



**OPEN WATERS [NORTHWEST PASSAGE AND POLAR SEA]**

(Paper)

**Topic: Digital Poetics Interactive Installation**

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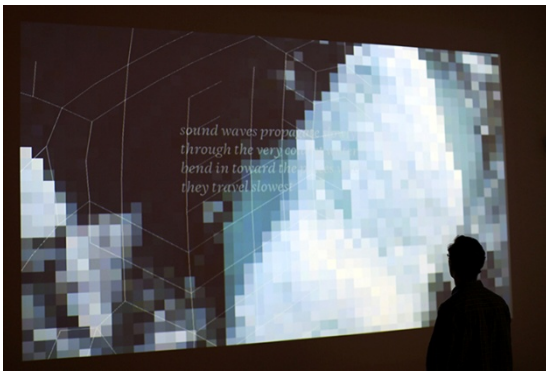
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**Abstract**

*Open Waters [Northwest Passage & Polar Sea]* is an interdisciplinary, interactive multimedia art work inspired by a five-hundred-year history of expeditions that sought to find the Arctic Northwest Passage and Open Polar Sea. The work blends together this rich history with twenty-first century realities of environmental and geopolitical change at the top of the Northern hemisphere.

Through a constellation of interconnected pieces including an interactive book and interactive wall projection, the *Open Waters* exhibit seeks to echo aesthetically the ecological and other change affecting the Arctic cryosphere and to offer creative, analytic lenses through which to understand what is occurring there and how we got to this juncture. The installation scrutinizes and reworks a number of discursive and visual genres across disciplines, to expose both how they have represented the Arctic's realities and potentialities and how they have consequentially intervened in their unfolding.



An interactive artist book features a suite of archival poems on Arctic exploration, politics, and ecological change. Across the double-page spread, containing printed poems, appears projected digital generative art consisting of fading poetic text

and animated phrases that coalesce and then fade away (or melt). As the viewer/reader turns the pages of this unique, print-digital hybrid book, RFID tags imbedded in each page signal a sensor that in turn signals a computer to "turn" the projected digital page. The interactive back wall of the gallery combine video and audio generative works that, using a Kinect motion sensor, respond to the activity present in the room, evoking the effects of human disruption of the Arctic environment.

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**Key words:** Generative Art, Interactivity, Digital Poetics

## ***Open Waters [Northwest Passage & Polar Sea]***

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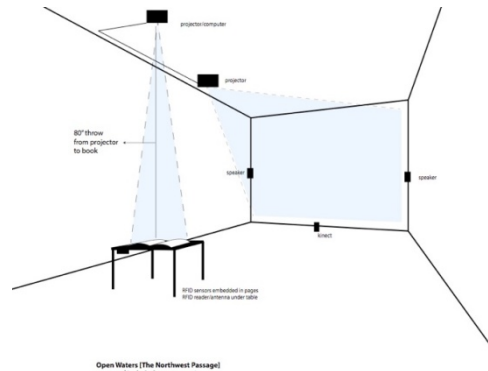


Figure 1 Open Waters Gallery Layout

Open Waters was created for and organized in association with the Brown University Arts Initiative symposium titled *Polar Opposites: Creative Interventions in the Arctic and Antarctica*, April 2018. *Open Waters* transforms the gallery into an ambient environment, produced in large part through generative artworks. Visitor interactions, both intentional and involuntary, with these generative ensembles triggers audio-visual events that shape the gallery space and happen differently each time they occur.

## 1. Background Collaboration

*Open Waters [Northwest Passage & Polar Sea]* is the most recent artistic collaboration between the authors, and is part of a series of works focused on the Arctic and Antarctic. A previous collaboration, *Ice Core Modulations: Performative Digital Poetics* was featured at the 2015 Generative Art Conference (among other venues) and included imagery and poetic fragments inspired, generated and controlled via historical Antarctic CO<sub>2</sub> data taken from ice core samples made available from the National Snow and Ice Data Center (NSIDC). These collaborations build on a series of prior works involving several of the authors that have focused on creative approaches to visualizing and sonifying data, generative and interactive audio-visual works involving place and personal narratives, and the synergistic rendering of a creative idea in multiple digital and physical media.

As a collaborative goal, *Open Waters* seeks to create a body of artistic work that is a semantically rich landscape containing simultaneity of disparate yet complementary disciplinary perspectives connected to the historical and evolving conceptions of the Northwest Passage and Open Polar Sea. To create a common source vocabulary for the collaboration, the creation of the work began with conduct in-depth historical research and gathering of archival and audio-visual source material. From this primary matter, poet Judith Goldman wrote a set of poems and poetic text fragments that other collaborators used in their respective media, rendering the phrases typographically, programming their behavior in generated audio-visual projections, and subjecting spoken recording of the phrases to dynamic audio processing.

