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Icy, Watery, Liquescent

Sensing and Feeling Climate Change on Northwest Greenland's Coast

ABSTRACT In the coastal areas of Northwest Greenland, water, ice and land intermingle with the lives and trajectories of humans and animals, take on a multitude of shapes and forms, and give rise to a complexity of social relations. However, as in other parts of the Arctic, the effects of climate change are increasingly evident. Sea ice cover during winter and spring is less extensive than people living in the region today have known it to be, while icebergs calve from tidewater glaciers at a rate faster than they and scientists have previously observed. Glacial ice mass is diminishing and increased meltwater runoff from glacial fronts affects water temperature, ocean depths and circulation patterns, as well as the formation and thickness of sea ice and the movements of marine mammals and fish. These changes have profound implications for local livelihoods and mobilities, the wider regional economy, and human-animal interactions. In this article, I consider what some of the effects of climate change mean for people and their surroundings in Northwest Greenland's Upernavik area and draw attention to *liquescence* as a counter to the "ice is melting" narrative that typically understands climate change as liquification. While the scientific monitoring of sea ice, glacial ice loss, and surface melt on the inland ice in the Upernavik region—and in the wider Northwest Greenland area—is well established, and contributes to the regular updating of state of the ice reports for the Arctic, little attention has been given to what these

changes to ice and water mean for people and for human and non-human relational ontologies. Thinking of this in terms of liquescence, rather than liquification is a way of moving toward a deeper appreciation of people's experiences and sense-making of the changes happening to them and to their surroundings as affective, sensorial and embodied.

KEYWORDS Greenland, climate change, liquescence, ice, human-environment relations

Introduction

Scientists continue to issue stark warnings that the very iciness of the Arctic is under threat. They point to a precarious future in which sea ice, glaciers, ice caps, and ice sheets will be reduced to mere remnants that mark a region ravaged by the effects of human action in the Anthropocene (e.g., Wadhams 2016). A vocabulary of vulnerability, risk, rapid change, thresholds, tipping points, and disappearance also inflects the language and style characteristic of Arctic Council reports and assessments of the region's cryosphere, biodiversity, ecosystem services and economies.[1] A recent review of observational indicators of climate change spanning a period of 47 years from 1971 to 2017 provides further scientific evidence that the Arctic's biophysical system is clearly trending away from its twentieth century state and moving into an unprecedented state with implications that extend far beyond the region (Box *et al*. 2019). Ice is one of the defining features of how the Arctic is expected to look. Its disappearance prefigures the complete transformation of the region's ecosystems and gives a sense of being witness to the passing of the Arctic as it has been imagined and known, to a "slipping away," as John Wylie (2009) puts it in wonderful writing about spectral geographies.

Thinking of how the Arctic will look after the ice is gone—and when glaciers are inactive, or dead—is disconcerting, disquieting, and haunted by a sense of what will be absent. There is urgent need according to the narratives that emerge about a melting Arctic, and given the prospects of a future in which Arctic ice is absent, to monitor and protect what remains intact. The World Wide Fund for Nature's (WWF) Last Ice Area campaign, for example, draws global attention to how disappearing ice retains a powerful presence precisely because there is less of it.[2] The absence of ice in a future Arctic is materialized through narratives and images of the icy fragments that will remain, clinging to Greenland's northern coast, to parts of the Arctic Ocean and Canada's Arctic archipelago, or as "dead" glaciers in Iceland. As Clara Orban writes, fragments emerge from "the aftermath of the process of breaking apart" in which objects have been produced and left

behind by rupture (Orban 1997: 6) and are suspended, as Sophie Thomas puts it, "between the part and the idea of the whole" (Thomas 2003: 181).

Scientific analyses of Arctic climate change are rooted in categorisations of physical states and observations of atmospheric processes and oceanic variability. The "ice is melting" narrative, in its concern with communicating the extent of sea ice decline and describing glacial ice discharge, surface runoff and mass loss, frames one of the most apparent effects of climate change as liquification. Yet this does not capture the cultural complexity of how people living in the Arctic experience, in affective, sensorial and embodied ways, the shifting dynamics of their surroundings, how they relate to the other-than-human (including ice and water), how they experience weather and think about climate change, and how this informs ways of movement, anticipation and adaptation on a daily basis. In this article, I draw on anthropological research with the hunting and fishing communities of the Upernavik district in Northwest Greenland and argue for a much more nuanced turn to understanding lifeways in an aquapelagic, *liquescent* environment that is experiencing significant climate change.

