

EDUCATION AND POLAR SCIENCE IN ACTION

 PEI 2019 UNITED KINGDOM

Conference Programme

The 4th international Polar Educators workshop is supported by: The International Arctic Science Committee (IASC). With special thanks to Christ's College, University of Cambridge, British Antarctic Survey (BAS), The Scott Polar Research Institute (SPRI) & The Polar Museum. Photography kindly sponsored by Anglia Ruskin University

Day One: Monday, 8 April: The Polar Museum,
Scott Polar Research Institute, Lensfield Road, Cambridge, CB2 1ER

13:30 – 16:30 Registration, tours and ice-breaker games in The Polar Museum

- Workshop pack and ID collection at The Polar Museum.
- Explore the Polar Museum and discover extraordinary stories of Earth's coldest, driest, windiest, highest and deadliest places, including historical tales from heroic age of polar exploration, life in the Arctic and modern-day climate science
- Visit the Polar Encounters exhibition, which features 200 years of Arctic art by Inuit artists and European travellers to the far north, showing different interpretations of life at home, at camp and at sea.
- Sign up to take a tour of the world-renowned Polar Library: books, journals maps and more relating to the Arctic, Antarctic snow and ice – 15:00 & 16:00.
- Learn more about the Museum's growing collection of online polar education resources.
- Enjoy some polar-themed 'ice-breaker' activities in the Museum

17:45 Doors re-open at The Polar Museum

18:00-20:00 **Conference Launch Event and Drinks Reception** The Polar Museum

Welcome - Prof Julian Dowdeswell (Director, Scott Polar Research Institute – SPRI), Julia Dooley (President, Polar Educators International - PEI) with Allen Pope (Executive Secretary, International Arctic Science Committee – IASC).

Opening remarks - Dr Chandrika Nath, Executive Officer, Scientific Committee on Antarctic Research (SCAR)

Keynote: Science on Ice: Wild, Charming or Alarming? Dr Gabrielle Walker

Dr Gabrielle Walker, co-author of *The Hot Topic: How to Tackle Global Warming and Still Keep the Lights On*. A self-confirmed 'ice-junkie' (she has visited both poles many times), she is a broadcaster and strategist, working with businesses to usher in a new sustainable world that addresses the challenges of new energy sources and climate change. Dr Gabrielle Walker will explore some of the many ways science from both poles has helped us revise the way we see ourselves and the world around us.

20:00 **Supper - Pizza Express, 26-28 Regent St, Cambridge CB2 1DB**

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SNAPSHOT - Day Two: Tuesday 9 April

Yusuf Hamied Conference Centre, Christ's College, Cambridge

8:30-9:00	COFFEE/TEA and posters	Function Room
9:00-9:30	Keynote: Earth from Space: Observing the Earth's Arctic and Antarctic surfaces, using radiation, Dr Gareth Rees	Theatre
9:30-10:30	Parallel Sessions - Science Labs Remote Sensing Applications - select one Session 1: Whales from Space, Hannah Cubaynes Session 2: Ice from the Air, Tom Chudley Session 3: Seals from Space, Premdeep Gill Session 4: Measuring Colour, Praveen Teleti	Z-Amenity Room Theatre Lloyd Room Function Room
10:30-11:00	Coffee and poster session –	Function Room
11:00-12:00	Parallel Sessions - Science Labs Remote Sensing Applications - Select one Session 1: Whales from Space, Hannah Cubaynes Session 2: Ice from the Air, Tom Chudley Session 3: Seals from Space, Premdeep Gill Session 4: Measuring Colour, Praveen Teleti	Z-Amenity Room Theatre Lloyd Room Function Room
12:00-12:30	Panel Discussion:	Theatre
12:30-14:00	LUNCH poster session and VR headset training –	Function Room
14:00-14:30	Keynote: Reimagining the Poles: Shifting ideas of Wilderness and Extremes, Dr Michael Bravo	Theatre
14:30-15:30	Break-out: Living in the Arctic, Piers Vitebsky	Theatre
15:30-16:00	Panel discussion:	Theatre
16:00-16:30	Tea and poster session –	Function Room
16:30-17:00	Keynote: Telling Stories – Techniques for bringing the issues of climate change into our communities, Jothsna Harris, Climate Generation	Theatre
17:00-18:00	Parallel Sessions - communications skills workshops – Select one Session 1 -Cool Communication, Jon Torrens Session 2: Communicating ideas in Polar Sci-Art, Julia Dooley, Sophie Weeks Session 3: Climate storytelling, Betsy Wilkening	Lloyd Room Z-Amenity Room Function Room
18:00-18:30	Panel Discussion	Theatre
18:30-20:00	Polar Sci-Art Soirée Prosecco and cheese reception –	Function Room
19:00	Sounds of Space talk & presentation	Theatre
20:00	SUPPER 1 King St, Cambridge, CB1 1LH	Cambridge Brew House

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Day Two: Tuesday 9 April,
Yusuf Hamied Conference Centre, Christ's College, University of Cambridge
St Andrew's St, Cambridge CB2 3BU

8:30-9:00 **COFFEE/TEA** and posters Function Room

EARTH FROM SPACE

9:00-9:30 **Keynote** Earth from Space: Observing the Earth's Arctic and Antarctic surfaces, using electromagnetic radiation. Dr Gareth Rees Theatre

Over the last 40 years remote sensing (Earth Observation) has revolutionised our ability to study the Earth's surface. As many parts of the polar regions are difficult to reach, images collected from sensors carried on aircraft, satellites and 'drones' can provide fine-grained and frequent information about what is happening to snow, ice and vegetation in remote, environments. Dr Rees will describe some of the techniques and applications that are now possible, giving examples from ice, trees and tundra, and penguins. He will show how the data and tools needed to perform this kind of research are increasingly moving into the public domain, and data can be collected and analysed in your own community, allowing the possibility of DIY science and citizen science.

9:30-10:30 **Parallel Science Labs – Remote Sensing Applications - Select one**

Session 1: Whales from Space: Whale detectives, Hannah Cubaynes Z-Amenity Room

Session 2: Ice from the Air: Calving glaciers in Greenland, Tom Chudley Theatre

Session 3: Measuring colour: Do-It-Yourself colour sensing and multispectral analysis,
Praveen Teleti Function Room

Session 4: Seals from Space: How and why do we count seals? Prem Gill Lloyd Room

Parallel Science Labs – Remote Sensing Applications - information

Session 1: Whales from Space: Whale detectives, Hannah Cubaynes Z-Amenity Room
Hannah Cubaynes has been looking at whales from space since she was 10 years old. Recognising a whale from space in a World View Three satellite image, despite the high resolution, is not easy! Hannah will explain why counting whales is important, how this helps with conservation on a global scale and she will share illustrated examples of when, where and how she uses remote sensing data to do this as part of her research.

Participants will be trained in spotting whales from space and will play a high-energy perception bias awareness game, the data from which will be used for developing new research on whale identification.

