Making The Invisible Visible: How an artist can translate/transform scientific data into a comprehensible visual language

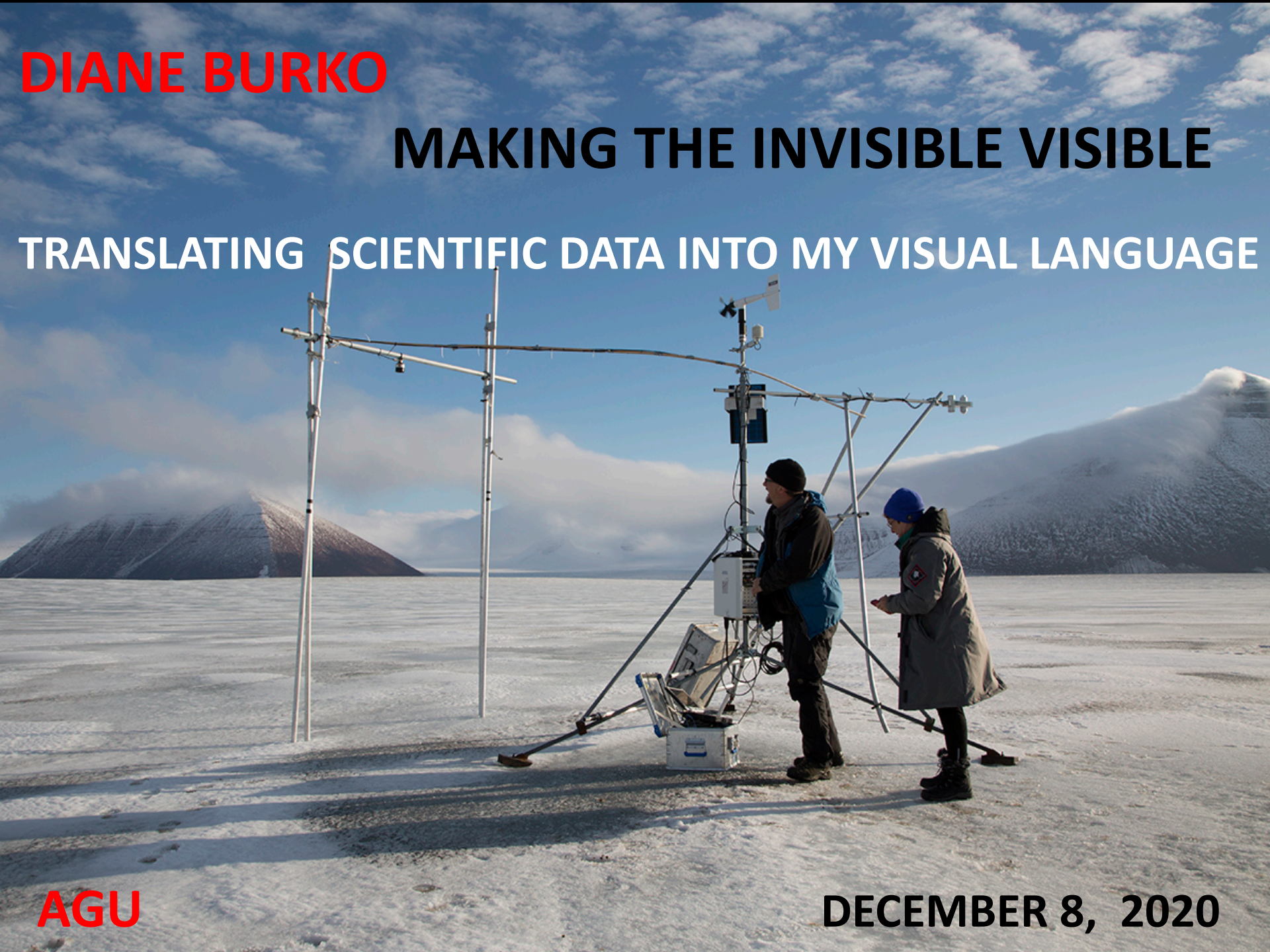
Diane Burko[1]

[1]Community College of Philadelphia

November 21, 2022

Abstract

While Artistic techniques may help scientists visualize data and communicate results to their colleagues, I believe the Arts can play a more significant role in communicating scientific information to the general public. Modes of presentation of information determine the impact of reception. Data on a page or screen is received cerebrally. Psychologists posit that concepts received emotionally can have a more lasting, deeper impact on an audience. That is what the arts (film, dance, drama, painting) can achieve. My paper will demonstrate through a particular project that concept. It will involve the presentation of a recent 56 foot long piece I've completed called "THE WORLD MAP SERIES" : https://www.dianeburko.com/new-page-1m which speaks to the impact of Climate Change on glaciers and coral reefs. This 10-part series represents my bearing witness to melting ice and coral bleaching, as well as exchanges with glaciologists and marine biologists over the past few years. It will also serve as an example of the artistic process.



DIANE BURKO

MAKING THE INVISIBLE VISIBLE

TRANSLATING SCIENTIFIC DATA INTO MY VISUAL LANGUAGE

AGU

DECEMBER 8, 2020

ARTIST

1980, On Cliffs of Etretat –
Giverny Residency Center Residency

IN THE LANDSCAPE

1993, at Casa Rosa Studio on Lake Lecco
Rockefeller Study and Conference


IT BEGAN WITH THE “LANDSCAPE”
GIVERNY, RESIDENCY, MONET’S GARDEN,

FIRST FLIGHT WITH JIM TURRELL 1977 48 x 80 inches

VOLCAN POAS #4a + 4b 1998 84 x 120 inches

PALAMI PALI #5 2001 60 x 96 inches

GODAFOSS #6 2004 60 x 96 inches

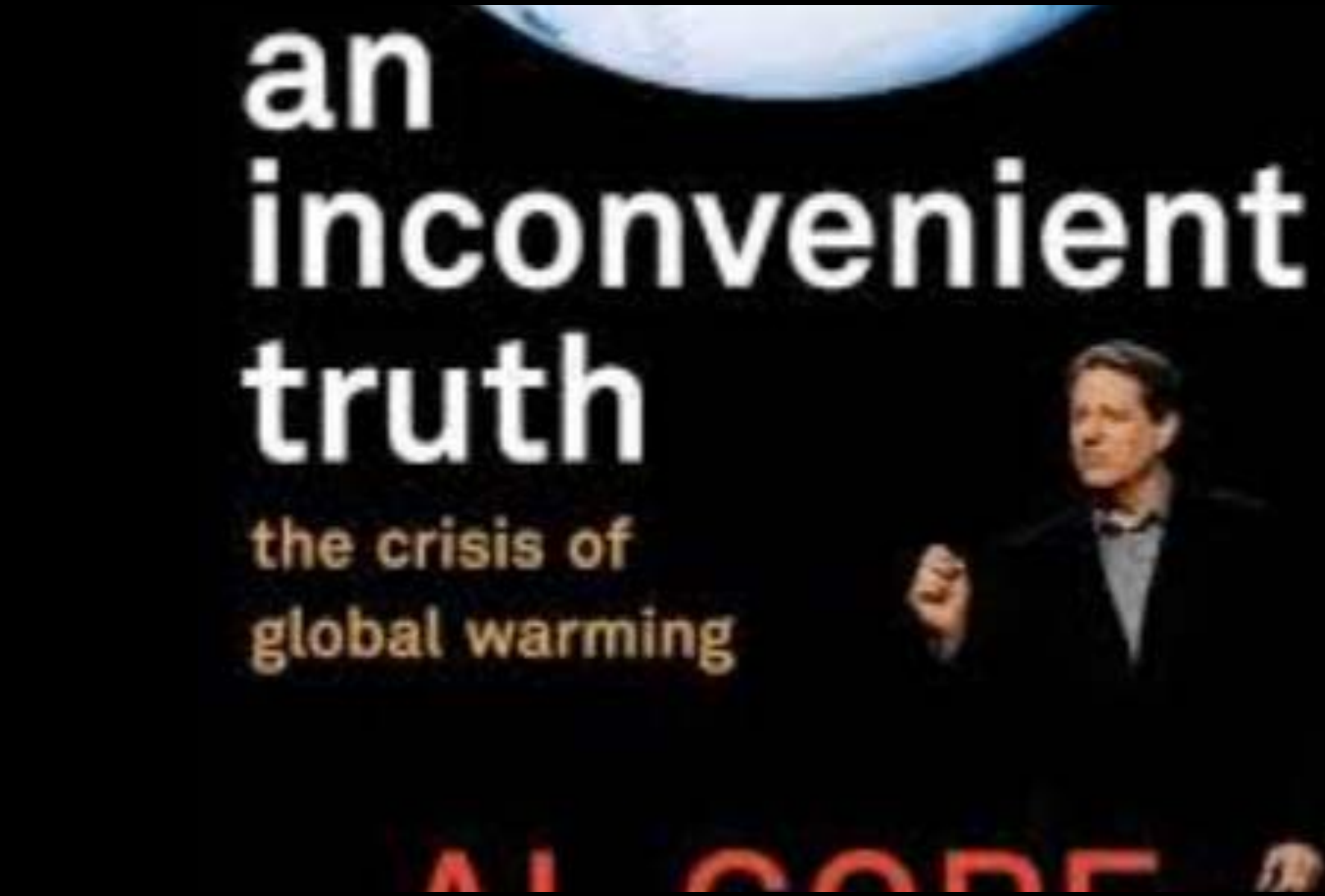
SPERRY 1 2011 40 x 60 inches

from

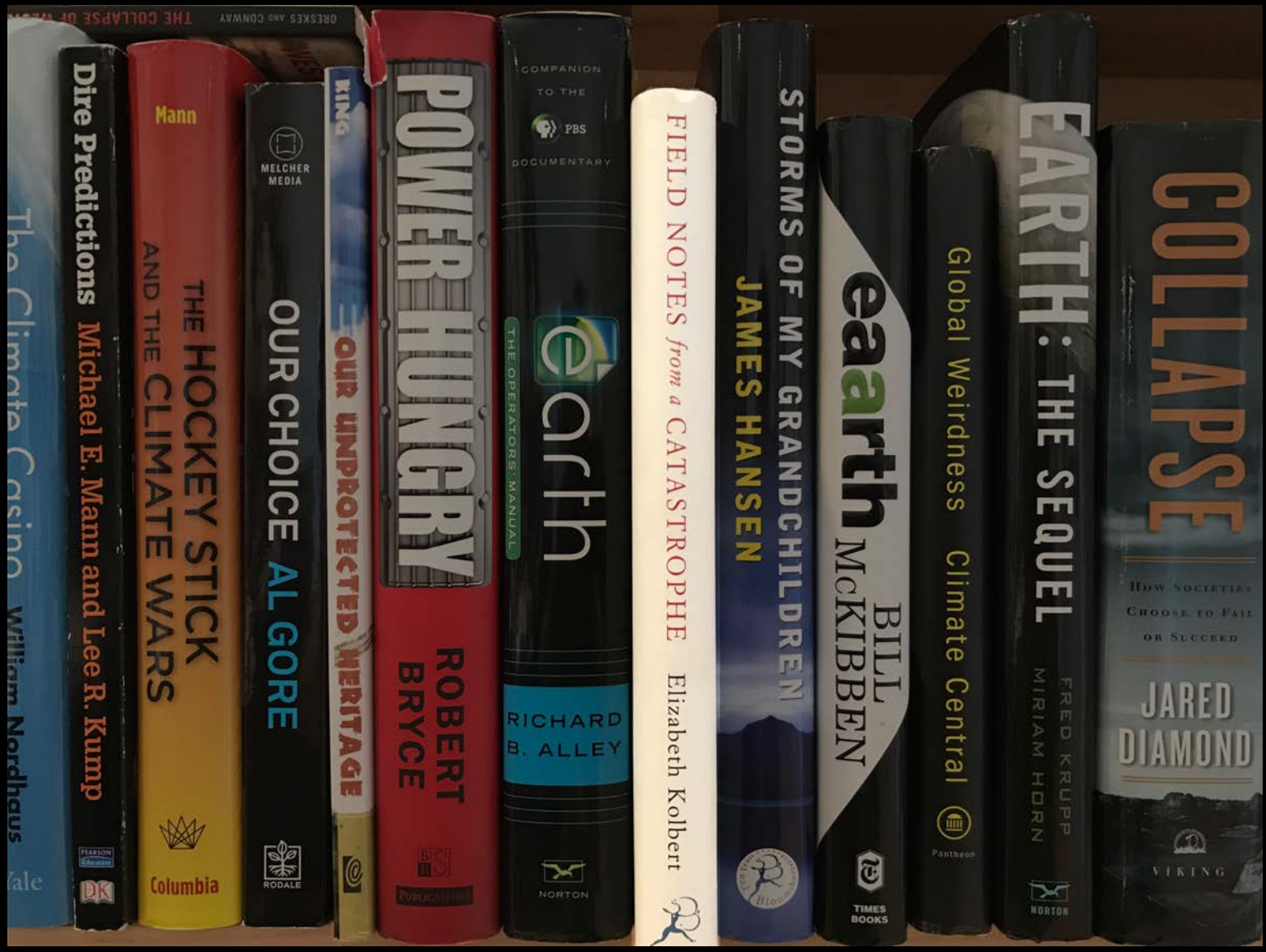
LANDSCAPE to the ENVIRONMENT: CLIMATE CHANGE

Installation *FLOW,* MICHENER MUSEUM 2006

GRAND JORASSES – POINTE MARGUERITE 1976 64 x 108 inches



AN INCONVENIENT TRUTH comes out in 2006



ELIZABETH KOLBERT: Field Notes on a Catastrophe

REPEAT PHOTOGRAPHY

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Climate Change in Mountain Ecosystems

USGS Repeat Photography Project Documents Retreating Glaciers in Glacier National Park

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View Repeat Photos

NOTE: Repeat Photo pages are best viewed on monitors set to at least 1280 pixels wide.