Recent interdisciplinary and community-based research efforts have set out to understand what environmental change means for people, animals and the environment further north in the Qaanaaq area, Pikialasorsuaq (the North Water polynya), and the northwestern edges of Melville Bay (Gearheard *et al*. [eds.] 2013; Hastrup, Mosbech & Grønnow [eds.] 2018), but the Upernavik district remains largely overlooked in comparison. In this part of Greenland, where reductions in sea ice and glacial mass loss are just as apparent, climate change is not necessarily experienced locally as liquification. I argue that thinking of the experience of climate change as *liquescence* is a way to capture melt and thaw in affective, sensory and embodied ways. People—especially hunters and fishers—move through an environment anticipating encounters with icy, liquescent, and watery spaces often on the same day, whatever the season, and they sense how the weather is, and how, through the movement of clouds or a change in wind direction, for example, it is likely to alter its mood. They feel these phased transitions on their faces, in their fingertips, in their toes, and in their bones, while they need to be sharply attuned to the navigational challenges of abrupt encounters with different conditions—headland cracks can suddenly open up on an otherwise smooth and apparently stable stretch of sea ice, for instance. Keeping dry is as vital as keeping warm—a constant preoccupation in surroundings that are increasingly moist, damp, rainy, and wet. My emphasis on liquescence is intended to draw attention to life in a world of human and non-human relationality where experiences of water as frozen, slushy, or liquid are not reflected upon in terms of ecosystem approaches

to ice formation, melt, runoff, refreezing, and so on. Liquescence means that changes in weather and climate are experienced as sensation as much as they are geophysical encounters. Observing climate change from monitoring stations and sensing it remotely from space are critical to advancing our understanding of how the Arctic is being reshaped as ice recedes and shrinks (Comiso & Hall 2014), but this can not possibly tell us anything at all about how flow, melt, moisture and saturation are sensed, felt and experienced by those who live in surroundings that are increasingly liquescent.

A Cryospheric World. Upernavik District, Northwest Greenland

The Upernavik region of Northwest Greenland is a configuration of sea, headlands, islands, deep fjords, mountainous and hilly terrain, lakes, rivers and streams, glaciers, the outer edges of the inland ice (including the ablation zone, where ice mass is lost through melt, sublimation and evaporation) and, in winter and spring, sea ice. Stretching 450 km northwards along the Baffin Bay coast from the area close to the northern edges of Sigguup Nunaa (Svartenhuk) to Qimusseriarsuaq (Melville Bay), Upernavik, like many other parts of Greenland's coasts, has a 4,500-year history of Paleo-Inuit, historic and contemporary Inuit settlement. Seasonal movement around the region to take advantage of access to resources or in relation to environmental fluctuation or animal migrations, and flexibility in technology, hunting and fishing strategies and social organization have been key to how Inuit have met with and responded to social, economic and environmental change at many times in the past. Yet, in their encounters with colonialism and globalization, people in the Upernavik district have experienced a long chain of social and economic events, some of which have been profoundly disruptive.[3] Inuit hunting and fishing practices and technologies, as well as settlement patterns, were influenced by the Royal Greenland Trade Company (KGH), which exercised a trade monopoly during Denmark's colonial administration, and affected by the seasonal presence and influence of other European explorers and whalers who passed through the district (the activities of the latter seriously depleted populations of great whales, such as the Greenland Right whale). From the end of the eighteenth century until the middle parts of the twentieth century, communities were established, sometimes as trading stations, and also closed in relation to the activities and economic fortunes of the KGH. In more recent decades, social and economic changes have made themselves felt with the implementation of Danish government modernization policies in the 1950s and 1960s, and with transformations in governance and economic development policy

under conditions of Greenlandic self-government, as well as from broader global processes influencing life in the district (Hendriksen & Jørgensen 2015; Nuttall 1992).

Northwest Greenland is not only undergoing environmental shift, it has come under the global gaze of extractive capitalism and conservationist intervention. This wider context is often left unspoken and unexamined in political discourses and economic narratives about sustainability and the future of Greenland's small villages (Dodds & Nuttall 2019). All this combines with changes in environment and climate to influence, determine and affect the abilities of people to travel and move around the locality and to hunt and fish. Often, rather than being the major issue people find themselves thinking about or confronted with on a daily basis, climate change is seen as something that intensifies the societal, political, economic, legal, institutional and environmental challenges and historical legacies already affecting everyday life. Of course, this is not unique to northern Greenland—as Marin (2019) discusses in relation to the impacts of climate change on pastoralism in Mongolia and Wilhite & Salinas (2019) show for forest peoples in the Global South, for example, an important cause of vulnerability is not climate change, but economic systems that magnify the vagaries climate change brings about.

