



GeoHumanities, GIScience and Smart City *Lifeworld* approaches to geography and the new human condition

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ABSTRACT

The New Human Condition (NHC) is perhaps the largest cognitive challenge in history to human intelligence and agency and concerns our species' ability to cope with the consequences and responsibilities of being the major driver of planetary change in the twenty-first century (Pálsson et al., 2013; Holm et al., 2015). But despite long held assumptions about intra-disciplinary engagements between its "human" and "physical" branches, geography's weakness as a discipline is that it has yet to gather sufficient momentum to collectively shape and implement practical and sustainable climate change policies and actions (Castree, 2014a). However, by considering together the heuristic values of the concepts of the Anthropocene and Planetary Boundaries, the Anglo-American sphere of geography recognizes in either ironic, or unconscious manners that a new strand of environmental determinism (discredited by geographical thought and practice in the early twentieth century) has re-emerged to elide the role of human agency and broadly dominate the discussion of climate change. Mike Hulme (2011, 247) states that "climate determinism" is "a form of analysis and prediction in which climate is first extracted from the matrix of interdependencies that shape human life within the physical world". Within this discourse it is often the biophysical sphere that is employed to explain the course of human behavior; consequently, this dominating perspective threatens to skew our predictions and understandings of future societies, cultures, climates and destinies. Climate change will certainly constrain human agency, but it also creates the potential for geography to play to its intra and inter disciplinary strengths and begin discussing and addressing human-environmental dilemmas in practical and realistic ways; and secondly, seize the climate change crisis as an opportunity to study where, why and for whom global environmental change matters. Firstly, this paper considers a theoretical balance between the NHC, the Anthropocene and Planetary Boundaries as a way forward for geography to begin addressing the common dilemma of climate change. Within this consideration it engages Anne Buttner's geographical translation of Martin Heidegger's *lebenswelt* as a dimension of the NHC. Secondly, the paper discusses how GeoHumanities and GIScience integrations with phenomenology, the digital and environmental humanities and social media generated "Big-Data" can explore the perceptual scales and scopes of the NHC/Anthropocene/Planetary Boundaries conceptual triad. Lastly, it argues that such integrations are salient to the study of emerging Smart City *Lifeworlds* as a means to engage the increasing urban agencies of global climate change driven by the vagaries of the human condition.

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1. Introduction

In 2015, the Royal Geographical Society-Institute of British Geographers (RGS-IBG) designated the "Geographies of the Anthropocene" as a conference theme to highlight the "post-disciplinary" ambitions of an Earth Systems Sciences which presents the integrative role of geography with new challenges (Whatmore, 2015). In turn, one of the marquee events of the 2016 Association of American Geographers (AAG) conference—the "Symposium on Physical Geography: Challenges of the 'Anthropocene'", asserted that "understanding human-induced

alterations in the past and present is critical to our ability to anticipate, mitigate, and adapt to changes in the future" (Chin, 2015). Both conference themes underscore the tensions, contradictions and opportunities facing the broad church of geography as it embraces the concept of the Anthropocene as a heuristic to address the human drivers and dimensions of global climate change.¹ This special issue's parsing of Political Philosopher Hannah Arendt's work into the New Human Condition

¹ This is not to negate the efforts of previous and continuing work conducted by geographers in the latter quarter of the twentieth century under the aegis of the World Climate Research program (WCRO), the International Geosphere-Biosphere Program (IGBP), the International Human Dimensions Program on Global Environmental Change (IHDP) and DIVERSITAS and its focus on aspects of biodiversity (Ehlers, 2010).

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(NHC) speaks to the dilemmas geography is currently grappling with, not only in Anglo-American discourse, but in hemispheric and regional spheres. This paper will draw on Arendt's work to discuss how the NHC is situated by geographical thought to balance the Anthropocene and Planetary Boundaries in a conceptual triad; secondly, the paper will discuss how GeoHumanities and GIScience integrations with phenomenology, the digital humanities and social media provide techno-heuristic tools to explore the perceptual scales and scopes of this triad, and thirdly how such techno-heuristics are relevant to the study of Smart City *Lifeworlds* as a way to better comprehend the emerging urban human agencies of climate change.

2. Geography, the Anthropocene and planetary boundaries

The NHC is perhaps the largest cognitive challenge in history to human intelligence and agency and concerns our species' ability to cope with the consequences and responsibilities of being the major driver of planetary change in the twenty-first century (Pálsson et al., 2013; Holm et al., 2015). Despite the recent RGS-IBG and AAG conference themes and long held assumptions about intra-disciplinary engagements between its "human" and "physical" branches, geography's weakness as a discipline is that it has yet to gather sufficient momentum to collectively shape and implement practical and sustainable climate change policies and actions in a fundamental way (Castree, 2014a). However, by adopting the theme of the Anthropocene, both the RGS-IBG and AAG recognize in a rather ironic manner that a new strand of environmental determinism has re-emerged to elide the role of human agency. Indeed, "the universalizing tendencies of science abstract" climate change "from the vagaries of individual human experience" (Head and Gibson, 2012, 700). Mike Hulme (2011, 247) argues that "climate determinism" is "a form of analysis and prediction in which climate is first extracted from the matrix of interdependencies that shape human life within the physical world". Within this discourse, the biophysical sphere is often employed to explain the course of human behavior; consequently, our predictions and understandings of future societies, cultures, climates and destinies become skewed. Climate change will certainly constrain human agency, but it also creates the potential for geography to begin discussing and addressing its dilemmas in practical and realistic ways; and secondly, seize the slowly moving crisis as an opportunity to study the where, why and for whom global environmental change is already socially and environmentally impacting. In a general sense, as a discipline, geography recognizes that most people adjust and adapt to environmental change under conditions not of their own making. Typically this occurs within socially sanctioned parameters and understandings based on cultural needs, abilities and values (Hulme, 2011; DeSilvey et al., 2011; DeSilvey, 2012; Radcliffe et al., 2010; Offen, 2014).