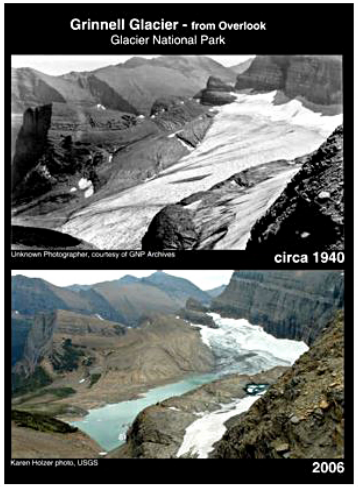
Glaciers

Agassiz (Boulder Pass)
Agassiz - terminus
Blackfoot-Jackson
Boulder
Boulder - Ice Cave
Boulder - Chapman Peak

Global Climate Change Background

Glacier National Park's namesake glaciers have receded rapidly since the Park's establishment in 1910, primarily due to long-term changes in regional and global climate. In the last century, the five warmest years have occurred in the last 8 years - in this order: 2005, 1998, 2002, 2003, 2004 (NASA). These changes include warming, particularly of daily minimum temperatures, and persistent droughts. This warming is ongoing and the loss of the Park's glaciers continues, with the park's glaciers predicted to disappear by 2030.

Repeat Photography Project Overview

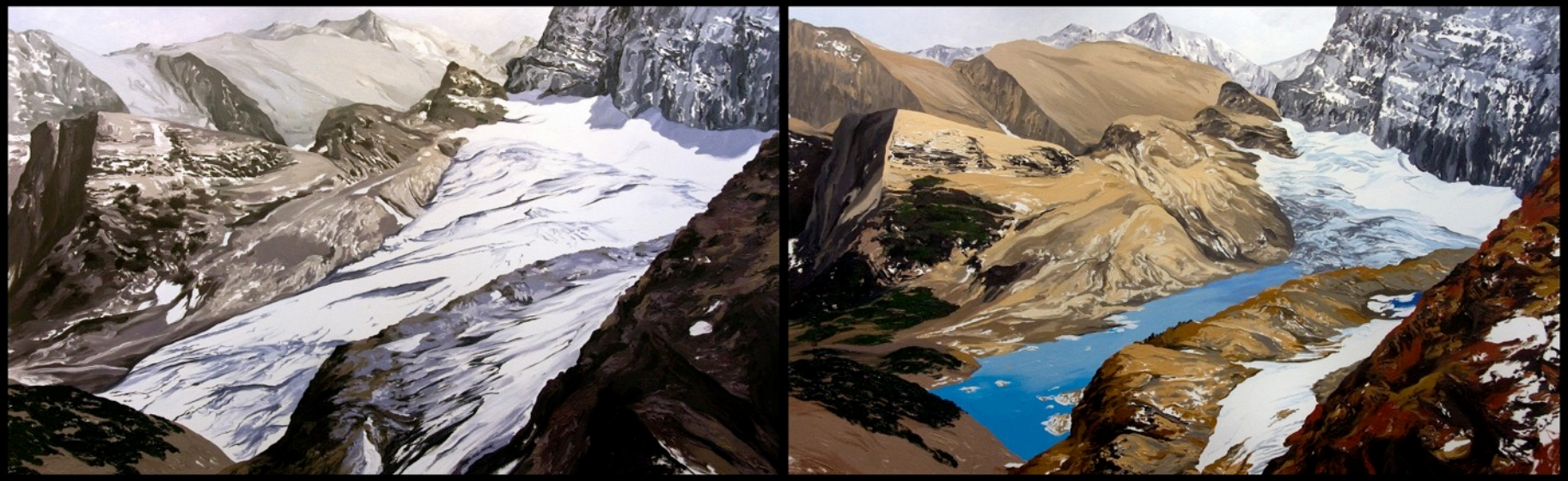


Climate change research in Glacier National Park, Montana entails many methods of documenting the landscape change, including the decline of the park's namesake glaciers. While less quantitative than other high-tech methods of recording glacial mass, depth, and rate of retreat, repeat photography has become a valuable tool for communicating effects of global warming. With evidence of worldwide glacial recession and modeled predictions that all of the park's glaciers will melt by the year 2030, USGS scientists have begun the task of documenting glacial decline through photography. The striking images created by pairing historic images with contemporary photos has given "global warming" a face and made "climate change" a relevant issue to viewers. The images are an effective visual means to help viewers understand that climate change contributes to the dynamic landscape changes so evident in Glacier National Park.

The Repeat Photography Project began in 1997 with a systematic search of the archives at Glacier National Park. We began searching for historic photographs of glaciers in the vast collection that spans over a century. Many high quality photographs exist from the parks' early photographers such as Morton Elrod, T.J. Hileman, Ted Marble, F.E. Matthes, and others who scoured the park to publicize it's beauty and earn their livings. Copies of the historic photos were taken in the field to help determine the exact location of the original photograph. Photographing the glaciers cannot occur until the previous winter's snow has melted on the glacial ice and when air quality conditions are considered at least good. This creates a narrow window in the northern clime of Glacier National Park where smoke from forest fires prevented photography on many occasions in the past few years.

Since 1997 over sixty photographs have been repeated of seventeen different glaciers. Thirteen of those glaciers have shown marked recession and some of the more intensely studied glaciers have proved to be just 1/3 of their estimated maximum size that occurred at the end of the Little Ice Age (circa 1850). In fact, only 26 named glaciers presently exist of the 150 glaciers present in 1850.

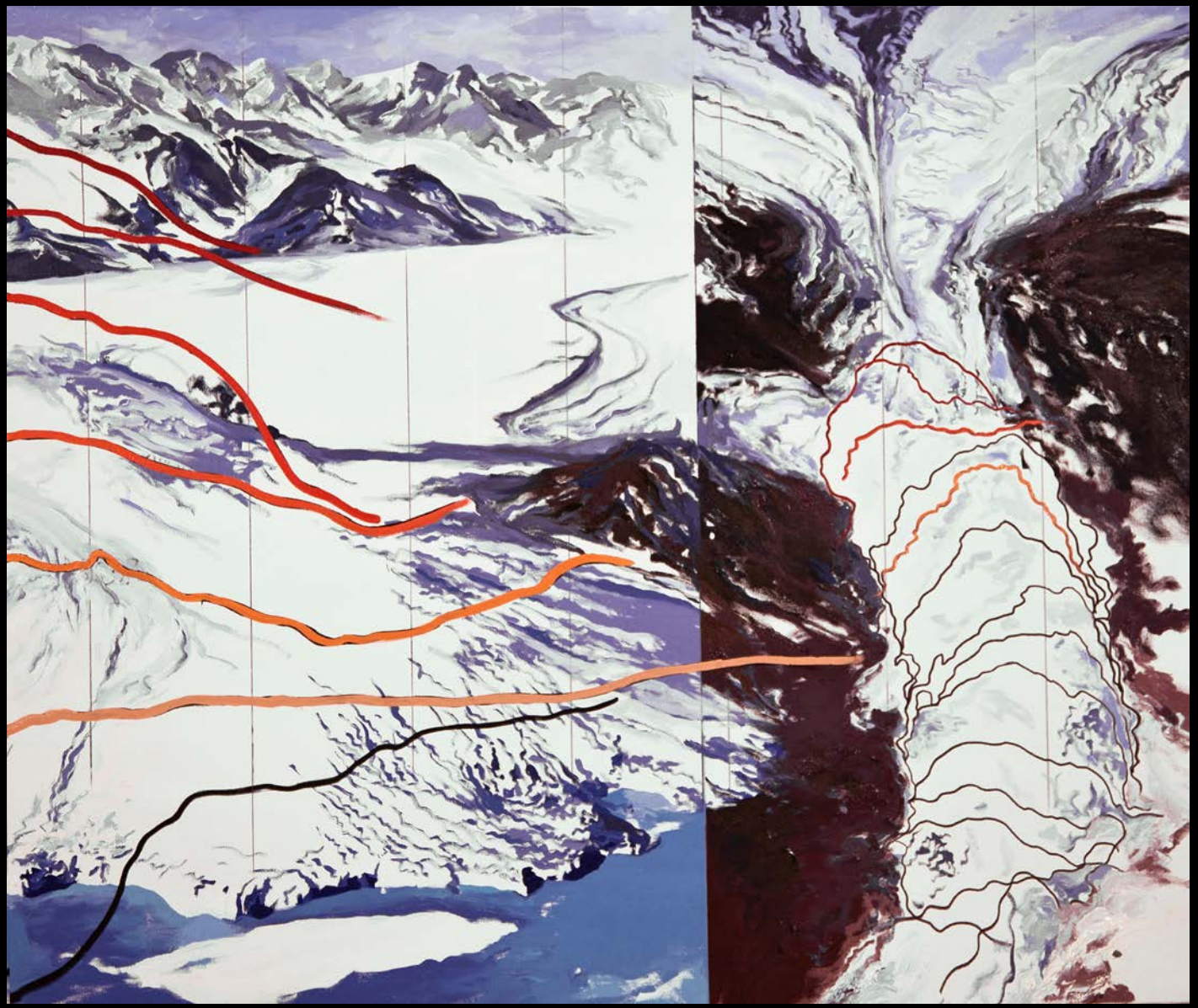
USGS: Glacier National Park Repeat Photography Project

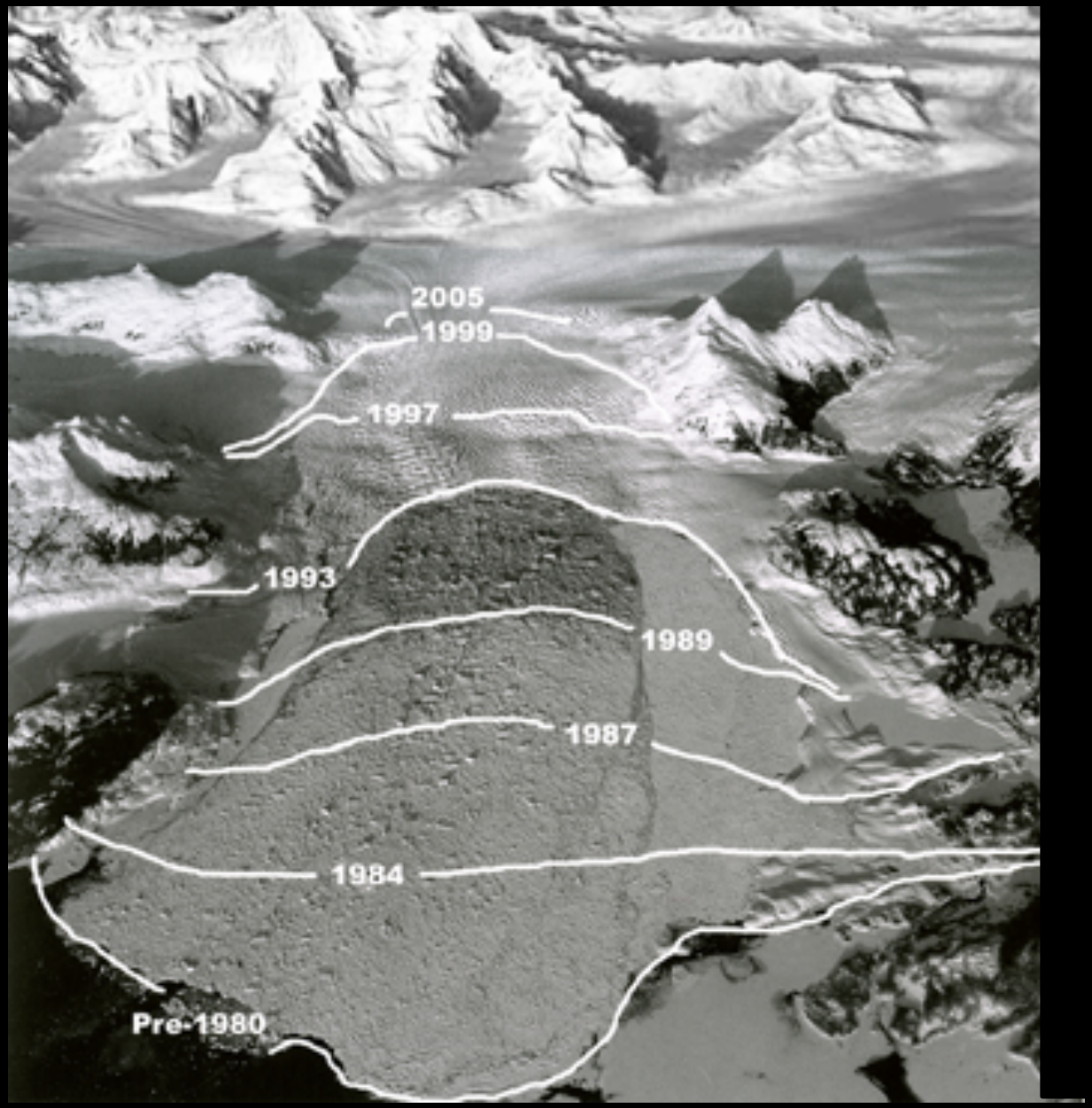


GRINNELL OVERLOOK #1, 1940 (GNP Archives);
GRINNELL OVERLOOK #2, 2006 (after Karen Holzer) 2009 50 x 162” overall

GRINNELL MT. GOULD #1, #2, #3, #4, 2009, 88”x200”

