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Truthing gap: imagining a relational geography of the uninhabitable

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In what ways might we seek to know the invisible and liquid depths of the ocean, asks a practice-based, fine art inquiry into geoscientific processes of deep-sea mapping.

Truthing gap:¹ imagining a relational geography of the uninhabitable

Rona Lee

During 2008–10, I was the Artist in Residence of the Leverhulme Trust, at the National Oceanography Centre, (NOCS), Southampton, working with sonar geophysicist Dr Tim Le Bas, exploring methods of seabed mapping and undersea survey. During this period I documented aspects of oceanographic study, learnt processes used by my scientific colleagues, conducted performative interventions and made works in direct response to the context of NOCS. The work produced was shown at an exhibition at University of Wales Institute, Cardiff in 2009 and will be developed into a larger exhibition at the John Hansard Gallery, Southampton in 2012. This article constitutes both a re-presentation of my primary research and a reflection on the methods I adopted to address the issues raised by my inquiries. Works produced are both referred to directly and represented via supplementary documentation.

Problems of depth and visibility make optical survey of deep-sea environments extremely difficult, necessitating that they be mapped instead by sonar. I begin by discussing the translation of acoustic signals into virtual images as a means to chart the seabed, reflecting on the 'seeing' involved in bathymetric modelling and going on to debate the place of both touch and embodied apprehension within the production of oceanographic knowledge.

Thereafter I present the idea that current bathymetric practice, which is centred on the virtual draining and illumination of undersea spaces, evidences the wider challenge posed to scientific and philosophical thought by the fluid. If geophysics shows a predisposition towards the 'dry', fixed and definable, my work is in part a call for new kinds of liquid encounter with the emergent landscape of the deep sea.

A handful of dust

Different creation myths attribute the genesis of the earth/mankind to the retrieval from the primordial waters of a handful of silt – the archetypal dust to which we must all return. Although visually

unprepossessing, mud cores contain microfossils that can offer clues to a variety of geological phenomena such as patterns of volcanic eruption and subsequent tsunamis. Collection of them is an arduous process that involves drilling down into layers of sediment that cover the seabed so as to fill a drainpipe-like tube which is then brought to the surface and cut open for analysis.

While at NOCS I made a work *I want I want*, that involved firing two handfuls of silt, collected in Whittard Canyon – a deep submarine gorge situated off of the coast of Ireland – at a depth of about 4000 metres. Named after an engraving by William Blake, which depicts a figure looking longingly up at the moon from the bottom of a spindly ladder, these petrified lumps of dirt speak simultaneously of the romantic pull of the unfamiliar and the impulse to 'know' that this engenders. Once brought to the surface, mud cores must be stored in atmospherically controlled environments in order to prevent them from reverting to dust, a circumstance which in the context of this essay might be read as a metaphor for the need to balance 'dry thinking',² a term coined by geographer Paul Carter for systems of analysis which privilege the pursuit of fixed distinctions, with 'liquid intelligence'.³

Fathoming the depths

The visible traces of my handprints upon these lumps of clay conjure an infantile desire to know the world by sensation rather than observation. At depths of more than six metres light fades away to impenetrable darkness. In her history of oceanographic exploration Helen Rozwadowski comments on the way in which sailors originally used line soundings to conceptualise the shape of the seabed, literally feeling their way across its surface, to construct a mental map of the unseen terrain below.⁴ In contrast, the ubiquitous use within contemporary bathymetric practice of photorealistic modelling to visualise oceanographic environments and the constant push to extend the



2 Top image
Core Store, National
Oceanography
Centre,
Southampton, 2008

Bottom image
Corer – Royal
Research Ship, James
Cook, May 2009

use of cameras at depth reveals a drive towards the visible. This can be understood as an extension of the wider post-Enlightenment scientific project of rendering the natural world as observable phenomena. It might also be said to evidence a literal and metaphoric impulse to lay the submarine world bare and shine the light of reason into its murky depths.

Classically within a hierarchy of the senses, sight has been valued above touch, the mutuality of which has the potential to bring a different set of subject and object relations into play than those occasioned by an epistemology of distance, characterised by detached observation and disembodied objectivity. I began my residency by learning to use mapping software of the kind employed by my scientific colleagues, playing with the visual conventions of bathymetric modeling and altering color, scale, relief and shadow. I then experimented with the use of rapid manufacturing technologies to materialize data, producing raised plaster reliefs (see image 3), inspired in part by nineteenth century maps for the blind. My aim with these interventions was to highlight the role of visual and material aesthetics in shaping understanding and bring other senses such as touch into play.

