

ITS5.9/EOS4.14: Trans-disciplinary aspects of researching Arctic change: science communication, outreach and education, integration, monitoring, modelling and risk perception

Co-organized by CL4/CR4/GM7/HS12/NH9

Convener: Peter Schweitzer | Co-conveners: Susanna Gartler, Annett Bartsch, Terenzio zenone, Frederic Bouchard, Stein Sandven, Donatella Zona, Ylva Sjöberg

Chat chairs/moderators: Peter Schweitzer, Susanna Gartler, Annett Bartsch, Ylva Sjöberg

<https://meetingorganizer.copernicus.org/EGU2020/displays/35699>

Short summary: This is the (slightly edited) text from the live chat for EGU session #35699, held on May 8th 2020. The session hosted chat presentations and discussion of Displays from all the presenters who had confirmed availability to participate in the chat - a total of 14 Display presentations in the chat session. Over 70 people attended the live chat event.

Discussion points included the transferability of approaches, the need to consider priorities of local communities and their seasonal activities when planning exchange. Further topics concerned differences between countries and regions including management, mining impacts and environmental awareness, and consistent data collection across the Arctic. Mentioned Covid19 impacts included uncertain fieldwork plans and pending feedback on education material. The utility of online material and tools for education has been pointed out in several displays. The question was raised, if the educational material about the Arctic fits actually into the school curricula around the world.

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1. *Community-based observations help interface Indigenous and local knowledge, scientific research, and education in response to rapid Arctic coastal change* - Hajo Eicken, Finn Danielsen, Matthew Druckenmiller, Maryann Fidel, Donna Hauser, Lisbeth Iversen, Noor Johnson, Joshua Jones, Mette Kaufman, Olivia Lee, Peter Pulsifer, and Josephine-Mary Sam

https://presentations.copernicus.org/EGU2020/EGU2020-12248_presentation.pdf

Hajo Eicken IARC-UAF (Author) (08:32)

Hi all - here's a brief summary of our presentation:

- Presentation summarizes key findings from review of literature on global community-based monitoring (CBM) activities and survey of Arctic CBM efforts with a focus on program effectiveness & sustainability
- We identified six key principles & supporting approaches that aid effective monitoring, knowledge co-production & actionable science, including: Matching observing program & community priorities, creating adequate organizational support structures, ensuring sustained community commitment
- The Alaska Arctic Observatory and Knowledge Hub (arctic-aok.org) helps illustrate how some of these approaches can be put into practice and what some of the challenges might be

Peter Schweitzer, U Vienna (convener) (08:34) Great project, Hajo. I am curious about the portability of that approach.

Peter Schweitzer, U Vienna (convener) (08:34)

1. Did it work in all communities equally well?
2. Could you export this methodology to other arctic locations?

Hajo Eicken IARC-UAF (Author) (08:35) Thanks Peter - our global review of CBM projects suggests that some of approaches from Alaska are portable - in particular working at the interface of Indigenous or Local Knowledge & large-scale observing programs has major benefits.

Bruno Tremblay - McGill (Author) (08:35) Hi Hajo, are the communities interested in sharing data with other communities using APP such as SIKU?

Annett Bartsch b.geos (co-convener) (08:36) @Bruno or Hajo - what is SIKU?

Hajo Eicken IARC-UAF (Author) (08:36)

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@Peter

1: No, big differences between communities - you have to work with the needs and priorities of communities and if you can't build good partnerships it's best to not tax people's time.

2: See my previous answer - I would say yes - there's been collaboration with Pisuna-Net in Greenland for some of this.

Hajo Eicken IARC-UAF (Author) (08:37) @Bruno - you want to answer that about SIKU?

Bruno Tremblay - McGill (Author) (08:37) It is a new APP that was co-developed with a grant from google that northern community are using to share data such as ice thickness, winds, etc.

gerti (08:37) Hi Hajo, how about discussions around "dynamic" nature of Indigenous Knowledge vis a vis "static" storage in a database monitoring system?

Peter Schweitzer, U Vienna (convener) (08:37) Excellent - what has been the reaction from the science community?

Hajo Eicken IARC-UAF (Author) (08:38) @Bruno - data sharing is of interest to communities if it relates to their specific needs; for example best practices, how to advance food sovereignty etc. are of greater interest, than, say snowfall or air temperature data.

Hajo Eicken IARC-UAF (Author) (08:39) @Gerti - that's a deep question for the discussion board - no quick answer...

Hajo Eicken IARC-UAF (Author) (08:40) @Peter: Reaction in "science community" varies - increasingly researchers see the importance of working closely with communities & Indigenous knowledge holders on impactful science. But it takes patience and trust building to be effective.

Peter Schweitzer, U Vienna (convener) (08:40) Finally, does this collaboration make you a better scientist?

Hajo Eicken IARC-UAF (Author) (08:41) @Peter: great question - not for me to answer!

J Otto Habeck (08:41) Mathias and Otto would like to discuss (later) the question of "translating" qualitative into quantitative data

Bruno Tremblay - McGill (Author) (08:41) Some of it is linked with security. I am sharing the link in case you are interested.

Bruno Tremblay - McGill (Author) (08:41) <https://en.unesco.org/courier/2019-1/siku-mixing-high-tech-ancient-know-how>

2. Community Engagement in Permafrost Research at the Western Arctic Research Centre, Inuvik, Northwest Territories, Canada - Erika Hille, Joel McAlister, Alice Wilson, and Steve Kokelj:

<https://meetingorganizer.copernicus.org/EGU2020/EGU2020-591.html?pdf>

Erika Hille ARI (author) (08:42)

Hello everyone - This display discusses strategies for engaging communities in permafrost research. At the Western Arctic Research Centre (WARC), our research is always done in the context of infrastructure, communities, and traditional ways of being. We've learned that the long term success and relevance of our programs largely depends on the meaningful involvement of local stakeholders at all stages of research. In addition to research, we work with Indigenous organizations and co-management boards to build research capacity in the Beaufort Delta Region (Northwest Territories, Canada) and support the establishment of community-based and community-led permafrost and water quality research and monitoring programs.

Susanna Gartler UW; co-convener & author (08:42) Thanks!

