18 Erin Walton - Edited

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SPEAKERS

Erin Walton, Dylan Cave, Brittany Ekelund

B Brittany Ekelund 00:01

We would like to first acknowledge that we are on Treaty Six Territory, the traditional gathering grounds for many diverse First Nations, MÃ©tis and Inuit, whose footsteps have marked this land and whose presence continues to enrich our vibrant community.

D Dylan Cave 00:16

Hello, and welcome back to Research Recast(ed), the knowledge mobilization podcast. I'm Dylan cave and I'm here with my co host, Brittany Ekelund. On today's episode, we are talking with geologist Dr. ErinWalton.

B Brittany Ekelund 00:30

Dr. Walten is an associate professor in the Department of Physical Sciences at MacEwan University, and an adjunct professor at the University of Alberta and New Brunswick. Her primary research focuses on shock metamorphism recorded in Martian meteorites. Over the past few years, this research has grown and evolved to encompass terrestrial impact structures and meteorites from our moon and the asteroid 4 Vesta. That sounds all very cool. Thank you so much for joining us today, Erin.

E Erin Walton 00:58

You're welcome.

B Brittany Ekelund 00:58

Yeah.

E

Erin Walton 00:59

It's great to be here.

B

Brittany Ekelund 01:00

So, um, but yeah, first, we'd love to hear a little bit more about you and what attracted you to the sciences, and geology and planetary sciences in particular.

E

Erin Walton 01:12

Right? Well, I grew up in New Brunswick. And I think like most people, when I started university, I didn't have a great awareness of the different-- all of the different types of careers that were out there for specifically for women in science. And so when I started my degree at the University of New Brunswick, I was doing a double major in biology and psychology, mostly because I knew I liked biology. I thought maybe, I like animals too, maybe I'll be a veterinarian. But I also wanted to explore what was out there in the arts. And I hadn't had the opportunity to learn about Earth Sciences up to that point. There weren't any courses in my high school. And so as my science elective, I took a first-year Earth Science course, really similar to the types of courses that I teach here at McEwen. And when I took that course, I learned all about how our solar system formed, how it evolved, how we learn about our solar system. I learned about why certain regions on the earth are volcanically active. I learned about plate tectonics, about the recycling of the crust in our oceans. And I was just completely blown away that I had lived my life up to that point and not known kind of how the earth actually worked in our, you know, our place in our solar system. And so I switched my major after taking that one course.

B

Brittany Ekelund 02:35

Wow. [laughter] So you're kind of like a jack of all trades.

E

Erin Walton 02:39

A little bit yeah.

B

Brittany Ekelund 02:40

Yeah.

D

Dylan Cave 02:41

I want to talk a little bit about meteoritics.

E

Erin Walton 02:44

Yes.

D

Dylan Cave 02:45

Is that how you say that?

E

Erin Walton 02:45

Meteoritics. Yes.

D

Dylan Cave 02:47

Amazing. So can you tell us and tell me exactly what that might encompass?

E

Erin Walton 02:52

Sure. So meteoritics, not meteorology - that's the study of weather.

D

Dylan Cave 02:56

Right.

E

Erin Walton 02:57

Meteoritics is a science that deals with meteoroids, meteors, and meteorites. So there's, there's a lot of jargon in there [Dylan laughs]. And so I'm technically a meteoriticist. So meteoroids are basically just chunks of rock that orbit around the sun, just like, you know, the earth and the other planet.

D

Dylan Cave 03:17

Yeah.

E

Erin Walton 03:18

[crosstalk] Yeah.

D

Dylan Cave 03:18

Dylan Cave 03:18

Hey, that sounds familiar. I think we're on a giant rock that orbits around the sun. [laughter]

Erin Walton 03:22

[crosstalk] Yeah. [laughter] But meteorites are small. Okay. They're small rocks that have-- are pieces broken off from moons and planets and asteroids. And some of those rocks get swept up by the earth. And when they transit through our atmosphere, they heat up by friction. They also heat the air around them by compressing it, and so they give off light. And so those streaks of light when the rocks are coming to our-- in through our atmosphere are called meteors. So some people call them shooting stars, but they actually have nothing to do with stars. They're just rocks coming through our atmosphere. And if those chunks of rock survive that transit through our atmosphere, we can collect them to study and those collected rocks are called meteorites. So I study meteoroids that have come through our atmosphere and landed as chunks of rocks.

Dylan Cave 04:11

Okay, so that's kind of like the lifecycle of of the meteors. I guess-- [crosstalk] That's the lifecycle. [crosstalk] Becoming a meteorite.

Erin Walton 04:16

[crosstalk] Yeah.

Brittany Ekelund 04:16

[crosstalk] Yes.

04:17

[crosstalk] Yeah. [laughter]

Brittany Ekelund 04:17

I'd like to know, what particularly about meteorites-- like how did you come to focus on this one very specific kind of rock and its cycle into our atmosphere?

Erin Walton 04:28

Right. Um, well, like my path to geology, it wasn't straightforward. I mean, I wasn't someone who was always interested in, you know, astronomy and thinking about, you know, the Earth's position within space. And so basically, I was just at the right place at the right time. At the

University of New Brunswick in 2001 the - it's called PASSC, so that's an acronym for the Planetary and Space Science Center - was created. And so this was basically a center that was charged with fostering a group of scientists and engineers that were working on astromaterials - so just basically materials not from the earth - and also on like space related technologies. And so that was being created right when I was finishing my undergrad, and one of my professors, Dr. John Spray, he was director of the Planetary and Space Science Center. And he sort of picked me out as someone who-- I was quite keen, but not about all aspects of geology. I wasn't so much into like fieldwork, and you know, that type of geology. I was really interested in microscopy. So taking-- And what--sorry, what's that? Right. So just using microscopes to study rocks.

B

Brittany Ekelund 05:50

Okay, perfect.

E

Erin Walton 05:50

Yeah. And so you can take a rock, you can slice it really thin - thin enough so that light is transmitted through it - and then you can look at how light interacts with the minerals in the rock to, I guess, describe-- describe the rock, the-- identify the minerals within it, describe their textures, and from that information, you can get a history for how the rock formed.

D

Dylan Cave 06:12

Interesting.

E

Erin Walton 06:13

And so he he kind of singled me out as someone who was very keen about microscopy. And he thought, well, maybe we can apply that love of microscopes to the study of meteorites under the umbrella of PASSC. And so that's how I segwayed into--originally, I started in as a Master's student, and then I progressed into a PhD. So I didn't do two separate degrees. I just did one PhD.

B

Brittany Ekelund 06:41

Okay.