In practice, while necessarily insulated from the hostile environment of the deep sea, aspects of oceanographic survey draw substantially on tactile understandings acquired in terrestrial environments. One colleague at NOCS told me of an instance when the temperature of a black smoker (undersea hydrothermal vent) was brought home to him not by the gauges on his instrument panel, but by watching a length of ducting tape, attached to a piece of external equipment, melt away; activating an imagined sensation of the extreme heat involved.⁵

In the biblical tale Doubting Thomas felt moved to put his hand into Christ's wounds to test the authenticity of his resurrection; seeing does not always amount to believing. Ironically 'Ground Truthing', or the use of remotely operated robotic arms to verify secondary data by direct sampling, constitutes a mainstay of seaborne oceanographic study; utilising forms of technologically extended

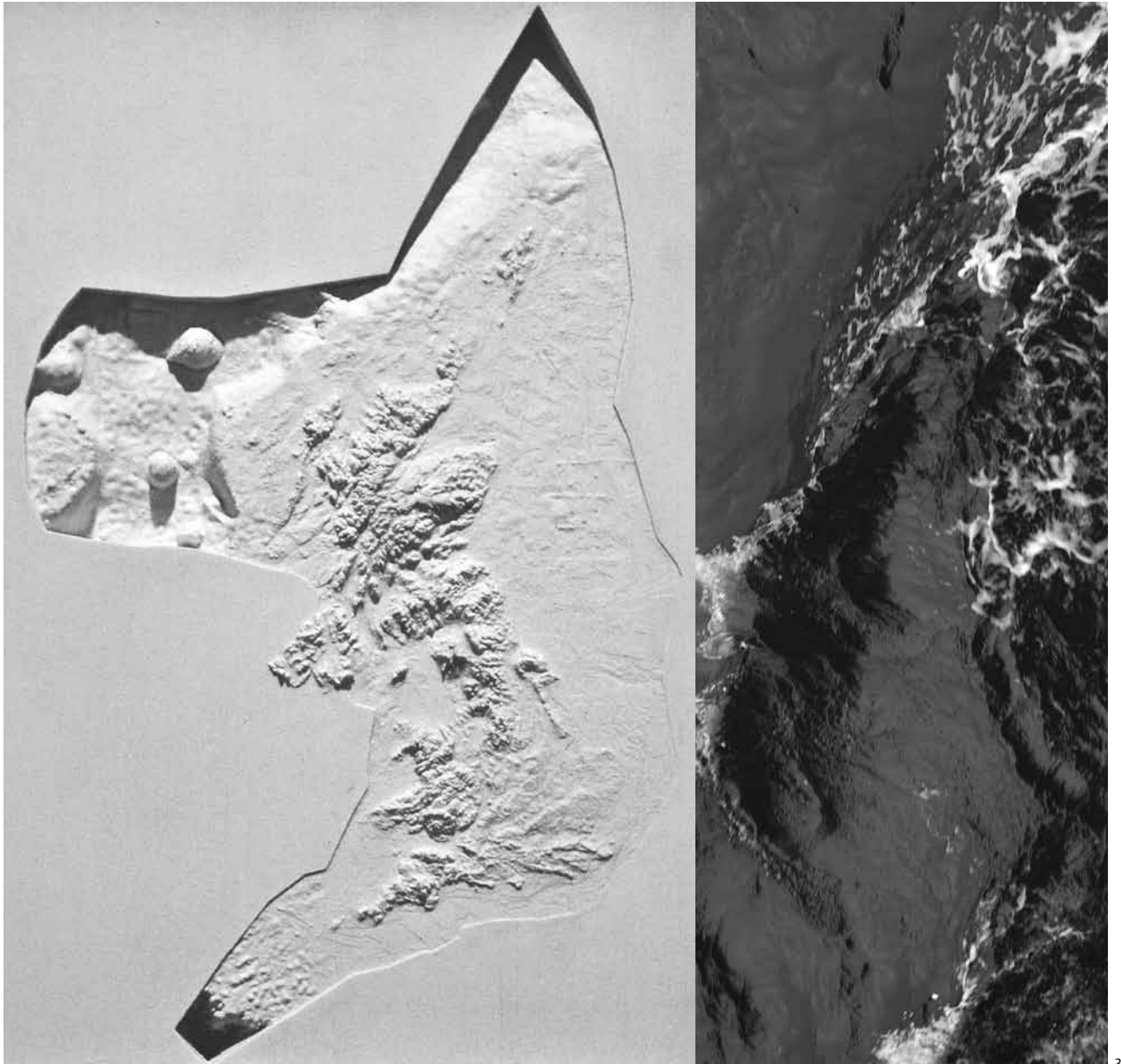
'reach touch' to bring the deep-sea world within grasp. The names given to these instruments, such as 'The Predator', are revealing however, making it interesting to speculate about the differing understandings to which devices capable of supporting haptic feedback might give rise, if used in similar circumstances.

Seeing the light

Philip Steinberg, author of *The Social Construction of the Ocean*, positions the sea within contemporary culture as 'a source of consumable spectacles'.⁶ During my residency I composed an animation, *Beneath the Briny*, charting the emergence of the submeritime within popular visual culture, as evidenced in images of underwater structures, from Jules Verne's *Twenty Thousand Leagues Under the Sea* to contemporary designs for the proposed Poseidon Mystery Island underwater resort. Taken together these images chart a shift in the way in which the deep sea is experienced, from source of horror to space of leisure, as witnessed in the changing view out of the large lenticular windows that form a feature throughout, enabling the underwater traveller to gaze, aquarium-like, upon the aquatic beyond.

