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Drifters of the Sea: Antarctic Citizen Science

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Drifters of the Sea: Antarctic Citizen Science

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ABSTRACT

Utilizing filmmaking as a tool for marine conservation, “Drifters of the Sea” brings light to the role of phytoplankton in marine ecosystems, as well as the importance of citizen science. *Phyto* comes from the Greek word for “plant”, and *plankton* comes from the Greek word for “drifter”. So, they are microscopic algae drifting in the oceans. To bring the audience closer to the microscopic world and citizen science, this film takes a closer look at FjordPhyto, a project that engages tourists in Antarctica in scientific activities by allowing them to participate in the collection of phytoplankton.

“Drifters of the Sea” focuses on three interviews: Dr. Maria Vernet, Co-Founder of FjordPhyto and phytoplankton ecologist at Scripps Institution of Oceanography; Allison Cusick, Co-Founder of FjordPhyto and Graduate Student at Scripps Institution of Oceanography; and Caitlyn Webster, polar guide and polar citizen science participant. They all share with us their journey of practicing science in Antarctica, and they teach us important facts about the microscopic world. If knowing is the key to caring, then citizen science can be an important tool for non-scientists to care more about the environment, and we might become better at protecting our ecosystems.

INTRODUCTION

In her book “The World is Blue: How Our Fate and the Ocean’s Are One”, Sylvia Earle once wrote: “Knowing is the key to caring, and with caring there is hope that people will be motivated to take positive actions. They might not care even if they know, but they can’t care if they are unaware” (Earle, 2010). This quote is the heart of this capstone project, which uses the tool of filmmaking to educate the viewer about citizen science. Citizen science allows non-scientists to participate in the collection of data across an array of habitats and locations over time (Bonney et al., 2009). According to Bonney et al., 2009, contributions from citizen scientists have provided a vast quantity of data about species occurrence and distribution around the world.

“Drifters of the Sea” is a film that focuses on citizen science and that has the following goals: (1) to inform the public about FjordPhyto, a citizen science project in which tourists get to participate in the collection of phytoplankton and contribute to polar research; (2) to inform the public about the role of phytoplankton in marine ecosystems; (3) to highlight the importance of citizen science and; (4) to show the beauty of the landscape and wildlife in Antarctica.

The film is documentary in style, and it portrays researchers Dr. Maria Vernet, Allison Cusick, and Caitlyn Webster, who highlight the importance of both phytoplankton and citizen science through their experience, knowledge, and personal stories. Dr. Maria Vernet is a phytoplankton ecologist at Scripps Institution of Oceanography (SIO), and her main research interests include polar phytoplankton ecology and physiology, effects of climate change on phytoplankton communities, photosynthetic pigments, primary production, long-term changes in marine ecosystems, and the plankton carbon cycle. She is an important person in this film, as she acts as the historian, since she has been doing research in Antarctica for many years. In addition, Allison Cusick is a PhD Candidate at SIO whose main interest is also polar phytoplankton, and who is the co-founder of FjordPhyto, a project under the guidance of Dr. Maria Vernet. Finally, Caitlyn Webster brings her unique knowledge and experience as a person who has been a polar guide, and who has also participated as a citizen scientist in Antarctica. Together, they complement each other and bring this film to life.

METHODOLOGY

The first step towards creating “Drifters of the Sea” was doing extensive research on polar videos made by other creators, to get an understanding of what this film would contribute that other films had not. A guide consisting of the title and description of the videos was created to have a reference during the project. These efforts were followed by creating a treatment that provided a rough draft of the shots and the script. After the treatment was created, the interview questions were written down and reviewed by chair Zeinabu Davis. Due to COVID-19 restrictions, only Allison Cusick’s interview was filmed in person, while Dr. Maria Vernet’s and Caitlyn Webster’s interviews were recorded through Zoom. Most of the footage in the film was

previously taken by Allison Cusick during her expeditions to Antarctica from 2016 to 2020. This footage is rich in shots of fieldwork on boats, wildlife, and Antarctica landscape. Finally, the editing was done using Adobe Premiere Pro. It was crucial to have the perspectives of the project's committee members, so the edits were extensively reviewed and discussed by chair Professor Zeinabu Davis, Dr. Alfredo Girón, and Allison Cusick. This process made the work stronger, as each member contributed their unique perspective.

