AA Gallery & Front Members' Room
12 January – 9 February 2013

Monday to Friday 10am–7pm
Saturday 10am–3pm

Architectural Association
36 Bedford Square, London WC1B 3ES

www.aaschool.ac.uk/exhibitions

FROZEN RELIC: ARCTIC WORKS BY SCANLAB PROJECTS

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The Arctic is melting. This year the summer sea ice levels reached their lowest point since records began. The Greenpeace campaign, Save the Arctic, is a ground-breaking collaboration between scientists, architects and environmentalists. This summer the Greenpeace ship, *The Arctic Sunrise*, took a research team headed by leading scientist Peter Wadhams and London-based designers ScanLAB to remote Arctic waters in order to deepen our understanding of the threats faced by this unique and fragile region. During this expedition to the Fram Strait, northwest of Svalbard in Norway, ScanLAB were able to capture a huge amount of data, documenting a series of ice floes using millimetre-perfect 3D scanning technology, capturing a total of 26 floes in forensic detail, mapping their surfaces precisely.

The exhibition, Frozen Relic: Arctic Works, recreates this landscape in its natural material – frozen saltwater. Each piece is a digitally fabricated scale replica of the original ice floe which was 3D scanned from above and documented using underwater sonar from below. The completed digital model is used to guide a CNC machine which carves the moulds in which each replica is cast.

Visitors entering the gallery find themselves in a darkened room; the suspended ice floes glow in an icy archipelago. Like the fragile environment they are born from, these exhibits are disappearing. Every day they will completely melt into the drip trays below, being refrozen and rehung for the following day. As the installation melts, it leaves only the supporting structure which itself accurately represents the scientific data that remains of this captured ice floe. Left with only their forensic records, ScanLAB speculate on this disappearing landscape for which architects may only ever design theoretically.

Stamukha
One of the ice floes captured was an extremely rare and infrequently studied piece of sea ice – a Stamukha, the name for a colossal floe that becomes beached in a shallow Siberian river estuary during the summer months. When the river waters flow over the floe, they sculpt its surface and freeze in sediments, giving it an uncharacteristic brown hue. This makes Stamukhi appear strangely terrestrial once they rejoin the Arctic ice pack and drift amongst the pure blue-white landscape of frozen sea ice.

Arne's Floe
Another individual floe, named after the ship's ice pilot, was documented at exactly 17:01:07hrs on 16 September as it drifted at 79 22.558 N, 003 04.611 W on the edge of the Arctic ice pack. This tiny piece of ice, approximately the size of a netball court, was captured in a single scan. Arne's Floe no longer exists. Shortly after Arne left the floe by helicopter, this tiny piece of ice cracked in two. Located close to the southern edge of the ice pack, this area is subject to a battering from surrounding floes, melt from the warm Atlantic waters and the comparatively warm summer temperatures at 79 degrees north. Like all of the Arctic ice floes, Arne's Floe is part of a dynamic and turbulent landscape, broken, reformed, merged, melted, moved and ultimately disappearing.

Frozen Relics: Arctic Works is part of a collaborative project between ScanLAB Projects, Cambridge University, Greenpeace and the Bartlett School of Architecture, UCL. ScanLAB would like to thank all those who have enabled the recent Arctic expeditions and have supported and encouraged the early years of our practice.

ScanLAB Projects
Formed in 2009 by Bartlett graduates Matt Shaw and Will Trossell, ScanLAB is both a commercial practice and a series of experimental projects investigating the use of large-scale 3D scanning in architecture and design. The practice works with leading architects, engineers, broadcasters and artists capturing the world in a forensic level of detail and creating uncanny digital versions of 'real' space. The outputs are varied, from controlled 3D models which guide millimetre-precise engineering and fabrication projects to speculative film and image work for gallery display.

ScanLAB @ UCL is the research and teaching arm of ScanLAB Projects. It is part of the Bartlett Media Hub.

Cambridge University, Department of Applied Mathematics and Theoretical Physics (DAMTP)
The science undertaken at the Department of Applied Mathematics and Theoretical Physics at the University of Cambridge covers a wide range of topics, from large-scale astrophysics to modelling the spread of infectious diseases. Polar ocean physics falls between geophysics and fluid dynamics, because we must combine an understanding of how the Earth's atmosphere influences the motion of ocean waves and how they both impact the motion of sea ice across the Arctic Basin, as well as contribute to its observed rapid decline in the past few decades.