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Session 2: Ice from the Air: Calving glaciers in Greenland Tom Chudley - Theatre

The rate at which the Greenland Ice Sheet is melting has been accelerating: contributions to sea level rise have increased by an order of magnitude in the past two decades. Satellite images can reveal the big picture, but cannot provide information about day-to-day variation at local scales. Recently, Unmanned Aerial Vehicles (UAVs, or 'drones') have become a vital tool to provide detailed information about ice loss in a difficult operational environment.

Participants will examine real data from drone flights taken at the front of Store Glacier, a large outlet glacier of the Greenland Ice Sheet. Using these, they will estimate how much ice Store Glacier contributes to sea level rise on a daily basis.

Session 3 - Measuring colour: Do-It-Yourself colour sensing and multispectral analysis

Praveen Teleti

Function Room

What is colour? We think of colour as light reflected in the visual part of the electromagnetic spectrum reflected. Naturally, we measure colour (reflectance) with our eyes, but it is difficult to quantify the colour we see. Polar researchers use high-tech instruments to measure the colour of ice and vegetation on the ground, and compare this with data from satellite images. With the availability of digital photography and low-cost, powerful sensors and micro-controllers we can measure colour effectively using simpler tools.

Participants will put together a simple colorimeter and use it to measure local colour using their mobile phones. And multispectral analysis of the colour (seen and unseen) of satellite images can be decoded using free software.

Session 4 - Seals from Space: How and why do we count seals? Premdeep Gill - Lloyd Room

Seals have their place in the polar food webs and both polar food webs are under stress. The monitoring of Antarctic ice seal populations can indicate changes in the Antarctic ecosystem's status and health. However, seals inhabit the dynamic and inaccessible sea ice zone, making traditional surveys (e.g. by plane/boat) logistically difficult. As a result of these challenges, reliable population estimates and habitat information for ice seals are lacking. To overcome the limitations of traditional surveys, Prem's research looks into the use of very high-resolution (VHR) satellite and unmanned aerial vehicle (UAV) imagery to study Antarctic ice seals.

Participants will engage in a hands-on demonstration that explains why Antarctic seals are excellent indicators for monitoring change in the Antarctic ecosystem, a history of wildlife monitoring techniques, the benefits and issues with state-of-the-art satellite technologies in spotting seals from space, and how these remote sensing solutions are pivotal to polar marine conservation.

10.30-11.00 **COFFEE** and Poster Session Function Room

11:00-12:00 **Parallel Sessions (repeated) - Science Labs Remote Sensing Applications - Select one**

Session 1: Whales from Space: Whale detectives, Hannah Cubaynes Z-Amenity Room

Session 2: Ice from the Air: Calving glaciers in Greenland, Tom Chudley Theatre

Session 3: Measuring colour: Do-It-Yourself colour sensing and multispectral analysis,

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	Praveen Teleti	Function Room
	Session 4: Seals from Space: How and why do we count seals? Prem Gill	Lloyd Room
12:00-12:30	Panel Discussion	Theatre
	Chair Allen Pope, with Dr Gareth Rees, Henry Burgess, Hannah Cubaynes, Tom Chudley, Prem Gill and Praveen Teleti	
12:30-14:00	LUNCH Poster Session and VR Headset Training by Encounter Edu	Function Room

REIMAGINING THE POLES

14:00-14:30	Keynote: Reimagining the Poles: Shifting ideas of Wilderness and Extremes Dr Michael Bravo	Theatre
	<p>The Victorian picture of the polar regions as a vast empty wilderness, a place of adventurous white males battling against the elements, is far from the only polar vision. There are plenty of alternative pictures: a habitable Arctic crisscrossed by densely connected networks of Inuit trade and travel routes; a world rich in indigenous cultural meanings; a sacred paradise or lost Eden among both Western and Eastern cultures; a setting for tales not only of conquest and redemption, but also of failure and catastrophe. As we face warming temperatures, melting ice and rising seas Dr Michael Bravo argues only an understanding of the North Pole's deeper history, of our conception of it as both a sacred and living place, can help humanity face its 21st century predicament.</p>	
14:30-15:30	Break-out session	Theatre
	Living in the Arctic, Dr Piers Vitebsky	Theatre
15:30-16:00	Panel Discussion	Theatre
	Chair: Dr Chandrika Nath with Dr Michael Bravo, Dr Piers Vitebsky, Dr Renuka Badhe	
16:00-16:30	TEA and Poster Session -	Function Room

COMMUNICATION

16:30-17:00	Keynote: Sharing Climate Stories – Techniques for bringing the issues of climate change into our communities, Jothsna Harris, Public Engagement Manager, Climate Generation - Theatre	
	<p>The issue of climate change is complicated and can often feel far removed from our lives. In order to place complex facts into context and connect us to the world around us, we need to share our climate stories. Climate Generation is deeply connected to the power of stories. For over 50 years, founder Will Steger has inspired thousands of people through his chronicles of Arctic adventures and his remarkable eyewitness account of climate change impacts on our polar regions. A climate story is a personal account of climate change from personal experience and observations, ranging from despair to hope, from loss to resolve. It is descriptive and makes an emotional connection to climate change. While climate stories are individual perspectives, 'collective stories' have the power to shift</p>	

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the predominant narrative. Political gridlock with regard to climate change is now prompting concerned individuals to strip away the layers that divide opinions and find the root of what can bring us together. Listening, compassion and personal storytelling are powerful tools to find alignment and the fertile ground where true change can begin.

17:00-18:00

Parallel Sessions: Communications Training - select one

Session 1: Cool Communication, Jon Torrens

Lloyd Room

Session 2: Climate Story Telling, Betsy Wilkening

Function Room

Session 3: Communicating ideas in Polar Sci-Art, Julia Dooley/Sophie Weeks

Z-Amenity Room

Parallel Sessions: Communications Training - information

Session 1: Cool Communication, Jon Torrens

Lloyd Room

Speaking in front of a group can be hard. Delivering a complicated mass of information can be even harder. Fortunately, communications coach Jon Torrens can help you with that. He will demonstrate tools for creating concise, engaging material with a story, plus the techniques that will help you deliver it in a way that looks confident, grabs your audience's attention and keeps it until the very end. Which is a formula for success!

Session 2: Climate Story Telling, Betsy Wilkening

Function Room

Participants are invited to experiment with putting Climate Generation's story telling techniques into practice with Teacher Ambassador Betsy Wilkening. Betsy's participation in a variety of environmental programmes, such as Project Drawdown – an inter-disciplinary, collaborative plan to reverse global warming, drives her love of the Polar Regions and her determination to combat climate change. Betsy will share her wealth of experience training environmental educators, together with her own stories as National Geographic Grosvenor Teacher Fellow and PolarTREC teacher to inspire your personal climate stories.

