Volume 1

Artist fellowship, EarthArt initiative, 2015 -18
University of Bristol, School of Earth Sciences

A Delineation of Strata of England and Wales with part of Scotland, Ireland and France

The Invisibility of the Sea

Rodney Harris

Rodney Harris

Rodney Harris (b.1966) is a sculptor and printmaker. His work includes a long term collaboration with artist Valda Jackson. In 2017, Harris and Jackson won the Marsh Award for Excellence in Public Sculpture for '*Four Brick Reliefs'* on the Peabody Estate in Clapham.

Harris has been commissioned by a wide variety of public and private organisations and his work can be seen in collections in Korea, Turkey, Europe and the US.

Harris was the Leverhulme Trust Artist in Residence at Bristol University, 2015, based in The School of Earth Sciences. During the residency, he produced a contemporary interpretation of the first geological map of Britain, made by William Smith in 1815.

Following this residence, Harris became a founder of the *EarthArt* Gallery.

His printmaking explores the use of natural rock and minerals in unique inks. The map of the British Isles uses geological pigments made from corresponding ground-up rock samples from each area of the UK. The resulting full-scale map is a unique and surprising overview of the true colours of the British landscape. The map was featured in the Museum of Wales exhibition, *'The Colour of the Earth - Art and the Material Landscape*' and Oriel Y Parc Gallery, St Davids, Pembrokeshire.

In 2017, Harris undertook a further fellowship at the University of Bristol titled '*The Invisibility of the Sea',* as part of the Brigstow Institute Commission. This project is documented as part two of this print.

Follow Harris' practice online at www.rodneyharris.co.uk

Part One
A Leverhulme Trust Project, 2015

A Delineation of Strata of England and Wales with part of Scotland, Ireland and France


A
DELINEATION
of the
STRATA
of
ENGLAND AND WALES
With part of
SCOTLAND, IRELAND, FRANCE
Printed in crushed rock
Based upon the 1815 map by William Smith
Rodney Harris
2015

EarthArt Sciences fellowship, 2015: *A Delineation of Strata of England and Wales with part of Scotland, Ireland and France.*
Interview with artist Rodney Harris, 2019 by curator Georgia Hall.

How did the fellowship begin with the Earth Sciences department at the University of Bristol?

In 2008, I was sculptor in residence at Liverpool university as part of the European City of Culture. During the residency, I developed a process of making and using natural material in inks. Subsequently, Bristol university heard about this work and together we approached the Leverhulme Trust for a fellowship to coincide with the bi-centenary of William Smith's first geological map of Britain of 1815. Therefore, the Leverhulme Trust fund in 2015, was part of the 200 year celebration for the William Smith Map, of which they have a copy. This map was the first time that mankind had ever worked out the structure of what is beneath our feet.

The map was to do with an environmental theme to encourage care of the landscape. It is about encouraging people to love their landscape. It is all about the emotional response to the beautiful colour that the land is made of. It's purely colour.

I made several different artworks but the most significant was a reinterpretation of William Smith's original map, which didn't include any of the information that Smith had, such as mines or towns, it was purely about the colour of the landscape. The map I produced was more to do with an environmental theme of encouraging care of the landscape. It is about encouraging people to love their landscape. It is all about the emotional response to the beautiful colour that the land is made of. It's purely colour. It is also about unity, in that William Smith's map is very southern England-centric, which is where the wealth was. The print I've produced is more about the colours of all the places in the geological area he described, so it includes France, Ireland and Scotland. It has an equal area on the map, as opposed to only concentrating on the South of England.

The map is made up of fifteen individual prints. These were popular and sold well, so I felt it would be great if there was an exhibition space within the university whereby artists could display, sell work and develop an interaction between Art and Earth Scientists. So the Art would influence the Earth Scientists to think in a different way about their work. From this, we decided to develop the *EarthArt* fellowship. The fellowship is about public engagement

and about changing how the scientists see what they are doing.

What were the types of conversations you had with the scientists?

I worked closely with Professor Kathy Cashman, who is also a photographic artist. I felt that relationship was important because scientist's don't always know what an artist's do, how they develop ideas or make work. No one knew what I might do. The great thing about Leverhulme Trust funding is that it was open-ended. Kathy understood what an artist might do. There was a mutual understanding and support within that. She also recognised the lack of awareness within earth sciences. One of the solutions was to begin a gallery. I also had a close relationship with Prof. John Blundy, who is a professor of Petrology. We would go on field trips and the thing about partnering with someone who knows what they are looking at when it comes to looking at the landscape, they can deepen your knowledge about what that landscape is. You are not just looking at the surface, you are receiving a deep knowledge of the structure and the history that you would not otherwise get.

How did you work with the Earth Sciences department to develop the new way of making?

Prof. Kathy Cashman, Professor of Volcanology, encouraged me to make a re-interpretation of the map at the scale that it is at (3m x 1.8m) and encouraged me to work with the British geological survey who provided the information for which the map is based on. As an artist, it is wise to partner with large institutions and organisations that are huge knowledge banks.

Could you take us through the making of the work and the outcome?

I had identified different areas of earth that had different geological materials and I would then visit those areas and collect those materials just by digging. You might have to go to a river where there is exposed material or a beach or a cliff face.

