

The work-sociology of academic aeromobility at remote institutions.

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Accepted manuscript: Mobilities, DOI: 10.1080/17450101.2019.1589727

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Abstract: Theoretically framed by the concepts of networks, co-presence and proximity, we explore the interplay of corporeal and virtual academic mobilities in the context of ‘remote institutions’ to advance the work-sociology of aeromobility at a time of climate crisis. Empirical insights are drawn from 31 in-depth interviews conducted with academic staff at the University of Otago (New Zealand), to explore the complex personal and professional decisions that underpin academic mobility practices, and shed light on why levels of academic aeromobility have not diminished with the growing capacity for virtual substitution. Our findings inform discussion of the concepts of ‘necessary’ travel, and virtual travel as a substitute for non-participation. We conclude with reflections on the scope for social (practice) and institutional (policy) reform, and avenues of future research.

Keywords: Climate change; aeromobility; remote institutions; networks; co-presence; virtual substitution.

Introduction

Aeromobility is widely recognised as a site of social and environmental injustice (Anderson & Bows, 2008; Urry, 2010). We live in a time when “our planet is on the brink of locking in dangerous levels of climate change” (Caset, Boussauw & Storme, 2018: 64), with twelve years left to avert climate catastrophe (IPCC, 2018). It has been argued that responding to aviation’s high emissions must begin with the so-called ‘high emitters’ - the tiny fraction of the worlds’ population who are disproportionately responsible for personal aviation emissions (Anderson & Bows, 2008; Schiller & Revilla Diez, 2012). Academics and their institutions are high emitters that have been generally unwilling or unable to respond to the urgency of aviation carbon mitigation. This is at odds with the role of tertiary institutions as the ‘critic and conscience of society’ (New Zealand Education Act 1989; *see also* Stohl, 2008; Smyth, 2010; Nevins, 2014; Hopkins, Higham, Tapp & Duncan, 2016). Critically examining academic aeromobility practices is important because we have arrived at the point that existing practices are morally and environmentally untenable (Lassen, Smink & Smidt-Jensen, 2009; Caset et al., 2018).

Aeromobility is the “dominance of flying as the normal international mode of traveling” (Adey, Budd & Hubbard, 2007: 774). The internationalisation of higher education systems is such that aeromobility has become central to the core functions of tertiary institutions (Storme, Faulconbridge, Beaverstock, Derudder & Witlox, 2017). Academics across all career stages routinely fly around the globe (Høyer & Næss, 2001) to conduct field work, attend conferences, engage in collaborations, and deliver papers and guest lectures (Storme et al., 2017). It has long been recognised that academic aeromobilities have enormous environmental impacts (Høyer & Næss, 2001; Spinellis & Louridas, 2013; Lassen, 2010), and the material environmental impacts arising from contemporary practices (Nevins, 2014) cannot be resolved by a technical fix under current technologies

(Lassen, 2006; Peeters, Higham, Kutzner, Cohen & Gössling, 2016; Caset et al., 2018). Rather "... the solution must be found in an increased understanding of the social and material basis of work travel" (Lassen, 2006: 311), based on individual experiences (Leung, 2012) that are set within specific geographical and institutional contexts (Lassen, 2009; Storme et al., 2017).

Aeromobility is a particularly deeply embedded aspect of the academic *modus operandi*, particularly for 'remote institutions' (Caset et al., 2018) in the global academic periphery (e.g., Australia and New Zealand), where being (and remaining) internationally prominent and globally connected is considered critical to recruitment, retention, reputation and standing. In contrast to the individual autonomy of automobility, in the case of aeromobility individuals travel with strangers, in accordance with airline schedules, and through places that may be irrelevant to them (Budd, 2011). Despite this, in the case of academic aeromobility, individuals "...have a considerable influence and self-determination in relation to the planning and execution of their work mobility" (Cidell, 2017: 694). Reflecting Urry's (2004) systems of automobility and 'automobility lock-in', we seek to critically address the 'aeromobility lock-in' of remote academic institutions, which is environmentally deleterious due to the high multiplier of radiative forcing. To date (academic) aeromobility practices have been neglected despite the growing climate crisis (Caset et al., 2018). We aim to contribute new perspectives on the work-sociology of aeromobility, specifically the 'how and why' of academic aeromobility practices, in the 'exceptional case' (Faulconbridge & Hui, 2016) of geographically distant institutions. These core objectives are interspersed through our lines of argumentation and empirical analyses. In doing so we also reflect upon the concept of 'necessary travel' and shed light on why levels of academic aeromobility have not diminished despite the growing capacity for virtual substitution.

Theoretically framed by the concepts of networks, (stimulated) co-presence and (virtual) proximity (Urry, 2002; Urry, 2003), our empirical study critically examines corporeal (physical) and virtual (mediated) academic mobility practices in the global periphery. Recognising that the substitution of one form of mobility with another is an oversimplification (Urry, 2002), and building upon earlier studies of European academic mobility practices (e.g., Storme et al., 2013; 2017), we seek to achieve insights into the interplay of corporeal and virtual mobilities in a uniquely distant academic context. Within this context, we consider the importance of spatially stretched international networks of 'small worlds and weak ties' (Urry, 2003) both for career security and career trajectory. We also critically explore 'obligations of co-presence' and the importance of 'meetingness' in relation to changing notions of (virtual) co-presence and proximity (Urry, 2002). We contribute an analysis of what these drivers mean in relation to virtual mobility substitution in the interests of climate stabilisation (Anderson & Bows, 2008), institutional sustainability (Høyer & Næss, 2001; Urry, 2003; Nevins, 2014), and researcher credibility (Attari, Krantz & Weber, 2016).

To contribute to the work-sociology of aeromobility, we begin by exploring the institutional context of knowledge organisations that are globally distant, and the conceptual context of networks, (virtual) co-presence and proximity. We reflect upon

methodological considerations and the methods implemented in the collection and analysis of empirical materials, before presenting and discussing the four themes that emerged from our data analysis. We conclude with a consideration of our theoretical and empirical contributions. The recommendations arising from our analysis target the encouragement and empowerment of individual efforts to substitute forms of mobility in response to the climate crisis, while also emphasising the urgency of collective action, by way of policy responses that span the individual, institutional and global scales of action.

Knowledge organisations, internationalisation and materiality.

Lassen (2006) outlines the connection between knowledge organisations, international aeromobility and environmental impacts, noting the significant material impacts caused by ‘immaterial’ organisations, and that “...this materiality is particularly linked to the extension of forms of mobility” (Lassen, 2006: 301). Here we focus on climate change, aviation and greenhouse gas (GHG) emissions, and nowhere is the confronting relationship between aeromobility and accelerating climate change more apparent than in the context of geographically distant academic institutions. While academics in the global North are considered part of the ‘super-mobile population’ (Lassen, 2006; Schiller & Revilla Diez, 2012; Storme et al., 2017), the problem of long-haul ‘aeromobility lock-in’ in geographically distant knowledge organisations has become critical (Hopkins et al., 2016). The University of Otago (*Te Whare Wānanga o Otāgo*), Aotearoa/New Zealand, makes claim to being the most geographically-isolated internationally-ranked university in the world. It is no different to other leading tertiary institutions elsewhere in New Zealand, or the rest of the world, that are engaged in the internationalisation of tertiary education (Storme, et al., 2017). However, almost all of its domestic and effectively all of its international academic mobility is perforce aeromobility. Questions of academic aeromobility and climate change (Stohl, 2008; Smyth, 2010) are uniquely problematic in the global periphery due to high dependence on recurrent long-haul air travel (Hopkins et al., 2016).

Internationalisation takes many forms. At the University of Otago, as elsewhere, institutional standing is enhanced by recruitment of international academic staff, publication in international journals, high visibility at international conferences and meetings, international collaborations and invitations to deliver presentations (University of Otago, 2013). Tenure/confirmation, performance review, promotion and research assessments¹ are conducted, in part, in relation to these criteria. Internationalisation extends beyond the regular mobilities of academic staff to recruitment of international students, curriculum development, and student exchange, which are described as “...key elements of the University of Otago’s approach to internationalization” (University of Otago, 2013: 6). Support for the development and maintenance of international collaborations is critical to the recruitment and retention of academic staff, many of whom are non-New Zealanders who have invariably made family sacrifices to live and work in New Zealand. This raises further questions about academic mobility practices, international migration (Hoffman, 2009) and the long-term, long haul mobilities associated with a largely international academic staff (Cohen, Duncan & Thulemark, 2015). Lassen (2006:301) rightly observes that in the case of academic mobility the “boundary between work and tourism is not distinct and there is a very complex

connection between travel, work, tourism, and play”. At the University of Otago, academic aeromobility practices are linked with workforce immigration and return visits to distant family (Hopkins et al., 2016).