Session 3: Communicating ideas through Polar Sci-Art, Julia Dooley/Sophie Weeks - Z-Amenity Room

Art inspired by science offers a way to experiment with ideas, generate conversations and create something meaningful. Join this hands-on session with to Julia Dooley and Sophie Weeks who provide materials, tools and inspiration to awaken your creativity and transform your ideas about polar science into beautiful, thought-provoking objects. No artistic experience required.

18:00-18:30

Panel Discussion

Theatre

Chair: Jon Torrens, with David Martinez, Betsy Wilkening, Julia Dooley, Sophie Weeks

POLAR SCI-ART SOIRÉE

18:30-19:00

PROSECCO & CHEESE

Function Room

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Bar open & activities

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19:00

Special Presentation: 'Sounds of Space': An Art-Science Collaboration, Authors: Dr Nigel Meredith (British Antarctic Survey), Diana Scarborough (Artist Engineer), Kim Cunio (Composer) and Becky Byers (Dancer) Theatre

Our planet naturally produces a variety of radio emissions, generated by lightning activity and geomagnetic storms driven by the Sun. These natural radio waves are at the lower end of the radio spectrum in the audio-frequency range, so-called because they have the same frequencies as audible sound waves. We use a Very Low Frequency Receiver, located at Halley Research Station in Antarctica, to record these emissions. Halley is a great location to detect these waves because it is magnetically connected to the outer radiation belt where some of the signals are generated and is electromagnetically "quiet", being far from man-made sources. At BAS, we use this radio wave data primarily to investigate the science of space weather storms, to help us understand the impact of space weather on the Earth-Climate system, and for lightning detection. As a remarkable spin-off, conversion to sound reveals a series of weird and wonderful noises, known as the 'sounds of space'. In this presentation, we will explore the amazing variety of natural 'sounds' detected at Halley, Antarctica and then embark on a sound-led, data-driven journey from Earth-orbit to beyond the galaxy! The presentation will be followed by the screening of 8 short films and footage of a recent performance including soundscapes, animations, live music and contemporary dance, inspired by the 'sounds of space'. This is an exclusive opportunity to join two of the researchers from this extraordinary Sci-Art project and preview the exhibit travelling to the Blue Dot Festival and Venice Biennale later this year.

20:00-

SUPPER

Cambridge Brew House, 1 King St, Cambridge CB1 1LH

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SNAPSHOT - Day Three: Wednesday 10 April Yusuf Hamied Conference Centre, Christ's College, Cambridge

8:30-9:00	COFFEE/TEA and posters	Function Room
9:00-9:30	Keynote: Antarctic Plastics: what do we know and what can we do about it? Dr Claire Waluda & Dr Cath Waller	Theatre
9:30-10:30	Parallel Sessions – Science Labs: Plastics - select one Session 1 - Plastic on Ice, Emily Rowlands Session 2 - Bringing it Home: Microplastics citizen science, Kirsty Jones-Williams - Lloyd Room Session 3 - Plastic in the Polar Food Webs, Vicky Dewar-Fowler:	Theatre Z-Amenity Room
10:30-11:00	Coffee and poster session –	Function Room
11:00-12:00	Parallel Sessions – Science Labs: Plastics - select one Session 1 - Plastic on Ice, Emily Rowlands Session 2 - Bringing it Home: Microplastics citizen science, Kirsty Jones-Williams - Lloyd Room Session 3 - Plastic in the Polar Food Webs, Vicky Dewar-Fowler:	Theatre Z-Amenity Room
10:30-11:00	Coffee and poster session –	Function Room
12:00-12:30	Panel Discussion:	Theatre
12:30-14:00	LUNCH and poster session –	Function Room
14:00-14:30	Keynote: Building Bridges between Disciplines, Nations and Generations: The INTERACT Experience, Prof Terry Callaghan	Theatre
14:30-15:30	Parallel Sessions – Hands on Polar Education – select one Session 1 - Bringing polar researchers into your classroom! (ages 13-20) Agata Goździk Session 2 - Wicked Weather Watch: An awesome Arctic adventure: with primary schools (ages 5-11) Gill Johnson & Vicky Oram-Ahern Session 3 – Polar Explorers Programme: A carousel of polar learning activity for ages 7-11, Clare Warren	Lloyd Room Z-Amenity Room Function Room
15:30-16:00	Panel discussion:	Theatre
16:00-16:30	Tea and poster session –	Function Room
16:30-18:00	Snap Talks (see separate programme)	Theatre
18:00-19:00	BREAK (Free time)	
18:45-19:00	Gathering point: Buttery, Christ's College (optional)	Buttery
19:00-22:00	POLAR BANQUET – The Hall, Christ's College	Hall
21:15	After dinner address: Polar education as the ice disappears, Peter Wadhams	

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Day Three: Wednesday, 10 April:

Yusuf Hamied Conference Centre, Christ's College, University of Cambridge

St Andrew's St, Cambridge CB2 3BU

8:30-9:00 COFFEE/TEA and posters

Function Room

ANTARCTIC PLASTICS

9:00-9:30 **Keynote:** Antarctic Plastics: what do we know and what can we do about it?

Dr Claire Waluda & Dr Cath Waller -

Theatre

With around eight million tonnes of plastic entering our oceans each year, there could potentially be more plastic than fish in the sea by 2050. Its presence on shorelines, in surface waters and in the deep ocean poses a significant threat to marine ecosystems around the world, even in the remote Polar Regions. This talk will discuss our current knowledge of plastic pollution in Antarctica using three decades of monitoring at South Georgia as a case study. Additionally, we will discuss the burgeoning issue of microplastic pollution (items less than 5mm in size). Despite being widely regarded as a 'pristine' environment, a number of recent studies have found worryingly high levels of microplastic pollution in Antarctica. The recently established SCAR Plastic Action Group aims to provide a co-ordinated focus to assess the current state of the problem, share knowledge and expertise and propose solutions for Polar ecosystems. This will contribute towards global efforts to address this major environmental, social and economic challenge.

9:30-10:30 **Parallel Sessions – Science Labs: Plastics - select one**

Session 1 -Plastic on Ice: Collecting and de-coding nano and micro-plastics in sea ice

Emily Rowlands

Theatre

Session 2: Bringing it Home – Microplastics and citizen science,

Kirstie Jones-Williams

Lloyd Room

Session 3: Plastic in the Polar Food Webs, Vicky Dewar-Fowler:

Z-Amenity Room

Parallel Sessions – Science Labs: Plastics - information

Session 1: Plastic on Ice: Collecting and de-coding nano and micro-plastics in sea ice, Emily Rowlands -

Theatre

Emily Rowlands studies nanoplastics and microplastics in the Southern Ocean. Through hands-on activities Emily will describe how she works in the field collecting ice core samples, processing these in the lab, and making sense of the data. Participants will process ice-cores for plastics analysis, decontaminating and melting down for filtration, and use authentic methods to analyse samples and organise the data. They will discuss what the data reveals about the transportation of plastics in the ocean and sea ice.

