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The emerging earths of climatic emergencies: *on the island geography of life in modernity's ruins*

Edward Hákon Huijbens 

Wageningen University and Research, Cultural Geography Group, Wageningen, Netherlands

ABSTRACT

This paper will map out the geographical contours of life in the Anthropocene borne out of the ruins produced by the particular relations of globalized capitalism and modernizing aspirations in Iceland. The focus on Iceland is in recognition of islands as scenes where these relations play out with particular intensity and visibility. Therefore, the paper will outline the island scene upon which our earthly entanglements can be readily scrutinized. Secondly, our planetary state of emergency will be outlined in relation to the logic of the Moderns, translating into the Anthropocene, setting up for the third part wherein the time of islands will be introduced and their particular relevance for analysis. The paper then proceeds to exemplify the emerging earths of the Anthropocene through a topo-ecological mapping of geothermal living in Iceland. As such, the paper argues for the need to realize two things: (a) the Earth *per se* does not care and (b) life will go on. Under the current state of planetary emergency, change is inevitable and will be drastic, but the emerging Earth(s) will necessarily reside in geographically specific responses, evolving from the ruins of what is, in this case, the geothermal landscapes of Iceland.

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Introduction

This paper is published as part of the Geografiska Annaler: Series B, Human Geography special issue “Planetary state of climatic emergency and geography”, edited by Martin G. Gren and Edward H. Huijbens. The paper is about the Earth and its evident state of emergency, translated through debates around climate change from the perspective of islands. In this paper, the main argument to be presented is that regardless of the looming catastrophe and planetary state of emergency, there is imminent hope to be found for humanity through a critical interrogation of the ruins of our current social contract of globalized capitalist relations. This hope is inspired by Wakefield (2020, 1) who informs us that as ‘[l]iberalism’s old structures are unraveling. We are free to create our own’. At the same time, however, the paper foregrounds islands whilst heeding the earthly imperative of Latour (2018, 106);

... while observing, with anguish, that the universal condition today entails living in the ruins of modernization, groping for a dwelling place.

Modernization, liberalism and globalized capitalist relations will be mapped onto the island of Iceland. In our ‘age of islands’ (Bonnett 2020), the paper recognizes that ‘islands are remarkable localized sites of relational entanglements and feedback effects’ (Chandler and Pugh 2020, in

CONTACT Edward Huijbens  edward.huijbens@wur.nl  Wageningen University and Research, Cultural Geography Group (GEO), Droevendaalsesteeg 3, 6708PB Wageningen, Netherlands

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print). This makes islands very suitable for analysing the prevailing cultures and institutions of the 'Moderns' with a capital M, following Latour (1993). The notions of progress, growth and enlightenment often follow when the Moderns are evoked. These denote a particular cultural logic emerging in Europe during the 'long sixteenth century' (1450–1640 CE) as defined by Wallerstein (2011), and instituting the capital entanglements of the 'web of life' (Moore 2015). Ours is indeed an Earth in the grips of the Moderns (Smil 2019). This grip is so pervasive that it is by now difficult to image a household, family or person on this planet that is not in one way or another wrapped up in the circuits of capital, which through its peculiar understanding of progress and growth are about to tip us into an altogether unfamiliar earthly state.

But life beyond the tipping point of the climate is one imminent to the Earth itself. Therefore, the paper argues for ways in which we can come to terms with our geographically specific earthly entanglements, most readily observable in an island context. At the same time that Modern hope of enlightened progress has been thwarted by our current state of emergency, this provides us with an enabling opportunity (Chandler 2018, 2019). Amidst emergency and crisis, there are emergent new hybrid earths of the Anthropocene and what the Earth can become of us. Foregrounded is the material, elemental, indeed earthy, entity that is our planet, relationally animated through island geographies. A positive power of differentiation this manifold Earth needs to be reclaimed as the subject of our discipline of geography. Interventions, hopeful politics and storytelling are most certainly humanity's bread and butter (Harari 2015). These I want to weave from the principles of 'togetherness' (Hägerstrand 1976) and what Moore (2015) and Glacken (1967) would call the 'web of life' imminent of the Earth and anchored in geographically specific practices, in this case, on the island of Iceland.

This paper will proceed in four parts, before summing up with a rather extensive conclusion. Firstly, the paper will outline the island scene upon which our earthly entanglements can be readily scrutinized. Secondly, our planetary state of emergency will be outlined in relation to the logic of the Moderns, translating into the Anthropocene; setting up for the third part wherein the time of islands will be introduced and their relevance for analysis. The fourth section exemplifies the emerging earths of the Anthropocene through geothermal living in Iceland. This Hägerstrand (2004) inspired 'topo ecological' mapping experiment of 'Geothermal Living' (Jónsson 2010) will contribute to the current environmental debate with an Earth-informed hopeful outlook whilst fully recognizing the planetary state of emergency we find ourselves in. As such, the paper argues for the need to realize two things: (a) the Earth *per se* does not care and (b) life will go on.

The island other

Islands have long been an object of obsession, reverence and dreams, where one is able to find peace, transformation and retreat from whatever mainland counterpart the isle is juxtaposed against (Francis 2020). In Umberto Eco's novel about the *Island of the Day Before*, he explains at length attempts made during the European discovery of the Americas and the Pacific islands at measuring longitudes (Eco 1994). Mainly through the search and establishment of the elusive 180° meridian, that divides yesterday from today, now known as 'the International Date Line'. In the novel, amazing ideas unfold from the voyages of discovery that explain how this dividing line spawns the sense-making of Enlightened progress, for instance, how the biblical flood is rationalized by explaining how God managed to flood the planet using seawater from yesterday and pouring it over the line. The protagonist is marooned on the vessel *Daphne* off an island, he is unable to reach as he cannot swim. He postulates that the island is the one of the wealthy biblical places of king Solomon's legacy. Thus, the island was named after him by the Spanish navigator Álvaro de Mendaña in 1568. The protagonist thus comes to one of the numerous arguments he finds for this island and the line dividing the world as producing the inverse or flip side of all that is European, civilized and established.