RESULTS

Initially, "Drifters of the Sea" was going to be focused mainly on science and field work in Antarctica, but after extensive research on previously made polar films, it was clear that the film needed to differentiate itself by adding a closer look to the community aspect of the work done by FjordPhyto. After all, it is through community participation that FjordPhyto finds strength, and the project would not be possible without the citizen science.

The result was an eight-and-a-half-minute film with the core message that "the more people get involved in hands on science, the more people might understand and care for the environment, and the more successful we might be at protecting ecosystems."

CONCLUSION

Filmmaking is a powerful tool in the world of conservation, and it is my goal to inspire viewers to take a closer look at the microscopic world and get curious about citizen science projects around them through this film. As Dr. Maria Vernet said during her interview, "science is all about communication, you cannot carry science on your own."

CITATIONS

Earle, Sylvia A. *The World Is Blue: How Our Fate and the Ocean's Are One*. National Geographic, 2010.

Rick Bonney, Caren B. Cooper, Janis Dickinson, Steve Kelling, Tina Phillips, Kenneth V. Rosenberg, Jennifer Shirk, Citizen Science: A Developing Tool for Expanding Science Knowledge and Scientific Literacy, *BioScience*, Volume 59, Issue 11, December 2009, Pages 977–984, <https://doi.org/10.1525/bio.2009.59.11.9>

Polar Videos Research

Video	Description	References
ACE Expedition Leg 2	Leg of the Ace Expedition is a 4:09 min film that shows a three-months voyage around Antarctica launched by the Swiss Polar Institute. It has inspiring music and high-quality visuals. Similar to my video, it shows how rough the weather can be in Antarctica. It also briefly mentions climate change, the same way my video will.	https://www.youtube.com/watch?v=zUHK-jAe2Gw
The Birds and the Bears	This is a 2:20 min film that educates the viewer on how melting ice affects the polar bear's habitat and available prey for sustenance which in turn affects other species, like arctic bird colonies. This video is successful at educating the viewer using text, without using narration. It is certainly different from what my video will look like, but I do plan on	https://usapecs.wixsite.com/usapecs/tipping-the-balance

	using text at the end of my video the same way this film does.	
Finding Out How Fast Greenland is Melting	A 5:24 min film that focuses on climate change in Greenland. The strength of this video is how in the depth the scientists explain their research methods and tools. This video incorporates maps in the same kind of way my video will.	https://usapecs.wixsite.com/usapecs/tipping-the-balance
Cryosphere: Frozen in Time	Frozen in Time is a 4:19 min film that presents still and moving images, narrated by letters written to a past self, to articulate the encounter between the half-century-old artist and the two-and-a-half-million-year-old cryosphere, the solid water of Earth. It uses a unique way of presenting visuals which is different from what my video will look like, but it is inspiring to see different ways in which visuals can be presented.	https://vimeo.com/288503474
Baffin Island: Lessons from the Past	This is a 3:01min film that tells the story of scientists as they learn more about the past of Baffin Island's climate and organisms by analyzing sediment cores from the Arctic tundra. This video successfully portrays researchers as humans that are approachable. The viewer might even feel like they have similarities with these characters, making them relatable. It is comparable to my	https://vimeo.com/245532901

	video because it gives information about a specific project happening in the Arctic.	
Science in the Sky	This is a 6:27min film that highlights the logistics of an aircraft mission in Antarctica. It does a good job at explaining the type of fieldwork done for the project. Like my video, it is targeted to a general audience, explaining everything in an easy to understand way.	https://www.youtube.com/watch?v=QI5YBNholxY
Traces in the Snow	This is a 3:54min film that shows how scientists measure trail of soot in Greenland's snow to see how tiny soot particles could contribute to temperature increase in the Arctic. Similar to my video, it focuses on fieldwork, explaining the processes and the tools for their research.	https://www.youtube.com/watch?v=xwSedSD8i74
Tariq Talcum Jannik- The Ocean From my Eye	This is a 4:17min film that highlights how Arctic youth are the future of climate resilience. The most useful thing in the video is the way children are used to make the story compelling. It is similar to my video as it shows how strength can come from community, but different in the ages and the occupations of the characters presented.	https://www.youtube.com/watch?v=HTYQEeCiC4M
The Traverse	This is a 14:49min film that the SALSA (Subglacial Antarctic Lakes Scientific Access) Traverse teams as	https://vimeo.com/268874448