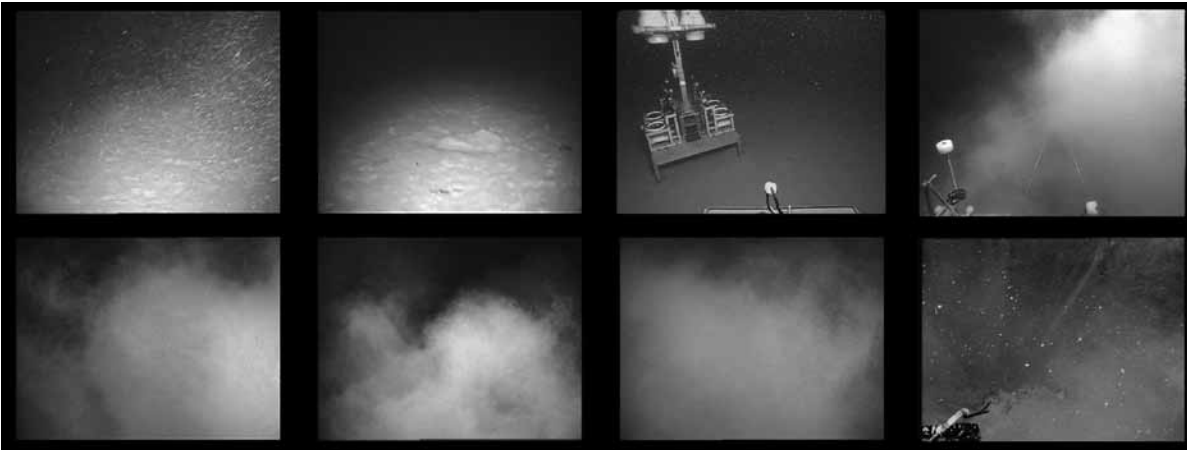
As Allan Sekula writes in *Fish Story*, despite the darkness of depth 'the submarine and the diving suit offered a new realm of imaginary visibility',⁷ the legacy of which can be discerned in the translucent undersea landscapes (as scenic as they are scientific) of contemporary geoscientific visualisation, over which the disembodied, hyper mobile eye may fly unhindered. Google Ocean, launched in February 2009, offers a similar freedom to the ordinary desktop traveller, available data and processing power being the only limits to exploration.

Sabine Höhler's account of the genesis of sonar technology highlights the capacity it allowed, unlike line-based sounding, for surveys to be conducted while moving, increasing both the speed with which data could be collected and its quantity, with the effect of rendering the hitherto opacity of the sea transparent. 'Through rich hydrographical volumes of scientific data the oceanic volume was cleared allowing the gaze to its solid ground.'⁸



3 *Left image*
A New Set of Borders
for the Kingdom (3D z
corp mono print, 297
x 210 x 30 mm), 2009

Right image
Atlantic Ocean, Royal
Research Ship, James
Cook, May 2009



4

4 *Top image*
Royal Research Ship,
James Cook, May
2009

Bottom images
Dive – ROV Isis dive,
Royal Research Ship,
James Cook, May
2009

The empty field and the horizonless smooth

Bathymetric modelling expunges factors such as darkness, pressure and even water, positioning deep-sea environments as sources of data rather than information⁹, creating the potential for what Bruno Latour has termed drift or 'the representation's ability to dominate the perception of the object even when it is returned to its physical reality'.¹⁰

From another perspective this drive to simultaneously drain and illuminate the deep ocean can be understood perhaps in terms of a wider set of circumstances whereby, from the creation of the earth out of the undifferentiated primal waters,¹¹ through to Steinberg's image of the sea as 'a void to be annihilated by hyper mobile capital';¹² it has been conceived in terms of nothingness – as Barthes' non signifying field,¹³ no where, no thing, 'meaningless materiality'.¹⁴ However as philosopher Edward S. Casey observes, absence of place, 'the dark vision of no place' gives rise to the impulse 'to fill up, to populate, the empty field with as much determinate Being as possible';¹⁵ a desire which by extension might be discerned in the push towards quantification and objectification of Western science.

For Deleuze and Guattari, the sea constitutes an archetypal example of 'smooth space',¹⁶ heterogeneous, haptic, rather than optic, constituted around events and intensities, while subject nevertheless to cycles and processes of striation – gridding, mapping, longitude and latitude.¹⁷ Ongoing United Nations legislature governing the territorial division of undersea resources might for example be taken as evidence of the ingression of striatory procedures into the boundless space of the submeritime.¹⁸ The physical characteristics of the deep ocean support direct comparison however with that other quintessentially smooth space, the desert, 'there is no line separating earth and sky; there is no intermediate distance, no perspective or contour'.¹⁹ Even when artificially illuminated, the light absorbing properties of water at depth (in combination with 'marine snow')²⁰ restrict visibility to a few metres, eradicating the horizon line and collapsing the spatial distance upon which sightseeing and survey as producing practices depend; while simultaneously activating the impulse to secure the transparency of vision.