The island as such an 'Other' is an expression of a possible world according to Deleuze (1990 [2004], 347). But moreover, from Deleuze's (1990 [2004], 341) reading of the early eighteenth-

century novel by Daniel Dafoe about Robinson Crusoe, he explains how ‘the isle is the frontier or field’ of the struggle between the earth and the sky. Thereby liminal, yet ripe for conquest, Eco’s island and that of Dafoe in Deleuze’s reading tap into a long legacy as ‘emblematic liminal and transgressive spaces’ (Chandler and Pugh 2020, in print, see also Abrahamsson 2018; 75 citing Deleuze and Guattari 1987). Chandler and Pugh (2020) go on to cite how these liminal spaces have emerged, being portrayed as lacking modernity’s coherence and uniformity. They argue that at our current climatic juncture, islands are seen as positive and generative, not least because of the ways in which islands allow people to grasp a seemingly contained set of relationalities which ‘play out with a special intensity on islands’, laying them bare in the process (Bonnett 2020, 10).

In these liminal spaces, things unfurl and unfold with particular intensity in often unforeseeable and unpredictable ways. As such, the island, as any space for that matter is not so easily traced or represented, as it is constituted by everything that created it throughout its history. The island as ‘other’ does not represent a utopian state to be aspired to, or some kind of ur/authentic earthly relations to be excavated, a type of ‘Kantian Island of Truth’ (Olsson 2007, 225–235). The island’s readily observable relational entanglements simply lay bare that:

Between things does not designate a localizable relation going from one thing to the other and back again, but a perpendicular direction, a transversal movement that sweeps one and the other away, a stream without beginning or end that undermines its banks and picks up speed in the middle. (Deleuze and Guattari 1987, 25, emphasis original)

Islands thereby need to be mapped from that unfurling middle. ‘Mapping the middle in spatial thought’ or the ‘limit zone’ they represent (Abrahamsson 2018, 65) is about coming to terms with a place where all things and the Earth of which we are made unravel and unfold. It is about the movement, and in order to find ourselves in relation to the island;

... humans would have to reduce themselves to the movement that brings them to the island, the movement which prolongs and takes up the *elan* that produced the island. (Deleuze 2004, 11, emphasis original)

Islands are indeed dynamic ecosystems possessing their own potential for emergence (*elan*) and can thereby make the elemental apprehended beyond representation and comprehension as a foregrounded matter of concern in our Anthropocene times (see Deleuze 1990 [2004a], 272–274). But there are two kinds of islands: continental and oceanic. The former emerging as land erodes, sediments shift, subsidence occurs or sea levels change. The latter are islands that are made by earthly forces and emerge from the sea (Bonnett 2020, 108–115). The dynamic landscape of a continental island can jolt us awake when we witness the consequence of ruin brought about by human activity animated by the promises of modernity (Wakefield 2018), as so many seem indifferent to the slow roasting ruin of global climate change. At present, humans are littering the planet with islands of the former kind as detailed by Bonnett (2020). At the same time and in particular, the oceanic islands can jolt our awareness of the earth’s forcefulness. Drawing on Deleuze, Higaki (2018) outlines how Japan, as an emerging oceanic island and part of the Pacific ‘ring of fire’, is alive with orogeny. As such, it is a defined place yet manifold as it emerges from the jostle at the ‘frontier’ between land and sea. As Deleuze (2004, 9) will argue:

Continental islands serve as a reminder that the sea is on top of the earth, taking advantage of the slightest sagging in the highest structures; oceanic islands, that the earth is still there, under the sea, gathering its strength to punch through the surface.

Iceland is another emergent oceanic island, reminding us of the earth’s urge to ‘punch through’. Somewhat different from most places in the world is the very dynamic character of its landscapes, through active volcanism and viscous glaciers. In the ‘land of ice and fire’, as the tourist image would like to have it, even mountains tend to visibly shrug (Pálsson 2017, see also English version Pálsson 2020b and Pálsson and Swanson 2016). Iceland is still in the making at the spot where the two tectonic plates of the North Atlantic diverge. Pálsson (2017) grounds this ever-present geoforcefulness in his semi-autobiographical account of the Westman Islands, a volcanic archipelago south of Iceland, where indeed the two diverging tectonic plates are making their presence felt.

He explains how mountains shrugging, new mountains forming and islands emerging there in 1963 (Surtsey) and islands expanding in 1973 (Heimaey), transformed not only the landscapes, but also the livelihood of the inhabitants. Indeed, ‘volcanic islands don’t just rise, they *writhe*; shorelines and hillsides spasm and flex with every passing week’ (Bonnett 2020, 120, emphasis original). The uprooting of the population’s earthly attachments through these landscape dynamics explains the ensuing ‘solastalgia’, or sense of loss partially present in Pálsson’s (2017) account, but moreover goes a long way to explain that we make sense of ourselves through our earthly entanglements, that we incorporate mountains, literally and figuratively. The example of the volcanoes forming Surtsey and expanding Heimaey shows how:

The volcano is actual, here and now; [and] we cannot expect to escape its eruption. Our predominant aesthetic procedures involve sampling, synthesizing, remixing, and cutting and pasting. (Shaviro 2011, 290)