Can you give us some more information on What type of training and research programs do you offer?

Erika Hille ARI (author) (08:43) Sure -

Our training programs are developed in response to the needs of our research programs and/or the needs of local organizations. I won't provide an exhaustive list, but I will highlight a couple of ongoing training programs. The Permafrost Information Hub held a Permafrost Monitoring workshop in Inuvik in 2019. They've also been training local environmental monitors in drilling, GPS, permafrost monitoring equipment, and data downloads. The Dempster/Inuvik-to-Tuktoyaktuk Highway Water Quality Monitoring and Beaufort Sea Coastal Restoration Programs are training local environmental monitors in permafrost and water quality monitoring equipment. And each year, we run a training program for the Climate Monitors in Tuktoyaktuk to support their climate change resiliency program.

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All of our research programs are listed on our website: www.nwtresearch.com/. Our website also lists some of our ongoing our programs.

Susanna Gartler UW; co-convener & author (08:43) Who are you targeting with these programs and can you give us some details on how they are organized?

Erika Hille ARI (author) (08:45) We are targeting local government, community, Indigenous, and co-management organizations. We also do a lot of outreach with the Beaufort Delta Education Council (working in schools). They are typically organized in consultation with the groups - what are they looking forward and what do they need to increase research capacity.

Susanna Gartler UW; co-convener & author (08:45) Ok. Can you give us an example of a particularly successful collaboration with local stakeholders?

Hajo Eicken IARC-UAF (Author) (08:46) Can you give an example of a co-management board you work with closely?

J Otto Habeck (08:46) @Erika, (and Peter, Gerti): It would be interesting to discuss of institutional structures similar to co-management boards also exist in Russia, or what the equivalents are.

Erika Hille ARI (author) (08:47) @Susanna - The Permafrost Information Hub is a good example of a successful collaboration. We are working closely with stakeholders to develop a community-based monitoring program. We are also working with them to design an online portal that can display permafrost data from the region.

Erika Hille ARI (author) (08:48) @Halo - We work with the Hunters and Trappers Committees and the Gwichin Renewable Resource Inuvialuit Councils

Susanna Gartler UW; co-convener & author (08:48) What would you say to researchers working on permafrost thaw in the Western Arctic, what are the most important things to keep in mind?

Erika Hille ARI (author) (08:48) @Halo Sorry for the typo - The Inuvialuit Hunters and Trappers Committees and the Gwich'in Renewable Resource Boards

Erika Hille ARI (author) (08:49) @Susanna -

It's critical to consult with communities before the research starts and when there's enough time to incorporate their feedback in a meaningful way. Stay flexible. Northern organizations are often in high demand. Make sure you start reaching out early, to ensure that they can make the time for the meeting. One thing I find useful

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is sending the agenda and background material to the organizations ahead of time. The consultations are always more productive when there is a clear purpose.

When you're planning a consultation, keep in mind the seasonal traditional cultural activities in the region. There are times of the year when no one will be available to meet with you.

Budget for hiring local community and environmental monitors to assist with your work.

Susanna Gartler UW; co-convener & author (08:49)

Thank you. I really appreciated your presentation. You are doing such important work.

3. *Strengthening connections across disciplines and borders through an international permafrost coastal systems network (PerCS-Net)*- Benjamin Jones and the Permafrost Coastal Systems Network (PerCS-Net) .

https://presentations.copernicus.org/EGU2020/EGU2020-11935_presentation.pdf

Benjamin Jones UAF (author) (08:50)

Our poster presentation provides an overview of a “new” International Network of Networks that is focused on permafrost coastal systems. It is funded by the US National Science Foundation’s AccelNet and Arctic System Sciences Programs. Our collaborative project is called the Permafrost Coastal Systems Network (PerCS-Net).

PerCS-Net strengthens linkages between existing networks based in Germany, Russia, Norway, Denmark, Poland, and Canada with the activities of several active US NSF-funded networks as well as several local, state, and federally funded US-based networks. Several of the member activities have been ongoing for more than three decades now.

Currently, we have 156 members from 21 countries, with more than half of the members identifying themselves as being an early career researcher.

Benjamin Jones UAF (author) (08:51) Please consider joining PerCS-Net to become an active participant - <https://permafrostcoasts.org/>

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Annett Bartsch b.geos (co-convener) (08:51) @Ben You plan to involve underrepresented groups and nations, what will be the first steps?

Benjamin Jones UAF (author) (08:51)

PerCS-Net envisions building:

- A sustainable pan-Arctic permafrost coastal observatory network , providing coordinated and timely information to researchers, managers, indigenous stakeholders, and the general public
- A transdisciplinary research network that fosters linkages in order to amplify the broader impacts of each individual network and maintain a circumpolar alliance for Arctic coastal community information exchange
- An international community that fosters and empowers the next generation of students, early-career researchers, and indigenous community members faced with the known and unknown challenges of the future Arctic System.

J Otto Habeck (08:52) Great initiative! Are the detailed studies about permafrost dynamics on cemeteries/ burial sites/ sacred places (e.g. North Slope or Yamal)?

Benjamin Jones UAF (author) (08:53) Great Question! Our network members and focus span from -10 UTC to +12 UTC

Benjamin Jones UAF (author) (08:53)

PerCS-Net goals include (1) developing internationally recognized protocols for quantifying the multitude of changes and impacts occurring in Arctic coastal permafrost systems, (2) sustaining long-term observations from representative coastal key sites, (3) unifying annual and decadal-scale observations of circum-arctic permafrost-influenced coasts, (4) refining a circum-arctic coastal mapping classification system and web-based delivery of geospatial information for management planning purposes and readily accessible information exchange for vulnerability assessments, (5) engaging local communities and observers to capture impacts on subsistence and traditional livelihoods, and (6) promoting synergy across networks to foster the next generation of students, postdoctoral scholars, and early-career researchers faced with the known and unknown challenges of the future Arctic System.

Benjamin Jones UAF (author) (08:54)

We have created a data portal with the Arctic Data Center -
<https://arcticdata.io/catalog/portals/PerCS-Net/About>

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If you would like to publish a dataset relevant to PerCS-Net please email me and I will help with the submission.

Bruno Tremblay - McGill (Author) (08:54) Which local communities are you working with in northern Canada?