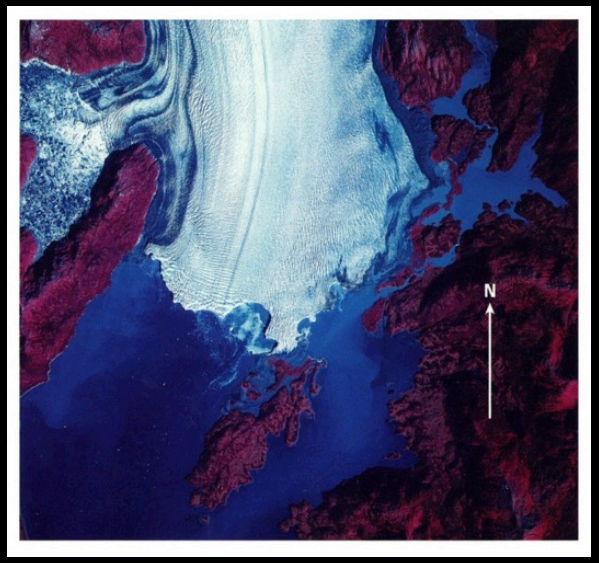
RECESSIONAL LINES



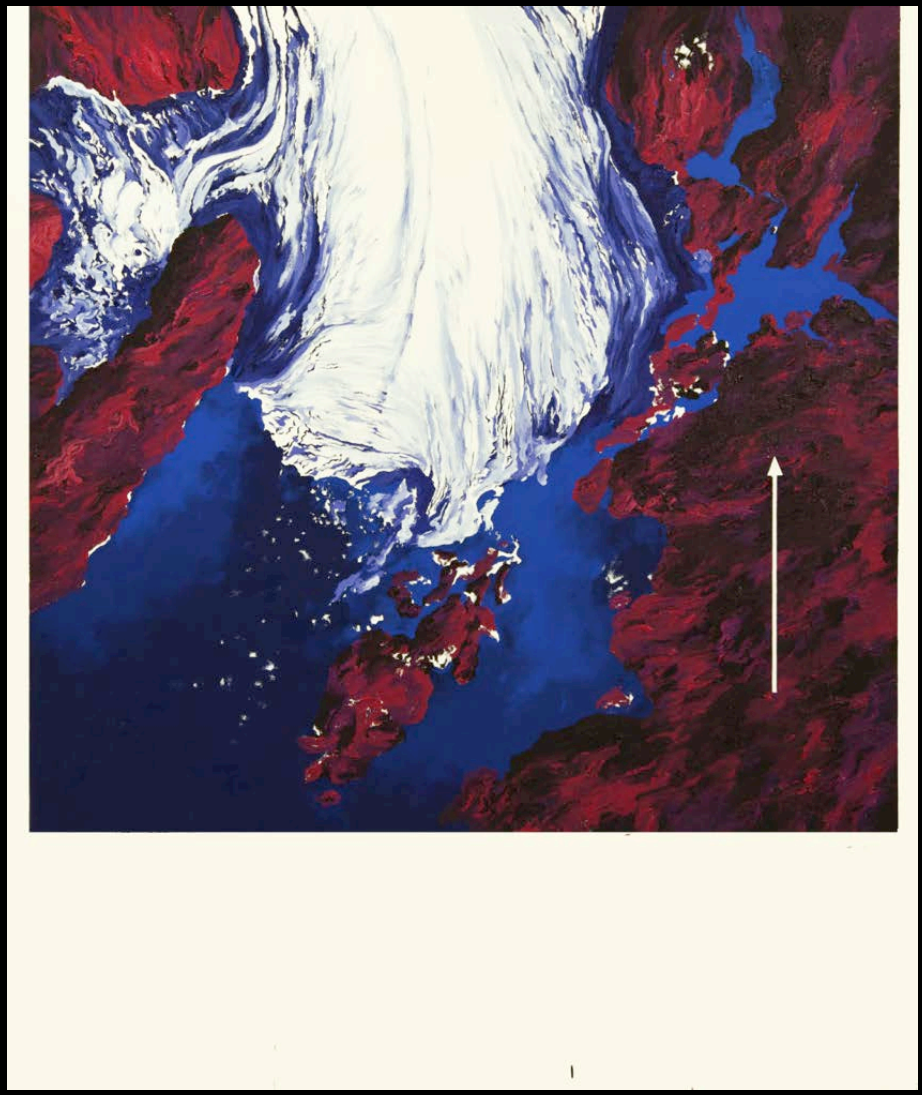


GLACIAL RECESSIONAL MAP combining images from Tad Pfeffer and Austin Post

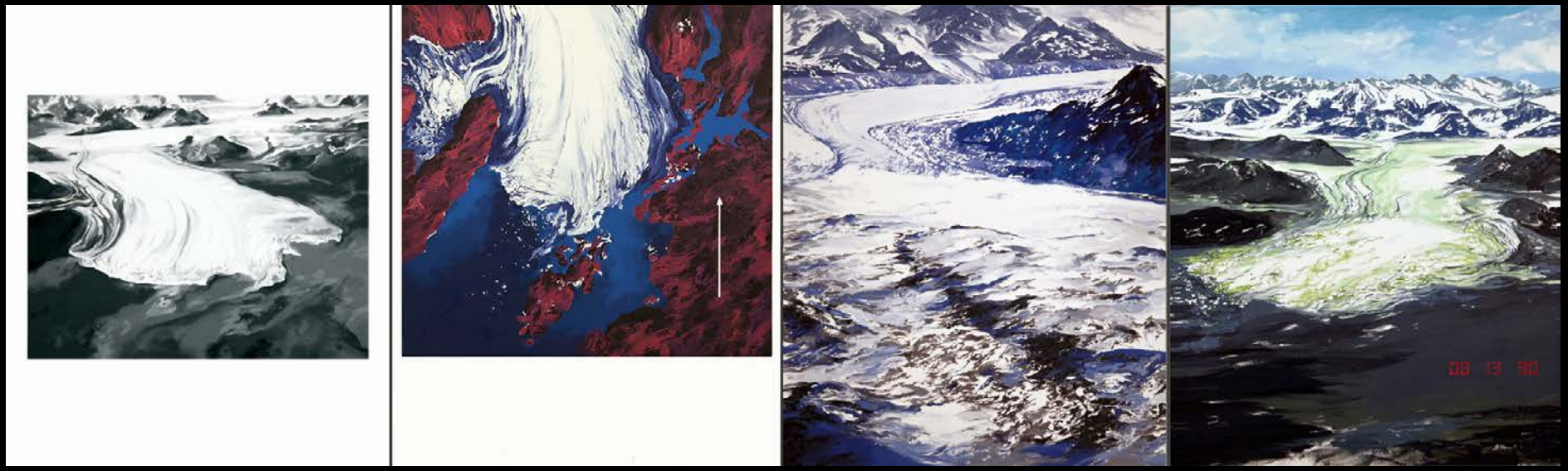
LANDSAT IMAGERY



Landsat map of Columbia Glacier



COLUMBIA GLACIER #2, 1978
(AHAP Aerial USGS)
2012 50 x 60 inches



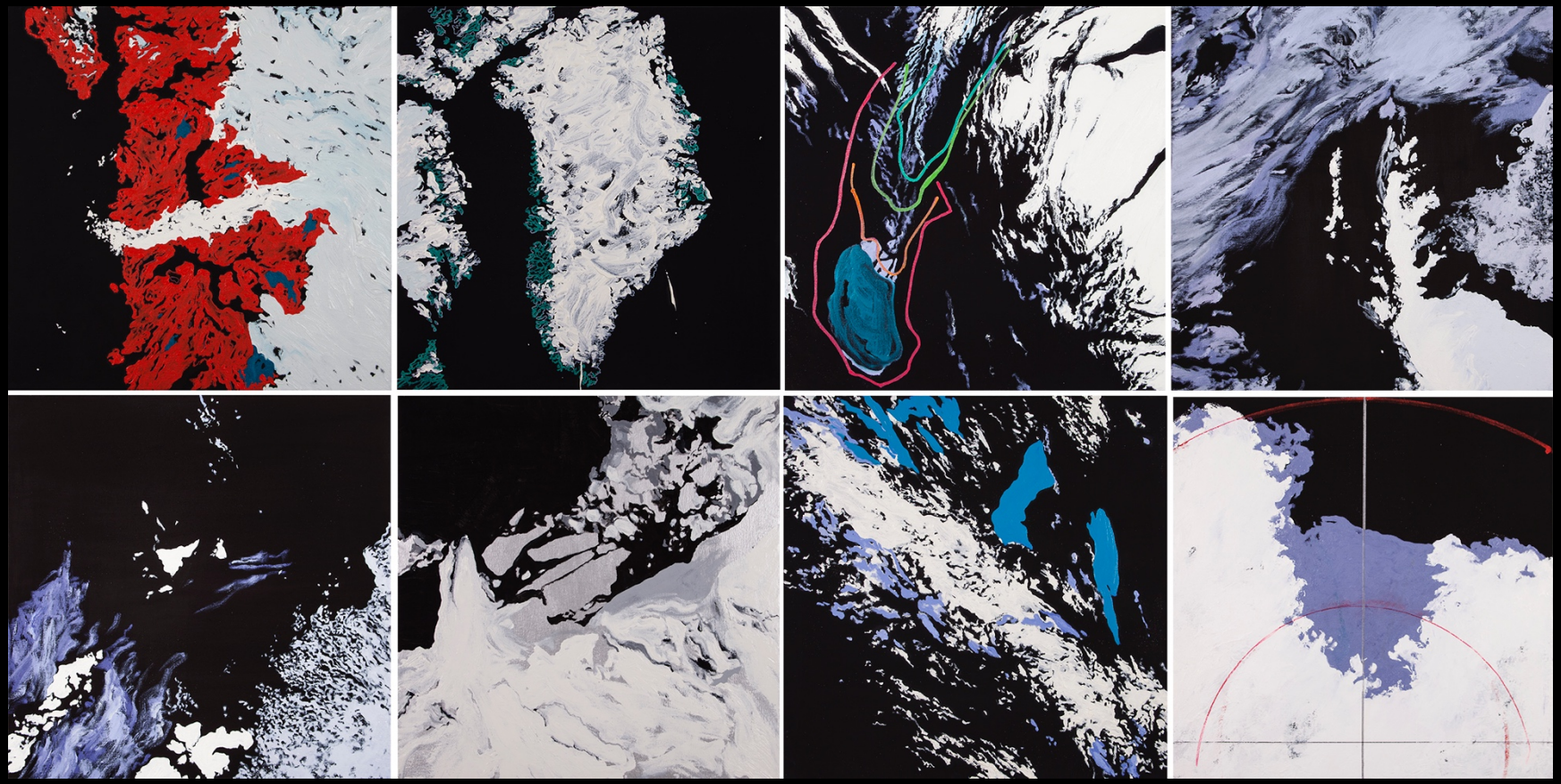
After BRADFORD WASHBURN 1938

after AHAP Aerial USGS 1978

after BRUCE MOLNIA 2010

after USGS 1990

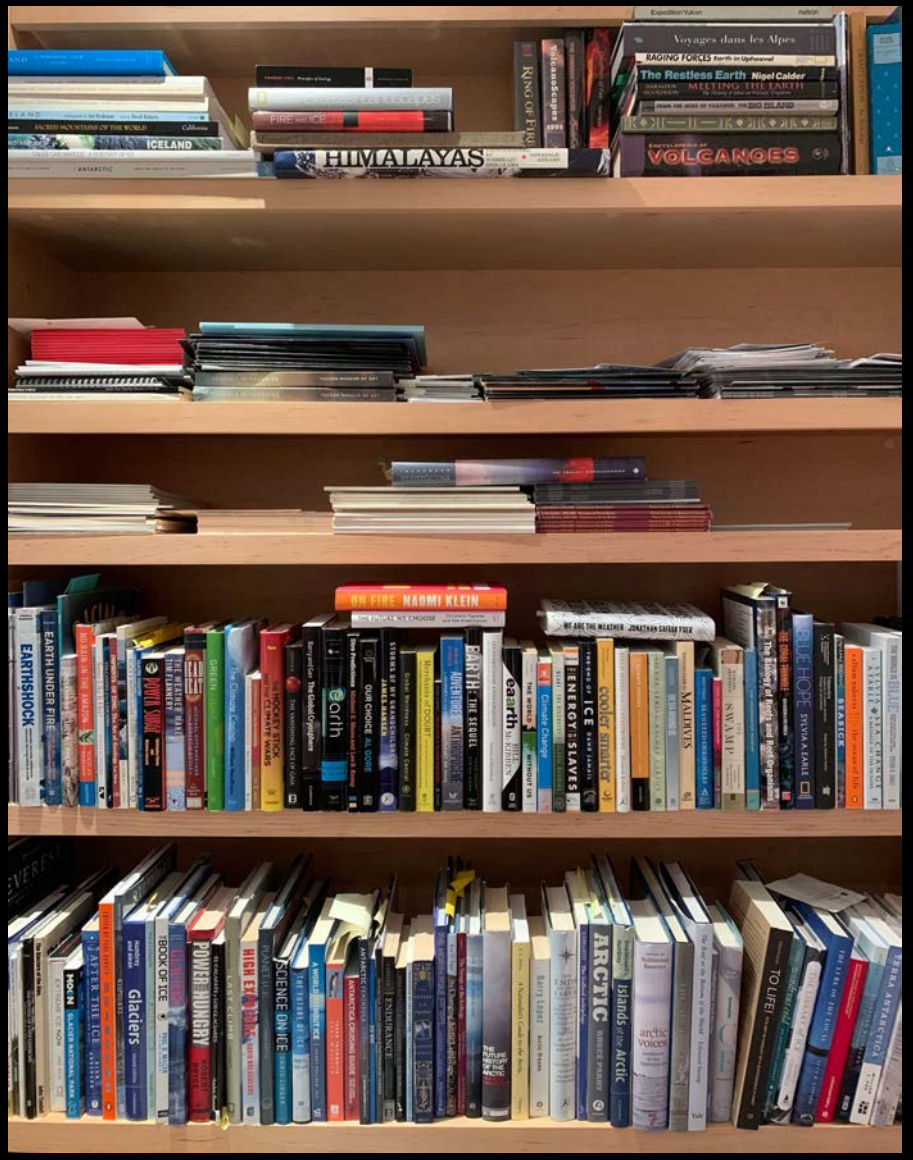
Columbia Glacier #1, #2, #3, #4, 60"x200”, **2011**



LANDSAT SERIES 1-8 2015 40x80 inches each

Installation, *VAST AND VANISHING*, Rowan University, 2-4, 2018

LEARNING FROM SCIENTISTS BY READING



Breakaway iceberg raises climate alarms

Four times size of manhattan

David Crossley, Aug 11, 10.

