Science AMA Series: We are the Association of Polar Early Career Scientists, Ask us Anything about Polar Science!

Polar$_{S}$*scientists*[1]*andr*/*ScienceAMAs*[1]

[1]Affiliation not available

April 17, 2023

Abstract

::edit:: Thank you all for your questions! It was such fun getting to talk to you and we look forward to answering more in the future! Remember to check out APECS' website (http://www.apecs.is/) and join for free if you're interested in getting into Polar science. You can also find contact information for some of the participants below and reach out to them individually. ::edit:: Keep those questions coming! The beauty of scientists in multiple time zones are that someone will likely be around to check. We'll continue answering through at least 11am (EDT) tomorrow when the next AMA begins. If you want to hear more about APECS' members research, you can also check out the #TweetYourThesis event on Twitter this Thursday (Sept., 24) starting at midnight GMT! Thank you so much for your interest in our Polar passion! The Association of Polar Early Career Scientists (APECS) is here to promote Polar Week! What is that? There are two International Polar Weeks each year – one in March and one in September – which coincide with the equinoxes, the only time when everywhere on Earth has 12 hours of daylight. Polar Week is a time to celebrate how the beauty and diversity of the Polar Regions and the amazing research that happens there! This AMA is just one of many events being held world-wide to connect and educate the public about all things polar. See a full calendar of events here: http://www.apecs.is/outreach/international-polar-week/upcoming-polar-week.html APECS is an international and interdisciplinary organization for undergraduate and graduate students, postdoctoral researchers, early faculty members, educators, and others with interests in Earth's Polar Regions (Antarctica and the Arctic) as well as the wider cryosphere. Our goals include creating opportunities for the development of innovative, international, and interdisciplinary collaborations among current early career polar researchers as well as recruiting, retaining, and promoting the next generation of polar enthusiasts. Learn more here: http://www.apecs.is APECS members participating in this AMA are early-career polar scientists in a variety of research areas with experience working in the polar regions in remote field locations and in some native communities, studying everything from sea-ice interactions to charismatic animals like penguins. We will be answering questions related to our research, what it's like to work in the polar regions, or even how to get into polar research. Learn more about and join APECS for free here: http://www.apecs.is/get-involved/join-apecs.html Participants: The USA Team: Alice Bradley: PhD student researching sea ice ocean - atmosphere interactions in environments with partial sea ice cover using unmanned aircraft as a sensing platform. Website. Alex Thornton: Master's student researching the ecology of Pacific walrus and oceanography in response to environmental change. Website. Olivia Lee: Postdoctoral researching using a combination of remote sensing and community observation data to understand how marine mammals adapt to changing ice conditions. Peter Peterson: Postdoctoral researcher of Arctic atmospheric chemistry, specifically how changing Arctic sea ice cover will influence the fate of atmospheric pollutants in the Arctic. Casey Youngflesh: PhD student researching how penguins are responding to rapid environmental change in the Antarctic. Website. Brit Meyers: Master's graduate in Marine Affairs researching how policy and science yield positive outcomes for people and the environment. The UK Team: TJ Young: PhD student using ice-penetrating radar to study how glaciers flow and deform. Website. Sammie Buzzard: Mathematician looking at how lakes form on Antarctic ice shelves. Website. Julia Feuer-Cotter: Geographer with an interest in smellscapes and the realities and imagination of violent experiences in Alaska's oil industry. Website Laura Hobbs: PhD student studying the behaviour of Arctic zooplankton during the Polar Night. We will be here throughout the day to answer your questions, Ask us Anything!

the WINNOWER

REDDIT

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POLAR_SCIENTISTS R/SCIENCE

ABSTRACT

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The Association of Polar Early Career Scientists (APECS) is here to promote Polar Week! What is that? There are two International Polar Weeks each year – one in March and one in September – which coincide with the equinoxes, the only time when everywhere on Earth has 12 hours of daylight. Polar Week is a time to celebrate how the beauty and diversity of the Polar Regions and the amazing research that happens there! This AMA is just one of many events being held world-wide to connect and educate the public about all things polar. See a full calendar of events here: http://www.apecs.is/outreach/international-polar-week/upcoming-polar-week.html

APECS is an international and interdisciplinary organization for undergraduate and graduate students, postdoctoral researchers, early faculty members, educators, and others with interests in Earth's Polar Regions (Antarctica and the Arctic) as well as the wider cryosphere. Our goals include creating opportunities for the development of innovative, international, and interdisciplinary collaborations among current early career polar researchers as well as recruiting, retaining, and promoting the next generation of polar enthusiasts. Learn more here: http://www.apecs.is

APECS members participating in this AMA are early-career polar scientists in a variety of research areas with experience working in the polar regions in remote field locations and in some native communities, studying everything from sea-ice interactions to charismatic animals like penguins. We will be answering questions related to our research, what it's like to work in the polar regions, or even how to get into polar research.

Learn more about and join APECS for free here:http://www.apecs.is/get-involved/join-apecs.html

Participants:

The USA Team:

Alice Bradley: PhD student researching sea ice ocean - atmosphere interactions in environments with partial sea ice cover using unmanned aircraft as a sensing platform. Website.

Alex Thornton: Master's student researching the ecology of Pacific walrus and oceanography in response to environmental change. Website.

Olivia Lee: Postdoctoral researching using a combination of remote sensing and community observation data to understand how marine mammals adapt to changing ice conditions.

Peter Peterson: Postdoctoral researcher of Arctic atmospheric chemistry, specifically how changing Arctic sea ice cover will influence the fate of atmospheric pollutants in the Arctic.

Casey Youngflesh: PhD student researching how penguins are responding to rapid environmental change in the Antarctic.Website.

Brit Meyers: Master's graduate in Marine Affairs researching how policy and science yield positive outcomes for people and the e

nvironment.

The UK Team:

TJ Young: PhD student using ice-penetrating radar to study how glaciers flow and deform. Website.

Sammie Buzzard: Mathematician looking at how lakes form on Antarctic ice shelves.Website.

Julia Feuer-Cotter: Geographer with an interest in smellscapes and the realities and imagination of violent experiences in Alaska's oil industry. Website

Laura Hobbs: PhD student studying the behaviour of Arctic zooplankton during the Polar Night.

We will be here throughout the day to answer your questions, Ask us Anything!

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Hello, thank you for doing this AMA. I was wondering how mental health issues were dealt with when you're out in the field. I understand you're out there for a long time, with little outside contact. Do you have mental health professionals etc?

madiechan

Yes - there are mental health professionals. Before you deploy on a lot of "extreme" field work, you'll be required to undergo an extensive medical and psychological check-up; in the field, you don't often have a therapist. This topic is often highlighted at major conferences like ones by SCAR (Scientific Committee on Antarctic Research). Big concerns are sleep disorders because of abnormal light-dark/day-night patterns, depression, interpersonal conflict, and beyond. In my experience, people aren't as open about these concerns as they should be, but I hope this changes for the better. Interesting to note: some researchers study these effects as an analog to what might happen to humans in space!

Here are a few links I'd had bookmarked from a while back:

http://www.sciencedirect.com/science/article/pii/S0140673607610563

http://eab.sagepub.com/content/23/6/782.short

http://eab.sagepub.com/content/23/6/766.short

https://sowkweb.usc.edu/news/polar-expeditions-take-toll-mental-health

https://thepsychologist.bps.org.uk/volume-24/edition-1/psychology-end-world

http://www.ncbi.nlm.nih.gov/pubmed/15253482

http://www.tandfonline.com/doi/abs/10.1080/00039896.1968.10665281?journalCode=vzeh20

-Alex Thornton

(edit: I've spoken with US and Australian teams extensively about these tests, so my responses stem from that.)

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madiechan

Hi, this a really good question many don't think about. My own research deals with people working in the oil fields, so mental health of people in small spaces who live mostly deprived of common sensory stimuli (for instance during the polar night) is constantly on my mind. Generally speaking, mental health out in the field is a bit of a taboo topic within the academic environment. We all get risk assessments and are physically checked, but the mental health is seldomly discussed. It is a part of our work that does not 'belong', it's seldomly addressed in the written output of our work - but this doesn't mean that

issues like trauma or depression don't happen. As far as I know there are hardly ever mental health professionals involved. Anyway, many scientists work out of field stations where there are large international groups and at night people get together and chat and cook or play music. This really helps, because you are together with many other people who are in the same situation as you and there is a supportive community. And whilst out in the field, there is so much work to do that I would say it takes my mind off things. In case you want to read about mental health and loneliness, I can recommend Deborah Shapiro's book Time on Ice. - Julia

Edit : Alex and I are based in different countries - they are different standards and systems in place and depending on what people are doing different rules apply.