Benjamin Jones UAF (author) (08:54) Currently, we are collaborating with colleagues working in Tuk

Benjamin Jones UAF (author) (08:55) If you can help spread the word, we are requesting photo contributions to an online tool that we have developed to communicate past and present observations of permafrost coasts in the arctic - <https://obs.percsnet.axds.co/>

4. Mapping lake drainage and drained lake basins around Point Lay, Alaska using multi-source remote sensing data - Helena Bergstedt, Benjamin Jones, Donald Walker, Louise Farquharson, Amy Breen, and Kenneth Hinkel

https://presentations.copernicus.org/EGU2020/EGU2020-11919_presentation.pdf

Helena Bergstedt UAF (author/presenter) (08:56)

Hello everyone,

Here is a short overview of our slides:

We are currently working on a comprehensive map of drained lake basins for the North Slope including the area around the village of Point Lay.

In August of 2016, the village drinking water source drained during a period of intense rainfall causing the village to seek alternative sources for a freshwater supply. Point Lay is known to be an area where drainage events occur frequently and are of high relevance to the community.

First results of our drained lake basin classification show the recently drained lake near Point Lay as well as large areas of older drained lake basins around the village.

We were planning to travel to Point Lay this April to share our first results with the community, build partnerships and seek their input on our results, site selection and next steps.

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These plans were cancelled due to COVID19. We are currently exploring opportunities to engage with the community remotely while proceeding with our remote sensing analysis of the drained lake basins.

Ongoing work is focused on expanding the preliminary analysis to the North Slope and to identify basins of interest where high resolution imagery can be used to study small scale dynamics more closely.

Annett Bartsch b.geos (co-convener) (08:58) @Helena - are other triggering events of drainage known in the regions? (is there data about that at all?)

Bruno Tremblay - McGill (Author) (08:58) How is your remote working experience going with local communities? And do you go about it?

Helena Bergstedt UAF (author/presenter) (08:59) @Annett: I don't know of data for that region specifically. The assumption that this one lake drained due to rainfall is based on local reports and visual inspection of high res imagery

Helena Bergstedt UAF (author/presenter) (09:00) @Bruno I am very new to this. This spring was supposed to be my introduction to this kind of work in a way.

Helena Bergstedt UAF (author/presenter) (09:01) @Bruno I have prev. done extensive work on remote sensing of permafrost landscapes, but not worked in these kind of communities

Annett Bartsch b.geos (co-convener) (09:01) @Helena But do you know anything about the mechanism for the drainage after the rain - widening of a channel due to erosion, flooding (seems to be part of a floodplain) and subsequent change of morphology?

Erika Hille ARI (author) (09:01) A lake south of Inuvik (in the Northwest Territories) drained catastrophically a few years ago. I believe the Northwest Territories Geological Survey caught it on a time lapse camera. They caught some pretty cool aerial shots too. It might be worth checking out their website.

Helena Bergstedt UAF (author/presenter) (09:03) @Annett this specific lake drained into the river. The riverbank is very near to the edge of the lake and the rainfall event prob caused some overflow that eroded it sufficiently to drain into the river.

Helena Bergstedt UAF (author/presenter) (09:03) @Erika that sounds like a highly interesting data set!

Georg Pointner, b.geos (author) (09:03) @Helena: Is this a multi-temporal approach or do you consider single acquisitions for the Landsat data?

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Helena Bergstedt UAF (author/presenter) (09:04) @Georg we were considering a multi temporal approach. But clouds have made this very difficult. So far I have been working with very few images per site

5. Permafrost Dynamics and Indigenous Land Use: Tracing Past and Current Landscape Conditions and Effects of Environmental Change in Sakha/Yakutia, Russia - Mathias Ulrich and J. Otto Habeck

https://presentations.copernicus.org/EGU2020/EGU2020-1840_presentation.pdf

Mathias Ulrich (09:04)

Hi everybody and thanks to the all conveners for organizing this session. In addition to our abstract and presentation, we have put together a few points as a take home and basis for discussion

- Take-home message:

Permafrost degradation and indigenous land use – it is more than a one-way causal connection!

- To what extent can we speak of permafrost landscapes as cultural landscapes?

- New research initiative:

A tundra/taiga comparison of pastoralism (reindeer herding and other forms of animal husbandry) and its manifold interactions with permafrost landscape dynamics

- For instance, one major question is: Reindeer husbandry may mitigate climate change by keeping tundra landscapes open and “stabilizing” frozen ground?

- Besides various landscape and ecological parameters, the understanding of demographic, economic and socio-cultural influences is necessary to formulate parameters for modelling the future risks that permafrost degradation exerts on rural communities.

Peter Schweitzer, U Vienna (convener) (09:06)

Question for Otto: what is “permafrost” to you as an anthropologist? I am asking as you are co-leading the “Permafrost and Culture” Action Group – is permafrost “not culture”?

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Susanna Gartler UW; co-convener & author (09:06) Hi Mathias, I am curious about how you define 'cultural landscapes' in this context, can you give us a bit more information?

Mathias Ulrich (09:07) We think a cultural landscape is a landscape that is shaped by human activities

Susanna Gartler UW; co-convener & author (09:07) Regarding your message: "Permafrost degradation and indigenous land use – it is more than a one-way causal connection!" What other connections are there?

Peter Schweitzer, U Vienna (convener) (09:08) Yakutia is a great place for human-centered permafrost research, given the subsistence significance of permafrost for the Sakha. Would there be similar opportunities in other parts of the Arctic?

J Otto Habeck (09:08) Yes, permafrost is part of culture... the problem is the word "culture" (old debate in anthropology). Anyhow, I perceive permafrost as part of a dynamic landscape, and part of people's existence, albeit not always visible

J Otto Habeck (09:10) @Peter: yes, indeed. Cooperation with communities and researchers in North America would be good. There have been studies from Alaska (Pewe) in the 1950s. Need to reach out, for example under RATIC/ T-Mosaic.

Mathias Ulrich (09:10) @Susanna; the point is that not only landscape processes are influencing land use conditions, rather we see that indigenous activities have been shaped the landscape as well

J Otto Habeck (09:11) @ "Not one way": Central Yakutia shows that cattle herders exert some influence on permafrost, e.g. by selective logging and modification of alaa areas.

