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Global Connections

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SESSION 46

**PUBLIC ENGAGEMENT WITH ANTARCTICA
IN A CHANGING CLIMATE**



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Using grand scale media to drive conservation: Protecting the Last Ocean and beyond

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Antarctica is exceptional. The coldest, windiest, iciest, driest, and most remote of continents is widely celebrated for its rich history of exploration, science and diplomacy and for its exceptional beauty. It's also exceptionally important and vital to Earth systems and harbors some of the last remaining great wildernesses on the planet. However, fishing pressure combined with cumulative impacts of climate change, jeopardizes the future Southern Ocean wildlife. Extensive research supports that protected areas – areas that are off-limits to fishing and other human activities – can conserve biodiversity, and perhaps most importantly in the case of the Southern Ocean, can enhance resilience to climate change impacts.

Here we present on how we've used media to bring this exceptionally beautiful and important place to the public and to the policy-realm in support of designating large-scale Southern Ocean MPAs. Our story starts with the 12-year long Last Ocean project which helped drive the adoption of the Ross Sea region marine protected area in 2016. We share stories and lessons learned for effectively working at the intersection of science, policy and the public. We highlight the powerful role that media can play in creating an intimate experience between the public and the most remote of continents. Finally, we end with recent efforts to use grand scale media in targeted countries (e.g., massive outdoor photography displays in Russia) to continue to promote the adoption of large-scale Southern Ocean marine protected areas.

Beyond the Heroic Age of Exploration: Fusing Environmental Literature with the New Human Experience South of 66°33'48

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Publicly available sales figures suggest that trade books in which Antarctica features centrally have yet to achieve enduring commercial success beyond those set in the “Heroic Age of Antarctic Exploration,” approximately 1897-1922. A trade book is defined as one written for a general readership (i.e. not academia). Of the 100 United States bestsellers in March 2020 in the nonfiction subcategories of “environment and nature,” “climatology,” and “environmental policy,” Amazon reports that none focus on Antarctica. (The United States is the largest publishing market in the world. Amazon is the largest bookseller, accounting for 41% of all books sold.) A February 2020 public opinion poll conducted by Pew Research Center suggests 52% of Americans call climate change the top issue for the next U.S. president—up 14% since 2016, and the first time a majority of Americans rank climate change as the top presidential priority. With increased coverage of Antarctica and the effects of climate change, the lack of interest in Antarctica-related books is crosswise with the cultural zeitgeist. The disconnect between growing popular concern about the environment and poor Antarctica-related book sales is attributable partly to a rigid adherence to siloed nonfiction genres. Recent bestselling cross-genre fiction with overt environmental themes present a path forward for Antarctic nonfiction to reach popular readerships. This will entail a fusion of traditional tropes of “heroic” Antarctic nonfiction with conventional themes found in polemic environmental literature. The creative writing aphorism “show don’t tell” is particularly salient in this necessary method of Antarctic storytelling.

A collaborative process between Antarctic researchers and Communication scientists for scientific videos production in order to popularize the polar sciences: seeking an accessible language to the general public

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In Brazil, the Antarctic sciences are absent from the school curriculum and rarely have space in the media. Besides, or because of that, there are not enough media materials with accessible language to the general public. This fact leads to a lack of scientific knowledge about Antarctica and its role on the planet. In this research, we studied the guidelines for the production of scientific videos for the popularization of the Antarctic sciences. Eleven scientists participated in the production team, collaborating with the creation of scripts, providing images, and searching for an accessible language to the general public to expose their research.

The conception of the videos considered the three dimensions of scientific literacy proposed by Miller (2000): the mastery of a basic vocabulary of scientific concepts, the understanding of the nature of the scientific method, and the understanding of the impact of science and technology on individuals and society. For this, the videos expose the processes of Antarctic research: hypothesis survey, logistics for field research, methods of data collection and analysis, systematization and interpretation of results, and their impacts.

The partnership with scientists to search for a language accessible to the general public allowed to transmit a trustworthy image of science, facilitating the understanding of scientific concepts, processes, and principles. The process also supported to improve the communication skills of scientists and the learning of Antarctic subjects by the production team. It is still a challenge not overcome, the quality of the images produced in the field.

Antarctic Expedition - contribution of a digital serious game, accessible to the blind and deaf, to the Antarctic sciences popularization

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Digital serious games, like educational ones, aim to bring changes in the real world. The game strength as a media to science popularizing lies in its rules and procedures. By learning the game rules, the player learns how to proceed in the world outside of it. Fun also plays an essential role in scientific literacy, as it promotes the dialogue of knowledge with practical actions, in a ludic way.

Based on these premises, we developed an educational RPG (Role Play Game) for interdisciplinary science teaching. In the Antarctic Expedition game, accessible to the blind and deaf, the player assumes the role of a tourist who, when visiting the continent, collaborates with some scientific research. The game has four missions: citizen science of bird and whale identification, and Brazilian research in vegetation and paleontology.

The game rules simulate real research processes. For example, in the paleontology mission, the player must follow all the steps to collect and identify fossils. Handling samples properly is one of the rules, when destroying a sample, the player loses the game and must restart it.

The player's interaction with the game is the most significant element of learning. He learns by talking to naturalists, playing mini-games, and engaging in research.

The simulation of scientific processes supports the transposition of the game symbolic world - the rules - to the real world - the research procedures -, demonstrating that the game is a fun and valuable medium for Science Education and the science popularization.