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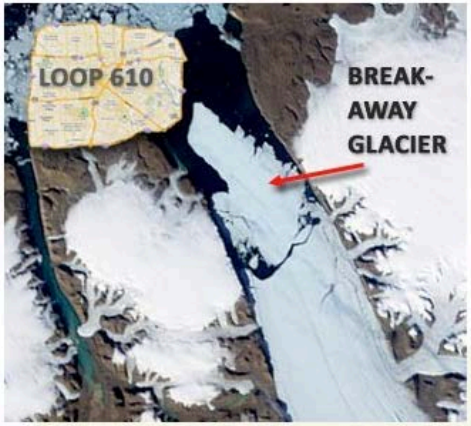

A chunk of ice only slightly smaller than the area of Loop 610 in Houston - four times the size of Manhattan - broke away from Greenland and ma drift toward shipping lanes in the North Atlantic and off the Canadian coast, according to researchers cited in a Bloomberg news story.

Other stories note that the glacier broke on the anniversary of global warming, that the Greenland ice sheet faces a "tipping point" in 10 years, and that "killer heat waves and retreating ice sheets" raise climate alarms.

From Bloomberg:

The 100-square mile ice island, with enough stored water to keep the Hudson River flowing for more than two years, split off from the Petermann Glacier last week, according to Andreas Muenchow, an associate professor of ocean science and engineering at the University of Delaware.

The ice is the largest to detach from an Arctic glacier since 1962 and follows the six warmest months on record. Glaciers in Greenland and Antarctica are melting faster than predicted, accelerating their march to the sea and adding to the rising ocean levels that threaten coastal communities worldwide, according to many scientific studies.

"So far, 2010 has been the hottest year on record, and scientists agree Arctic ice is a canary in a coal mine that provides clear warnings on climate," said U.S. Representative Edward Markey, a Democrat from Massachusetts and chairman of the Select Committee on Energy Independence and Global Warming, on the panel's website.

ABOUT PETERMANN GLACIER

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Where every day is Earth Day

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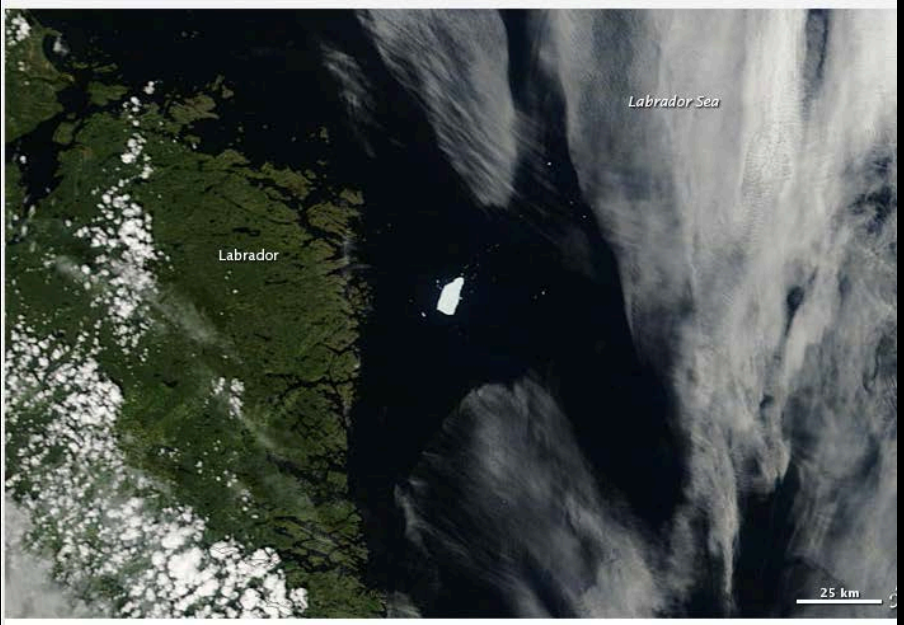


download large image (716 KB, JPEG, 2000x2600) acquired July 20, 2011
download GeoTIFF file (7 MB, TIFF, 2000x2600) acquired July 20, 2011
download Google Earth file (KMZ) acquired July 20, 2011

In August 2010, the Petermann Glacier along the northwestern coast of Greenland calved an ice island roughly four times the size of Manhattan. Nearly a year later, on July 20, 2011, a piece of that ice island—named Petermann Ice Island-A (PII-A) and about the same size as Manhattan—was still visible to the Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's Terra satellite.

The Canadian Ice Service (CIS) tracked the ice island as it drifted through the Labrador Sea. On July 8, 2011, the CIS reported that the PII-A was approximately 55 square kilometers (21 square miles), and was continuing to lose surface area through calving and melting. On July 20, MODIS observed PII-A slightly south of where it had been a month earlier.

On July 21, 2011, MSNBC reported that PII-A was slowly drifting toward Newfoundland. The glacier was not likely to reach land; its base would probably become grounded on the sea floor off the coast. The ice chunk did, however, pose a potential hazard for shipping lanes and offshore oil rigs.

References

Canadian Ice Service (2011, July 8). Petermann Ice Island Updates. Accessed July 22, 2011.
MSNBC. (2011, July 21). Massive ice island drifts toward Canada. Accessed July 22, 2011.

NASA image courtesy Jeff Schmaltz, MODIS Rapid Response, NASA Goddard Space Flight Center. Caption by Michon Scott

Entrance to the WALTON ARTS CENTER show, 2017

BEARING WITNESS

On Kronebreen Glacier, Svalbard 9/17/13

KRONEBREEN

GREENLAND

ANTARCTICA

NEW ZEALAND

INVESTIGATING GLACIAL MELT

NORTH

AND

SOUTH

2013

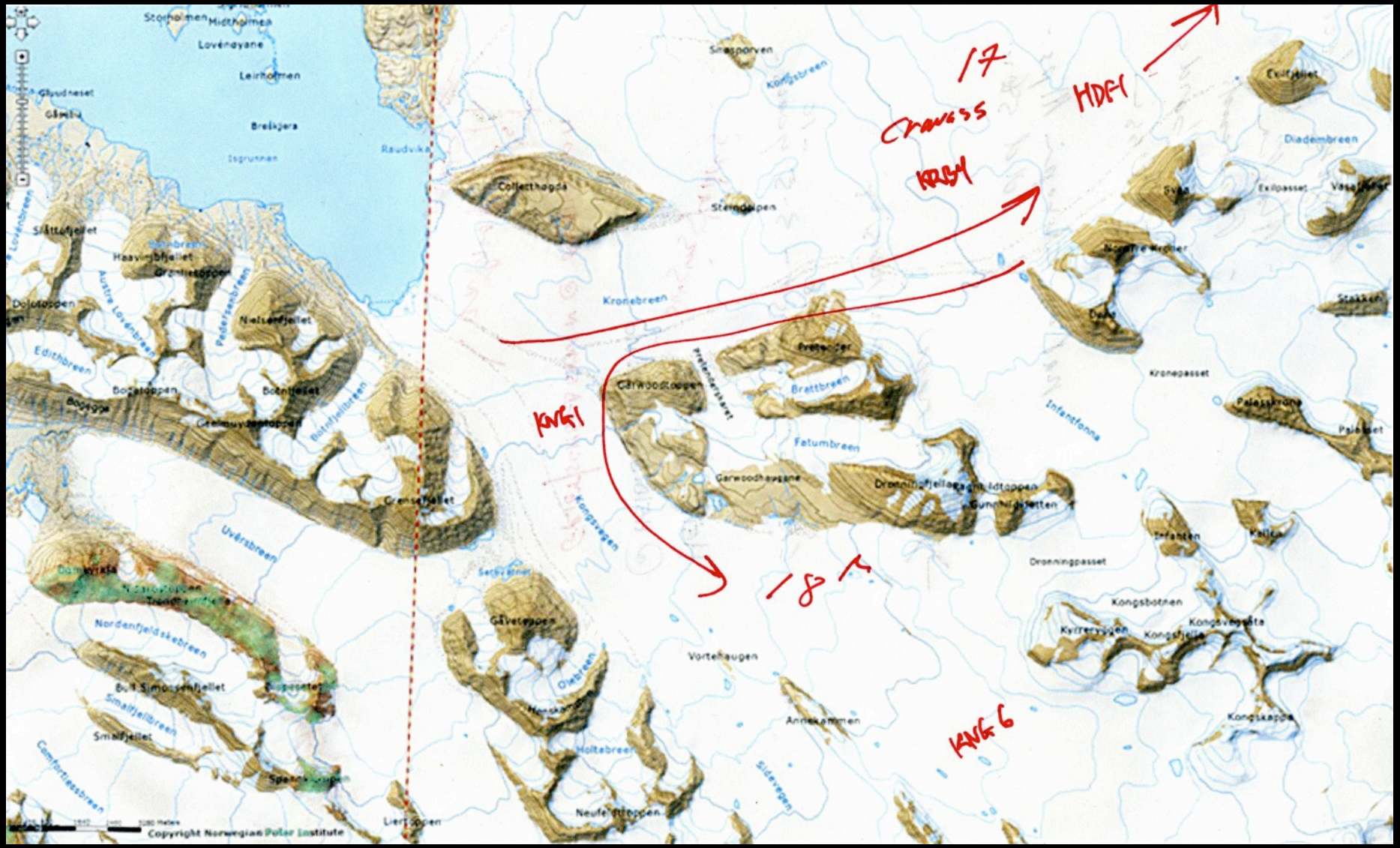
2014

2015

2017

ON RAUDFJORD BEACH OF ICE, September 2013

FLYING UP KRONEBREEN September 17, 2013



TOPOGRAPHICAL MAP

with notes of Kohler's flights on September 17th and 18th

STUDIO: 2014

GLACIAL SHIFTS, Bearing Witness to Climate Change, Walton Arts Center, Arkansas, 2017

LEARNING FROM SCIENTISTS IN THE FIELD

KRONEBREEN, SVALBARD, with Dr. Jack Kohler, NPI, September, 2013

LEARNING from SCIENTISTS at CONFERENCES

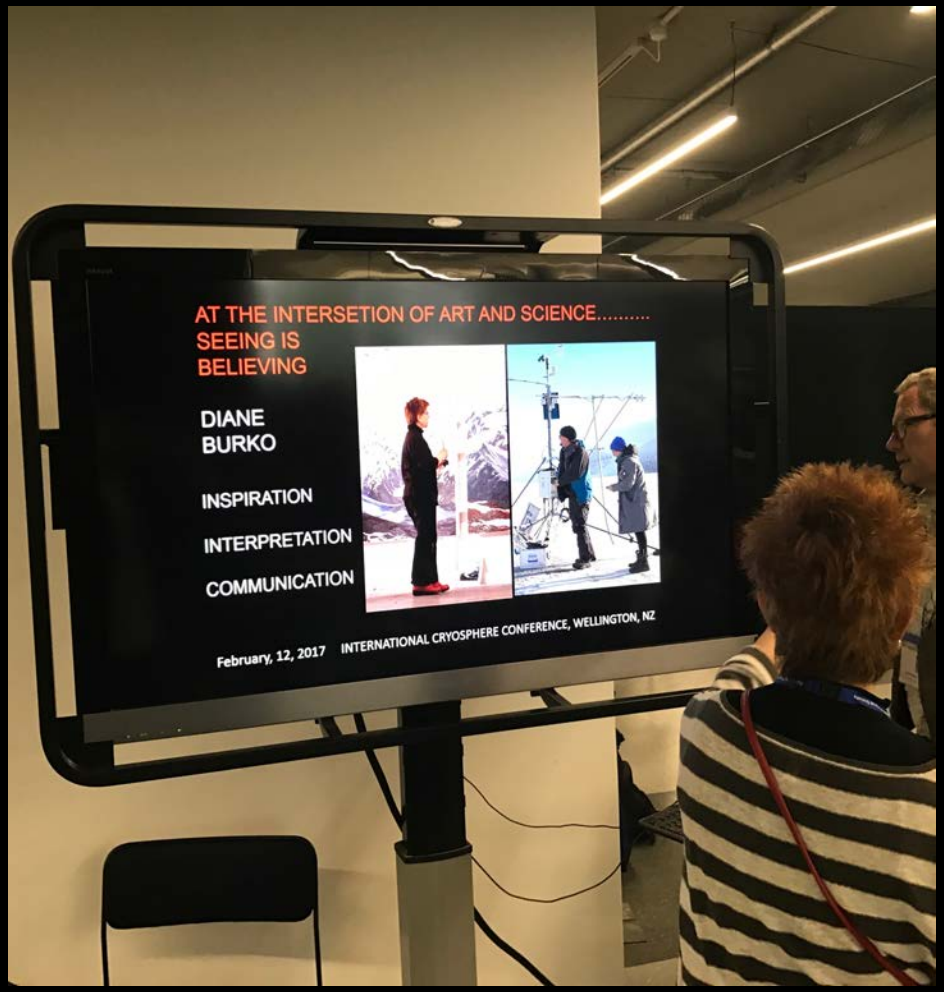
CLIMATE LITERACY:
The Arts as an Ally in Invoking Change
AGU
December 15, 2016