6. Spatiotemporal influence of permafrost thaw on anthrax diffusion - Elisa Stella, Lorenzo Mari, Carlo Barbante, Jacopo Gabrieli, and Enrico Bertuzzo

https://presentations.copernicus.org/EGU2020/EGU2020-1184_presentation.pptx

Elisa Stella CNR (author) (09:11)

Hi everyone!

Our presentation describes the methodologies used to understand the dynamics of anthrax disease in Arctic regions. In particular we:

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- propose and describe a new mathematical formulation aimed at analysing epidemic dynamics of anthrax disease, including also the role of active layer and permafrost thawing among the triggering drivers.
- investigate anthrax suitability areas and therefore we provide a map which describes environmental variables that may favour anthrax infection.

Looking forward to questions!

Susanna Gartler UW; co-convener & author (09:12) Thank you Otto and Mathias!

J Otto Habeck (09:12) Permutation rate: what exactly is it? Further, I saw that cattle seem to have a higher permutation rate. Since there is cattle herding in the central part of Yakutia/Sakha in areas of permafrost with high ice-content, the risk of anthrax outbreaks may be even higher than in the far northern areas of Yakutia/Sakha.

Annett Bartsch b.geos (co-convener) (09:13) @Elisa - are you in contact with local communities?

Hajo Eicken IARC-UAF (Author) (09:15) @Elisa: How far can spores be transported from the location where they have been exposed in the thawing permafrost? Do they travel by water or air or are they just associated with the carcass?

Elisa Stella CNR (author) (09:15) @Otto Permutation rate is the rate that describes the importance in mapping anthrax suitability. The problem of Arctic regions is that we don't have much detailed data, so the overall contribution of cattle comes mainly from southern regions.

Elisa Stella CNR (author) (09:17) @Annett directly no. However our topic is part of the Nunataryk project, which involves local community.

Lisa von Friesen (UCPH) (09:18) @Elisa, very interesting and important. Could you elaborate a bit on what environmental variables that can be expected to favour infection?

Elisa Stella CNR (author) (09:19) @Hajo - Great question. It is still uncertain how far spores could be transported. In the Arctic a lot depends permafrost thawing dynamics. And yes, they could be transported by water, by air also, but maybe water could have major influence.

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7. The Sea Ice Tracking System (SITU): A Community Tool for the Arctic and Antarctic - Bruno Tremblay, Stephanie Pfirman, Garrett Campbell, Robert Newton, and Walt Meier

https://presentations.copernicus.org/EGU2020/EGU2020-7154_presentation.pptx

Bruno Tremblay - McGill (Author) (09:18)

Summary of Points:

We have put online on the NSIDC web site the Sea Ice Tracking System (SITU), formerly known as the IceTracker - <http://icemotion.labs.nsidc.org/SITU/>

SITU calculates forward and backward trajectories for both the Antarctic and Arctic the full satellite record and for the 21st century (from GCM data) - with animated environmental field in the background.

It can be used for research, educational purposes, planning.

It is compatible with Chrome, Edge and will be compatible with Firefox this summer after they update the graphics.

Your feedback/suggestions on the site is welcome at any time.

Hajo Eicken IARC-UAF (Author) (09:18) Bruno, great tool & resource! Based on your analysis of the Last Ice Area I'm curious what the mean residence of ice in that region is – can you comment?

Peter Schweitzer, U Vienna (convener) (09:19) Who is the community for SITU? Does it involve local communities? Or, to put it differently, are local communities knowledge producers or just users of knowledge?

Hajo Eicken IARC-UAF (Author) (09:19) @Bruno - make that "mean residence time"

Bruno Tremblay - McGill (Author) (09:19) The mean residence time in this region is very long. It is caught between the Beaufort Gyre and Transpolar Drift. I have not looked at it in details but I am now curious. I will do and get back to you!

Bruno Tremblay - McGill (Author) (09:21) @ Hajo. There is also transport through the CAA for instance through the Byam Martin Channel. The residence time base on the through flow through the CAA is about 20-30 years.

Peter Schweitzer, U Vienna (convener) (09:22) It makes a lot of sense to have this tool for the Arctic and the Antarctic. How different are the user communities in these areas and how might that affect the tool?

Bruno Tremblay - McGill (Author) (09:24) This is a good question. The tool is just now online. It was presented at AGU last December and now at EGU. We have not received feedback yet from the community, except during the introduction of the tool. We have funding for the tool development and we are eager to address need from the community if you have suggestions

Bruno Tremblay - McGill (Author) (09:25) For instance animation of sea ice concentration with polar bear track in the foreground to track polar bear movement with respect to ice conditions

8. Voices of the Sea Ice: engaging an Arctic community to communicate impacts of climate change - David Lipson, Kim Reasor, and Kååre Sikuaq Erickson

https://presentations.copernicus.org/EGU2020/EGU2020-12661_presentation.pdf

David Lipson SDSU (author) (09:25)

Hi, everyone! Thanks for virtually visiting our presentation. This project is a collaboration between a climate change scientist (David Lipson), an artist (Kim Reasor), a social scientist and local outreach specialist (Kaare Siquak Erickson), and four 5th grade classes in Utqiagvik (Barrow), Alaska (taught by Jamie Phan, Brett Stevens, Laurie Stevens and Arvinelle Gandia). We presented a lecture to the kids about how the loss of sea ice impacts the planet and their local way of life, and then asked them for help to communicate the problem to the rest of the world. They created one hundred paintings that we attached to a poster showing sea ice decline, depicting how things that are important to them could be lost as the ice shrinks. This project taught the students some science, but more importantly, their artwork and voices created a powerful personal statement about the impacts of climate change on real people. Please check out the presentation materials – the images speak more eloquently than I can.

Susanna Gartler UW; co-convener & author (09:26)

Thank you, David, what an engaging project. I really love it. I'm wondering :

1. Did you feel like the kids could take away the main points of your research and what were their reactions to the research and poster?
2. How did you make the material more relatable?