D

Dylan Cave 06:41

Amazing.

B

Brittany Ekelund 06:43

Brittany Ekelund 06:42

Now you're here. [laughter]

Dylan Cave 06:44

[inaudible crosstalk] Here I am. [laughter] So you you've worked with and collaborated with the Canadian Space Agency?

Erin Walton 06:52

Yes.

Dylan Cave 06:54

Is that like, Canada's NASA?

Erin Walton 06:57

That's Canada's NASA.

Dylan Cave 06:57

That's Canada's NASA. So tell us a little bit about your project that's underway that's focused on creating an expertise in lunar geology? Sure. Yeah. Like, if, for example, I guess you could tell us a bit about your role and how your work interacts with the larger project. [crosstalk] Yeah.

Erin Walton 07:15

Okay, so yeah, I've been involved with the Canadian Space Agency for quite a while they've supported my research through funding ever since graduate studies. They also had funding for my postdoc, which is what brought me here to Alberta in the first place. Um, I did my postdoc at the University of Alberta. And now we have funding from the Canadian Space Agency through their LEAP program. So that's Lunar Exploration Accelerator Program. And so we submitted an application, there's a number of us and I'm a co-investigator on this grant, and we're charged with building a network of planetary scientists across Canada. And so it's a project that will go on for the next five years. And most of that funding is used to support students. And so we support them through their salary. We use funding to pay for them to attend conferences, to attend workshops, but also to travel within the different collaborating institutions, so that those students can have access to, you know, different instruments, and then the different expertise within the groups. So I'm someone within the group who studies lunar meteorites using microscopes. But we also have people who work on lunar analogs. So that's where we have environments on Earth that are sort of similar to the moon, and so--

B

Brittany Ekelund 08:44

[gasps] Like where!? Is there zero gravity on earth?

E

Erin Walton 08:46

Yeah, no zero gravity, but we have rocks in Canada called anorthosites that are very similar to one of the main rock types on the moon. And so you can go interact with those rocks, actually, some of the Apollo astronauts did some fieldwork in in Canada working on this anorthosite rocks.

B

Brittany Ekelund 09:06

Where in Canada?

E

Erin Walton 09:08

It's in sort of Quebec, Labrador.

B

Brittany Ekelund 09:10

Okay.

E

Erin Walton 09:10

[crosstalk] I was like, Can I do a day trip?

D

Dylan Cave 09:12

[crosstalk] The area 51 of Canada, obviously, Remote remote locations. And also impact craters. So I talked about meteoroids, which are small chunks of rock that gets swept up the Earth, but larger chunks of rock are called asteroids. And when these larger, like meter or kilometer sized, rocks get swept up by the Earth, they don't get slowed down by our atmosphere. So they're traveling really, really fast when they hit the ground. And when they hit the ground, they stop and they transfer all that kinetic energy, that energy of motion to to the earth. And what that does is it excavates a hole that we call an impact crater. So when you look up at the night sky at the moon, you can see all of these large circular basins and circular holes. So those are all impact craters. Or if they're larger, we just call them impact basins. And so we have quite a few impact craters in Canada that we can study as an analogue for lunar conditions. And then lastly, we also have people in the group who are experts in remote sensing. And so they take data from satellites that orbit the moon. And they look at that data and they sort of decipher it into what it means in terms of like the minerals that make up the moon surface. I just read something in passing whilst Doom scrolling online. [laughter] And it was like the, you know, there's people that are trying to harvest minerals from the moon now, because there's such an abundance of them. But I read an article saying that there's like, an actual structure in underneath the surface of the moon that is, like, millions of tons worth of like metals and stuff like that, that they're trying to, like, get rights to harvest.

E Erin Walton 10:57

Right, to mine.

D Dylan Cave 10:58

Yeah.

B Brittany Ekelund 10:58

Of course.

E Erin Walton 10:59

Yeah. And they're also interested in - there's water ice on the moon. And so if we were to establish a permanent base, which Russia, China and the United States all have plans to establish a more permanent presence on the moon, we would look at harvesting that water ice, purifying it for drinking water, but then also breaking it down into hydrogen for fuel and oxygen for breathing.

D Dylan Cave 11:21

Wow.

B Brittany Ekelund 11:22

We already got plans for the moon, okay. We've got plans for the moon. [laughter] We're done here, up to the moon. [laughter] Just before we move on to some of your other research, I'm kind of interested about the Canadian Space Agency. And like this project that's focused on again, creating an expertise in lunar geology in Canada. I'm just wondering about how this program and the Canadian Space Agency kind of compare to other agencies like NASA in the States, and why we would want to establish this expertise. Like what does that mean for Canadians or Canadian geologists? or Canada?

E Erin Walton 11:59

Right? [laughter] Well, I'd say the Canadian Space Agency is quite a bit smaller, compared to a large, more well funded agency like NASA. But we do have expertise in Canada, in the space industry, you know, it's more concentrated in Ontario and Quebec. And then--

D Dylan Cave 12:18

But there's also a lot of collaboration with other other other parties as well, from my understanding.

E Erin Walton 12:23

Yes, with the European Space Agency, and also with NASA. Yeah. And so, you know, I just spoke a little bit about plans to establish to send astronauts back to the moon, to establish a base there and not I'm not as familiar with plans by Russia and China, as they have with NASA. But NASA, it's called the Artemis project or the Artemis mission. And from that information that's gained by establishing a base on the moon that will be used to eventually send astronauts to Mars, that being kind of the longer term goal--

B Brittany Ekelund 13:00

Oh.

D Dylan Cave 13:00

Just build these like, little stepping stone station type of deal. Yeah ,yeah. We need to first you know, learn how students or-- students, sorry, astronauts [laughter]. I guess they once werre students once. But yeah, you know how to survive in this low gravity environment, you know, how to harvest resources, like minerals and like water-ice to, you know, sustain them long term and then take that information and relay it to Mars. And it's so-- I'm saying it kind of deadpan, but it's so it's so exciting to think about-- [crosstalk] Yeah. It's a lot bigger than than you think. Yeah. And so I think, you know, Canada wants to be involved in this endeavor. And in order to be involved, we need to have a-- we need to foster that expertise here. From a science point of view, we-- there's other reasons why we why we study the Moon. And I think the most simple way of explaining it is that, you know, when I was talking about the Earth, and how I was first learning about how the Earth formed, and evolved, and about how we have volcanoes on Earth, and plate tectonics. So what all these processes do is they constantly recycle the Earth's crust. And so we don't have rocks on the Earth's surface for geologists to study that span, the whole 4.5 billion years of Earth history. But the moon does, right, the moon doesn't have this plate tectonics cycle. And so the surface of the Moon tells us about near Earth space, from the time the moon was created to present day. And so from a scientific point of view, that's-- [crosstalk] Pretty huge.