## 2. Historical Inspiration, Current Climate Data and Source Material

Our title *Open Waters* is meant to capture multiple, productive contradictions on which our project reflects:

- The historical irony that the Northwest Passage, once so ice-impacted it was thought to be mythical, is now traversable by commercial transport vessels and cruise ships alike
- The longstanding, Western, tragic-Romantic fantasy of a polar paradise and “Open Polar Sea” that was held tenaciously, against all evidence of the frozen, impassable state of the high north
- The contemporary conflict between, on one hand, scientific and indigenous perspectives focused on understanding, assessing, and halting ecological damage and, on the other, forces that see the rapidly melting Arctic as an opportunity for resource extraction, economic growth, and alterations of the parameters of political sovereignty.



Figure 2 Northwest Passage Routes



Figure 3 Gallery Wall Rendering of Northwest Passage Routes

In sixteenth-century Britain, the spatial technology of a Northwest Passage (Figure 2) was central to the inception of globalization and imperialism, while the Arctic, as a region where climate change is amplified and accelerated, is emerging as a focal point of the Anthropocene era. The interconnected pieces of the *Open Waters* installation (Figure 3) thematically and formally echo, in a number of modes, the process of ecological and other change affecting the Arctic cryosphere.

The gallery's media ecology also reflects the collaborative structure and process of researching and creating *Open Waters*. Our primary sources include archival documents, travel narratives, ship's manifests, personal letters and memoir, contemporary science articles, historical maps, government policy statements, trade journals, newspaper headlines, data sets, recorded environmental sound, and stock and drone video footage. Some of our primary materials have been created, rather than sourced, such as the visual vocabulary of aesthetic ice-forms and the Processing language programs for the digital media. From this primary matter, we have made poems, book components, processed and mixed audio tracks, data visualizations as digital graphics, processed video segments.

### 3. Poetic Elements and Processes

The twelve poetic texts written for *Open Waters* are original, research-based poems composed by Judith Goldman, through scholarly-aesthetic exploration of the historical archive of works of literacy, documentary, scientific, and political on the Northwest Passage and the Arctic realm. The poems are informed by contemporary scientific literatures on climate change and ice loss in the Arctic; engineering and economic literatures on the feasibility of new routes of transport/shipping; and legal literatures on contemporary questions of sovereignty among nations and indigenous claims.

Major themes of the poems include:

- The long history of extractive capitalism in the polar north, told through the exploits of Martin Frobisher and James Knight,
- Changes in the global ocean current system, due to desalinization through glacial melt,
- New plans around global transport of commodities using various polar routes, Arctic cruise tourism, and the effects of pollution on wildlife,
- The expeditions of John Franklin and the search for his lost expedition,
- Emily Dickinson's abiding interest in polar travel and imagery, and
- Contemporary Arctic geopolitics.

Written specifically for the print-digital hybrid structure of the interactive book (Figure 5), the poems are organized in thematic or topical "vignettes," with each vignette taking up a verso-recto page (double-page) spread, with some of the text appearing in print and some digitally projected. Phrases from the poems appear in the gallery as vinyl printed forms on the walls and are incorporated into the digital projection on the gallery's back wall.

After the poems were written, the collaborators selected textual fragments to feature in their work. Specifically:

- Each two-page spread of the book featured one of the poems and used 'fixed' poetic fragments with typographic layout and formats designed by the visual artist,
- For each spread, 'dynamic' poetic texts were programmed in Processing with generative spawning and behaviour logic as to when and where they would appear and how they would evolve over time, and
- Texts were recorded by the poet and then subjected to sound processing for use in the audio-visual wall projection.