Not a leg to stand on

A key characteristic of the smooth is the emphasis it places on bodily encounter and experience at close range. Ideas, which together with Deleuzian concepts of the nomadic have afforded walking, as a means to counter the abstractions of Euclidean space, a particular significance within the wider psycho geographic turn of contemporary thought. However, as Connery points out the concept of grounding emplaced thought in the ambulatory becomes literally unsupportable in a maritime context 'you cannot stand in the middle of this'.²¹

Two works made as part of my residency utilised walking as a motif. In the first – a *sailor went to sea, sea, sea, to see what he could see, see, see and all that he could see, see, see, was the bottom of the deep blue sea, sea, sea* – over six miles of string was laid out on the dockside in Southampton, enough to reach the bottom of the Mariana Trench, the deepest surveyed point on earth. The second work – a *long slow walk of 20,000 leagues* – used geoscientific profiling software to map an imagined journey along the route taken by Verne's Nautilus submarine under Antarctica, through a fictional passage connecting the Indian Ocean and the Mediterranean, to its demise off the coast of Norway. Part wry comment on the equivocality of definitive measurement – how long is a piece of string? Part riposte to the failure of largely male histories of walking, from the Romantics to the Situationists, to address questions of access; and part acknowledgment of the contradictions involved in seeking forms of intersubjective encounter with environments chosen precisely for their inaccessibility – both works can be understood as allied to Connery's critique of the terrestrial orientation of contemporary thinking around place. The 'legwork' undertaken here is not only necessarily displaced, deferred and imaginary, but deliberately so; offering a counterpoint to the disembodied opticality and deductive emphasis of bathymetric survey and simultaneously problematising ideas of walking as a critical tool from the perspective of its anthro/terra-centrism.

As Connery observes: 'there may be particular difficulties inherent in the ocean as an object of embodied knowledge'.²² Few of us will ever pass below the thirty metre limit set for recreational

diving – beyond which light filtering down from the surface fades away to darkness. Despite this, the concept of descent into the ocean can be said to carry a powerful, albeit phantom, bodily charge. At its most immediate, entry into water effects an alteration in the balance of the body – our centres of buoyancy and gravity being differently located – and has the potential, along with factors such as temperature, darkness, scale, to be deeply disorientating. Just as importantly, by breaking the ordering, and by association colonizing, line of the horizon, submersion can be said to bring about a rupturing of the symbolic codes which define our terrestrial existence, affecting entry into another morphology.

For me, the idea of descending thousands of metres into the ocean gives rise to a mixture of anxiety and attraction – manifest as a falling away in the pit of my stomach, which has prompted the attempt in pieces such as *to fly to fall to dive to float* – to model depth in a manner that understands it as something that both contains and is contained within the body. Subsequently I have found Maurice Merleau-Ponty's differentiation between objectified and primordial depth helpful in conceptualising the possibility of an immersive process of perception, which recognises the materiality of the oceanic. Objectified depth can be understood in terms of determinate measurement – the z-axis of Cartesian geometry, so that by contrast, while primordial depth is 'the dimension in which things or elements of things envelop each other, breadth and height are the dimensions in which they are juxtaposed'.²³

Aspects of the primordial support direct comparison with the submarine smooth. Casey argues for example that 'Just as the horizon encompasses the discrete things and places it embraces in its comprehensive sweep, so primal depth encompasses the horizon in turn.'²⁴ Going on to state that: 'If the determination of longitude is appropriate and valuable on the surface of the sea it is inappropriate and useless in tehom – the deep from which the known world is said to have come in the first place.'²⁵ Taken together, such factors suggest the possibility and need for a different form of encounter with the submarine.

Draining the oceans

Bathymetric modelling dispels darkness and embodied relationality. It might also be described, with its routine virtual siphoning away of water, as antithetical to liquidity.

As a child I was given an illustrated Bible that included an illustration of Moses parting the Red Sea, pushing the water back like a curtained wall to reveal the usually hidden seabed. I was both fascinated and disturbed by the image. Connery identifies this incident, along with the miracle of Christ walking on the water, as indicative of an antipathy towards the watery (discernible, he argues, in other aspects of culture) that reaches its biblical dénouement in the Book of Revelations with the final banishment of the sea. 'And I saw a new heaven and a new earth, for the first heaven and the first earth were passed away, and there was no more sea.'²⁶

Vestiges of aquaphobia are discernible in 'a virtual scientific expedition'²⁷ commissioned by *National Geographic*, on which my co-researcher at NOCS, Dr Tim Le Bas, worked as consultant. As suggested by its name, *Draining the Oceans* is a CGI animation that 'pulls an imaginary plug' on the ocean, eradicating the play of motion and mutability to which the watery gives rise and enacting a kind of hydrographic hegemony. The effect of this is rudely to expose the under-sea-scape to the skies, recasting the deepest submarine environments as terrestrial ciphers and allowing geologists to stand unassisted on undersea features such as the mid Atlantic ridge.