I spent a couple of months collecting materials from the whole geological region on the map. By hand, I would crush it with a large pestle and mortar and then using what is called a jigsaw linocut technique where each specific area of strata is laser cut effectively making a large jigsaw puzzle. Where there is chalk, separate that section of lino, and with the collected chalk you then dry it and crush it and mix it with a linseed oil-based medium to turn it into ink. It is fun… you just don't know what the colour is going to be like until you have made the ink and printed it. It's a discovery. Different slates have different

colours and what I didn't realise is that Cornish slate is green - it is the most beautiful green. It is amazing to see.

How did this fellowship influence other work and lead onto your next project with the university, *Invisibility of the sea*?

Having made work about the land and having grown up next to the sea. I wanted to make a similar mapping of the ocean bed using sea-bed samples. The techniques that I had developed on representing landscape, I was able to use to represent the landscape beneath the sea. That was the basis of making the project.

However, this work included mythology and superstition of the sea. And especially how the sea has invisibility; in how we treat the sea badly and use it as a dump. So again as with the original map, I wanted the work to encourage care for the sea and heighten environmental awareness of the sea and how it's a really important part of our lives but we often ignore it - 90% of trade is by sea, it cools the planet, it absorbs carbon dioxide, we eat food from it, the list could go on… It seemed like the right time to make work that had some beauty about the sea. It is that interesting word 'beauty', the unfashionable-ness of beauty. ■

Previous image:
A Delineation of the Strata of England and Wales, with part of Scotland, Ireland and France, 2015. 2.4m x 1.8m. Based on the original William Smith Map of 1815.

This page:
South West II, 2017.
Hannemule White Paper, 98cm x 78cm.

Essay by artist and writer Ellen Wilkinson
First published in Printmaking Today, Autumn 2017.

Rodney Harris – *A Delineation of the Strata of England and Wales, with part of Scotland, Ireland, France*

Rodney Harris's A Delineation of the Strata of England and Wales, with part of Scotland, Ireland, France is a 15-part print based on the first geological map of England, Wales and southern Scotland, made by William Smith in 1815. While Smith's map is a rainbow of hand-tinted gradients, his vivid colours exaggerate the hues he found in the rock strata and in some cases, invent them: for instance, chalk is represented by green ink. Two hundred years on, Harris has reworked that map with a concise gesture that brings us closer to the land we inhabit.

The pigments in Harris's print are made from rock, collected by him from all of the areas depicted in Smith's original map, then ground and mixed with linseed oil to form a printable ink. Harris, who is primarily a sculptor, describes this process in a Serra-like list (1): walking, searching, collecting, drying, smashing, grinding, sieving, mixing, rolling, printing; physical actions that result in 'discovering' the colours that appear on the paper.

Harris's map not only presents us with the true colours of the earth, but is more truthful than Smith's in temporal terms. While we tend to view land as hard and permanent, in reality it is constantly, if imperceptibly, changing. By collecting his raw material from the ground, Harris uncovers this deception, often encountering rock that is soft and easily ground by hand. In transforming rock into pigment, its solidity and opacity become tentative, the translucent printed ink seeming to question the stability of the substance it originated from.

The white cliffs of Dover, glowing through frequent greyness, are purportedly symbolic of permanence, continuity and independence. They are often saluted as our natural wall: geological matter as middle finger to mainland Europe. Yet to walk along the top of a chalk coastal cliff is to observe its ragged edges,

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1. Richard Serra, Verb List, 1967–68, graphite on paper, 254 x 203mm.

frayed like torn cotton. Creep close to its perpendicular and peer down, to see sprinkled white nuggets in the sand below, like lumps of flour that could be plucked from the beach and pulverised between finger and thumb. Occasionally Dover's soft, permeable façade experiences a headline-grabbing landslide, but most of the time it regardlessly continues its inexorable crumble into la Manche.

Walking deepens our connection to place, but few people understand land as well as those who work with it and on it. Harris is from a Somerset farming family and attributes his profound bond with that landscape to his agricultural background. The simple act of digging reveals what is beneath, beyond that which the eye sees, and by booting a spade into soil it is possible to literally cut through time, through its accumulated layers.

Clay, mud and stone are the most fundamental materials that humans have used to build, make objects and paint with. Readily available and associated with a primitive past, they are regarded as useful but not precious. In contrast, considering the use of ultramarine in religious painting, a colour first produced from lapis lazuli in the twelfth century, Maggie Nelson writes: '[It] is not, of course, holy in and of itself. (What is?) It had to be made holy, by the wicked logic that renders the expensive sacred.' (2)

Gold, silver and bronze indicate a familiar order of merit, while wedding anniversaries illustrate our tendency to categorise materials according to a hierarchical scale of value. While early anniversaries are marked by paper, cotton, leather, linen and wood, longevity in marriage – assumed, culturally, to be an achievement – is rewarded with precious stones and metals: rubies, diamonds and platinum. Monetary value directly relates to accumulated time together.

The human lifespan provides a frame for systematically marking time's passing with materials that in many cases will outlive us. In this act of measurement matter becomes more solid as the end of life approaches; reassurance is sought in the face of the fundamental impermanence of all things human.