E Erin Walton 14:33

More simply that's why we study the Moon, right? It was around when life was forming and evolving on the earth. And it records that period of time that we don't that we have a very incomplete picture of here. [music plays]

B Brittany Ekelund 14:38

[music ends] Little known fact - both Dylan and I are crazy about Vietnamese food, and luckily there's the Saigon taste right across the street from our studio. Vermicelli bowls and iced coffees have fueled many a podcast and they can fuel your next project too. If you're on campus or downtown, we highly recommend you swing by and show support for local kick-ass food. [music plays]

D Dylan Cave 15:11

[music ends] All right, welcome back, everyone. So Erin, let's talk a little bit about the Steen River Project. Can you tell us a little bit about this work?

E Erin Walton 15:20

Sure. Well, Steen River is one of the impact craters that we have in Alberta. It's in the northwestern part of the province, really close to the border that we share with the Northwest Territories. It's a buried crater, so you can't actually go like drive to Steen River and actually see the crater structure. It's actually buried beneath, you know, a couple 100 meters of other types of rock.

D Dylan Cave 15:45

Oh, no way.

E Erin Walton 15:46

Yes. And so we study it through core. So because there's a lot of oil and gas activity in Alberta, there is a lot of core that's taken. And core is a way of studying the structure of the rocks beneath our feet. And so all of the core that's collected for oil and gas exploration in the province has to be made available to people to look at. And so we have two of these core research facilities. There's one in Calgary, and then there's one here, the MCRF in Edmonton, and so core that was drilled from Steen River in the early 2000s, it was here in Edmonton. And they're sort of kilometers of rocks that show sort of a profile through this structure. And no one had really looked at them before they just kind of said, oh, there's not you know-- I think originally they drilled the crater because they thought it might be related to Kimberlite pipes. So kimberlites are a special type of rock that bring diamonds to the Earth's surface.

B Brittany Ekelund 16:52

Oh.

E Erin Walton 16:53

Erin Walton

And so--

Dylan Cave 16:54

Money! [laughter]

Erin Walton 16:54

[crosstalk] Yeah, money. [laughter] Yeah. And so when they didn't find diamonds, I think they didn't find the core very interesting. There is oil and gas activity in the structure, but it's it's around the rim. So just for for a sense of scale, the diameter of this crater from the rim to rim - if you can imagine like a raised rim and then a bowl, and then there's actually sort of like a hill in the middle - And so rim to rim, the diameter is about 25 kilometers.

Dylan Cave 17:20

[crosstalk] No way! That's huge!

Erin Walton 17:22

Yeah.

Dylan Cave 17:22

I cannot imagine something like that being created today like that, to me like that would take out our city. [laughter] [crosstalk] Yeah, it would be pretty devastating. [laughter]

Brittany Ekelund 17:30

How large would the-- would that be a meteorite or an asteroid?

Erin Walton 17:34

That would be an asteroid, yeah.

Brittany Ekelund 17:35

And like, how big would the asteroid be to make a crater that big?

Erin Walton

E Erin Walton 17:39

It would be on the order of a kilometer diameter.

B Brittany Ekelund 17:42

[crosstalk] Oh wow, okay.

E Erin Walton 17:43

Yeah, but it varies depending on like, what type of asteroid was it? Because there's-- different asteroids have different composition. So if it's just sort of a rocky asteroid, it could be larger. If it was something stronger, like an iron-nickel metal asteroid, then it could be smaller and do a lot more damage because that's more of a like a heavier, more coherent type of rock.

B Brittany Ekelund 18:02

[crosstalk] Okay.

E Erin Walton 18:02

[crosstalk] Yeah. A one kilometer asteroid.

B Brittany Ekelund 18:03

[crosstalk] 25 kilometer--

D Dylan Cave 18:05

[crosstalk] Crater.

B Brittany Ekelund 18:06

Buried impact crater.

E Erin Walton 18:09

Yes.

B Brittany Ekelund 18:10

Okay, cool.

Okay, cool.

E

Erin Walton 18:11

Yeah. [laughter]

B

Brittany Ekelund 18:11

So you guys are looking at the core.

E

Erin Walton 18:12

Yes.

B

Brittany Ekelund 18:13

And then what?

E

Erin Walton 18:15

Well, I found kind of a unique type of breccia in the core. So a breccia is a type of rock that's made when you kind of glue or bind together, angular fragments of other rock types. And so breccias are common in impact craters. Because you can imagine this asteroid coming down and, you know, kind of pulverizing the the target rocks, excavating the crater and a lot of the material. Some of the material gets ejected, some of it gets ejected into space. That's actually the mechanism by which meteoroids are delivered to Earth from from other planetary bodies, right. And so some of the material gets injected into space, other gets-- other material gets injected around the crater, but some of it slumps back in to fill that hole. And so I found this really thick unit, it was about 165-meters thick of breccia. And it was really green, it was actually quite beautiful, or striking in terms of the way it looked. And I just really wondered why, why is it so green? And so whenever we made thin sections, so we just took samples of that core, slice it really thin, and again, thin enough so that light can be transmitted through minerals when we study that interaction. What I found is a specific mineral called pyroxene, and another mineral called Garnet. And these are both very rich in calcium. And we're always kind of wondering where did all this calcium come from? Because in the types of rocks or the target rocks that that asteroid hit there was no Garnet. And there was no pyroxene. What there was, was a lot of limestone. So limestone is a rock that's made of almost entirely calcium carbonate. And so the hypothesis was that you had a lot of this, you know, chunks of this limestone broken up by the impact event. These chunks of rock were then incorporated into this breccia as fragments. But the breccia was very hot. And if you take calcium carbonate, and you heat it up and you bake it, you will release the carbonate part as co2 gas, which can then be lost to the atmosphere. And you will leave behind that calcium. And then that calcium went into making all of the pyroxene and Garnet that were giving the the rock this green color. And so this was really significant because it's a mechanism for sort of longer term co2 release from impact craters through this sort of baking - or we call it a sintering process.

B Brittany Ekelund 21:03

Okay, like I've heard of Garnet before, and I'm like, what-- That must have been beautiful. [laughter]

E Erin Walton 21:10

[inaudible crosstalk] They're they're very small. They're not gem quality garnets.

