—show the importance of the practical side (Campbell, 2000). Geo-metrics remains a useful way to make sense of calculative strategies turned towards land, terrain and territory.

Can we extend this to think about geo-power as a related term to bio-power? (see Grosz, Yusoff, Saldanha, Nash, & Clark, 2012) And what would the 'geo' mean here? Geopolitics has tended to become conflated with global politics or political geography writ large. But could we turn this back to thinking about land, earth, world rather than simply the global or international? I have spoken elsewhere about the geo-politics of *Beowulf* or *King Lear* (2009b, 2013b), a description which is not anachronistic, but an attempt to make sense of the land and earth politics of these texts. How would our thinking of geo-power, geo-politics and geo-metrics work if we took the earth; the air and the subsoil; questions of land, terrain, territory; earth processes and understandings of the world as the central terms at stake, rather than a looser sense of the 'global'?

Work in this register equally needs to think in terms of the volumetric. The Oxford English Dictionary suggests this word dates from 1862, is formed from Volume and Metric, and means "Of, pertaining to, or noting measurement by volume". While the term is used in cartography and physics, there is real potential in working out in detail its two aspects: the dimensionality implied by 'volume' and the calculability implied by 'metric'. The political technology of territory comprises a whole number of mechanisms of weighing, calculating, measuring, surveying, managing, controlling and ordering. These calculative techniques—similarly to those employed in biometrics and geo-metrics—impact on the complexities of volume. In terms of the question of security, volume matters because of the concerns of power and circulation. Circulation does not simply happen, nor does it need to be contained, controlled and regulated, on a plane. Thinking about power and circulation in terms of volume opens up new ways to think of the geographies of security.[6]

Just as the world does not just exist as a surface, nor should our theorisations of it; security goes up and down; space is volumetric. There is, as the referencing in this article attests, already an extensive literature on many of these questions, but taken independently they do not cover all its dimensions. Literature on the vertical has tended to look down, from above, rather than also approach these questions from below. Work examining what happens below the surface needs to be better connected to the discussions of the above and the surface. Most fundamentally, thinking merely straight up and down may blind us to different angles of approach, and the function of the oblique. Only by thinking through all of these aspects can we reflect more profoundly on the politics, metrics and power of volume.

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Endnotes

[1] Weizman's work has been criticised for his lack of attention to those that live in the spaces he analyses (Harker, 2012), a criticism that is perhaps partially blunted by his most recent work on humanitarianism (2012a) and what he calls 'forensic architecture' (2012b, 2012c; Keenan & Weizman, 2012).
[2] See also the exchange between Bennett and Bradley Garrett at the Society and Space open site http://societyandspace.com/material.
[3] He goes on to add cinema to this. His connection of cinema to war is discussed earlier in this article.
[4] For a general analysis see Lichtenwald and Perri (2011); and on Slovakia–Ukraine http://www.reuters.com/article/2012/07/19/us-slovakia-ukraine-tunnel-idUSBRE86I0ZO20120719.
[5] See www.rosh-hanikra.com/default.asp?lan=eng.
[6] On security, my thinking has been shaped by works such as Campbell (1998), Dillon (1996), and Neocleous (2008).

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