Objects and matter undeniably exist independent of our presence. At the same time, the island ‘other’ is ‘expressed, grasped as not yet existing outside of that which expresses it’ (Deleuze 1990 [2004], 347). Inversely and paraphrasing Luce Irigaray: the island is not continuously becoming for me, it is what it is because it corresponds to it being an island (Irigaray 2019, 52). An island, and the Earth for that matter, simply is; and understanding that should instil a necessary degree of humbleness into our cognition. ‘No matter what we do, the Earth will continue to make islands’ (Bonnett 2020, 109). But what matters about islands are those whose very being consists of the acts they perform in its context. Accordingly, and in the spirit of Shaviro’s words:

the universe consists in part of ‘contingent’ facts and relations, and in part of ‘systematic relatedness,’ and that any definite character ‘is gained through the relatedness and not the relatedness through the character.’ (McGilvary 1941, 214, quoting Whitehead 1922)

How we make sense of climate change is a result of what and how we relate to places. Inundation due to a rise in sea level; transformations in agriculture, land use and vegetation; shifting watersheds as glaciers disappear; foreign vegetation and migratory species appearing in new places; tundra subsiding as permafrost thaws and species going extinct at an alarming rate. All of this is happening in real time, in front of our eyes now, but with consequences way beyond that of a human lifetime or even that of our current civilizations. It is a hard one to make sense of and relate to, but we have to.

Future catastrophe is now – the state of emergency

Although a range of existential threats face humanity (see Ord 2020), none seems as imperative at present than extreme anthropogenic climate change. The landscape transformations wrought by climate change are becoming painfully apparent and are being identified and highlighted by scientists and popular media to an ever-greater extent (see e.g. Pálsson 2020a). Lewis and Maslin (2018) aptly demonstrate that these environmental changes and the emergence of the Anthropocene are directly related to the Moderns’ legacy of colonialism and conquest for their defined notions of progress. Indeed, the current climate emergency has been a while in the making. As the cultural geographer Carl Sauer long ago recognized, the ‘modern world has been built on a progressive using up of its real capital’, characterized by the extinction of species, restriction of useful species and serious and widespread soil destruction, due to opening of the world to commerce (Sauer 1965 [1938], 148–151). The result is now understood as a transgression of multiple planetary boundaries (see Rockström, Steffen, and Noone 2009). These transgressions are the result of what Carl Sauer – already in the 1930s – identified as, ‘the suicidal qualities of our current commercial economy’ derived from the ideology of frontiersmen who are ‘prone to think of an ever ample world created for our benefit, by optimistic anthropocentric habits of thinking’ (Sauer 1965 [1938], 152–153).

The earthly climatic signals of this malaise are too numerous to mention, and they are appearing fast. The geographical position of humanity’s temperature niche is projected to shift more over the coming 50 years than it has in the last 8.000 years (Xu et al. 2020). In fact, a place like Greenland is

no longer changing in geological time, it is changing in human time, as is the Antarctic ice sheet. As Charles C. Mann argues:

... the onset of climate change meant that *Homo sapiens* was getting into the biological big leagues – we were tiptoeing into the terrain of bacteria, algae, and other truly important creatures. (Mann 2018, 296)

Life has been co-creating its habitat ever since its emergence (Lenton, Dutreuil, and Latour 2020). The Great Oxidation Event, starting perhaps some three billion years ago with photosynthesizing cyanobacteria is a case in point, creating the atmosphere fostering us today. And now it is our turn it seems, as there is indeed no doubt about the speed and depth of the earthly transformations humanity is bringing about.

Recent reports from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES 2019) and the 2018 special report of the Intergovernmental Panel on Climate Change (IPCC), along with e.g. the World Wildlife Fund (2018), make abundantly clear that we seem to be performing the ultimate ‘terrific’ in the words of Henri Lefebvre (2009). ‘In the case of climate change, however, the unthinkable is business as usual’ (Harper 2019, 5), but revealing in us an ongoing and basic vulnerability, or even our pending doom (see Clark 2011). Moreover, faced with an already arrived, albeit patchy, apocalypse, unable to think beyond the confines of the Modern imperative Ulrich Beck (2010, 263) rightly notes that in the name of climate change, ‘green politics has succeeded in de-politicizing political passions to the point of leaving citizens nothing but gloomy ascetism [*sic*], a terror of violating nature’. The increasing use of the ‘inevitable climate apocalypse’ narrative is thus creating a de-politicized moral imperative resulting in the persistence of social inequality, segregation and marginalization (Stripple and Bulkeley 2013). This is the Anthropo(obs)cene the geographer Erik Swyngedouw talks about, one wherein:

... a global intellectual and professional technocracy has spurred a frantic search for ‘smart’, ‘sustainable’, ‘resilient’, and/or ‘adaptive’ socio-ecological management and seeks out the socio-ecological qualities of eco-development, retrofitting, inclusive governance, the making of new inter-species eco-topes, geoengineering, and technologically innovative – but fundamentally market-conforming – eco-design in the making of a “good” Anthropocene. (Swyngedouw 2019, 253; see also Parikka 2014)

To Wakefield (2020, 51), these ‘eco savvy’ promises;

... must be understood as the substrate of a liberal regime promising neither redemption nor progress but only survival of existing, ruinous conditions amidst catastrophe.