B Brittany Ekelund 21:13

[crosstalk] Okay. [laughter]

E Erin Walton 21:14

And there are different compositions. Garnet-- like iron-rich Garnet. And you know, this specific type of calcium-rich Garnet was called grossular. But they're a beautiful mineral.

B Brittany Ekelund 21:23

So the research that you just talked about, this was in 17?

E Erin Walton 21:27

20.

B Brittany Ekelund 21:27

[crosstalk] Yes, yes. Sorry. 2017. [crosstalk] 2017, Yeah. [laughter]

D Dylan Cave 21:30

[crosstalk] We can start saying that now. We're in the 20s. Yes, like the roaring 20s. [crosstalk] Yes. That's true.

B Brittany Ekelund 21:35

But something that's going on now is actually, a former student of yours, Haley Jurek is carrying on this work. So can you kind of talk about how your previous article on the Steen River Project and her current work, just kind of the story about it and how it interacts?

E

Erin Walton 21:58

Sure. Well, Haley took a course in mineralogy from me. And just like, you know, kind of I was discovered in my mineralogy class in my undergrad, I also discover that Haley had a real talent for describing minerals. And she had an enthusiasm for it. And she did particularly well in the lab components, which is sort of the applied part of the course, where you take the theory you learn in the lecture and you apply it to actually identifying and describing minerals. And so she did some work with me as an undergrad, I saw that she had real potential for research. Like you mentioned, I'm an adjunct professor at the University of Alberta and the University of New Brunswick. And so that means that I can supervise graduate students there. And so I asked Haley if she would like to move to New Brunswick to start a master's - they're looking at trying to test this hypothesis that I have published, that all of those calcium rich minerals formed by the sintering, or the baking of limestone in the breccia. And so she said yes and off she went. And so basically, her project is in a branch of geology called experimental petrology. So we try and create the conditions that rocks form under in a lab. And so Haley is taking the types of rocks that were in the target from Steen River, so limestone, but there's also quite a bit of granite that's buried quite, quite far below the surface. So she crushed up granite and crushed up limestone, she mix them together, put them into these little platinum crucibles, and bake them in a really hot furnace for-- Like, how hot? So we did three batches. So we did 600, 700, 800 degrees Celsius.

D

Dylan Cave 24:00

Wow.

E

Erin Walton 24:00

So pretty hot, actually. And we did sorry, we did another-- we did four temperature steps. We did 1000 degrees Celsius as well.

B

Brittany Ekelund 24:06

Oh my. [laughter]

E

Erin Walton 24:07

Yeah. And so they're-- they're experiments, we call them cook-and-look, so we weren't really sure what was going to happen. They sintered, so baked in that furnace, for six months, we took them out, she prepared them to look at them under a microscope - so embedded them in epoxy, polish them. And what we found is that some of the starting conditions-- so we took different amounts of powder. So some had more granite than limestone, some have more limestone than granite. And so we found a particular set of conditions, so starting materials and temperature, that we were able to make these calcium rich minerals. And one idea we had was, what happens if the size of the starting materials is smaller? And so this is where she started doing these experiments that are really kind of pushing the boundaries of experimental metrology. To our knowledge they're the first of their kind that have ever been performed where she's taking nanomaterials. So a nano-meter is just a description of a size that's really small. It's a billionth of a billionth of a meter. And so she's taking nano-material sized particles and baking those, and looking to see what happens with the reaction-- reaction rates in the furnace. And so, because these particles are so small, they have a really high surface area to volume ratio and that makes them very reactive. So we're looking at how does not only changing the composition of our starting material and the temperature, but changing the size of the starting material, how does that change the dynamics of how these rocks form?

B

Brittany Ekelund 25:52

I mean, that's really interesting. Um, I have a question about this process that she's using with the nano materials. [pause] Why is this a rel-- like, why is this a new process? Like, why hasn't it been done before?

E

Erin Walton 26:13

I don't know. [laughter]

B

Brittany Ekelund 26:14

Okay. [laughter]

E

Erin Walton 26:15

Because when we were looking through the literature, I was like, Whoa, I can't believe that people haven't done this before. But I think it's just the application of like nanomaterials are in a lot of different industries. But we don't work with them a lot in like the geological sciences, I guess.

B

Brittany Ekelund 26:32

I mean, that's got pretty huge implications.

E

Erin Walton 26:34

Mmhm.

B

Brittany Ekelund 26:34

I think, to be the first. Go team! [laughter] Yeah, we were really excited.

E

Erin Walton 26:39

She's going to be I mean, unfortunately, she's done most of her graduate studies during a pandemic. And so it hasn't been the same interactive experience that it is for most graduate students. But yeah, so she's done, you know, presented virtually at conferences, which we all know is not the same thing. But she's going to be going to her first in person conference this summer. It's a meeting of the meteoritical society. And it's going to be in Glasgow.

B

Brittany Ekelund 27:07

[crosstalk]Oh, that's very exciting.

E

Erin Walton 27:08

[crosstalk] Yeah. So we're really excited. She has a batch of experiments. The last batch for her thesis is coming out of the furnace in April, and then she's going to come back to Edmonton. And we're going to characterize those over the summer.

B

Brittany Ekelund 27:20

I have a quick question. When you say coming out of the furnace, how long are you heating these for?

E

Erin Walton 27:28

Right, six months.

B

Brittany Ekelund 27:29

[crosstalk] Oh six months? [crosstalk] They're six month experiments. [crosstalk] Oh, okay this isn't just like, Easy Bake Oven.

D

Dylan Cave 27:34

Literally, like in an oven for six months.

E

Erin Walton 27:36

It's literally in oven--

B

Brittany Ekelund 27:37

[crosstalk] At a thousand degrees.

Erin Walton 27:38

Yeah.

Dylan Cave 27:39

Does it turn into glass, like what is like, I know, like they heat up sand. Some, like that's how glass is made. But like, does the does it come out different?

Erin Walton 27:48

Yeah, so really, it depends like in the higher highest temperature range, like 1000 degrees Celsius, we will get glass because in order to make a glass you need melting to happen. So we knew that 1000 degrees Celsius was too hot, because we don't see melts in the beccias right. Okay. They're, they're rock that's been sort of baked. And then new minerals have formed in that, we've call it like a subsolidus process. So everything takes place in the solid state. And so yeah, the-- what we found is that the lower temperature conditions were producing that, the minerals.

Brittany Ekelund 28:21

[crosstalk] Okay. [crosstalk] Wow. [crosstalk] Good to know. Yeah, I was like, What do you mean, they come out of the oven?

Dylan Cave 28:25

[crosstalk] That's really awesome.