However, modern Anglo-American geographical perspectives on human-environmental relationships are limited by the tenacity of the enlightenment project and dominance of Cartesian thought. Furthermore, such perspectives are entangled in culture war and identity-politics cul-de-sacs; deeply enmeshed within processes of industrialization, urbanization and consumerism maintained by a Western middle-class consciousness imperiling the worlds outside of the bubble of Occidentalism.² In addition, a positivist strain in modern geography cleaves climate change away from its fundamental core as a problem of human agency. Mass increases in CO₂ emissions inaugurated by the Industrial Revolution, the detonation of the atomic bomb in 1945, and the "Great Acceleration" of technologies, economics, and consumption

in the twentieth century embody the dominant human agencies of the Anthropocene. Defined by the geochemist Paul Crutzen and ecologist Eugene Stoermer, the concept suggests that 'boundary conditions' characteristic of the last twelve millennia of Earth surface history have been compromised (Crutzen and Stoermer, 2000; Castree, 2014a). This is complemented by the Planetary Boundaries (PB) hypothesis of Rockström et al. (2009, 472) who identified nine Holocene earth system processes (ocean acidity, chemical balances, atmospheric aerosols, biodiversity, land use types, freshwater, nitrogen and phosphorous cycles and stratospheric ozone density.) PBs coalesce to create "a safe operating space for humanity", however, juxtaposing these boundaries with the concept of the Anthropocene, is not without issue. Rockström argues that Holocene processes are preferable to those of the unknown and potentially unwelcoming future posited by adherents to the concept of the Anthropocene (Rockström et al. 2009, 472; Castree, 2014a). This type of division is symptomatic of the cultural crisis engendering climate change. The crisis manifests in public and private spheres in forms of alarmism, denialism, or apathy. However, it must be recognized our explanations of the physical processes of climate change, have to an extent outrun our understandings of the social processes constituting the Anthropocene concept (Wainwright, 2010). As heuristically framed concepts, the Anthropocene and PB seem to echo Arendt's (1961, 59) prescience in *Between Past and Future*: "the world we have come to live in, however, is much more determined by man acting into nature, creating natural processes and directing them into the human artifice and the realm of human affairs". Noel Castree (2014b, 2) observes that these "two ideas speak, in different ways, to both physical and human geographers (plus those betwixt them); they might provide a common point of reference in a discipline possessed of unusually high intellectual bandwidth". He further notes:

...though not primarily associated with [...] Geography, both neologisms speak to a subject many geographers have been preoccupied with for years, namely, the growing human impact on the Earth's decreasingly natural physical environment/s. While many geographers have influenced expert and lay discourse about those impacts, few have so far contributed overtly to the discourse about the Anthropocene and planetary boundaries (2014a, 11).

In *Grasping the Dynamism of Lifeworld*, Anne Buttimer (1976) argues that practiced as a science, geography often lacks the "ideas and languages to describe and explain the human experience of nature, space and time" (123). As a humanistic geographer, Buttimer considers Martin Heidegger's *lebenswelt* as a way to think about human dwelling, and place. Heidegger's phenomenological perspective sidesteps Euclidian and Cartesian framings of space to reveal "an ordered, articulated region out of which objects that pertain to one another stand over against us in a surveyable, handy, available and measurable way" (Elden, 2001, 52). Applying a similar lens, Buttimer (1976, 281; 277) observes that human consciousness embraces "a world of values, a world of goods, a practical world. It is anchored in a past and directed towards a future; it is a shared horizon, though each individual may construe it in a uniquely personal way", and geographically translates *Lifeworld* as the "culturally defined spatiotemporal setting or horizons of everyday life". Viewed as a component of the NHC, and situated in a theoretical triad with the Anthropocene and PB concepts, *Lifeworld* opens a window from which to explore the human perceptions and agencies driving climate change. In *The Human Condition*, Arendt (1958) adopts elements of Heidegger's spatial thought, contending that human beings operate within interpenetrating phenomenological scales: the Earth, the World, and Public, Private and Social realms (Canovan, 1992). Following this, it can be argued that the Anthropocene posits human agency as a recent geological force and PBs define the thresholds within which such agencies can operate safely. Pairing Arendt's "human condition", with Buttimer's *Lifeworld* facilitates alternative geographical perspectives on human dwelling, sense of place and environment to address