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Session 2: Bringing it Home – Microplastics and citizen science, Kirsty Jones-Williams Lloyd Room

Kirsty Jones-Williams is an environmentalist researching the impact of microplastics on the natural environment. Kirsty will work with participants to develop a protocol for sample collection, to enable non-scientists to collect and process samples from their local beach, as part of a global citizen science project. Through hands-on activities, participants will learn the rudiments of how to collect a sample suitable for scientific analysis, learn to distinguish plastics thermosets from resins, acrylics and dyes (microplastics), support the development of a public protocol and discuss the connection between plastics on our coastlines and those polar regions

Session 3: Plastic in the Polar Food Webs, Vicky Dewar-Fowler- Z-Amenity Room

Vicky Dewar-Fowler is a marine biologist studying migration patterns of zooplankton (small animals base of a complex aquatic food web that graze on the phytoplankton) and what they tell us about active transport of carbon & microplastics from the ocean surface to the interior. Participants will take another look at two important food webs – the Arctic and the Antarctic model – and investigate the complexity of ways that plastics interact with the food chain and discuss the wide-ranging implications.

10:30-11:00 **BREAK**

11:00-12:00 **Parallel Sessions (repeated) – Science Labs: Plastics - select one**

Session 1 -Plastic on Ice: Collecting and de-coding nano and micro-plastics in sea ice

Emily Rowlands

Theatre

Session 2: Bringing it Home – Microplastics and citizen science,

Kirstie Jones-Williams

Lloyd Room

Session 3: Plastic in the Polar Food Webs, Vicky Dewar-Fowler:

Z-Amenity Room

12:00-12:30 Panel Discussion

Theatre

Chair: Jose Xavier, Claire Waluda, Cath Waller, Vicky Dewar-Fowler, Kirstie Jones-Williams, Emily Rowlands,

12:30-14:00 **LUNCH**

COLLABORATION AND ACTION

14:00-14:30 **Keynote:** Building Bridges between Disciplines, Nations and Generations: The INTERACT Experience,
Professor Terry V. Callaghan Theatre

Today's societal challenges are so great and global connectivity so strong that no nation can solve the problems alone. Also, these challenges are an unfortunate legacy from one generation to another. INTERACT is a European Union consortium that unites 86 research stations in 16 countries that annually host about 5,000 researchers and provide the infrastructure for 156 networks. INTERACT offers transnational access – giving around 900 researchers access to infrastructure

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outside their own countries – and provides educational resources to empower future generations. INTERACT has also been formally acknowledged for its Science Diplomacy.

14:30-15:30

Parallel Sessions - Hands on Polar Education – select one

Session 1: Bringing polar researchers into your classroom! (ages 13-20)

Dr Agata Goździk

Lloyd Room

Session 2: Wicked Weather Watch: An awesome Arctic adventure: with primary schools (ages 5-11)

Gill Johnson/Vicky Oram-Ahern

Z-Amenity Room

Session 3: Polar Explorers Programme: A carousel of polar learning activity for ages 7-11,

Clare Warren, Polar Explorers Programme

Function Room

Parallel Sessions - Hands on Polar Education - information

Session 1: Bringing polar researchers into your classroom! Dr Agata Goździk, Poland -Lloyd Room

EDU-ARCTIC is an EU-funded project focused on using Arctic research as a vehicle to strengthen science education curricula all across Europe. The project offers a mix of tools, including webinars with scientists for classes, Polarpedia – an online encyclopedia explaining polar terms in 16 national languages, with ready-to-use educational materials and monitoring systems for meteorological and phenological observations.

Participants will explore EDU-ARCTIC polar science activities and tool-kits for students aged 13 to 20 to encourage them to pursue further education in science, technology, engineering and mathematics (STEM).

Session 2: Wicked Weather Watch: An awesome Arctic adventure: with primary schools (ages 5-11)

Gill Johnson & Vicky Oram-Ahern UK

Z-Amenity Room

Wicked Weather Watch is a charity that aims to provide clarity about climate change, engaging young children and teachers at both local and global levels. Focusing on change in the Arctic, resources help children and teachers to understand the links between the Arctic and the UK, and encourages action to get involved in helping our planet. Gill Johnson and Vicky Oram-Ahern have worked together for Wicked Weather Watch since its inception in early 2016. They have transformed WWW from a small pilot initiative with a few schools following the Polar Ocean Challenge to a fully-fledged organisation working with more than 100 primary schools to help children understand climate change, and inspire them to take action.

Participants can enjoy this hands-on opportunity to experiment with some of the free materials and resources that can be used to explore climate change at a primary school level (ages 5-11).

Session 3: A carousel of polar learning activity for ages 7-11,

STEM Polar Ambassador Clare Warren (Polar Explorers Programme)

Function Room

The Polar Explorer Programme encourages and supports schools to enrich their teaching of STEM subjects, placing relevant curriculum topics within the context of the construction and

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launch of the new polar research ship, RRS Sir David Attenborough, and of polar exploration in general. 500 primary schools across the UK have received the support of a dedicated Polar Ambassador to develop the teaching and learning of STEM subjects in their school.

Join Clare Warren- Polar Ambassador for a carousel of Polar Explorer activities aimed at pupils aged 7-11.

15:30-16:00	Panel Discussion	Theatre
	Chair: Terry Callaghan with Renuka Badhe with, Gill Johnson/Vicky Oram-Ahern, Diana Watson & Dr Agata Goździk	
16:00-16:30	TEA and poster session –	Function Room
	POLAR EXCHANGE	
16:30 -18:00	Snap Talks (see separate programme) -	Theatre
18:00-19:00	BREAK (Free time)	
	THE POLAR BANQUET	
18.45	Gathering point: Buttery, Christ's College	Buttery
19:00-22:00	Polar Banquet – The Hall, Christ's College	Hall
21.15	After dinner address: Polar education as the ice disappears, Peter Wadhams	

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SNAPSHOT - Day Four: Thursday, 11 April,
Scott Polar Research Institute, Lensfield Road, Cambridge, CB2 1ER,
British Antarctic Survey, High Cross, Madingley Road, Cambridge CB3 0ET &
Scudamore's Punting Station, Mill Ln, Cambridge CB2 1RS

9:00-10:00	PEI General Meeting – Lecture Theatre, Scott Polar Research Institute
10:00-10:15	Coffee
10:15-11:00	Talk - The Stowaway: A Young Man's Extraordinary Journey to Australia: Conversation with American author Laurie Gwen Shapiro and British explorer and Travel Writer Hugh Thomson – Lecture Theatre (SPRI)
11.00-14.30	Excursion to British Antarctic Survey (including Lunch), High Cross, Madingley Road, Cambridge CB3 0ET
15:00-16:00	Polar punting: Scudamore's Punting Station, Mill Ln, Cambridge CB2 1RS
16:30-17:00	Closing Address: Julia Dooley, President PEI - Scott Polar Research Institute

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Day Four

Thursday, 11 April, Scott Polar Research Institute, Lensfield Road, Cambridge, CB2 1ER