Storme et al. (2017:406) note “empirical studies that explore what compels and motivates academics to travel are very rare, especially in terms of analysis of the complex interplay between corporeal (physical) and virtual mobility”. The few studies that do exist have generally addressed academic mobility practices in the global North (Ackers, 2008; Lassen, 2006; Leung, 2013; Storme, Beaverstock, Derrudder, Faulconbridge & Witlox, 2013; Storme et al., 2017). Situated in the context of a globally distant institution, our research offers unique insights into drivers of academic aeromobility in relation to connectivity and obligations of presence (Urry, 2002; Storme et al., 2017), both personal and professional (Hoffman, 2009). It also affords the opportunity to critically explore the inescapable institutional policy clash (Bows & Anderson, 2007) that arises from existing internationalisation (Hopkins et al., 2016) and sustainability policies and practices (University of Otago Sustainability Framework, 2017-2021) that are environmentally irreconcilable (Nevins, 2014; Peeters et al., 2016). Critical insights are required into the complex interplay of corporeal and virtual mobilities, how this interplay has evolved over time, and the possibilities of virtual mobility substitution to reduce levels of academic aeromobility.

Conceptual framing: Networks, (virtual) co-presence and proximity.

Academic mobilities may be addressed according to at least two conceptual approaches (Storme et al., 2016). Functional approaches view work-related mobility to be a management requirement that can be measured in terms of economic value generated through, for example, visiting subsidiaries and negotiating sales contracts. The mobilities approach (Sheller & Urry, 2006), by contrast, recognises the importance of social obligation and social practices in family relations, friendship groups, and professional organisations, and the increasingly spatially stretched nature of social relationships. Thus, as social life has become more networked and mobile the celebration of important milestones (e.g., birthdays, weddings, anniversaries), which were once celebrated locally, are now more likely to involve significant travel (Larsen, 2007). Flying has been transformed from an extraordinary event into an everyday ‘locked-in’ social institution (Randles & Mander, 2009).

Both conceptual approaches can be applied to the study of academic mobilities. The functional requirements of tertiary institutions include attendance at international exchange and study abroad fairs, the outcomes of which can be measured in economic terms (e.g., numbers of international student enrolments generated). The mobilities approach, which is adopted to conceptually frame our research, recognises that networks are also critically important to a successful academic career (Urry, 2003). In addressing the work-sociology of aeromobility, networks can be understood in terms of groups of independent actors and the relationships between them, which can vary from close personal ties to infrequent impersonal or mediated interactions. It has also been argued that academic practices are increasingly embedded in network sociality (Urry, 2002).

Network sociality is based on information flows, the exchange of data, sharing of ideas and ‘catching up’. That is, “...a form of sociality that is ephemeral but intense, it is informational and technological, it combines work and play, it is disembedded and generic, and it emerges in the context of individualization” (Wittel, 2001:51).

Networks are critical to knowledge workers (Storme et al., 2017). Storme et al. (2013) contemplate a minimum threshold of travel required in order to be a successful academic, to develop and sustain networks of current and potential future collaborators, rather than simply to present conference papers, seminars and guest lectures *per se*. A minimum of travel is required to ensure “the transfer of tacit knowledge or the know-how and know-who during informal meetings” (Storme et al., 2013: 5). This aligns with notions of ‘network activation’ (Elliott & Urry, 2010) which can open job opportunities, appointments to editorial roles, collaboration on grant funding proposals and publication opportunities. This type of work environment is defined by Wittel (2001) as a ‘network driven workplace’.

Despite the proliferation and acceleration of digital technologies, which offer the potential to change travel behaviours (van Wee, 2015) and offset corporeal travel with virtual substitution (Urry, 2003), physical travel has continued to increase apace (Peeters et al., 2016). Yet digital communications have fundamentally changed social relations, and personal and professional activity systems in other ways. ‘Little boxes’ which were constituted by strong, discrete but overlapping social groups, have been largely replaced by ‘networks’ “...where connections are spatially dispersed and membership of one network does not necessarily overlap with that of any other” (Urry, 2003: 159). The consequences of networked life are significant. Network nodes have become global, places of residence and work activity have become more distant, and networks with little overlap have come with the need to be maintained. Urry (2003) considers the role that corporeal travel plays in social arrangements. He argues that social life is networked and that “...increasingly extensive networks, hugely extended through the information revolution, depend for their functioning upon intermittent occasional meetings” (Urry, 2003: 155).

‘Little boxes’ and ‘networks’ have contrasting structural characteristics (Urry, 2003). Although networks can take various forms (linear, hub/star and distributed), they are typically formed in clusters that vary in terms of strength of ties. Urry (2003) explains that extensive ‘weak ties’ are critical in terms of acquaintanceship and informational flows which are fundamental to many social processes. Networks also vary in terms of relationships, commitment, obligation and reciprocity. Membership of networks that are comprised of extensive weak ties may be extremely beneficial in terms of the diffusion of information and mobility opportunities (Granovetter, 1973), but they must be maintained through the demonstration of commitment and investment of energy. Corporeal travel is critical to this commitment, because face-to-face and virtual meetings serve different purposes (Denstadli, Julsrud, & Hjorthol, 2012; Fontes, Videira & Calapez, 2013). Urry (2003: 161) explains that “Networks of weak ties need to meet up, with the network seemingly unable to reproduce itself without such periodic meetings”. Beyond the limitations of virtual communications, meetingness is rich in social exchange due to

‘intense and dynamic conversational interactions’ that address, in an academic context, research projects, funding arrangements, research team membership, offers and invitations, as well as matters of personal friendship, rumour and gossip.

Networks and degrees of meetingness walk hand-in-hand, as do obligations of co-presence and academic corporeal mobility. Occasional physical proximity is an obligation that comes with network membership (Urry, 2003), where co-presence makes network members uniquely accessible and subject to one another, which is important in terms of commitment. Most critical to these face-to-face personal social exchanges is trust (Urry, 2003). Urry (2003) argues the point that co-present interaction is fundamental to social life. Physical co-presence represents meetingness in its most direct and pure form, made up of more than just words (i.e. expressions, body language, non-verbal feedback) affording the opportunity for multi-layered and rich conversations that may be described as ‘thick co-presence’ (Urry, 2003). Mutual attentiveness is central to physical proximity. Obligations of co-presence remain so strong that digital communications (inclusive of virtual mobility) are seen to function as a driver of (Urry, 2002), as opposed to a substitute for, corporeal mobility (Storme et al., 2017).

While digital technologies have driven the shift in social organisation from ‘little boxes’ to networks, the same technologies have driven changes in academic mobility practices (Storme et al., 2017), with implications for (virtual) proximity and co-presence. Virtual mobilities have blurred the lines between work and non-work spaces, business and leisure time, and colleagues and friends (Wittel, 2001). Digital communications may facilitate the involvement in conversations of people who are physically distant. Space has become ‘folded and crumpled’ with the emergence of virtual technologies that temporarily eliminate distance and separation (Müller, 2014). This adds considerable complexity to the mutual attentiveness formerly reserved for those who are physically co-present. The idea that virtual mobility drives corporeal co-presence may be increasingly challenged if that co-presence now includes those who are only virtually present. Digital communications mediated by the screen have heralded new forms of ‘simulated co-presence’ (Urry, 2003). Rapid advances in communication technologies are driving continued growth of a networked sociality that is simultaneously entrenching and redefining the need for regular corporeal mobility (Urry, 2003).

Within this conceptual framing, we seek to shed light on academic aeromobility practices in a globally distant context. We do so by exploring the interplay of corporeal and virtual mobilities among academic staff at the University of Otago (Aotearoa-New Zealand), in relation to networks and obligations of co-presence. Insights into networks, degrees of meetingness and obligations of co-presence are critical to understanding corporeal and virtual mobility practices of academics, and the prospects of reducing academic air travel emissions in the interests of institutional sustainability, global citizenship and academic credibility (Høyer & Næss, 2001; Urry, 2003; Nevins, 2014; Hopkins et al., 2016; Storme et al., 2017; Attari et al., 2016). Specifically, we set out to advance the work-sociology of aeromobility by exploring contemporary corporeal and virtual academic mobility practices in a unique geographical context, perceptions of accountability for air travel

emissions arising from academic aeromobilities, and the potential and emerging possibilities for virtual mobility substitution within that context.

