

## Interview with ARCUS Member, Ming Xiao

By: Katherine Schexneider, ARCUS Volunteer

*Editor's Note: Katherine Schexneider interviewed Ming Xiao on 15 November 2021. The following transcript of that interview accompanies and provides further background to the ARCUS Member Profile of Ming Xiao published in the January 2022 issue of Witness Community Highlights. This interview and the Member Profile highlight the work of our individual members and help ARCUS members get to know one another by supporting connections across disciplines, communities, and career paths.*

**Katherine: Welcome, Ming. Please introduce yourself to the reading audience.**

Ming: Thank you, Katherine, for even pronouncing my name correctly. I am a Professor of Civil Engineering at Penn State. This is my ninth year at Penn State.

**Katherine: From a civil engineering background, how did you get interested in permafrost and infrastructure in the Arctic, particularly? What drew you to that?**

Ming: Well, as you know, the climate change is affecting everywhere and almost everybody. For me as a civil engineer, my specialty is to do technical engineering, dealing with the soils and the soils as support for foundations, and to act as this resilient bearer for the infrastructure. And that, you know, naturally relates to what's happening in the Arctic with permafrost degradation and coastal degradation along the coastline, and that has, as you know, a significant impact on the infrastructure. So, ultimately what drives my research is the social impact. I like to address the issues that really have a bigger social impact on people's lives. Gradually learning all those processes and changes that have impacts in the Arctic got me increasingly interested. So, I was fortunate to get several government funding grants from the National Science Foundation and working with collaborators at University of Alaska Fairbanks (UAF) and University of Alaska Anchorage (UAA), and many other universities and getting now more and more into the research more and more about the Arctic.

**Katherine: That's great. The social impact is something more and more of us are beginning to appreciate. I'm learning about it myself with a budding interest in permafrost and I belong to an organization called Rapid Arctic Transitions due to Infrastructure and Climate (RATIC), which looks at infrastructure and infrastructure damage due to melting permafrost. Even as a non-specialist, if you look at some of those photographs of coastal erosion and you know that most of those communities, particularly in northern Alaska but also in Canada, are on the coast for fishing reasons, hunting reasons, things like that. Once those communities are destroyed, or at risk of destruction, it's no easy task to move somewhere else. It's a huge lift and costs a lot of money. So, your interest in the social impacts is wonderful, and I commend**

**you for that. I imagine many aspects of your work are interesting, particularly in an academic setting, but what's most exciting for you? What kinds of activities make for a gold star day?**

Ming: Well, as faculty, the research itself inspires me. Conducting research and particularly multidisciplinary, interdisciplinary research by working with others and learning from others, and working with my students itself, is a very rejuvenating process and fulfilling. So, in addition to that, as I mentioned earlier, a strong and fundamental motivation for research that excites me is for the research to be useful. Our work has the potential of being used in the Arctic context, by Arctic communities. Our work may serve for well-informed decision making, for example, but we're not there yet. Right now, we're doing fundamental research and applied research by working with local communities, but our work is not at the level of being able to be used by a local community yet. But we hope in the next couple of years we will be able to produce results, outcomes that can be really useful.

***Katherine:* You may not have much in the way of time-off, but when you do, whether it's a proper vacation (and it sounds like you really don't get these very often), or just a free weekend, what do you enjoy doing?**

Ming: Well, Katherine, I have two kids, elementary school kids, seven and nine years old, and we love travelling. From short trips in a couple of hours to Pittsburgh or maybe longer drives or even international trips—they love it—and I like to take them on trips and plan them. Just to have a good time with them is something I really like.

***Katherine:* Part of ARCUS' mission is enabling collaboration, and interdisciplinary collaboration is a major focus for us. Like many organizations in Arctic research, we believe it's so important to connect the civil engineers with wildlife biologists, model builders who use satellite imagery, social scientists studying food insecurity, the list goes on. What aspects of your work would you like to share with others in the Arctic research community in other disciplines, or perhaps in other geographic locales (it sounds like you're well on your way to that right now), and whom do you want to come learn about what's happening at Penn State?**

Ming: Well, Katherine, just as you said, any of the fundamental research issues happening in the Arctic, whether it's coastal erosion, permafrost degradation, food security, energy issues, wildfires—all those—they require an interdisciplinary approach. I work with our geoscientists, social scientists, and other engineers and try to address some of those issues. Currently, my research is on permafrost degradation and its impact on the infrastructure, and coastal erosion and coastal erosion remediation. This research really requires multidisciplinary expertise. So, this is one thing: the research itself. Another is I wish to work with others in STEM education of future Arctic and polar region engineers. For the Arctic to be a resilient and adaptive community, we really rely on the next-generation scientists and engineers. So, education, STEM education of the local community and others is really important. As an educator, I have a great passion for that. There are lots of things going on and more awareness and attention and resources available. I wish to contribute to that, by working with other educators, local

Indigenous community members, engineers, teachers. I think particularly that education should start earlier. You know, start from kindergarten, just to instill this sense of responsibility and desire of learning. And such desire is important, so from kindergarten, elementary school, high school are what we should focus on. Even myself as a university professor, I really wish I can reach out to more and collaborate with others to do something in the case of education, for K–12 education, particularly in the Arctic and polar regions.

***Katherine:* That's great to hear. STEM education is so important for all of us, particularly as you mention with climate change. There's a scientific basis for it. Obviously, there are social and economic and cultural impacts, but we need people to understand the scientific basis of climate change, at whatever level is appropriate for them. But we absolutely need people to go for those bachelor's degrees or advanced degrees so they can contribute to the solution.**

Ming: I agree. You said it really well, Katherine. Thank you.

***Katherine:* How can ARCUS community members best get in touch with you? Is email best, do you have a website or a Twitter account? How do we reach out to Ming Xiao?**

Ming: I have a website, and we actually have a new YouTube channel. It's called The Changing Arctic. If you like, Katherine, you can check it, and we have a few products that are fun to watch. But the best way to reach me is through email. It's [mzx102@psu.edu](mailto:mzx102@psu.edu). I stay up on email, and I reply within an hour usually. I have just a few emails in my Inbox.

Another thing I'd like to talk about, if we have time, is that we recently had a trip to Utqiagvik, Alaska at the end of August to early September for one of the projects. We installed two-kilometer fiber-optic cables in the tundra of Utqiagvik, Alaska. We use distributed acoustic sensing and distributed temperature sensing technologies to study the *in-situ* and long-term variations of the permafrost, see how it changes with the climate and with different soil conditions. Eventually, we will use the information for the foundation evaluation. It was fun and we were there for two weeks; we had laughs and lots of challenges. We worked with local community members, and saw some wild animals. It was great working with multidisciplinary experts. It was great and something I forgot to mention that really excites me.

***Katherine:* That sounds wonderful. You know, in the past year-and-a-half, so few of us have been able to travel or travel easily up to some of these Arctic environments or just go internationally for conferences. It's wonderful that you were able to get up there and spend two weeks and really do some great work.**

Ming: Well, thank you Katherine.

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