² In contrast to 'Western' religious and ideological orientations 'Eastern' Confucian cosmology for instance, understands human beings as microcosms of the cosmos—a continuity of being between various levels of reality such as the cosmic, the social, and the personal. This in turn manifests in distinct perceptions and agencies concerning human-environmental relations.

tensions between the capacities and limitations of the agencies of the Anthropocene and PB. To adopt Buttimer's (1976, 290) argument: "in contradistinction with the 'picture' versions of *homo economicus*, or *homo faber*, carving out cost-minimizing, profit-maximizing areas on the earth, one could envision a dynamic version of *homo sapiens*, more attuned to his own survival and growth needs, in dialogue with nature, space, and time". This is perhaps one way in which to reinvigorate the nineteenth century "geographical experiment" and place the study of society and nature "under one conceptual umbrella" (Livingstone, 1992). Similarly, Eckhart Ehlers (2010, 368; 377) argues modern geographical research should take a "back to the future" approach in mapping the "geology of mankind" by focusing squarely on human-environmental dependencies. The NHC/Lifeworld nexus, Anthropocene and PB triad could re-orient geographical research on local, regional, national and supranational public, private and NGO organizations, and explore how climate change policies are conceived, developed and implemented. This conceptual triad could help facilitate theoretical, social media based, pedagogical and textual "more-than-climate" linkages between ideology, culture, consumerism, the public, policy makers, bureaucracies, industry, corporations, with the science of atmospheric gases and meteorology, the ecologies of ocean acidification, desertification, drought sea-level rise and the social-environmental dimensions of political violence, famine and migration (Head and Gibson, 2012). The next section will discuss the emergence of GeoHumanities as a means to foster such integrated approaches between the humanities and sciences to address the human dimensions of climate change.

2.1. GeoHumanities

One of geography's strength, is that when it is practiced well, the discipline can bring a confluence of contrasting empirical, theoretical and methodological approaches to research and pedagogical activities. However, the recrudescence of environmental, positivistic and technological determinism in geography's responses to global climate change is a threat to the NHC. Buttimer (1976, 277) observed in the wake of the discipline's 'Quantitative Revolution' of the 1950s and 1960s: "strange indeed sounds the language of poets and philosophers; stranger still the refusal of science to read and hear its message". Over the past quarter century, a new subfield in geography, heralded by the volume *GeoHumanities: Art, History, Text at the Edge of Place* (2011) is re-asserting modes of inquiry on the human meanings of place and ways to create new knowledge and better-informed scholarly and political practices (Dear et al., 2011). Emphasizing "that the division between empirical/descriptive disciplines and interpretive disciplines is itself a fiction and one that stands in the way of the production of knowledge" the volume asserts that GeoHumanities provides a means to remedy geography of its largely passive role as a stage for human history by bringing to the fore and integration of the earth sciences and the humanities (Fish, 2011). With an ethos of experimentation and creativity, GeoHumanities can blend literary, historical, philosophical and cultural studies, art, and drama, with the digital and environmental humanities, GIScience and neogeographic techniques. In the 1950s the French Anthropologist Claude Levi Strauss defined the three "humanisms" of Western history.³ Milad Doueihi (2013) argues that "digital humanism" constitutes a fourth convergence of the world's complex cultural heritage and technology which is changing human relations between

territory, knowledge, history and habitat. *The Humanities World Report 2015* identifies five commensurate research areas: 1) digital collections, archiving and text encoding; 2) reading and analysing electronic texts; 3) geospatial and critical discursive mapping technologies; 4) 3D immersive visualizations; and 5) Big-Data, social computing, crowdsourcing and networking (Holm et al., 2014). "Old" (books, maps, paintings, film, etc.) and "new" mediums (GIS, social media, Big Data, virtual reality, etc.) are shaping the digital discourses of a global society not fixed by time or space. The GeoHumanities can bring a focus to this emerging milieu on performance, language, landscape, architecture, religion, belief and cosmogenesis to study the various human experiences and meanings of place accreted in our distinct and collective historical memories (Swimme and Berry, 1992; Doueihi, 2011; Cresswell et al., 2015; Hawkins et al., 2015). In ways, GeoHumanities revisits geographical work in the 1970s exploring phenomenology as an alternative methodological approach to the positivism of "spatial science". Developed by European philosophers Edmund Husserl, Merleau-Ponty and Martin Heidegger, phenomenology engaged by geographers Anne Buttimer, Yi-Fu Tuan, Edward Relph, David Seamon, Edward Casey and others emphasized "Sense of Place" over "Scales of Space". Incorporating realms of subjective perception and the active, creative function of language and discourse in making the world intelligible, geographers conducted analyses and interpretations of consciousness, particularly on the conscious cognition of individuals' direct experiences of place (Buttimer, 1976, 277; 279; Johnston et al., 1994). As a result, "Sense of Place" studies in the 1970s and 1980s sought to counter-act elisions of human contingency in the statistical models of geography's "quantitative revolution" in the 1950s and 1960s. In *Humanistic Geography*, Yi-Fu Tuan (1976) identified five perspectives that needed to be considered in equal balance to positivistic studies: (1) the nature of geographical knowledge; (2) the role of territory in human behavior; (3) the creation of place identities; (4) the role of knowledge as an influence on livelihood; and (5) the influence of religion on human activity. Tuan's (1977, 186) observation that "sense of time affects sense of place" was commensurate with Torsten Hägerstrand's (1978, 123) "Time-Geography" studies revealing that an individual's "internal mental experiences and events" were in symbiosis with the "interplay between body and environmental phenomena". "Sense of Place" studies underscore that simply plotting human behavior in isometric space and on time grids provides only a door to exploring a Lifeworld horizon. "Neither geodesic space nor clock/calendar time" was "appropriate for the measurement of experience", argued Buttimer (1976, 289), concluding that "the notion of rhythm may offer a beginning step toward such a measure". From the example of a protein molecule unfolding in the nuclei of a cell, to the roiling, non-linear dynamics of the earth's oceans and atmosphere, rhythms of world complex systems emphasize that reality exists at a level of human experience that literary tools have been best and historically most practiced, at describing. David Porush (1991, 77) argument: "by science's own terms, literary discourse must be understood as a superior form of describing what we know" reflects geographer Gunnar Olsson's (2007, 137–138) perspective on remote sensing practices: "for what is that type of mapping at a distance if not a human activity located in the interface between poetry and painting? What is a satellite picture if not a peephole show, a constellation of signs waiting to be transformed from meaningless indices into meaningful symbols?". The next section will discuss how GeoHumanities and phenomenological perspectives can engage GIScience to consider how "three key referencing systems—space, time and language—might be engineered in such a way that changes in one ripple into the others" (Corrigan, 2010, 85).