Methodology and methods

Our research addresses the aeromobility practices of academic staff at the University of Otago, Aotearoa-New Zealand. High levels of aeromobility among (many) academic staff is implicated in contentious public debates that address questions of institutional sustainability, emissions reduction, divestment, and global citizenship (Hopkins et al., 2016). This collaboration involves researchers who share in common the view that aviation CO₂ emissions are a significant driver of anthropogenic climate change, and that academic aeromobilities must be addressed in institutional sustainability policy. Reflecting this view, we adopted a critical interpretive research approach informed by a relativist ontology and a subjectivist epistemological position (Denzin & Lincoln, 2005).

A programme of one-to-one semi-structured interviews was implemented in order to achieve in-depth individual perspectives from academic staff employed in a range of disciplinary fields at the University of Otago. Semi-structured interviews offered the opportunity to engage in comprehensive and wide-ranging two-way conversations (Fontana & Frey, 2005) that were intended to mutually explore contextually subjective views on climate change and academic aeromobilities. Interviews were guided by an interview schedule that broadly addressed academic mobility practices in relation to institutional expectations (e.g., relating to internationalisation), disciplinary standards and norms, professional practices, institutional and departmental conference funding, career advancement, personal circumstances and preferences, sustainability commitments, and climate accountability. Individual accounts of corporeal-virtual mobility substitution were of central importance to our interview programme. The need to address all aspects of our interview schedule was balanced against a willingness to facilitate a flow of conversation that, at times, opened avenues of discussion that were not identified by the research collaborators as important in the planning of the research (Jennings, 2001). We set out in all interviews to establish rapport, put interview participants at ease, and engage in conversations that were co-created, mutually informative and honest (Fontana & Frey, 2005).

Participants were recruited in accordance with a random sampling procedure. In order to accommodate disciplinary perspectives we set out to achieve a university-wide sample of academic staff. The University of Otago is organised into four academic divisions (Commerce, Health Sciences, Humanities and Sciences), each comprising a number of academic schools/departments (*see* Appendix A). Schools/departments within all four divisions were listed and selected for inclusion using the Excel random number function. In order to ensure participant anonymity, departments were required to meet a minimum number of academic staff to be eligible for inclusion. A minimum of three departments were selected from each division. Individual academic staff from each selected department were recruited using the same random number function. All departments in each division, and staff in those departments had an equal non-zero probability of being recruited for this study. In practice, our sample of participants was controlled and

stratified. Initially, 16 academic staff were randomly selected and then discussed in a meeting of the research team. Where conflicts of interest were identified, participants were reselected. At the completion of the first sixteen interviews the same procedure was followed to further build the sample of interview participants. At this point the sample was stratified to ensure gender representation and coverage of the academic scale. Where necessary, female academic staff were purposively sampled through randomly generated numbers of a list that included only the female academic staff of a department. This approach afforded a profile of participants that was reasonably balanced and representative of gender, age and junior/senior academic staff status (Table 1). It should be noted, however, that as with all qualitative research, all participants ultimately agreed to take part, which may result in a selection-bias.

Insert Table 1 here:

Table 1. Summary of interview participants

Interviews were conducted between July 2015 and June 2016, ranging in duration from 22-59 minutes with a total duration of 1317 minutes (21 hours, 57 minutes) and average of 43 minutes per interview (see Table 1). Data collection was concluded when evidence of saturation emerged after 31 interviews. At the completion of data collection, interviews had been conducted with academic staff in three Commerce departments (Economics, Accountancy and Finance, and Marketing), three Humanities departments (Music, Classics, and Philosophy), five Sciences departments (Chemistry, Physics, Surveying, Zoology, and Physical Education, Sport and Exercise Sciences) and three Health Science departments (Microbiology, Obstetrics & Gynaecology, and Anatomy). Interview participants included 21 male and 10 female staff, and a balance of academic positions (Professors 8; Associate Professors 8; Senior Lecturers 7; Lecturers 5; Senior Research Fellows 2; Postdoctoral Fellows 1).

All interviews were digitally recorded with the written consent of participants, and fully transcribed to safeguard against information loss, and ensure data security. Transcriptions were distributed among the researchers and subject to independent reading and annotation. A blind process of transcription analysis and text interpretation was initially undertaken individually. The interpretations of the collaborators were then drawn together and subject to a manual thematic analysis that was conducted interactively (Patton, 2002). During our meetings, empirical material was reduced into broad categories based on interpretation of the participants' narratives and the identification of emergent themes (Miles & Huberman, 1994; O'Reilly, 2005). Distilling our interpretations in meetings allowed for 'analyst triangulation' to take place (Patton, 2002) and to ensure trustworthiness (Decrop, 2004) by checking for aspects of convergence and divergence in our interpretations of the empirical material (Lincoln & Guba, 1985). Interpretations were presented individually and contrasting interpretations discussed collectively, until congruent interpretations were achieved.

Analysis and results

Four themes emerged from our analysis (Table 2), which we labelled ‘Complex drivers’, ‘Don't weaken me!’, ‘Selective substitution’ and ‘Assorted scalar accountabilities’. Verbatim quotations were drawn from interview transcripts to illustrate our interpretations. In the interests of thick description (Ponterotto, 2006), our results are extensively presented in the words of interview participants. These are referenced by an interview code convention that includes interview number (#), academic division (Com/HS/Hum/Sci), gender (M/F) and level of appointment (junior/senior) (*see* Table 1 column 1 and associated notes).

Insert Table 2 here:

Table 2: Themes, sub-themes and nodes arising from interview transcript analysis

Complex drivers

The mobilities approach to understanding academic travel (Sheller & Urry, 2006), which highlights the complex drivers of academic mobility practices, is reflected in the interplay of professional, social and personal factors that emerged in our programme of interviews (Table 2). Reflecting the findings of Storme et al. (2013), we found that academic mobility practices are subject to a range of informal and tacit work practices that may (or, increasingly, may not) require corporeal proximity. The drivers of corporeal mobility varied between disciplines, but also between scholars within disciplines based on a range of personal drivers. Most notable was the inescapable requirement in some disciplines for travel associated with field or collaborative laboratory-based research, particularly in the Science disciplines (e.g., Chemistry, Surveying) and science-based Humanities disciplines (e.g., Physical Geography, Archaeology) (*see* Heffernan & Jons, 2013). Researchers across the science disciplines expressed the view that they were locked into what Lassen (2006) describes as ‘super mobile’ professions. *“When it’s a matter of field work it [travel] is a necessity unless it’s something that can easily be done by someone else in the course of their own research or as their contribution to a collaboration”* (#22/Sci/M/J).

By contrast, the Humanities disciplines are experiencing a revolution of archival digitisation, although individual perspectives on the potential for digitisation to overcome the need to travel differed. Corporeal travel to physically visit archives was considered an absolute necessity by some. *“For a historian of 19th century Italy, the life blood of my work is archival resources ... you either go to the archives and do the research in situ or you don’t publish anything... Without data I can’t be a historian”* (#10/Hum/M/J). Others expressed the capacity to effectively use digitised archives from their office desks. *“...[T]here is an enormous amount of that available. Stuff that 30 years ago you would have had to travel outside of New Zealand to find. The French National Library have a lot of 17th century texts in PDF format. Not only can you view them, you can download them”* (#15/Hum/M/S). The same sentiments were expressed by some researchers in the Commerce disciplines (e.g., Economics; Accountancy and Finance). *“I can access*

databases... from my office so I don't need direct contact with people other than co-authors" (#2/Com/F/J).

Within the array of informal and tacit work practices of academics at the University of Otago, two clear points emerged from this aspect of our analysis. Firstly, an enormous 'mobility burden' (Urry, 2007) arises from being located at a remote institution due to the need to build or maintain network capital (Storme et al., 2013). Networks were considered by most to be critical to a successful academic career. In the case of the laboratory-based sciences, conference contributions and lab profile were considered to go hand in hand with international collaboration, grant success, and graduate student career possibilities. *"It [travel] is really, really important because you need to have a profile. Without a profile you're not going to get grants. You're not going to keep up with the current state of play..." (#16/Sci/M/J).* Network sociality was considered to be built on the social processes of commitment, obligation and reciprocity (Urry, 2003). Reciprocation in the form of two-way travel was considered central to successful collaboration.

"Some people's internationalism would be satisfied by the computer whereas my internationalism is satisfied by me travelling. There is a huge need to develop genuine international collaborations and they're not based on meeting at a conference. They often require that your collaborators come and visit you, and you visit them - two-way travel is fundamental" (#24/HS/M/S).