I have two (maybe related?) questions!

Are the poles shifting?

Have we reached a genuine point of no return in terms of rising ocean levels? (Should everyone on the Florida coast for example move within the next 30-50 years..)

Synaptic_testical
It's my understanding that pole reversal happens somewhat commonly on a geologic timescale. I'll let NASA tell you more: http://www.nasa.gov/topics/earth/features/2012-poleReversal.html

In terms of ocean levels rising, we're talking about both thermal expansion and the ice on land melting (sea ice melt won't have the same affect). As for a point of no return in terms of rising ocean levels, that's hard to say for certain but everything I've learned says that if we haven't, we are dangerously close. For sure, some regions will be impacted more than others because rise is more in certain areas, but the average rate is 4 mm a year and the IPCC says it's as close to a guarantee as you can get that it will continue to rise (and get faster) until at least 2100. This will result in more extreme sea levels and weather events.

(However, I'll tell you that I actively discouraged my family from buying property in Florida - and I have a great fondness for the state, having been born there. I'm also an emergency responder and have seen the devastation in places like New Orleans after Hurricane Katrina, and am familiar with the financial state of Florida well enough to not want my family there.)

Learn more here: https://www.ipcc.ch/publications_and_data/ar4/wg1/en/faq-5-1.html If you want to read the full IPCC chapter, try here: http://www.climatechange2013.org/images/report/WG1AR5_Chapter13_FINAL.pdf

-Alex Thornton

Welcome,

Bit of an operational question here -- aside from the obvious cold weather, what is the biggest difficulty in conducting research in Arctic and Antarctic environments?

adenovato
Good question. Taking any kind of measurements in polar regions is a logistical challenge. Often we leave instruments to collect data after we leave, and we aren't usually able to go back and repair them if something goes wrong, so designing instruments that can reliably operate in the polar regions year round is a huge challenge, especially in remote sea ice regions far from land.

Peter

Welcome,

Bit of an operational question here -- aside from the obvious cold weather, what is the biggest difficulty in conducting research in Arctic and Antarctic environments?

adenovato
From the prospective of my own research (mostly concerned with Antarctic penguins) the greatest challenge lies in the logistics of everything. This includes: getting to your research site of interest, determining how gear is going to get where it needs to be, dealing with broken gear while in the field and having to improvise, and working under the constraints of your environment. For instance, you might want a -80C freezer, a fume hood, or even a bigger work space (!) where you're at but you just can't always have those things. Fluctuating conditions, particularly fluctuations in sea ice along the Antarctic Peninsula, means that you can't always get to where you want to go. Contingency plans are important because outside assistance might not be possible.

-Casey Youngflesh

Welcome,

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adenovato
Yes, logistics is extremely challenging in polar research. Related to logistics (and the cold!) is the seasonal accessibility for most scientists. The harsh winter months and the long dark days are particularly challenging for collecting data. Also, for my sea ice research lab we have a problem with polar bears that tend to destroy some of our instruments on the ice out of curiosity (and maybe boredom?) -Olivia

Welcome,

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adenovato
Not just the weather being cold but the unpredictability of the weather is a big issue- for an expedition of only a few km away from a fixed base such as Rothera in Antarctica field parties will take up to 30 days of food as well as tents etc. because things can change so quickly. -Sammie

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adenovato
Specifically when working in Greenland, anything could happen at any time (usually because of weather). There are always a few days at the beginning and end of fieldwork to account for unpredictability. So, if we were just finishing our fieldwork campaign and needed to fly out, we could be delayed for many reasons, including: 1. Blizzard comes along, too dangerous for chopper to land; 2. Helicopter is being serviced and is the only one within 300 km of field site; 3. Someone in the town that the helicopter is stationed in needed to be air-evacuated and that takes priority over us; 4. Rich oil company buys out the helicopter for the day and money speaks.

TJ Young

Thanks again,

I am also curious if any of you are interested in using deep submergence assets, such as the newly built Nereid Under Ice ROV?

If so, there is still time to apply for the DeSSC New User Symposium at the upcoming Fall AGU meeting, deadline September 30, and there is funding.

Wrathchilde
I am - thanks! I had a chance to use an ROV just once with Scripps Institution of Oceanography and it was brilliant; I'd love to know more and use this technology in a future PhD. -Alex Thornton

Hi there, I'm an undergrad engineer from Germany and I'm interested in taking part in a research project in Antarctica. What are the requirements for this?

BangBangla
If you are interested in the logistics of how Antarctica runs, you can apply to be an engineer and help maintain the buildings down south. All bases in Antarctica offer jobs like this, for example, the British Antarctic Survey

- TJ Young

Hi there, I'm an undergrad engineer from Germany and I'm interested in taking part in a research project in Antarctica. What are the requirements for this?

BangBangla
It really depends on what you're doing, when, and with whom. I'd suggest you join APECS (http://www.apecs.is/get-involved/join-apecs.html) and then take a look at our mentor database (http://www.apecs.is/career-resources/mentor-database.html). Try e-mailing folks who work in the field you're interested in breaking into to get the best advice! Good luck! -Alex Thornton

Hi there, I'm an undergrad engineer from Germany and I'm interested in taking part in a research project in Antarctica. What are the requirements for this?

BangBangla
Find a research group you can work with that has ongoing work in the Antarctic, and you might be able to go on one of their field campaigns.

As for requirements - going in the austral summer is very different than an overwinter stay. It'll depend a lot on the nature of the work you're doing, so the important first step is to get involved in research that has a field component, and then work really hard and make yourself indispensable so they'll be more likely to take you!

Alice

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BangBangla
There are also options during a Masters course which you could do after finishing your undergrad. For instance a friend of mine studied Antarctica Studies in New Zealand, the course actually includes fieldwork in the Scott Base in Antarctica. http://www.canterbury.ac.nz/future-students/qualifications-and-courses/postgraduate-certificates-and-diplomas/postgraduate-certificate-in-antarctic-studies/

Sometimes there is funding for those kind of courses available, so it is worth it keep an eye out very early one if you plan on doing a Masters degree. -Julia

Hey guys great work out there!

I'm a young mathematician hopefully just about to start graduate school next year. I'm passionate about climate change and especially how it effects the Arctic.

What do you recommend to someone wanting to get involved in the kind of research all of you do?

obsessivelyfoldpaper
I would join APECS (http://www.apecs.is/get-involved/join-apecs.html) and start contacting people working on projects you're interested in (http://www.apecs.is/career-resources/mentor-database.html). Mathematicians are usually in high demand in labs I work with (quantitative ecology of seabirds and marine mammals). If you can get any internships while in school, you'd be in a better place later on; I know a lot of math postdocs who are getting into polar research for the first time. Bayesian statistics and modeling are "hot" right now. Good luck! -Alex Thornton

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obsessivelyfoldpaper
Ooh, this is a fun one.

1) Find something you're passionate about. For a graduate thesis, you're going to spend a lot of time on one thing. Make sure it's something that you'll stay excited about for at least 80% of the project.

2) Go to conferences. Meet people. Follow up with them. Go out for drinks after the talks, or meet them for coffee, or something. The more people who know who you are as an early career scientist, the more opportunities you'll have. Science has a reputation for being people shut away in labs not talking - don't believe it! We're all here because we do value communicating our work, but people are generally more successful when they make connections.

3) Do things besides your thesis. Obviously, get your work done. But make sure you have something else going on (whether that is a project through APECS, or a side subject that you're just reading about because you're interested) for when you really aren't making progress on your main thing.