2.2. GIScience

Donald J. Janelle (2001) has stated that the underlying complexities in the human organization of space present methodological problems for linking empirical research questions in GIScience with alternative

³ In the 1950s Claude Levi Strauss defined the three "humanisms" of Western history. The first concerned the discovery in the Middle-Ages and Renaissance of Greco-Roman antiquity, which opened up new world perspectives in these epochs emerging from the Dark Ages. Learning a different language—Latin and Greek, and thus a shift in linguistic consciousness and perspective was required to access this type of knowledge. The second humanism concerned the extension this approach to the study of other world civilizations such as China and India. The third humanism extended this type of scholarly reach (which through reiteration transmuted into ethnology and philology) to cultures ignored by traditional humanisms. In succession, these three humanisms transformed perception and knowledge on the relations between humans, cultures and environment.

theoretical frameworks. In contrast, human geographers have long held that literature is a product of human perception, and consider discursive tools such as imagery, narrative and setting as means to access the subjective dimensions of a particular location's "Sense of Place" (Pocock, 1981; Travis, 2015b, 2016b). However, Sui and Goodchild (2011, 1744) note: "until recently, place has been off the intellectual radar screen of GIScientists, many of whom appear to use the two terms place and space somewhat interchangeably". Furthermore, GIScience has been critiqued on several fronts. Firstly, for its lack of attention to the nuances of human contingency in terms of ethnicity, race, class, gender issues and sexuality. Secondly, for a preference for research-driven rather than community enhancing projects, and thirdly for persistent apolitical attitudes, and most importantly, a lack of diversity among practitioners. Feminist, and anthropological "Mixed Methods" GIS research has responded to such critiques by focusing on human agency, inequality, and social and environmental differentiation, to explore affective, temporal and spatial rhythms in concert with historical contingencies embraced by women's, ethnic, LGBT indigenous, literary and cultural studies (Kwan, 2002; Knowles, 2008; Cope and Elwood, 2009; Cooper and Gregory, 2010; Bodenhamer et al., 2010; Aitken and Craine, 2011; Von Lünen and Moschek, 2011; Kwan and Schwanen, 2012; Palmer, 2012; Travis, 2010, 2013, 2014, 2015a, 2015b). Mei-Po Kwan's (2002) creative use of GIS disrupts conventional geographic and cartographic methods. Employing language, images, and numbers, Kwan's "GeoNarratives" synthesize life-paths, oral histories, sequences of events, memories, with affective dimensions of place. By engaging 3D "GIS inquiry spaces" Kwan integrates indices of "action and interaction (personal and social), time (past, present, and future), and space (physical places or the storyteller's places)" (Kwan, 2007; Kwan, 2008; Kwan and Ding, 2008, 449). Storytelling in humanities, feminist and anthropological GIS tends to be non-linear, ergodic, and disruptive to conventional sequences of chronology and space (Staley, 2007). Non-Western, indigenous and phenomenological perceptions of environment are echoed in Czech author Milan Kundera's (1988: 35) aphorism: "Man and the world are bound together like the snail to its shell: the world is part of man, it is his dimension, and as the world changes, existence (*in-der-Welt-sein*) changes as well". Ironically, such perceptions have been viewed as incompatible with the traditional GIScience practices, and traditional Cartesian perspectives which adopt an "objective" separation between the perceiver (subject) and the perceived (object). Yet such perceptions have been essential to developing "deep mapping", "performative" and "immersive-experiential" GIS methodologies. Conceived by the writer William Least Heat Moon (1991) in *PrairieErth* "deep mapping" is employed as a heuristic by GIS practitioners to design alternative data structures and models to map the dynamic stratigraphy of time and place. "Deep mapping" weaves oral testimony, anthology, memoir, and biography into a "vertical form" of travel writing to reveal the grain and patina of place by intersecting the historical with the present, the political with the poetic and the discursive with the sensual (Pearson and Shanks, 2001; Yeh, 2009; Bodenhamer et al., 2010, 2015; Harris and Hodza, 2011; Oxx et al., 2013; Ridge et al., 2013; Offen, 2014; Travis, 2013, 2014, 2015a). For instance, Mark Palmer's 'Indigital' GIScience models of Kiowa oral culture complement "deep mapping" techniques. By bracketing tribal time-space narrative performances as Native American historical theater, Palmer's models strip away the past, allowing long-elapsed events to unfold simultaneously in the present.⁴ The indigenous landscape models he produces are fragmentary, contradictory, full of uncertainties, and unreconciled to the Western Cartesian grid; never-the-less the GIS visualizations and analysis