Erin Walton 28:27

We take them out and their little crucibles, and we unwrap them like a Christmas present. [laughter] It's very exciting.

Dylan Cave 28:32

That's, that's gonna be the new the new geo-toy of 2022 is an easy bake oven for for minerals for little little geologists. And you know, those stone things. Like we used to get like, there's these kits you can get of like different stone minerals that you like, Chip open. And they have like different things inside them. And I always liked those as a kid. [crosstalk] And the dinosaur ones were my favorite.

E

Erin Walton 28:55

[crosstalk] I mean, who doesn't like collecting sparkly minerals as a kid.

B

Brittany Ekelund 29:00

I have a rock collection as an adult that I add to every summer.

D

Dylan Cave 29:04

Oh, nice. [laughter] So what what's it like to see young geologists building off your work, and in experiments that are like the first of their kind, within the earth and science community. Must be pretty cool.

E

Erin Walton 29:18

It's really rewarding for sure. I mean, you know, because a lot of the time you'll meet students, but they kind of come and go during their undergrad and because we don't have a graduate program at McEwen, you don't see students for long term like they do their undergrad and you might work with them very closely doing a lot of undergraduate research, but then they'll move on to a career or if they go to graduate studies, they go to another university and so it's really rewarding to be able to you know, mentor these students for longer periods of time to really see the growth in their their knowledge over time. So it's it's one of the most rewarding parts of my job. Yeah. Before--I just, before I move on, I really should give a shout out to Dr. Cliff Shaw, who is Haley's co-supervisor. And so it's-- Cliff was actually on my supervisory committee for my PhD.

B

Brittany Ekelund 30:17

Oh, my goodness.

E

Erin Walton 30:18

And so yeah, so it's really cool. Now we're co-supervising Haley's project. So he is the one that built the lab at the University of New Brunswick that Haley now lives in, and he--

D

Dylan Cave 30:29

Wow.

E

Erin Walton 30:29

Erin Walton

He's helped design a lot of the experiments. And then because we've been doing this collaborative work, during a pandemic, I haven't been able to travel there to be as interactive with that aspect of the project as I would have liked. And so really, Hayley and I, what we're doing together is we're describing the samples, like we call it a run product. So that run product is what comes out of the furnace at the end of the six months.

B

Brittany Ekelund 30:58

That's really amazing. It's like three generations of geologists, and it really is a testament to, in real time, like how science works. And how you build off the work of others and the mentorship that goes into it. And that's really wonderful.

E

Erin Walton 31:12

Yeah, absolutely.

B

Brittany Ekelund 31:14

So, I mean, this kind of segues perfectly into the next project we wanted to talk about because it is again, another project with a student, Tatiana Mihailovich is another undergraduate student, and she's also doing some really interesting work. Can you tell us about that?

E

Erin Walton 31:32

Sure. Well, like Haley, I met Tatiana, you know, in an undergraduate-- in an undergraduate course at MacEwan, this one was a second year course that I teach called geology of the solar system. And I just I remember her coming up after a class and just saying, like, I want to be a planetary scientist, and like, Can I do it? Is there research at MacEwan? You know, are there careers in Canada? And the answer was, yes, yeah. There's myself and some of my colleagues who do, you know, planetary sciences studies. And so that that experience as an undergrad research really helps you to segue into to graduate studies in Tatiana's case. And so lots of people don't know, but we have a meteorite collection at MacEwan.

B

Brittany Ekelund 32:22

We do?

E

Erin Walton 32:23

We do. Yes, we have over 20 individual specimens. We have rocks that come from our moon, we have rocks that come from Mars, from the asteroid belt, and then also Vesta, which we'll talk about after.

B

Brittany Ekelund 32:35

Perfect.

E

Erin Walton 32:36

And so one of these rocks, which was purchased by Dr. Rob Hilts, who is also in the physical sciences department. It was unclassified. And so to classify a rock, you need to describe the minerals in them - their composition - and then you need to do a bit more detailed studies by looking at like the oxygen isotopes in the sample. And so for her undergrad project, Tatiana classified this lunar meteorite, and then we submitted it for review by a committee under the meteoritical society, and then it got accepted as an official lunar meteorites. And then it now has a name. And so that was her undergraduate project. What's the name? Right, I'm like, I should have fact checked before that because it's not a very inspiring name. [laughter] So it's NWA, which stands for northwest Africa because it was found in the Sahara Desert, and then it has a number that sort of an identifier for meteorites found in that year. So I believe it's 10414. But I would have to double check on that because there are literally like 1000s of northwest Africa meteorites. [crosstalk] Okay. We will follow up on that. [crosstalk] Yeah.

B

Brittany Ekelund 33:50

And we will put the actual name of the meteorite in the episode description.

E

Erin Walton 33:53

Excellent. So that so yeah, so she did this, you know, incredible undergraduate research here at MacEwan and started a master's project co-supervised between myself and Dr. Chris Herd, who was my postdoc supervisor at the University of Alberta. So Tatiana's project is also looking at lunar meteorites. So they're meteorites that come from the moon. And what she's studying is this term that you mentioned when you're introducing me, shock metamorphism. So to metamorphose like meta-morph is to change. And to shock metamorphose is to change a rock by increasing the temperature and pressure almost instantaneously. And that, that shock means that the rock behaves very differently than it would in a normal geological environment where we kind of change temperature and pressure over over long periods like deep time, you know, hundreds of thousands or millions of years.

D

Dylan Cave 34:53

We're talking about like the people who pretend to take like a lit piece of charcoal and dip it in peanut butter and it comes out as a diamond, right? Like, it's it's like the compression.

E

Erin Walton 35:04

Yes.

D

Dylan Cave 35:04

And like trying to synthesize like, people who are trying to synthesize making diamonds and stuff like that.

E

Erin Walton 35:10

Yeah, so shock-- Well, yeah, there are impact craters that have diamonds in them. Pop, the Popigai crater in Russia is the one really good example that I can think of where diamonds are actually mined from the crater. So in that process of shock metamorphism, you create very high temperature and pressure conditions. But they don't-- it doesn't last long, it only lasts for a fraction of a second. So that's the whole shock process. And so we have lots of different samples from the moon, we have samples that were returned by the Apollo astronauts, and also the Luna astronauts. And then we have meteorites that are delivered through this process of impact cratering, right? So we have asteroids or meteorites hitting the surface of the moon, creating a crater, but also kicking off rocks in that process. And so she is studying how rocks are shocked or changed in that process of impact ejection from the moon, and what the overarching goal is to try and pinpoint the location on the moon surface where the meteorites came from. So by studying shock, we can constrain things like pressure and temperature and time, which in turn will tell us about the size of the crater that was made. And then we have all of these satellites orbiting the moon that tell us about the composition of rocks on the surface. So we combine the information from satellites, so composition and crater size to try and say where they came from.