Good luck with grad school! There is some really interesting work in mathematical modeling and sea ice (including a conference happening this week: https://www.pims.math.ca/scientific-event/150924-cmsi)

Alice

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obsessivelyfoldpaper
Generally mathmaticians do extremely well in polar sciences, especially if you are researching quantitive-heavy subjects such as ice sheet or climate modelling, glaciology, fluid dynamics, etc. Because you have the quantitative skill set, it will be easy to pick up the biological, geological, or atmospheric "fluff" as you read about it later, so even if you have little experience with applying your math to the real world, apply anyway, and you'll have a decent shot at your applied position because of this. - TJ Young

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obsessivelyfoldpaper
I came into this as a mathematician- lots of PhDs just ask for someone with a numerical background as those skills would be hard to pick up during a PhD. Talk to potential supervisors and find a topic you're really interested in, but having the skills you do will be really useful! Sammie

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obsessivelyfoldpaper
As a mathematician, you might also be interested in checking out the work of the Sea Ice Prediction Network (SIPN) & the Sea Ice Outlook (SIO) reports that they produce each summer. The SIO reports are based on community contributed dynamic models, statistical models and heuristic/observation-based estimates to predict the Arctic's annual minimum sea ice extent. Public estimates are welcome and Master's/PhD candidates from a number of fields have contributed predictions in the past. It's an opportunity to start engaging right away in an applied mathematics activity with an Arctic focus. Here's a link to the SIPN/SIO website: http://www.arcus.org/search-program/seaiceoutlook - Brit Myers

First of all, thank you for this AMA! As someone that is unlikely to enter this field of research, how contested are other, supportive or logistical, positions surrounding the research in the arctics? For example, a helicopter pilot? Second question - How many hours of movies and series do you take with you! And

DerLoladin
Air Greenland are always looking for helicopter pilots, though you would need a decent grasp of Danish/Norwegian/Swedish to be able to communicate effectively with other pilots/air hostesses/etc. Not really sure about the logistics in other Arctic countries (e.g. Canada/Russia). But the British Antarctic Survey periodically send out job vacancies about pilots flying in/out/within Antarctica as well. --TJ Young

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DerLoladin
Answering your second half of the question: depends where you work. When I am out in the field (on a glacier with nothing around except ice) we run solely on solar power and with a few batteries to support, and a 4-stroke generator if we REALLY need the power. So movies are out of the question since that would draw valuable energy needed to recharge equipment/GPSes/radars. But I bring a Kindle with me. And boy does that help. If you're snowed in or have really shit weather the Kindle will save your life. I think I read about 5 books in 2 weeks last year. One of them was Crime and Punishment. --TJ Young

EDIT: I don't represent Kindle in any way. You can use any e-book device you want. But it will massively help.
EDIT 2: Not having internet or movies or TV series is quite refreshing, and it really does make you appreciate how "connected" you are in real life, as well as appreciating that you have been completely detached from the world with just a satellite phone for an emergency.

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DerLoladin
1) I don't know much about it, but the US Antarctic program employs a fair number of non-science positions to support bases such as McMurdo. And there are certainly helicopters there. I would imagine logistics positions would be listed at usajobs but I could be mistaken.

2) I'll second that about how being disconnected from internet/phone etc. is actually quite nice

-Casey Youngflesh

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DerLoladin
Fieldwork tends to be a good time for me to catch up on non-science reading, so an e-reader is essential for me. A lot of folks on research cruises travel with very extensive libraries of series and movies.

-Peter

i know this one is a bit late to the party, but it's something I've been curious about for quite some time.

Admiral Byrd's 1939 polar expedition abandoned a purpose built vehicle called the snow cruiser at their camp "little America".

I know that the Ross ice shelf broke in that region sometime during the 1960's, but I've never been able to determine whether their camp was disturbed or not.

Do you know of any resources where this information could be found?

Fromanderson
Unfortunately I do not, though I do appreciate the hilarity of the snowcruiser.

-Casey Youngflesh

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Fromanderson
The snow cruiser was brought to Little America III in 1939 and last seen in 1958. Unfortunately, the camp broke off and was lost to sea, last sighted in 1963 near the Ross Ice Shelf. It is suspected the cruiser is on the seafloor.

Source: http://www.tandfonline.com/doi/abs/10.1080/789610142

-Alex Thornton

you seem to be living in a very cold place....how is it being there....my small question is the have you ever come across an interesting marine sea creature with a some immaculate ability to be more evolved in terms.

etimejumper
Being in the Antarctic or Arctic is incredibly special and I feel tremendously privileged to have been one of a lucky few to see these unique places. In Antarctica, when you're on land and the ship has left, it's a beautiful kind of silence I haven't experienced anywhere else and the wildlife is beyond belief!

I'm not sure what you mean by "some immaculate ability to be more evolved in terms," could you clarify? :)

-Alex Thornton

Who came up with the idea of polar week and how do you celebrate it?

kh498
What is Polar Week? It's a time to celebrate how cool the Polar Regions are and the amazing research that happens there. Polar Week aims to celebrate the beauty and diversity of the Polar Regions through education. Events are held world-wide to connect and educate the public about all things polar. There are two International Polar Weeks each year, one in March and one in September, which coincide with the equinoxes– the only time where everywhere on Earth has 12 hours of daylight. The first was in 2012 and is organized by APECS (Association of Polar Early Career Scientists), the Arctic Research Consortium of the U.S., and Polar Educators International.

Now more than ever, Polar Week celebrations are of high importance. Climate change is rapidly effecting the Polar Regions and the Aboriginal peoples who make those regions their home. Industries are increasingly making their way to the Polar Regions, which has impacts on the environment,

infrastructure, and local communities. These issues are not just a "polar problem", but a global problem that requires global cooperation for a solution. Polar Week can be a time to stress the importance of global communication and cooperation. Polar researchers need to work with educators, community members and politicians to teach the public, especially youth, about these problems and inspire them to come together to work towards solutions.

More info: http://www.apecs.is/outreach/international-polar-week/upcoming-polar-week.html (Not all events are listed yet. I'm going to message someone to see if we can get that done today.)

Hi everyone, thanks for doing this AMA today! I have never heard of your association before, but I will definitely be checking it out after this!

I was wondering if anyone in your group had thoughts about the recent work from the American Museum of Natural History, suggesting that polar bears may be able to sustain themselves on a terrestrial based diet in the face of climate change and sea ice loss? http://www.amnh.org/explore/news-blogs/research-posts/polar-bears-may-survive-the-ice-melt-with-or-without-seals Journal article: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0128520

Cheers

hard_n_sloppy
I think it's important for scientists to continue to investigate how all polar species adapt to climate change and to report their findings accordingly. Polar bears may adapt to alternate food sources, but the impacts of such changes are not fully understood on ecosystem-levels. The key here is that there is a lot that we don't know, and simulated computer projections based on energy budgets may provide some insight into what the future holds, but no model can accurately predict the future. Keep up the curiosity! -Olivia

How is the funding situation for Polar science? And how much of your research is actually done at the poles?

I ask because I recently decided to go get a PhD after my Master's ends in May and I think this would be something right up my alley as a young geophysicist.

voltnor
Funding is both good and bad. In my field, it's pretty horrible. For friends who study key "buzzword" fields, they're flush with funding. In general, it's extremely competitive.

As for time spent at the poles, that also depends on what you're doing, who's on the team, and funding. Some people will spend several seasons in the field, but I also know people who got a PhD in a Polar science field and actively work in their chosen field, but still have never been.

I'd encourage you to join APECS (http://www.apecs.is/get-involved/join-apecs.html) and start going through our mentor database (http://www.apecs.is/career-resources/mentor-database.html), then ask them specific questions about what your life would be like as a member of their lab! Good luck! -Alex Thornton

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voltnor
Well, funding for science in general is not excellent and we all wish that a lot more money was allocated to it. As far as National Science Foundation (NSF) money is concerned, I believe that success rates are slightly higher in Office of Polar Programs (OPP) than in many other divisions. There are certainly other pools of money available (including NASA funds) but NSF is a big one.

My advice would be, regardless of what the funding situation is like, if you think that it's something that you would really enjoy doing - go for it!

EDIT: And to answer your first question, while I don't work directly at the pole per se, I do spend about 2 months of each year on the Antarctic Peninsula. This, of course, will vary from person to person, and from field to field.

-Casey Youngflesh

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I ask because I recently decided to go get a PhD after my Master's ends in May and I think this would be something right up my alley as a young geophysicist.

voltnor
If you want to do fieldwork, you should be up front about that when looking at potential PhD projects. There are some polar researchers that unfortunately don't get a chance to get out much.

-Peter

Thanks for doing this AMA! Related to the question on whether we can participate in a supporting role, any doctors in your group who can speak to being an MD in a group on one of these research trips, and what it takes to become involved as a doctor?

d1anasaur
Outsourcing your questions among my colleagues, and we'll get you an answer soon! --TJ Young

Thanks for doing this AMA! Related to the question on whether we can participate in a supporting role, any doctors in your group who can speak to being an MD in a group on one of these research trips, and what it takes to become involved as a doctor?

d1anasaur
Hi!