Liquids can be said by their nature to resist attempts to 'map' them, evoking a desire to corral their fluidity and engineer them into recognition. The trope of fluidity and flux has been theorised by feminist thinkers, in particular Luce Irigaray, as offering a means to disturb and dissolve the dualisms upon which Western culture is founded, allowing instead for a play of difference. According to Alison Stones:

*The notion of material fluidity emerges out of Irigaray's earlier analyses of the western philosophical tradition, which, she believes, consistently fails to think through the fluid – as, for her, does modern science, with its comparative difficulty in theorising fluids.*²⁸



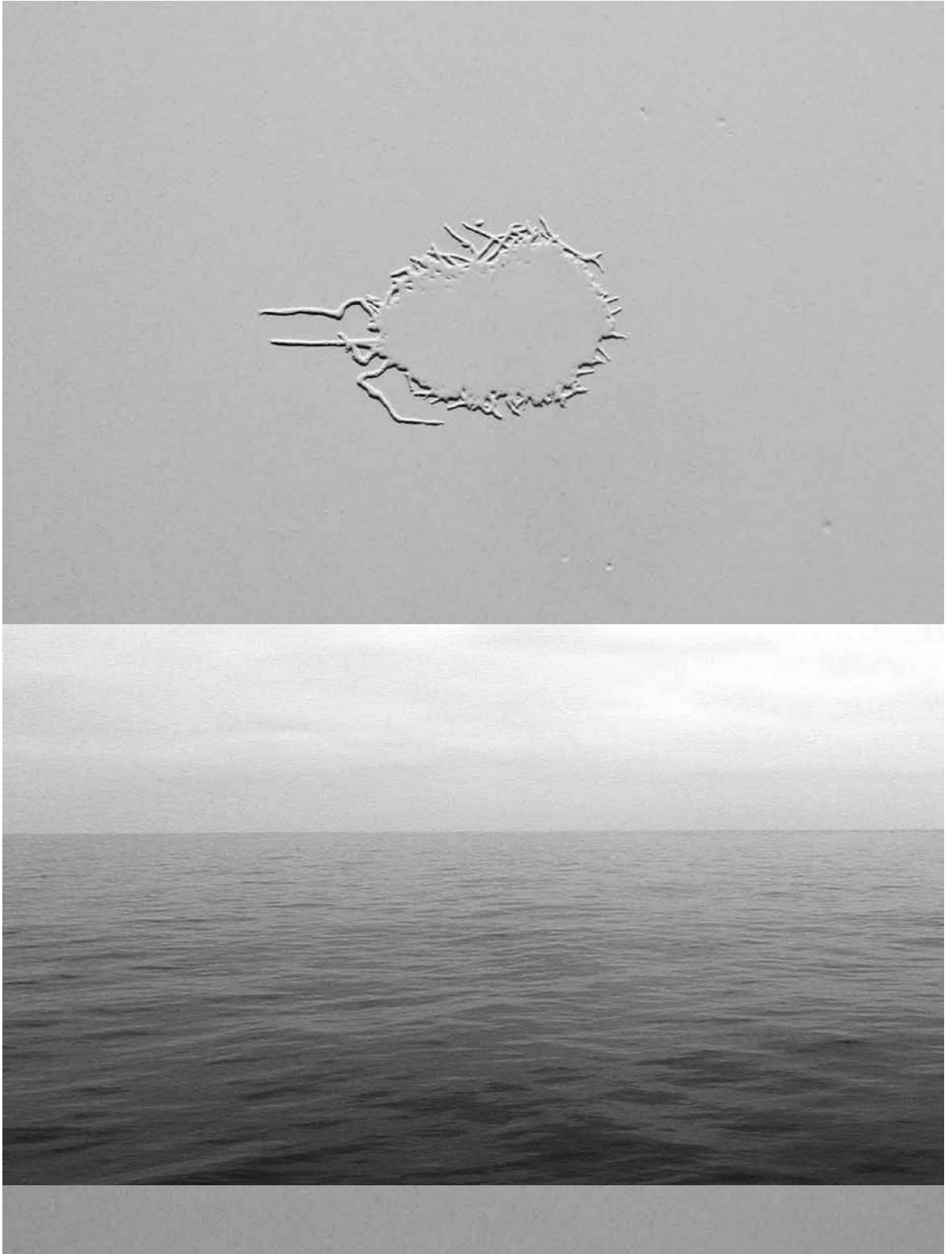
5&6 Top and Bottom Image

*A sailor went to sea, sea,
sea, to see what he could
see, see, see and all that he
could see, see, see, was the
bottom of the deep blue
sea, sea, sea*

Dockside, National
Oceanography Centre,
Southampton, May
2010
(Photographer Barry
Marsh)