- 9:00-10:00 PEI General Meeting – Lecture Theatre, Scott Polar Research Institute
- 10:15-11:00 The Stowaway: A Young Man’s Extraordinary Journey to Australia: Conversation with American author Laurie Gwen Shapiro and British explorer and Travel Writer Hugh Thomson – Lecture Theatre (SPRI)
- When she stumbled upon mention of a teenage stowaway on Admiral Byrd’s first expedition to Antarctica, award-winning author and documentary film-maker Laurie Gwen Shapiro uncovered a forgotten story in polar history. As part of her research, she travelled for over a month to reach the Ross Sea and visit the Ross Ice Shelf where Byrd’s Little America was built. The magnetic presence of a young New Yorker hidden aboard a polar ship, together with tales of the scientific gains of Admiral Richard Byrd’s four expeditions were used in an attempt to engage an American public who traditionally, were less enamoured with Antarctic exploration than Europeans. In doing so, she garnered the attention of the worldwide press. The book has gained critical acclaim, gone into a fourth printing and been optioned for film. Laurie has invited celebrated British explorer, filmmaker and author Hugh Thomson to join her in this lively presentation and conversation about the story of her first non-fiction book - The Stowaway: A Young Man’s Extraordinary Journey to Antarctica (Simon & Schuster).
- 11.00-14.30 Excursion to British Antarctic Survey (BAS), High Cross, Madingley Road, Cambridge CB3 0ET
See separate programme
- 15:00-16:00 Polar punting Scudamore’s Punting Station, Mill Ln, Cambridge CB2 1RS
- 16:30-17:00 Closing Address: Julia Dooley, President PEI - Scott Polar Research Institute

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Speakers Biographies – in order of appearance

Prof Julian Dowdeswell

Prof Julian Dowdeswell is Director of the Scott Polar Research Institute and Professor of Physical Geography. He is also Brian Buckley Fellow in Polar Science at Jesus College. He graduated from the University of Cambridge in 1980, studied for a Masters Degree at the Institute of Arctic and Alpine Research in the University of Colorado, and for a PhD in the Scott Polar Research Institute, University of Cambridge. His research interests include: the dynamics of large ice masses and their response to climate change, the application of airborne and satellite geophysical techniques in glaciology and processes and patterns of sedimentation in glacier-influenced marine environments. He has worked, on the ice and from aircraft, in a number of areas of the Arctic, including Svalbard, Russian Franz Josef Land and Severnaya Zemlya, Iceland, Greenland and Baffin, Devon and Ellesmere Islands in Arctic Canada. He has also undertaken many periods of work on icebreaking research vessels in the Norwegian-Greenland Sea, in the fjords and on the continental shelves of Svalbard and Greenland, and in the waters around Antarctica. In February 2019 he led the international Weddell Sea Expedition to study the Larsen C Ice Shelf which also attempted to pinpoint the seafloor location of Ernest Shackleton's lost ship, Endurance.

Dr Allen Pope

Dr. Allen Pope is Executive Secretary at IASC (International Arctic Science Council), based in Iceland. Before joining to IASC, Dr. Allen Pope held positions as a research scientist at the National Snow and Ice Data Center (University of Colorado Boulder) and the Polar Science Center (University of Washington) where he researched remote sensing of glaciers. He also was a visiting scientist at Dartmouth College where he taught a course on Polar remote sensing. Allen holds a Ph.D. and a M.Phil. in Polar Studies from Cambridge University where he worked on multispectral remote sensing of Arctic glaciers and conducted glaciological fieldwork in Antarctica, Iceland, Svalbard, Sweden, Alaska, Canada, and Nepal. He has worked extensively with a range of international scientific organizations, including as a council member of the American Geophysical Union and president of the Association of Polar Early Career Scientists.

Dr Chandrika Nath

Dr Chandrika Nath has over 15 years' experience of providing scientific advice to policy makers with the UK Parliamentary Office of Science and Technology, where she is currently Acting Director. She has briefed UK policymakers on a wide range of policy areas spanning environment, energy, security, ICT and international development. Prior to working for Parliament, Chandrika worked as a glaciologist at the British Antarctic Survey from 1998-2002. She has since maintained an active engagement with polar research and has spoken extensively about bridging the gap between research and policy, for example at recent Arctic Frontiers and Arctic Circle meetings. She has a keen interest in capacity building and has worked with parliaments and researchers across the world to support uptake of research evidence in policy-making. She has a PhD in High Energy Physics from Oxford University.

Dr Gabrielle Walker

Dr Gabrielle Walker is a strategist, writer and broadcaster who works with businesses to address global challenges, with a particular focus on sustainability, energy, mobility, finance, land-use, plastics and the circular economy, and climate change. Gabrielle works as an advisor at boardroom-level with a wide range of companies, helping to broker cross-sectoral collaborations and turn good intentions into real action on the ground. She is author of four books including co-authoring the bestselling book *The Hot Topic*, how to avoid global warming while still keeping the lights on, *Snowball Earth*, and *Antarctica: An Intimate Portrait of the World's Most Mysterious Continent*. She has presented dozens of TV and radio programs for the BBC, reporting from all seven continents, and has written very extensively for

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international newspapers and magazines, including The Economist, Prospect, The Wall Street Journal and The New York Times. In 2009 she presented BBC Radio 4's Planet Earth Under Threat and in 2011, Thin Air, a series about the earth's atmosphere. She has a PhD from Cambridge University and has taught at both Cambridge and Princeton Universities.

Day Two: Tuesday 9 April, Yusuf Hamied Conference Centre, Christ's College, University of Cambridge.

Dr Gareth Rees

Dr Gareth Rees is a physicist who has spent most of his career developing and applying remote sensing methods for the polar regions. He has been a member of the academic staff of the Scott Polar Research Institute (SPRI) for a third of a century, and a Fellow of Christ's College, University of Cambridge for even longer than that. A lot of his work is done in Russia, in collaboration with scientists from Moscow. Most of this work depends on measuring the colour of things with great accuracy, and understanding how colour (and broader concepts based on colour) can be used diagnostically in understanding the Earth's environment.

Hannah Cubaynes

Hannah is a PhD Candidate in Remote Sensing and Marine Conservation, a joint project between the Scott Polar Research Institute (SPRI) and the British Antarctic Survey (BAS). Since 2003, Hannah has been spending most of her time observing cetaceans in various seas and oceans, including three years as a professional marine mammal observer and acoustic technician to mitigate for the impact of anthropogenic noise. Using all this experience, she is currently working on a joint project, "Whales from Space", with the British Antarctic Survey and the Scott Polar Research Institute, at the University of Cambridge. The aim is to develop a reliable method, using very high resolution satellite imagery to detect and monitor great whales in remote and inaccessible places.

Tom Chudley

Tom is a PhD Candidate at the Scott Polar Research Institute (SPRI). His research, part of the European Research Council (ERC) funded RESPONDER project, uses imagery derived from drones and satellite data to assess the impact that meltwater is having on the Greenland Ice Sheet.