Not that I work in the medical field at all...but from previous experience, there seems to be two methods within the UK at least. One is to try and work with the organisations running the science programmes (British Antarctic Survey predominately), who will post doctors to bases on on ships. The second is to be involved with expedition medicine for groups needing support. If this is more your scene, I highly recommend attending the Explore weekend run by the Royal Geographical Society in November where there are sessions on "becoming an expedition medic" and "working in the Polar Regions". This is obviously UK based advice, but I am sure there are equivalent organisations in the US or wherever you might be based!

~ Laura Hobbs.

Hey all, I just graduated with an mph in epidemiology and would love to get to either arctic

circle. Do you have any need for young health researchers?

swill128
One Health is definitely an important concept and there are people who study epidemiology at both poles. However (keep in mind this isn't my field), I know way more people in this line of work in the Arctic given that there is a year-round population of humans who live there - and have for a long, long time. Groups like the Alaska Native Tribal Health Consortium and the U.S. Centers for Disease Control, Arctic Investigations would be a great place to start your search, at least in the US.

Good luck! -Alex Thornton

Hey all, I just graduated with an mph in epidemiology and would love to get to either arctic circle. Do you have any need for young health researchers?

swill128
Absolutely. Understanding issues related to health in Arctic communities is important. Particularly as the changing environment has the potential to expose communities to new contaminants and diseases. Continued research is key.

Dont think that my question is really appropriate. I am totally ignorant about whats happening in the Antarctic and Arctic regions. But I can't stop thinking about a SF book from a French writer, René Barjaval, which talked about archeology in those area. Are some of you leading archeology research in those places, is there some ? Thanks

ikemen38
Well, there is a lot of archeology going on in the Arctic - you might have heard of the boats recently found which belonged to Franklin's lost exhibition. This is all archaeological work which tells us more about human history in the Arctic. At the same time the indigenous peoples in the Arctic have and always had a rich culture which left traces which are of interest to archeologists. Here is a list with some links that might be a good resource :http://www.arctic.noaa.gov/peoples.html - Julia

Thanks for taking time to answer questions.

Would any of you care to comment on the potential benefits or detrimental impacts on your ability to conduct sea-going polar science as a result of the recently implemented "Polar Code". This is the international code of safety for ships operating in polar waters for those not familiar.

Wrathchilde
Thank you for bringing up the researcher's perspective on the Polar Code. I think that the Polar Code is a positive development for continued work in the poles, and I doubt that many researchers will be negatively effected by its implementation. I see one potential benefit for the Polar Code in the Arctic: with the opening up of northern routes to seasonally ice-covered waters, it helps to ensure increased vessel traffic in the region comply with the safety regulations. This may reduce interference and potential conflict with researchers that may otherwise come across vessels that are ill equipped to handle polar conditions. -Olivia

Thanks for taking time to answer questions.

Would any of you care to comment on the potential benefits or detrimental impacts on your ability to conduct sea-going polar science as a result of the recently implemented "Polar Code". This is the international code of safety for ships operating in polar waters for those not familiar.

Wrathchilde

I'm a huge fan of the Polar Code (set to be implemented in 2017). It has no impact on me, though that's more a matter of funding in general as recent LTERs (long-term ecological research) in my preferred area of research keep having their finances slashed. Most of my colleagues are increasingly using remote data or going on cruise ships to the Antarctic. (The Arctic is a bit different.) Generally though, I'm in favor of more environmental protections and, also being involved in the effects of oil on wildlife/responder community, I think it's vital to preventing more future incidents than will already occur. -Alex Thornton

http://www.takepart.com/article/2015/09/16/starving-polar-bear-climate-change-arctic-sea-ice-low?cmpid=tpenviro-eml-2015-09-19-sealevel

What can we as individuals, do about these situations?

StonerMeditation
Small things matter; I can't say that enough. If everyone chips in, we will see meaningful change.

Yale's School of Forestry & Environmental Studies has a great overview, including specific links to find out how to do each task: (1) Learn more and stay informed (2) Reduce your carbon emissions (3) Become a citizen climate scientist (4) Take political action

http://environment.yale.edu/climate-communication/what-can-i-do-global-warming

-Alex Thornton

http://www.takepart.com/article/2015/09/16/starving-polar-bear-climate-change-arctic-sea-ice-low?cmpid=tpenviro-eml-2015-09-19-sealevel

What can we as individuals, do about these situations?

StonerMeditation
Climate change is going to be one of the defining issues of our time. As an individual: make thoughtful decisions about how you use energy, and when politicians say "I'm not a scientist, but I think climate change is a load of hooey" (not, obviously, an exact quote), call them out on it. There are thousands of scientists who work on climate science, and we know a remarkable amount about how and why it's happening. Politicians that have zero training and think they know better than experts are doing everyone, including some very tired polar bears, a disservice.

Alice

Thank you for doing this AMA. Do you have anyone on your research team conducting active acoustic research? If so, what is your research about?

Also, I am excited to see this group. As an early career marine scientist looking to do some research in polar regions, I'm glad to find this resource. Cheers!

foodfishsci
I don't personally do any active acoustics but I do know that krill surveys have been conducted using active acoustics in the Antarctica. There is some work being done on seabirds vocalizations by some colleagues of mine using passive acoustics but it's not my area of expertise.

-Casey Youngflesh

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foodfishsci
I know some folks doing research to associate vocalizations with behaviors in cetaceans. We can't see what these marine mammals are doing a lot of the time, so syncing up this information (if possible) would be a great way to passively monitor them. -Alex Thornton

Thank you for doing this AMA. Do you have anyone on your research team conducting active acoustic research? If so, what is your research about?

Also, I am excited to see this group. As an early career marine scientist looking to do some research in polar regions, I'm glad to find this resource. Cheers!

foodfishsci
I'm not doing anything with active acoustic research, but tomography (using acoustics in the ocean to solve for sea water properties along the path) is a really interesting tool that I would love to learn more about (beyond the wikipedia article and the few papers I've read: https://en.wikipedia.org/wiki/Ocean_acoustic_tomography)

Good luck with your research, and definitely get involved with APECS!

Alice

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foodfishsci
My old research did (among other research) acoustic monitoring and profiling of whales and seals down in Antarctica (and other non-polar in the world). Shameless plugin, but check out the Marine Conservation Ecology lab group out in the Duke Marine Lab! - TJ Young http://superpod.ml.duke.edu/

Thank you for doing this AMA. Do you have anyone on your research team conducting active acoustic research? If so, what is your research about?

Also, I am excited to see this group. As an early career marine scientist looking to do some research in polar regions, I'm glad to find this resource. Cheers!

foodfishsci
Hi!

I use echosounders to look at behaviours of zooplankton across the entire Arctic. I use a network of Acoustic Doppler Current Profilers to investigate what zooplankton are doing during the Polar Night when the sun sets for months at a time. Whilst we previously thought that the zooplankton went into hibernation, it turns out some species are still very active right through winter. I also use multi-frequency acoustics to try and determine which types of zooplankton are still active. Let me know if you'd like any links to more info/papers on the topic!

~Laura Hobbs.

Thanks for doing this AMA. A few dozen years back, just after acid rain was the environmental

buzz du jour, and before co2 came into vogue, ozone depletion at the poles was a major concern. Is it still, and does it affect your health, and the health of the animals you study?

DropAdigit
Ozone depletion is one of the major environmental success stories. Ozone depletion is largely caused by certain types of molecules (CFCs) that were commonly used in refrigeration systems, among other things. Once the problem was recognized, governments came together and changed regulations so that now different chemistry is used in cooling systems. Since then, there has definitely been an improvement in the ozone hole (though it does still have a long way to go).

As to UV rays and health - I'm not an expert. It has certainly been an issue in Australia, but I don't know about in the polar regions. Mostly we're so covered up that it's not much of an issue!

Alice

Thanks for doing this AMA. A few dozen years back, just after acid rain was the environmental buzz du jour, and before co2 came into vogue, ozone depletion at the poles was a major concern. Is it still, and does it affect your health, and the health of the animals you study?

DropAdigit
The Antarctic ozone hole is improving, but CFCs (http://www.esrl.noaa.gov/gmd/hats/publictn/elkins/cfcs.html) stay in the atmosphere for a very long time (~50 years) so despite our successful efforts to reduce the use of CFCs, it will still be a bit before things improve. Ozone holes do occur in the Arctic, but not nearly as frequently.

NASA keeps tabs on the ozone hole here (http://ozonewatch.gsfc.nasa.gov/)

Peter

I'm a fan of Google Earth and love to look at remote parts of our planet.

Unfortunately, Antarctica is a bit of a strange place in some way and many of the photos of the middle of the continent seem smeared by the satellite imagery. I don't know why this seems so and is there any chance it will be fixed in the future.

