STRATEGIES FOR SLOW VIOLENCE

by Andres Chang

I remember visiting my grandmother in Philadelphia as a child, and she would tell me the most fantastic travel stories. She was very adventurous and lucky enough to travel extensively, and one of her favorite places in the world was the African Serengeti. My grandmother would explain her encounters with elephants and friendship with lions, and I would follow along in a photo book, sitting cross-legged on the floor before her, but transported to a seemingly wild place.

My grandmother died two years ago after developing a horrible case of dementia that wrecked her memory. The stories, though, stuck with me – tales of abundant wildlife and a closeness to nature, with mention of the kind locals who helped her experience a place so different from Philadelphia. *I know that this place does not exist.* That is, some version of it may have existed, but her depiction of it is outdated. Between 1977 and 2009, populations of almost all wildlife in the Mara region of Kenya have declined to a third or less of their former abundance.[1] The statistic, while dramatic, is not particularly surprising – but if I were to visit the Serengeti, the difference would not be clear to me, despite my sense that things must have changed in the time between my grandmother's adventures and the present. From her memory and my brief knowledge of the region, I can feel that wildlife populations may have declined and that land usage has changed, but I cannot really perceive or even close to comprehend changes before that point.

What I'm getting at is a problem known as *shifting baselines.* Essentially, each generation has a different idea of what is 'natural,' what the past may have looked like, and hence the magnitude of change that has occurred. And our perception of change plays a major role in deciding conservation efforts, land usage, and environmental regulations. Especially as methods of data collection change, we lose track of the past and have a tendency to perceive change only to the extent that we can reasonably experience it and experiment on it. This is one tenant of a concept that has informed my perspective on art and science known as *slow violence*.

The concept of slow violence was introduced by a professor named Rob Nixon as a way to describe ecological degradation and climate change.[2] By contrast to our daily experiences – the fast pace of media, politics, and spectacular atrocities that we see in the news like terrorism – slow violence is amorphous and often hidden from public view. It is out of sync with political and economic change, as well as with our dramatic expectations – so although we can recognize that climate change is in a sense rapid, it doesn't feel that way to us. But slow violence is still violence. It can still result in countless premature deaths by means of air pollution, malnutrition due to soil degradation or drought, and mass displacement due to increased sea levels and more frequent flooding.

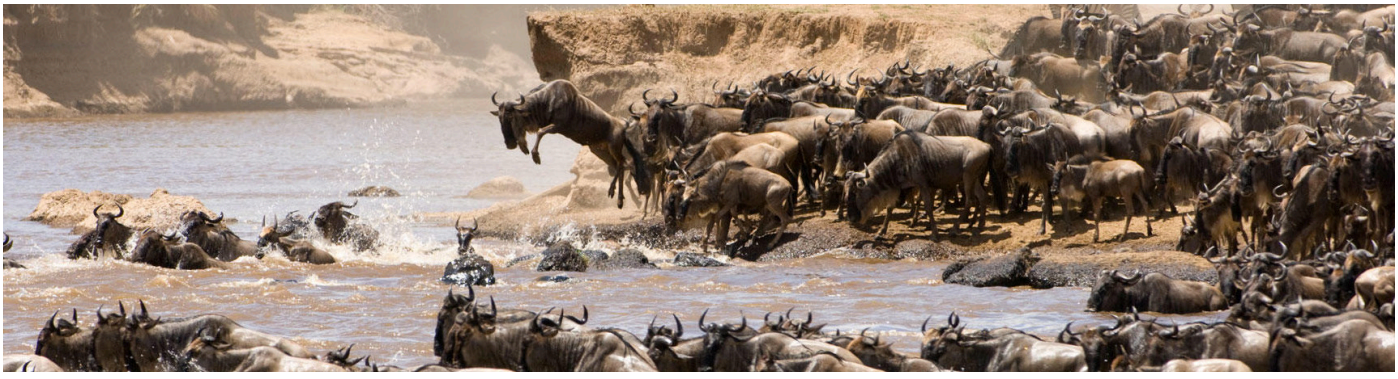


Photo from safaribookings.com

Climate change, when observed through a lens of slow violence, represents two major challenges: the scientific and the representational. The scientific challenge is how to research changes that occur over a long timescale with a high degree of spatial and temporal variability. The representational challenge is how to depict and communicate the violence of climate change that is so detached from our everyday experience.