The importance of network capital was consistently expressed across disciplines, although disciplinary perspectives on the necessity of travel varied with researcher ontology, epistemology and methodology. In contrast to the science disciplines, humanities researchers engaged in ethnographic research offered insights into a blurring of professional and social networks (Urry, 2003). An ethnographic researcher of music explained the notion of 'living my work' *"The location of my research is in another country so I've got to travel to that country to speak to culture bearers, cultural informants, collaborators, insiders... you need to be there and observe and participate" (#8/Hum/M/S).*

Given the high degree of travel autonomy that some academics enjoy (Hoffman, 2009; Storme et al., 2013) it is of no surprise that taking up opportunities to travel differs on an individual basis. Some expressed a love of travel and a wish to constantly travel more, often based on both professional and personal drivers. *"I'd much rather [travel] because of the type of person that I am; the type of personality I have and the way that I know people [other researchers] open up to me." (#9/Hum/F/S).* By contrast, others considered conference attendance, presentation and networking to be stressful. *"I get nervous about talking ... [and] I get really nervous about having to network... [I]t can be an incredibly lonely experience" (#20/Sci/F/S).*

Secondly, we found that a disproportionate 'mobility burden' associated with working at a remote institution may be linked to an elevated risk of academics becoming 'off-balance' in their aeromobilities. Storme et al. (2013) use the term 'off-balance' to

describe academics at Ghent University (Belgium) "...who (temporarily) do not reach a travel threshold, or academics who are above a certain travel limit" (Storme et al., 2013:19). While important in terms of professional network capital, the need to remain connected with distant family also emerged as a key social driver in travel planning (*see also*: Hopkins et al., 2016). The blurring of the dividing line between professional and personal drivers of academic mobility (including the familial needs of spouses) was clearly evident. *"Work-related travel would be a conference with a little bit of research collaboration and a visit to family all in the same trip. That works well to kind of keep me in touch with colleagues ... and to combine it with a trip probably once a year to get back and see family"* (#22/Sci/M/J). Some admitted that choice of conference was heavily influenced by personal drivers, most notably to visit family members that one would otherwise very rarely see, or never see at all. Equally, domestic commitments may serve as a barrier to travel, with many explaining complex challenges of work demands, compromise and disconnection. *"When I went to the UK it was two weeks away from the kids so that's really hard. It's hard [for my wife] also because we're relatively new to New Zealand; we don't have a family support network"* (#3/Com/M/J).

Storme et al. (2017:406) explain that "socially, mobility can be a source of stress and frustration for the traveller and the family of the traveller, and can impinge on work/life balance (*see also*: Espino, et al., 2002; Gustafson, 2006). The darker side of (academic) hypermobility (Cohen & Gössling, 2015) was evident in the context of our research. The physical toll associated with long-haul, short duration travel was most apparent. The after effects of trans-meridian travel were considered to be compounded by the need to immediately resume work upon return. *"It was May; it was the middle of teaching ... but my body clock was thrown out for two or three weeks after I got back, too. I didn't know what time of day it was when I got back. I think that probably killed my productivity for another couple of weeks ... I don't take any delight out of actually travelling"* (#7/Com/M/S). The elevated challenges that academics at remote institutions face in maintaining 'balance' in their professional and personal lives, and home and away commitments, was clearly evident in this theme.

"Don't weaken me!"

The title of our second theme is drawn verbatim from one of the interviews (#13/Hum/F/S). It expresses the view that stepping out of the socio-technical system that underpins our academic institutions and wider societies will make no discernible difference in terms of emissions, but will result in significant professional disempowerment, personal inconvenience and sacrifice (*see*: Young et al., 2014).

"I don't limit my travel because I have a strong belief that the individualisation of risk is a strategy that disempowers people who would otherwise be powerful and affect change. I think if individuals view it as an individual decision... they're making a serious mistake and they're participating in a hegemonic viewpoint that nobody intends. They undermine their own agency by participating in that viewpoint... I certainly should try harder to live ecologically. I make some choices that are good and

many that are less good but I don't think my first step should be to make myself weaker" (#13/Hum/F/S).

This line of argument was linked to the role of academic institutions as the 'critic and conscience of society' (New Zealand Education Act 1989), a role seen to be particularly important in times of urgent socio-technical system change (Young et al., 2015). The view was expressed that a reduction or cessation of academic travel would have an exculpatory function, where those who have short-term interests in the continued extraction and burning of fossil fuels are freed of scientific and philosophical critique. Thus, the roles of academics as scientific researchers, educators and, more broadly, the 'critic and conscience of society' are more important than ever, and must be safeguarded rather than eroded and undermined by individual sacrifice. While this point was clearly evident in our analysis, it can also be considered in relation to the 'uncomfortable contradiction' (Caset, 2018:65) that the carbon footprint of aeromobile academics may "...outweigh the environmental benefits of their findings and their lobbying" (Grémillet, 2008: 1175), while compromising the public credibility of the research community (Attari et al., 2016).

Beyond the argument that academic institutions (and those working in them) should not act in ways that weaken them, aeromobility practices were also linked to career security and trajectory (Table 2). An expanding body of research draws a relationship between mobility and career progression (Storme et al., 2017) and, as Ackers (2008:411) notes, "...the tendency (in both policy circles and academic research) to conflate different forms of mobility and to equate these with notions of excellence or quality". Many expressed the view that reducing or limiting air travel would be an unacceptable career compromise. *"If you said, 'Okay I'm not going to fly anywhere' I would have stayed as a senior lecturer for the rest of my life - waiting to be performance managed out of the university for failing to do my job as they see it"* (#6/Com/M/S). The same sentiments were expressed in relation to career trajectory. *"You may be puddling along at a certain level ... but the opportunity to take the next step is missing if you're not connecting internationally... if you are aiming to be promoted then you must be networking"* (#6/Com/M/S). The consequences of reduced air travel extended to career fulfilment. *"I would essentially be reduced to a provincial bystander who might comment on the field as an outsider and that's not a great career"* (#10/Hum/M/J).

The importance of academic network sociality (Urry, 2003), and the centrality of meetingness to the establishment and the ongoing maintenance of networks (Urry, 2003), was a central element of this theme. The importance of strong academic networks was described as "absolutely instrumental" and "without substitute" (#12/Hum/M/S). Networks were considered critical to all aspects of a successful research career. *"If you want to publish in the top journals you need to be at these top conferences networking. If the editors have met you, you know it just makes a difference"* (#3/Com/M/J). Regular conference attendance was linked to grant application prospects, which were considered to be enhanced by a strong network profile. *"If you're going to read a grant and if you know the person ... and you know that they're doing good work, then you are naturally favourably disposed"* (#16/Sci/M/J).

The blurring of professional and personal networks (Urry, 2003) was considered a particularly enriching aspect of academic mobility. *“It’s really, really beneficial for not only keeping up with what’s going on but sometimes you can learn more over a cup of coffee or tea or a beer ... It’s instant knowledge... it’s worth its weight in gold in the areas I work in”* (#8/Hum/M/S). Network development was considered to be critical at the early career stage. *“Younger people need to travel to present their face... I am mentoring younger staff and particularly younger women with families who are restricted in that way; they can’t get away. I’m sure it inhibits opportunities longer term”* (#7/Com/M/S). Networking in the Sciences was considered an important exercise in *“...waving the flag; waving the flag is probably a bit contrite actually. It is imperative that we make it clear what research we are doing here ... It is important in respect to the students getting jobs from their PhDs - that they present work and they network with people who may hire them as post docs”* (#18/Sci/M/S). Learning approaches to, and benefits of, networking were considered to be particularly important for early career scholars. This is particularly relevant to attendance at annual meetings and international conferences where intra-national ties are much more likely to arise than building strong international networks (see: Derudder & Liu, 2015).

Many of the elements of professional sacrifice that were considered likely to arise from curtailed academic mobility are conceptually framed by Urry (2003). Obligations of co-presence was considered critical to maintaining functional networks (Urry, 2003). *“If I want to maintain those links I do need to head back there at some point. It’s such a mission going to the other side of the world – it does make it difficult.... I’m often catching up with people I know and it’s good to maintain those relationships”* (#31/HS/M/J). Intermittent co-presence was considered essential.

“We are on the other side of the world from where the majority of the research is being undertaken and I think it was really important to my career development that my international colleagues saw me a lot ... and I was considered as part of this international community. It was often commented on that they were surprised that I was able to make so many meetings but I really went out of my way to do it... I think through that you build a reputation of being a reliable colleague if you like, you’re always attending the meetings, asking questions - I think that’s been hugely beneficial for me” (#28/HS/M/S).