retrieve and map lost Kiowa time-places by synthesizing "science, symbols, and stories" (Palmer, 2012).

Harris and Hodza's (2011) "Immersive-Experiential Visualization" GIScience (IEVGIS) combine "deep mapping" and "performative" techniques with a *Star Trek* "holo-deck" embodiment within virtualized time and place. 3D models of the natural, cultural and historical landscapes of a nineteenth century West Virginia rural town are projected upon the walls, floor and ceiling of an enclosed space called "The Cave". Sound effects, such as an amplified heartbeat, facilitate a GIS performer's sense of danger in a contested milieu. Other applications of "IEVGIS" models allow practitioners to journey through the nano-spaces of the human body and epidemiologically map and diagnose disease, or follow the currents of the Gulf and Jet Streams as they interact with oceanic and atmospheric environments affected by climate change. Embedded in an "EIVGIScene" performers produce multi-dimensional visualizations, analyses, and interpretations. Interacting with dynamically projected 3D vector and raster data, researchers and scholars can create and perform across dimensions of time and space within virtual reality models in which social landscapes and natural environments intersect. Lastly, Esri GIS software company's StoryMap platform "The Age of Humans" [<http://arcgis.com/arcgis/storymapjs>] illustrates the salience of "deep mapping", "performative" and "immersive-experiential" "for communicating and sharing knowledge about the planet's surface with and among the masses" (Sui and Goodchild, 2011, 1738; Esri and Jaggard, 2014). Swimme and Berry (1992) contend that our epoch "seems to call for a new type of narrative—one that has only recently begun to find expression". Furthermore, they argue that "the greater problem is not in the lack of data but in our capacity to understand the significance of the data that we already possess. This data has not yet been sufficiently assimilated to bring about a new period in our comprehension of ourselves and of the universe itself". The next section will consider how "GIS and social media prompts a new level of urgency for theoretical works to reconcile the world of space (traditional GIS) and the world of place (social media)" as means to parse data, tell stories and create models that address the looming urban dimensions of the NHC (Sui and Goodchild, 2011, 1744).

2.3. Smart City lifeworlds

In this special edition of *Global and Planetary Change*, Lawrence, (2017) informs us that as of 2008 the NHC was constituted as an urban condition for more than half of the earth's inhabitants. Global populations living in cities are predicted to grow to 70% by 2050, marking the crossing of a significant demographic Rubicon for humankind. In fact, urban populations are now growing faster than cities. Megacities to needed to accommodate such growth will rival size of Austria, devour grasslands, impact rainfall and produce more greenhouse gases in self-generating climate zones. In 1950, New York City became the world's first megacity housing 10 million people or more; looking at one hundred years onward, U. N. planners predict there will be 40 megacities on the planet by 2050 (United Nations, 2010; Hotz, 2015). The neurologist Susan Greenfield (2014, 13) states that the challenges posed by climate change to humankind and by the digital landscapes of cyberspace are commensurate and connected. The "brain will adapt to whatever environment in which it is placed ... [and] could therefore be changing in parallel, in corresponding new ways. To the extent that we can begin to understand and anticipate these changes positive or negative, we will be able to better navigate this new world". Human agency now operates symbiotically in both 'environmental' and 'digital' milieus. Social media networked smartphones, and wrist-watches, linked in with X-Box game consoles, tablets, and laptops are transforming humans into living, breathing remote sensors, and urban environmental actors generating cybernetic data points and flows. Integrated with GIS and Global Positioning Systems (GPS) applications these data streams allow the visualization, analysis and experience of 'digital' spaces and 'active' places in the environment of a city simultaneously. New York University's Center

⁴ The Standing Rock Lakota Native American Tribe on the North-South Dakota State boundary in the upper plains of the United States has promoted its protest against the construction of an oil pipeline through their reservation and under the Missouri River—the tribe's main source of water on Facebook, Twitter, and other forms of social media. Such digital narratives can be woven into Indigital GIS in addition to other 'indigenous' and 'Western' climate activist networks and campaigns (Palmer, 2012; Brangham and Woodruff, 2016).