3. How did you approach the school?
4. What is the URL of the interactive webpage?

David Lipson SDSU (author) (09:27) Regarding taking away the main points, Yes, the activity seemed to have a big impression on them. I should clarify that my personal research isn't related to sea ice – I study C cycling in Arctic soils. We decided it would be more impactful to focus on an element of climate change that affected this community most directly, rather than force ourselves to stick to our specific research project. But some of these kids had an advanced understanding of science. For example, the student who drew the adorable krill explained how it was the base of the food web for the whales. Another one who drew the sun made a similar comment.

David Lipson SDSU (author) (09:27) Their reaction to the poster was mostly excitement to see their work come together. In the presentation materials there's a photo of them crowding around it to see it for the first time after we attached all their individual artworks. However, the subject of sea ice loss was upsetting to some. One poor student was crying after our presentation and said something like "I don't want to be a part of this future!" This experience inspired us to add the "green line of hope," the RCP 2.6 scenario on the final day of the project. Another student told me that after our presentation on Tuesday, she and her cousin made a "Save the Ice" banner, and made a painting of the two girls holding the banner and jumping on a trampoline. That gave me chills.

David Lipson SDSU (author) (09:28) To make it relatable, the subject matter was chosen to be directly relevant to these children's lives, as most were part of subsistence hunting families. I focused on the marine mammals that are central to their lives (though many loved the pictures of narwhals, which don't occur in that area). Also, they have seen the increased coastal erosion in their town resulting from slow ice formation in the fall, and so the photos of familiar streets and buildings nearly collapsing into the sea resonated with them. It was also a huge help to have Kaare there to anchor everything in our presentation back to a local perspective. For example, Kaare told them about places further south where the whale hunts had failed entirely that year.

David Lipson SDSU (author) (09:29) So many questions! To set up the project:

Kaare (coauthor and outreach specialist for the UIC) did all that work for us. He found four enthusiastic 5th grade teachers at the local school and got us all together. We couldn't have done it without him.

Jade Hatton, Bristol (09:29) Hi David, do you have any plans to continue working with the class? Are any of the children asking about 'what they can do?', do you have ideas/resources to empower them - say with the wider community?

David Lipson SDSU (author) (09:29)

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What is the URL of the interactive webpage? This is a work in progress, but a preliminary version exists at: <https://kimreazor7.wixsite.com/voicesoftheseaice>

We acquired the domain "voicesoftheseaice.com" and will be migrating the website there soon.

David Lipson SDSU (author) (09:30) @Jade: Yes, we'd like to maybe repeat this project elsewhere, and put the classes in touch with each other

Susanna Gartler UW; co-convener & author (09:30) Thank you so much David, for sharing this experience with us! One last question from my side: How do you plan to use the poster now? Are you planning to educate other audiences and how?

David Lipson SDSU (author) (09:31) ...and we tried to emphasize that they were helping us communicate, and this is the key issue these days

Jade Hatton, Bristol (09:31) Great, thanks David. Creating a 'network' of classes sounds like an interesting idea!

David Lipson SDSU (author) (09:31) @ Susanna: Yes, we're working on the website, and want to use this as a model for other classes.

David Lipson SDSU (author) (09:38) @Susanna:
<https://kimreazor7.wixsite.com/voicesoftheseaice> seems to be working for me! Anyway, brand new, we'll work it out.

9. Large-scale Mapping of Arctic Coastal Infrastructure using Copernicus Sentinel Data and Machine Learning and Deep Learning Methods - Georg Pointner, Annett Bartsch, and Thomas Ingeman-Nielsen

https://presentations.copernicus.org/EGU2020/EGU2020-8978_presentation.pdf

Georg Pointner, b.geos (author) (09:32)

In our display, we present two machine-learning based approaches for automatic classification of Arctic coastal infrastructure from Copernicus Sentinel-1 and Sentinel-2 data. Resulting data products will be used in a risk-evaluation framework in the Horizon 2020 project Nunataryuk. Our target classes include buildings, roads and other human impacted areas, while traditional land cover maps usually include just one class for artificial surfaces. Extensive validation data was collected on site in

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settlements in Svalbard and Greenland and annotated with information on infrastructure types and materials. First results show that a gradient boosting tree classifier performs better with respect to errors of omission, a deep learning approach better with respect to errors of commission, but manual post-processing is required in both cases. I am happy to answer questions.

Ylva Sjöberg UCPH (co-convener) (09:33) This sounds like a very unique data product. Are there other users that you anticipate or target with this product and what do you anticipate it will be used for?

Georg Pointner, b.geos (author) (09:34) @Ylva, it is supposed to be used within Nunataryuk for assessing the risk of coastal permafrost thaw on arctic infrastructure in total; I think it may be of interest for further studies concerning human impact in the Arctic

Annett Bartsch b.geos (co-convener) (09:35) @Ylva - it will be published open access ..

Benjamin Jones UAF (author) (09:35) Cool stuff Georg. Will your information be used for future development in communities?

Annett Bartsch b.geos (co-convener) (09:35) @Ylva - and it will cover the entire Arctic coastal region within a 100 km buffer

Ylva Sjöberg UCPH (co-convener) (09:36) You are doing this for the entire Arctic coastal region. Are there any environments that are more challenging or problematic than others for this approach?

Georg Pointner, b.geos (author) (09:37) @Benjamin, thanks! As far as I know, this is not directly the goal of the project, but it may be used in other frameworks as well

Georg Pointner, b.geos (author) (09:38) @Ylva: We found the mountainous regions are problematic, leading to false classifications largely; also, there are some regions where nearly no cloud free optical acquisitions were available

10. Svalbard's Arctic Settlements: From Mining Sites to Urbanized Environments - Dan Baciú and Anna Abramova

https://presentations.copernicus.org/EGU2020/EGU2020-2458_presentation.pdf

J Otto Habeck (09:40) @Dan & Anna: Is coal production going to come to an end in the near future? If so, when? Are there plans for closing the mines? And what comes after coal?

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Anna Abramova CSULB Dan Baciu UCSB (09:41) Coal mining is declining. The mine in Svea was closed in 2017

Susanna Gartler UW; co-convener & author (09:42) You say in your abstract that “persistent environmental awareness formed in Svalbard only long after mining activity affected the environment.”