B

Brittany Ekelund 36:45

So [pause] she's basically, in very simple terms, trying to match the meteor to the crater, or the meteorite.

E

Erin Walton 36:56

Yeah.

B

Brittany Ekelund 36:57

Is this something that is like a common process, like of finding out where a meteorite might have come from?

E

Erin Walton 37:05

Well, it's common in my research, [laughter]. Because that's always sort of been the goal. So that's something I've also done in studying Martian meteorites. We're trying to find the location on the surface of Mars, where they came from by matching up the age of rock units, the composition of rock units, and then dynamics of the crater. So I had another co supervise student, Jarrett Hamilton, who worked with Dr. Herd and myself, but he was looking at meteorites from Mars, and Tatianna is doing the same type of work, but from the moon. And so her her project is funded by the CSA LEAP grant.

B Brittany Ekelund 37:43

Okay. I mean, that's got to be a lot more difficult for Mars, because I imagine there's less information maybe about, or I mean, have we been to Mars enough times to know--

E Erin Walton 37:54

[crosstalk] We've been to Mars a lot! Yeah. [laughter] And it's actually easier on Mars, because there's fewer craters, because Mars is a planet and, and so it's a lot more dynamic than the moon. Like we had, you know, we, we know that there were once glaciers on Mars, and rivers that float on the surface, and it has huge volcanoes. And so it also has an atmosphere. And so these processes act to erase impact craters and create new crust over time. And so there's, there's still a lot of impact craters on the moon, but a lot of them are concentrated on the the southern hemisphere of that planet, which is the older part of the planet. And most Martian meteorites are quite young, on the order of, you know, a few 100 million years, which I mean, it seems old, but in geological terms, that's quite young.

B Brittany Ekelund 38:44

Okay. So where is this project? Like, is it still underway? Like, has she matched any meteorites? Like, what's what's going on in the here and now?

E Erin Walton 38:56

Right. Well, like most projects, over the last two years, there have been significant delays, because of obviously, the pandemic - goes without saying. [laughter] Just in, you know, in getting samples, and so it took us a while to kind of amass a large inventory of lunar meteorites for her to study. And so right now, she's just wrapping up that descriptive part of her project where she's describing shock metamorphism, as the way that the minerals are deformed, and also you generate melt. And then from that melt, new minerals crystallize, and so she's characterizing those new minerals that crystallize, and so she's coming up with a series of parameters that constrain pressure, temperature time, and then we'll move into looking at what pressure temperature time tells us about the size of the crater, and then she'll look at the remote sensing data. So ideally, she'll be wrapping up this project in the fall.

B Brittany Ekelund 39:54

Okay, well, we'll definitely keep in touch and let us know how that goes. Definitely. I can't believe that the impact of the-- the impact of the impact. [laughter] But like it's really incredible to me, I had no idea that when a meteorite or an asteroid impacts a planet or moon, that it's so forceful that it actually shoots stuff back off into space, and that's how meteo roids or meteors are formed.

E

Erin Walton 40:29

[inaudible] That's how meteorites are delivered to Earth.

B

Brittany Ekelund 40:31

Yeah.

E

Erin Walton 40:32

Yeah.

B

Brittany Ekelund 40:32

So they're just like, a thing is hitting a planet out there. And then that's bouncing off here and then coming over here, and...

D

Dylan Cave 40:39

I was always so worried about like a big meteor like the, you know, the one kilometer, 25 kilometer meteors. Armageddon. Armageddon, like, even if they just like hit our planet enough that it just kind of like shifts us into like a different orbit. Like how awful that would be if we if we all of a sudden just got really hot or really cold. [laughter]

E

Erin Walton 40:58

Yeah, well, a lot of it is the damage that's done by like tsunamis and wildfire as these you know, shards of molten rock are sort of falling back through our atmosphere, and then shockwave and there's lots of devastation that can be done by these.

D

Dylan Cave 41:11

It's amazing that nothing that bad has happened.

B

Brittany Ekelund 41:14

[crosstalk] It's only 22 or 2022!

E

Erin Walton 41:16

[crosstalk] Don't say anything yet. It's already-- [laughter]

B

Brittany Ekelund 41:19

[crosstalk] We need another major historical event for next year. [laughter]

D

Dylan Cave 41:23

[crosstalk] Bad things happen in threes. And you know, we're going on world war three. So that's the third one. [crosstalk] Yeah, so-- [crosstalk] Anyways, we're not gonna talk about that

B

Brittany Ekelund 41:32

You mentioned that, what you're doing, and what Tatiana is doing, and the other student are-- what was his name again?

E

Erin Walton 41:41

Jarett Hamilton,

B

Brittany Ekelund 41:42

Jarrett Hamilton. Is common in your research. But I'm like, in the broader community-- How many people within the community are trying to match these asteroids or meteorites to their origin?

E

Erin Walton 42:00

Right. Well, there are there are a few other groups, but I would say it's a handful of researchers in the world.

B

Brittany Ekelund 42:06

[crosstalk] Okay.

E

Erin Walton 42:06

Yeah. So this whole process by which planetary bodies in our solar system exchange material, that's sort of the overarching theme in my in my research, and so I'm just looking at material that comes from different places in our solar system, like our moon, like Mars, and the asteroid that comes from different places in our solar system, like our moon, like Mars, and the asteroid belt.

B Brittany Ekelund 42:26

And the asteroid belt is where 4 Vesta is?

E Erin Walton 42:29

The asteroid belt is where 4 Vesta is.

B Brittany Ekelund 42:30

Okay, well, maybe we'll take a little break before we come back and talk about 4 Vesta and anything else. Okay, we are back. And we are headed to the asteroid belt, or field. [Erin fanfares] Yeah. So we can't go without talking about for Vesta. So can you explain to us in the listener, what is 4 Vesta? Where is 4 Vesta? Tell us all about it.