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2. Maggie Nelson, Bluets, 2009. Seattle and New York: Wave Books.

In comparison with the sneeze of a human lifetime, the slow shifts of geological progress offer a sense of calm in their infiniteness. While Google Earth and Street View allow us to see like satellites and walk virtual paths, Harris's print ventures beyond the notion of contemporary mapping as an accurate, minute representation of surface landscape in the present. With the majority of the world's population now living in urban areas, our psychological connection to land is increasingly compromised by concrete. The mineral tones of Harris's map shimmer with emotional resonance, quietly reminding us that our most precious asset – and the one that requires the most protection – is Earth. ■

East Anglia, 2017.
Somerset paper, 70 x 70 cm.

The Order of Strata, 2012.
Somerset paper, 108 x 80 cm.

Interview with Professor Katharine Cashman

How did you begin working with and supporting Rodney Harris throughout his project, *'A Delineation of Strata of England and Wales with part of Scotland, Ireland and France'*?

I first met Rod after attending an afternoon introduction about his art practice, which included a wonderful set of hands-on exercises involving clay, but also visualisation. I then participated in a few field trips with him to collect material for his map project. As I was already taking classes at the Spike Island print studio, I was interested in his work from the perspective of both art and geology; I was also at Spike Island periodically, and therefore would stop by to see his work progress, or help to prepare (or clean up!) material for printing.

How did the relationship develop with artists within the Earth Sciences department whilst working with Harris?

Rod, as a Leverhulme Trust Fellow, was in the unique position of having an office in a fairly central location, which meant that interested people in the Earth Sciences department could stop by and chat. It became clear that there was a broad interest among the scientists of interacting with artists - geology is, at its heart, a visual science that requires skills in spatial thinking. It was at this point that a few of us realised that it might be of interest to both artists and scientists to develop a long term relationship, particularly given the concentration of artists at Spike Island.

How did Harris' work connect and contribute to the work of the department?

From my perspective, artists offer a different way to view the scientific world that we inhabit. It is easy, as an Earth Scientist, to lose sight of the mystery and beauty of the materials that we work with, and the extent to which our views of the landscape are informed by our knowledge of the underlying processes. Interacting with artists, and seeing their visual response to the processes that we study, provides us with a new, and often different, appreciation of the Earth. Rod's project is an excellent example. We now have his map hanging in our tea room, and I admire it on an almost daily basis. The UK is interesting, in that the regional geology is so clearly reflected in the stones used for buildings and walls. Now when I travel, I place myself on Rod's map, which *is* the colour of the UK. ■

Professor Katharine Cashman

Katharine Cashman is Professor of Volcanology at the University of Bristol who studies the physical and chemical processes that operate within magmatic systems. Prof. Cashman came to Bristol to study volcanic ash - its formation and ash properties that determine how it is transported in the atmosphere and how it is deposited on the landscape. She also has a long term interest in mafic volcanism, from channel development in Hawaiian lava flows to volcanic ash formation in eruptions from Hawaiian, Icelandic, Italian, Latin American and Pacific Northwest (US) volcanoes.

Prof. Cashman holds a BA degree in Geology and Biology at Middlebury College, Vermont, USA (1976), which led to an MSci (1st class Hons) at Victoria University, Wellington (New Zealand) and a PhD in Earth Sciences at Johns Hopkins University, Maryland, USA (1986). Her PhD project applied theories of crystal size distributions to volcanic systems, and was supervised by Professor Bruce Marsh. She was an Assistant Professor at Princeton University, New Jersey, USA (1986-1991), and an Associate Professor (1991-1997) and Full Professor(1997-present) at the University of Oregon. In 2011, Cashman was funded by AXA insurance for a three year Research Professorship at the University of Bristol. In December 2013 she was offered an AXA Endowed Chair at Bristol. She was Head of the Department of Geological Sciences, University of Oregon (2007-10) and President of the Volcanology, Geochemistry and Petrology (VGP) section of the American Geophysical Union (AGU; 2002-2004).

In 2003, Prof. Cashman was made a Distinguished Professor of the College of Arts and Sciences (Oregon), in 2007 was made a Philip H. Knight Distinguished Professor of Natural Science (Oregon). She received the AGU VGP Bowen Award in 2006, was elected a Fellow of the AGU in 2009, of the American Academy of Arts and Sciences in 2012 and of the Royal Society in 2016; in2016 she was also elected to the National Academy of Sciences (USA).

Prof. Cashman is a co-founder and arts council member of the *EarthArt* initiative hosting an artist Fellowship and exhibition space within the School of Earth Sciences at the University of Bristol. She has worked with and supported the research of many fellowship artists including Rodney Harris, Emma Stibbon, Jo Lathwood, Alice Cunningham, Milo Newman and Olivia Jones. Prof. Cashman's is a drawer, printmaker and photographer. She uses these techniques to enhance her field research and to give her brain a rest from scientific research.

Additional works by Rodney Harris

The Leverhulme Trust artist residency at Bristol University was based around the bicentennial of the first geological map of Britain, made in 1815. This map came about after William Smith, a surveyor, was exploring how to move coal from the Somerset coal fields to the local cities and beyond through the creation of a canal. There is a defined link between the mining of coal and the groundbreaking development of the first geological map.