Expeditions like the ones undertaken by the Polar Ocean Physics group and ScanLAB are the backbone of the theoretical modelling done at DAMTP. An ice floe constructed out of equations on paper is only as good as the assumptions made about its average size and shape. Obtaining highly resolved maps of the surface of floes is essential for the calibration of theoretical models. What is unique about the data obtained with ScanLAB is that it allows the profiling of the sea ice to be done in a matter of hours. A full description of a floe can be carried away and every contour examined in full living detail, whereas prior to this technology we had to rely on drilling, which only gives a coarse picture of a small subsection of the ice under study.

Most Arctic research is done by satellites, which provide a fast and safe way to collect vast amounts of information. Whereas the scientist can only ever see as far as the horizon, a satellite can survey the whole of the Arctic Ocean in a matter of hours. From such surveys, maps of the exact area covered by sea ice are produced on a daily basis. This is how the perhaps most striking geophysical effect of global warming was first observed – the rapid decline of sea ice extent in the Arctic Ocean.

However, satellites are much less successful at measuring the thickness of the ice. Even the latest satellite technology can only reliably measure the fraction of the ice above sea level. The radar struggles to capture what happens below. But since roughly 9/10 of sea ice is submerged, any error in measuring the part above water is multiplied by 10 when we try to infer the whole thickness of the ice. This is one reason why we need to go north – to calibrate and validate satellites, and to measure the real thickness of the ice.

A second reason is found in the precision of the measurements. In the Polar Ocean Physics Group at DAMTP we are interested in small-scale processes: how do individual ice floes break up under wind and waves? How do the broken-up pieces get crushed and compressed to form vast rubble fields and imposing pressure ridges? To study these processes we need information at the mm to cm scale. The best satellite resolution, however, is still a few hundred square metres. And this is where ScanLAB come in.

Greenpeace International
We are witnessing a catastrophic ice melt in the Arctic. This year the Arctic sea ice reached the lowest recorded extent – a drop of at least 45% since records began in 1979. If we ever needed a wake-up call from Planet Earth, this is it. Yet even while the world looks on in disbelief at the calamity unfolding at the top of the world, oil companies like Shell, BP, Exxon and others are going in to drill for oil. That's because the more the ice melts, from the burning of fossil fuels, the more chance they have to prospect for oil.

We are on the point of losing one of the Earth's most essential life support systems; that helps keep the planet cool. And with it, the Arctic's ecosystem: beautiful species like polar bears, Arctic foxes, narwhals, birds and walruses. Tragically, they are all threatened with extinction.

We now face a planetary emergency as the Arctic sea ice vanishes at a truly terrifying speed. But together, we can help change the course of history by declaring the unclaimed area around the North Pole as a global sanctuary and banning oil exploitation. Free from greed. Free from pollution. Owned by all of humanity and not a mere handful of oil barons. And the billions that would go into Arctic oil exploration need to be invested in clean energy.

The collaboration between the University of Cambridge and ScanLAB Projects is a vital tool to build the scientific foundation of our campaign to declare the Arctic a global sanctuary.

The expeditions are tough, expensive and long, but they bring attention to one of most urgent environmental issues of our time, and an awareness of how we must protect the Arctic.

We need millions of people to join the campaign to Save the Arctic. Securing a positive future for the Arctic is important for everybody, and every single person who joins the movement is making our call for a global sanctuary stronger. 30 years ago we launched a similar campaign to protect the Antarctic. Nobody thought we would succeed, but we did, and we created a world park around the South Pole.

Now the Arctic is calling.

Take a minute today to join the movement.

www.savethearctic.org

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Images
Front: 3D Scan of Arctic Ice Floe: Floe A1004 in September 2011, Fram Strait, North West of Svalbard.

1 ScanLAB on the ice

2 The team drilling bore holes to measure the draft and freeboard ice levels

3 Pancake Ice

4 Cambridge scientists with an ice core sample

5 Greenpeace;s Ice Breaker The Arctic Sunrise as it moves through the Arctic Sea Ice

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