E Erin Walton 43:08

Alright, so we have small rocks orbiting the Sun called meteoroids, larger rocks are called asteroids. And the majority of asteroids are concentrated in what's called the main belt, and that's between Mars and Jupiter. And so Vesta is the second largest asteroid in the main belt, just behind series, which is actually a dwarf planet. Yes. Yeah, so Vesta is an asteroid, meaning that it's some it surface is kind of irregular, it's not large enough to have been rounded by its own gravity. It's about 525 kilometers diameter, and it is differentiated. So differentiation is a process that our Earth underwent, that, you know, our moon underwent that other planets in our solar system underwent. And so it basically just described that, when they're first forming, they're hot enough so that the rocks in them can separate according to their different physical and chemical properties. So you have iron-nickel metal, that segregates into the core, right? We all know that the Earth has a core, you know, an inner solid core and outer liquid core, and it's made of an iron nickel metal. We have an outer mantle, and then we have a thin layer at the surface called a crust. And so the process of forming those internal layers is called differentiation. And so Vesta, unlike a lot of other asteroids in the main belt, is differentiated. And so I am became involved in a project looking at meteorites from Vesta. And so these are called H-E-Ds which stands for howardite-eucrite-diogenite. And then each of those terms is just used to describe a different composition of rock. And so in our collection at MacEwan, we had a couple HED meteorites. And one of them I noticed had these thin black lines that were cutting across the stone. And so that immediately made me think of my work that I've done on lunar and Martian materials where you know, I mentioned that shock, the shock metamorphism can deform minerals.

B Brittany Ekelund 43:30

[crosstalk] Oh! Yeah.

E

Erin Walton 45:25

But it can also generate melt. And when that melt forms, it forms quickly, and it cools quickly. And so it's a lot of glass and small minerals. And that causes the melt to look black when you look at a chunk of the rock. And so I thought, oh, there's these black veins in this meteorite, and they look like shock melts. And then I started looking in the literature, and there wasn't a lot of work done on shock metamorphism in HED meteorites, and there's-- has been a lot of interest in the planetary science community about this specific asteroid, because a mission called the Dawn mission actually went to Vesta. And so it reached Vesta in 2011. It orbited around Vesta, and it collected information about the surface composition. And so by collecting information about the types of rock on the surface, we were able to match HED meteorites to that asteroid. And so we can say, these, we know we have these different lines of evidence. And so these meteorites are most likely derived from Vesta.

B

Brittany Ekelund 46:40

Okay, so is that like, like obsidian is black?

E

Erin Walton 46:45

Yeah.

D

Dylan Cave 46:45

I was gonna just say, obsidian I was like, Oh, black, black rock must be obsidian. [laughter]

B

Brittany Ekelund 46:52

Yeah. So is that, like, what makes it black? Is it the the chemical composition of the rock before it melts? Or is it just by virtue of the process and the shock?

E

Erin Walton 47:06

It's a combination of two things. So one is the glass, they're often quite glassy. And we know like, from looking at obsidian, that when you melt rock and created a glass, it can be black. But also the minerals in it are really, really small. And so they're on the order of, you know, nanometers scales, right? So we're talking very, very small. And if you have a whole bunch of tiny minerals all stacked against against each other, they block out light. And so that makes them look black. Okay, yeah. But whenever you kind of polish them and create this really thin, we call it a thin section, what you'll find is that those shock veins will often transmit light, it's just that they're thicker in the main rock.

D

Dylan Cave 47:50

So why hasn't 4 Vesta crashed into Earth yet?

E

Erin Walton 47:56

Yeah.

B

Brittany Ekelund 47:57

Um.

D

Dylan Cave 47:57

Probably really far away.

E

Erin Walton 47:58

Yeah. And it's in a stable orbit around the sun.

D

Dylan Cave 48:01

Yeah.

E

Erin Walton 48:02

Yeah, you need something to kind of jar it out of that orbit, right, like a collision event to, to bring it out of that stable orbit and kind of bring it in an orbit like this, where it's going to get swept-- where it can, could get swept up by the Earth.

D

Dylan Cave 48:16

I'm surprised like, I'm so surprised, all of our planet's just haven't at one point in time, just had a group party and just been like, you know what, this is our time. And--

B

Brittany Ekelund 48:24

Well, in the beginning, didn't they, like start as a party? Yeah, yeah. Like, apart?

E

Erin Walton 48:29

Yeah. There's a lot of evidence now to suggest that the outer gas giants like Jupiter and Saturn

Yeah. There's a lot of evidence now to suggest that the outer gas giants like Jupiter and Saturn were once much closer to the sun, but they-- their position has migrated through time. But that's, that's for the astrophysicists.

D Dylan Cave 48:49

Oh, yeah. 100%.

E Erin Walton 48:51

That's definitely outside of [inaudible]. [laughter]

D Dylan Cave 48:51

I know nothing about any of this stuff. So it's very interesting to learn about it.

E Erin Walton 48:55

[crosstalk] But it's fascinating.

B Brittany Ekelund 48:56

Yeah. So with 4 Vesta, um, how old are the meteorites and the pieces that you've studied that have come off? Or that have come off 4 Vesta? Because I'm just kind of curious as to, you know, in the asteroid belt, are we continuing to see, you know, pieces of it kind of chip off and float to Earth? Or is this-- are these remnants pieces of kind of older shifting times in space where things are a little bit more chaotic?

D Dylan Cave 48:56

Yeah.

E Erin Walton 49:33

Yeah, that's a good question. So, so one part to unpack all of those questions. So one part is looking at the age of Vestan rocks and they-- they are ancient. So on the order of, you know, around 4-billion years old. And so that tells us that this process of differentiation happened very quickly, because the ages that come from those rocks are kind of-- during the time that they formed as like the-- a lot of them are sort of basalt, like the type of rock you might find on like Hawaii, or they're kind of rocks that cool a little more slowly below the earth's surface. And so by getting the age of those, it tells us what the timing of those igneous processes on on Vesta. So it was quite ancient. Then there's another branch of-- so we call the dating of rocks geochronology. And so there's another branch, it's looking at trying to date the timing of these impact events that excavated huge basins on Vesta, and then also sent-- there's a class of asteroids that are related to Vesta. They're called Vestoids. Oh! And they're in orbit also in the asteroid belt. Like with Vesta, we think during the formation of these huge impact basins, like one of them is like is-- takes up almost the entire hemisphere of the asteroid that it excavated, you know, huge portions of the mantle and crust. And now we have these family of asteroids that were kind of liberated from Vesta that are now related, related to it.

B

Brittany Ekelund 51:14

Like little baby asteroids. [crosstalk] Like little babies. Yeah, but-- [laughter]

D

Dylan Cave 51:19

Probably still quite large. [laughter]

E

Erin Walton 51:20

Yeah. But it is quite difficult to-- like geochronology is very complex, and it is quite difficult to unravel all the different ages that we get from different minerals. Like there's different chronometers or ways of, of dating different minerals. And so I don't think we have a really good handle on when the impact events that created the shock metamorphism that changed the rocks actually happened. And that's where I'm hoping my research leads me to.