DIANE BURKO

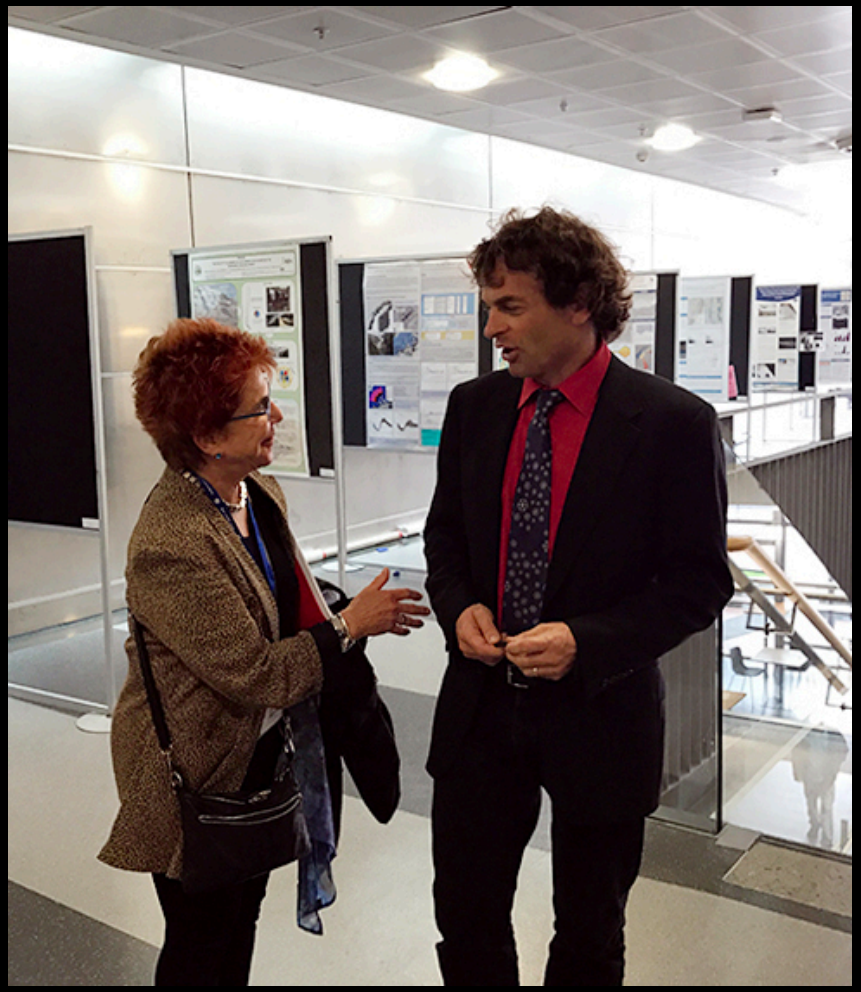
Engagement in Climate Change Awareness through