Praveen Teleti

Praveen Teleti is a PhD Candidate examining how climate change affects Antarctic sea ice variability, from seasonal to decadal time-scales using historical ship records from the dawn of the 20th century, marking the heroic age of Antarctic exploration. He is also an engineer and is interested in Making & DIY Science.

Premdeep Gill

Premdeep Gill is a PhD Candidate leading the "Seals from Space: the study of Antarctic seals by remote sensing" priority project with the Scott Polar Research Institute (SPRI), British Antarctic Survey (BAS) and World Wildlife Fund (WWF).

Henry Burgess

Henry Burgess is the Head of the NERC Arctic Office, hosted by the British Antarctic Survey in Cambridge. The Office operates the UK's Arctic Station in Ny-Alesund (Svalbard, Norway); supports UK Arctic research activity; provide advice to policy makers; and develop international scientific cooperation across all aspects of Arctic research.

Before he joined the Arctic Office in February 2016, Henry was the Deputy Head of the Polar Regions Department in the Foreign and Commonwealth Office, with particular responsibility for representing the UK in the discussions of the Committee for Environmental Protection in the Antarctic Treaty System, of which the UK was a founder member. Prior

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to that, Henry worked in a range of Government Departments, including the Department for Culture, Media and Sport; the Office of the Deputy Prime Minister and the Cabinet Office.

Maddy Street

Learning Designer Maddy Street has worked in primary education for over decade both as a teacher and subject lead coordinator for English and Maths both abroad and in London. Passionate about conservation and sustainable development, she brings to the team a wide experience in designing lessons and resources to inspire STEM learning and spark student curiosity for wildlife, science and the environment. She joined Encounter Edu upon completing her Masters in Education, Gender and International Development from University College London. She's thrilled to be part of the Encounter Edu team due to its dynamic and new approach to education.

Dr Michael Bravo

Dr Michael Bravo's research examines a wide range of issues in history and public policy relating to the Polar Regions. His group's work is concerned mainly with the Arctic, which has been much in the news because of its oil and gas reserves, as well as the impact of climate change on its predominantly coastal inhabitants. Their ecological systems are now experiencing the impacts of climate change in ways that matter to the rest of the world: the melting of sea ice, the freshening of the Arctic Ocean, the shifting of Arctic ocean currents, and the release of methane from the tundra are just a few of the phenomena that link our future in the temperate latitudes of Europe to the Arctic. He has contributed to numerous international debates about the importance of science and conservation in the governance of the Arctic and international cooperation.

Dr Piers Vitebsky

Dr Piers Vitebsky was Head of Anthropology and Russian Northern Studies at SPRI since 1986. He was educated at the universities of Cambridge, Oxford, Delhi and London, and studied ancient languages before becoming a social anthropologist specialising in the religion, psychology, poetics and ecology of small-scale societies, and the relations of these societies to the centralised state. He has carried out long-term fieldwork among shamans and shifting cultivators in tribal India since 1975, and among nomadic reindeer herders in the Siberian Arctic since 1988. In the Russian Arctic, he was the first westerner since the Russian Revolution to live long-term with an indigenous community. Piers Vitebsky has trained a generation of specialists on the Russian North who now occupy positions in universities, government departments and NGOs worldwide. He was also the initiator and convenor of the Magic Circle interdisciplinary seminar on religion, ritual and symbolism.

Jothsna Harris

Through her work at Climate Generation, Jothsna Harris is bringing the issue of climate change to communities across Minnesota, building community resiliency and capacity through multi-stakeholder alliances, and connecting people through the power of storytelling. Jothsna's work includes innovative programming designed to empower climate champions and normalise climate change, including the Talk Climate Institute, 2017-18 Youth Convening Minnesota, and the award-winning 2014-16 Climate Minnesota project. Jothsna is a recipient of the Clean Energy Resource Team's Women in Energy series, and holds dual BAs in Environmental Studies and Political Science from the University of Saint Thomas, Minnesota.

Jon Torrens

Jon Torrens has worked as a designer (and experienced the joy of deadlines) at games companies including Sony and Electronic Arts, and as a professional stand-up comic for a few years, so he knows how to engage and motivate. Occasionally he can be funny too. Now, as a coach and speaker, he teaches effective communication, using his personal skills to both show and tell. He delivers training for a range of clients in London and Cambridge, including Foster + Partners and Cambridge University. Unique insights from the worlds of computer game design and stand-up

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comedy enable even the most introverted of his clients to deliver presentations that delight and motivate their audiences.

Sophie Weeks

While co-ordinating the education programme at The Polar Museum (Scott Polar Research Institute) Sophie Weeks participated in the Polar Educators workshop in Montreal and was a founder member of Polar Educators International. Having studied Exploration Geophysics, History of Art and Philosophy and Critical Fine Art Practice she is passionate about creative, inter-disciplinary approaches to science engagement. In her 20 year career as a museum educator she developed interdisciplinary festivals of learning for children ages 6-12, a sci-artist fellowship, library and museum based artist-in-residence engagement programmes and polar research and education - such as The Cool Club (ages 8-12) and Polar Philosophy (children and teachers). She still considers herself as a practising artist, integrating creative methodologies in her work. She currently produces 'The Art and Science Soirée' in Cambridge to inspire interdisciplinary collaboration and runs several Sci-Art projects.

Julia Dooley

Julia Dooley, President – Polar Educators International

Julia's polar experience began as an ARISE Educator with the ANDRILL programme (ANTarctic geological DRILLing) in 2007. During the subsequent International Polar Year (IPY) she participated in the Polar Teacher and Polar Educator workshops in Oslo and Montreal. She was a founder member of Polar Educators International, and sat on its first Council. She has participated in many polar education projects, for example, Integrated Ocean Drilling Programme (IODP) School of Rock and School of Ice, and the National Aeronautics and Space Administration (NASA) History of Winter Workshop.

Julia has been a school teacher in America for the past 17 years, initially with children ages 10-11 and currently with gifted and talented students ages 5-10. She brings her love of science into the classroom in novel ways, for example raising small fish to study food webs, growing tomatoes in space-like conditions, taking simulated trips to Mars and encouraging interactions with polar researchers. Julia studied both Photography and Education and is an artist in her spare time, exhibiting polar-themed Sci-Art to engage the greater community about research methods and findings.

Betsy Wilkening

Betsy Wilkening is an educator coordinator for Arizona Project WET at the University of Arizona in Tucson. Her projects include Recharge the Rain, a NOAA Environmental Literacy project to build community resilience to increased temperature, extended drought, and extreme storm events by sinking the rain and growing shade. Additionally, she uses her engineering background to instruct teachers in the design, building and testing of underwater robots, or ROVs. Teachers work with their students and return to compete in a statewide competition that she runs using the MATE program.

Betsy Wilkening has been actively involved with PEI since its inception in Montreal and works on website, ex-comm, and UK conference. Her participation in a variety of programs drives her love of the Polar Regions and drive to combat climate change; Climate Generation's Teacher Ambassador, Project Drawdown, National Geographic Grosvenor Teacher Fellow, and PolarTREC.