Today, around 2,800 people live in several small hunting and fishing communities located on islands or on headlands that have afforded access to a range of marine resources. The largest is the town of Upernavik, which has a population of around 1,100 while some 1,700 people inhabit nine smaller villages, ranging in size from about 50 in Naajaat and 450 in Kullorsuaq, which is Greenland's largest village. The area is part of the country's northernmost municipality of Avannaata Kommunia (which has its administrative headquarters in Ilulissat, further south in Disko Bay), but Upernavik is the administrative and supply centre for the villages in the district and a number of public sector services and private businesses provide some full-time and part-time employment. Traditionally, though, people have hunted and fished and lived from the food sources and products derived from marine mammals such as seals, walrus, polar bears, narwhal, beluga, fin and minke whales, and Greenland halibut, cod, salmon, Arctic char and other fish species. Land animals such as musk-ox and reindeer are also hunted occasionally. The meat, blubber and skins of marine mammals (along with their organs, intestines and bones, or the teeth and claws of polar bears, and narwhal and walrus tusks), remain vital material substances for household economies, while a small-scale commercial inshore fishery, mainly for Greenland halibut provides an income that goes a considerable way to supporting subsistence hunting (Hendriksen & Jørgensen 2015;

Nuttall 1992; Nuttall 2017). Much of what is caught from these northern waters is used for household consumption. Sharing remains vital for gluing together networks of close social relatedness in Upernavik district, but meat and fish also circulate in and around local and wider regional and national distribution channels. Rather than exploiting natural resources, people work hard to produce and reproduce their livelihoods. However, wildlife management regulations and quotas for marine mammals and local fisheries that are implemented by government bodies in Nuuk, Greenland's capital, can frustrate local ambitions for sustainable livelihoods (e.g., Nuttall 2009; Nuttall 2017), while international environmental regulations restrict the export of such items as polar bear furs, skulls, teeth and claws, and narwhal and walrus tusks (including jewelry, carvings and works of art made from them), and affect markets for sealskins.

In some ways, Philip Hayward's (2012; 2015) idea of the aquapelago, an assemblage of marine and terrestrial spaces and their human and non-human entanglements, seems apt as a description of the Upernavik area, as it possibly is for Greenland's entire territorial extent. While commonly referred to as the world's largest island, the country should be more accurately viewed as a complex of land, ice, islands, mountains, fjords, channels, and sea. Expanding on conventional geographical descriptions and categorizations of the archipelago to draw as much (if not more) attention to water as well as land, Hayward argues that such aquapelagic assemblages

> are constituted by social units in locations where the aquatic spaces between and encircling islands are fundamentally interconnected with and essential to communities' inhabitation of their locale (and substantially generate their senses of identity and belonging to that place). (Hayward 2015: 84)

The aquapelago as assemblage involves the interaction between humans and other actants, that "may be animate (living) entities, inanimate ones (such as sand, soil, etc.) or the product of energies (such as individual weather events or larger climatic patterns, such as global warming)" (Hayward 2015: 84). Hayward's notion of the aquapelago, as does other recent work on hybrid and fluid environments, social and hydrological relations, oceanic ontologies, and the geophysical, social and political ambiguity of littoral spaces (e.g., DeLoughrey 2017; Gibbs 2009; Hastrup & Hastrup [eds.] 2016; Krause & Strang 2016; Lahiri-Dutt 2014; Leyshon 2018; Thomas 2007), reminds us of the need to understand the ways aquatic and terrestrial places, and the human and non-human entities that compose them, are not only integrated and intermingle but how the boundaries between water and land dissolve

(and perhaps were never there in the first place in many cases) in their mutual entanglements and becomings.

Yet thinking of the Upernavik district as an aquapelago may still not quite capture the essence of Northwest Greenland as a fluid, shifting, lively and sometimes indeterminate cryospheric (and increasingly liquescent) world. While the concept of the aquapelago moves us away from seeing coasts, islands, headlands, estuaries, bays and so on, in terms of distinct and immutable land-sea binaries, ice (and its melting) further complicates our understanding of water worlds and how people live with and in them. For a good part of the year, sea ice covers and fills the aquatic spaces between islands, headlands and communities, but it also, in the form of glacial ice, covers land. The surfaces of lakes and rivers freeze. Icebergs get trapped in sea ice and remain motionless for several weeks in many instances. The coastal seas and inner fjords are often choked with ice in the summer but often devoid of it in winter and spring. Ice can frustrate and impede mobility; it is often experienced in several parts of the district as not thick or extensive enough to travel far on by dog sledge during winter and spring, and yet fragments of ice can block travel by small open boat, while diminishing ice allows, in turn, increasing accessibility to northern waters for cruise ships, cargo vessels, and seismic survey boats.