ART EXHIBITIONS

INTERNATIONAL CRYOSPHERE CONFERENCE, NZ, 2017



AT OPENING RECEPTION



SPEAKING WITH ERIC RIGNOT AFTER HIS KEYNOTE ADDRESS

DEMONSTRATION BY SCIENCE COMMUNITY AT AGU 2016

REFOCUSING ON THE OCEANS

OAHU

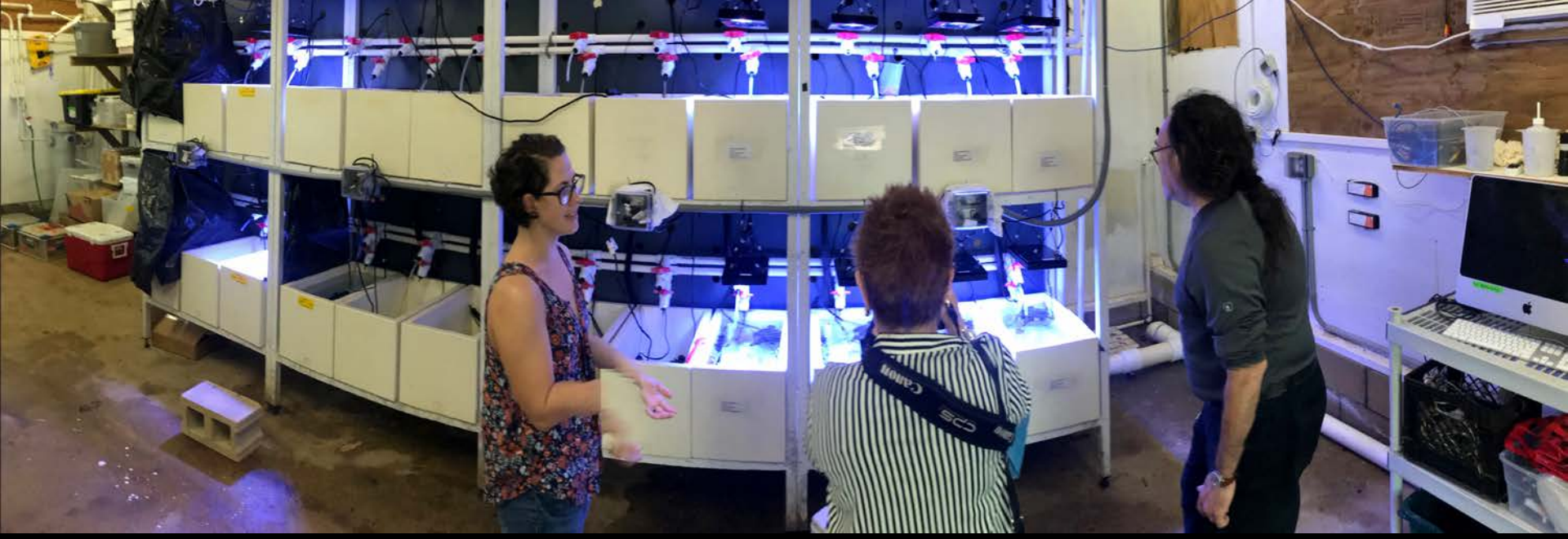
MOLOKAI

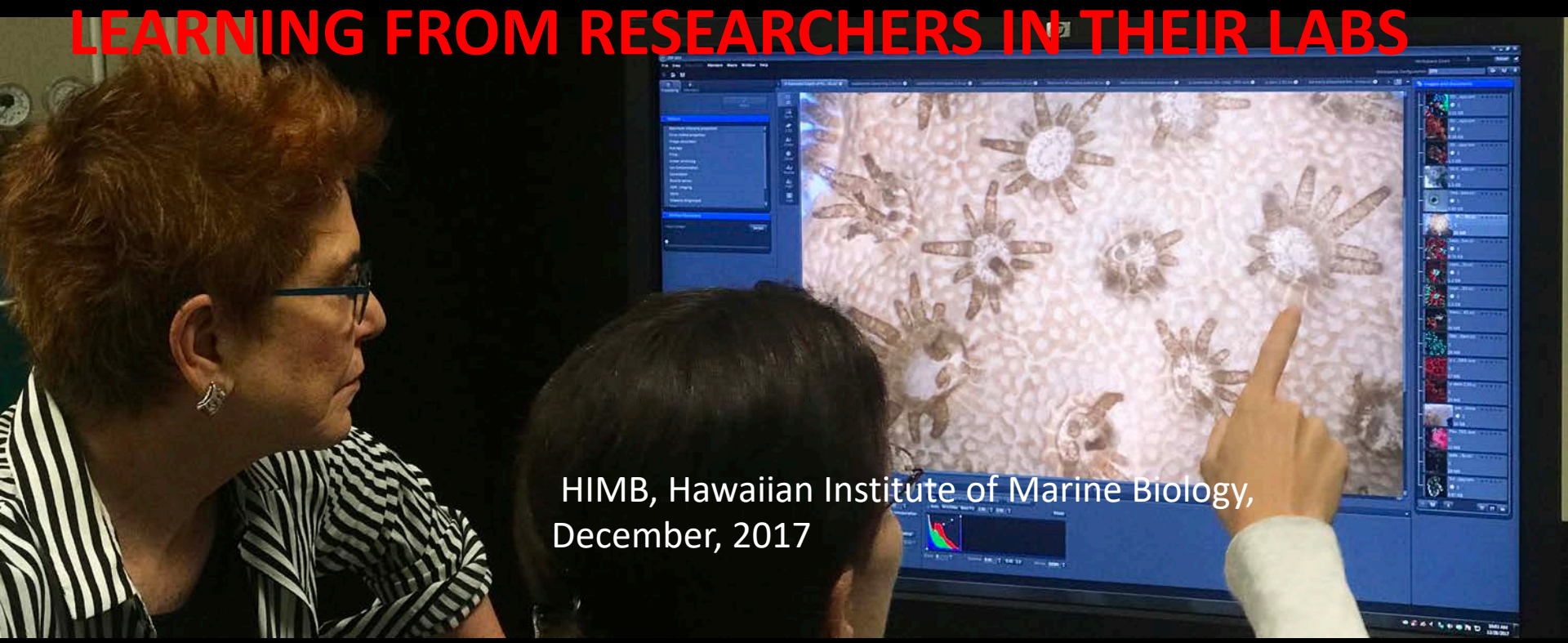
AMERICAN SAMOA

December 2017

January, 2018

LEARNING FROM RESEARCHERS IN THEIR LABS



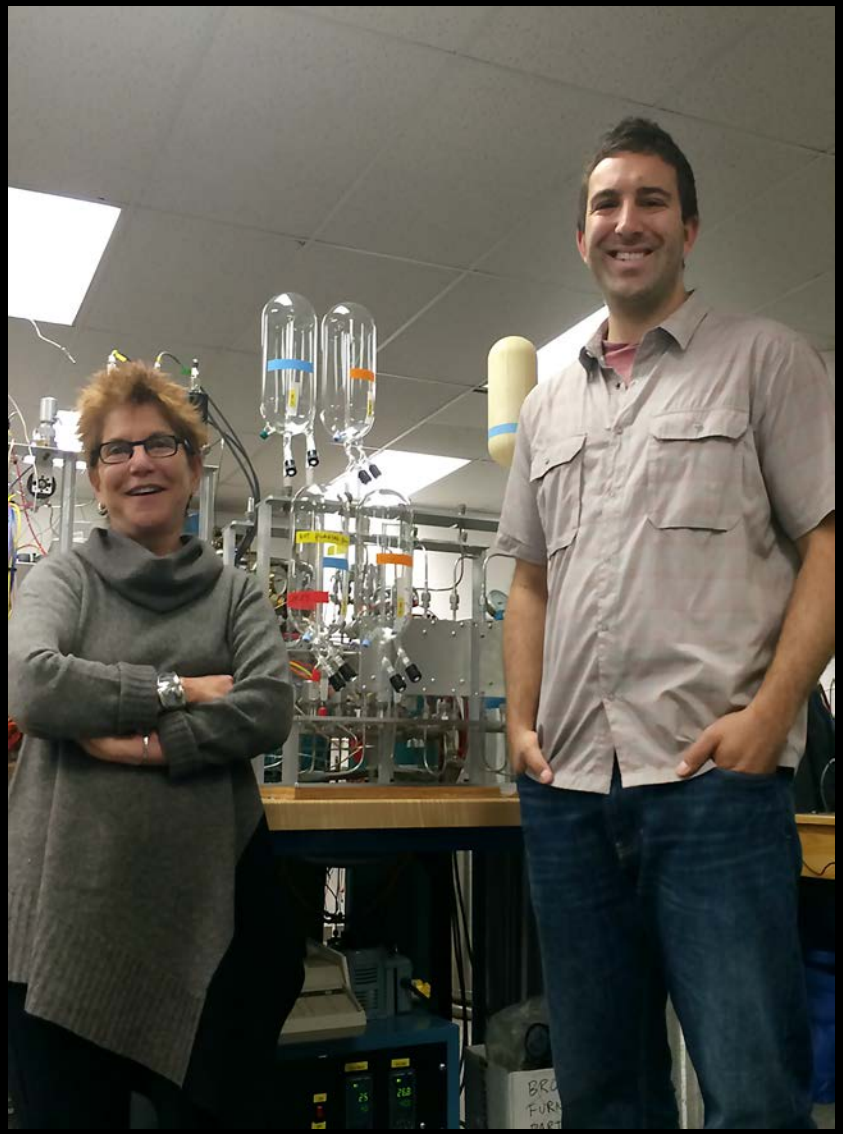


HIMB, Hawaiian Institute of Marine Biology,
December, 2017

HIMB: Wet Labs: Learning about SYMBIONTS,

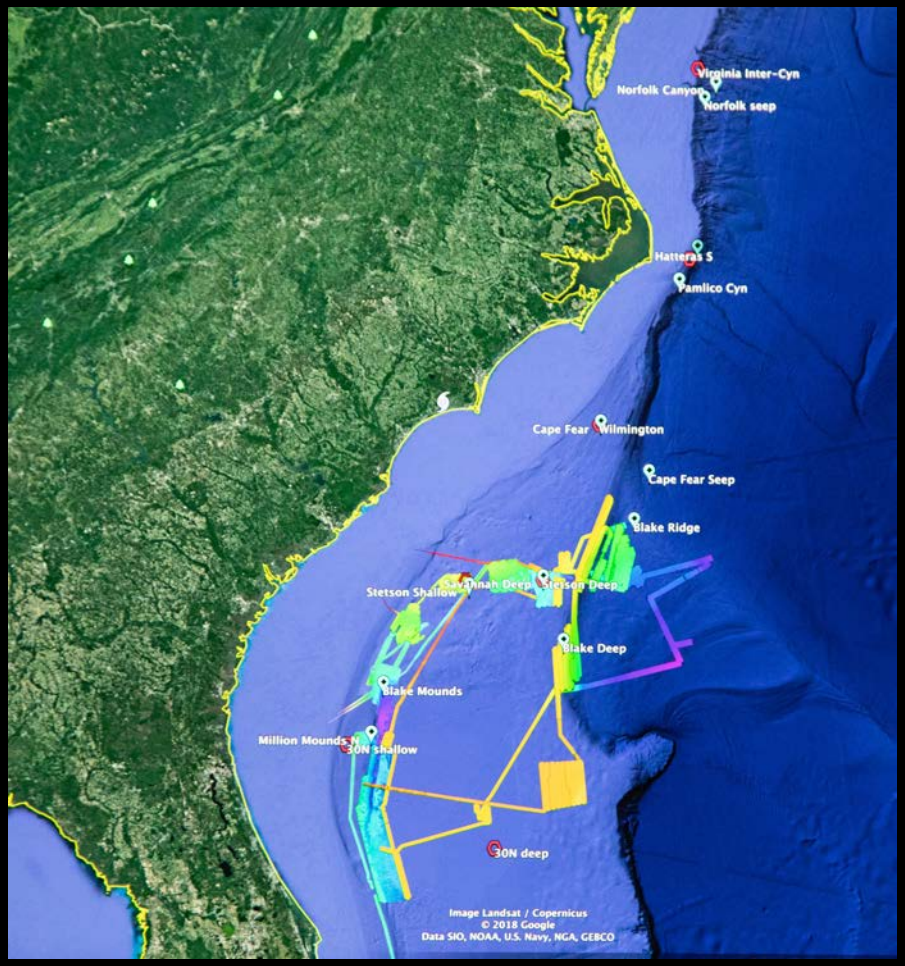
SCRIPPS INSTITUTE OF OCEANOGRAPHY, @ STUART SANDIN LABS

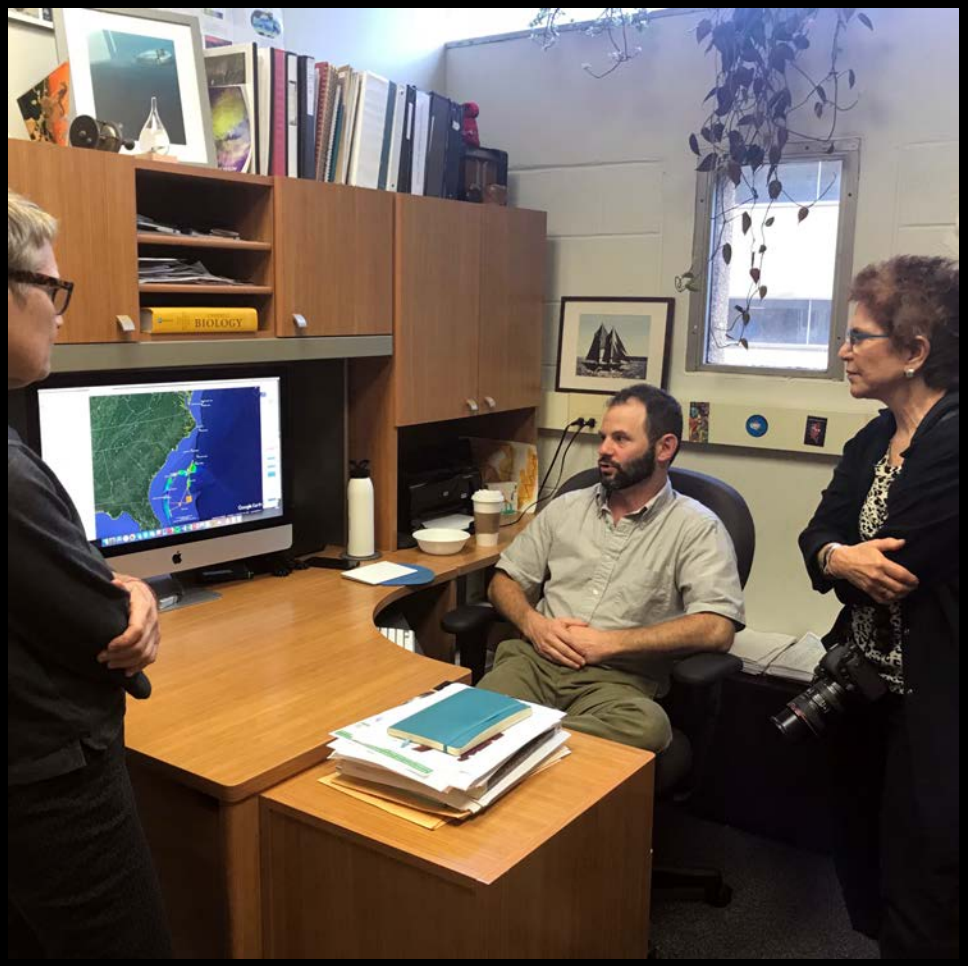
Marine Biology Research Division, March 1, 2018



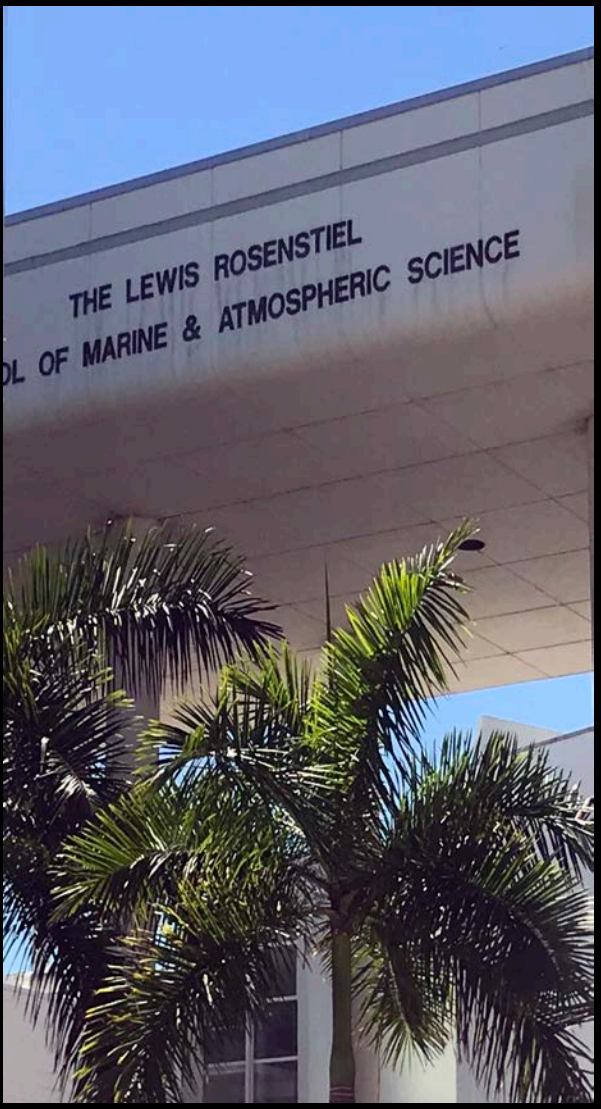
INSTARR, BOULDER, CO STUDENTS and LABS ARCHIVE, November 2014

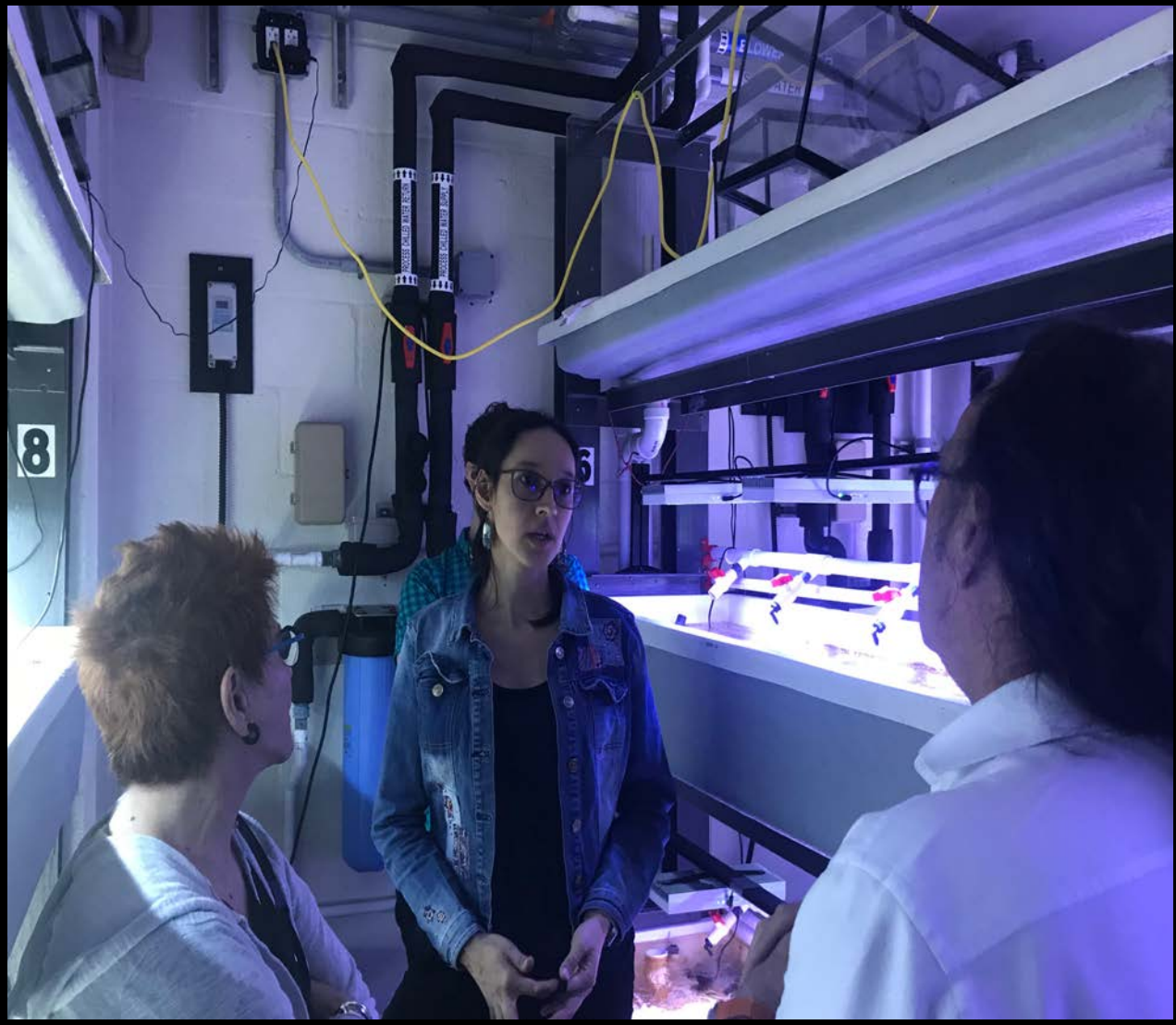
INSTITUTE FOR MARINE AND ANTARCTIC STUDIES, TASMANIA, MARCH 2017





with ERIL CORDES, Lead Scientist, “Deep Search Project” at Temple University, September, 2018





UNIVERSITY OF MIAMI, ROSENSTIEL SCHOOL OF OCEANOGRAPHIC AND ATMOSPHERIC SCIENCE

TRANSLATNG IN THE STUDIO

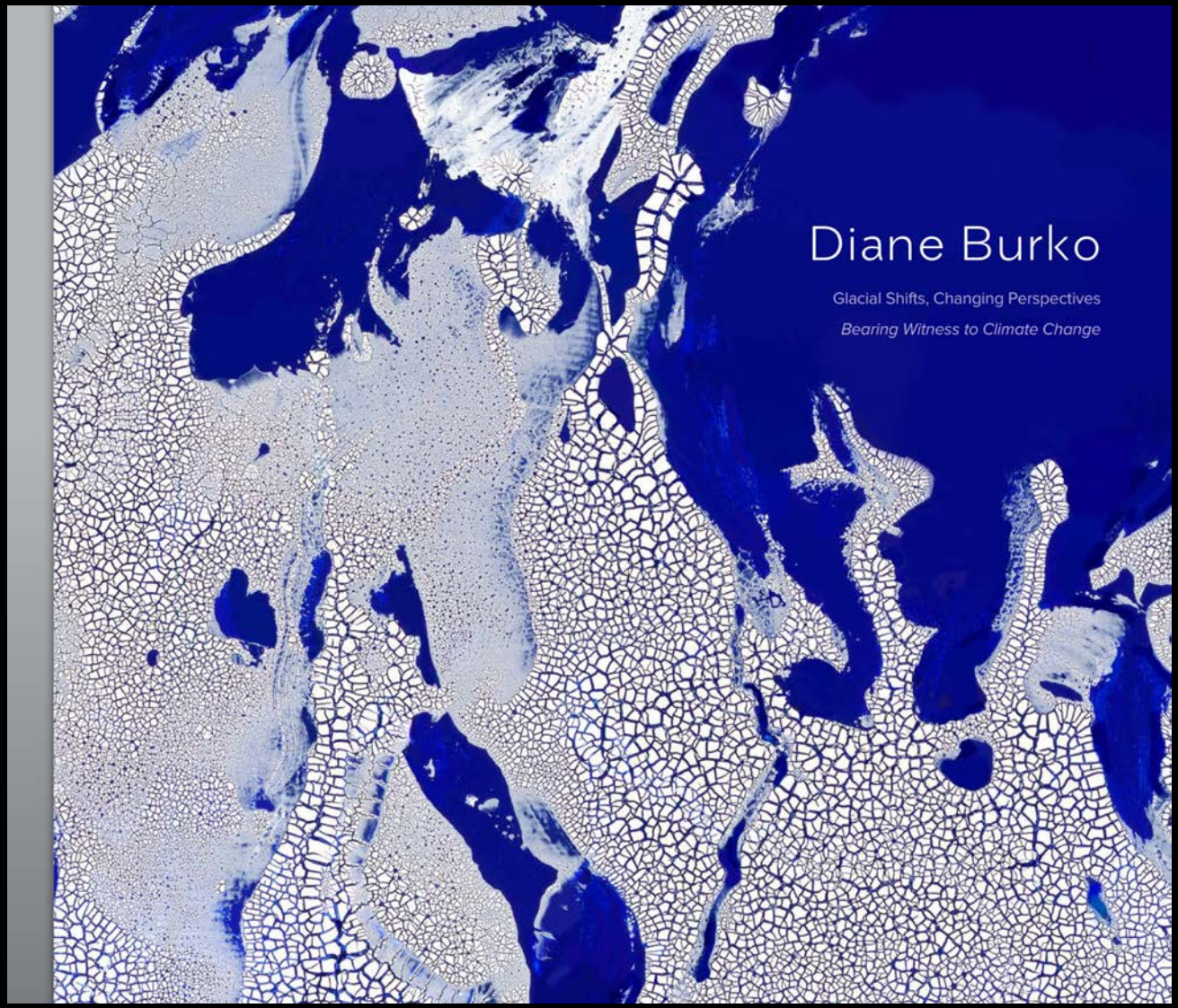
STUDIO: 2010

STUDIO: 2011

STUDIO: 2015

STUDIO with ARCTIC MELTING I and II (unfinished), From NASA WORLD VIEW SITE OCTOBER 2016,