For my talk today, as part of this event, The Art and Science of Rapid Climate Change, I would like us to keep this idea of slow violence in mind. Using a few examples from my own work and lessons I've learned along the way, I'm going to talk about how creative approaches to science can help us research and address the problem of climate change, as well as how art can help us comprehend our relationship to nature and society across time and space.

Performance documentation of *the eternal ocean.* Photo by Cole Moore.

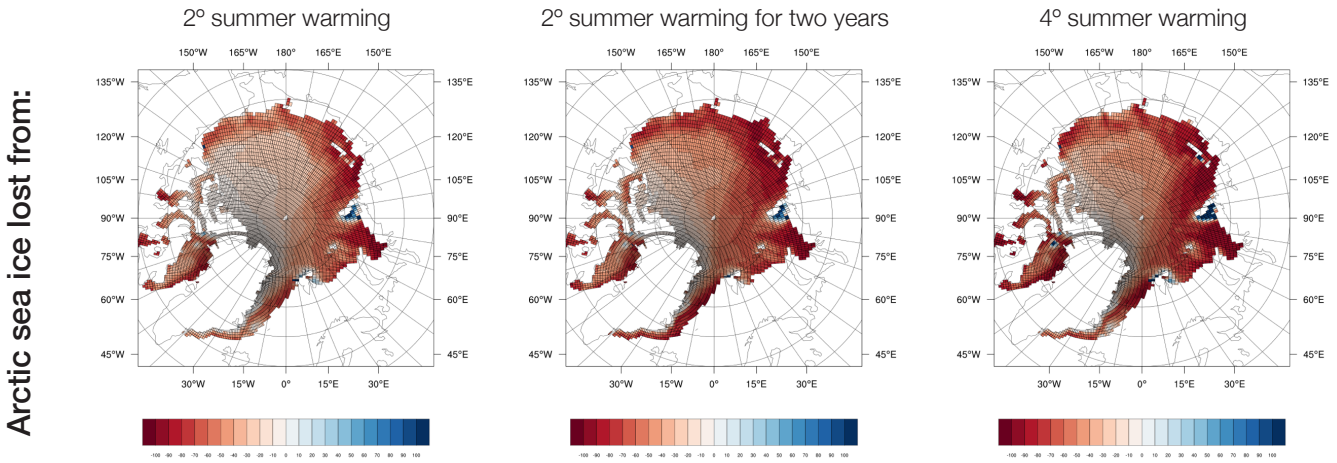
From a scientific perspective, how can we more adequately understand climate change – a crisis that involves many interlocking processes that combine to create a complex system of feedbacks and variability? How can we obtain the best possible understanding of the climate's response to a wide range of possible futures? And what is the role of art and creativity in executing this research? Before addressing this last crucial question, it's important to recognize the success of earth science to date – which has resulted largely from a diverse arsenal of tools and data analyses that have been evaluated separately and together, correlated and cross-checked. Atmospheric measurements from Mauna Loa, Hawaii tell us that CO_2 has been increasing steadily since monitoring began in 1948, while isotopic measurements confirm that this CO_2 comes from fossil fuel. These observations and others are unequivocal evidence of anthropogenic climate change, but the real challenge lies in detecting specific mechanisms of change and projecting into the future.

I posit that one of the greatest lessons to be learned from art in the context of scientific research is an emphasis on the research tools themselves. This is a distinctly postmodern idea – that the tools that we use to study climate change have as much or more of an effect on our results than the usage of those tools. I propose that the development of accessible data models and visual interfaces could result in a wider array of experiments that provide insight to climate change. I'll turn to my own research experience as an example.

For my thesis with Dr. Amanda Lynch, I used a climate model to investigate the response of Arctic sea ice to single and multi-year heating patterns.[3] How much ice would be lost if this summer were 2° warmer than usual? What about this summer and next – what if they were both 2° warmer than usual? Would the associated ice loss be short-lived – that is, would we see the sea ice recover after a few years of normal conditions – or would we still see the trace of this heating five years later? These sorts of question demand the use of a climate model, which allows us to compare the effects of different forcings, different potential futures.

My experiment was made possible by the use of pre-existent model output data. A group of scientists led by Dr. Jennifer Kay executed thousands of runs to replicate the observed climate conditions of 2000–2012.[4] The resultant atmosphere and ocean output data was made available for use by other researchers. For my experiment, this output data was used to force a sea-ice model, which responds freely to atmospheric and oceanic conditions that update every few seconds. By running the sea ice model under modified conditions and comparing it to the control case, I can observe how sea ice thickness would change if surface temperatures were, for example, 2° warmer in summer or winter. Overall, I tested 14 different cases with 10 replications each for a total of 140 runs.