Figure 4 presents an excerpt from the poem "Open Water Fetch".

open water fetch in the Arctic sea & swell depend  
on open water **fetch** air-water-ice interface ocean surface  
waves (sea & swell) generated by winds blowing over distance **{fetch}**  
waves develop beyond pure wind seas, evolve  
into (swells)  
long waves resulting  
from nonlocal winds  
remain tied to available **fetch**

swell waves accumulate energy  
in the wind sea wave energy scales w/**fetch**  
**{space required to build a swell}**

ice can suppress waves distance available for wave  
evolution  
**wave energy scatters**

**Beaufort Sea:** ice-covered in summer: no waves to measure  
reduction in seasonal ice cover results in larger waves **waves break**  
up sea ice **accelerate**  
ice retreat  
results in larger  
waves break  
up sea ice  
**accelerate**  
ice retreat results in larger  
~ waves

Figure 4 Excerpt from "Open Water Fetch" poem

#### 4. Interactive Book of Poetry

The main component of the gallery installation is a large format (65x65cm) hardbound interactive thirty-page artist book featuring a suite of twelve poems. The book is bound with a screw-post binding allowing for flexibility in adding/changing pages for future iterations. The book cover is inlaid with hand-marbled endpapers made from facsimile historical maps of the Northwest Passage. Embedded in each left side page of each double-page spread is an Radio Frequency Identification (RFID) tag that is recognized by a RFID reader positioned within the left side of the table. As the reader turns the page, the tag is recognized by the RFID reader and sends data to the computer (positioned inside the table), which then generates corresponding graphics, and poetic texts that are projected onto the open pages of the book.

The components of the projected information, generated by Processing software, include various sized text phrases, and ice graphical imagery blue triangular clusters, and perspectival line art (**Errore. L'origine riferimento non è stata trovata.**Figure 5). These dynamic visual elements are designed to interact and move around in relation to the fixed text on the page. Different behaviours are assigned to each element; certain text passages are formed from coalescing granular particles before dissolving and fading out. The non-textual imagery evokes qualities of ice, from the translucent blue and surface cracks of frozen lakes to the drifting of icebergs retreating from a glacier.