Interestingly, being co-present was also linked to serendipity and gossip (Urry, 2003). *“I think I would lose those connections especially over time and those cool opportunities that pop up unexpectedly every once in a while”* (#21/Sci/F/J). *“While things come through in the literature, if you want to know the roots of what’s actually happening in your area you have got to network ... while email is a great thing you get a lot more out of conferences; grass roots gossip stuff that doesn’t get into published journals and I find that is quite important”* (#19/Sci/M/J). Networks, co-presence and meetingness (Urry, 2003) were considered critical to academics working at a remote institution, which raises important questions regarding the challenges and scope for virtual mobility substitution.

Selective substitution

In-depth and critical insights into corporeal-virtual mobility substitution are needed to inform policy directions for tertiary institutions seeking to address the material environmental impacts of current academic (aero)mobility practices (Hopkins et al., 2016; Storme, et al., 2017). It emerges that corporeal-virtual mobility substitution is a realistic but selective practice, driven primarily by considerations of efficiency and effectiveness. Fundamentally, virtual mobility substitution is recognised as a *substitute for non-participation*, that was perfectly effective in cases where networks (e.g., relationships and collaborations) already exist (e.g., PhD co-supervision and meetings of collaborative research team members). Virtual communications were considered sufficiently effective to facilitate a growing range of academic activities that can be undertaken without the need to travel. *“There is so much you can do via the internet and Skype these days; and I do... I’m working on co-editing a book and we [co-editors] discuss it regularly via Skype”* (#12/Hum/M/S). Virtual co-presence was considered to be lacking in terms of full and effective participation, and the intense interaction required to give rise to thick co-presence (Urry, 2003), but growing in potential and worthy of active encouragement. *“Skype is a bit like watching a YouTube recording of something, it’s never quite the same... but if the alternative is non-participation then I think it’s worth looking at, definitely”* (#11/Hum/M/J).

That said, virtual mobility substitution was widely considered to fail in *facilitating participation* in building effective networks, and enduring and successful relationships. Thick co-presence and intense personal interaction were considered irreplaceable and exceptional, in terms of establishing and maintaining networks of relationships (Urry, 2003). *“Meeting face to face and socialising; there is no substitute for that... There are some of those people that I have met at crucial times who for one reason or another you’ve struck a rapport with and they’ve been instrumental in getting my career going”* (#12/Hum/M/S). Physical co-presence was widely considered to be both essential and irreplaceable and beyond substitution in terms of networks and relationships. *“I don’t think there is any substitute in the end for human interaction”* (#14/Hum/M/S). *“In my own view, I think it’s absolutely essential in the profession... I think the internet is changing things but for me, there is just no substitute for actually meeting people in person”* (#12/Hum/M/S). Virtual meetings were considered to be more structured and time constrained, less free flowing, and ineffective in reproducing the human dimensions of interaction. *“I think virtual meetings are basically for people where the meetings are very formal, where you may as well be a dummy in a suit frankly and listen to a power point presentation. It’s a bit like lecturing; you can... do it but it’s not very interactive or very imaginative”* (#18/Sci/M/S).

Interestingly, our interview programme yielded insights into specific aspects of physical co-presence that are alluded to in Urry’s (2003) theorisation. Foremost among them is non-verbal communication. *“It’s presence in the same room. Communication isn’t just verbal ... just by hanging out and having a coffee for a couple of hours and just talking – you exchange lots of information”* (#8/Hum/M/S). This was considered particularly

necessary in building new relationships that may offer a starting point for subsequent virtual communications. Our interview programme reinforced the importance of co-present time, eye contact and shaking hands in the building of trust (Urry, 2003). *“We can look at each other in the eyes. It makes a huge difference; otherwise you’re really unable to participate”* (#13/Hum/F/S). *“When you meet... you shake hands with everybody. Shaking hands is a big deal and its part of that personal affirmation of a relationship”* (#6/Com/M/S). These aspects of co-presence were seen as fundamental to building enduring relationships of trust (Urry, 2003). The missing human element extends to perceived barriers of physical separation, attention and full inclusion, when virtually co-present. *“I have been to a couple of meetings where they’ve video linked in somebody who couldn’t be in town; and there’s always the feeling that that person is kind of separate from the group - it’s just never quite as inclusive”* (#4/Com/F/J).

Assorted scalar accountabilities

Caset et al. (2018) cite Bonnett (2006: 230), who notes that the “...glory days of guilt-free and gleeful world winging are gone”. The University of Otago is a remote institution that is committed to sustainable practices and global citizenship (University of Otago, 2017), but geographical distance has created high institutional dependence on regular, high carbon long-haul air travel (Hopkins et al., 2016). The fourth and final theme to emerge from our analysis reinforces the quandary that frames our research, and emphasises the need for accountabilities across a range of scales. At the scale of the individual (academic), for some, the geographical quandary is irreconcilable. *“There is very little that I can do about that given that we are a very long way away from the rest of the world. I don’t think there are any alternatives; we have got to use air travel”* (#19/Sci/M/J). Others considered much academic aeromobility to be profligate, pointing to the need for individuals to significantly reduce unnecessary air travel as a starting point. However, emissions and climate change are factors that are typically excluded from travel decision making (see Higham & Cohen, 2011). *“It would be really nice to think about decisions as being environmentally sustainable but it wouldn’t be true to say that’s what’s driving my decision-making”* (#13/Hum/F/S). The benefits of strong academic networks, and the social mechanisms and obligations underpinning those networks, are such that individual academics at remote institutions are unlikely to voluntarily reduce their current aeromobilities.

A prevailing view stated that individuals cannot be held responsible for the emissions associated with their academic mobilities because:

“...carbon costs are imposed by deciding to live in New Zealand and pursue an academic career... We are quite conscious consumers in other parts of our lives ... but there is no way around travelling. It’s necessary if you want to become a professor [and] it’s necessary if you want to maintain your relationship with your partner, your relatives and your friends. Necessary is a word that can hide all manner of sins. One could argue that none of those things are necessary but if you accept that those things are important then they are necessary” (#6/Com/M/S).

Parker and Weik (2014), highlight the structural and institutional constraints that underpin academic mobility practices: “Their freedom to travel, which entails a freedom from certain local obligations, is not always voluntary but part and parcel of professional expectations and is subject to peer and managerial evaluation” (Parker & Weik, 2014:167). Our interviews highlighted a widely held view that high academic aeromobilities should not be cast as an individual problem, but rather one for which institutions should take responsibility. *“I don’t think that climate change is the product of individual consumer choices. It’s the product of a certain socio-economic structure”* (#14/Hum/M/S). Thus, *“...the university should be paying attention to the carbon footprint of research and academic interactions that are carried out under its umbrella. I’m not sure what shape exactly that would take or should take. I would hesitate to see any real impositions made or severe restrictions placed on travel”* (#22/Sci/M/J).

Our interviews revealed differing views on the scope for institutional accountability. One view suggested that the university should extend its current (local) emissions reduction initiatives which centre on sustainable buildings (e.g., heating systems) and local transport (e.g., commuting) to include air travel. Offsetting was considered an important response to the university’s high air travel carbon footprint. *“The university should ... offset the carbon [to be] a bit more responsible in terms of owning our carbon emissions”* (#16/Sci/M/J). Fossil fuel divestment was also considered absolutely necessary. Fundamentally, it was considered important that the institutional response extend to facilitating individual academics to make travel decisions that accommodate environmental concerns, to address institutional lock-in, and encourage and facilitate changes in academic travel practices without personal or professional disadvantage. *“If the university were interested in reducing its total carbon footprint then everybody’s behaviour would make a difference. So you could offer incentives... If you had a programme that rewarded people who are able to make reductions in anticipated non-zero emissions; that could be pretty neat”* (#13/Hum/F/S).

This line of thought links to two important points; first that changes in air travel decision-making should be autonomous rather than imposed (Tindall Travel Strategy, 2015) and secondly, institutional change must ensure that virtual mobility substitution can be encouraged without individual disadvantage (Hopkins et al., 2016). Addressing the structural and institutional constraints that underpin academic mobility practices (Parker and Weik, 2014), should include a commitment to invest in the technologies that will continue to redefine the possibilities for virtual mobility substitution.

Collective action among global scientific communities, and groups of universities, was also considered critical.