	<p>they use specialized tractors to haul roughly 1,000,000 lbs of science equipment across 600 miles of the Antarctic Ice Sheet. It does an incredible job at introducing the characters, giving them a lot of personality and making the story more compelling. Similar to what I wish to do with my video, it follows a journey using chronological order.</p>	
<p>Belgica 121: A Low Environmental Census of the Southern Ocean</p>	<p>This is a 5:52 min film that shows the journey of nine scientists who embark to the frozen continent to assess the impact of global change on Southern Ocean ecosystems. The sound in this video is used wisely to make the viewer feel a certain way, and the characters are presented in a way that is compelling. I would like to be able to successfully incorporate sound the way this video does, as it is a piece that could be entertaining even without the visuals.</p>	<p>https://vimeo.com/278784870</p>
<p>The Toxic Compounds of the Arctic- Greenland</p>	<p>This is a 7:59 min film that is the part 3 of a series concerning toxic compounds found in the Arctic. The images are high quality, it uses maps to help the viewer, and it uses language that is easy to understand for the general public. It is my goal to be able to explain the FjordPhyto work in Antarctica as clear as this video explains their project.</p>	<p>https://vimeo.com/265130344</p>

Antarctica: The Seventh Continent	<p>This is a 2:59 min film that shows footage from researchers that spent 8 weeks in the Weddell Sea with RV POLARSTEN. It uses dramatic music and images, and does a beautiful job at showing how wild Antarctica is. Without using words, this video is successful at making the viewer feel emotional. Weather I want my video to be this dramatic is still something I am not sure about, but it is certainly an option worth considering.</p>	<p>https://vimeo.com/262950,467</p>
Ice Alive	<p>This is a 20:01 min film that takes a closer look at the microbial life that can be found all over the planet's glaciers and ice sheets. This video is very comparable to mine, as it focuses on microscopic life. They do an incredible job at making microscopic life fascinating without the use of charismatic megafauna. Minute 7 to 8 is something I want to strive to recreate. It also does a good job at including a call of action at the end, saying that work still needs to be done.</p>	<p>https://usapecs.wixsite.com/usapecs/melt</p>
The Polar Portal	<p>This 8:19 min film focuses on giving personalities to wildlife through humor and music, as the producer believes that it is a good way to make people care about the ecosystem and its organisms. It has</p>	<p>https://www.youtube.com/watch?v=mbmGsoSu4E</p>

	<p>a unique use of sound, as it uses a catchy song with lyrics. The creativity in this video inspires me to want to explore more ways to tell the story in my film.</p>	
<p>Take a 4-Minute Escape to the Blissful Serenity of Antarctica</p>	<p>This is a 4:48 min film that focuses on showcasing the beauty of wildlife in Antarctica. The best thing about the video is all the wildlife sounds. There is no narration or any voices other than the one from the song in the background.</p>	<p>https://video.nationalgeographic.com/video/short-film-showcase/0000015d-bd4d-d466-a57f-bdcd456f0000</p>
<p>Antarctica - National Geographic Explorer - Nov 29th 2016</p>	<p>This is a 33:09 min film that shows what exploring Antarctica looks like for tourists. It uses humor to give character to wildlife, and similarly to my film, it has interviews throughout the video.</p>	<p>https://www.youtube.com/watch?v=mms2tXLWZk</p>
<p>Vodavos</p>	<p>This is a 32:10 min film that highlights carbon transfer in one of the largest rivers in the Arctic. It follows two labs (French and Russian) and the challenges surrounding fieldwork in the small Siberian town of Igarka. The visuals of the video are good quality, the filmmakers use smooth panning motions and they incorporate creative visuals like time lapse throughout the video. It is similar to my video as it shows the interviews of different scientists that are</p>	<p>https://vimeo.com/110815901</p>

	describing their work and the tools they use.	
The Toxic Compounds of the Arctic- Svalbard (serie2/3)	This 7:26 min film explains how the "invisible pollution" in the Arctic is affecting bird colonies in Svalbard. It is an effective video that manages to explain a problem in a concise way with visuals that help the viewer understand the issue.	https://vimeo.com/265130217
Mining on First Nation Land. The Na-Cho Nyak Dun First Nation in Mayo/ Yukon	This 13:15 min film that shows the changes experienced by the mining industry in the indigenous communities in Mayo/Yukon, both pros and cons of development, importance of their inclusion planning and development. It is different from other videos because it uses pictures as opposed to video as visuals, incorporating interviews throughout the piece. Similar to my video, it has a strong human component, with its characters being humans as opposed to wildlife.	https://www.youtube.com/watch?v=u4UXywmkoqM
Cloudcatcher	This is a 10:52 min film shows the influence of winter cloud coverage in the warming of the Arctic. It has strong use of maps and charts to show global warming data. This usage of charts is something I want to incorporate in my video.	https://vimeo.com/286907882