POLARCASTERS - strategies for scientific literacy through video production by non-scientific public

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Studies on scientific literacy highlight the failure of communication models based on the cognitive deficit and show the tendency of dialogical communication models, which foster democratic public participation. Abandoning the deficit model does not mean ignoring its existence. Research continues to indicate the difficulty of understanding, by the general public, about science and its processes. There are still discussions about who should communicate science: scientists who master the content or communicators who master communication techniques?

In this work, we assume the dialogical communication model to develop scientific literacy strategies about Antarctica. We implemented, in two undergraduate classrooms, one in elementary education and two teacher training programs, a learning methodology mediated by the scientific video production: the PolarCasters project. Aimed at teachers and students, it offers video production workshops and guided studies on Antarctica over three months.

The more than 200 participants produced videos about research conducted in Antarctica, experimenting with different methods, genres, and languages. Forty-two videos were published on a YouTube channel called PolarCasters Antártica.

As a result, the Antarctic sciences are no longer the exclusive domain of scientists. The methodology fostered the construction of knowledge, and by assuming the role of science communicators, participants have become protagonists in the processes of producing scientific videos, demystifying science, and inserting Antarctica in the school curriculum. In future studies, we intend to analyze the impact of scientific communication being produced by the non-specialist public, and not by scientists or communication professionals.

The Science Hero's Journey--Using Storytelling in Science Outreach

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Individual researchers are increasingly called upon to participate in science outreach. But polar scientists soon run into what I call the “Polar SciComm Problem”: It is relatively easy to draw people in with remote adventures, extreme beauty, and penguins, but keeping the audience’s attention while conveying sophisticated science concepts is a challenge. What happens at the poles seems remote or removed from “real life”. The public has little concept of the scale of Antarctica and its glaciers, and Antarctic science in a warming world can raise anxiety, causing people to quickly tune out.

Storytelling can not only capture an audience’s attention but keep it while you explore the science and why it matters. Using my experience as an editor, writing teaching, author/illustrator, and Outreach Officer, I discuss the usefulness of textual and visual storytelling in polar science communication and outreach.

I explore how traditional narrative structure--with a beginning, middle, rising tension, climax, and resolution--can be applied to outreach for various audiences, from young children through the adult layperson. Using specific examples of my own polar science communication work, I examine how scientists can harness traditional narrative structure in lab and expedition blogs, expository social media posts, educational products, and public presentations. Let me take you on a narrative journey into polar outreach.

Going South, Aiming North—Perspectives on Successful & Creative Antarctic Outreach

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Accelerating ice loss from the West Antarctic Ice Sheet, not enough political action to combat climate change, and successful disinformation campaigns make it clear that vigorous, targeted, and coordinated science communication must be among the top priorities of the Antarctic community. But with a range of media ever competing for the public's attention, capturing the layperson with engaging, simple, and scientifically accurate information is challenging. Not only institutions carry an obligation to spread accurate information; individual polar researchers, together with dedicated communicators and creatives, are on the vanguard in this battle to capture public awareness, educate, and inspire action.

I discuss what the Antarctic community can learn from a highly successful outreach program. The Onboard Outreach Program (OOP) aboard the JOIDES Resolution sets the gold standard for science communication, outreach, and interaction with a broad, global audience and is an excellent instructional model. I examine the success of the OOP's multifaceted approach to public engagement and education, plus resources I would add to such programs for the Antarctic community.

My idea outreach program includes: an accessible, visually appealing, and easy to navigate centralized information source and I explore its various components; coordinated social media platforms; downloadable educational resources aimed at preschool through the adult layperson; live interactive broadcasts between scientist and audience; and opportunities for growth of scientist as communicator. It encourages an individual to use their unique communication skill set and eases the burden on individual scientists by providing readily sharable information and a strong network.

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All Hands on TweetDeck!--A Social Media Crash Course for Scientists

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You suspect you need to do it, but concerns about social media leave you cold. You have a languishing Twitter account, but you don't understand how to use it. You're an avid lurker, but you have no idea what to tweet. You're already using social media, but your posts just aren't hitting the mark. Whatever your social media experience, this is the crash course for you.

As a freelancer, I have used my social media platform to build a successful business and a strong presence in my field. As the veteran Outreach Officer of two Antarctic research cruises, I am well-versed in how to apply social media tools to polar outreach, the limits of using social media in the field, and in using simple, engaging short-form posts to convey complex science to a broad audience.

I discuss the utility of the three top social media platforms and convince you why should use Twitter (and Instagram)--for both public outreach and building your career. I show you how to get started, plus what to consider as you develop your social media presence.

We'll explore how to acquire a following, what to tweet and what to avoid, how to use hashtags and threads, how to avoid falling down a time-sucking rabbit hole, troll avoidance, and other ins and outs of Twitter and other social media. I highlight the importance of amplifying the efforts of organizations, individual scientists, and creatives on social media. It's all hands on deck--the polar community needs you!

Media reporting on sea level rise in Aotearoa New Zealand (1988 – 2018)

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New Zealand scientists have been communicating about sea level rise to publics, via the media, for the past three decades. We identified a corpus of 541 news articles about sea level rise from four New Zealand print publications (newspapers and magazines) from 1980 to 2018.

Analysis of the articles shows that while headlines are often sensationalist, presenting extreme sea level rise scenarios, the content of the articles is more measured and is usually in line with IPCC projections. Here, thematic analysis of the articles identifies the ways the media has (i) quantified the amount, timing and rate of sea level rise projections, (ii) identified quote-worthy sea level rise experts, (iii) made connections to Antarctic ice melt and (iv) presented the ways in which scientists, publics, businesses and government are responding to the threat of sea level rise.