The sculpture explores this link through a visual association with the use of the product, and its ultimate role in fueling climate change. The sculpture was intended to replace / replicate a radiator in the University, which was of exactly the same design. ■

Radiator, 2015.
Coal cast. Exhibited in the RWA Sculpture Open exhibition 2019.

Part Two
A Cabot Institute Commision, 2017

The Invisibility of the Sea

In 2017, Margherita Pieraccini (Law) and Laurence Publicover (English), with the support of the Cabot Institute, brought together a group of Bristol academics from different disciplines and faculties, including an expert on cartography, to talk about their research on and concerns for the sea. The following series of texts, written in October 2017, are extracted from a 'The Invisibility of the Sea: A Brigstow Institute Working Paper', which can be viewed at www.bristol.ac.uk.

Kindly supported by the Brigstow Institute, artist Rodney Harris was commissioned to interview these academics, before creating a series of artworks inspired by these conversations.

Two of Harris' works were sited on the MV Balmoral while it undertook its summer cruises in 2017; the full exhibition, *The Invisibility of the Sea,* was launched at the *EarthArt* Gallery, Wills Memorial Building, in 2017 until 2018.

Laurence Publicover
Department of English

(This text is an adaption of the introduction by Laurence Publicover from a talk given at the launch of 'The Invisibility of the Sea' in the Earth Gallery in October 2018, an event sponsored by the School of Earth Sciences. The original project was funded by the Cabot Institute and the Brigstow Institute at the University of Bristol.)

We live in a culture of sea-blindness. Principally due to containerisation and the mechanisation of ports, fewer people are involved in the business of seafaring; in Bristol and London, rivers and harbours are now site of leisure rather than routes towards ocean highways; the ports themselves have moved to sites like Avonmouth and Felixstowe. The development of affordable air travel has also, of course, had a profound effect on our relationship with the sea: very few of us now go on long sea-journeys as passengers, but instead hop across oceans as though they weren't there. The sea is no longer a significant barrier to travel, an alien element we need to overcome. We glance out of aircraft windows and might as well be looking at prairie, or desert.

For these reasons, and others, the sea has lost a lot of the cultural meanings it once had. And yet, more world trade than ever is taking place on the seas. Most of the clothes I wear and the electronic devices I use are, in some respects, maritime objects, as most of them have been carried across oceans. But to think of them in this way seems odd. In eighteenth-century England or France, a piece of Chinese porcelain would have had a maritime aura; the same could be said for an amphora of wine or olive oil in the ancient Mediterranean. These were objects whose value—whose cultural meanings—derived partly from having been transported, at some expense and effort, across deep water. You would struggle to say that you felt like that about your laptop or your cardigan.

This sense of the 'invisibility' of the sea was at the heart of our Brigstow project. But when Margherita and I gathered together scholars working on the sea from subject areas as diverse as Chemistry, Archaeology, Earth Sciences, Law, and Literature, our interest was not only in the wider cultural phenomenon of sea-blindness, but also in how those who worked on the sea could be

'blind' to one another's research: how our views of the sea were independent of one another.

Working on literature, I am often thinking about the sea as a symbol or metaphor; and so working on this project has meant thinking, to a greater extent, about the thing itself—about declining fish stocks, bleached coral, rising temperatures, increased acidity, pollution from plastic, and so forth. But it is important to stress that the former influences the latter: our way of thinking about the sea influences the sea itself.

Something frequently pointed out by scholars working in what has been called the 'blue humanities' or 'oceanic studies' is that the sea is often portrayed in literature and other art forms as a wild space that lies beyond human influence—and, more specifically, a site in which we can cleanse ourselves (1). The theologian-cum-anthropologist Kimberley Patton has demonstrated, in a wonderful book, that the sea is, across several cultures, thought of as a place that can 'wash away all evils'; and this way of thinking about the sea, she and others have argued, has diminished our capacity to understand the damage we are doing to it (2). Whatever the evidence to the contrary, something in the cultural psyche—of the West, at least—suggests that we can, without consequence, throw into the sea things we don't want and don't even want to think about—nuclear waste, for example. In a pattern of thought perhaps most apparent in the work of the Romantic poets, we also think of the sea as an element beyond human influence: as unchanging, sublime, even timeless. In such thinking, the sea is not quite invisible, but we remain blind to its real presence and to the damage we can do to it. This project, and the opportunity to talk to scholars from other disciplines, has helped me to think about these problems.

On the science side, what I hope this project has done is to ask those who

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1. See, for example, Dan Brayton, Shakespeare's Ocean: An Eco-Critical Exploration (Charlottesville: University of Virginia Press, 2012).

2. Kimberley C. Patton, The Sea Can Wash Away all Evils: Modern Marine Pollution and the Ancient Cathartic Ocean (New York: Columbia UP, 2006).

work on the sea itself to think even harder about human relations with and perceptions of the sea. This is, I think, what humanities and law scholars are good at helping us think about—the presence and influence of social constructions of the world around us (3). And this is also, it seems to me, what Rod's work brings out so beautifully. Rod has been concerned not only with the sea itself, but also with how we see it—with our maritime superstitions and our attempts to predict or pacify the sea; with the ways we map it, demarcate it, delineate it, and attempt to claim ownership over it; with our attempts to understand its depths while measuring them in 'fathoms', a unit of measurement derived from the human body (specifically, the amount we can get our arms around). The ***Antarctic Ocean*** and the ***Marine Environment*** pieces use elements of the real ocean in their materials, but they also beautifully suggest the very human, and in some respects anthropocentric, ways in which we experience the sea: by, for example, isolating one facet of it—its depth—to try to comprehend it.