Dr Nigel Meredith

Nigel Meredith is a Space Weather Research Scientist at BAS. He investigates fundamental problems in radiation belt physics with relevance to space weather hazards. He develops global plasma wave models, essential for the operation of radiation belt models in the UK, Europe and the US. He is also interested in extreme space weather and has recently applied extreme value analysis to long-term satellite datasets to determine the 1 in 10, 1 in 50 and 1 in 100-year electron flux levels to help assess the impact of extreme events on the satellite fleet. He recently led work packages in

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the EU FP7 projects SPACECAST and SPACESTORM and is currently a co-Investigator in the NERC Highlight Topic Rad-Sat. He enjoys exploring the use of scientific data as art and is currently involved in an art-science collaboration on the 'sounds of space'. He has published 111 papers in peer-reviewed journals covering a wide range of topics in space plasma physics.

Diana Scarborough, leading Australian composer Kim Cunio and professional dancer Becky Byers worked with Nigel Meredith on their collaborative, science-inspired journey of off-world sounds: Sounds of Space – an Art Science Collaboration. Together they created a performance with animation, contemporary dance, music and soundscapes. The performance was filmed and an edited version will be presented at The Blue Dot Festival 2019 and the forthcoming Venice Biennale.

Diana Scarborough

Diana Scarborough is an artist-engineer whose collaborative practice is inherently cross disciplinary with a technology and contextual bias. She takes her inspiration from research and science, working with world leaders in the fields of astrobiology, nano-biotechnology, nano-microscopy, space weather data and DNA data. Her interest lies in revealing the beauty, playfulness, emotion and meaning in science and making it present as art using film, sound, live performance projection combined with traditional fine art practices. Overlays of codes and text in printmaking plays with the boundaries of perception at the point where pattern becomes decoded.

Day Three: Wednesday, 10 April: Yusuf Hamied Conference Centre, Christ's College, University of Cambridge.

Dr Cath Waller

Cath Waller developed a passion for marine biology after learning to dive. Her work is mainly on or around the Antarctic Peninsula and Scotia Arc Islands. This is one of the fastest warming places on the planet and little is known about what is going to happen to the plants and animals that live there. She is Senior Lecturer at the University of Hull and researcher at British Antarctic Survey, undertaking regular field work in Antarctica.

Dr Claire Waluda

Claire Waluda is a marine ecologist specialising in Antarctic ecosystems. Her work provides fundamental insights into the response of species and ecosystems to environmental change and human impacts. Based at the British Antarctic Survey, she leads the Scientific Committee on Antarctic Research Action Group on plastic pollution at the Poles and has discussed the issue of plastic pollution in Antarctica in the UK House of Commons.

Emily Rowlands

Emily's research is focused on the Southern Ocean marine ecosystem. Her interest stems from the fact that there is still so much to explore about this remote environment and its fascinating species. She is researching how two of the biggest marine ecosystem stressors of plastic and ocean acidification impact key zooplankton such as Antarctic krill, which are hugely important for supporting the Antarctic marine food web.

Kirstie Jones-Williams

Kirstie Jones-Williams is passionate about understanding and protecting the Polar Regions from anthropogenic stresses. Her PhD research takes her to both the Arctic and Southern Oceans investigating the potential impact of microplastics on zooplankton. These small but mighty animals are a vital component of polar marine food chains and there is still a lot to learn about the impact of plastics in these fiercely beautiful and remote parts of the world.

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Vicky Dewar-Fowler

Vicky is interested in understanding the ways ecosystems are responding to anthropogenic stresses, such as pollution and climate change. Her PhD focusses on assessing how zooplankton migration patterns may be aiding carbon sequestration in polar oceans. Before starting her PhD, she investigated the impacts microplastics have on coastal marine animals.

Dr José Carlos Caetano Xavier

Dr José Carlos Caetano Xavier is a principal investigator of the Institute of Marine Research of the University of Coimbra, Portugal and at the British Antarctic Survey, Cambridge, UK. As a polar marine biologist he collaborates with researchers from more than 15 countries. He was one of the leading scientists for the implementation of the national research program PROPOLAR and of the educational program LATITUDE60! during the last International Polar Year. José co-founded the Association of Polar Early Career Scientists (APECS) and Polar Educators International (PEI). He is involved in more than 40 educational activities and events, nationally and internationally, giving talks in schools, producing exhibitions and directing educational films, among other activities. He was involved in the institutional efforts for Portugal to join the Scientific Committee for Antarctic Research (2006), European Polar Board (2007) and signing the Antarctic Treaty (2010). He co-led Portugal's polar science, education and outreach activities during the International Polar Year.

Dr Eoghan Griffin

Dr Eoghan Griffin studied the polar upper atmosphere in the Atmospheric Physics Laboratory at University College, London, first as a PhD student and then as a Post-Doctoral Research Fellow until 2009. He joined the Imperial College INSPIRE teacher training programme and became a qualified teacher in 2010 before joining SCAR (Scientific Committee on Antarctic Research) as a Project Officer in September 2011. He manages aspects of the Open Science Conferences, Climate Change communications and latterly the day-to-day finances at the Secretariat.

Professor Terry V. Callaghan

Professor Terry Callaghan is Professor of Arctic Ecology at University of Sheffield, UK and Professor, National Research, Tomsk State University, Russia. He is Scientific Coordinator of INTERACT (International Network for Terrestrial Research and Monitoring in the Arctic), a network of currently Arctic field 80 stations. He started as an arctic plant ecologist in 1967, and his research developed from plant ecology into ecosystem science and environmental change. Over a career of 50 years, he has worked in every arctic country and been in the field each year. In the early stages of his career Terry became part of the International Biological Programme Tundra Biome Project. He went on to be founder of the UK NERC Arctic Station on Svalbard, where he coordinated its first 5-year science programme. For 14 years, he led the Abisko Scientific Research Station in Swedish Lapland. In 2001 he developed and coordinated a network of nine research stations in the North Atlantic Region, which developed into INTERACT. He has also contributed to major arctic and global organisations and environmental assessments, including IPCC and participates in high-level arctic initiatives and is an adviser to the UK All Party Parliamentary Group on Polar Regions (Arctic and Antarctic). He is developing international collaboration to understand environmental change in Siberia, and his current interests are in Arctic system science and assessment of change.

Agata Goździk

Agata Goździk is an environmental education lecturer and project co-ordinator for Edu-Arctic: Engaging students in STEM education through Arctic research, based at the Institute of Geophysics Polish Academy of Sciences, Warsaw, Poland. She also co-ordinates other European science engagement projects such as ERIS (Exploitation or Research Results in School Practice) which aims to increase the interest of students in lower and upper secondary schools in mathematics and science, and the choice of a scientific career and EDUSCIENCE, one of the largest educational

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projects in Poland, providing hardware, teaching aids, software, and interactive materials to 10% of schools in Poland. She is the Polish contact for Scientix, a European network that collects and promotes best practices in science teaching and learning in Europe and organises trainings and workshops for STEM teachers.