Results of this research into media perceptions of sea level rise, which is funded by the NZ SeaRise programme, will have value for scientists communicating about Antarctic ice melt, sea level rise, and climate change more broadly, in the years ahead. As part of this paper, we will present some initiatives by the NZ SeaRise programme to enhance media coverage of sea level rise in Aotearoa New Zealand.

Reporting Antarctica: How the News Media Frames Antarctic Science in a Changing Climate

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For the majority, Antarctica is a mysterious frozen continent: a place of science and international collaboration; and a symbol of fears about global warming. But from where do these ideas generate and who decides the terms of reference for the public's understanding of Antarctic science? The role of news media has been largely overlooked in scholarship, which seeks to understand public engagement with, and understanding of, the Antarctic region. This is a significant gap in research, given that the news media is the public's main source of information about science. As images of calving icebergs and collapsing ice shelves become more commonplace on news feeds, news media's role in framing key issues such as climate change deserves exploration. Using the Australian news media as a case study, data collected from Australian online news media outlets over a recent 12-month period will be analysed to identify prominent frames and voices in news discourse related to Antarctic science. The data will be considered in light of existing scholarship which examines the role of journalists as gatekeepers of science stories and the politicisation of science. This presentation argues that exploring journalistic representations of Antarctica science has the potential to challenge assumptions about the role of news media and scientists in communicating issues such as climate change.

'Planetary conscience': a useful concept in Antarctic artistic enquiry?

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This paper introduces the concept of 'planetary conscience' as a lens to consider two Antarctic arts-based enquiries. I define 'planetary conscience' as having a heightened awareness of the interrelationships and interdependences that create the conditions for, and sustain, life on Earth, coupled with conscious acts that seek to minimise human environmental impact.

Leave Only Footprints critically considers the tensions and contradictions between human presence and environmental impact in Antarctica. Created over seven seasons of working in the Antarctic Peninsula region, the project has evolved to embed environmental conservation work within the artistic process. Antarctic Sun Lines uses solargraphy to record the dynamic relationships between Antarctica, the sun and the tilted orbit of the Earth. Since 2015 the project has developed into an international collaboration with over 50 Antarctic organisations involved. Audience responses during a public exhibition at Christchurch Art Gallery / Te Puna o Waiwhetū in 2019 suggest that the work stimulates curiosity in planetary dynamics. Both enquiries can be understood as reflecting 'planetary conscience' in their conceptual foundations, and in the questions prompted during the creative process and exhibition of the work. Further, the work has resulted in conscious environmental action as an integral element of the art-making process.

In the Antarctic context, we know that 'the ice' is fundamental to the creation and continuance of the ocean and climatic systems essential to life, therefore the concept of planetary conscience may be useful in our cultural, environmental and political engagements with the continent and the wider world.

Citizen Science & Plastic Pollution Engagement in Antarctica

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Plastic pollution has captured the attention of the world and presents an opportunity as a “gateway topic” to engage the public with environmental issues. Making the connection between the behaviours we have at home with the isolated Frozen Continent can often be challenging for educators and scientists in the polar field. Here we present the Antarctic Sabbatical, a project funded by Airbnb, in partnership with the Ocean Conservancy and Antarctic Logistics and Expeditions, which afforded five members of the public with an opportunity to engage in polar research and microplastics investigations in Antarctica. The “Antarctic Sabbatical” project encompassed training and a lecture series delivered in Punta Arenas, engagement with local partners (including the Instituto Antartico Chileno and Gaia Antarctica Research Centre, Universidad de Magallanes), fieldwork on a glacier, and development of Environmental ambassador skills. Carrying out a pilot-scale study of microplastic investigations out of Union Glacier Camp, we illustrate the plausibility for regular data collection utilising already existing tourism for “Extreme Citizen Science” and plastic pollution engagement in Antarctica.

When there was no ice - an exhibition that brings audiences closer to the research carried out in Antarctica

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“When there was no ice - new discoveries from the Antarctic continent” was the first exhibition organized by the Museu Nacional/UFRJ after the fire of September 2nd, 2018, that seriously affected the palace where the main part of the institution was housed. The main purpose of the exhibit was to show the climatic changes that occurred in Antarctica throughout deep time and how research concerning paleontology and geology is done in this region, using the results obtained by the PALEOANTAR project, that has collected fossils mainly in the Antarctic Peninsula. The exhibit is divided into two main areas. The first shows the current conditions of Antarctica, including elements of the present flora and fauna - what can be regarded as common knowledge. But in the second part, the visitor is invited to travel some 70 million years ago when the Antarctic Peninsula, was covered by gymnosperm forests and inhabited by different creatures in land and sea. New results from the PALEOANTAR expeditions are shown, including flying and marine reptiles. Concepts of climatic change, plate tectonics and "how do we know what we know" are presented. There are also areas where the public can have a glimpse on the daily life of a researcher working in the frozen continent. This kind of activity brings the public closer to Antarctic research.

If you have lemons make a lemonade: challenge and inspiration for polar and climate change education.