Rod's barometers, meanwhile, begin with an interest in our measurement of atmospheric pressure, a measurement it's necessary to take while at sea; but they also help us think about different kinds of pressure in relation to the sea: the cultural pressures that arise when people travel across the oceans; the environmental pressures our activities place on the seas. What I especially like about the barometers is how they invite us to decode them—reminding us of our own tendency to 'read' the sea as a symbol: as something that requires human interpretation—and how they juxtapose ideas without imposing on them a clear narrative structure. In this latter respect, they seem to me to capture the problem of disciplinary atomisation I mentioned above; Rod has picked up the challenge we set him and thrown it back in our faces.

What characterises much of the best writing about the sea, in my view, is how it explores the relationship between the oceans and human understanding. Even in cultures far less sea-blind than our own, poets and novelists have been interested in how difficult it is to think about the sea—about how doing so makes us think about how we know what we know.

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3. For one of the best studies of this phenomenon, see Philip Steinberg, The Social Construction of the Ocean (Cambridge University Press, 2001).

I am not sure where our conversations about the sea, as academics and as global citizens, will go. But Rodney's exhibition has helped us further them. Like a camera rotating around an object to provide a three-dimensional image, it has begun to make the sea's invisibility more apparent, at least to me—and has in that way made the sea more visible. ■

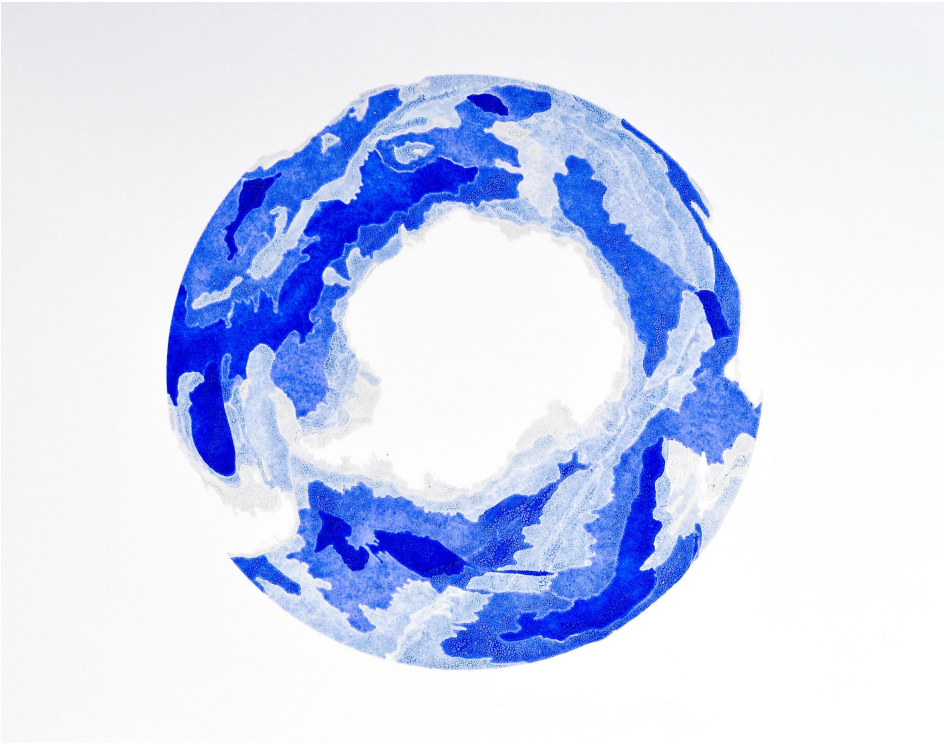
Rodney Harris, Artist

My fellow artist Emma Stibbon asked me if the large print ***Marine Environment***, which illustrates 300 million years of rocks created beneath the sea, was a self-portrait, as it is my height in width and a print of where I was born and grew up. In a way it is a self-portrait, and implies that we all have an emotional connection to the place we are from. The connection often manifests itself through the colours of a particular home landscape or geology.