The aquaspheric and the cryopelagic—the ocean depths and the underside of the sea ice—and sea ice, glaciers and icebergs (and not forgetting snowscapes for much of the year), the coastal interior landscapes of mountains and deep valleys, the fluvial, the subterranean and the sea bed, and the atmospheric and aeolian are enmeshed with the lives of humans and animals. The Northwest Greenland aquapelago is just one assemblage within a lively world of emergence, movement and interspecies encounters and relations. It is tempting to expand upon Hayward's notion and think of this cryospheric world as a cryopelago as a way of drawing attention to its volumetric, icy nature, but this may still say nothing about indigenous relational ontologies, ways of knowing, and how people think of themselves as being in the world which, in Northwest Greenland, is expressed in thought, speech, and silence about *pinngortitaq*.

Pinngortitaq is often translated from Kalaallisut (Greenlandic) into English as 'nature' or 'environment,' but it refers and points to all that has come into existence—all that is around, above, below, underneath and within—and which is still being revealed and taking shape (Nuttall 2009). More than just the surface of the earth, *pinngortitaq* encompasses the human and more-than-human in dynamic, relational surroundings; people, animals, water, ice, snow, soil, rock, sky, and wind, as well as the air, atmosphere, the subterranean, mountain interiors, the world beneath the seabed,

and earth processes (creation was translated as *pinngortitaq* by the early Christian missionaries in Greenland). Within *pinngortitaq* all of these elements—as well as *sila*; 'air, weather, the wider world'—and formations are entwined, intersect, interact and relate. And *pinngortitaq* itself is always coming into being, forming, and reforming. Movement around and within the Upernavik district, then, is not merely travel between places and locations, or across aquatic and icy spaces. In the way Virtanen & Saunaluoma (2017) describe it for the indigenous peoples of the Upper Purus region of the Brazilian Amazon, movement in Northwest Greenland is a configuration of human engagement with the non-human.

In this richly textured world, water—in its liquid and frozen states—assumes form, flows, falls (as rain, sleet and snow), heaves, coalesces, coagulates, gushes, thickens and continually makes and remakes the Upernavik coastal environment. Merely describing this northern environment in terms of water, ice and land, and assuming they have distinct boundaries, however, reduces it to something far less intricate and patterned. Water, ice and land overlap, merging in different seasons and at different scales, and shimmering in different light, when their boundaries, edges and form are often difficult to identify. This is especially so in winter when sea ice confuses perceptions of terrain and surface, and when snow cover blurs land and ice. Even when sea ice appears to be thick, firm and extensive, water seeps and oozes through headland cracks and fissures, can saturate the ice and form a type of slush (*putsinneq*) that is neither water, ice, or snow. In this regard, it is interesting to note that the word for liquid (*imerpalasoq*) is similar to saying something—like the slushiness of ice—is thin (*imerpalavoq*). The current can cut up the ice (*aakarneq*), or pockmark it with holes (*aakkarnerinnaavoq*). Ice can suddenly crack, break up, go adrift, and form stretches and patches of open water (*imaviat*). The ice edge (*sinaaq*, or *qaanngoq*) is not a distinct line between floe and open sea, but a porous mosaic of ice floes and holes in the ice that are in continuous motion. It is perhaps as much a liquid edge (to borrow a nice phrasing from Suzanne Thomas [2007]) as it is an ice edge; there are areas of water surrounded by ice that never freeze during winter (*sikujuippoq*), often because of tides, currents, and upwelling; and at low tide, ice can separate from the surface of the water and rest on rocks on the shoreline (*issinnerit*), rejoining the sea and recomposing the cover of ice at high tide.

The sea is known as *imaq*, but a rich vocabulary describes its character depending, for instance, on whether it is moving up and down (*qaffiavoq*), rising and subsiding (*qaffiumisaarpoq*), constantly breaking apart when it meets rocks, skerries, and shoreline (*qaraarpoq*), or when its appearance is changed by a faint light washing over its surface, perhaps from a full

moon, and when *imaq* becomes *qaammarujunneq*. Hunters and fishers say they may be out on *imaq* late one afternoon and they can experience its transformation to a state of *qaammarujunneq* during the evening. One literal meaning of *imaq* is 'has something in it.' In this worldview, as indeed for coastal peoples elsewhere, not just those who are dwellers in icy places, the sea is not an open expanse of wild water, a space thought about in opposition to land and set apart from human lives. It is a constituent part of a world of action, movement and engagement. As a place with something in it, the sea is not empty, but filled with more-than-human things (some of which are good for people to eat), and which move with its currents and tides, in between its different layers from the surface to the seabed, and underneath the cover of ice in winter and spring. Marine mammals and fish move within, live out their lives, appear, emerge, and are retrieved from it by hunters and fishers (the generic name for seal, *puisi*, for example, means 'raises its head'). People talk of many other things that fill and compose the sea. These may be different varieties of seaweed, or rock, sediment, silt, and glacial flour, all of which have their own trajectories and effects (such as the ways the bottom of an iceberg can scar the seabed, for example), but also the wrecks of nineteenth-century whaling ships on the seabed, toxic substances left from the Cold War that lurk within, and the contaminants and plastics from industrial development and modern life that infect the water, marine mammals and fish today (Nuttall 2017; Nuttall 2019*a*).