The results were exciting. We confirmed that summer heating has a much greater effect on Arctic sea ice loss than winter heating and that one very warm summer has the same effect as two moderately warm summers.



The experiment and our findings were made possible due to the diligent work of other researchers who generously provided their output data for us to use, as well as the climate model and supercomputing facilities of NCAR. As we say in academia, stand on the shoulders of giants. But what if we took this one step further, not just by putting the data out there for others to use, but by actively encouraging this sort of experimentation? Because in the case of climate modeling, we're looking at a particularly mean-spirited giant. It took me two years of modeling experience and direct assistance from one of the model engineers just to execute a control run. But what if the model were turned inside out – made operable by a graphic interface instead of indecipherable code? Countless more experiments would be run and skeptics could see firsthand how the model works. This open-source mentality and transparency of process is common in the arts community. Think Andy Warhol or Sol Lewitt, more recently, Irene Haiduk's standout piece in the Whitney Biennial, SERVERS 4 .YU. If the same were applied to research, think of how many more experiments would be run. Many more students, researchers, and citizens would engage with science and produce more meaningful results than ever before. Herein lies a creative approach to the scientific challenge of slow violence.

Performance documentation of *the eternal ocean.*
Photo by Cole Moore.

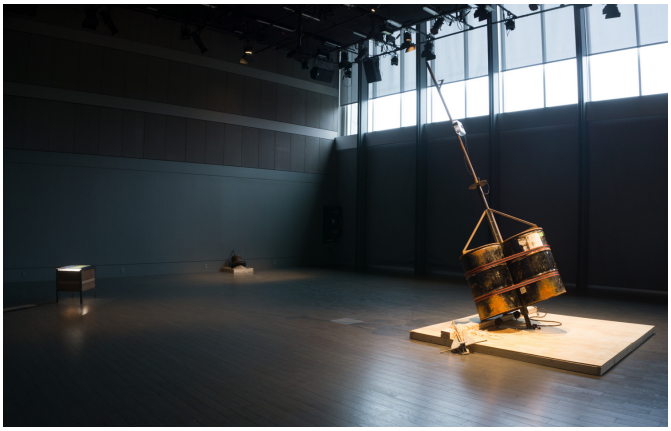
This leaves us with the representational challenge. What is the role of art in depicting the amorphous nature of climate change? To me, art is a way to envision real and imaginary frameworks that shape collective experience. A lot of my past work has focused on the forces that govern human impulses and the traces that our actions leave behind. I often draw analogies between the historical pursuit of progress and subconscious working of the mind, personal and geological manifest destinies.

My recent exhibition, *the eternal ocean*, is an artifactual installation and sound environment derived from a performance that I did back in April. I designed and built a floating buoy about 15' tall and 800 lb with a small platform that would sit above the water. As an

endurance challenge, I would balance on this platform as it rocked in the waves and wind for as long as possible. Attached to my body were two microphones to record my heartbeat and breathing, while another contact mic picked up noise and resonance from the buoy itself and a few surround sound mics recorded the environment.

The performance was alternately grueling and meditative. It lasted roughly five hours before I had to abandon the buoy, which was ever-so-slowly sinking, and swim back to shore in 45º water. But with just two wetsuits and a kayak, my crew was unable to retrieve the buoy until the following morning, when a groundskeeper helped us tow it back to shore using a small beach tractor. This story, the history of the performance, is documented in an online portal, but it's also inherent in the buoy itself. For the exhibition, which is separate from the online portal, there is no description of the performance and my body is strangely absent, except for the sounds of my breathing and a fluctuating heartbeat that emanate from the buoy. The sound of the ocean fills the room. As part of the sound environment, these sources mix in a conflation of my body, the machine (a tenuous one at that) separating me from the ocean, and 'nature.' Five hours of sound are collaged into a spatially dynamic infinite loop with moments of intrigue and danger interspersed with longer periods of waiting. At these times, the sound of ocean is occasionally interrupted by an airplane flying overhead or noise from the shore, serving as a reminder that what we consider nature is not separate from the human society that overlies it.