Little Auks Through the Ages	This is a 13:55 min film with breathtaking images and high-quality sound that tells the story about the environmental pressures that threaten the survival of Little Auks. This video is different from mine in that the main characters are wildlife. There are no interviews throughout the film, and there is one narrator.	https://usapecs.wixsite.com/usapecs/env-issues
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Treatment for Drifters of the Sea

Purpose:

1. To inform the public about FjordPhyto, a citizen science project happening in Antarctica.
2. To inform the public about the importance of phytoplankton.
3. To highlight the importance of citizen science, and of having community in science.
4. To show the beauty of the landscape and wildlife in Antarctica.

Summary:

This is a film about the efforts of the FjordPhyto project in Antarctica, a citizen science project in which tourists get to participate in the collection of phytoplankton and contribute to polar research. Researchers Dr. Maria Vernet, Allison Cusick, and Caitlyn Webster highlight why phytoplankton is so fascinating, and why it is important for the ecosystem. They also highlight the importance of having non-scientists participate in research. The more people get involved in hands on science, the more people might understand and care for the environment, and the more successful we might be at protecting ecosystems.

Approach to the film:

This film will be documentary in style. Most of the footage has already been taken by Allison Cusick during her expeditions in Antarctica. This footage is rich in shots of fieldwork on boats, wildlife, and landscape. In addition, it will include extensive use of interviews. Due to COVID 19 restrictions, the interviews will be recorded using Zoom or a phone with the least possible personal contact. These interviews will be indoor, but the majority of the shots throughout the film will be outdoors.

Content of the film:

Maria Vernet

Allison Cusick

Caitlyn Webster

1. Allison explains what phytoplankton means and Caitlyn explains what fjords are. Allison: "If you break up the word phytoplankton, the word phyto and plankton are both derived from Greek. Phyto means plant, and plankton is a drifter. So, they are like little tiny plant like organisms drifting in the ocean. They are not able to swim away."
2. Footage of phytoplankton, as well as footage of polar fjords. Caitlyn continues speaking: "FjordPhyto is a research project that is studying not only phytoplankton in general, but specifically in polar fjords which are mountainous areas that have been carved away by glaciers over time to create these very deep V's within these very steep mountains and have a high amount of freshwater depositing into the surrounding seawater."
3. Allison: "Phytoplankton are amazing little creatures that we don't know much about in the sense of your daily life. So, they live in the ocean, they are actually contributing to global processes, so in one drop of sea water you might find all of these organisms, and together they are contributing to over 50% of our Earth's oxygen, so that's more than the trees and plants on land combined. They are regulating carbon that moves from the atmosphere to the ocean's depths. When

you realize there's these single celled underdogs making these huge things happen in Earth as a whole, and giving life to life, it's amazing! They are also intriguing because they are ancient, they have been around for hundreds of millions of years."

4. Shots of krill, penguins, seals and/or whales. Maria Vernet explains the importance of studying phytoplankton "The phytoplankton is the most important thing in the world. The same way as we humans depend on crops like wheat, corn and things to make our food, phytoplankton is also the food for all the animals that live in the ocean. So, you have the phytoplankton that is only one cell being eaten by another animal, which is eaten by an animal that is a little bigger until we get all the way to see some penguins and whales. We call that the food web. None of all these beautiful animals that we all love would be alive, as the phytoplankton provides that food for everyone in the ocean. Phytoplankton are extremely old. They were one of the first organisms when the world was started. And they are the ones that have made the water livable. They have changed the world in such a way that other organisms like us, have been able to live."
5. Caitlyn speaking. Shots of phytoplankton and people using the microscope. Shots of penguins and killer whales. "Most people know what a penguin is or even a killer whale, even if they haven't seen one in real life, but the microscopic teeny tiny world is absolutely dazzling with all kinds of different amounts of iridescence and even their fluorescence can be variable. When you have the proper tools and microscopic lenses to see them for what they really are, and they are nothing short of immaculate works of art. 95% of the living organisms within the ocean are made up of phytoplankton, so plankton alone is making this huge amount of the biomass living within the sea, and we know hardly anything about them! "
6. Allison: "I think for people that participate; they get a different view of science. With citizen science people can see that it is a fun process, I have had people approach me after participating saying that it is the first time in a while that they've felt this spark of childlike curiosity, and that makes me excited because that's what I'm trying to get, enthusiasm spread about science." I have also had people say I want to do something different with my life, or I'm finally seeing how changes in here would affect what I am doing back at home, so I'm going to make changes in my home life. I think that impact really hits them. I've had people say that it meant more to them than being a tourist, that they got to participate in some citizen science."
7. Shots of tourists on ships in Antarctica. Closeups of faces. Song playing in the background. Allison Cusick's voice: "We always say that scientists need to get out