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The tropical climate conditions typical of much of Brazil tend to limit Brazilian perceptions of the frozen polar regions. This is especially so in regions with limited scientific knowledge and no involvement in polar research. The activity “Why should we study the poles of the Earth?” was organised by APECS-Brazil for students from the fourth and fifth elementary school grades at the Escola Estadual 13 de Maio, in the city of Porto Esperidião, Mato Grosso State, near the Brazil-Bolivia border. Topics addressed included polar biodiversity, the proximity of Brazil to Antarctica, the main impacts observed near the poles resulting from climate change, and our responsibility to protect these regions. Symbolising the commitment to reduce human impacts on the Earth's climate, 30 native and fruit trees were planted by the students involved. Unfortunately, these trees will not bear fruit or create future shade, as a machine cut them a month after the planting, undoing all the effort of the students. However, teachers, students and APECS-Brazil used this experience to exchange letters reporting their feelings, challenges and renewed commitments in the face of such events. Twenty-one letters were written by the students and posted to APECS, expressing the most beautiful and hopeful thoughts for a better world, which showed that the teachers and students were very involved with the activity. Challenges will always remain, but in response there is also a new way of creating, inspiring, learning.

The urgency of finding new ways of communicating science while Antarctic ice is melting

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The warm temperatures of February 2020 renewed a global concern in the media about the future of the White Continent. Such temperatures raise new questions about our role as researchers. Scientists communicate the results to their peers through papers, but the impacts of climate change in Antarctica also requires creative and effective ways of communication. Among different outreach activities related to Antarctica in Ushuaia, the “Café Antártico” (“Antarctic Coffee”) is an initiative performed by researchers in this Antarctic Gateway City. Three key ideas inspired the criteria for its organization since 2014: (i) interdisciplinary objectives in the invitation of speakers; (ii) itinerant venues in town; and (iii) general and interinstitutional public is invited. In doing so, we expect to shorten the distance between the people interested in Antarctica and those with Antarctic experience. Thus, we offer a meeting point beyond their public or private occupation to discover or deepen their knowledge about Antarctica. Although the “Café Antártico” is not an isolated action in science communication in Ushuaia, our efforts are not enough: climate change represents a new worldwide challenge to the public engagement of science communication. This presentation aims to discuss experiences of public engagement in Antarctic science and to articulate with other initiatives.

The Fantastic Feedback Loop - how Happywhale attracts and holds public interest in science, Antarctica and its whales.

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The International Association of Antarctica Tour Operators (IAATO) states that ambassadors are created through responsible tourism, creating awareness and advocacy that lead to positive conservation outcomes. We propose that this ambassador effect can be significantly deepened when visitors actively contribute to Antarctic research through citizen science, particularly when it includes a rewarding feedback loop. We created a web-based citizen science platform (Happywhale.com) to collect images and sighting data for marine mammals, and implemented automated image recognition for humpback whale fluke photo ID. Automated feedback mechanisms notify contributors of research results, informing them about the identity of whales they have photographed when identified, and also alert them whenever 'their' whale is seen again.

Happywhale has seen organic growth since inception in 2015. It has received 267,871 images globally from 6140 public contributors and research collaborators, with 859 contributors sharing images from the Antarctic. Happywhale is an attractive, easy platform to use, with 35% of IAATO operators running the project on their vessels in the 2018-2019 season. The key to its growing success is rapid feedback to contributors which educates about whale encounters, with links to known sighting history. It encourages greater attention to marine mammal sightings, potentially inspiring greater efforts to engage with science. The resulting dataset has identified approximately 25% of individual humpbacks on the Antarctic Peninsula, a valuable asset for population modelling, and informed IAATO development of an extensive vessel slow down zone.

“A community-shaped hole” –public engagement, policy, and Australia’s Antarctic gateway.

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When it comes to public engagement, the Antarctic sector is faced with the singular challenge of attempting to connect with a populace who will likely never experience the continent first-hand. In this environment, the Antarctic gateway cities of Hobart, Christchurch, Punta Arenas, Ushuaia and Cape Town are attracting increasing academic attention (Bertram et al., 2007, Elzinga, 2013, Boekstein, 2014, Hall, 2015, Roldan, 2015, Leane, 2016), and offer a unique opportunity to foster indirect engagement strategies that build on the cities’ well-established geographic, cultural, economic and scientific Antarctic ties. At an Australian level, we are seeing increasing political investment in Hobart’s gateway status through developments like the forthcoming Macquarie Point Antarctic & Science Precinct (Australian Government, 2019). Little is currently known however, about the perspective held by Hobart residents themselves, and the local community’s contribution to the Antarctic sector remains largely unexplored.

This paper will examine the ways in which Hobart residents are characterised in public policy. Drawing upon the emergent results of PhD research concerning civic participation in the gateway cities, this paper will present the results of a mixed-method policy analysis using rapid policy network analysis (Bainbridge, 2014) and various close reading techniques.

The analysis will argue that Hobart residents are not currently seen as stakeholders in Australian Antarctic policy, and that there is a corresponding under-representation of the social and cultural spheres of activity within Hobart’s Antarctic life, something that has implications for our ability to strategically engage gateway residents in Antarctic issues of local and global importance.

Launching 'Polar Alien Hunters' – a new educational biosecurity campaign to protect Antarctic biodiversity

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Polar Alien Hunters is an educational biosecurity campaign that uses comics to highlight the issue of alien species in Antarctica, the researchers who study them, and what we can do to protect our vast icy wilderness. SCAR-COMNAP 2020 will mark the official launch of the initiative, where we will share our first 3 comics introducing the issue of alien species in Antarctica and invite researchers, logisticians, managers and national operators to join us and become Polar Alien Hunters. We will also present our own research on non-native species in the Antarctic region to contextualise both the problem of non-native species and the need for a coordinated international campaign.