6



7 *Main image*
Ten Atlantic Days
(plaster relief 297 x
210 x 15mm detail),
2009

Centre image
Royal Research Ship,
James Cook, May
2009

Irigaray's ideas find a parallel in Deleuzian critiques. Royal or State science, the dependence of which upon extraction of 'invariant ("universal") laws from the variations of matter',²⁹ can be said to involve a 'rejection of fluid dynamics in favour of solids'.³⁰ Arguably Royal Science forms the dominant paradigm of both Western science and contemporary marine geophysics. Nomad science by comparison can be understood as an itinerant, turbulent and 'informal physics of hydraulics',³¹ centred upon flows of energy and matter. This idea finds extension in the concept of 'Celeritas', or 'comparative swiftness', which Casey suggests, calls for 'an "anexact" science of approximation that takes account of just where a motion occurs, that is, of its varying inclination and direction'.³² 'Gravitas' on the other hand demands 'an exact science of weights and measures and precise parameters'.³³

In May 2008 I took part in a ten-day scientific cruise aboard the Royal Research Ship, James Cook. While on board I produced a series of ten 'drawings', subsequently cast as plaster reliefs, generated by the movement of a pen (hung from the table in my cabin) recording the motion of the sea over an eight hour period. Lacking the capacity for repetitious testing demanded by deductive analysis and, as a consequence, any standing as data, each of the pieces that make up *Ten Atlantic Days* might be thought of perhaps as an exercise in nomadic science.

Buoyancy

Watching a video work recently, edited together from numerous popular movies, in which myriad fatalities, crashed, over and over again, like felled trees, to the floor, I was reminded of the comments of a colleague at NOCS, who told me of how the sight of small jellyfish, floating weightlessly along at a depth of 30,000 metres, had led him to reflect on the existential impact of gravity, as symbolised by the fall to earth of death – how this shapes our consciousness and how, had we evolved in an aquatic medium, buoyancy would have given rise to an unthinkable different metaphysics.

Geography, geology, geophysics – despite the fact that 70.8% of its surface is covered with water, the terms earth and globe continue to be taken as synonymous. In *Amante Marine*, Irigaray's amorous discourse with Nietzsche, she suggests the element he most fears is water, preferring instead 'earthly heights and plains'.³⁴ For Irigaray, water operates in a state of:

*... continuous flux, which seems to me quite close to my jouissance as a woman [and is] completely foreign to what an economy of erection and detumescence represents to the female body. My movement let us say of feminine jouissance is more maritime than scaling or descending a mountain.*³⁵

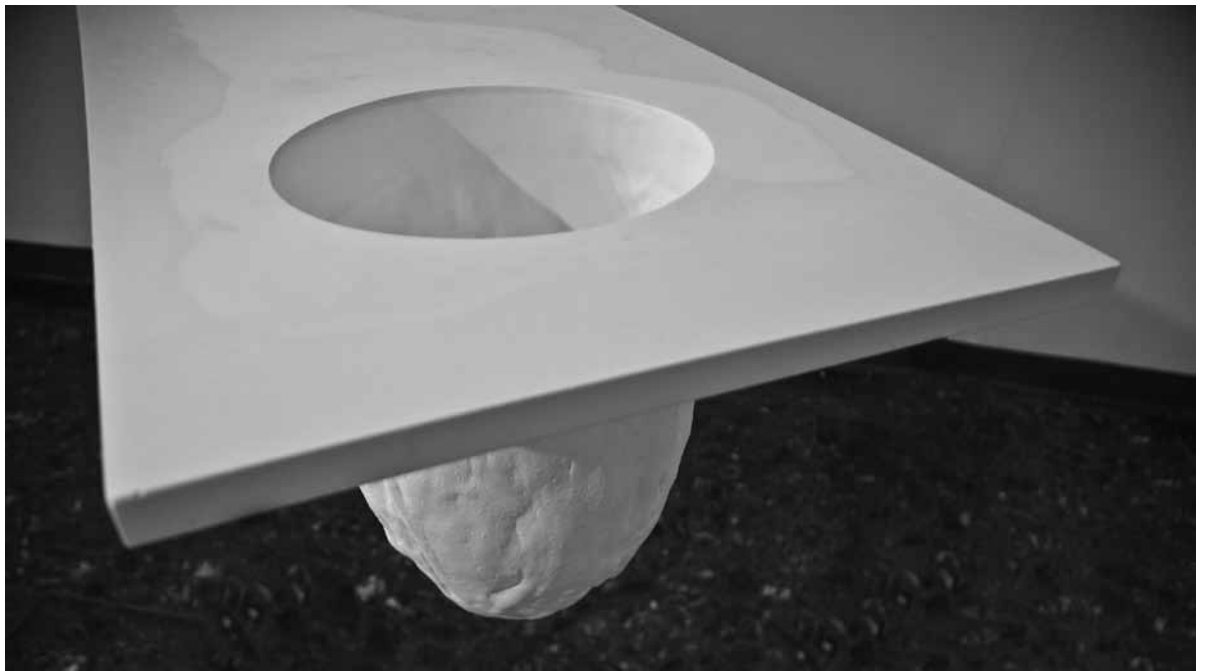
The capacity of buoyancy to trouble gravity (schematised within the Euclidean geometry of Newtonian physics as a set of parallel never meeting lines) can be understood in relation to Irigaray's ideas as resistant to not only the outworkings of gravitas/gravity but also an order of being, recognisable in the dry landscapes of oceanographic survey, founded upon an axis of fall and ascent, which is both phallo- and geo-centric.