of the ivory tower and interact more with the public. If science starts with observation, then people can help with science through observation. You just have more eyes on the ground collecting more information about how the world works. For Antarctica specifically, I was struck by the fact that in the summer you have maybe have 5000 researchers from all the nations working in Antarctica, but then in the peninsula you have this tourism industry that is growing with over 59,000 visitors coming, so that's more than ten to one ration of visitors to scientists. So, for me personally, that was my motivation to get that community of people involved in the polar research that is going on down there because Antarctica is preserved as a place for peace and science."

8. Caitlyn Webster's interview shots. "The best part about participating in citizen science is having the opportunity to share this rare facet of science with someone that is seeing the project almost with childlike eyes, seeing things for the first time. It puts everything into a different perspective and as a scientist it makes you question things differently because you are being confronted with questions or thoughts that are more often than not taken for granted and in a project like FjordPhyto where its already such a unique experience to be in these places, it brings this more profound experience to the forefront of how the world is dependent on these organisms that aren't typically studied or given a lot of spotlight time. Not only are you going to appreciate everything that much more when you take a moment to look at the tiniest forms of life that your eyes can see, but that's going to be something that you bring home and share with more people that not necessarily know what phytoplankton is. And so that novelty and that connection, not only with people involved in the citizen science project, but also their connection and seeing them form that connection with the place that they're in is really special and unique.
9. I love getting more people involved with citizen science because I like to think that it starts this spark of curiosity in their world that otherwise wouldn't be there. And the more sparks you have, eventually will add up into a potentially roaring fire that can really drive actionable change. That can help further science and help foster this community that wants to support these kinds of projects because more people care about them because at the end of the day, people will care about what they know."
10. "I would love if my grandparents were still alive that they would find a new fascination with something like phytoplankton. When you think of who's voting and who has a voice and who has the potential to make big changes right here, right now it's going to be the people that are over 18 that can vote and are making decisions about their careers and their education right now. So, I think its hugely important to get younger generations involved, but I also think its

arguably important to get people later in life or starting an education career because that they can gain just as much.”

11. Shots of people on the mountains and on boats, both tourists and researchers. Shots of the Antarctic Treaty. Maria: “Antarctica is the only continent that has an Antarctic Treaty, instead of a government, it doesn’t have a passport. It doesn’t have a nationality. Everyone that is going to respect the place is entitled to go there. So, in a certain way, is it utopia. This is what we all aspire to that many countries come together to agree on how they interact. The agreement that this continent is for research and for tourism and not to destroy. So that international sense of community that has survived many smaller things like during the Cold War between the United States and Russia, and Russia came together to define the Antarctic Treaty in 1958, so it has that sense that it can go beyond our human limitations and create something better for the rest of humanity.”
12. Maria Vernet: “Community is basically communication. You create community by communicating with each other, and science is all about communication, because you cannot carry science on your own. Because the communication doesn’t happen if the language is not understood by both sides.”
13. Maria: If I were not a scientist, I would love to do citizen science! I think it’s very important to enjoy nature more. We have become excellent about making cities, and buildings and cement, but I think people need more open spaces, they need to see green and sunshine. If citizen science could bring that to anyone that would also be a wonderful way of making people more in touch with nature, because it’s the only way that we are going to go through the different crisis that we are experiencing. To make more peace with our environment.”
14. Allison’s interview shots. “You don’t have to come all the way to Antarctica to do citizen science. You can look at projects near you.”
15. End up with text showing facts and numbers about citizen science, such as the amount of citizen science projects in the United States.