Wicked Weather Watch

Wicked Weather Watch (WWW) aims to provide clarity for children and young people about climate change and global warming. The main objectives are that children to have access to unbiased information and to bring the important issues to life for both children and their teachers. The project shares the personal experiences of Arctic explorers, such as David Hempleman-Adams (Founder), looking at the latest science and information, and asking how climate change is affecting the people and wildlife of the Arctic and the rest of the world.

Gill Johnson

Gill Johnson has over 15 years of experience in the international development and humanitarian sectors, with a background in fundraising, change management and humanitarian operations, including coordinating responses to climate change-related natural disasters.

Vicky Oram-Ahern

Vicky Oram-Ahern is an expert in fundraising with more than 15 years' experience across the arts, heritage and international development sectors, and in particular securing support for learning and outreach projects with young people.

Polar Explorers Programme

The Polar Explorer Programme to build on the excitement generated by the commissioning and building of the new polar research ship RRS Sir David Attenborough, and its automated submersible Boaty McBoatface. The Programme is focuses on curriculum-linked activities for students aged 7-11 and encourages and supports schools to enrich their teaching of STEM subjects. It places relevant curriculum topics within the context of the construction and eventual launch of the ship, and of polar science and expedition in general.

Clare Warren

Having trained as a secondary maths teacher Clare Warren worked in Bedfordshire Middle and Lower schools for over 20 years. She now specialises in primary science and works as a Polar Ambassador, a Senior Facilitator for STEM Learning Networks and for the Primary Science Quality Mark, supporting schools to develop their science curriculum and pedagogy. Having completed an MA in Education in 2015 she is now working towards a PhD in primary science education.

Dianne Watson

Dianne Watson is the project lead for the Polar Explorer Programme, connecting Polar Ambassadors to U.K. schools who are in most need of support, and ensuring the achievement of key outcomes. Dianne also leads on the teacher placement programmes STEM Insight, and Grand Challenges- Our Futures, as well as teacher and school recognition schemes. Prior to joining STEM Learning U.K., Dianne was Head of Information Services with York St John University and has an MA in Leading Innovation and Change

Encounter Edu

Encounter Edu is an innovative education agency developing sponsored STEM and Global Citizenship programs which integrate virtual exchange, live expedition broadcasts and virtual reality to create immersive classroom encounters that widen young people's world view. Live learning is underpinned by an online library of curriculum-linked teacher resources and training. In the last decade, they have built a network of 4,000 teachers in 96 countries and partnerships such as TES, STEM Learning UK, Primary Science Teaching Trust, the Association of Education Science.

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The education model aims to give students knowledge and skills to investigate the world's most pressing issues, from the Polar regions, ocean health, climate change, to artificial intelligence and refugees. Irina Prentice (Former TV news producer UN journalist covering conflicts, humanitarian crises) and Jamie Buchanan-Dunlop (former teacher) work together to develop the 'Edu Live' elements of the programme and grow Encounter Edu's footprint. Their annual Arctic Live programme reaches thousands of young minds, using technology to bring faraway peoples and environments into classrooms, broadcasting from one of the most remote locations on the planet.

Megan Folan

Learning Designer Megan Folan is a former teacher, specializing in geographical and environmental learning in schools in East London and Brentwood. In the classroom, she used case studies and field excursions to make it easier for students to relate to the STEM subject they were studying. She noticed that increasing real experience of a subject could stimulate engagement and further understanding. At Encounter Edu, Megan is building resources that give teachers the ability to easily integrate experiences as they seek to inspire a student love for learning.

Peter Wadhams

Peter Wadhams is one of the most experienced polar scientists, with over 40 years of research in sea ice and ocean processes in the Arctic and the Antarctic. He was Director of the Scott Polar Research Institute (1987-1992) and later moved to the Department of Applied Mathematics and Theoretical Physics (DAMTP), University of Cambridge as Professor of Ocean Physics, now Emeritus. He has led 54 research expeditions to the polar seas, working from ice camps, icebreakers and aircraft, and has also worked extensively from Arctic submarines where he has used multibeam sonar to measure ice topography. He is a pioneer in the use of AUVs under sea ice, and is the author of over 320 publications on dynamics and thermodynamics of sea ice, sea ice thickness, waves in ice, icebergs, ocean convection and kindred topics. The current main topics of his research are sea ice properties, dynamics and distributions in thickness and concentration, as well as the broad scale implications of sea ice retreat on global climate change. He has led numerous large research programmes of the EU. In 1990 he received the Italgas Prize for Environmental Sciences, and has been awarded the Polar Medal (UK) and the W.S. Bruce Prize of the Royal Society of Edinburgh, and contributed to the IPCC report which was awarded the Nobel Peace Prize in 2009. He has been an Associate Professor at the Laboratoire d'Océanographie de Villefranche, run by Université Pierre et Marie Curie, Paris, and is a Visiting Professor at the Università Politecnica delle Marche, Ancona, Italy. He has been twice a Green Scholar at Scripps Institution of Oceanography, California. He is a member of the Finnish Academy, of the Arctic Institute of North America, and of the Explorers Club. His book "A Farewell to ice" (2017) on the effect of sea ice retreat in the Arctic on the world's climate has so far been translated in 8 languages.

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Day Four: Thursday, 11 April, Scott Polar Research Institute, Cambridge

Laurie Gwen Shapiro

Laurie Gwen Shapiro is a native of New York City's Lower East Side. She has written articles for publications including *The New Yorker*, *New York Magazine*, *The Daily Beast*, *Lapham's Quarterly*, *Slate*, *Aeon*, *Los Angeles Review of Books*, and has her own history column in *The Forward*, focusing on unsung heroes. Shapiro is also a documentary filmmaker and won an Independent Spirit Award for directing IFC's 'Keep the River On Your Right: A Modern Cannibal Tale' and an Emmy nomination for producing HBO's 'Finishing Heaven'. *The Stowaway* is her first non-fiction book

Hugh Thomson

Hugh Thomson has led adventurous and challenging filming expeditions to difficult and sometimes extreme environments – like Afghanistan, the Sierra Madre in Mexico, the Himalayas and the summit of Mt Kilimanjaro. He has been nominated for many awards, from his major series on the history of rock and roll, *Dancing in the Street* (BAFTA), to the Grierson-winning *Indian Journeys* with William Dalrymple and the BBC's flagship series *Dimbleby's Russia*. He has specialised in making authored films with presenters such as William Dalrymple, Jonathan Dimbleby and Joanna Lumley, in which they put forward their view of a subject, partly from his own background as a writer. He is also the author of a series of travel books: *The White Rock*, *Nanda Devi* and *Cochineal Red: Travels through Ancient Peru*. His memoir *Tequila Oil*, about getting lost in Mexico when he was 18, was serialised by BBC Radio 4 as their Book of the Week.