

Geointeresting Podcast Transcript

Episode 18: Mapping the Arctic

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Welcome to Geointeresting, presented by the National Geospatial-Intelligence Agency. President Obama signed an executive order in January 2015 to enhance coordination of the national efforts in the Arctic. NGA collaborated with outside experts and developed digital elevation models of the Arctic that were released earlier this year. During his recent rip to Alaska, President Obama announced the NGA-National Science Foundation collaborative effort. The audio you are about to hear was provided by C-SPAN.

Barack Obama: And to help Alaskans better plan for sustainable development, the National Geospatial-Intelligence Agency and the National Science Foundation are leading a public-private collaboration to create the first ever publicly available high-resolution satellite-based elevation map of Alaska by next year and the entire Arctic by the year after that so that we know exactly what's taking place all across this great state.

NGA and the National Science Foundation relied on experts in academia and in science to assist in researching and mapping the Arctic, Alaska and the surrounding areas. Part of that effort was Paul Morin, director of the Polar Geospatial Center at the University of Minnesota. Morin was able to sit down with us and answer some questions about the project. Stay tuned for Geointeresting!

NGA: So let's just start with a background on how the NGA and Polar Geospatial Center linked up.

Paul: Sure. So I've been director of a relatively small science and logistics support center at the University of Minnesota for probably — it's about nine years now, and in the second year, we were in Antarctica collecting ground control in a place called "the dry valley." So this is one of the beautiful places on earth, and so I got back out. I found out that the two weeks I was in the field my mailbox had filled up, and my program officer at the National Science Foundation said, "Did you get this email?" and the email was to me saying, "If you had access to submeter commercial imagery, would you know what to do with it?" The answer is always yes.

NGA: And so what would you say is unique about a partnership like this with an IC agency?

Paul: We're scientists. We talk for a living. We're supposed to go out, and the people I work with have tenure. They have tenure because they're supposed to upset people for a living. They're supposed to discover things and go on television and write papers and do whatever it takes to market that idea to not only the public, but to their own colleagues. You guys don't do that. You guys are basically a combat-support organization. You collect imagery [and] you solve geospatial problems that a handful of people ever see, and what's unusual is in this relationship, NGA has access to this extraordinary high-quality, high-resolution, high-frequency submeter imagery, but we're interested in all the places you're not interested in. My organization of about 12 people in the basement of the Livestock Pavillion in the St. Paul Campus in the University of Minnesota is basically a mini version of NGA. All we really do is solve geospatial problems. We solve problem with a lat-long. Sometimes it's making a map. Sometimes it's remote sensing.



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Sometimes it's some kind of geospatial analysis, but the application's just different. Otherwise, it's the same tools; it's the same imagery. We may be looking at trees or ice or coastline or something like that, where an NGA analyst may be looking at some other hotspot around the world. We do the same things.

NGA: That's really cool. It's cool to see that intersection illustrated in open-source commercial succeeding in the open, as our director likes to say.

Paul: Exactly, and remember, that science is by nature open source. This is what we do. We are funded by the U.S. government to find things out and to give it away.

NGA: So tell us about some more — some of the projects or problems you are currently or your students are working on.

Paul: The big one right now is we're producing an elevation model for the Arctic. And so NGA and contractors have been collecting this imagery for us, and we have this opening where we had the imagery and the software, and it turns out that NSF, the National Science Foundation, has some of the largest supercomputing in the world, and so what we did was organized two agencies, five scientists, six universities, the White House Office of Science and Technology Policy [and] program officers all across the board and came up with enough computer time on top of it to be able to process all this imagery. So we've gone from a time when you're flying an airplane, and you can get a county every few days, to we're collecting the equivalent of about California once a day.

NGA: With the small sats and everything.

Paul: Well, not with small sats yet. These is all with one, two and three. This isn't LIDAR, but we have nothing in these places, and for most of the world, we have very, very poor topography. It's only in a developed county — the U.S, Western Europe, Japan, something like that — or in a trouble spot where you're going to have this data. With these resources, with the open-source software, the commercial imagery and massive computing, we can create a uniform quality, high-quality publicly available data set with a U.S. science agency and NGA. The imagery is being used to look at mass balance; just how much ice there is there at any one time, and as it snows and as new ice is created, is that topography going up or down? One of the key things here is that not only the imagery is critical, but topography is perhaps the most important of all data sets for Earth science.