So, would you say that mining and environmental awareness are diametrically opposed to each other, or can mining go hand in hand with a concern for the environment?

Susanna Gartler UW; co-convener & author (09:42) From your chemical screening of snow samples, can you tell if the ground is more polluted near former coal mines? Is there anything that can be done about the pollution?

Anna Abramova CSULB Dan Baciu UCSB (09:42) No, that's our point. Mining and awareness are not opposites.

Anna Abramova CSULB Dan Baciu UCSB (09:43) Awareness comes after mining, but it takes time.

Anna Abramova CSULB Dan Baciu UCSB (09:43) Yes, the ground is more polluted closer to the mines.

Anna Abramova CSULB Dan Baciu UCSB (09:44) Near operating coal mines the pollution is highest.

Susanna Gartler UW; co-convener & author (09:44) Are you familiar with Frigga Kruses' archeological research who shows that miners at the turn of the centuries decorated some of their places, which points to place-attachment? Do you think the workers could have also had a concern for their environment?

Susanna Gartler UW; co-convener & author (09:45) And a last question: What are the novel digital humanities techniques you use?

Anna Abramova CSULB Dan Baciu UCSB (09:45) We think that workers contribute to the evolution of awareness. However, you cannot clap in the hands and there the awareness is. It takes time for it to form.

Anna Abramova CSULB Dan Baciu UCSB (09:45) We use text mining, and we develop a new measure for discourse diversity.

Anna Abramova CSULB Dan Baciu UCSB (09:46) We collected text especially from local news publishers.

Anna Abramova CSULB Dan Baciuc UCSB (09:49) The zone operates under a multinational treaty

11. *Memories of Mining: First Nation of Na-Cho Nyäk Dun Elders' perspectives* - Susanna Gartler and Gertrude Saxinger

https://presentations.copernicus.org/EGU2020/EGU2020-22647_presentation.pdf

Susanna Gartler UW; co-convener & author (09:46)

This display addresses the urgent need to understand perspectives of change, both societal and environmental, from indigenous viewpoints in Northern Canada.

The research stems from the ReSDA funded project "LACE - Labour mobility and community participation in the extractive industries: case studies in the Canadian North." (PI Gertrude Saxinger, Co-PI Prof. Chris Southcott).

The poster and book are based on an oral history study on First Nation Elders' opinions on the impact of the extractive industry, conducted throughout 2014 – 2019.

The community-led process started in 2014 when I was asked by chief and council to conduct interviews with Elders in Mayo, Yukon Territory, and culminated in the publication of a short book called "Dän Hùnày – Our People's Story" last year - together with Joella Hogan, Gertrude Saxinger and 13 First Nation of Nacho Nyäk Dun Elders, who live in Mayo.

You can access it (and other materials we produced) here:

<http://www.nndfn.com/heritage/>

This is the project page:

<http://yukonresearch.yukoncollege.yk.ca/resda/projects/research-projects/theme-2-sustainable-communities/labour-mobility/>

Peter Schweitzer, U Vienna (convener) (09:47) So far, we primarily have been discussing environmental change in the Arctic. Was environmental change a topic in your conversations about mining?

Susanna Gartler UW; co-convener & author (09:47) Yes, definitely. The Elders were very concerned about what was and still is happening currently in the region.

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Peter Schweitzer, U Vienna (convener) (09:48) Is mining seen as part of colonialism in that community? Or, to put it differently: is it entirely seen as an external project?

Susanna Gartler UW; co-convener & author (09:49) It depends I would say, on each person's perspective. Mining is a very difficult topic somehow, some are very pro-mining, some are anti-mining.

gerti (09:49) I would say it is seen as sth coming in from outside, but the attitude is "if we are not a part, it will happen anyway and we would have nothing". So it is also appreciated for jobs and economic development "if it is done in the right way"

Susanna Gartler UW; co-convener & author (09:49)

The main points to take away are:

Methodological: Relationship-building in a First Nation context takes time, but enables meaningful outcomes for everyone if done respectfully. Regular community meetings and producing outreach products is very satisfying, they reach a wider audience (not just the scientific community) and ideally make researchers as well as study participants & the wider community happy. Furthermore, outreach and science communication facilitates long-term cooperation by continuous relationship building.

Theoretical: Nacho Nyäk Dun Elders' perspectives shed a differential light on the recent history of the Yukon and contact with settlers. Common narratives of 'discovery' and 'empty lands' of previous historical accounts are nearly purely oriented towards mining proponents and processes. Instead First Nation Elders' narratives offer a much more nuanced understanding of how mining colonialism was and still is experienced.

Peter Schweitzer, U Vienna (convener) (09:50) Thank you, Susa and Gert. My last question: what was the local reception of the project and the booklet?

Susanna Gartler UW; co-convener & author (09:51) @Peter There are some people who are employed directly in the industry for generations. For them, it is very much 'internal' to the point where one said: 'It's in my blood.'

gerti (09:51) It was very moving - esp the final presentations of the book. the Elders were reading out from the book and did a book sign.

Ylva Sjöberg UCPH (co-convener) (09:51) Who do you hope reads the book?

Susanna Gartler UW; co-convener & author (09:52) Local community members, a wider Yukon audience, mining proponents, people who are interested in the history of the region

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gerti (09:52) It was first given away for the community members, it was already "sold out" super quickly.

Susanna Gartler UW; co-convener & author (09:53) The next step in the process of this successful collaboration between community stakeholders (such as our research assistant, and the designer), local professionals (such as the photographers) and knowledge holders and is to get the book in to Canadian bookstores. The poster can be viewed in the government house of the First Nation of Nacho Nyäk Dun.

gerti (09:53) it is, I think, a strong statement of the Elders how they see mining and environment. it is a statement to outsiders and a valuable source for heritage, as well as as we have seen a joyful reading for different generation. we hope it made sense

12. INTAROS teaching and outreach materials: how a multidisciplinary project creates opportunities for teachers and the general public - Ruth Higgins, Thomas Juul-Pedersen, Agata Goździk, Walter Oechl, Donatella Zona, Kjetil Lygre, and Stein Sandven

https://presentations.copernicus.org/EGU2020/EGU2020-18853_presentation.pdf

R.Higgins (09:53)

Good morning everyone, Our presentation provides a review of the teaching materials with Arctic themes available for educational activities with high school level students and the general public. The work was carried out in the context of the H2020 project INTAROS <http://www.intaros.eu/> and covered materials produced by the project as well as our broader network of contacts. This was originally a simple study that ended up presenting some great results. The full report is available via the QR code in our presentation or here: <https://intaros.nerisc.no/content/educational-material-v1> We found that there is a wealth of material out there, it's probably just a matter of using it. nevertheless, INTAROS is currently developing some new and exciting educational materials for this target audience, and will also provide a workshop later this year, so watch this space.