Also, why not more photos at interesting sites? I know they have been explored, but I would like to see more photos. I'm much interested in the dry valleys where no snow is found. Also I am interested in any large bodies of water under the ice and what is down there. Has any group drilled down through the ice and taken video?

johnknoefler
This is a really good question, and it really boils down to how satellites orbit our planet. Most satellites that Google Earth (or any other mapping utility) would rely on generally orbit at a lower altitude (relative to other satellites, say, around 750 km above the Earth's surface)--this means that the satellites rotate differently to that of the Earth's rotation and so can cover a trip around earth in, say, 100 minutes. These satellites fly in what are called near-polar orbits, in which they pass near both poles on each orbit. They will never actually pass directly over both poles because the orbit of the satellite must match (in some form) the earth's orbit around the sun (this would usually mean about an angle of roughly 8 degrees tilt from the satellite). Thus, most satellites would never cover the actual pole. There are some satellites that can hang out in lone times in view of the pole (e.g. the Molniya orbit), but this type of orbit is generally for communications and less for imaging.

Sorry this has been somewhat of a rant: TL;DR below! - TJ Young

TL;DR: Most imaging satellites need to orbit close to the pole, but would never actually pass directly

over the pole, causing very few images to be taken there.

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johnknoefler
I know Google Earth is actively working to correct this problem, so hopefully you'll see more photos soon. :) (Not sure how much I'm allowed to say, so that's all for now.)

Some areas you won't have the same kind of photos just because it's harder to get permission to access (like the Dry Valleys)

I know when I've talked to folks about getting cameras on marine mammals in the polar regions, it's hard to find ones small enough that are able to withstand the extremes. (Or, to get light that far down.) This does not mean it's impossible and it looks like one person has taken a camera to the bottom of a subglacial lake: https://www.youtube.com/watch?v=kZotS8ZiOGg

-Alex Thornton

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johnknoefler
So there is currently satellite imagery being shot at 30cm resolution from commercial satellites. Sub-meter imagery. From space. Incredible. Large amounts of this imagery is actually already incorporated in google earth (continuously really). I should also note that there is a TON of google street view imagery being collected from across Antarctica (much of it by scientists) that hasn't yet been input into google earth. Afraid you'd have to ask google when it's going to show up in google earth...

If you're interested in learning more about the people behind high-resolution polar imagery I would check out the Polar Geospatial Center site (http://www.pgc.umn.edu/). High-res imagery is what they do!

-Casey Youngflesh

This may or may not be relevant...Do you have any idea of how soon it will be that the North Pole magnetic field shifts to the South Pole? I remember hearing in geology class years back that the shift was overdue.

bluecubie
It's my understanding that pole reversal happens somewhat commonly on a geologic timescale. I'll let NASA tell you more: http://www.nasa.gov/topics/earth/features/2012-poleReversal.html

-Alex Thornton

Is the snow at the poles different? Which pole is more "scenic"?

87612446F7
I won't try to paraphrase as the National Snow & Ice Data Center says it really well (https://nsidc.org/cryosphere/seaice/characteristics/difference.html):

Because the Arctic Ocean is mostly covered by ice and surrounded by land, precipitation is relatively rare. Snowfall tends to be low, except near the ice edge. Antarctica, however, is entirely surrounded by ocean, so moisture is more readily available. Antarctic sea ice tends to be covered by thicker snow, which may accumulate to the point that the weight of snow pushes the ice below sea level, causing the snow to become flooded by salty ocean waters.

As for which is more scenic, personally I think the Antarctic. However, beauty is in the eye of the beholder! :)

Is the snow at the poles different? Which pole is more "scenic"?

87612446F7
There are tons of types of snow! In the polar regions, where the weather tends to be more windy and cold, snowflakes often get broken up (think about what would happen if you threw a thousand glass snowflakes down a hill - you end up with a lot of shards). So the resulting snow is made of smaller pieces of snowflakes and tends to be very dry and very dense. You see this kind of snow at lower latitudes too, but we tend to think about either the super-fluffy Colorado type powder, or wet, heavy snow that is more common in east coast storms.

Antarctica has some incredible mountains, but both poles are stunning. Looking out across the Arctic Ocean is unlike anything I've ever seen anywhere else. Sea ice is pretty cool stuff! (pun very much intended)

Alice

How large are artic teams on average?

aquib99
I don't think there's really an average at the general level.... some range from 1-2 to 100+ on big vessels with scientists collaborating. Were you curious about a specific kind of work? -Alex Thornton

How large are artic teams on average?

aquib99
It really depends on what you want to be doing in the Arctic, but generally quite big. A team to trek up to the North Pole could could seem small with as little as 2 or 3 people doing the actual trek, but they have a huge support team of people waiting for them at nearby Arctic bases, logistical support from pilots, weather forecasting from meteorologists, and many many people back home what have helped with fundraising, logistics, packing, shipping, etc. Similarly, in scientific missions, you've got your main team that do the work on the ice sheets, sea ice, etc. (mine was 4 people) but we have had help from cartographers who make us maps for the region, modellers who predict which spot on the glaciers are

best for our research, technicians that prepare our instruments for us, administrative officers that help us prepare grants and process payments, and more. It ended up being about 20 people in the background. Hope that answers your question! - TJ Young

How large are artic teams on average?

aquib99
Research cruises I've been involved with generally involve 20-30 scientists and then the crew of the ship. Different institutes have different capabilities and expertise, so there is a lot of collaboration.

Peter

Thanks for doing this AMA - I love the cold and I am working towards my wildlife biology degree. Questions:

How have the native communities received your science teams?

What quality of life improvements have been made by working with and among the locals, if any?

Thanks!

fruntbuttt
I can only speak for my research specifically and I know teams who have had both positive/negative interactions with native communities. Right now, I'm studying walrus ecology in response to climate change and the team I work on has spent years working with the villages we work out of. For us, once you get to a site, there's often no hotels or boat rentals, so you have no choice but to develop relationships in town (a good thing). As a result, my PI (principal investigator; AKA my advisor) was introduced by her predecessors and will introduce me. For us, this isn't just about curiosity about walrus; we pass on all information to local groups so that native communities can use this information (they subsistence hunt these animals). So, in our case, it's a positive-positive relationship. We get our research and can give back financially and with knowledge. I have heard of cases where natives are not given due respect and projects fall apart, rightfully so. -Alex Thornton

Good luck with your degree! It's never too soon to get involved, so I hope to see you around other APECS events! :)

-Alex Thornton

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Thanks!

fruntbuttt
Thanks for your question. Depending on where you are, some fieldwork stations offer for instance jobs to local communities. Depending on what people are doing, some work with local guides or others write ethnographies and stay longer in communities. I personally have made many long lasting friendships in communities whilst on fieldwork, but obviously there are sometimes questions asked what and why I am doing what I am doing. Also, I work on my own and I try to make local contacts

before I go out in the field (making contacts is fairly easy, especially through other academics). There is a lot of research done to improve the life on local communities, often times by many excellent academics that are of indigenous heritage themselves. In Alaska there is, for instance, a program that allows students to remain in their community whilst studying so they can contribute to their local environment in addition to the academic one. Julia

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Thanks!

fruntbuttt
I would also say that at larger regional/national/global scales, Arctic science & Arctic scientists can & do play a role in making sure that the human dimensions of Arctic change are not forgotten about. For example, IPCC reports aren't only discussing atmospheric science, they are also discussing climate impacts to people. Scientists that promote inclusion of indigenous knowledge systems and/or who have made an effort to relate their research back to impacts on human well-being are helping to create better policies and better outcomes for the people who live under these governance systems. -Brit

How competitive is it to become a researcher with you guys? As an aspiring geologist I've always thought it would be cool to do a few months of research in an icy climate.

I'd love to hear about a day to day of what you guys do and what I can do to increase my chances of doing research with you.

kuavi
I'm not 100% sure what you mean by competitive -

If you're talking about getting into grad school programs, that varies. Generally you need solid grades/scores/etc, and then have a good fit with a scientist or program offering the kind of research/training you want.

Doing just a few months of research might be harder than doing a lifetime - faculty and senior scientists are usually looking to invest in the people who will be the future of the field. Getting you all trained and up to speed on the project isn't free, so they're generally looking for people who are in it for the long haul.

That said, if what you're looking for is a chance to try it before committing to a career, there are training programs that are meant to give students/people an experience of doing field research without the commitment of a graduate program. The one that comes to mind immediately is JIRP (http://juneauicefield.com) but there are probably others too.