The main goal of the project is to share educational material with visitors before they leave for Antarctica, ensuring that they do not accidentally take any 'aliens' with them on their trip. Our engaging and fun comics will instruct and educate tourists, researchers, and support staff alike on the risks of introducing an alien species, their personal responsibility for carrying out biosecurity measures, and why coordinated effort is needed across nations and sectors. The topic of non-native species introductions is a priority for the Committee for Environmental Protection and Polar Alien Hunters represents the first effort to conduct an Antarctic biosecurity campaign across all nations and sectors that visit the Antarctic region.

Infographics to support communicating science to the public and policy makers: summarising the science of the first Marine Ecosystem Assessment for the Southern Ocean

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Effective science communication regarding global change has taken on new urgency as a result of dramatic increases in the quantity of information – derived from ‘big data’ and technology – directed towards knowledge users (policy makers, government and the general public). Moreover, the volume of information is such that it is difficult for anybody to be across all the detail in a time-poor world. Therefore, efficient means of delivering key messages is important. Methods that leverage people’s most dominant faculty for receiving information – visual processing – through graphic visual representations of information, data and knowledge (termed ‘infographics’) are increasingly being implemented to communicate research in an immediately intuitive and engaging manner.

The first Marine Ecosystem Assessment for the Southern Ocean (MEASO) aims to provide a current assessment of the status and trends of marine habitats, species and food webs around Antarctica. The assessment created a valuable learning opportunity for collaboration between researchers and graphic artists to distill and convey key scientific concepts and results of interest to the public and policy makers in a visual narrative. Here we discuss the process of co-creation of a series of infographics produced from MEASO, the lessons learned from this process and, in our experience, how the use of graphics may enhance education practices to effect change.

India's scientific endeavours in the polar research: Bridging the gap between science and society

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Scientists are concerned about the implications of human-induced changes on polar regions and their butterfly effect across the globe. Though, the same must be communicated in the simplest form among the general public and policy-makers. National Centre for Polar and Ocean Research (NCPOR) is a nodal agency for Indian Polar Programs (Antarctica, Arctic, Southern Ocean). NCPOR has undertaken a number of outreach activities in recent years to raise public awareness about climate change and to highlight Indian endeavours in Polar Regions. Polar outreach activities aim to connect teachers, students and citizens across India through the cultivation of interest in the polar research among enthusiastic scientists, educators and communicators. To achieve this, different methods such as organising outreach program/workshops, participation in exhibitions, public lectures, etc have been implemented. To promote audience participation, quiz contests, scientist-student interactions, panel discussions, screening of science films, etc. have organised. Over the past year, NCPOR interacted with more than 8000 students and general public using different platforms: educational visits (28%), participation in the scientific exhibitions (64%) and outreach events (8%). NCPOR's initiative biennial 'National Conference on Polar Sciences' provided a platform for Indian polar community to address challenges, share research findings and enhance collaborations. NCPOR also liaise with APECS to conduct outreach activities. Integrating the latest technology like virtual reality, augmented reality are some of the tools planned for future outreach activities to deliver an immersive experience of Antarctica. India will host 10th SCAR conference in 2022 to encourage international scientific collaborations with SCAR members.

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How do we build capacity, resilience and community connectivity to the polar regions (and each other) from afar?

Transdisciplinary Antarctic climate communication landscapes and the many functions of art.

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Art, its processes, methodologies, aesthetics and interdisciplinarity, connect audiences to knowledge and place that is complex and outside of regular experience. Here we examine how art can be used to improve communication of climate science. The central question is “can collaborative, inclusive and inter-generational project design with stakeholders, scientists and artists, create more science-positive futures and problem solvers?” We address this question with a project developed to communicate climate science using story-telling and art-making in an educational context with an embedded social science framework. The output generates community collaboration and, in doing so, strengthens the impact of the shared science knowledge. This then extends through to policy with increased care, concern and action at a societal level. The work also shifts definitions of the term “stakeholder,” whereby the art allows audiences to reconsider stakeholders and publics that exist within an ecosystem rather than a hierarchy, while improving trust between science and the public. The project developed a data-driven evidence base to quantify the strength of the outcomes. The work suggests a combination of Antarctic science research stories, place-based methodologies and art can affect change within our communities.

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Engaging schools with a new map of Antarctica

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To commemorate the 60th anniversary of the Antarctic Treaty, the NZ Antarctic Society in partnership with Land Information New Zealand produced and printed a new map of Antarctica, which was sent to every school in New Zealand at the beginning of the academic year in 2020.

Themes of the map addressed climate change issues, including ice sheets, ocean currents and sea ice. Seabed bathymetry of the Southern Ocean was also shown, including the continental shelf. The map highlighted the critical interconnection between continent and ocean, and how they impact the global climate system. The map was supported with the accompanying 'Antarctic' magazine of the NZAS

The new map, which was a radical redesign of traditional cartographic conventions, was positively received by schools, with many seeking to deepen their engagement with the NZ Antarctic Society. As a result of the map initiative, there is now an ongoing program of educational outreach by the NZAS to schools throughout the country.

Communicating information about Antarctic Science and Research to first year students at Stellenbosch University.

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The Antarctic Legacy of South Africa (ALSA) focuses on communicating science at different levels. One level is at tertiary institutions to enlighten students on research done in the Antarctic by South Africa. An opportunity presented itself when the Faculty of Science at Stellenbosch University added a new compulsory module, 'Science in Context' to be completed by all first year BSc students. The purpose of this module is to expose students to the benefits of integrating knowledge from different disciplines when approaching scientific topics. ALSA became involved in this module in 2018 by supplying topics, giving lectures, creating podcasts, as well as end-of-year evaluation of the students' projects. Antarctic-related topics(12) were compiled in conjunction with ALSA and making it one of the key role-players in this module. Students made use of the ALSA online archive as well as the links to the different research projects within SANAP. Students presented their work, which gave the rest of the students the chance to learn more about these Antarctic-related topics. One of the topics that was chosen multiple times in 2018 was; 'Invasive species can have devastating effects on their environment. Consider the mice invasion on Marion Island. How did it happen, why is it problematic and what can be done about it?', and in 2019 "Scientists and researchers spend 2 to 14 months in isolated and extreme weather conditions with limited contact with family and friends. How does one prepare for such an expedition?" (The presentation will include excerpts of the projects.