Ylva Sjöberg UCPH (co-convener) (09:54) To what extent and how do you work together with teachers to develop relevant materials for schools?

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gerti (09:55) I just yesterday had a conversation with a First Nation representative who asked me regarding a new project that I have proposed: Do you want to teach us from outside. A very important question. How did you deal with this aspect?

R.Higgins (09:55) We have plans to work with teachers in Greenland and Poland, to go to the schools and demonstrate some of the materials that exist.

Ylva Sjöberg UCPH (co-convener) (09:57) Do you have any advice for people who want to develop educational resources from their research projects?

R.Higgins (09:57) Not really, there are already so many initiatives that deal with education and specifically with educating teachers, with existing programmes. We aren't planning to reinvent the wheel, just to work with some of those existing platforms and to enrich their materials and promote their resources.

Agata Goździk (09:58) In fact, the teachers in Poland are very interested in the Arctic and polar research. They were enthusiastically participating in online lessons (with whole classes).

Jade Hatton, Bristol (09:58) Hi Ruth, great materials. I wonder how much scope the schools have for incorporating these materials into their classrooms? How well do they 'fit' with the curriculum, is there enough time on top of core lessons etc for teachers to be using such great resources?

Ylva Sjöberg UCPH (co-convener) (09:58) Did you find many resources in languages other than English?

R.Higgins (09:59) I think one of the hardest challenges is in identifying the audience and their understanding and needs. We often see research that is very thorough and interesting but fails to translate the key messages to a general audience, i.e. to non-peers.

Agata Goździk (10:00) Polar issues are, in deed, hardly represented in curricula of many European countries. However, as teachers find this topic engaging for students, they manage to include it in their activities: both in regular classes and as extracurricular activities.

R.Higgins (10:00) @Jade this is not easy and takes time. I think the key is to plan in advance. Incorporation of these materials doesn't happen quickly. Most curricula are tight and the schedule doesn't allow for spending time on "other things".

Jade Hatton, Bristol (10:03) Thanks @Ruth, wider curriculum changes are needed I guess to help with that - no short term fix

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Agata Goździk (10:09) @Ylva Sjöberg UCPH - some of the resources produced within the EDU-ARCTIC project were used by 1000+ educators in 60 countries. They mainly used English version. However, we developed Polarpedia.eu - a multi-language online encyclopedia of polar terms. Many teachers contributed to translations voluntarily (eg. from Albania, Bulgaria, Greece...)

13. Resources for teachers on the "Ocean and Cryosphere in a Changing Climate" - Eric Guilyardi, Lydie Lescarmontier, Robin Matthews, Nathalie Morata, Mariana Rocha, Jenny Schlüpmann, Mathilde Tricoire, and David Wilgenbus

https://presentations.copernicus.org/EGU2020/EGU2020-4936_presentation.pptx

David Wilgenbus (OCE) (10:00)

Hello everybody, I will present the OCE on behalf of my co-authors. The Office for Climate Education (OCE) has been created 2 years ago by various scientific institutions and NGOs, and became in 2020 a centre under the auspices of UNESCO. It's mission: support primary and secondary school teachers in Climate Change Education, by developing teaching resources and providing opportunities of networking and training. The OCE published in 2019-2020 a set of teaching resources in accompaniment of the "ocean and cryosphere" IPCC special report (SROCC): - a Ready-to-use teacher handbook (multidisciplinary, active pedagogies...) - a Summary for teachers of the IPCC Special Report - 10 videos with experts (oceanographers, climate scientists...) - 4 multimedia activities - 3 teacher training protocols These resources are available for free in 4 languages (EN, FR, ES, DE): <https://oce.global>

Ylva Sjöberg UCPH (co-convener) (10:01) How many schools use your resources and how do they find them?

David Wilgenbus (OCE) (10:02) We don't know yet because the resources have been published at the beginning of the COVID-lockdown :-)

David Wilgenbus (OCE) (10:02) But, our previous summary for teachers of the IPCC 1.5°C report has been downloaded approx 100,000 times, last year

David Wilgenbus (OCE) (10:03) the resources are here: <https://oce.global> (click on "resource" menu).

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Ylva Sjöberg UCPH (co-convener) (10:03) How do you prefer to work with materials in different languages, do you develop local products or translate the same product into several languages?

David Wilgenbus (OCE) (10:03) Actually, we use to work in different phases :

David Wilgenbus (OCE) (10:04)

1/ we develop content with a international board of partners.

2/ as the English version is OK for everyone, we translate into French, Spanish and German

3/ local partners (today : in Mexico, Colombia and Indonesia) produce local adaptations of the resources

Ylva Sjöberg UCPH (co-convener) (10:05) Do you have any advice for people who want to develop educational resources from their research projects?

David Wilgenbus (OCE) (10:06) It's often difficult for scientist to produce education material. The OCE (like other NGOs) can be part of research projects and lead the "outreach" part of these projects. For the moment, we have been associated to 2 european projects (upon validation)

Eric Guilyardi, LOCEAN-IPSL (co-author) (10:06) As a climate scientist I can add that all IPSL education outreach work in projects now happens via the OCE which has professionals in pedagogy and the right networks.

David Wilgenbus (OCE) (10:08) It's important to associate scientists and teachers to produce education projects, instead of letting them work alone on their side

Lisa von Friesen (UCPH) (10:12) @David and Eric, if you are familiar with the journal *Frontiers for Young Minds*, it would be very interesting to hear what your thoughts around it are, if you believe it is a feasible way for scientists to produce educational material for kids, and if it is a good resource for teachers to get new research into the classrooms - or still too un-graspable. Thanks (and sorry for writing a bit late)!