But the Earth possesses a powerful agency much beyond its constitution as a governable life-support system or living infrastructure (Wakefield 2020, 53). Through the Earth *we* can recentre the politics of the Anthropocene not duped by the;

ultimate de-politicising gesture [which] resides precisely in letting the naming of a geo-social epoch and a contingent ‘truth’ of nature decide our politics, thereby disavowing that the ‘our’ or ‘the human’ does not exist. (Swyngedouw 2019, 256)

Our climatic vulnerabilities indeed need to be recognized, politicized and negotiated (Hamilton 2017), but following Wakefield (2020, 33), I do not see the Anthropocene as the tragic end, but as a particular set of ruins that can be negotiated for their potential. Lefebvre’s already cited ‘terrific’ was actually conceived in the spirit of rethinking geopolitics. The proposal here is to ‘earthen’ geopolitics, one very much inspired by the possibility of destruction (see Lefebvre 2009, 98). The disarming and demotivating apocalyptic image of the Anthropocene may indeed be obscuring the mosaic of open-ended assemblages of entangled ways of life, if not recognized as one of our making and thereby politicized. To discover these, we need to discover the elemental that is retained within the body of the ‘other’, in this case, the island (Deleuze 1990 [2004]).

The time of islands in the Anthropocene

The island is the necessary minimum for this re-beginning, the material that survives the first origin, the radiating seed or egg that must be sufficient to re-produce everything. (Deleuze 2004, 13)

The island and its relational entanglements have no intentionality, but people do, and in some (not all, and not always) relations, they can assert this. This assertion does not always yield that which was intended. How meaning is made to matter revolves around placing and spacing the things themselves within the power geometries of assembling what matters to us. To conceive of the whole Earth as such, an assemblage is impossible and to recognize it as an open, incomprehensible multiplicity is surely a challenge. Much like trying to conceive and account for humankind as a whole in all its variability. But the island allows a grasping, albeit ever so fleeting.

Recent debates in island studies have radically decentred and pushed the notion of 'island' beyond singularity to instead emphasise mobile, multiple and interconnected forms. (Chandler and Pugh 2020a, 65)

Another dynamic feature of the island of Iceland, beyond its tectonic upheavals, is its glaciers and ice caps. Indeed, a glacial landscape is one of the most dynamic geologies on the planet (Björnerud 2018, 131) and there are abundant examples of new landscape features appearing and disappearing where glaciers are present, or not so present. Glaciers are generally portrayed as the 'canaries in the coalmine' when it comes to global warming as they rapidly response to climatic temperature fluctuations. This emblematic role of the glacier can be seen in the disappearance of the glacier Ok in the West of Iceland. In a mere 100 years, the glacier went from about 10 km² to becoming non-existent. Perched on top of an 1198 mamsl shield volcano, its prominence and visibility from the West of Iceland was striking, and hence so was its disappearance, provoking its detailed documentation (<https://www.notokmovie.com/>, see also Howe and Boyer 2020). On 18 August 2019 the prime minister of Iceland along with an entourage that included scientists, documentary film-makers and authors, visited the now gone glacier and affixed a plaque to a boulder that reads:

Bréf til framtíðarinnar

Ok er fyrsti nafnkunni jökullinn til að missa titil sinn.
Á næstu 200 árum er talið að allir jöklar landsins fari sömu leið.
Þetta minnismerki er til vitnis um að við vitumhvað er að gerast og hvað þarf að gera.
Aðeins þú veist hvort við gerðum eitthvað.

A letter to the future

Ok is the first Icelandic glacier to lose its status as a glacier.
In the next 200 years all our glaciers are expected to follow the same path.
This monument is to acknowledge that we know
what is happening and what needs to be done.
Only you know if we did it.

Ágúst 2019
415 ppm CO₂

This rather sobering 'letter to the future' by the novelist Andri Snær Magnason (for more see: Magnason 2020) demonstrates how our current times of climate change have seized flowing from past to present and onwards, but have started to flow backwards. This future present is clearly captured in an article in the *New York Times* accompanying the Ok event. Therein the prime minister of Iceland stated:

Most of the earth's nearly 200,000 glaciers will belong to history books, just like Ok, unless we do something about it and we do it now. (Jakobsdóttir 2019)

A call to arms, the article does not in the least shy away from the urgency of climate change and its consequences. Striking is indeed the fact that a fixed item in the landscape of Iceland, represented in a place name in the famous medieval Sagas and numerous topographic maps, is gone. Its

prominence and the subsequent publicity demonstrate how all that seems solid is melting into thin air at our current climatic juncture. Moreover, the actions around Ok show that our times are animated by the things that are coming towards us (Latour 2018, 29; see also Latour 1993, 68), untethering the presumed continuity of our current lives (Colebrook 2014, 114; see also Wakefield 2020, 60). With mountains shrugging and glaciers disappearing in front of our eyes, the depth of time is becoming commonly visceral and as our gaze is oriented towards the future – there is no escaping the Anthropocene. The here and now matters and is most readily visible in the island context.

The wholly enlightened Earth, one purely dictated by Modern instrumental rationality, is one radiant with calamity (Horkheimer and Adorno 2002 [1947], 1). The perfect-future drive of the Moderns' juggernaut cannot be indefinite and the day of reckoning has come. As the Anthropocene gains traction, we cannot dismiss the ever-louder discordant clamouring of this juggernaut. Bruno Latour (2018, see also 1993, 68) reminds us of our modern tendency to face backward while continuously attempting to flee the horror and destruction of the past. This tendency is rendering us poorly equipped to face the looming catastrophe that we have inadvertently allowed to pile up behind our backs. It is only now, with the advent of the Anthropocene, that we are beginning to turn around, at least some of us. We who dare, or are forced, to look into a climate future now coming fast towards us, see the full horror and shape of things to come.

With all this in mind, Clark and Yusoff (2017, 6) argue for 'geosocial formations' that constitute the oft-neglected in scientific accounts of the Anthropocene;

... becomings of earth and society together [which] might help us probe the richly layered formations we have inherited for the overlooked, marginalized or as yet unactualized geosocial possibilities murmuring within them.