There are many ways to refer to sea ice (*siku*) too—it is not just thought of and described as frozen sea water. When ice forms, people say the surface of the sea (*immap qaa*) has been glazed (*sikassarpaa*). As with the sea, one goes out on *siku* (*sikuliarpoq*), moves about and around on it by dog sledge or on foot. It is where one is engaged and occupied (*sikusiorpoq*), and on which one camps. *Siku*, just like *imaq*, constitutes surroundings that are akin to Ingold's notion of the taskscape as a place that emerges from human activity and dwelling (Ingold 1993). And it is not only humans who are occupied and busy on sea ice. Polar bears (*nannut*; sing. *nanoq*) are active in a search for seals (*nanoq* means 'good at finding something'), carving out their own places and trails and leaving evidence of their presence (an *unerraq*, for instance, is a trace left behind on the ice because a seal has been dragged along it by a polar bear), making their own dwellings and places to hide from seals (a polar bear den is *illuigaq*, which is the same word to describe a snow house made by people), and infusing *siku* and its many forms with their essence. Seals also shape places on the ice in their own way—hunters look out for a seal's breathing hole (*allu*), or a *kikkuleq*, a hole through which they have to crawl up on to the ice, or for a *nunarsaq*, a cavity or hollow in the ice where a seal lies. Being on the sea and on the ice, as on

the land, requires humans and animals alike to think and anticipate across, within, above and below.

A Liquescent World. The Effects of a Changing Climate

In the Upernavik district then, as in other parts of northern Greenland, water, ice and land intermingle with the lives and trajectories of humans and animals (e.g., Flora *et al*. 2018; Hastrup 2013; Hastrup 2016*a*; Nuttall 2019*b*), and this extensive knowledge about, and experience of, *pinngortitaq* and its ways informs anticipatory moments, action and movement in dynamic surroundings. Yet climate change is having notable effects that challenge anticipation (Hastrup 2016*b*; Nuttall 2009). Sea ice cover during winter and spring is less extensive than people living in the region have known it to be, while icebergs are calving from tidewater glaciers at faster rates. Glacial ice mass is diminishing, islands and headlands are being revealed as major glaciers in the area such as the Upernavik Isstrøm recede (Andresen *et al*. 2014; Box & Decker 2011; Khan *et al*. 2013), and the rubble constituting ever larger lateral and terminal moraines indicates the extent of recent retreat. Increased meltwater runoff from glacial fronts affects water temperature, ocean depths and circulation patterns, as well as the formation and thickness of sea ice and the movements of the marine mammals and fish people rely on for their livelihoods.

Studies of past ice movement and flow and projections of future sea ice cover point towards continued declining drift ice in Baffin Bay and the decline and continued thinning of land fast ice along the coasts of northern Greenland (Bi *et al*. 2019). Studies have also documented rapid ice-mass loss of Greenland's inland ice sheet resulting from oceanic and atmospheric forcing (e.g., Bevis *et al*. 2019; Mouginot *et al*. 2019), a greater summer melt of its edges and surface areas (e.g., Box & Decker 2011; Trusel *et al*. 2018), and the retreat of large outlet glaciers (e.g., Andresen *et al*. 2012; Carr, Vieli & Stokes 2013; Harig & Simons 2012). While there is increasing ice discharge from some of its thinning and retreating marine-terminating glaciers (Enderlin & Howat 2013), large amounts of ice mass are turning to meltwater and flowing away towards the coast from Greenland's interior as streams and rivers, and contributing to global sea level rise (Bevis *et al*. 2019; Khan *et al*. 2013; Haubner *et al*. 2018). Increased meltwater runoff from glacial fronts is affecting water temperature and circulation patterns as well as the formation, thickness and break-up of sea ice (Briner *et al*. 2013), and meltwater has been found to contain dissolved organic carbon, making the Greenland ice sheet an important source of organic carbon entering the Greenland and Labrador seas (Lawson *et al*. 2014). Cryoconite, which is