14. Impacts of infrastructure and climate changes on reindeer herding in the Yamal, west Siberia - Timo Kumpula, Roza Laptander, and Bruce C. Forbes

https://presentations.copernicus.org/EGU2020/EGU2020-13995_presentation.pdf

Timo K (10:07)

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Hello from Joensuu Finland! Our poster presentation summarizes key findings of our long term research that we have been conducting in the Yamal Arctic Russia. As you might know that area has experienced huge changes from collapse of Soviet Union to expansion of oil and gas industry.

- Sort of key message is that, we have build long term relation to local reindeer herders and we have been able to find interesting themes from herders point of view and also to find interesting views from scientific perspective.
- Another issue is our multidisciplinary focused research team that truly combines nat. science and social science, already when we are framing the research questions for funding applications. From remote sensing to anthropology.

Timo K (10:07)

Advertise: Roza Laptander defended last week!

<https://www.ulapland.fi/news/Doctoral-Dissertation-When-we-got-reindeer,-we-moved-to-live-to-the-tundra---The-spoken-and-Silenced-History-of-the-Yamal-Nenets--/10917/abd2c8d8-bdb1-4499-aff-86c3fa5e750a>

Timo K (10:07)

Another advertise:

We are starting new Horizon funded project (CHARTER (Drivers and feedbacks of changes in Arctic terrestrial biodiversity)), which will be a continuum of our research efforts in Yamal and Northern Fennoscandinavia.

<https://www.ulapland.fi/news/Bruce-Forbes-to-coordinate-a-major-international-project/38394/6fb9592b-72be-431b-b545-c8f3c4cf078>

Benjamin Jones UAF (author) (10:08) Congratulations on the new project Timo!

Timo K (10:08) yes, Bruce is the main man there!

Annett Bartsch b.geos (co-convener) (10:08) @Timo how do you actually engage local communities/herders?

Timo K (10:09) well, we always made reconnaissance trips to Yamal to establish connections

Annett Bartsch b.geos (co-convener) (10:10) @Timo There is this lake example on your display. What is the actual proportion of the lake Khalevto drainage area which became useful as pasture? Some still floods in spring.

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Timo K (10:10) find out which herding group will be in our research sites, and anthropologists established connections before field campaign

Timo K (10:11) its about 35-40 %, lake khavlevto I mean

Mathias Ulrich (10:12) Hi @Timo. Congratulation to the new project. My question: What strategies do the herders use to adapt to the changes?

Timo K (10:12) yes spring flood area is larger, but site is mainly used in late summer, and some herders said that they actually stay in the area longer because lake bottom is such good pasture

Annett Bartsch b.geos (co-convener) (10:13) @Timo -- and is it representative for the region, are there more such sites? Or just a special case?

Timo K (10:14) Mathias, yes good question, actually adaptation of normal thing for herders, variations between years are big

Benjamin Jones UAF (author) (10:14) Some of the elders in northwest Alaska that used to herd also talk about how they preferred the drained thermokarst lake basins

Timo K (10:14) Annett, I think this is quite representative for region, lakes are changing quite a lot.

15. Chat attendees at the end of the session

1. Annett Bartsch b.geos (co-convener)
2. Peter Schweitzer, U Vienna (convener)
3. Susanna Gartler UW; co-convener & author
4. Ylva Sjöberg UCPH (co-convener)
5. Agata Goździk
6. Alessandra_Giuntini
7. Alice Cima UCB
8. Alvis Finotello Unive
9. Angelika Renner, IMR Norway
10. Anna Abramova CSULB Dan Baciuc UCSB
11. Anna Irrgang
12. Bell Hsu HCU
13. Benjamin Jones UAF (author)
14. Birgit Heim AWI
15. Bruno Tremblay - McGill (Author)
16. Charles Brunette - McGill - attendee
17. Charlotte Haugk AWI MSc student
18. Christine Kroisleitner, b.geos
19. Céline Gießel UHH
20. David Lipson SDSU (author)
21. David Wilgenbus (OCE)
22. Elisa Stella CNR (author)
23. Enrico Bertuzzo (Un. of Venice)
24. Eric Guilyardi, LOCEAN-IPSL (co-author)
25. Erika Hille ARI (author)
26. Fuxing Wang (attendee)
27. Georg Pointner, b.geos (author)
28. gerti
29. Giulia Grandi - Un. of Venice (Attendee)
30. Guy Tallentire (Lboro Uni, PhD)
31. Hajo Eicken IARC-UAF (Author)
32. Hannah Mevenkamp GAUG (ECS)
33. Hannibal
34. Helena Bergstedt UAF (author/presenter)
35. hestro
36. Hong Chin Ng - Bristol
37. Ilka_Peeken_AWI

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38. inciozdogru
39. J Otto Habeck
40. Jade Hatton, Bristol
41. Janna Rückert UB (PhD)
42. Janne Repschläger MPIC
43. Joana Parente UA
44. Johanna Mård CNDS/UU – (participant)
45. Julia Wagner SU (guest)
46. Kai-Frederik Lenz CAU Kiel (audience)
47. Kim Reasor SDSU author
48. Konstantin Nebel LMU
49. Lammert (DKRZ)
50. Lei_Xie_Shandong_University
51. Lena Schreiner (audience)
52. Letizia Tedesco SYKE
53. Lina Madaj, MARUM, UBremen
54. Linda Thielke U Bremen
55. Ling AWI (PhD)
56. Lisa von Friesen (UCPH)
57. Mareike Wieczorek AWI
58. Maria Scheel AU
59. Marie Sicard - LSCE
60. Mathias Ulrich
61. Monique Patzner Uni Tübingen
62. Nicolas Stoll AWI
63. Per Pemberton SMHI
64. Qiangshan Gao
65. R.Higgins
66. Rachele Lodi CNR
67. Rosamaria Salvatori CNR-ISP (co-author)
68. S Rasmus ULAPLAND (guest)
69. Shanshan Zhang SciEditor One Earth
70. Thomas Opel (AWI)
71. Timo K
72. Vanya Stamenova SRTI-BAS
73. VictoriaMartin,UNIVIE
74. Wuyang
75. xiaoming