for Urban Science and Progress, working with city managers and civic entrepreneurs is re-wiring the Big Apple as a digital laboratory for Smart City research. By making digital data public, linking municipal computer networks, installing sensors to monitor urban life (from water quality, traffic and power use, to the sound of gunfire) researchers are hoping “to turn data generated every day by people in New York into a sustainable design for living that could become a template for digital cities world-wide” (Hotz, 2015). Urban inhabitants are now creating and dwelling in unmapped “Smart City *Lifeworlds*”. Our planet is now ablaze with “digital wildfires”, and threatened by rising “oceans of Big Data” expected to reach 1.6 zettabytes in volume by the year 2020 (Lenz, 2015). Like the “Anthropocene” the term “Big Data” adopted from the sciences by the humanities and social sciences has been parsed as a cultural, technological, and mythological phenomenon. But as Dana Boyd and Kathleen Crawford clarify, what the term really implies is the ability to aggregate, cross-reference and analyze large data sets. Maintaining that insights from “Big Data” can be found at very modest scales Boyd and Crawford (2012, 670) argue that the “size of data should fit the research question being asked [and] in some cases, small is best”. Google analysts (who developed algorithms to track flu and unemployment patterns and trends) discovered that small samples of large data sets are generally reliable as proxies. Only one-third of a percent of daily data concerning any phenomenon is required to calculate an aggregate statistic and identify patterns and trends. Advances in cloud computing now allow “Big Data” to be processed remotely on desktop and tablet computers. Sui and Goodchild (2011) state that human generated “Big-Data” supplies GIScience with the “deep content” required to analyze patterns and trends about the “many”. Research conducted on the 2102 U.S. Presidential election discovered that geospatially tracking “tweet” communications revealed the social context of specific events. In turn this provided a means to analyze temporal and spatial relationships linking short message strings and human behavior (Tsou et al., 2013). The dynamic and roiling nature of social media activity can send “Big Data” tsunamis rippling in “real-time” through the digital streets, neighborhoods, districts and boroughs of laboratory cities like New York. Therefore, new types of GIScience data gathering methods, visualization, analysis and interpretation techniques need to be developed. Deployed creatively, “Mixed-Methods” can potentially synthesize Volunteered Geographic Information (VGI), with literary, cultural and historical schemas and socio-political-economic sources such as “RadStats”.⁵ By triangulating origins, positionalities, temporalities, and dynamic vectors of social media activity cresting within “Big Data” tsunamis, the froth of SmartCity *Lifeworlds* coalescing in the digital network spaces and across the human faces of a city can be plotted, visualized, analysed and interpreted (Elwood et al., 2013; Kitchin, 2014; Travis, 2015b). Reflecting on the 2008 global economic crash, John Liechty a Professor of Marketing and Statistics at the Pennsylvania State University pointed to the decades long process in creating better models to predict the potential human, environmental and financial impacts of climatic events and geo-hazards: “markets are at least as complicated and important as the weather, but we don’t have the equivalent of a national weather service or a national hurricane center, for the financial markets” (Mendelowitz and Liechty, 2009, 2010; Bollier, 2010; Liechty and Foster, 2011; Duyn and Aline, 2011). Liechty’s perspective is salient to considering the Big-Data “Twitter Storm” that erupted in cyberspace

on 24 November 2014 after a jury declined to indict a white police officer for the killing of a black youth in Ferguson, Missouri, U.S.A. (Fig. 1). The “Twitter Storm” provides an example of the potential of “real-time” human language, perception and agency analysis, but there are caveats. Such data is not curated in the traditional sense therefore its reliability and veracity varies substantially. Also, cities with advanced ITC infrastructure, rather than rural, remote locations and under-developed countries are typically data sources, so spatial distribution of data is non-uniform and heavily skewed toward urban regions (Croitoru et al., 2014). Despite these limitations, social media data and activity is becoming a potential agent for human change and transformation. Social media grass roots activist networks spin their digital threads to national and supra-national scales of engagement, widening the web of the “micro-climates” that provoked their campaigns. Examples include the #BlackLivesMatter (progenitor of November 2014’s Big-Data “Twitter Storm”) and the #OccupyTogether social protest movements. In addition, the Mumbai Mall Terror Attack in 2008, the Hong Kong Democracy Protests and western African Ebola Crisis of 2014, and the Greek Euro Crisis of 2015 illustrate human agency increasingly enmeshed in the virtual realities of social media networks. Digital eco-systems and cultures (hackers, hacktivists, gamers, bloggers, cyberpunks, politicians, pundits, performance artists, etc.) have evolved into potent social movements. ISIS’s terroristic redesign of a utopian Caliphate is sustained as much as digital territory and web with global reach by its social media activity as a terrestrial occupation in the no man’s land of eastern Syria and western Iraq. Doueiri’s (2013) questions concerning digital humanism are apt as we consider its relevance to the study of SmartCity *Lifeworlds*: “what is the situation with the anthropology of this new inhabited earth, these new digital territories that are flexible, fluid and constantly moving? How should we think about them, analyze them, especially since geolocation and smart cities cannot be dissociated from our daily lives?” Stephen Roche (2015) observes that smart cities manifest in four ways: firstly as an intelligent city (social infrastructure); secondly, as a digital city (informational infrastructure); thirdly, as an open city (open governance); and fourthly, as a live city (a continuously adaptive urban living fabric.) Roche (2015, 6) argues that a digital city comprises a network of *places* rather than areal *spaces*, that can be accessed “through the analysis of the digital (spatial) activity generated by social media users” “Sense of Place” (or *platial*) GIScience social media data and activity models of smart cities are facilitating a conceptual shift from the classical “layer-cake view of the world” to a digital “networked cupcakes view of the world” (Goodchild, 2011; Goodchild and Li, 2012; Roche 2015, 2). GIScience “Sense of Place” models illuminate Jaime Lerner’s (2014) theory of “urban acupuncture” in which the city is viewed as a living organism possessing specific “neural” target points that can be targeted and engaged to re-energize its corpus. Such a perspective digitally ‘reboots’ Buttimer’s (1976, 290) argument,