Thus, whilst we might 'imagine the Anthropocene, then, as the disaster to end all disasters' (Clark 2014, 21) and our planetary state of emergency as irreversible, therein lie other ideas, possibilities and virtualities that we can excavate and think through. Indeed, '[w]ithout stories of progress, the world has become a terrifying place'. And as Anna Tsing continues her final words about the Matsutake mushroom springing from the ruins of old-growth forests around the Pacific:

The ruin glares at us with the horror of its abandonment. It's not easy to know how to make a life, much less avert planetary destruction. Luckily there is still company, human and not human. We can still explore the overgrown verges of our blasted landscapes – the edges of capitalist discipline, scalability, and abandoned resource plantations. We can still catch the scent of the latent commons – and the elusive autumn aroma. (Tsing 2015, 282)

To ground these 'autumn aromas' even further beyond the overgrown verges of our blasted landscapes, the Earth looms large at the horizon.

And my daily experience as an earthling is enriched by an awareness of the lingering presence of so many previous versions and denizens of this place. (Bjornerud 2018, 17)

Tsing, and Bjornerud more generally, thus challenge us to reckon with the ruins of existing colonial and capitalist relations, confront onto-epistemological differences, and recognize the autonomy of more-than-human others. The ways in which the elusive Earth perpetually peeks through (Morton 2013, 70) and is lived by and through us is thus what is at stake, and island topographies provide an excellent venue to explore these emerging elements.

Entanglements in the ruins of Námaskarð

Figure 1 titled 'notes from the underground' is perchance a deliberate reference to the famed novella by Dostoevsky? The important thing however is that it captures the ways in which the magmatic rhythms of the Earth are harnessed to produce both electricity and hot water for heating houses and eventually the epicurean delights of year-round outdoor hot water pools in Iceland. This

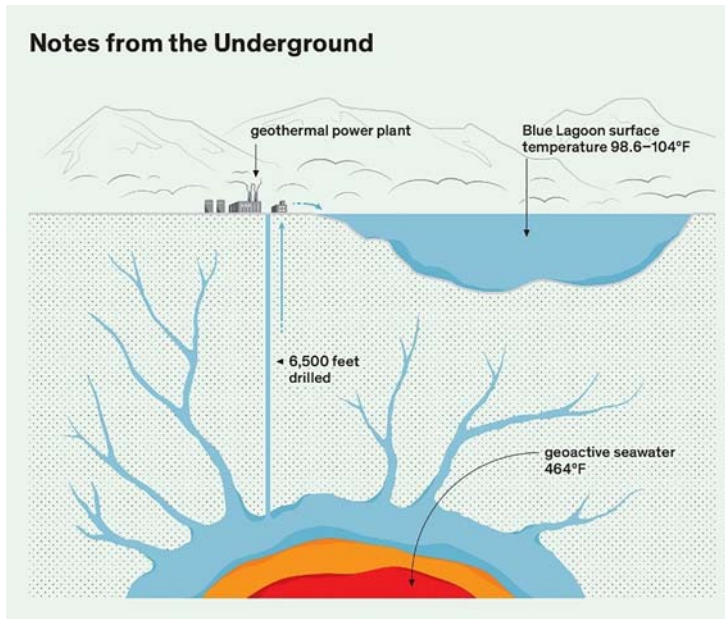


Figure 1. Earthly entanglements. Chart photo: Vincent Fournier, Dwell Magazine.

effort of harnessing the volcanic energy of the emerging oceanic island of Iceland represents the modernizing aspirations of a country rapidly industrializing in the post-war years. In this context, the reference is not far off as the Moderns' juggernaut is the context in which Dostoevsky's protagonist struggles.

At the outset of the twentieth century, Iceland was one of the poorest nations in Europe. As the nation struggled to gain independence, the Great War proved a boon and its sequel in 1939–1945, even more so. The warring tribes of Europe bought fish from the small island nation 'north of war' as one Icelandic novelist quipped, thereby jump-starting the process of modernization/industrialization as profits were reinvested in the latest fishing and marine technology. Although this story also involves Allied occupation during the Second World War and a type of post-war 'Okinawa' syndrome when the tiny nation was transformed into a US naval base with military installations built at Keflavík and around the country, it is fair to say that fish was what Iceland was all about, captured in the phrase by Iceland's only Nobel prize laureate; 'lífið er saltfiskur' (Laxness 1932). The economically precarious sole reliance on fish was recognized in the 1950s and 1960s, and efforts were made to diversify the economy. With foreign aid and development loans, the energy resources of Iceland were to be harnessed and used for factories, mainly aluminium smelters that would catapult the nation even further into the modern era.

To date, six multi-nationally owned heavy industry production plants – aluminium (3), ferrosilicon (1), foil capacitor (1) and silicon metal (1) – are in operation in Iceland, sucking up 85 per cent of the energy produced in the country. This was achieved through the successfully harnessing of hydropower, the most readily accessible and reliable source of energy.

But more diversification was deemed necessary in the Moderns' name of progress. At current and according to the Master Plan for Nature Protection and Energy Utilization, 94 per cent of the energy that is considered acceptable to use in the confined island space of Iceland comes from geothermal sources, the island's very emergence. Most hydropower sources have by now been exhausted or placed under nature protection (Landsnet 2014, 16, for details of the story, see Benediktsson and Waage 2020).