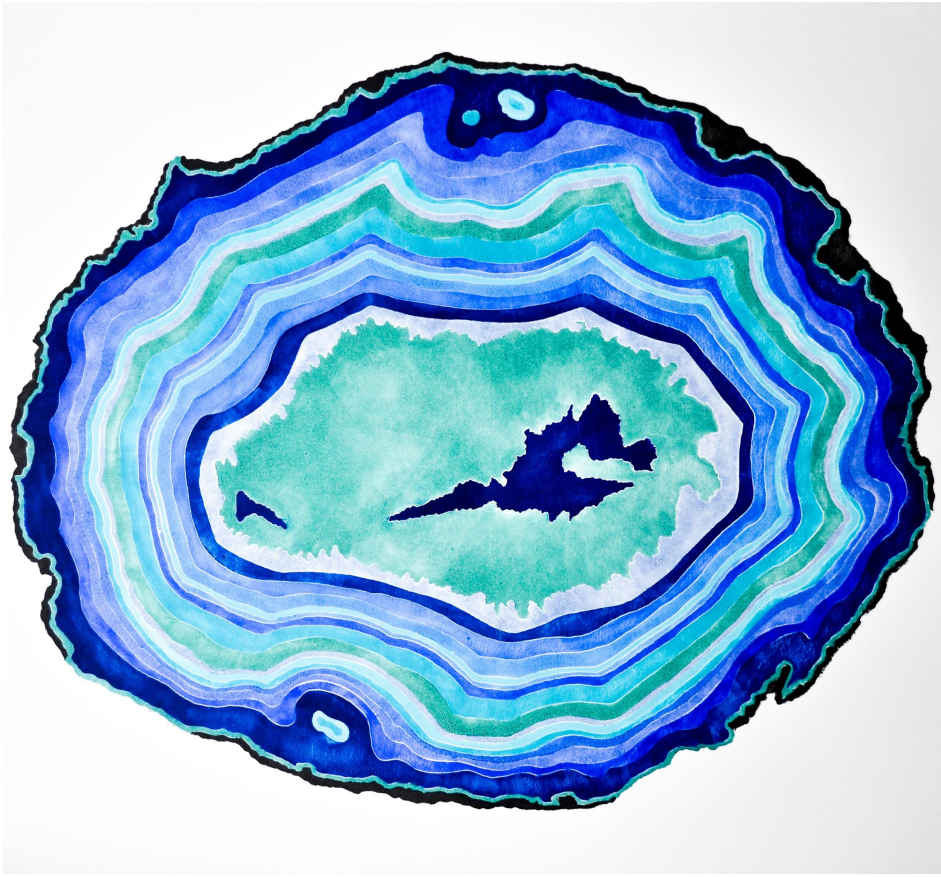
Clothing is also historically associated with place or ritual of place: the colour of football shirts, or specific ethnic clothing, links us to a specific club or belief often associated with place. These affiliations are almost always land-based; when "at sea", we are in another place and are in this sense rootless, and this way of describing such a condition affirms our connection with a particular piece of land – a piece of land which forms our identity. This notion is further strengthened by the term "ashes to ashes": when we die, this suggests, we return to the materials of which we are made. Though there is also a sense in which we are all from outer space, as we contain minerals and materials brought to Earth, we probably contain far more minerals from the land of our heritage or where we grew up; in this sense, too, our identity is linked with place. There is an intentional "truth to materials" aspect to the work. The materials or colours are not altered, but are shown just as they are, hand ground and mixed with a linseed oil-based transparent medium. I do not make any aesthetic decisions about which colour goes where; their position on the print is determined by their geological position. Truth to materials is a tenet of modern architecture (as opposed to postmodern architecture), which holds that any material should be used where it is most appropriate, and its nature should not be hidden. When using these geological materials in printmaking its important that colour is presented as accurately as possible.

The project has changed my approach to my art—and to life more generally—in that I am more acutely aware of the environmental implications of my actions and behaviour. I also have a deeper appreciation of the sea. I already loved being near the sea, but now I have greater respect for it. Our reality is often governed by the stories we tell ourselves: about our history, our identity, and our relationship to the earth. For me, the project has challenged some of the assumptions behind those stories. ■

Marine Environment, 2017.
Brent Knoll cross section through North Somerset from Sand Bay to the Somerset Levels, 2.4 x 0.8 m, hand printed on Japanese Kozo paper.



Antarctic Ocean, 2017.
Lapis Lazuli mixed with Namibian Sea Bed, somerset paper, 90cm x 90cm.



Agate, 2019, print.

Barometer of the Sea, 2017.

Barometer of Superstition of the Sea, 2017.

Margherita Pieraccini, Law School

The international community recognises the need to conserve and sustainably use the oceans (SDG n. 14, Agenda 2030). There are a number of legally binding instruments with the concept of sustainability and sustainable development at their core. These range from the United Convention on the Law on the Sea 1982, to regional instruments such as the 1992 Ospar Convention, the EU Marine Strategy Framework Directive (2008/56/EC) and domestically, the Marine and Coastal Access Act 2009. The law does point to a protection of the marine environment that attempt to reconcile different uses of the sea. Employing the concept of sustainable development indeed can be read as a call for balancing and integrating economic, social, cultural and environmental considerations.

However, being able to accommodate and reconcile the various interests is problematic. As the ***Barometer of the Sea*** shows us the scale of justice is surrounded by multiple perceptions and understandings of the sea that cross both temporal and spatial boundaries. Recent legal attempts to reconcile the various interests and uses of the sea can be found in the recent development of marine spatial planning under the Maritime Spatial Planning Directive (2014/89/EU) and domestically under Part 3 of the Marine and Coastal Access Act 2009. Deciding which interests and perspectives count should ultimately be a collective effort to be carried out in deliberative fora to enhance maritime democracy and avoid marginalising certain voices. ■

Kate Hendry, School of Earth Sciences

As a marine scientist, I work on the flow of nutrients and food through ecosystems and around the oceans – today and in the past. It's all too easy to become buried in the details of research, and it's in working with Laurence, Margherita, Rodney, and the rest of the team, on the Invisibility of the Sea project, that I've been able to take a few breaths and reflect on what it means to be a marine scientist, the challenges that face us, and the role that communication of science - and social media - plays in marine conservation. Rodney's art exhibition formed the central pivot around my collected thoughts.