Alice

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kuavi
I'll be brutally honest, for my field (glaciology) it goes from being extremely dull work for most of the year to 1 or 2 months of extreme excitement. A day for me would either be sitting in front of a computer coding in MATLAB all day, or in the lab making antennae for radar. A couple of months before your fieldwork, you start preparing logistics: what you need to take with you, flight plans and helicopter chartering, shipping equipment to your location, packing, etc. I go over every list at least 5 times because you have to get it right when you're in the field; you are spending thousands of dollars (most likely from taxpayers) and you've got this one shot, so don't blow it, especially by forgetting a necessary tool or not having enough spare parts. Then in the field, you work your butt off, because the more things you can do in the field for as little time as possible (without compromising sleep--but that's hard anyway since try sleeping on a glacier with gale-force winds ripping your tent) the more bang for buck. Then, when you come home, you spend a couple of days sorting out receipts, backing up data (extremely important!) and then spend the rest of the year analysing it for things, writing up papers on these results, and then the cycle starts all over again :)

Anyway, hope that doesn't dissuade you from what we do--it's all worth it at the end of every field excursion, I promise! -- TJ Young

Such a variety of fields represented in this AMA! Awesome!

Two quick questions:

1) What kinds of natural products are coming out of the polar regions? The only one I really know about (from molecular bio) is antarctic shrimp phosphatase.

2) What are the big drivers of weather in polar regions? In lower latitudes, we're kinda at the mercy of atmospheric circulation patterns.

Thanks!

dcmelc
Can only comment on (1), but two major products (both derived from krill) would be krill oil, and krill pellets. The former being taken by humans as an Omega-3 supplement, the later used as feed in fish aquaculture.

-Casey Youngflesh

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2) What are the big drivers of weather in polar regions? In lower latitudes, we're kinda at the mercy of atmospheric circulation patterns.

Thanks!

dcmelc
I'm not going to be much use on your first question, but I can take a stab at your second one:

Atmospheric circulation patterns make a difference everywhere. In the Arctic, these are complicated by two things: storm tracks coming in off the east coasts of North America and to a lesser extent Asia, and then the sometimes very sudden geographic variability in surface temperatures.

In the Antarctic, there is a polar vortex, similar to the thing that caused all the cold weather in the eastern half of the US last winter. Because of where there is (and is not) land, the one in the Antarctic is more stable and stronger than the one in the Arctic. This pretty effectively traps cold air in the Antarctic.

Alice

Hi, so I'll just ask some questions that came to mind:

1. **Why go to the poles in the first place? What kinds of data can you get, what kinds of experiments can you do, you can't do anywhere else?**
2. **What has polar science been most successful at, as in: What do you think was one of the best experiments/projects in terms of findings/insight?**
3. **What do you think is the most important polar project right now?**
4. **What could your field of science do with more money? What project do you wish you could do?**

Don't feel obligated to answer all questions, it would be nice, but some or any one will do.

mcymo
I'm going to jump in on #4:

There are tons of things that polar science could do with more money, but one that would be huge is getting stable funding for long-term monitoring. Climate in the polar regions is changing really fast, and there is always the looming threat that some monitoring program will lose funding and that a long-term data record will suddenly end. Patching together data sets is harder than it sounds, and having the peace of mind that the longer-term sites will continue to collect quality data into the future would be great. There are some projects doing this (like the LTER sites https://en.wikipedia.org/wiki/Long_Term_Ecological_Research_Network), but at least with the funding system in the US it's very hard to get that kind of long-term funding in place.

Alice

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mcymo
So... kind of an answer to #2 & #3... I think the Circumpolar Flaw Lead (CFL) system study led by Canada during the International Polar Year was a great project for a lot of reasons (for example, it allowed for sustained winter observations when people are not typically conducting field research in the Arctic). The CFL study was 293 days in duration and involved the overwintering of the Canadian

research icebreaker CCGS Amundsen in the Cape Bathurst flaw lead throughout the annual sea-ice cycle of 2007–2008. It was multidisciplinary in nature, integrating physical sciences, biological sciences and Inuvialuit traditional knowledge and it engaged over 350 participants from 27 countries. But... in the U.S.... the Coast Guard's icebreaker fleet currently consists of TWO vessels total. Can you imagine committing one of those vessels to being frozen in place for over half a year to conduct research? Probably not going to happen. If we had a few billion dollars to spare, I'd say building another U.S. icebreaker could benefit Arctic research. But, then again, a billion dollars could support a lot of other important research too! ~Brit Myers

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mcymo
And a stab at #1:

There are lots of reasons to go to the polar regions for science. Many of them have to do with the environments there: it's very hard to study penguins or sea ice in Florida. Just like you don't climb mountains in Kansas, you have to go to the polar regions to get access to the processes that are going on there.

In the bigger picture, the polar regions are very important parts of the planet. Generally, energy comes into Earth around the equator and goes out at the poles. Understanding what is going on with the energy balance of the planet is one of the more fundamental things in understanding how Earth as a system works and what might happen in the future. Polar regions are a key to this.

But also: unrelated to the ice/cold/oceans, there are other things about the polar regions that are useful in other fields. Physicists/upper-atmosphere scientists who study particle precipitation do so mostly in the polar regions because of the orientation of the magnetic field. The Antarctic ice sheet is also a good place to build a giant neutrino detector (https://icecube.wisc.edu/science/icecube).

Polar science (and this sort of addresses #2 and #3) covers A LOT of different fields. I study sea ice and what is going on when the ocean freezes. Alex is studying walrus. The fields are interrelated, but far enough apart that I have no idea what the biggest questions in walrus science are. Fortunately organizations like APECS bring a lot of different flavors of scientists together to share our research and take advantage of the areas where our fields overlap. #2 and #3 are really hard questions.

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3. **What do you think is the most important polar project right now?**
4. **What could your field of science do with more money? What project do you wish you could do?**

Don't feel obligated to answer all questions, it would be nice, but some or any one will do.

mcymo
Okay, #1.

From an ecological prospective, the poles can provide interesting insights into how ecosystems are responding to rapid climatic change. While these systems are not simple by any means, they have many fewer components (types of organisms) than other systems, such as tropical rain forests. Studying these 'simplified systems' might allow us to better understand how these ecosystems function and better understand their underlying structure. Insights and information gained from the poles could possibly be applied to other systems around the world, furthering our understanding of the world we live on. These are effectively laboratories of climate change (whether we like it or not) and may serve as a premonition of what's to come in other systems.

From a conservation and management perspective, it's necessary to research the polar regions in order to get a handle on how they function, how our activities might be impacting the environment, and what implications that might have for us as humans. If we are to conserve and manage these systems properly, we must understand them. Manage what you say? Keep in mind that the polar regions harbor important fisheries. Also keep in mind that these systems do not operate in isolation. Changes to one system will surely have cascading effects for other systems.

Additionally, non-polar related work is also done at the poles. I know that some astronomy and physics research is conducted in the Antarctic because it's cold and the air is relatively clear, even though it has nothing to do with the Antarctic in the slightest!

-Casey Youngflesh

This is pretty broad, but: What are some of the biggest/most interesting unanswered questions relating to the polar regions?

atallcostsky
In my field (glaciology), we have very little knowledge about how glaciers move, flow, and deform. Because the Greenland and Antarctica ice sheets are over 3 km and 4.5 km thick at it's thickest (respectively), you can only see what's going on underneath the ice by either: * Drilling through all that ice using a hot water drill; or * Using a radar to "image" the ice-bed interface. All the information about how glaciers move is based on theory and there is very little empirical evidence to support this. Presently, controls on glacier flow over continents, especially where temperatures go above zero in the summer, are thought to be controlled by how "lubricated" the ice-bed interface is (see Zwally et al. 2002). What this means is that glaciers are lubricated at the ice-bed interface from meltwater that either propagate from surface melt through moulins, crevasses, or other englacial channels; or through heat from friction, where the ice rubs against the bed (which is either rock or sediment). Water builds up at the bed, but there is nowhere to go, so the pressure at the interface builds up. When that is strong enough, it "lifts" the glacier off the bed, and causes the glacier to flow faster. Because this is dependent on melted water both from the surface and from the bed, this would usually happen at the start of the summer season, when surface temperatures are highest. The more melt, the more the bed is lifted off--but over time, the water will create subglacial channels and thus make its way out to the sea. Further development of the drainage system during the summer, aided by the melting of well connected channels, may subsequently reduce water pressures and slow glacier bed flow by relieving the basal pressure of the system.