This is a fundamental shift, as Jónsson and Karlsson (2016) argue. They claim that hydropower is sustainable, but geothermal power is not, according to the definition used by the National Energy Authority (NAE) when estimating the potential of geothermal fields (Ketilsson et al. 2009). Indeed, geothermal energy is a much more complex and vague thing than producing energy from water, wind or sun. The earthly entanglements under our feet are elusive and technology allows only a limited vision of these through seismographs, electro-magnetic resistivity surveys and other geological tools of measurement. So, and as any geologist or engineer involved in geothermal energy projects will inform, there are constantly surprises. The utilization of a geothermal site is normally estimated for 50 years in Iceland, yet;

Sustainable use of geothermal energy is based on utilisation for 100 to 300 years. In order to estimate the productivity of a particular geothermal site one needs to divide the findings by 2 for 100 years of utilization and divide by 6 if one is going to estimate for 300 years utilisation. (Ketilsson et al. 2009, 9)

Hydropower and geothermal power are thus radically different sources of energy and arguably neither is that sustainable (Jónsson and Karlsson 2016). Both possess particular qualities and a variety of potential technological ways to generate energy. Hydropower is a sustainable primary power source if used within certain parameters. Hydropower can easily be converted into electricity, a standardized base product that can be transmitted through powerful grids. Geothermal power on the other hand is unreliable and unsustainable, and its harnessing and utilization are largely dictated by situational factors, that is where it is found and how it is intended to be used. The utilization of the geothermal is thus a complex geographically specific amalgam of skills developed into tacit knowledges through learning-by-doing. Geothermal energy is thereby harnessed by ways of solving issues that come up there and then in relation to the particular composition of chemicals and fractures in the ground (Ketilsson et al. 2009). They further point out that there is no thing such as:

... a simple transferal from four geothermal energy sites to all geothermal power sites. This kind of transferal can be dangerous as each geothermal site is unique and transferring knowledge from one to another is difficult. (11)

In the name of Modern progress, the prevalent use of geothermal energy to date in Iceland is through hot water utilities, which has improved living standards and provided for a variety of production such as vegetables, flowers and even fruits in greenhouses, with some of these greenhouses even becoming tourist destinations. Tourism being the most recent manifestation of the Modern progress, purely conceptualized through growth (Huijbens and Jóhannesson 2019).

In the beginning of the 1960s, it was clear that the capital region of Iceland was growing very rapidly, with post-war socio-economic transformations resulting from the 'blessed war' as it is referred to in Iceland (Hálfdanarson 2001). The existing heating utility drawn from geothermal fields within the capital's Laugardalur district and from neighbouring Mosfellsbær, needed to be expanded to include the suburbs under development around Reykjavík. Technically, this was a huge undertaking requiring huge investments, which could only be financed through the World Bank's development loan scheme (Alþingistiðindi 1961; Morgunblaðið 2004). It was a purely political decision to do this, largely fuelled by the OPEC oil crisis in 1973. With this move to the geothermal, oil for heating houses in the capital region could be ousted as the utility was already in place. As a result, other municipalities around the country started exploring their geothermal potential for developing their own heating utility. This transition could not have happened if not prepared by the political decision made in Reykjavík in the 1960s, and the net result was that geothermal energy use for heating increased by 50 per cent in Iceland from 1973 to 1980 (Jónsson and Karlsson 2016).

During that time, there were also experiments to develop geothermal energy as a source for electricity. At Námafjall, which is linked to the Krafla caldera and volcanic system in NE Iceland, the Icelandic Energy authority started exploring the geothermal potential of the Krafla/Námaskarð area

in the 1960s, erecting the first-ever geothermal power plant in Iceland at nearby Bjarnarflag in 1967–1968. This experimental plant is still in operation, producing around 3 MW of energy, originally used for a factory drying diatomite earth mined from the bottom of lake Mývatn. After the factory closed in 2004 (Gunnarsson 2012), the facility was used to supply the nearby spa of the Mývatn Nature Baths with water and energy. This facility is now partially owned by the Blue Lagoon, one of Iceland's largest tourism service providers and the subject of Figure 1.

Part and parcel of this exploration was the drilling of experimental holes to gauge the potential of the site. Two were drilled near the field of boiling mudpots at Hverarönd, the name of the surface features at the Námafjall site. The site is less than half an hour's drive from Lake Mývatn, a major tourist destination on Route 1, which conveniently encircles the island; thus providing an excellent frame for tourism promotion. These experimental holes culminated in the Krafla geothermal power station, the first of its kind to generate substantial amounts of electricity from geothermal sources (30 MW and later 60 MW). As Stefánsson explains in his history of the development of Krafla power station, the knowledge of those leading the construction of Krafla was very limited as this technology was being invented on-site, yet it was a great technical success (Stefánsson 2005, 218). Moreover, as the Krafla station was being built a series of fissure eruptions in the very caldera itself ensued, lasting from 1976 to 1984. So, in a sense, the station was built into the flanks of an erupting volcano. Despite the Earth's efforts to punch through, the Krafla station has been in operation since 1976, and is currently being expanded through the Icelandic Deep Drilling Project, where the aim is to drill 4–5 km into the high-temperature hydrothermal system in order to reach 400–600°C hot supercritical hydrous fluid.¹