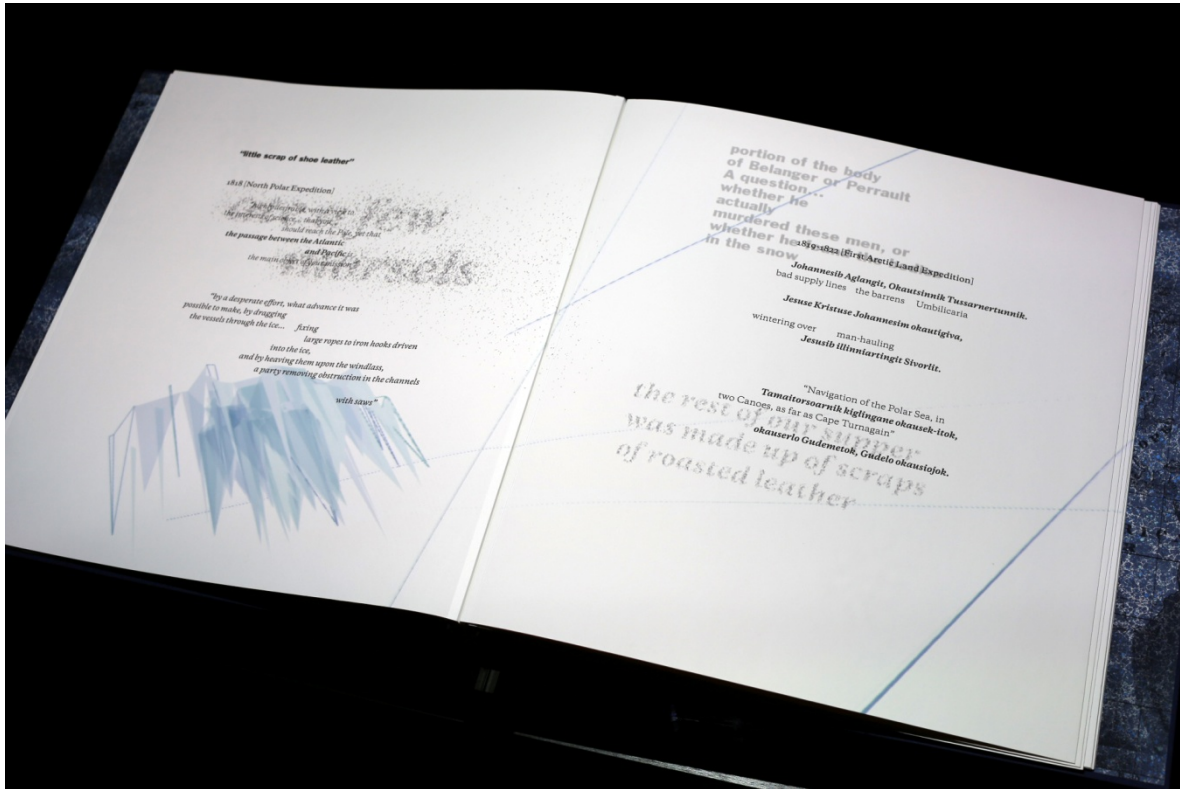


Figure 5 Interactive Book showing fixed printed and dynamic projected elements

Similar to erasure poetry forms, the projected generative typographic elements intentionally obscure and “overprint” the printed text on the page changing the meaning and emphasis of the poem. The projected text and graphics are designed to enter and exit the pages slowly allowing the reader to engage in complex readings. The poetic text and animated granulated phrases slowly appear, coalesce, and then fade away (or melt). Ice cluster forms appear across the pages, briefly obscuring the text. Because the digital text complementing a particular print page changes with every reading, generated by algorithmic selection from materials matched to that page, the book is different each time it is read. By combining physical interfaces with typographical information in a hybrid environment, this piece explores new ways of receiving and reading information.

## 5. Interactive Visual/Sonic Wall Projection

The interactive back wall of the gallery combines video and audio works that, using a Kinect motion sensor, respond to the activity present in the room, evoking the effects of human disruption of the Arctic environment. The video projection (Figure 6) introduces drone footage segments of Alaskan and Greenland glacial and meltwater, as well as footage from a United States Coast Guard icebreaker. This footage is combined with animated, digital graphic vignettes that combine mesh-structures based on climate data with visual poetic language that is generatively processed/alterd through a program whose algorithm is based on ice loss and other data from the National Snow and Ice Data Center.

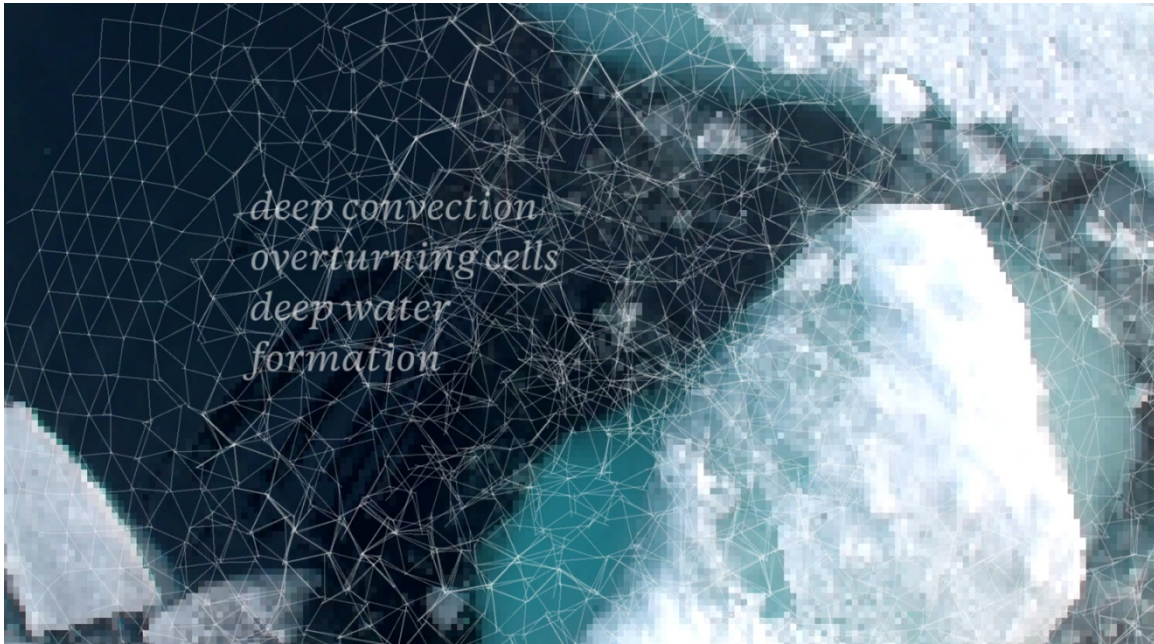


Figure 6 Back Wall Projection

Movement in the room is detected by a Kinect sensor and granulates the video, amplifies the movements of the mesh-structures (Figure 7.)