The sixth continent

It is beyond the scope of this essay to address the topic of underwater architecture. Given current interest in exploitation of undersea resources, however, not to mention wider ecological issues, discussion of such a subject seems perhaps timely.

Peter Raisbeck provides a fascinating analysis of the work of various groups and individuals, active during the 1960s and 1970s, among them Archigram, Buckminster Fuller, Warren Chalk and the Japanese Metabolism group,³⁶ who, inspired by a mixture of influences, from Jacques Cousteau's pre-continent underwater living experiments, to the rhetoric of the 'abundant resources of the oceans' emanating from the emergent field of oceanographic science,³⁷ formulated proposals for marine (partially submerged) and underwater city projects. The impetus behind such schemes is attributable, Raisbeck contends, to a techno-romantic desire to extend the Modernist project of urbanisation that had reached its limits within the constraints of existing twentieth-century cities. 'The smooth scope of the sea was seen perhaps as a place where the urban gesture and theories of the terrestrial city could unfettered play themselves out.'³⁸ As far as can be ascertained from his brief descriptions, their aquatic milieu was conceived of as little more than a backdrop to these utopian enclaves, to be kept at bay by features such as encircling perimeter walls.³⁹ 'The marine or underwater city was thus easily envisaged as either a floating or underwater outpost for further exploitation; a staging post for expending the frontiers of the marine landscape.'⁴⁰

In parallel, investment by the oil industry and military in a range of research projects including



8 *Top image*
Royal Research
Ship, James Cook,
May 2009

Bottom image
to dive, to fall, to
float, to fly
(porcelain, plaster),
2009

mineral extraction, desalination and aquaculture programmes, was heightening popular ideas of the ocean as a new futuristic frontier or, in the words of the French architect Jacques Rougerie, a '6th continent'.⁴¹ Despite the somewhat colonial character of this comment Rougerie, who continues to be active in the field of aquatic design, should at least be credited with an interest in the submeritime as a distinct sensory environment:

*Man with a pioneering spirit will be able to attempt to live in harmony with the oceans. Human presence under the sea can only be achieved with permanent activities such as marine aquaculture to which cultural, sports and touristic activities could be appended. Within this perspective man will acquire new sensory awareness, tactile, auditive and visual.*⁴²

However as Raisbeck wryly points out, 'If built, the schemes outlined here, would have literally and quickly become smooth spaces, as they rusted, leaked and their actual haptic reality overtook the senses.'⁴³

In *Design of Enclosed Spaces*, Piera Scuri makes a

number of references to man-made underwater structures comparing them, in their dependence on technology to sustain life in an alien environment, to space habitats. Her primary interest lies in the psychological impact of design within confined environments. While a number of the subjects she considers, such as the effects of light and darkness upon the body/mind, are of relevance to the question of inhabiting the Oceanic, one observation is of particular interest. Referring to research into the long-term effects of living in a submarine she says:

*It has been demonstrated that long stays in confined environments have a detrimental effect on visual ability because of the lack of deep vanishing points. As a consequence researchers advise that when planning these sorts of spaces / machines, allowance should be made for the creation of distant visual centres of interest [...] The use of mirrors and trompe l'oeil is advised.*⁴⁴

It seems that even when insulated from the immediate dangers of the submeritime we need to counter the effects of its enveloping darkness by taking refuge in a view.