The Effect of Exposure to Antarctic Focused Art and Science in Shaping Attitudes Towards Climate Change.

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Climate change is an exigent problem that requires a substantial increase in action to mitigate. It has been suggested that exposure to climate change inspired music may shape climate change attitudes by evoking emotions and influencing system 1 (affective, automatic and fast) judgements. A recent study investigated whether different combinations of auditory stimuli relating to the Antarctic region influenced participant attitudes towards climate change. 134 online participants were exposed to one of four stimuli conditions: Antarctic inspired music, science information with Antarctic inspired music, science information with 'neutral' music (i.e. not emotive or inspired by Antarctica), or science information only. Participants completed pre- and post-stimuli exposure measures of implicit and explicit Biospheric attitudes (a measure of climate change attitudes) and positive and negative affect. Results indicated that irrespective of the stimuli, both implicit and explicit Biospheric attitudes were significantly higher post-stimuli exposure, and positive affect lower. Furthermore, participants exposed to science information only had the highest increase in Biospheric attitudes, Antarctic inspired music only the lowest, and all music conditions showed a significant decrease in positive affect. These results imply that combinations of Antarctic inspired music and science information can shape Biospheric attitudes, and whilst positive affect may decrease it does not directly relate to attitude change levels. These findings have implications for communicators seeking to engage the public with the issue of climate change.

Action Group on Public Engagement with Antarctic Science

Rebecca Priestley¹, Elizabeth Leane², Heidi Roop⁴, Rhian Salmon¹, Jose Xavier³

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A primary goal of SCAR is to “communicate scientific information about the Antarctic region to the public.” To this end, SCAR, national SCAR members, research organisations, and individual scientists conduct significant science communication, public engagement and outreach activities. At the same time, the field of study variously known as “Public Understanding of Science,” “Public Awareness of Science”, and (more recently) “Public Engagement with Science” has developed rapidly, and now has its own critical literature, theoretical debates, and scholarly forums.

In 2019, the SCAR Standing Committee on the Humanities and Social Sciences endorsed the formation of an Action Group on Public Engagement with Antarctic Science, proposed by Elizabeth Leane and Rebecca Priestley.

The aim of this Action Group is to foster the academic study of public engagement with Antarctic science. The group’s members will describe, evaluate, contextualize and critique the diverse ways in which scientists, communicators, artists and educators engage with different publics, and the ways in which publics engage with Antarctic science. Members of the group will apply the methods and findings emerging from the scholarly fields of science communication and public engagement with science to produce analyses and recommendations for Antarctic researchers.

In this session we will discuss the aims of the Action Group, identify existing initiatives aligned with the aims of the Action Group, invite researchers and practitioners to join the group, and make plans for future activities.

Public perceptions of sea level rise in Aotearoa New Zealand

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The IPCC Special Report on the Ocean and Cryosphere in a Changing Climate (2019) stated likely sea level rise projections to 2100, under different scenarios, of 0.29m to 1.1m (relative to 1986-2005). Some scholars, though, have published, or spoken publicly about, the possibility or likelihood of higher sea level rise by 2100. In Aotearoa New Zealand, while most reporting aligns with IPCC advice, media also give coverage to extreme and catastrophic scenarios. To investigate public perceptions of sea level rise, we conducted a representative survey of 1100 New Zealanders comprising 15 multi-choice questions.

Respondents were surveyed on understanding of the mechanisms of sea level rise, and the amount, rate, and timing of sea level rise expected this century and beyond. Despite New Zealand media coverage not perpetuating this misunderstanding, respondents had a strong belief that the main contributor to sea level rise is melting sea ice, with it selected as the single main contributor by 32% of respondents and one of the top three (along with 'other' and 'melting ice sheets') by 66.5% of respondents. While more than half of respondents believed sea level rise by 2100 would be up to 1m, the remaining respondents overestimated sea level rise, choosing 'up to 2m' (14.9%), 'up to 5m' (10.7%) or 'more than 5m' (8.2%).

Results of this research, which is funded by the NZSeaRise programme, will have value for scientists communicating about Antarctic ice melt, sea level rise, and climate change more broadly, in the years ahead.

Involve Latin America and the Caribbean countries for Antarctica in a changing climate

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Today we live in a changing world, where not only climate change is putting pressure on the different earth systems. Changes in geopolitics, business, and markets are putting more pressure on different ecosystems. Antarctica is well known as a thermal regulator for the earth's climate, although scientists have this information, it has not been enough to take concrete actions and stop those activities which put at risk. Antarctica should be a priority for science diplomacy and science-policy interface worldwide, that is why RedLAtM, an atmospheric science organization, has started an initiative for young scientists in the global south specifically in Latin America and the Caribbean, in effort to connect the Antarctic region with society, a project called action for Antarctica was developed to involve the younger generations through communication, outreach and education to bring Antarctic scientific research to the general public and also empowers and develops capabilities especially atmospheric and climate scientists, to bring their knowledge to the highest level and their local governments to help these countries adhere to the Antarctic treaty because to the global change needs south overview must be also incorporated. The global south must be positioned for Antarctica decision making in order to combat the scientific gap that still exists between north and south.