grainy sediment on the surface of the ablation zone of the inland ice and its glaciers, contains windblown dust particles from Asian deserts, volcanic eruptions and industrial activity (e.g., Biscaye *et al.* 1997; Hammer *et al*. 1978). This dark matter and the micro-organisms found in the water that accumulates in cryoconite holes lower ice albedo and contribute to melt. The inland ice may have long been subject to deposition from windblown dust and the black carbon particles originating from anthropogenic activity occurring far away from the Arctic, but Greenland's melting glaciers are also a source of high latitude dust emissions, as sediment is exposed, flushed out, and enters the aoelian system, with impacts on terrestrial, cryospheric and aquatic environments (Bullard & Mockford 2018; Tobo *et al*. 2019; Wientjes *et al*. 2011).

While scientists and environmentalists talk of ice being endangered and conjure images of environmental ruination in a rapidly melting Arctic, the experience for people in the Upernavik district is that it is also becoming far more challenging to move around this rapidly changing region. They encounter greater difficulties in accessing hunting and fishing places (as well as travelling between communities during winter and spring). Sea ice is forming later in the winter and, in many places along the coast, is not always as firm and fast, local people say, as it should be to allow for safe and efficient travel on it. The spring sea ice break up has also been happening earlier in the season over the past twenty years or so. This trend makes hunting and fishing by dog sledge riskier when the ice is not solid and yet still covers large stretches of water, or travel between communities by open boat becomes almost impossible as the ice which lingers during the early weeks of open water hinders mobility and limits connectivity. Hunters report that the period of travel by dog sledge on good, solid sea ice is now, on average in recent years, only around three months during winter and spring, with occasionally decent, but somewhat fluctuating conditions for another month or so. Near Melville Bay communities, hunters say that sea ice is only best in March and April, reducing the amount of time for hunting and fishing by dog sledge significantly. Hunters also say they would usually expect to encounter *putsineq* on ice during the spring, but it is increasingly found in January and February. They experience travel on sea ice that they say has a different texture and consistency (ice is described as *quasappoq*—increasingly slippery, making dogs slip and slide—*sarrippoq*—and the runners of the sled zigzag—*ajalupput*), and the ice edge has become a place of greater instability, of constant shifts and movement, a more confused mass of ice and water (where ice is often described now as 'moist;' *alutsinneq*), which makes camping and hunting there more difficult and dangerous.

Iceberg grounding patterns have also had an effect on local sledge routes between communities or out to where seal nets are set under the ice near the shoreline of headlands and islands, some of which are now abandoned or rarely used. People have talked to me in recent years about their concerns now that ice rarely forms for extended periods along the outer stretches of the coast. This makes for a situation where lengthy winter journeys by dog sledge are often no longer possible, especially from the settlements to the town of Upernavik (e.g., see Nuttall 2017), limiting movement around the district for hunters and fishers who need to travel during winter from their home villages to other places to either fish or land their catch. Accessing fish processing facilities is problematic if it is risky, dangerous, or impossible to travel by dog sledge to the communities where they are located. This limits and even curtails the possibilities for fishing and earning an income.

The changing nature of sea ice means having to navigate a seascape in winter and spring that is neither always reliably covered by ice or is open and free of ice, while the changes affecting glacial fronts, and which are reshaping some areas, have significance for marine mammals and fish. All this affects hunting and fishing activities, even if retreating glaciers often reveal islands and headlands which can mean new places to explore for hunting and fishing possibilities. People express concerns that, in summer and autumn, seals have been moving further away from coastal waters with the shifting pack (and some hunters in the southern part of the district say they noticed an absence of seals for a few years following seismic activities for oil exploration in Baffin Bay; see Nuttall 2016), while changing ice conditions and warming waters also mean differences in the migration routes of other marine mammals. By way of example, in June 2015 one hunter from Naajaat, in the central part of Upernavik district, told me:

> Fishing is the primary source of making a living here. The ringed seal is a primary source for livelihoods as well. There were times when the ringed seal used to come in September and October, but now the seals come in December which is a month when hunting gets hard. There aren't so many seals any more either so they don't provide a great living any more. This is a big change. We could fish for halibut with long lines because there were plenty in the water last year. We couldn't catch as many as halibut this year because there weren't enough. Also, we usually don't see seaweed under the ice. Now there is a lot of that and the long lines tend to snag it.

In response, new forms of aquatic and cryospheric knowledge are taking shape. This, along with a finely-grained vocabulary about the ways of *pinngortitaq*, needs to be carried around and drawn from if one is to be safe. There is also a greater reliance on boats during winter months, as people

are giving up their dog teams because of thin or no ice, while early summer hunting forays and journeys between some communities often need to be made via routes some distance from the coast, to get around the floating ice that lingers, into what hunters call *iluakkooq* ('the swell') and even further out to sea where the swell rolls, churns, is heavier (*iluakkoorpoq*) and far riskier and dangerous to be out in a small open boat.