“I don’t feel we are in a position where we could make a unilateral decision. I couldn’t suddenly decide that I feel guilty about this travel so I’m not going to do it and therefore I’m going to compromise my career where somebody else may not compromise their career and leap forward ahead of me. Whereas in a collective society if we agreed, okay well let’s not hold this conference, let’s all meet online

... and improve our connectivity ... that would be a good way to go”
(#28/HS/M/S).

Clearly concern about travel decisions that may give rise to individual disadvantage extends to institutions. *“I think if other universities weren’t doing it in a virtual way then we as a university would be really disadvantaged by not having a physical presence at these meetings overseas”* (#20/Sci/F/S). This view was reiterated by another participant who noted that: *“It would need to be a conglomeration of universities, it would need to be scientific societies who hold these meetings; saying ... we are going to have our annual meeting virtually. I would definitely support a move in that direction because I do see the problem, but I am of the opinion that small-scale solutions aren’t real solutions”* (#28/HS/M/S). The need to move from individual sacrifice to collective action was clearly evident (Higham et al., 2016).

Conclusion

Current academic aeromobility practices are contributing significantly to continued high growth in global aviation emissions (Creutzig, 2016). These practices are incompatible with the radical emissions reductions required to meet COP21 climate commitments and to minimise the risk of dangerous climate change (Higham et al., 2015). To address this predicament, we set out to contribute to the work-sociology of aeromobility, by offering critical insights into the ‘how and why’ of academic aeromobility in the ‘exceptional case’ (Faulconbridge & Hui, 2016) of globally remote institutions (Caset et al., 2018). The University of Otago is regarded as the most geographically-distant internationally-ranked university in the world. The institutional commitment to the principles and practices of sustainability (University of Otago, 2013) is fundamentally at odds with its excessive air transport emissions footprint. It has been noted that the transport modal choice of academics is influenced by the fact that “...many universities hold an internal culture prioritising air travel” (Høyer and Næss 2001: 464). The challenge facing geographically distant institutions, such as the University of Otago, is that its considerable international academic mobility is perforce aeromobility (Smith & Rodger, 2009, Hopkins et al., 2016).

We conducted a programme of in-depth semi-structured interviews with academic staff at the University of Otago, in order to achieve detailed personal insights into climate change and academic aeromobility practices. Specifically, we set out to explore the relationship between corporeal and virtual mobilities, and the potential for virtual mobility substitution. We found that academics who generally enjoy high levels of autonomy and self-determination in the planning and execution of their professional mobility (Cidell, 2017), make complex individual decisions about their personal aeromobility practices (Storme et al., 2017). We offer specific insights into the factors that shape and influence those complex decisions, both personal and professional, in the specific context of a remote institution. We also explore why levels of aeromobility have not diminished with the growing scope for virtual substitution, finding that high academic aeromobility is considered an inescapable part of a fulfilling and successful academic career. We found that networks (Urry, 2003) are vital to career satisfaction and success, perhaps more so

than ever when working at a remote institution, and that obligations of co-presence are deeply entrenched. Regular corporeal mobility is considered fundamental to engaging with extensive weak ties, establishing relationships of trust between individuals and between groups of individuals (Granovetter, 1973), and building or reaffirming functional networks (Urry, 2003).

The view that corporeal mobility and physical co-presence cannot be traded off or substituted was emphatic, because virtual mobility cannot, as yet, adequately replicate the deep engagement and serendipitous social situations of physical co-presence, which can prove to be so valuable to all aspects of an academic career. However, the scope for virtual substitution was generally considered to be expanding, particularly in aspects of academic work where network relationships are established, and where virtual attendance is the only realistic alternative to non-attendance. Virtual attendance at committee meetings, advancing collaborative research projects, webinars, delivery of presentations, conference attendance (e.g., via remote satellite conference centres), research co-supervision, and PhD oral examinations offer examples of growing virtual mobility substitution, and there is considerable scope to extend virtual substitution to such things as annual association meetings and conference participation, with the necessary vision and commitment of national and international organising bodies. Despite the importance of physical co-presence in the building and/or maintenance of networks, we found evidence that some are increasingly asking important questions about ‘necessary travel’. Reflecting the findings of Storme et al. (2017:405) we did find that “virtual mobility is mainly used when conflicting obligations of presence exist, and as a means of sustaining networks over time... rather than as a means to reduce levels of corporeal mobility”. Clearly, individual and institutional understandings of ‘necessary travel’ offer a timely and important avenue of further research.

Our research supports the claim that “virtual mobility proves in some scenarios to be a viable alternative to corporeal mobility when obligations conflict, but is not a substitute” (Storme et al., 2016:14). Academic aeromobility practices have not diminished but corporeal and virtual mobility interdependencies (Haynes, 2010) are being redefined. Virtual mobility is now seen as an effective substitute for non-participation, which is important for academics working at remote institutions who regularly face challenging circumstances and complex decisions in reconciling and balancing personal/professional and near (home)/distant (away) commitments. Given the pace of change in digital communications it is necessary to consider the extent to which virtual networks (e.g. mediated social media and online platforms such as ResearchGate and Academia.edu) may substitute personal networks, and how rapidly evolving virtual technologies may replicate the thick co-presence that is so critical to academic networks. This adds weight to the case for remote institutions to provide cutting-edge technical support for academics who seek to build or maintain strong international networks, while trying to achieve ‘aeromobility balance’ in the face of a mobility burden that arises from high personal and professional commitments, and the competing time demands of ‘home’ and ‘away’.

Our empirical contribution extends to the institutional conditions that frame individual air travel decision-making. Academic institutions are ‘network driven workplaces’ (Wittel,

2001) and occasional co-presence and high degrees of meetingness are critical not only to the career success of individual academics, but also the international standing of disciplinary fields of research and institutional reputation. As elsewhere, we found that many academics have difficulty in rationalising their corporeal mobilities against institutional drivers of internationalisation (Storme et al., 2013). Thus, individual decisions are indeed "...heavily impacted by institutional conditions which determine what travel is prioritised, deemed necessary, or desirable, and the mode of transportation chosen" (Høyer and Næss 2001: 460). Within the broader institutional context, we heard a call for institutions to foster and encourage further virtual mobility substitution, and a wish for opportunities for virtual mobility substitution to address current inequities in meetingness (e.g., based on family commitments). Investment in virtual technologies, changes in travel policies, and increased flexibility in the use of travel funding were considered to offer opportunities to incentivise virtual mobility substitution.

Our research corroborates the view that institutional policy arrangements drive institutional mobility practices (Gössling & Cohen 2014) such that current practices will remain locked-in unless institutional policy change allows those practices to be questioned, and alternative practices to emerge. Caset et al. (2018:66) put forward radical measures such as imposing an institutional emissions ceiling with a sinking lid (i.e., 5% reduction per annum in line with 2030 Paris targets), while noting that researchers at remote institutions would "...in the future be allowed to fly more than average, albeit within an emissions budget that would be declining for them as well". At the very least it is necessary that the institutional policy context foster new interplays of corporeal and virtual mobilities that facilitate co-presence and meetingness in ways that take account of social and environmental inequalities. Urry (2003:172) extends current issues of inequality to future generations, "...to ensure that the conditions for such meetingness are not all used up on the hypermobile present". Herein lie further avenues of research, given both the urgency of radical emission reductions (Higham et al., 2016) and the relentless march of virtual technologies (Haynes, 2010).

Notes

1. Reflecting the UK's REF framework of research assessment, all New Zealand tertiary institutions are subject to the six-yearly Performance-based Research Fund (PBRF) research assessment exercise.

Acknowledgements:

The authors acknowledge the insights of all those who engaged in our interview programme. We also acknowledge Sarah Tapp (University of Otago, New Zealand) and Dr. Tara Duncan (Dalarna University, Sweden) for their initial contributions to the 'Academic Mobilities' research project.

References:

Ackers, L. (2008). Internationalisation, mobility and metrics: A new form of indirect discrimination? *Minerva*, 46(4), 411-435.

Anderson, K., & Bows, A. (2008). Reframing the climate change challenge in light of post-2000 emission trends. *Philosophical Transactions of the Royal Society of London A: Mathematical, Physical and Engineering Sciences*, 366(1882), 3863-3882.

Attari, S. Z., Krantz, D. H., & Weber, E. U. (2016). Statements about climate researchers' carbon footprints affect their credibility and the impact of their advice. *Climatic Change*, 138(1-2), 325-338.

Bonnett, A. (2006). The need for sustainable conferences. *Area*, 38(3), 229-230.

Bows, A., & Anderson, K. L. (2007). Policy clash: Can projected aviation growth be reconciled with the UK Government's 60% carbon-reduction target? *Transport Policy*, 14(2), 103-110.