The original experimental drill holes at Námaskarð still exist. Once drilled and measured, stones were heaped upon them. But through the holes, steam emanating from the ground has found a new and easy pathway to the surface. With great force, superheated groundwater depressurizes at the hole rushes to the surface as steam. This has become a popular tourist spot for an immediate haptic sense of geoforcefulness. These steaming heaps of stones are an essential part of the attraction of the area, whereby people travelling around the island, following route number 1, cannot miss the site and it has been widely popularized. Having stopped there with friends, family and tourists alike countless times, I could never help but stand and marvel at the hissing pile of stones. Part of that is to walk around the pile and disappear into the steam for a while. Once lost in the steam cloud you feel the heat of the steam, most commonly a stark contrast to the cold brisk winds dominating the area. Also, you smell rotten eggs, or sulphurous oxides (SO₂), which in combination with water makes for the highly corrosive sulphuric acid, partly responsible for the fact that the stones heaped on the hole some 60 years ago are starting to coagulate. In this steam minerals abound, dissolved from rocks deep underground in the superheated subterranean water container. These precipitate from the steam as it reaches the surface and cools, forming a magnificent coating on the coagulating basaltic boulders in the heap. Most striking is the bright yellow sulphuric deposit, coincidentally related to the name of the area Námafjall. Náma means mine, and indeed sulphur deposits have been known to be there for centuries. Sulphur (S) was exported from Iceland as far back as the 1300s, but the mine at Námafjall dates back to 1563 when the then king of Denmark purchased all mining rights from the local inhabitants. Before that, the king had declared a monopoly on all sulphur trading from Iceland in 1561. Since then sulphur mining at the site was on and off till the late nineteenth century (Pálsson 2017). This sulphur was used for gunpowder, so arguably Iceland has been part of the military complex of Europe for some time now, despite never having had an army of its own, apart from the one that built the Keflavík airport and occupied it till 2006.

The tourist experience of Earth's forcefulness at Hverarönd is clearly manifest in the reactions of those passing through the steam cloud at the hissing pile of stones. The heaps themselves are indicative of the ways in which geothermal energy in all its unpredictability became one of the pillars of an unforeseen earthly connection in the face of the Moderns' aspiration of progress. Although not planned, tourism has by now become the largest export revenue generator and the tertiary pillar

to the Icelandic national economy. Part and parcel thereof is the island's geothermal and volcanic appeal and the utilities and experiences these provide for. [Figure 1](#) is amongst a series of pictures that accompany the development of the first five-star hotel in Iceland, built at the Blue Lagoon near the Keflavik International airport. The Retreat hotel was opened in autumn 2018 and with prices starting at 1.900 EUR a night, the hotel is part of a complex including the Lava Cove, a subterranean spa, hewn into the volcanic rock which will offer a sauna, lava rock-heated steam room and a range of mineral-based treatments. For a more exclusive experience, guests are able to rent out a private, self-contained spa called Hidden Cove, which comes with a butler, on-call chef and private masseuse. As such, the hotel represents the pinnacle of geothermal living from an epicurean standpoint.

Standing at the hissing fumarole and strolling along the bubbling mud pots of Hverarönd, you can hear knocks and underground belching as the simmering mud is being cooked and transported to the surface. The energy present in the mumbling mud at Námaskarð has most certainly been translated into a societal good with a considerable story of trial and error, and moreover lodged the country in socio-political vagaries of past and present. But all in all, to me, the mumbling mud pots at the site and the Retreat hotel developed at the Blue Lagoon show how our earthly entanglements manifest in particular instants extended through time and society, our technology, aspirations and surprising epicurean delights emerging from the ruined landscapes of geothermal energy exploration of an emerging oceanic island.

Life in geothermal ruins

The immanent earthly forcefulness at Námaskarð allows for an earthly re-grounding of geopolitics, but moreover one very much inspired by the possibility of destruction, as the site has been transformed through Modern aspirations. The insights from the geothermal experiments and benefits gained from them in Iceland lead to two points. One has to do with the Earth and the ways in which it presents itself so directly in the island's geography, playing out with particular relational intensity in Icelandic orogeny and mass wasting processes of glaciers. This presencing creates ways of being and doing that are very much entwined with the planet's and our co-evolutionary story. Incorporated in this story are the ways in which the island is a frontier of 'land and sea', expressing possible worlds through its dynamic constitution (Deleuze [1990\[2004\]](#)) and an entangled 'meshwork' (Ingold [2015](#); see also Morton [2013](#), 83) of orogeny and human ambition. The other has to do with the surprising epicurean delights and earthly attachments afforded by the ruins left by the Moderns' juggernaut seeking fuel underground. These delights of 'geothermal living' are readily visible means by which we relate to and constitute the meshwork.

Both the Blue Lagoon, where the Retreat hotel has recently opened, and the site at Námaskarð are debris-strewn environmental ruins of modernizing projects, both tapping a resource that is unsustainable in the long run and unreliable in the short run. The Blue Lagoon originated simply as pooled-up effluence of the nearby Svartsengi geothermal power station, where mined, super-heated seawater was dumped after heating fresh cold water for utility and to propel turbines for electricity generation. Similarly, at the site of Námaskarð, not only is the site being dynamically transformed by subterranean fumes, but it has been and still is mined for sulphur and now energy. To contain the man-made hissing fumaroles, stones were simply piled on top, stones which have been transformed by the steam for decades now and seem 'natural' to the site as they slowly coagulate with deposited minerals from the steam.

What has emerged at both sites of environmental ruin are ways of making use of and inhabiting those spaces for pleasure. The Retreat hotel and the world-renowned colour of the Blue Lagoon have become attractions that on the one hand fuel yet another Modern enterprise of Iceland, namely tourism capitalizing on the islands exotic allure. But on the other hand, these spaces enable a wholly different set of topo-ecological relations for those present, drawing on magma, pressurized seawater at 400°C, technological innovation surrounding its extraction and the history of a recently abandoned US naval base that has developed to become a trans-Atlantic hub for commercial

aviation, fuelling the Icelandic tourism boom and contributing to climate change at the same time (see Huijbens and Jóhannesson 2019). This particular geological Earth emerging from this geographically bound meshwork is one offering warmth, cure for skin problems, relaxation and decoupling (for those who can afford that) and exposure to its inner workings along with global links through airborne connectivity, all framed by the boundedness of the island and its visible intensity of orogeny. The unfurling topo-ecological relations at Námaskarð tie together again magma, but also a history of mining, traversing rugged highland interiors and the technological assemblage manifest in the Krafla power station of which the heaped rocks hissing steam mark the earliest experimental engagements with the earthly entanglements offered by the site in the context of energy generation. The Earth emerging from this clearly bounded context and particular meshwork inspires a degree of humility in visitors confronted with the awesome powers that are almost tangible in the bubbling mud pots and the steam. The steam from these particular heaped stones in the words of Morton (2013, 96) ‘dramatizes the ways in the environment encroaches on human social, psychic and philosophical space’. Moreover, in this barren wilderness setting, where the subterranean energies of the Earth rise to the surface to present themselves, they can feel a connection with what sustains the people living on this sub-Arctic island in the middle of the North Atlantic.