Icebergs are a source of drinking water for most villages in the Upernavik region, but the retreat of some glaciers from which smaller icebergs now calve has implications for its availability, while in other parts along the coast people are living with a problem of much larger icebergs, which are seen as hazards, as they block passages between islands and access to community harbours, as well as bringing the risk of rising waves when they shift their centre of gravity. Upernavik may be an increasing liquescent place, but the unavailability of a good source of freshwater in some places has implications for local economies. For example, in the community of Kangersuatsiaq, south of Upernavik town, the fish processing and freezing plant closed in 2011 because it lacked a sufficient freshwater supply. The village is situated on a small island and water is obtained mainly from icebergs, although a desalination facility is able to draw water from the sea. Yet this is not enough to keep the fish processing facility open. Its closure has meant many people have since left the village, often moving to Upernavik, while other communities are also struggling with problems of access to water supplies (Nuttall 2017).

Changes to sea ice, glaciers, seasonal temperatures, and the movements of marine mammals and fish have affectual and sonic dimensions in the Upernavik district that are experienced beyond the visual witnessing of melt. To say "the weather is bad" (*sila ajorpoq*) is also to describe how one's own sense of being in the world is disrupted. And, when the weather is bad, I have heard people say "*silaga aalavoq*"—which means 'my head/my mind is swimming, shaking, moving.' When the weather improves, it is said not just to get better, but to return to its senses (*silattorpoq*), just as a person does who has had a momentary loss of perspective, reason or balance. In the way that Joy Parr argues that bodies are archives of sensory knowledge (Parr 2010), environmental change disrupts people's embodied knowledge of the world with profound implications for identity, community memory and sense of place. A changing climate affects not only a person's surroundings, it can be experienced as disorientation. As Tschakert, Tutu & Alcaro (2013) describe in their work on the effects of climate change in Ghana, deteriorating landscapes, apparent in parched fields, withered crops and dry water wells, for example, cause emotional distress. There is a sense of solastalgia in Northwest Greenland too in how I hear some people talk of

the transformations happening around them (e.g., Nuttall forthcoming). Sensory knowledge of how ice used to feel and sound—for instance, when one travelled over it by dog sledge, how frozen snow used to crunch and creak under one's feet while wearing kamiks (traditional sealskin boots) with the sole made from the skin of a bearded seal, or how the wind would feel on one's face (and people say the air is being made moist by the changing weather, and that being made uncomfortable by damp seems a far more prolonged experience)—is drawn upon as a reference for how people today experience changing ice, or warmer temperatures, or different patterns of precipitation. Descriptions of how melt appears to be different from say twenty years ago draw heavily on bodily metaphors of skin lesions and disfigurement. For instance, I have heard people liken the dripping of melting snow and ice to the running and seeping of a boil or a sore (*igivoq*), or how holes in the ice are like open wounds that are slow to heal (*mamitsuippoq*), or how the way ice is slow to form on the surface of the sea is likened to the skin of a young sick bird or seal that has only grown a few feathers or hairs (*qiviulik*) and is struggling to survive.

People also talk about what climate change, for them, sounds like. The runners of a dog sledge, for example, squeak rather than whoosh and crackle over snow and ice that are wetter and mushier. In May 2017 friends from Kangersuatsiaq told me that with less ice in winter it is now common to hear the roaring sounds of the sea (*immap ittunnera*) between December and March, something that the cover of ice usually silences through a long winter. This corresponds to how scientists are observing greater wave action and swell events in other parts of the Arctic, such as the Beaufort and Chukchi Seas, as sea ice cover declines (Overeem *et al*. 2011; Thomson & Rogers 2014). People also talk about the increased frequency of hearing glaciers calve and the rumbling sounds of rocks that fall with the ice—as well as the silence deep in some fjords now that some glaciers have receded away from the water's edge, meaning there are places where waves no longer rise from the crashing of icebergs. When I did research in Upernavik in the winter of 2015 there was good, solid ice throughout much of the district (with especially cold weather in February), something that ran counter to the trend of increasingly poor ice that people noticed began in the late 1990s and early 2000s. Some hunters made journeys by dog sledge from the central part of the district south to Upernavik town and to Kangersuatsiaq and stories were told to young people that these trips lasting several days were like those both people and dogs were able to make "in the old days," invoking memories of travel on sea ice in places and spaces many people are no longer able to visit and experience in winter. But when people talked that winter of "the old days" or "times in the past" (*qangarsuaq*), or "in former times" or "in times gone by" (*itsaq*), this

sense of temporality encompassed the 1980s and early 1990s as much as it did decades before (Nuttall forthcoming).