In particular, my favourite work of his, ***Antarctic Ocean***, reminds me of my beloved Antarctica, but also makes me think about its fragile future: by picking out the different nature of the natural deposits of sediments in the ocean around Antarctica, Rodney's work makes me think about what we're doing to change the balance, as there have been more and more reports coming out about the increasing human fingerprint on the Southern Ocean and Antarctica.

And yet, there is an important positive message to come out of our collaborative project as well: the need to tell our stories of the ocean, and to recapture our wonder of the deep. My thoughts are summarised so well in a quote from a 2013 TEDx talk by marine science writer, Helen Scales:

"I've been lucky enough to spend a lot of time diving and researching in oceans around the world. I've seen beautiful bizarre things and I've also witnessed many of the problems that the oceans face. I've felt the squeeze of a seahorse's tail and I've seen hundreds of dead seahorses on sale… And there came a point when I decided doing research for myself wasn't enough and I wanted to share these stories... essentially I've become one in a long line of ocean story-tellers. For millennia people have pondered this alien realm filled with strange, scary creatures, and have told stories to try and understand that. The only difference now is that there's never been a more vital time for people to hear these stories, because human actions are ruining the oceans like never before. And the only way we're going to change that - I think - it is if people know about this and if they care about some of the things that live there. And what better place to start than to have your mind spin with stories of real sea monsters." ■

Tamsin Badcoe, Department of English

To speak of seeing the sea still sounds to me like a statement of pleasures anticipated: the homophones revive childhood memories that recall the first glimpse of a promised horizon. For the purposes of this project, however, as its title *The Invisibility of Sea* suggests, we tried to recalibrate our visual, tactile, and aural horizons somewhat differently: by reading across disciplines we attempted to attend to the parts of the sea that remain unseen or often ignored, whether through impassibility, negligence, or owing to the limits of our ways of knowing and imagining. To begin with an anecdote, I will always remember the first time I saw the horns of narwhals: detached from their long-lost bodies and displayed in Whitby museum, together with such items as a 'sea bishop', and a Hand of Glory found concealed within a wall, I felt their spiralling length test the limits of what I believed to be possible in the underwater world. At this most gothic of coastal locations – still more a cabinet of curiosities than a public gallery – the portability of marine objects resulted in a confrontation that can only be described as uncanny. I know narwhals to be real enough though I have never encountered one in life; yet, framed thus, they seemed creatures of myth and superstition, and their horns relics of a place unseen.

In my work on the representation of experiencing the sea in medieval and early modern literature and culture, including the ways in which poets, satirists and preachers engage with the sea as both a physical site of testing and an allegorical figuring of existence, I have been drawn to confrontations between devotional and geometrical approaches to the arts of navigation. The Hereford Mappa Mundi, for example, which is centred on Jerusalem and envisions a tripartite world wrapped around the Mediterranean Sea, is full of textual and visual detail that is rendered on the cusp between wonder and legibility. Some of the inhabitants of the map's margins, such as the Sciapods and Blemmyes, have found their way onto Rodney's ***The Barometer of the Sea***, as relics of an ancient encyclopedic tradition that includes the monstrous: a way of understanding the world that recovers the etymological origins of monstrosity and its capacity both to demonstrate and admonish. It seems fitting that they sit, as part of this work, beside a greenhouse and pair of scales, registering different kinds of measurement, limit and im/balance, and recalling the barometer's function as an instrument for gauging variations in pressure. In its inclusion of a sand-timer, ***The Barometer of Superstition of the Sea*** participates in a similar visual language of warning; yet, what I find most interesting about Rod's pieces is the interpretive work they require of the Viewer. The inert needles of the instruments are only capable of motion in the mind's eye, creating charged correspondences as the eye flickers from one

icon, or emblem, to another. By contrast, the tranquil luminescence of ***Antarctic Ocean*** and the striations of the geological cross section, ***Marine Environment*** seem to play a complementary visual game; in ***Antarctic Ocean*** the ocular quality of the polar seas is arresting, appearing iris-like around a blank centre, and in ***Marine Environment*** subterranean layers resemble seams of subcutaneous muscle. Historically, cartographical terrae incognitae are sites of epistemological testing, anxiety, and speculative projection, but for the purposes of ***Antarctic Ocean***, in particular, the centrality of the landmass as a negative space redirects the gaze outwards: seabed meets lapis lazuli in a fusion of surface shimmer, material depth, and sacred colour. Like the Hereford Mappa Mundi, the image is arresting, reviving the meditative practices that are intrinsic to early cartography; yet, unlike the busy fullness of a centred world, imagined by the medieval mapmakers in response to a weight of tradition, here the centring of negative space seems to speak of a new, if fragile, kind of resonant potential. ■

Diana Manson,Geographic Information Systems (GIS) specialist, LUC (Bristol)

What I found really thought provoking, in the discussions I've had during the project, was the idea that we look to space as the future and the ocean depths as the past. I really enjoyed speaking to Rod about mapping, in particular. His use of words like 'pigments' contrast with my use of words like 'symbology' and 'RGB values' to describe what is essentially the same thing.