Notes

1. A term used within the oceanographic community to highlight the necessity for remotely gathered information to be verified by direct sampling.
2. Paul Carter, 'Dry Thinking: On Praying for Rain', written paper based on published essay 'Trockenes Denken: vom Verlust des Wasserbewusstseins und von der Poesie des Fluiden', *Lettre Internationale*, Winter 2008, pp. 76–81. www.ioe.sinica.edu.tw/chinese/seminar/100612/paper/FCarter.pdf [accessed 6 June 2011]
3. Jeff Wall, 'Photography and Liquid Intelligence', in *Jeff Wall*, ed. Ivona Blazwick (London: Phaidon Press Ltd, 1996), pp. 90–93 (p. 93). Writing of the interplay of wet process and dry optics within analogue photography, Wall describes liquid intelligence as 'immersion in the incalculable'.
4. Helen M. Rozwadowski, *Fathoming the Ocean: The Discovery and Exploration of the Deep Sea* (Cambridge, MA and London: The Belknap Press of Harvard University Press, 2005), pp. 69–71.
5. See Paul Rodaway, *Sensuous Geographies: Body, Sense, and Place* (London: Routledge, 1994), pp. 48–54, for a discussion of imagined, extended, reach and global touch.
6. Philip E. Steinberg, *The Social Construction of the Ocean* (Cambridge and New York: Cambridge University Press, 2001); Philip E. Steinberg, 'The Maritime Mystique: Sustainable Development, Capital Mobility, and Nostalgia in the World Ocean', in *Environment and Planning D: Society and Space*, volume 17(4), (1999), pp. 403–26 (p. 403).
7. Allan Sekula, *Fish Story* (Düsseldorf: Richter Verlag, 2003), p. 110.
8. Sabine Höhler, *A Sound Survey: The Technological Perception of Ocean Depth, 1850–1930*, Mikael Hård, Andreas Lösch, Dirk Verdicchio (eds), *Transforming Spaces. The Topological Turn in Technology Studies*. (2003), pp. 1–17 (p. 9). www.ifs.tudarmstadt.de/gradkoll/Publikationen/transformingspaces.html [accessed 21 March 2011]
9. See Rodaway, pp. 19–21, for a discussion of J. Gibson's ecological theory of perception as involving an active observer moving within a dynamic world.
10. Erin Stepney, *The Effect of Aerial Photography as a Structured Perception Upon Terrestrial Archaeological Survey*, pp. 1–35 (p. 30). <http://traumwerk.stanford.edu:3455/31/330> [accessed 17 February 2011]
11. Christopher Connery, 'There was No More Sea: the Supersession of the Ocean, from the Bible to Cyberspace', *Journal of Historical Geography*, vol. 32 (July 2006), pp. 494–511.
12. Steinberg, op. cit., p. 403.
13. Roland Barthes, *Mythologies*, trans. Annette Lavers (London: Vintage, 2000), p. 112.
14. Connery, op. cit., p. 497.
15. Edward S. Casey *Getting Back into Place – Toward a Renewed Understanding of the Place World* (Bloomington and Indianapolis: Indiana UP, 1993), p. xi.
16. Gilles Deleuze and Félix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, trans. Brian Massumi (Minneapolis: University of Minnesota Press, 1987), pp. 474–82.
17. *Ibid.*, p. 474, '... the two spaces in fact exist only in mixture: smooth space is constantly being translated, transversed into a striated space; striated space is constantly being reversed, returned to a smooth space'.
18. The UN Convention on the Law of the Sea (UNCLOS) is a global international agreement that regulates the various zones of the world's oceans and seas and confers on all coastal States sovereign rights for the purpose of exploring and exploiting the natural resources of its continental shelf.
19. Deleuze and Guattari, op. cit., p. 382.
20. A constantly raining shower of organic debris that, if disturbed once it has settled on the bottom, explodes into swirling 'dust' clouds.
21. Marianne Moore, 'A Grave', *Complete Poems* (New York: MacMillan, 1994), p. 49, in Connery, p. 508.
22. Connery, op. cit., p. 494.
23. Maurice Merleau-Ponty *Phenomenology of Perception*, trans. C. Smith (London: Routledge & Kegan Paul, 2002), p. 308.
24. Casey, op. cit., *Getting Back into Place*, p. 67.
25. Casey, op. cit. *Getting Back into Place*, p. 70.
26. Rev 21:1 *King James Bible*.
27. http://channel.nationalgeographic.com/episode/drain-the-ocean-3639/Overview23-tab-Videos/07062_00
28. Alison Stone, *Luce Irigaray and the Philosophy of Sexual Difference* (Cambridge: Cambridge University Press, 2006), p. 98.
29. Eugene W. Holland, 'Nomad Citizenship and Global Democracy', in *Deleuze and the Social*, Martin Fuglsang, Bent Meier Sorensen (eds), (Edinburgh: Edinburgh University Press, 2006), p. 191.
30. *Ibid.*, p. 192.
31. Edward S. Casey, *The Fate of Place – A Philosophical History* (California: California University Press, 1997), p. 463, with reference to *Thousand Plateaus*, pp. 370–71.
32. Casey, *The Fate of Place*, p. 303.
33. Casey, *The Fate of Place*, p. 303.
34. Elizabeth Grosz, *Sexual Subversions – Three French Feminists* (Australia: Allen and Unwin, 1989), p. 167.
35. Luce Irigaray, 'Le corps-à-corps avec la mère' (Montreal: Editions de la pleine lune, 1981), pp. 48–49, in Grosz, p. 170.
36. Peter Raisbeck, *Marine and Underwater Cities 1960–1975*, Additions to Architectural History: XIXth Annual Conference of the Society of Architectural Historians, 2002, 1–15 (p. 15), www.farooqhussain.org/pubs/Raisbeck_Peter_2002.../download [accessed 24 March 2011]
37. *Ibid.*, p. 2.
38. *Ibid.*, p. 11.
39. *Ibid.*, p. 6.
40. *Ibid.*, p. 11.
41. *Ibid.*, p. 8.
42. Jacques Rougerie, 'Thalassopolis II, Habiter La Mer', *L'architecture d'aujourd'hui*, No. 175, September / October 1974 in Raisbeck, op. cit., p. 15.
43. Raisbeck, op. cit., p. 11.
44. Piera Scuri, *Design of Enclosed Spaces* (New York: Chapman and Hall, 1995), pp. 38–39.

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Biography

Rona Lee is Reader in Fine Art Practice at the University of Wolverhampton and a practising professional artist. Her work is research led and encompasses a range of media alongside other forms of engagement and intervention. This project extends her ongoing research into water as a geographic, architectural and epistemological locus.

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