Conclusions

My concern in this article has been to point in a different direction from the "ice is melting" narrative that so often dominates much of the scientific literature as well as the broader policy-related processes concerned with Arctic climate change. Rather than just seeing climate change as it affects the Arctic in terms of liquification, as ice melts into water, I argue, for Northwest Greenland at least, that it makes for a far more liquescent place—one that is experienced as icy, but wetter, damper, slushier, mistier, foggier, and stormier. The region is increasingly well-monitored and scientific research done there, as in other parts of Greenland, contributes to wider Arctic observing networks. While scientists go out into the field, observing, measuring and monitoring reductions in sea ice and snow cover, mass loss acceleration in glacial zones, and surface melt on Greenland's inland ice, satellite remote sensing has made important discoveries about the climate system that have not been detected by field-based observation or by climate models, such as the spatial pattern of sea-level rise and the cooling effects of increased stratospheric aerosols (Yang *et al*. 2013). Satellites allow for the production of technically-mediated images of the Arctic from space that give us a different spatial and temporal view of a region in transformation. Surface melt on the Greenland inland ice is often depicted in shades of red, for instance—an alarming impression of global warming and disappearance. The Arctic is "sensed" by sophisticated technology that can produce high resolution datasets for the atmosphere, land, ocean and ice. These scientific representations of melt are valuable and necessary, especially for the role they play in communicating the dramatic nature of climate change in the Anthropocene and for getting the message across to policy-makers, as well as informing a liquescent geopolitics, but they allow us, to paraphrase Jody Berland's observation of weather charts and forecasts (Berland 2009: 243), to look anxiously at what climate change is doing to the Arctic without really feeling its wrath.

A satellite image, no matter how visually compelling a statement it makes about melting ice and temperature rise, cannot communicate how it feels when travelling on sea ice that is no longer thick and firm, or feels far wetter and more slippery, or when rain falls in January when one expects snow, and when the winter air feels damp when it should be dry. Nor can remote sensing provide us with images of the effects of climate change on human bodies and community memories. As Tim Ingold (2007) writes,

there is no distinction or separation between earth and sky and being out in the world is to live, engage and mingle with weather and climate. This is something at the heart of indigenous ontologies. *Sila*, the Greenlandic word for weather and climate, is the same word for the world, and for breath, air, and consciousness. To breathe in is to inhale *sila*—climate and weather are brought into the body, along with damp air, moisture, contaminants, windblown dust and black carbon particles. If cryoconite pockmarks the inland ice so extensively, what can deposition do to human lungs? As Wainwright puts it:

> breathing and air (climate/weather) are intimately entangled, in that sensing the breath inside the body is sensing the air outside it. We exhale part of our body into the world and we inhale the environment into our bodies. It is therefore not only our eyes, ears, noses, and our taste buds which connect our inside bodies and minds to the outside world but also our lungs, adding breathing as an important focus for sensorial anthropology. (Wainwright 2017: 342)

And so, while the scientific monitoring of sea ice in Baffin Bay (e.g., Bi *et al*. 2019) and of glacial ice loss in the Upernavik region, including Melville Bay, is well established (e.g., Khan *et al*. 2013; Kjær *et al*. 2011; Liu *et al*. 2017; Van As 2011), I argue that attention needs to be given to what these changes to ice and water mean for local livelihoods and mobilities and human-animal interactions, but also for a person's sense of self in relation to *sila* and how they feel and inhale the warming, melting world. Thinking of this in terms of liquescence, rather than liquification is a way of moving toward a deeper appreciation of people's experiences and sense-making of the changes happening around them.

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NOTES

[1] Recently, for example, the Arctic Council's Arctic Resilience Assessment (ARA) and the Adaptation Actions for a Changing Arctic (AACA) initiative have set out to chart how the Arctic is unsettled and imperiled by global processes and how resilience in social-ecological systems is threatened, while the 2017 Snow, Water, Ice and Permafrost Assessment (more commonly known by its acronym SWIPA, a periodic update of the Arctic Council's 2005 Arctic Climate Impact Assessment) reiterates how evidence for the transformation of the Arctic towards a new state has grown stronger over the past decade.

[2] See www.wwf.ca/conservation/arctic/lia/ (access date 2 March 2020) for information on WWF's Last Ice Area initiative.

[3] A colony of Denmark 1721–1953, Greenland is a constituent part of the Kingdom of Denmark and achieved Home Rule in 1979, followed by greater autonomy in the form of Self-Rule in 2009.

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