Finally, we facilitate the vision that scientists have the power to communicate to society the value of polar areas and especially Antarctica and the importance it has for life and climate literacy to achieve the Sustainable Development Goal 13-Climate Action.

“Inviting Antarctica to your home”: an evaluation of public engagement with Antarctic science, policy and technology.

Gabriela Roldan¹

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Calls for greater public engagement with Antarctica and its pressing environmental issues have been at the forefront of the international science community in recent decades. Effective communication of Antarctic issues can create public awareness of the challenges facing the southern Polar Region, which has the potential to motivate change in human attitudes towards the protection of the environment. These initiatives require dedication, time and funding to create (and deliver) Antarctic education and outreach programmes accessible to the public. Yet, there is little understanding to what degree the public engages with Antarctic matters through these initiatives, and how effective science communication is measured in the Antarctic context.

This paper focuses on the drivers and barriers to the education and public engagement with Antarctic science, policy and technology found in Punta Arenas (Chile). Data for this research were collected through participant observation, an online survey and by conducting in-depth interviews with local science communication and education stakeholders. This presentation shares the preliminary results of this research and proposes a set of qualitative indicators to assess effectiveness in public interest and community engagement with Antarctica. This research took place in 2019 under the COMNAP Fellowship scheme.

From 'gateways' to custodian cities? Rethinking the Antarctic Gateways

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The Southern Hemisphere cities of Cape Town, Christchurch, Hobart, Punta Arenas and Ushuaia are recognised as the main Antarctic gateway cities in the polar community with a recognised Antarctic urban and cultural heritage. These cities today have significant transport infrastructure and scientific logistics to and from Antarctica, and an increasing public engagement with the South Polar Region. Taking advantage of their cultural, ecological, economic and political ties with Antarctica, these cities starting to rethink ways to be more than primary exit/entry points for polar science programs, tourism or fishing. This paper discusses the key final results of the international collaborative cultural research project Antarctic Cities and the Global Commons: Rethinking the Gateways. The paper outlines a particular mode of engaged research, showcasing a series of social research tools, creative methods and critical perspectives, that could reorient the role that these cities have within their national and global contexts, and inspire youth and decision-makers alike to create a novel ways of public engagement and fostering a sense of Antarctic custodianship across the five cities.

Embedding an 'Engagement Incubator' into Antarctic Research

Rhian Salmon¹, Jo Bailey¹

¹*Te Herenga Waka - Victoria University Of Wellington, Wellington, New Zealand*

It has been posited that the International Polar Year 2007 – 2008 catalysed a step change in the value and visibility given to science engagement in polar research. However, while this may have led to more researchers 'doing Antarctic outreach' and more engagement professionals being contracted to 'deliver Antarctic outreach', there still appears to be a lack of strategic engagement, or awareness of public engagement theory, embedded into these research efforts. This is for many reasons including limited time, funding and expertise.

This paper reports on a new approach to embedding engagement within research efforts. In February 2020, fifteen people representing nine separate research projects gathered together for the inaugural two-day 'Te Pūnaha Matatini Engagement Incubator'. The goal was to interrogate, develop and embed engagement strategies for a diverse set of research initiatives ranging across conservation, microbiology, mathematics, ecology, information management, urban planning and Antarctic policy. Participants all worked in Aotearoa New Zealand and included researchers across a range of career stages, from doctoral student to professor level. The outcomes of the Engagement Incubator were greater articulation of the goals of engagement for each project, a deeper understanding of the implicit and explicit expectations by various key actors, and a clearer vision for resources required, delivery and evaluation.

This paper will provide an overview of the context, goals and delivery of this first Engagement Incubator and explore the potential for its application across a range of Antarctic research and policy initiatives.

Top-down and bottom-up approaches between middle school students and Antarctic Museums in project base learning and science outreach: how to engage young generations into real Antarctic research and transform Museums into powerful learning opportunities

Stefano Schiaparelli^{1,2}, Paola Gatti, Eleonora Gatti, Bianca Maresca, Lucia Guideri, Viola Rossi, Tommaso Marinelli, Barbara Andreoni³, Paola Pippo³, Federica Brigandì³

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We live in an historical moment characterized by notable climatic changes and an ever-growing attention to the environment. The best way to commit people to understand major problems of our planet is to give them direct access to information and knowledge. There are several powerful ways to engage students in these activities, but this is typically a “top-down” process, where selected, pre-packaged information is drained from the “ivory tower” of research to the public. Less common instead is the “bottom-up” approach, where motivated students ask to be active part of this communicative process. Here we present a study case where a group of 10 to 15 years old students (here also participating as authors of the abstract), working together outside class activities, have developed a new idea of collaboration with public Museums. With the coordination of their teachers, they asked to the Italian National Antarctic Museum (MNA, Section of Genoa) to become their mentor in order to: 1) understand Antarctic research, and 2) disseminate scientifically correct information to young generations based on ideas and communication tools designed by themselves for other students of the same age. This was a successful experience for both sides and this inedited outreach mechanism could be exported to any other Museum, even outside Antarctic topics, and proposed to other schools as a general model for active learning.