WALTON ARTS CENTER, ARKANSAS, MAY-SEPTEMBER, 2017



GLACIAL SHIFTS, CHANGING PERSPECTIVES :

Bearing Witness to Climate Change

GREAT BARRIER REEF, 2017-2018, 60”X84”, December 2018

OVER THE GREAT BARRIER REEF, A
40 x 60 inches, March 2017, Archival inkjet print

MAKING THE INVISIBLE VISCERAL……


Diane Burko: Flow

ENDANGERED: FROM GLACIERS TO REEFS

CONTINUING to attend CONFERENCES……

The Coral Reef Ecosystem: Observation, Configuration, and Communication at the Intersection of Art and Science

My Art Practice: From Climate Change Impacts on Glaciers To Coral Reefs

DIANE BURKO
Community College of Philadelphia

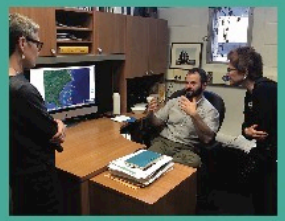
For over a decade my practice has embraced issues of climate change, specifically glacial melt. As an artist, I believe the only way I can contribute to the public dialogue is to learn from researchers in the field and then bear witness. I see myself as a "subversive" artist", creating compelling images which in turn inform the public of the dire threats to our planet. My presentation will briefly review recent exhibitions on glacial melt, up to the present current exhibition now at the National Academy of Sciences, as well as my public engagement activity.

My attention is now focused on how issues of climate change are threatening the health of our oceans and coral reef ecosystems. In particular. This redirection began in March 2017 exploring the Great Barrier Reef, then seeing the compelling film Chasing Coral that summer, and then joining a project called "Kai-Apapa" which took me to the Pacific for a month long investigation this year. Visits to labs at the Hawaiian Institute of Marine Biology, Scripps Institution of Oceanography and Temple University's Center for Biodiversity & Conservation provided the valuable knowledge needed to create the current exhibition: Endangered: From Glaciers to Reefs.

Endangered: From Glaciers to Reefs

The core of the text features a conversation between artist Diane Burko and anthropologist Ben Orlove of Columbia University with essays on glaciers by Ted Pfeffer from INSTAAR and on coral reefs by Nancy Knowlton, Marine Biology at the Smithsonian Institute.

This far ranging exchange includes not only commentary on the work in the exhibit but integrates ideas about climate change, geography, history, the human condition and the creative process.



Art & Science Of Wildlife & La Mer Ceramic Sculpture

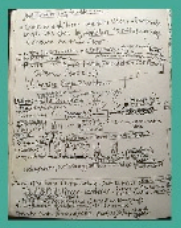
MARGUERITA HAGAN
Artist

As an advocate for the thriving of all life in mutually sustainable communities and environments, my work intends to expand wonder, awareness and responsibility at this climacteric time of change. The coral reef is a stellar role model of interdependence for us, the ambassadors for this blue planet.

My presentation will highlight my Wildlife and La Mer ceramic sculptures with special interest on the diverse coral reef ecosystem. While residing in Hawaii's coral reefs at sea, my Wildlife Project was conceived and is the core message for the highlighted throughout my career. The Wildlife work is inspired by nature's ingenious design, constantly perfecting for each unique environment. Its colorful patterns envelope planes and convex ceramic forms which play on the idea of a shield, a protection. Like a family crest, the shield also honors lineage of the countless species with which we share the planet and are intrinsically linked.

La Mer, a branch of the Wildlife work specifically shines light on the unseen life of the sea. Invertebrates, our primary ancestors to land, communities, the bluest whale and the algae. This intricate white ceramic sculpture magnifies the exquisite and lift of known tropic marine life that supports earth. La Mer was recently shown in OCEANS at the NY Hall of Science with solo exhibits La Mer: People Protect What They Love at the Science Museum of Virginia and Wildlife & La Mer at Philadelphia International Airport.

While exposing nature's life sustaining elements, Wildlife and La Mer offers a lens into the responsible and critical role we play. As we stand at the edge of this ecologies precipice, our corals and wildlife can no longer adapt swiftly enough to survive without our positive global change now.



PA41E-1360
PA41E-1361

a panel discussion
TH43D: The Coral Reef Ecosystem: Observation, Configuration, and Communication at the Intersection of Art and Science

Thursday, 13 December 2018
12:30 - 13:30
Marriott Marquis - Independence E

Artists

Scientists

Panel Moderator

Endangered: From Glaciers to Reefs: A Multi-Media Exhibition

NAS Building, 2101 Constitution Ave., N.W.
9 a.m. to 5 p.m. weekdays.
Photo ID required. Free