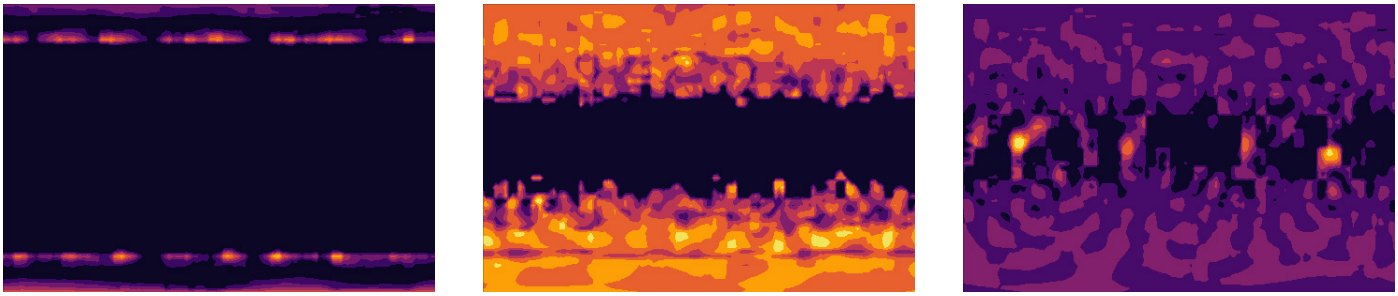
By using an infinite loop, I have indicated that there is no start or end to the performance. The viewer, losing herself within the exhibition, becomes a subject of the performance unraveling over both human and deep time. In this way, the eternal ocean becomes an enactment of the long-term human relationship to nature. It is memory of the past, present, and future. One reviewer, Ellie Irons, commented that the "subtly of the sound element in terms of combining human/water/more ambiguous sounds, is such that one doesn't immediately recognize the human breath, and the listener is rewarded for listening longer (the dialectic between human forces and the rest of earth systems is suggested in this, as is the personal/intimate struggle of an individual, as suggested by the closeness/vulnerability of breath)."



Exhibition documentation of *the eternal ocean.*

I recognize that describing the experience that this work imparts on a viewer is futile, but I hope that it at least provides an example of how art can transgress the limits of normal human perception, partly by engaging directly with the environment. In the words of Olafur Eliasson, "Art is not outside the world, but within the world." It is important that my work is the result of human struggle, physical processes like rust, and a legitimate confrontation with natural forces out of my control.

In another body of work, I have been using a climate model to envision abstract or mythological places like chaos. The climate of chaos is precisely determined by a general circulation model, where the surface of



Stills from *chaos.17.01.precip.*

the planet has been made randomly absorptive and reflective, run for nine years on a supercomputer (nine years of chaos time, not computing time). Here, I am interested in the purposeful conflation of science and mythology, using a model that is numerically rigorous to produce a detailed representation of fictional space. The space remains abstract because we can't enter into it, but we know it's there by the whirring of the supercomputer and gigabytes of output data. Again, this work is within the world – not outside of it. There is an energy cost to its production, and while the eternal ocean may represent a closeness with nature, this body of work aims for the absurd and hints at a separation from nature.

In this day and age, it can be difficult to focus on problems that seem far away. It's clear that we, as a society, need to continue developing new tools, as well as methods of analysis and communication, to adequately address climate change and overcome the problem of shifting baselines. Art allows us to comprehend long-term changes that may otherwise pass unnoticed or that are visible only in the data. Art reminds us of the dynamic continuity of human experience across generations. Paired with science, it can demonstrate our closeness to nature on both material and spiritual levels but scorn our carelessness at the same time.

I will end this talk not with a simple, but a deviously complex, call to action that demands large-scale change from a variety of positions – grassroots and top-down. Climate change may feel slow, but it is rapid. It is now, and it is urgent. I challenge you to think critically about the short-term and long-term implications of your decisions. Let art and state-of-the-art research be your guides in envisioning the far-away past and future, but do not stop there. I hope that we can all be leaders in supporting new experiments and approaches that blur the boundaries between art and science; that help us close the gap between here and there, now and then; and that produce empathy, self-reflection, earth literacy, and security for generations to come.

"Strategies for Slow Violence" was conceived as a talk for The Art and Science of Rapid Climate Change – a private event at the Whitney Museum of American Art hosted by the Institute at Brown for Environment and Society on June 1, 2017. Additional project documentation can be found at andreschang.com.

Works Cited

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