NGA: And what are some of your next steps in all your efforts, and where do you see the relationship of NGA and Polar Geospatial Center in the future.

Paul: The relationship really is between NGA and NSF. The Polar Geospatial Center, we make things and do things and we facilitate. But we started the Antarctica now. So we're producing the evaluation map of the Antarctic, and when we're done with both the Arctic and Antarctic, we'll have topography of over 95 percent of all ice on earth when we're done with that. Where I see this going is the natural place for it to go — is more and more scientists want access to this imagery, and we need to find ways of effectively passing on these resources that were licensed for the good of the U.S. federal government, and it's a challenge because NASA builds instruments, builds rockets, launches it all, maintains it in orbit and does science. The National

Science Foundation generally provides infrastructure for peer review, and then they write checks to get science done. We're an anomaly in there where we're a center that provides services to those people. And so there's an educational process going on. There's a computer-science aspect of this, just trying to get the data out, and there's just getting people used to the fact that this type of capability exists. This is new to my scientists.

NGA: I liked how you described it as a mini NGA. It's important, yes.

Paul: Exactly. The product of science is a publication. All we do is facilitate the production of that publication, and we facilitate it either by helping people get to a location because we have geospatial information like imagery or other data that helps them get to that place or it's imagery that's used directly to measure something that's used to produce science that's documented in the paper. That's all we do, and so if you were to just move a couple of those words around and talk about the intelligence and combat support, you could have used my paragraph from a moment ago. It's the same thing.

NGA: National security

Paul: National Security and science. We still have to measure the earth. I have a currency issue where we need to know what something looks like now. Well no, the takeaway here is what NGA does here — how they have reached out to us and the science community has changed things. Science is different now than when I started doing this eight years ago. And it's different in part because of the contribution of NGA, and I could say inadvertent, and I don't really mean that. What I mean here is the people here are doing the right thing. NGA's mission is NGA's mission, but when it's possible, we've been able to use some of these resources for U.S. federally funded science, and what's happening tomorrow is we're bringing in a number of people to talk about this. And they're coming in to, in essence, to explain what they're doing, but above all, just say thank you. I mean, this is this is extraordinary. I mean, we've got people flying in for just a few hours from LA from UCLA, from University of Michigan, University of Colorado [and] University of Illinois. We've got two people coming from the Office of Science and Technology Policy and three people coming from NSF. It's this is important to us, and we want to make sure that everyone knows what's going on because we can talk.

NGA: Yes, and what exactly are you briefing tomorrow to the director at ops intel?

Paul: Well at the ops intel, we're talking about exactly this: what everyone's using the commercial imagery for. We'll talk a bit about Arctic DEM, and we'll talk about how this has transformed the way that we're seeing the world, how we're doing earth science [and] how we're doing biology and glaciology. Marin Clark from University of Michigan is coming in. She's using this to look at landslides in Nepal. There is no alternative for this. It's too expensive to fly aircraft [and] landsat. Some of the other NASA spacecraft can't see at the resolution she needs to see. She also can't get elevation. It's too expensive to go in with LIDAR. But with keystrokes and some email and some clever grad students, we can get quite a bit done.

NGA: Yes, that's awesome. Well, I could talk to you all day. I think that's a good place to end.

Paul: Yes

NGA: For now.

Paul: That's right.

NGA: Maybe we'll do a part two.

Paul: Absolutely.

NGA: Yes. So I think this is so cool, especially when the dems came out, and they were all colorful, and, oh man, it was so great.

Paul: Yes, that was. You don't get that very often, and the stars aligned on that one and aligned to the point — my next deal with Claire is that my next star has to smaller. There's become a lot of stakeholders in this, and until you can get through the really public aspects of it; it's only really now that we can get down and just really product this thing. That was an interesting time when President Obama said elevation model

NGA: He's using our words!

Paul: Those are the words we use .He's one of us!

NGA: Pretty cool.

Paul: And he said it above the Arctic circle.

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