...if people were to grow more attuned to the dynamics and poetics of space and time, and the meaning of milieu in life experience, one could literally speak of the vocation and personality of place which would emerge from shared human experiences and the time-space rhythms deliberately chosen to facilitate such experiences.

Employing literary, historical and cultural studies methods “Sense of Place” GIS models could be scripted and performed to contextualize, manage and regulate the rhythms and flows of information and resources in an urban milieu. “Like films” human activity in a city could “be scored by famous composers-with the soundtrack electronically edited, on the fly [with] everything of relevance at a particular location (for example, a historic site or a crime scene) might be retrieved and arrayed to provide a comprehensive, electronic *mise-en-scène*”. By improving communications and facilitating responses, “Sense of Place” GIS models could untangle “digital traffic jams” caused by the volume, variety and velocity of data flows congesting the “neural networks” of a city during social and environmental crises, as well as mediating the

⁵ “RadStats” is the acronym for the Radical Statistics Group. Also known as “Radical Statistics” the group is composed of a collective of statisticians based in Britain was founded in 1975 as a radical science movement associated with the establishment of the British Society for Social Responsibility in Science (BSSRS). The RadStats mission statement states: “We believe that statistics can be used to support radical campaigns for progressive social change. Statistics should inform, not drive policies. Social problems should not be disguised by technical language”. RadStats working groups have focused on population studies, education, health, nuclear arms, ‘race’, and social indicators. Only the population studies working group initiated in 2010 is active. It is investigating debates relating to population and the environment which pose an “optimum population”. <<http://www.radstats.org.uk>>.

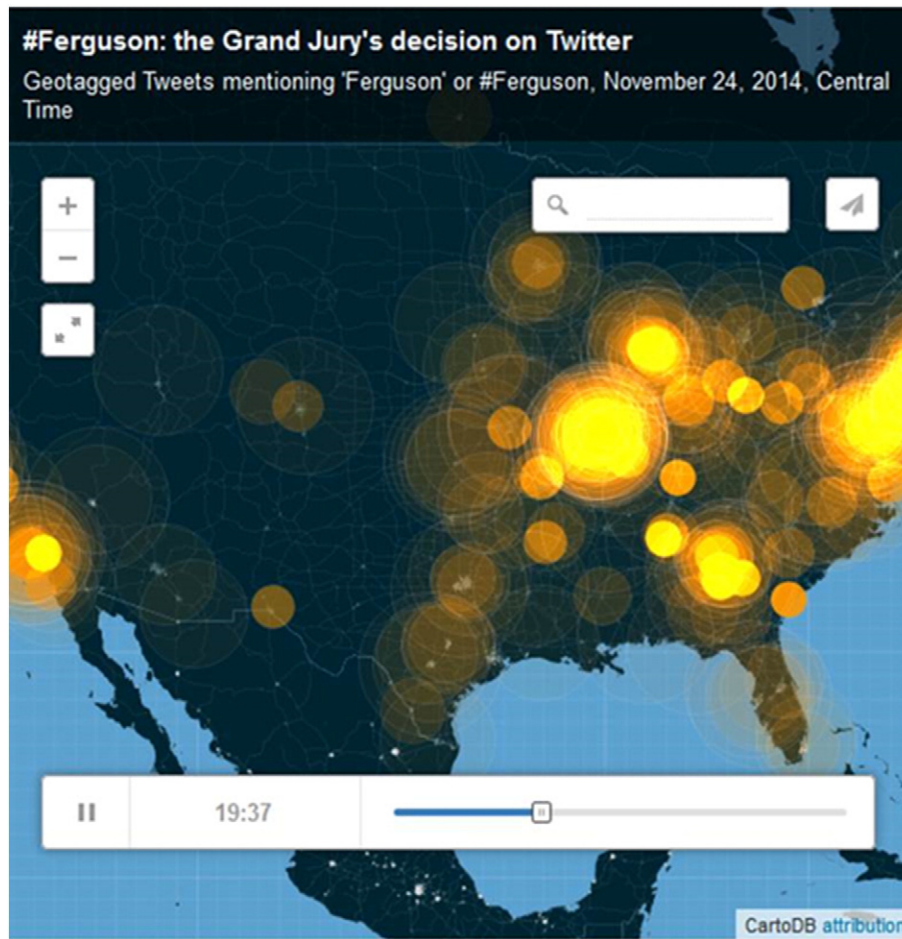


Fig. 1. Ferguson Twitterstorm.

mundane, but important everyday problems of say, balancing child and elder care duties, fixing potholes, aiding pharmaceutical as well as food deliveries and responding to general public needs in urban environments (Mitchel, 2003, 123–124; also Curry, 1996; Llober, 1996; Locke, 2001; Fisher, 2006; Travis, 2012a, 2012b; Travis, 2013).