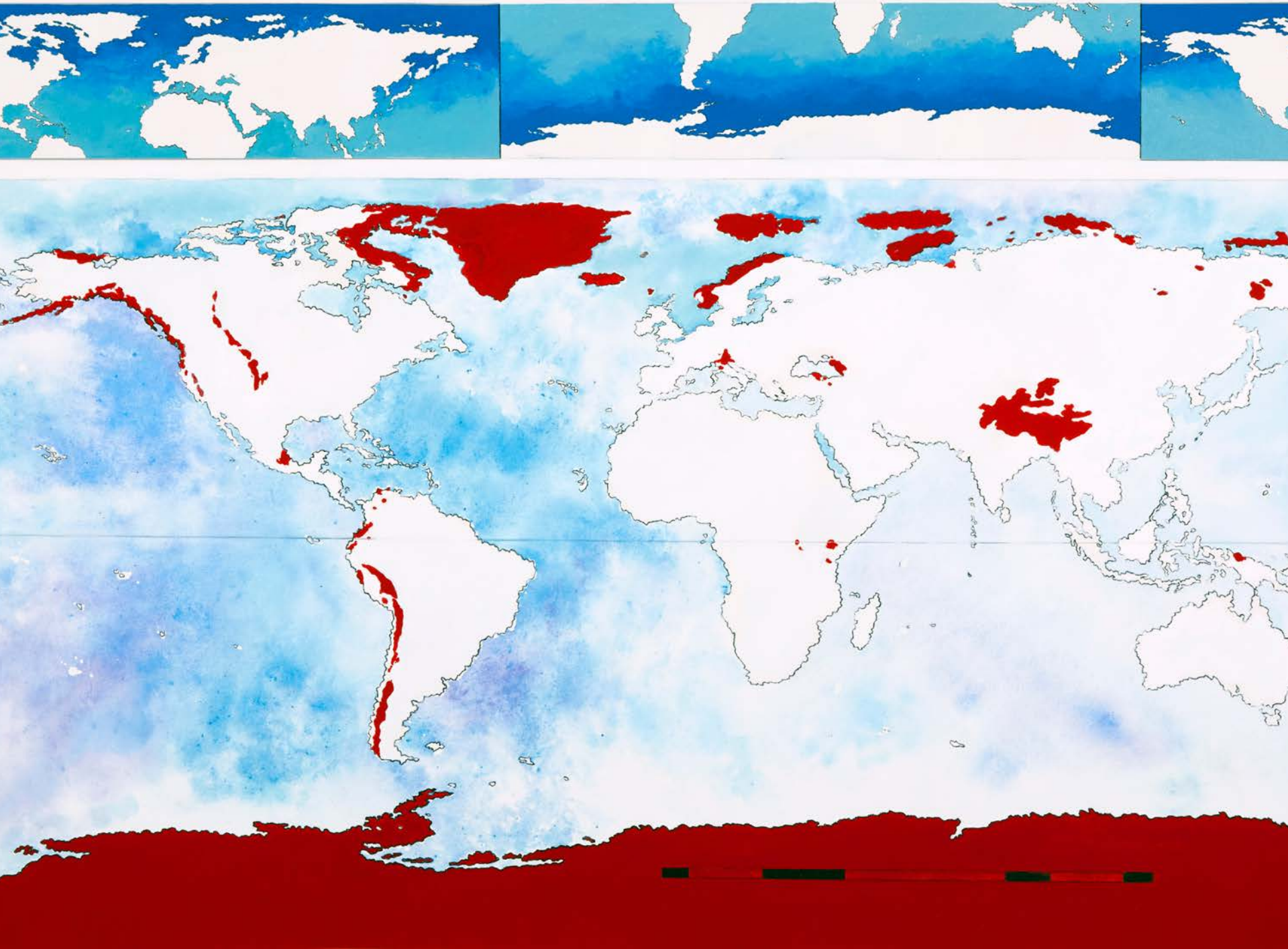
August 15, 2018 - January 31, 2019

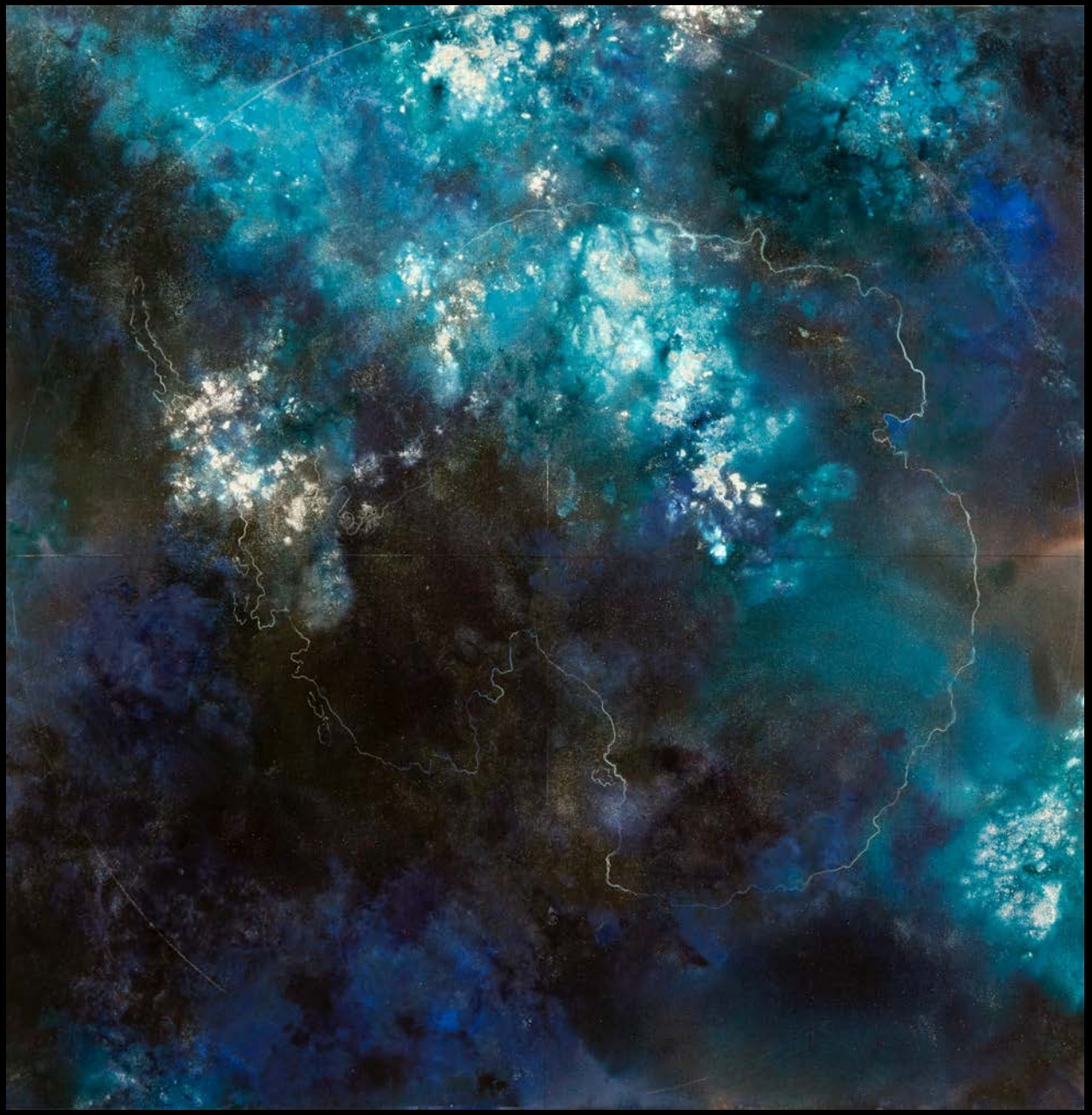
AGU 100

December 13, 2018 at the AGU in Washington DC

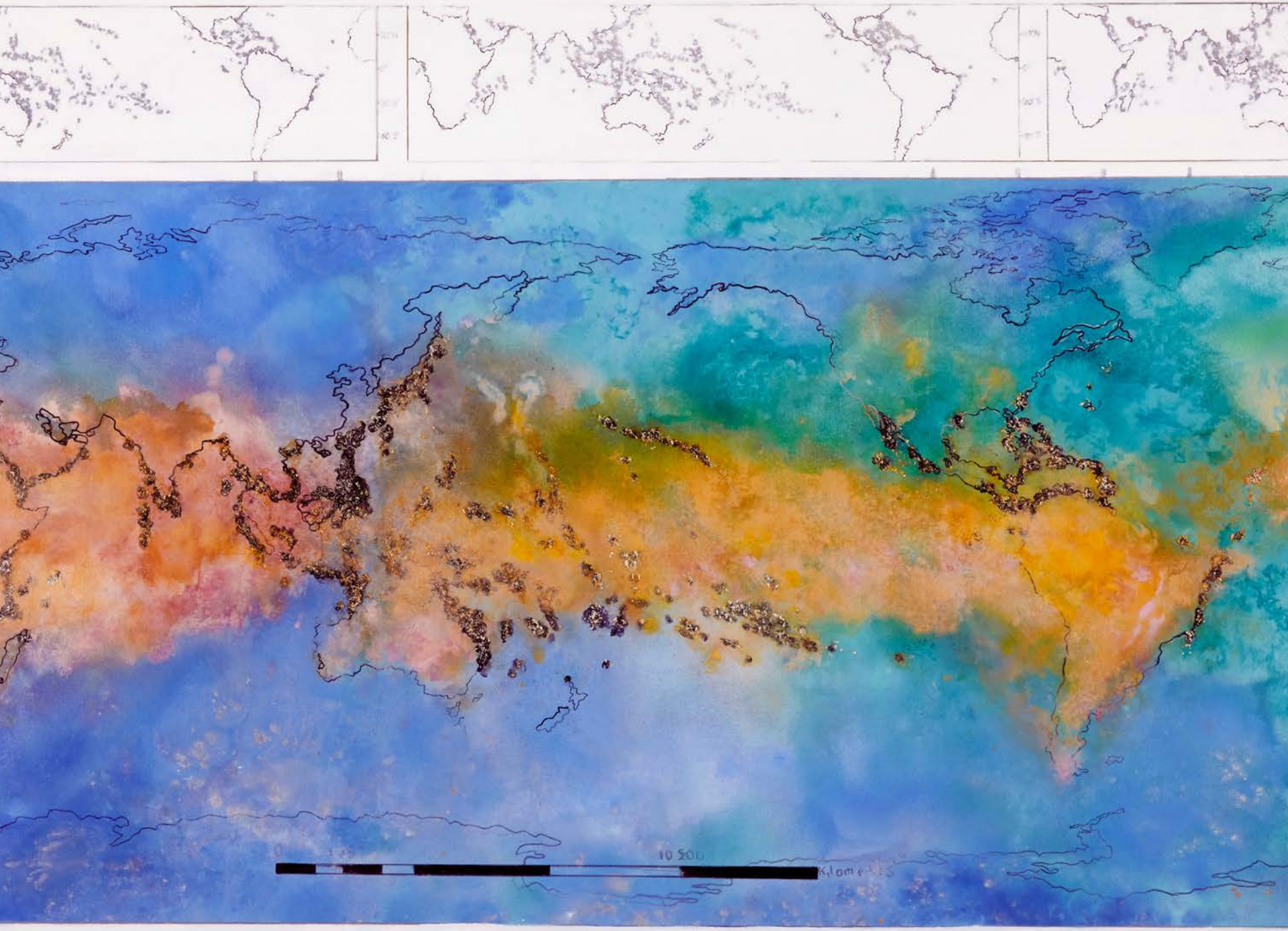

NATIONAL ACADEMY OF SCIENCES
August 2018 to January 2019


WORLD MAP and NOOA MAP series BEGINS: 2019

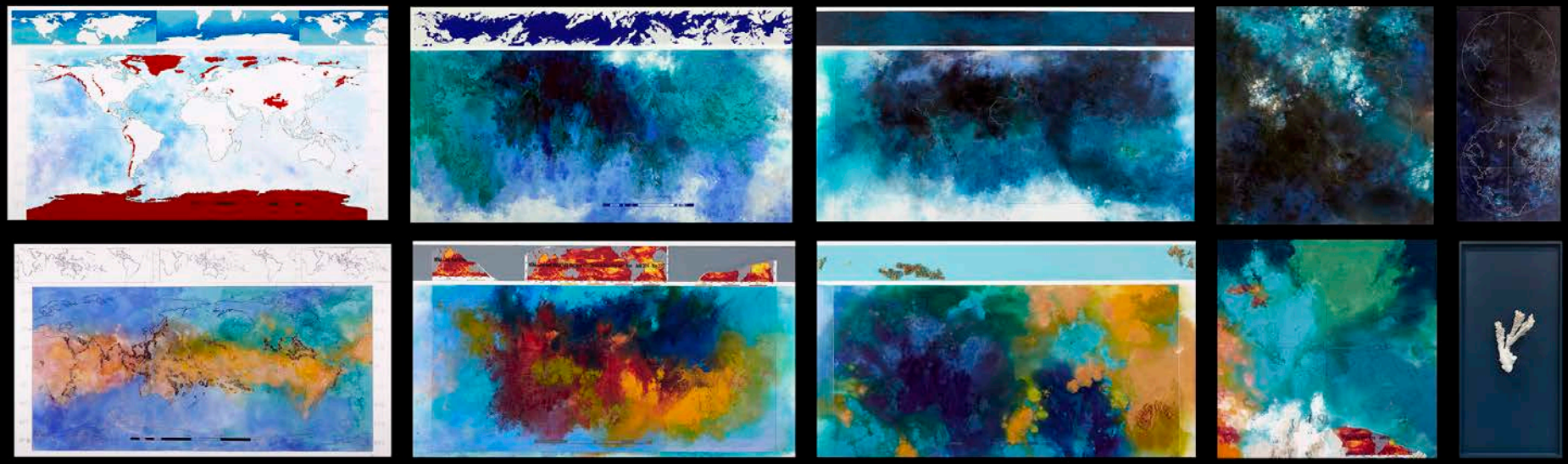




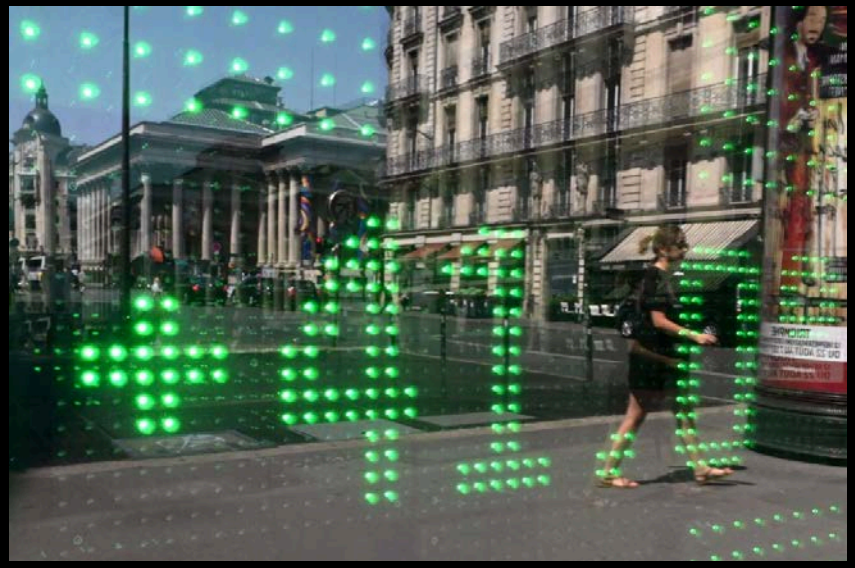

STUDIO – June, 2019
IRISH OATMEAL

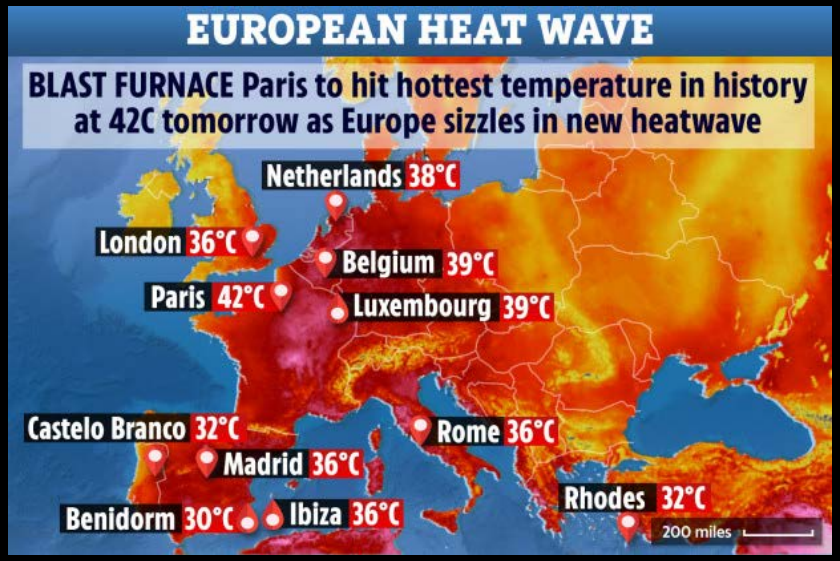

10 500
Kilometers

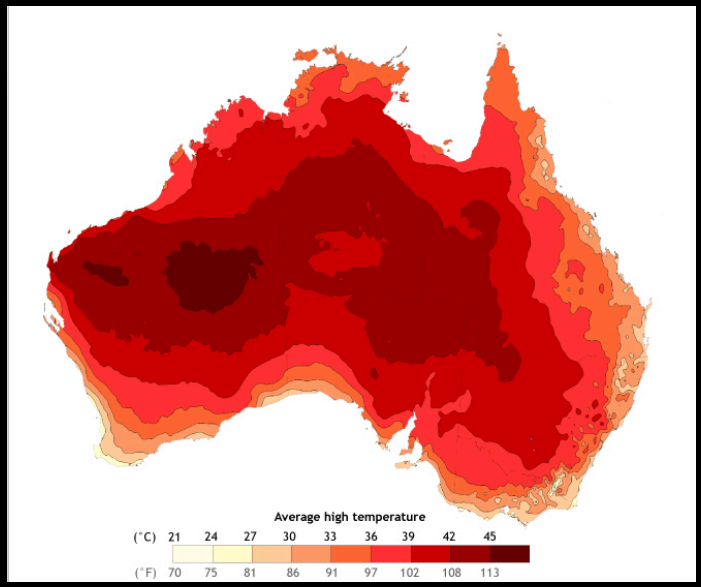

Bleaching Alert Area
-140
-120
-100
-80
-60
-40
-20
0

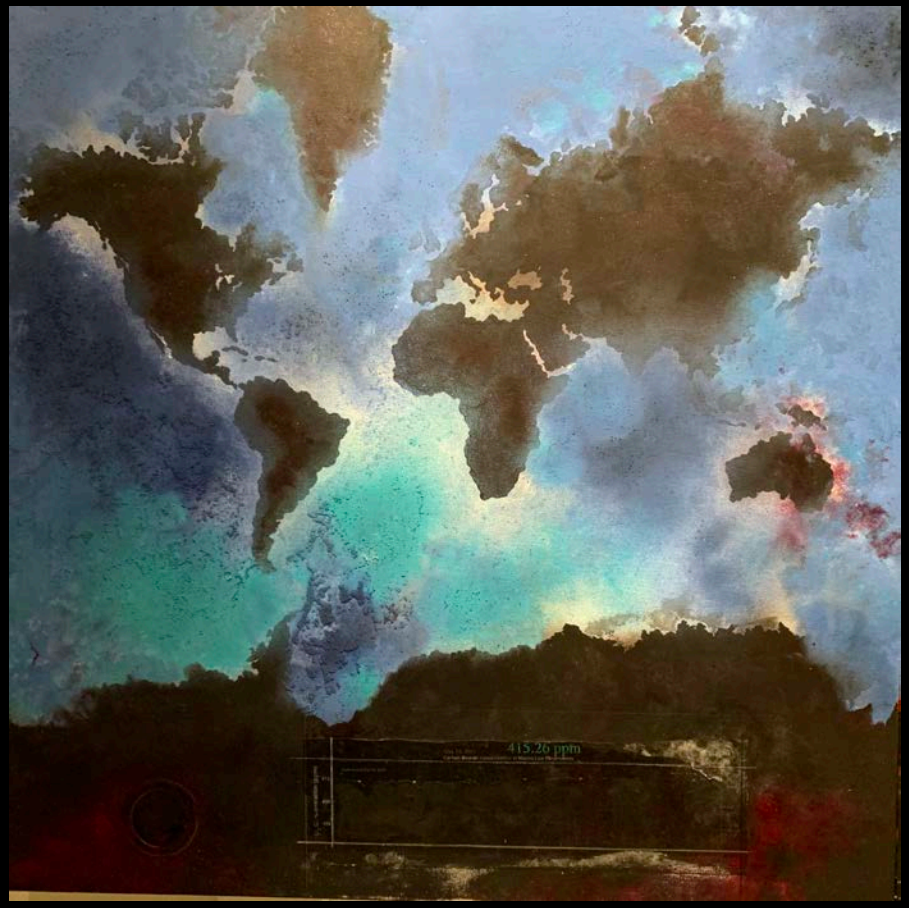


VISUALIZING GLOBAL WARMING








415.26 ppm


May 14, 2019
415.26
Carbon dioxide concentration at
Hourly average
Daily average
CO2 Concentration (ppm)
415
410
405
400


March, 2020


85 PERCENT OF REEFS IN THE CORAL TRIANGLE ARE THREATENED.....
THE CORAL TRIANGLE HAS MORE CORAL REEF AND FISH DIVERSITY THAN ANYWHERE ELSE. IT IS THE WORLD'S MOST ECOLOGICALLY DIVERSE AND ECONOMICALLY IMPORTANT MARINE AREA WHERE OVER 120 MILLION PEOPLE LIVE AND RELY ON ITS CORAL REEFS FOR FOOD, INCOME AND PROTECTION FROM STORMS.

VISUALIZING THE PANDEMIC


MERRELL
GOLDEN

DISAPPEARING AMAZON – MELTING ICE SHEETS – BURNING FORESTS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