Because there has been very little, if any, empirical evidence from this (most of this is inferred indirectly through radar, sensors installed at the interface from ice drilling, etc), this is a primary uncertainty in polar climate change. The uncertainty carries on through work: because we have uncertainty in glacier movement and the basal glacial environment, this will feed in as an uncertainty in models of glacier and ice sheet flow, and ultimately this leads to uncertainty in sea level rise from glacier melt.

Sorry for a long-winded question, but hopefully that gives you a glimpse of the challenges that we are working hard to resolve! - TJ Young

This is pretty broad, but: What are some of the biggest/most interesting unanswered questions relating to the polar regions?

atallcostsky
There are a lot of unanswered questions, hopefully other folks chime in with unanswered questions in their specific field. I study atmospheric chemistry, so I'm interested in what's in the air in the polar regions. Sea ice regions act as a source of highly reactive halogen (chlorine, bromine, iodine) radicals (species with an unpaired electron that react rapidly with pretty much everything) to the atmosphere, which impacts what happens to pollution in these remote areas. We have a good idea of the chemical reactions involved, and what happens once these radicals get in the atmosphere, but the amount of halogens present is really variable, and we still don't know why, and how this chemistry might be impacted by other changes in the polar regions such as the rapid loss of multi-year ice in the Arctic.

This is pretty broad, but: What are some of the biggest/most interesting unanswered questions relating to the polar regions?

atallcostsky
I support the Study of Environmental Arctic Change (SEARCH) program. In 2009, SEARCH convened a task force to work with the larger Arctic research community in identifying some of the "big" questions that should guide modern efforts to understand the arctic system. They produced a white paper that proposes a number of important research questions about the Arctic region that you might find interesting. Here's a link: http://www.arcus.org/files/page/documents/751/understandingchangereport_23april2012rev.pdf (~Brit Myers)

Thanks for doing this AMA. I'm an undergrad Molecular/Cell Bio student. Long story short, what would I have to do to get to Antarctica as a grad student?

Terraneaux
Get involved with a research group that does Antarctic research. Be really good at what you do.

It's totally fair to ask prospective research advisors if you would be working on projects that involve Antarctic field work. Start contacting people who do research you're interested ~now for this year's application cycle.

Alice

I'd just like to respectfully note that the poles don't have 12 hours of daylight/12 hours of night during the equinox.... it's just a 24 hour constant state of twilight/sunrise. (Source: I'm looking outside right now and I'm wintering at the South Pole)

Toasty321
Two points for an extremely legit source. But yay! You have some daylight! I bet that is a welcome

sight :)

Alice

Hello! Thanks for doing the AMA! This is so niche I just HAVE to ask. I am a PhD student looking to do qualitative social research on workers in Antarctica. I have found minimal opportunities of travel, and do not quite know who to network with in order for this to become a feasible working project.
1. So, what advice can you give to a PhD student interested in doing research in Antarctica on the social behaviors of the worker there?
2. Where should I research for travel opportunities/cost?
3. How did the younger researchers get involved in these projects?
4. How frequently is your research actually conducted on site in the polar regions?
5. Who should I want to get to know to create working partnerships with researchers?

Thanks for doing this, again! If it's not too forward and creepy, I'd love to PM you to discuss how to get a start in this line of work. Cheers!

tah_infity_n_beyarnd
So... I'll make a plug here for the PolarTREC program... both as a potential opportunity for educators to participate in Polar field research... but also as a place to go to find out about more about field research projects that are being/have been done in the Arctic/Antarctica. Check out the "Follow Expeditions" section and the "Locate Team Members" section for more info about the expeditions/people who are currently active in the Polar regions. http://www.polartrec.com/ (Brit Myers)

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tah_infity_n_beyarnd
I think your best bet is to get in touch with people running the Antarctic programs. Start with your own country, and then maybe branch out. Program managers are generally pretty happy to discuss research, or they can direct you to someone who you should be talking to.

Travel to Antarctica is expensive. That would need a more significant budget, at which point you're looking at putting in a grant proposal.

Re: getting involved...Do you mean the projects that we're on that have field work? Through graduate research, mostly.

There is a TON of prep for fieldwork. It varies by the field, but for sea ice research you might spend a month in the field for a year of prep work, and not do field work every year.

I'm sure I don't need to tell you this, but generally make sure you have a clear plan for how your

research will be conducted. The people who are working in Antarctica are there for the science, so make it very clear when you're proposing this research that you'll be respectful of their time.

Alice

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tah_infity_n_beyarnd
1) There are a lot of people that work at McMurdo Station, not all of them scientists, and some that stay year round. I believe there is some social science research that goes on there - I would search the lit to check it out and get in contact.

4) While I do use some historical datasets and remote sensing data for my work I'm in the Antarctic for a couple months of each year.

5) More than welcome to contact me (website link in description) about getting in touch with a network of people that work on the Antarctic Peninsula (possible study subjects?). Might be easiest to conduct studies remotely via email (would certainly be a lot cheaper/easier), but that's just my 2 cents!

-Casey Youngflesh

How often does someone freeze their tongue to the south pole?

ProsithiusErvingMott
Haha! I don't know much about that, but there are 3 places people visit/call the South Pole: http://icestories.exploratorium.edu/dispatches/big-ideas/the-south-poles/ -Alex Thornton

There is a lot of crazy talk about Admiral Byrd and Operation Highjump, what is the consensus about these stories among people who actually spend time at these places? (Don't reply if a shadowy organization prevents you from revealing the truth)

rageling
I've never heard anyone mention anything crazy about Operation Highjump or Admiral Byrd. I think everyone realizes the "conspiracy" around this is unfounded/completely unrealistic, so it's not worth mentioning. -Alex Thornton

How does it feel to be chroniclers of the demise (perhaps murder) of your subject matter?

I know there are well detailed reports of abject despair among climatologists, and an old ornithologist friend admitted their job was largely documenting the last gasps of their target species and supporting habitats.

I salute your grim task as it is more vital than ever, if only more tragic each day.

Also, can you comment on polar methane deposits and the rate of liberation thereof?

genericcommonwords
I focus on first-year sea ice, which to put a silver lining on things, is just getting more important relative to multiyear ice. :)?

It's important to know how your research fits into the bigger picture, otherwise it would certainly get depressing to see ice melting away so quickly. When it all fits into the global climate puzzle, understanding one disappearing environment can (maybe, hopefully) help save a different one.

I don't have the expertise to comment on polar methane deposits, other than that they're there and sound like they'll compound the greenhouse effects in the coming decades.

Alice

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genericcommonwords
It's depressing, yes. However, I get a lot of pleasure from knowing the work I do is important and I don't ever plan on being a scientist who silences my voice. If I feel there's enough evidence for, for example, us to adopt certain conservation policies, I'll be there trying to get people to support/understand it. - Alex Thornton

How many different north and south poles does Earth have?

SoulWager
A remarkable number.

The normal ones: - Geographic (+/- 90° Latitude) - Magnetic pole (vertical magnetic field lines)

And then the Antarctic also has: - Geomagnetic pole (where the magnetic south pole would be if the planet were replaced by an equivalently strong dipole magnet) - Some people call another location the "Pole of Inaccessibility"

I plan on filling Lake Meade and ending the USWest drought by constructing a string of desalination plants along the coast.

As salt will be a major byproduct of this reaction, I have been looking for things to do with it that, preferably that don't involve dumping supersaturated brine back into the environment.

That said however, it had been suggested to me that the rate at which the Artic is melting is causing a large influx of fresh water into the system and disrupting current marine ecosystems in the process, and that diverting salt from my operations into this fresh water might help restore the balance in the area.

Is the fresh water influx from the melting of the Artic really as bad as I've been led to believe it

is, and would mixing salt from the desalination operation into it be of benefit for the local environment there?

Epyon214
While an interesting thought, I think we should remember that we, as humans, are not so adept at ecosystem engineering. This reminds me of the iron fertilization experiments, where it was thought we could sequester carbon by triggering phytoplankton blooms. Man-made changes to our environment can have unforeseen consequences. The cane toad should serve as a word of warning to all!

http://www.wikiwand.com/en/Cane_toad

-Casey Youngflesh

Hello. How does one typically get around on the poles and why did top gear not convince you it should be by car driven by grumpy old men.

scotscott
Here's a short answer for now... --TJ Young

Hello. How does one typically get around on the poles and why did top gear not convince you it should be by car driven by grumpy old men.

scotscott
Well actually, Sir Edmund Hillary made it to the South Pole on a tractor! Here is a photo and the story: http://www.nzhistory.net.nz/media/photo/dash-pole-tractors (I am not suggesting that Sir Ed was a grumpy old man). It really repends where you want to go. Generally speaking, there are some ice roads in Antarctica that can be travelled by motorized vehicles. In the Arctic researchers sometimes use dog teams. In parts of the North American Arctic there are sometimes even proper roads (like the ones exaggerated on Ice Road Truckers). And when people need to go on glaciers they tend to hike or fly. Julia

I'm a polar scientist and I've never heard of you. Of course, my research is focused on mars. You ever consider branching out to other planets? There's tons of crazy cryosphere stuff going on out there!

notthatnoise3
Branching out into planetary polar science is something I'd love to do some day!

