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Teleconnections in STEAM: Antarctic Field-Camp Art

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Abstract
We describe a component of a multi-element STEAM collaboration looking to explore ideas around the life cycle of Antarctic sea ice. One of the intermediate phases of the work involved the scientist deploying partially pre-made art components. Results were modulated by weather and operational constraints and generated a sequence of images and recordings as well as greater understanding of the creative collaboration process.

Author/Artist Bio
Craig Stevens is an oceanographer who trained at the University of Western Australia and the University of British Columbia. He is now an Associate Professor with a joint position at the National Institute for Water and Atmospheric Research and the University of Auckland, New Zealand. His research focus is on stratified turbulence in extreme ocean environments - for example beneath sea ice in Antarctica. He is the current President of the New Zealand Association of Scientists. Gabby O'Connor is an artist who trained at the University of Melbourne and the University of New South Wales in Sydney, Australia. She now works as artist, educator, workshop facilitator and science communicator. Her present research interest focuses on the connection between art, science and education and how all three goals can met met within the rules of each discipline. She has been a team member on two Antarctic expeditions.

Keywords
Antarctic, STEAM, Teleconnections, life cycle of sea ice

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Craig Stevens and Gabby O'Connor

The authors were brought together in 2011 at an Art+Science speed dating night which spawned a collaboration around shared interests in trans-disciplinary aspects of creativity, especially in the context of Antarctic climate science. This resulted in a trajectory of collaborative works ranging from gallery talks through poetry, sonic postcards, all the way to Antarctic field physics. STEAM in an Antarctic context is not new (Fox 2005; Brown 2012). What is unique here is the trajectory of collaborative connections as the overarching exploration of ideas unfolded. Here we describe one of the more complex, intermediate steps in the collaboration where the art-making process occurred "at a distance".

The scientific context to the collaboration is the growth and decay of sea ice around Antarctica – one of the largest geophysical actions on the planet occurring on an annual cycle. Sea ice is the thin surface layer of frozen ocean, perhaps only a metre or two thick. This influences the reflectivity of the planet, Antarctic food-webs, as well as how the oceans cycle globally – not just around Antarctica. The life-cycle of this thin, but important, band of ice is not so well known that we can reliably include it in climate models. Instead, there is on-going research on its growth and decay, how it interacts with the ocean, and also how satellites can reliably sense it from space (Kennicutt et al. 2015).

Figure 1 Spike emerging from the sea ice of Haskell Strait, Antarctica, with Mount Erebus in the background (image: Stevens).

O'Connor seeks to represent this ice through her art practise of using recycled material, often with the assistance of school children, to build structures that represent facets of the cryosphere (O'Connor & Stevens, 2015). Typically, she builds up large structures from small elements – in the present case triangles of blue-lacquered tissue paper. These structures get connected in ways that result in three-dimensional shapes that are translucent and so influence light. In addition, the works are recyclable in that they can be reduced to their components and reassembled in some other structural macro-scale arrangement.

In climate science the term teleconnection refers to separated processes having some correlative connection (e.g. Vance et al 2013). Here, the teleconnection approach was designed as a precursor to develop a profile for actually embedding the artist in science field

camps. The artist prepared the scientist with an "art kit" and some instructions to see what would get produced. In a climate teleconnection there will be a set of biophysical processes connecting the "separated processes". In the STEAM teleconnection there is a suite of modulating aspects like operational constraints and science-side artistic naivety.

Notably the art pieces pack down very small so a compact box of raw art material and fasteners were readily included in the field camp freight. The camp itself is constructed from shipping containers that are towed out onto sea ice – the thin frozen skin of ocean typically only a few metres thick. The containers contain holes in the floor through holes are drilled into the ice to access the 500 m deep ocean below. The laboratory containers are typically 2.5x2.5x6 m in dimension and filled with scientific equipment. The camp deployment lasts several weeks and is fully self-contained with living and research areas.

The art instructions included sketches for general shapes which were generally rounded – like large icy boulders. As an example of how the teleconnection process modulated the realisation, it was not anticipated how the physical laboratory space would determine the ultimate form. This normally large art works needed to be constructed in the protective but crowded container. The resulting works were long tapering cylinders of lacquered paper built around a core made from bamboo poles normally used for navigation flags. This improvisation is a key facet of field science that has significant cross-talk with the art making. One piece in particular, named *Spike*, was then mounted outside late on a rare windless evening of the 24 hour day-lit day. The art is a function of time and space.

The works produced included a sequence of digital photographs that ranged from setting *Spike* against the geophysical landscape. This includes sea ice as well as a volcano as a back-drop. *Spike* was also deployed in white-out conditions where it was the only source of contrast, so it looked almost like a crack in the world. Additionally, the work was also set against a human context whereby a second sequence of photographs included human

interaction where the art work was used as a javelin. This broke the artist's normal code of practise, the teleconnection meaning she had only limited control, which typically excludes the human scale. This human-art interaction was then repeated in a compare-and-contrast exercise on a later expedition with the artist being present. The interaction was bidirectional and reached through time.

The entire STEAM teleconnection was documented with a sonic postcard (Stevens et al. 2014) that placed the exercise in a field recording context and explanations of the artistic, scientific and curatorial aspects of the work. The collaboration has since been extended to two in situ field STEAM expeditions that are resulting in further outputs. As expected these have their own unique set of outcomes, leaving the teleconnected STEAM to have produced a unique signature.

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