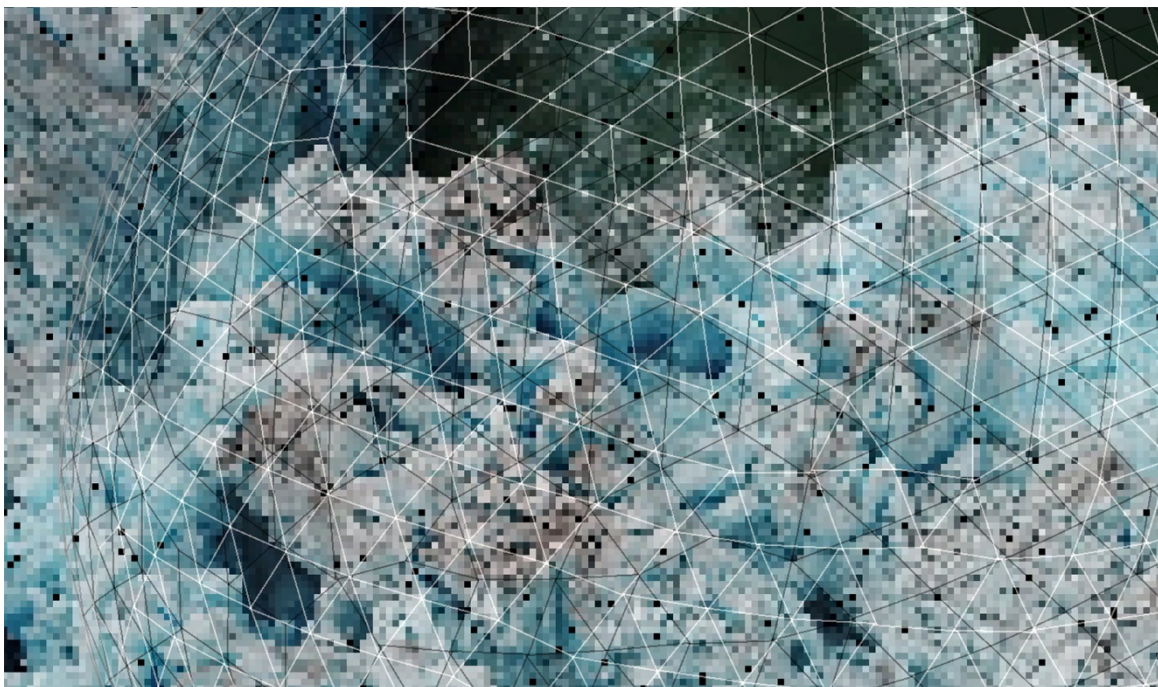


Figure 7 Video Processing based on Kinect Gesture Sensing

The audio embodies a long, multi-layered loop made of processed sonic material from the Arctic landscape (flowing water, glacial calving, whales, sonar, and industrial sonic pollution) and spoken language that includes poetic excerpts and interview responses about Arctic Policy taken from a faculty member of the US Coast Guard Academy. Against this sonic backdrop, audience motion triggers audio events of ice cracking that intensify with increased visitor presence and activity.

The generative behaviours triggered by the Kinect motion sensing are based on an estimation of the number of people in the room and gestural detection of left and right oriented gestures. New



visitors and gestures lead to sequences of video granulation (in proportion to the number of people in the room) and activity over short periods of time, returning to a recognizable video background as activity subsides.

## **6. Summary and Future Directions**

The collaborative intent of *Open Waters [Northwest Passage & Polar Sea]* project allowed for interdisciplinary synergy between a creative team spanning poetry, computer science, electronic sound composition, and visual art, expanding the technological and creative means by which the historical information about the arctic could be conveyed and expressed. Our collaborative team plans on an ongoing series of installations that bring art and science together immersively and interactively to educate the public about the Northwest Passage: its status as an important strand in the history of globalization; its potential to reconfigure contemporary networks of global relations; its function as a bellwether of the transformation of Earth systems. We are confirmed to exhibit a version of this work in 2019 at the Burchfield Penny Museum in Buffalo, New York. We plan to travel this research to other exhibition spaces and will transform its components both to continue to explore dimensions of the Northwest Passage/Arctic and to make each installation site- and public-specific.

## **References**

The complete booklet containing all references for this work can be found at:

<https://www.conncoll.edu/andrea-wollensak/open-waters-northwest-passage--polar-sea/>

Open Waters project links:

<https://www.conncoll.edu/andrea-wollensak/open-waters-northwest-passage--polar-sea/>

Brown University Arts Initiative Promotional Brochure (page 8)

<https://arts.brown.edu/sites/default/files/documents/2017-08/BAI%20FY18%20Season%20Brochure%20FINAL%20LOW%20RES%20FOR%20WEB.pdf>

Brown University POLAR OPPOSITES: CREATIVE INTERVENTIONS IN THE ARCTIC AND ANTARCTICA (conference and exhibition April 5-6, 2018)

<https://sites.google.com/a/brown.edu/polar-opposites/schedule>