We're generally pretty earth-focused, but I am sure we'd get great turnout if we put together a webinar on planetary polar science. We should be in touch :)

Alice

I'm a polar scientist and I've never heard of you. Of course, my research is focused on mars. You ever consider branching out to other planets? There's tons of crazy cryosphere stuff going on out there!

notthatnoise3
I have considered this actually! A lot of polar scientists branch out and use environments here on Earth to study as analogs (e.g. Dry Valleys in Antarctica for Mars). A woman who got her PhD at a school I got my first masters at studied penguin physiology and is now going to be an astronaut! -Alex Thornton

Recent decades have seen a fairly precipitous decline in Arctic sea ice cover during summer, reaching an unprecedented low of 3.6 million km^2 in 2012.

What are your views on when we could start seeing the first nearly ice-free Arctic summers (i.e. <1 million km^2), and how is this expected to affect both subsequent sea ice formation as well as the local ecosystem?

guebja
Model predictions vary, but it's pretty safe to say we'll see approximately-ice free summers within the century and probably much sooner. I'm not a modeler, so I don't have a more specific number for you.

Already, the Arctic is growing roughly 10 million km^2 of first-year ice every winter. This fills the Arctic Basin and extends into the northern Pacific and north Atlantic near the coasts. First year ice behaves differently than multiyear ice - it's thinner, and therefore more prone to deformation (ridging and rafting when stresses within the ice cause it to break under compression, and opening leads when it's under tension), it grows faster, but also melts faster. First year ice has traditionally been harder to study than multi-year ice (you can't go out in the summer and set up a station on the ice if the ice isn't there yet), so there is a lot that we don't know about how it behaves.

One of the interesting things that happens with approaching-ice-free summers is that there is a lot of time for the upper ocean to heat up from absorbed solar energy. This heat all then has to get released before freeze-up can happen, and it delays freeze up giving first year ice less time to grow. (Incidentally, this happens to be my thesis topic)

As for ecosystem changes - I'll need to call in a biologist on this. My expertise only goes as far as the physical processes at work.

Alice

Thanks for doing this AMA. I am in my final phase to become a Bachelor in Environmental Computer Science. During the following half year I will be researching on smart-clustering large satallite imagery at the German Space Agency. After that I would like to stay in the field of satellite imagery and combine that with arctic or preferable antarctic studies related to climate change. Is there any chance for an IT guy with low knowledge in Antarctic Science (compared to a Bachelor of Antarctic Studies) to start working/switch into this field? How did you find out about where you would study these fantastic fields?

_fancy_pancy
Hey! I'm assuming that you're German if you're working for the German Space Agency. Look out for PhDs in remote sensing, particularly at the Alfred Wegener Institute (either in Potsdam or Bremerhaven). They are always looking for remote sensing speciliasts to automate things, such as glacier scourmarks (for paleoclimatology), crevasses on glaciers, and more. If you're looking to come to the UK to do a PhD (where I work), there are polar 'hubs' at the Universities of Edinburgh, Bristol, Cambridge, Swansea, Aberystwyth, Northumbria, the British Antarctic Survey, and the National Oceanography Centre where they do polar remote sensing. If you're interested in going States-side, Ohio State has a fantastic remote sensing and geodesy centre that do exactly what you're looking to do.
Seems like you've got the skills to make the switch! It's far better to have a skillset in mathematics/physics and come over to polar science than to start off in a field like biology or history (like me, I was an ecologist before switching to radar work) as it's far easier to pick up the spatial intricacies of the polar regions than it is to pick up fluid dynamics and multivariable calculus. --TJ Young

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_fancy_pancy
Satellite derived products are only becoming more important through time, in my opinion. Remote sensing is such a cost and time effective way of sampling large areas, especially in the logistically challenging environment at the poles. I think it's an incredibly valuable skill set to have going forward. With these vast amounts of data coming in, we need to process it and actually do something with it. In that regard IT is certainly a good background to have.

As far as where to go with all of this: one suggestion might be to read a few scientific papers (perhaps found on google scholar) of something you're interested in and see 1) who wrote them, and 2) where they work.

-Casey Youngflesh

I'm a licensed municipal drinking water and waste water plant operator. Who do I contact to contract as a polar base plant operator? I can find all the info I want on those neat little reverse osmosis modular plants the bases use, but not how to get a job running one.

browwiw
This is way out of my field of expertise, but maybe check with the companies that run logistics for the polar programs? In the US, Lockheed has the contract now for Antarctica, and CH2MHill does the Arctic program. They usually have job positions posted once a year or so.

Alice

I'm a licensed municipal drinking water and waste water plant operator. Who do I contact to contract as a polar base plant operator? I can find all the info I want on those neat little reverse osmosis modular plants the bases use, but not how to get a job running one.

browwiw
If you're in the US, Raytheon is the place to check. They hire for the US Antarctic Program (USAP). -Alex Thornton

Specifically for T.J. Young have you seen any high melting rate localities that may be the result near surface geologic processes; Any phreatomagmatics?

Greentreevor
Hi there! Sorry for late reply, just woke up (different time zones and all that). Specifically my research location--not yet, I'm still processing the basal melt data from where we are working (Store Glacier, West Greenland), though preliminary results show a lot of deformation, most likely due to large amounts of localised sediment at the ice-bed interface. The ice at this interface in our area is above the pressure melting point (~600 m deep) which does suggest high basal melting rates, either due to high basal friction or strain heating. There is a possibility that there is also high localised geothermal heat in this region, but if you look at the components of heat transfer, that term is dwarfed by those of strain and frictional heat.

Otherwise, there has been evidence of anomalous high geothermal heat on both the Greenland and

Antarctic [sub-]continents; see Fahnestock et al. 2001, Fisher et al. 2015.

I'm not very knowledgeable on phreatomagmatics, but my guess is that this would be more common on Iceland where glaciers are spatially concomitant with volcanoes. A quick Google Scholar search shows not very much (most from the late 1980's) but it seems like this has also been observed on Antarctica (see Palais et al. 1988).
--TJ Young

Do you stay in Weatherhaven units in the Arctic? Concerning sleep pattern problems due to increase dark or light, I just go to bed at a set time and find that keeps my sleep pattern normal when in the Arctic.

freedomdrought
Sometimes--it all really depends on how much funding you have and how necessary you actually need one. The BAS iSTAR project that traversed Pine Island Glacier in west Antarctica (conducting radar and seismic surveys) brought along a caboose that they used to cook and hang out in, though I'm not on this project, I just saw some pictures.

My fieldwork? I wish! Our project is rather conservative in terms of funding, and so we're staying in regular Mountain Hardwear tents that get quite noisy, given that the average wind speed in our study site is between 10-15 knots due to katabatics and the natural pressure gradient between the interior and the periphery of the Greenland Ice Sheet, and gets stronger during the nighttime! We do have a central 'spacedome' that is classified as a 24-person tent that we use to hang out in and cook as well, though this is purely just a dome with no base in--the ground is ice. This does have it's advantages, such as dumping your cold tea wherever you want as the ground is a natural sink. However, because we are there during the ablation season (i.e. temperatures above freezing), the ground is melting all the time, and if the tent base is shading this part of the ice from the sun, there is preferential melt, and over time the tent ceiling will start to creep closer and closer to the ground as the tent is anchored to the melting ice. So we have to move tents every 4-5 days otherwise we can't sit up in tents!

Regarding sleep pattern problems--I struggle tremendously sleeping in 24 hour light, even with one of those complimentary eye masks that airplanes give you. I just can't get past the idea of sleeping while the sun is still up in the sky (the sun doesn't ever dip past the horizon while we're there). Of course, the katabatics flapping the tent doesn't help either. I think lots of tea was our solution while we were on ice? Of course, this is only a temporary fix--the first few days back in civilisation were spent catching up on sleep...--TJ Young