Awakening to Science through Dive into Science USP, a program of women scientists dedicated to young girls

Camila Signori¹, Amanda Bendia¹, Ana Paula Dornellas¹, Carmita Magalhães³, Diana Roque², Elisabete Braga¹, Elysandra Cypriano¹, Flávia Saldanha-Corrêa¹, Francielli Peres¹, Jamille Rabelo¹, Júlia Gonçalves¹, Juliana Bomjardim¹, Juliana Neiva¹, Letícia Costa-Lotufó¹, Luana Agostini¹, Maria Clara Argeiro¹, Maria Inês Rodrigues², Mayza Pompeu¹, Natascha Bergo¹, Samara Cazzoli y Goya¹, Sandra Bromberg¹, Stephanie Leone¹, Telma Pantano¹, Vivian Pellizari¹

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The dissemination of Science outside universities, showing society the role of women scientists and the importance of Science for the country's development, the encouragement of gender equality and the empowerment of women in scientific areas are needs raised by society and by national and international organizations aiming at world development. In this context, the Outreach and Education Program Dive into Science USP aims to encourage the inclusion of girls in Science, especially in STEM, introduce scientific literacy, humanize the figure of a scientist, sow the knowledge acquired by the participants for the school and family environment. For this, a free course, organized by a strong team of women at different levels of education, is offered at the Oceanographic Institute of the University of São Paulo for 50 girls between the 5th and 9th grade of elementary education, from public and private schools. A wide variety of scientific topics are offered, including Oceanography and Astrobiology with examples of the Antarctic research, taught by women scientists through theoretical and practical classes at laboratories and visits to museums. This course and other related activities played a very positive impact on participants, were widely publicized in the media, and received recognition from the United Nations (HeforShe Impact report). We hope that the project will have a long life and reach other audiences in the near future. Finally, we believe in the crucial and transforming role of basic education combined with science for the formation of a citizen in a more inclusive world.

Social Media as a Tool for Polar Science Outreach: Influencing the Public and Policy Makers

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The evolution of various social media platforms has made it relatively easy, simple, and economical to share scientific results and thoughts. With growing recognition among the general public and decision-makers about the looming climate and environmental crisis, the role of social media has become more pertinent than ever in communicating climate change knowledge. During my participation in the International Ocean Discovery Program (IODP) Expedition 382, the Onboard Outreach Officers shared on-going experiments and science to the public. IODP Expedition 382 publicised numerous onboard lab activities and the expedition objectives through blogging, Vlogging, and other social platforms (such as Twitter, Instagram and Facebook). A large number of students from elementary school through university level from different nations were engaged by scientific activities during the expedition. Many researchers wrote blogs during Expedition 382 on the JOIDES Resolution website and received significant attention from the public. We simplified the complex information so that it can be understood by elementary school students and laypersons. The science team learned about outreach activities and the efficient and responsible use of social media during the IODP Expedition 382. Based on my experience of science communication, here we discuss a new model of outreach education which involves debates, creative videos, online book reviews, and organizing town halls which are more engaging to the general public as well as relevant for policymakers.

Whakairo (traditional carving) as research

Priscilla Wehi¹, Te Warihi Hetaraka², Poutama Hetaraka^{2,3}, James York³, Fayne Robinson³

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How can scientists undertake research, and partner with the community, in ways that make sense to both? Here we describe research undertaken between scientists and Indigenous Māori partners in New Zealand, that embraces Indigenous frameworks and ways of knowing in relation to the future of Antarctica. Whakairo is a traditional Maori carved art form that embodies values and history, and acts as a repository of knowledge. In a five year funded research project on the Ross Sea Marine Protected Area, we are partnering with tribal groups to begin articulating Maori aspirations and concerns for Antarctica. We chose to begin with a research project expressed through a culturally important medium, whakairo, with expert carvers from both Ngāi Tahu and Ngāti Wai. In 2018 we came together over a year to wānanga, or discuss and work through this project. In 2019, James York and Poutama Hetaraka travelled to Antarctica (together with film maker Vanessa Wells) to finally complete the carving of a door lintel and sides, which was unveiled at Scott Base. The whakairo draws on centuries old concepts of kaitiakitanga to speak directly to Māori values and connections to the Ross Sea. It also draws attention to the partnership of mātauranga Maori and science, the maramataka (traditional phenological calendars) and global climate change and demonstrates how Māori and scientists can find shared values, insights, and impetus to work together. We discuss the value of research in its different forms, and how communities engage with science and research in different ways.

Communicating Antarctic issues of global importance: lessons learned from scientists, educators and policy makers

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Antarctica is now recognized to influence the rest of the planet (Rintoul et al. 2018), with Antarctic scientists working in hot topics such as climate change and ocean pollution. From an Antarctic Treaty perspective, there is a clear view that countries are becoming more conscious of the growing interest in Antarctica and the value of education. We show that the number of papers mentioning “education and outreach” submitted to the Antarctic Treaty Consultative Meetings (ATCM’s) were low up to the 1990’s. Since then, particularly in the last 5 years, the number of papers submitted at ATCM’s increasing considerably (Xavier et al. 2019). As an example of a country engaged in SCAR and ATCM’s, we review the activities and lessons learnt while working with Antarctic scientists, educators and policy makers in Portugal with other countries, in their efforts to communicate “Antarctic science” on urgent global issues, in collaboration with Polar Educators International (PEI), the Association of Polar Early Career Scientists (APECS), SCAR Capacity Building, Education and Training advisory group and the ATCM Intersessional Contact Group on Education and Outreach. We provide evidence that activities engaging scientists and educators, while informing policy makers, contribute to define a common and effectively strategy to communicate polar knowledge and advance awareness to a range of different audiences (Xavier et al. 2018, Roop et al. 2019, Xavier et al. 2019)

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