Budd, L. C. (2011). On being aeromobile: airline passengers and the affective experiences of flight. *Journal of Transport Geography*, 19(5), 1010-1016.

Caset, F., Boussauw, K. & Storme, T. (2018). Meet & fly: Sustainable transport academics and the elephant in the room. *Journal of Transport Geography* 70:64-67.

Cidell, J. (2017). Aero-automobility: getting there by ground and by air. *Mobilities*, 12(5), 692-705.

Cohen, S. A., Duncan, T., & Thulemark, M. (2015). Lifestyle mobilities: The crossroads of travel, leisure and migration. *Mobilities*, 10(1), 155-172.

Cohen, S. A., & Gössling, S. (2015). A darker side of hypermobility. *Environment and Planning A*. DOI: 0308518X15597124.

Creutzig, F., Fernandez, B., Haberl, H., Khosla, R., Mulugetta, Y., & Seto, K. C. (2016). Beyond Technology: Demand-Side Solutions for Climate Change Mitigation. *Annual Review of Environment and Resources*, 41, 173-198.

Decrop, A. (2004). Trustworthiness in qualitative tourism research. In *Qualitative research in tourism: Ontologies, epistemologies and methodologies* edited by J. Phillimore and L. Goodson. London: Routledge. Pp. 156-169.

Denstadli, J. M., Julsrud, T. E., & Hjorthol, R. J. (2012). Videoconferencing as a mode of communication: A comparative study of the use of videoconferencing and face-to-face meetings. *Journal of Business and Technical Communication*, 26(1), 65-91.

Denzin, N. K., & Lincoln, Y. S. (2005). Introduction: the discipline and practice of qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *The Sage handbook of qualitative research (3rd ed.)* (pp. 1-32). Thousand Oaks: Sage Publications.

Derudder, B., & Liu, X. (2016). How international is the Annual Meeting of the Association of American Geographers? A social network analysis perspective. *Environment and Planning A*, 48(2), 309-329.

Elliott, A. and J. Urry, 2010. *Mobile lives*, Routledge.

Fontana, A., Frey, J.H., 2005. The interview: from neutral space to political involvement. In: Denzin, N.K., Lincoln, Y.S. (Eds.), *The Sage Handbook of Qualitative Research (Ed. 3)*. Sage Publications: Thousand Oaks, pp. 695-728.

Fontes, M., Videira, P., & Calapez, T. (2013). The impact of long-term scientific mobility on the creation of persistent knowledge networks. *Mobilities*, 8(3), 440-465.

Gössling, S., & Cohen, S. (2014). Why sustainable transport policies will fail: EU climate policy in the light of transport taboos. *Journal of Transport Geography*, 39, 197-207.

Granovetter, M. S. (1973). The strength of weak ties. *American Journal of Sociology*, 78(6):1360-1380.

Grémillet, D. (2008). Paradox of flying to meetings to protect the environment. *Nature*, 455(7217), 1175.

Hall, C. M. (2009). International Business Travel by New Zealand Firms: An Exploratory Study of Climate Change Mitigation and Adaptation Practices. *CAUTHE 2009: See Change: Tourism & Hospitality in a Dynamic World*. J. Carlsen, M. Hughes, K. Holmes and R. Jones (Eds). Curtin University of Technology: Fremantle, W.A., CAUTHE.

Haynes, P. (2010). Information and communication technology and international business travel: Mobility allies? *Mobilities*, 5(4), 547-564.

Heffernan, M. & Jons, H. (2013). Research travel and disciplinary identities in the University of Cambridge, 1885-1955. *British Journal for the History of Science*, 46(2), 255-286.

Higham, J. E., & Cohen, S. A. (2011). Canary in the coalmine: Norwegian attitudes towards climate change and extreme long-haul air travel to Aotearoa/New Zealand. *Tourism Management*, 32(1), 98-105.

Higham, J., Cohen, S. A., Cavaliere, C. T., Reis, A., & Finkler, W. (2016). Climate change, tourist air travel and radical emissions reduction. *Journal of Cleaner Production*, 111, 336-347.

- Hoffman, D. M. (2009). Changing academic mobility patterns and international migration: What will academic mobility mean in the 21st century? *Journal of Studies in International Education*, 13(3), 347-364.
- Hopkins, D., Higham, J., Tapp, S., & Duncan, T. (2016). Academic mobility in the Anthropocene era: a comparative study of university policy at three New Zealand institutions. *Journal of Sustainable Tourism*, 24(3), 376-397.
- Høyer, K. G. (2009). A Conference Tourist and his Confessions: An Essay on a Life with Conference Tourism, Aeromobility and Ecological Crisis. *Tourism and Hospitality Planning & Development*, 6(1): 53-68.
- Høyer, K. G. & P. Næss (2001). Conference tourism: a problem for the environment, as well as for research? *Journal of Sustainable Tourism*, 9(6): 451-470.
- IPCC (2018). *Special Report: Global Warming of 1.5 °C*. Retrieved 6/12/18 from: <https://www.ipcc.ch/sr15/>
- Jennings, G. (2001). *Tourism research*. Milton: John Wiley & Sons.
- Larsen, J., Urry, J., & Axhausen, K. (2007). Networks and tourism: Mobile social life. *Annals of Tourism Research*, 34(1), 244–262.
- Lassen, C. (2006). Aeromobility and work. *Environment and Planning A*, 38(2), 301-312.
- Lassen, C., Smink, C. K., & Smidt-Jensen, S. (2009). Experience spaces,(aero) mobilities and environmental impacts. *European Planning Studies*, 17(6), 887-903.
- Leung, M. W. (2013). ‘Read ten thousand books, walk ten thousand miles’: Geographical mobility and capital accumulation among Chinese scholars. *Transactions of the Institute of British Geographers*, 38(2), 311-324.
- Lincoln, Y.S. & Guba, E.G. (1985). *Naturalistic Inquiry*. Newbury Park, CA: Sage Publications.
- Macintosh, A. & Downie, C. (2008) Aviation and climate change: can the airline industry continue to grow in a carbon-constrained economy? *Australasian Journal of Environmental Management*, 15:4, 253-265.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Thousand Oaks: Sage Publications.
- Müller, M. (2015). Assemblages and Actor-networks: Rethinking Socio-material Power, Politics and Space. *Geography Compass*, 9(1), 27-41.

Nevins, J. (2014). Academic jet-setting in a time of climate destabilization: ecological privilege and professional geographic travel. *The Professional Geographer*, 66(2), 298-310.

O'Reilly, K. (2005). *Ethnographic methods*. London: Routledge.

Parker, M., & Weik, E. (2014). Free spirits? The academic on the aeroplane. *Management Learning*, 45(2), 167-181.

Patton, M. Q. (2002). *Qualitative research and evaluation methods*. Thousand Oaks: Sage Publications.

Peeters, P. & Dubois, G. (2010). Tourism Travel under Climate Change Mitigation Constraints. *Journal of Transport Geography*, 18 (3): 447-57.

Peeters, P., Higham, J., Kutzner, D., Cohen, S., & Gössling, S. (2016). Are technology myths stalling aviation climate policy? *Transportation Research Part D: Transport and Environment*, 44, 30-42.

Ponterotto, J. G. (2006). Brief note on the origins, evolution, and meaning of the qualitative research concept thick description. *The Qualitative Report*, 11(3), 538-549.

Randles, S., & Mander, S. (2009). Practice(s) and ratchet(s): A sociological examination of frequent flying. In S. Gössling & P. Upham (Eds.), *Climate change and aviation: Issues, challenges and solutions* (pp. 245–271). London: Earthscan.

Schiller, D. and Revilla Diez, J. (2012). The Impact of Academic Mobility on the Creation of Localized Intangible Assets, *Regional Studies*, 46:10, 1319-1332.

Sheller, M., & Urry, J. (2006). The new mobilities paradigm. *Environment and planning A*, 38(2), 207-226.

Smith, I. J., & Rodger, C. J. (2009). Carbon emission offsets for aviation-generated emissions due to international travel to and from New Zealand. *Energy Policy*, 37(9), 3438-3447.

Smyth, K. R. (2010). Air travel and climate change: Should faculty and students be grounded? *Sustainability*, 3(5): 1-2.

Spinellis, D., & Louridas, P. (2013). The carbon footprint of conference papers. *PloS one*, 8(6).

Stohl, A. (2008). The travel-related carbon dioxide emissions of atmospheric researchers. *Atmospheric Chemistry and Physics*, 8(21): 6499-6504.