The symbols on the barometers were a good reminder of the effort that went into historic mapping – specifically, the use of icons and art to bring out the character of a place. This gave me lots to think about in terms of how I use my white space! ■

Daniela Schmidt, School of Earth Sciences

We rely on our oceans for oxygen, food, transport, recreation, coastal protection and regulating climate for habitability. The uncomfortable truth is that the health of our oceans is under threat due to man-made changes. Increasing noise and plastic pollution, sea level rise, over-fishing, coral bleaching and ocean acidification are all threatening to ocean ecosystems and to us, who benefit from the ocean. We often forget that blue environments contribute significantly to our wellbeing and mental health, as we are more active in these environments and often in a more positive mood. The economic impacts of climate change are largely variable in their impact across the globe and across industries (1). Some countries will face the double jeopardy of negative impacts on both agriculture and fisheries. We need to ensure that we support countries with low adaptive capacity but increasing food demands while at the same time "conserving and sustainably using our ocean, seas and marine resources". Action is imperative for us in times of increasing mental health issues and low- income food-deficient societies around the world. ■

Notes:

1. http://ec.europa.eu/research/sam/pdf/topics/food_ocean_sapea_report.pdf

For further thoughts on the ocean's role in feeding the world, and thus the importance of keeping the marine ecosystem healthy and diverse, see the following article, published in The Conversation: https://policybristol.blogs.bris.ac.uk/2018/01/05/putting-algae-and-seaweed-on-the-menu-could-help-save-our-seafood.

The Invisible and Inconstant Deep Sea

Closing essay by Rich Pancost, School of Earth Sciences

Today, the deep sea is a dark and empty world. It is a world of animals and Bacteria and Archaea – and relatively few of those. Unlike almost every other ecosystem on our planet, it is bereft of light and therefore bereft of plants. The animals of the deep sea are still almost entirely dependent on photosynthetic energy, but it is energy generated kilometres above in the thin photic zone. Beneath this, both animals and bacteria largely live off the scraps of organic matter energy that somehow escape the vibrant recycling of the surface world and sink to the twilight realm below. In this energy-starved world, the animals live solitary lives in emptiness, darkness and mystery. Exploring the deep sea via submersible is a humbling and quiet experience. The seafloor rolls on and on and on, with only the occasional shell or amphipod or small fish providing any evidence for Life. And yet life is there. Vast communities of krill thrive on the slowly sinking marine snow. Sperm whales dive deep into the ocean and emerge with the scars of fierce battles with giant squid on which they feed. And when one of those great creatures dies and its carcass plummets to the seafloor, within hours it is set upon by sharks and fish, ravenous and emerging from the darkness for the unexpected feast. Within days the carcass is stripped to the bones but even then new colonizing animals arrive and thrive. Relying on bacteria that slowly tap the more recalcitrant organic matter that is locked away in the whale's bones, massive colonies of worms spring to life, spawn and eventually die. But all of these animals, the fish, whales, worms and amphipods, depend on oxygen. And the oceans have been like this for almost all of Earth history, since the advent of multicellular life nearly a billion years ago. This oxygen-replete ocean is an incredible contrast to a handful of events in Earth history when the deep oceans became anoxic. Then, plesiosaurs, ichthyosaurs and mosasaurs, feeding on magnificent ammonites, would have been confined to the sunlit realm, their maximum depth of descent marked by a layer of bright pink and then green water, pigmented by sulfide consuming bacteria. And below it, not a realm of animals but a realm only of Bacteria and Archaea, single-celled organisms that can live in the absence of oxygen, a transient revival of the primeval marine ecosystems that existed for billions of years before complex life evolved. ■

EarthArt Initiative

The *EarthArt* fellowship, beginning in 2015, is an exploration of collaborations between contemporary artists and scientists from the School of Earth Sciences at the University of Bristol.

Earth Sciences encumbers not just rocks and fossils but increasingly climate change, oceanography and extraterrestrial life. There is a lot of material for artists to explore and we thought this was a great chance to bring artists into the school to meet with scientists and the wider academic community through a six-month duration fellowship.

Jon Blundy, Professor of Petrology and *EarthArt* co-founder

The idea of developing the Fellowship and EarthArt Gallery at the University of Bristol following my Leverhulme Trust residency was to address two things; firstly, to deepen the dialogue and investigation between artists and earth scientists, generating new ways of visualising research, and secondly, to create a gallery to share this work with a wider public.

Rodney Harris, artist and *EarthArt* co-founder.

This booklet is an opportunity to reflect, share and document the fellowship and exhibition of artist Rodney Harris in collaboration with the School of Earth Sciences at the University of Bristol.

LEVERHULME TRUST

University of BRISTOL Brigstow Institute

University of BRISTOL Cabot Institute

EARTH GALLERY

University of BRISTOL

All photographs are courtesy of the artist.

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Booklet interviews, research and design by contemporary art curator Georgia Hall.