The geothermal living that is manifest in these two Icelandic examples adds a geological temporal dimension to our topo-ecological understanding of Earth (Hägerstrand 2004). This addition is visible in the link between the hot water infrastructure and the magmatic rhythms of the Earth, whereby society becomes connected to the rising mantle plume that along with tectonic subductions has been driving the cycle of plate tectonics reshaping the Earth’s surface area and creating and destroying islands for hundreds of millions of years (Björnerud 2018, 62–92). By unravelling this geothermal living, ‘we discover a web-like form of trajectories, of which some are stationary in space and some are in motion, while some entities may grow and others shrink in the process’. Hägerstrand goes on to explain that ‘[t]his condition is the basis for cooperation and conflict and for the human yearning for power over spaces filled with resources or at least over parts of their contents’ (Hägerstrand 2004, 323).

This yearning for power and craving for energy has created the intolerable environmental devastation so well documented in the literature on climate change and the notion of the Anthropocene, and readily visible in Námaskarð and other green energy development sites of hydro and geopower across Iceland. The Earth has been scarred and penetrated by the infrastructure development needed to derive the benefits of geothermal energy. These are examples of the Moderns’ way of relating to the planet, leaving in ruins what the Earth left for us through its myriad processes and rhythms of orogeny, vulcanism and weathering, but at the same time allowing other earths and earthly attachments to emerge. The geothermal project created not only warmth for housing and electricity for infrastructure, but also delightful leisure attractions. These demonstrate the ways in which at ‘the end of the world’ (Morton 2013, 99), we remain of this one and the many Earth (s). But, moreover, if we want to make sense of the local connections we found when examining the readily visible earthly entanglements of island spaces manifest in geothermal infrastructure, then we must go further and realize that any configuration of geographically specific connections is in itself connected to other configurations. Indeed, all earthly entanglements on this one planet form a synergistic whole with all the ingredients standing shoulder to shoulder as Hägerstrand (1976) would have it. The boundedness of the island space and the geothermal living scrutinized is therefore a way to think about the ‘togetherness’ of phenomena in space and time (Hägerstrand 1976), and indicates the many Earths emerging from the life growing out of the environmental ruins of capitalist modernity. In the face of the apocalyptic image of the Anthropocene, our future needs to be apprehended as ‘collective probabilistic descriptions, which cannot be reduced to individual trajectories ...’ (Prigogine 2003, 72 and 75). Ours is a world that is being made and remade every day, animated by a mixture of irreversibility, probability and instability. The big questions we all face now revolve around who the change-makers are; who wields the power to affect; and how to live in the light of our earthly conditions and climatic emergencies (Castree 2014)?

The question to be posed then, in this context, is about what is to gain by declaring a state of climate emergency under our current socio-political Modern regime? Whose interest does it serve to proclaim issues of social and environmental justice as our very survival is at stake in the face of planetary climate catastrophe? Through the ‘earthly togetherness’ and unfurling earthly entanglements readily visible from the island context I argue for valuing life and placing faith in emergent complex pluralisms as opposed to the Moderns’ juggernaut and techno-scientific projects under the illusion that they can attune earth system processes to the needs of humankind. What I would like to add though is that life emerges also from what seems to be left in ruins by our activities. We need to recognize that the discouraging rhetoric of apocalyptic planetary climate emergency not only downplays the many Earths that can emerge from under our feet, but also binds all peoples and their different ways of being and doing to a common fate of doom devised by those who proclaim its imminence. Recognizing the many emergent Earths of the Anthropocene opens up potential and opportunity for those dispossessed and marginalized to reclaim ground in the literal sense, and gain a voice in what the many futures of our planet might look like. Under the current state of planetary emergency change is inevitable and it will be drastic, but the way to address these will necessarily reside in locally articulated responses with visions of what Earth we wish to strive for and defend, and where better to start than with the clearly bounded island spaces of the planet. This is a hopeful message; we need not despair. But we do have to take action, local action devising ways of being with and of the Earth. The ways in which societies make sense of and cope on islands can show us how.

So, what are the emerging Earths? Have we not always been spawned from evolutionary relations between life and land? Perhaps that recognition is what is needed, a type of ‘down to Earth’ mentality (Latour 2018; Pálsson 2020b and Pálsson and Swanson 2016). What I hope to convey here is that there is no thing such as one Earth to go back to, as this ‘going back’ entails a radically open notion of the future. This going back is thus implicitly hopeful; it allows us to sense and understand the multiplicity of Earth, and to base our (political) decisions on it. Which earthly entanglements we chose to attend to is one of the major challenges of our times in the light of the current planetary climate emergency. Islands can provide us with an opening scene, teaching us valuable lessons with their earthly entanglements, and helping us realize how everything is connected to everything else.

Note

1. <https://iddp.is/>.

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ORCID

Edward Hákon Huijbens  <http://orcid.org/0000-0003-1939-1286>

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