Storme, T., Beaverstock, J. V., Derrudder, B., Faulconbridge, J. R., & Witlox, F. (2013). How to cope with mobility expectations in academia: Individual travel strategies of tenured academics at Ghent University, Flanders. *Research in Transportation Business & Management*, 9, 12-20.

Storme, T., Faulconbridge, J. R., Beaverstock, J. V., Derudder, B., & Witlox, F. (2017). Mobility and professional networks in academia: an exploration of the obligations of presence. *Mobilities*, 12(3), 405-424.

Tyndall Travel Strategy (2015). Accessed 17 May 2017 from:
http://oldsite.tyndall.ac.uk/sites/default/files/tyndall_travel_strategy_2015_v1.pdf

University of Otago Strategic Direction to 2020 (2013). Accessed 10 May 2017 from:
<http://www.otago.ac.nz/otago069833.pdf>

University of Otago Sustainability Framework 2017-2021: Bringing Otago's sustainability commitment to life (2017). Accessed 10 May 2017 from:
<http://www.otago.ac.nz/otagobulletin/news/otago644919.html>

Urry, J. (2002). Mobility and proximity. *Sociology*, 36(2), 255-274.

Urry, J. (2003). Social networks, travel and talk. *The British Journal of Sociology*, 54(2), 155-175.

Urry, J. (2004). The 'system' of automobility. *Theory, Culture & Society*, 21(4-5), 25-39.

Urry, J. (2010). Consuming the planet to excess. *Theory, Culture & Society*, 27(2-3), 191-212.

van Wee, B. (2015). Peak car: The first signs of a shift towards ICT-based activities replacing travel? A discussion paper. *Transport Policy*, 42, 1-3.

Wittel, A., 2001. "Toward a network sociality." *Theory, culture & society* 18 6: 51-76.

Young, M., Higham, J. E., & Reis, A. C. (2014). 'Up in the air': A conceptual critique of flying addiction. *Annals of Tourism Research*, 49, 51-64.

Young, M., Markham, F., Reis, A.C., & Higham, J.E.S. (2015). Flights of fantasy: A reformulation of the flyers' dilemma. *Annals of Tourism Research*, 54, 1-15.

Appendix A: University of Otago academic divisions and schools/departments.

1. Division of Commerce (Otago Business School).

1. Accountancy and Finance
2. Economics
3. Entrepreneurship
4. Executive Programmes
5. Information Science
6. Management
7. Marketing
8. Tourism

2. Division of Health Sciences.

1. Bioethics Centre
2. Medical Lab Science
3. Faculty of Dentistry
 - a. Oral Sciences
 - b. Oral Diagnostic and Surgical Science
 - c. Oral Rehabilitation
4. School of Pharmacy
5. School of Physiotherapy
6. Otago School of Medical sciences
 - a. Anatomy
 - b. Biochemistry
 - c. Microbiology & Immunology
 - d. Pharmacology & Toxicology
 - e. Physiology
7. Faculty of Medicine
 - a. Dunedin School of Medicine
 - i. Department of GP and Rural Health
 - ii. Department of Medicine
 - b. Department of Pathology
 - c. Department of Preventive and Social Medicine
 - d. Department of Psychological Medicine
 - e. Department of Women's and Children's Health
8. Christchurch
 - a. Centre for Postgrad Nursing Studies
 - b. Department of Anaesthesia
 - c. Department of General Practice
 - d. Department of Medicine
 - e. Department of Obstetrics and Gynaecology
 - f. Department of Orthopaedic Surgery and Musculoskeletal Medicine
 - g. Department of Paediatrics
 - h. Department of Pathology

- i. Department of Population Health
 - j. Department of Psychological Medicine
 - k. Department of Radiology and the Centre for Bioengineering
 - l. Department of Surgery
 - m. Maori Indigenous Health Institute
- 9. Wellington
 - a. Department of Medicine
 - b. Department of Obstetrics and Gynaecology
 - c. Department of Paediatrics and Child health
 - d. Department of Pathology and Molecular Medicine
 - e. Department of Primary Health Care and GP
 - f. Department of Psychological Medicine
 - g. Department of Public Health
 - h. Department of Radiation Therapy
 - i. Department of Surgery and Anaesthesia

3. Division of Humanities

- 1. Anthropology & Archaeology
- 2. Classics
- 3. College of Education
- 4. English and Linguistics
- 5. Geography
- 6. History & Art History
- 7. Language and Culture
- 8. Faculty of Law
- 9. Media, Film and Communication
- 10. Music & Theatre (Seems music is separate?)
- 11. National Centre for Peace and Conflict Studies
- 12. Philosophy
- 13. Politics
- 14. Sociology, Gender and Social Work
- 15. Te Tumu – School of Maori, Pacific and indigenous Studies
- 16. Theology & Religion

4. Division of Sciences

- 1. Applied Sciences
- 2. Botany
- 3. Chemistry
- 4. Computer Science
- 5. Food Science
- 6. Geology
- 7. Human Nutrition
- 8. Marine Science
- 9. Mathematics & Statistics
- 10. Physics

11. Psychology
12. Surveying
13. Zoology
14. School of Physical Education, Sport & Exercise Sciences

Table 1. Summary of interview participants

Interview code *	Division	Gender	Academic position	Interview length (minutes)
#1/Com/M/S	Commerce	Male	Associate Professor	34
#2/Com/F/J	Commerce	Female	Lecturer	32
#3/Com/M/J	Commerce	Male	Senior Lecturer	34
#4/Com/F/J	Commerce	Female	Senior Lecturer	39
#5/Com/M/S	Commerce	Male	Associate Professor	47
#6/Com/M/S	Commerce	Male	Associate Professor	49
#7/Com/M/S	Commerce	Male	Professor	59
#8/Hum/M/S	Humanities	Male	Professor	54
#9/Hum/F/S	Humanities	Female	Associate Professor	43
#10/Hum/M/J	Humanities	Male	Senior Lecturer	52
#11/Hum/M/J	Humanities	Male	Lecturer	44
#12/Hum/M/S	Humanities	Male	Professor	59
#13/Hum/F/S	Humanities	Female	Associate Professor	47
#14/Hum/M/S	Humanities	Male	Professor	41
#15/Hum/M/S	Humanities	Male	Associate Professor	36
#16/Sci/M/J	Sciences	Male	Lecturer	22
#17/Sci/M/J	Sciences	Male	Postdoctoral Fellow	50
#18/Sci/M/S	Sciences	Male	Professor	54
#19/Sci/M/J	Sciences	Male	Lecturer	45
#20/Sci/F/S	Sciences	Female	Associate Professor	36
#21/Sci/F/J	Sciences	Female	Senior Lecturer	42
#22/Sci/M/J	Sciences	Male	Lecturer	36
#23/Sci/F/S	Sciences	Female	Professor	47
#24/HS/M/S	Health Sciences	Male	Professor	42
#25/HS/M/S	Health Sciences	Male	Associate Professor	29
#26/HS/F/J	Health Sciences	Female	Senior Lecturer	44
#27/HS/F/J	Health Sciences	Female	Senior Lecturer	48
#28/HS/M/S	Health Sciences	Male	Professor	42
#29/HS/F/J	Health Sciences	Female	Senior Research Fellow	33
#30/HS/M/J	Health Sciences	Male	Senior Research Fellow	35
#31/HS/M/J	Health Sciences	Male	Lecturer	42

Notes: * The University of Otago departments are organised into four divisions. Com=Commerce, Hum=Humanities, Sci=Sciences, HS=Health Sciences; S denotes senior academic positions: Professor (n=8) and Associate Professor (n=8); J denotes junior academic positions: Senior Lecturer (n=7), Lecturer (n=5), Senior Research Fellow (n=2), Postdoctoral Fellow (n=1).

Table 2: Themes, sub-themes and nodes arising from interview transcript analysis

Theme	Sub-themes	Nodes
1. Complex drivers	Professional	Disciplinary perspectives
		Research approaches
	Social	Networked sociality
		‘Living my work’
	Personal	Personality
		Family commitments
		Health and wellbeing
2. “Don't weaken me!”	Career	Academic performance
		Career trajectory
		Career satisfaction
	Network sociality	Meetingness
		Obligations of co-presence
		Disciplinary wellbeing
		Early career networking
3. Selective substitution	Non-participation	Substitute for non-participation
	Missing dimensions	The human dimension
		Interpersonal dynamics
4. Assorted accountabilities	Aeromobility lock-in	Institutional responses
	Structural issues	Beware the backlash
		Facilitate individual action