Arendt states in *The Human Condition* that the relationship between science and culture is intimately interwoven in such ways. She notes that science is “anticipated in dreams” and revealed by science-fiction writing, film and vernacular culture, providing the rationales and cognitive frames in which to situate emerging technologies, and speculations on the cultural teleology of their impacts (Arendt, 1958 [1998]; Kearnes, 2007). David Nemeth (2014, 334) observes that

...contemplating the human condition a hundred years into the future is a game anyone can play for both fun and profit. Predicting for profit may be second oldest profession on Earth. The lucrative entertainment industry today thrives on spinning dramatic scenarios of the human condition being lived in the context of spectacular futuristic and fantasy settings. Seriously contemplating the future through the process of heuristic modeling, and undertaken as a public service, can also entertain but in the first instance aims to inform and influence those decision makers who control the power and resources.

J. Guldi (2013) observes that “mapping, code, and data collection [...] must be allied to a sense of memory” to counter institutionalized GIS “information overload, the corruption of privilege, and the inefficacy of expertise”. In this light, conceiving and developing future Smart City

Lifeworld “Sense of Place” GIS models raises two main challenges; firstly, new tools, models and standards to support people’s engagement in the generation of rich and useful place-based data needs to be imagined and created; secondly, alternative techniques of analysis are needed extract and interpolate data that only really reveals a “latent substratum” of human experience, leavened with a recognition that “behavior in space and time [is like] the surface movements of icebergs, whose depths we can sense only vaguely” (Buttimer, 1976, 287; Roche, 2015). Phenomenological parsing of social and spatial data sets proscribes certain types of nuanced digital hermeneutic, cultural and discourse analysis techniques drawn from the humanities and social sciences in contrast to GIScience approaches which often generate “geometries with names” from large secondary data sources. Bethany Nowviskie (2015) argues: “picturing histories anew will require us to go beyond big-data algorithmic analysis and visualization. If we seek a rich and humanistic [digital humanities] capable of meeting more than the technical challenges of our massive geo-temporal datasets, we must develop design approaches that address recent theoretical mergings of background and foreground, space, and time”. Though also employing “paint by number” techniques commensurate with GIScience approaches, “Sense of Place” GIS incorporates the use of embodied data sources, language, semantics, textual, cinematic and artistic tools to excavate and drill down in time into the sedimentary layers of a location’s social, biological and environmental ecological systems. As Swimme and Berry (1992, 3) observe, during the twentieth century a shift from the “dominant spatial mode of consciousness, where time is experienced in ever renewing seasonal cycles to a dominant time-developmental mode of consciousness, where time is experienced as

an evolutionary sequence of irreversible transformations”, has occurred. Subsequently, deep mapping “Senses of Place” embraces this temporal shift to holistically address global climate change by providing longitudinal (past, present and speculative future) perspectives on Smart City planning, sustainable forms of energy and economic development, transport, public health and safety, in addition to disaster preparedness and recovery (Jones et al., 2008; Yu and Shaw, 2008; Foth, 2009; Goodchild, 2007; Shaw and Yu, 2009; Goodchild, 2010; Warf and Suib, 2010; Sieber et al., 2011; Sui and Goodchild, 2011; Walters, 2011; Ye and Wu, 2011; Elwood et al., 2013; Leventala, 2012; Ye and Liu, 2012; Li et al., 2013; Lin, 2013; Young and Gilmore, 2013; Leszczynski, 2014; Quesnot and Roche, 2015).

3. Conclusion

Arendt's *The Human Condition* focuses the ways which we dwell and act in our built and natural environment. Her works speaks volumes to geography's humanistic and scientific subfields on how to address our habitation on earth and the looming threats of global climate change. In the twenty-first century, the NHC symbolizes our alienation from both the common, arte-factual world and nature (Arendt, 1958; Szerszynski, 2003). As Buttimer (1976, 277) observes:

To dwell implies more than to inhabit, to cultivate, or to organize space. It means to live in a manner which is attuned to the rhythms of nature, to see one's life as anchored in human history and directed toward a future, to build a home which is the everyday symbol of a dialogue with one's eco-logical and social milieu.

Sarah Whatmore (2015) asserts that geography occupies a “radical geo-political moment in which the Earth shapes new concerns and forms of public engagement in the contestation of planetary governance” heralds “new demands on our habits of thought in which ‘post-human’ or ‘more-than-human’ modes of theorizing and analysis stretch familiar models of historical, cultural and economic analysis in new directions”. Despite this, climate change research, policy debates are still dominated by scientific abstractions, “nation state” scales of governance, the language of economics, the gauge of CO2 emissions, all shaped by discourses of neoenvironmental determinism. However, the 2015 COP21 Agreement in Paris firmly places the human condition as the core driver of the global climate change crisis. In the face of this, the discipline of geography must mobilize with an integrated purpose and the sense of urgency underlying Arendt's (1968, 83) late twentieth century perspective on globalization: “for the first time in history all peoples on earth have a common present: no event of any importance in the history of one country can remain a marginal accident in the history of any other”.

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