B

Brittany Ekelund 51:52

Okay, well, that's very exciting. So, before we move on, is there anything important that we should know about for Vesta, and its little Vestoids and the belt?

E

Erin Walton 52:09

Well, I guess it's important that it's my favourite asteroid. [laughter]

B

Brittany Ekelund 52:12

Okay. That's important! And I mean, theoretically, you are building potentially into a new body of research.

E

Erin Walton 52:19

Yes, yes. Yeah. Trying to figure out what the timing of these impact events and actually, I'm presenting this data for the first time next week. But it's, it's virtually again. It is a hybrid conference, but I decided not to go. But it's at the 53rd Lunar and Planetary Science

Conference, which is in Houston. And so I'll be presenting this data that I've I've collected over the past few years, on this one specific diogenite in our collection, which is another northwest Africa, but I know the number this one, it's northwest Africa 1026868.

B Brittany Ekelund 52:58

I mean, I think it's really incredible. You're presenting this for the first time coming up here right away. And it sounds like it was something where you were just looking at it and being like, hmm-- These are cool. These are cool, what's that little line? And you know how it can blossom into, now, a future avenue for interesting research on your favorite asteroid. Yeah. Congratulations on that! [laughter] Moving on. This podcast is part of the series we're doing for MacEwan's months of scholarship. So we want to talk to you a little bit about your experience as a previous Board of Governors chair. So can you tell us a little bit about the experience and how the appointment helped you grow your research program?

E Erin Walton 53:45

Yeah, so the Board of Governors research chair sits in that position for two years. And so I really viewed it as sort of two years where I had time, or the luxury to explore these, you know, areas of research that just kind of pop up through these experiences. Like, hey, look, that rock is green - I wonder what it's made of. Or, Hey, look, this meteorite has shock veins or things that look like shock veins in it, maybe I'll study that. And so I had the time to kind of explore all these avenues of research and also to put together grants, which is, you know, it's a really time consuming process. Like I forget the page count on our CSA LEAP grant, but it was, you know, I would say upwards of 50 pages, you know, putting these proposals together, and so you just have time to conduct research, to think about research, to put together proposals to get funding that will then, you know, give you the opportunities to support students to carry out you know, these types of research projects and so, yeah, it was a very--

D Dylan Cave 54:16

That sounds really important to for the university, you know, they're they're investing, you know that time to get back, you know, that that research from you know, they're, they're putting in the time to allow you to make our university shine and like create projects that are really, I think would really benefit our research and scholarly activity.

E Erin Walton 55:18

Yeah, absolutely. I mean, that--the undergrad students that I had, when I, you know, first tenured the Board of Governors chair, have continued on to do graduate studies with me. And so, yeah, so I think that really speaks to the the success of the program and how important it is not only for myself and growing my program, but to students at MacEwan by, you know, enable me to foster undergraduate research that can--

D Dylan Cave 55:42

Dylan Cave 55:42

Giving you the time to do that for sure.

B

Brittany Ekelund 55:44

And to those like future generations - like maybe, you know, your students like Tatiana Haley, like, you may be supervising them supervising other students someday-- [laughter]

E

Erin Walton 55:55

{crosstalk] Yes, exactly. Maybe we'll be co-supervising students. And I just have another MacEwan grad, graduate, Radhika Sanghani - I'm probably pronouncing your last name incorrectly. But she just started a master's with Dr. Herd and I at the UofA too. And so I kind of have this history of sort of cultivating undergraduate research here. And then, you know, having those students progress into more sophisticated research projects--

B

Brittany Ekelund 56:22

They're your Vestoids.

E

Erin Walton 56:24

They're my Vestoids. [laughter]

D

Dylan Cave 56:26

You know, it really amazes me on the amount of research that's being done at this university on such a large scale. You know, I had no idea people in our institution, were studying space and things like that, like. That's pretty huge working with, with our Canada NASA. [laughter]

E

Erin Walton 56:43

[crosstalk] Yeah.

B

Brittany Ekelund 56:44

[crosstalk] Yeah.

D

Dylan Cave 56:44

Our Canada NASA. [laughter] Our Canada NASA. That's what--- they should just changed her name.

E

Erin Walton 56:48

But I think, you know, research is it's applied learning, you know, and so it's where you're able to take what you learned in the courses and apply that to a project. And, you know, not only do you get to be involved in, you know, the design of a project, but you get experience in, you know, science dissemination and communicating science, and also in, you know, these writing skills, and these translate into, you know, having a well rounded CV for, you know, your next step when you leave MacEwan, as you know, in your chosen career or to graduate studies. And so, yeah, I think this whole culture of undergraduate research is is unique to make us something that makes us stand out

B

Brittany Ekelund 56:48

Can-NASA.

D

Dylan Cave 57:34

100%. Like I, I'm a student researcher, as well, and like, nobody in my program, I come from the music department, and it's very, very rare we see students in a undergraduate setting, especially in a music program, wanting to pursue research instead of just focusing on their craft and, and becoming, you know, better at what they do. Kind of segwaying-- moving, moving on, like, I'm just going to ask before we before we kind of wrap this, this podcast up, it's been really great having you, but I want to hear if you have anything coming up any plan-- anything planned beyond your 4 VESTA project.

E

Erin Walton 58:17

Right, so the next the next phases in that one specific project--

D

Dylan Cave 58:22

Or after like, and yeah, after that, too,

E

Erin Walton 58:25

Right. So I think I'm just continuing to, you know-- meteorites are my jam. That's like, that's the bread-and-butter of my research program. But I also am really interested now and terrestrial impact structures through looking at Steen River. And so I would like to look at other impact craters, uh, one of the grants I have - the Discovery Grant through the [inaudible] program - I proposed to try and look for other buried impact craters in Alberta. And so, like I was talking about before, we have oil and gas activity here, which means that lots of drilling happens. And the products of that drilling are made available publicly through these two core facilities in Calgary and Edmonton. And so, what I would like to do is to look at combined-- so geophysics looks at sending seismic waves like pressure waves below the earth and looking at how they bounce off rock layers to build kind of a three dimensional structure below the earth. And so, these can act to identify other buried impact craters, by their morphology by their shape. And so, the shape is not enough to say that that crater formed by collision of a an asteroid or meteoroid, you need to have identify shock metamorphic effects in the rock so it would combine searching for these unknown buried craters in Alberta, looking at little chips of rock or core that's brought up to the surface and looking for shock metamorphic effects. So just to try and build the inventory of known craters in this province. And then like, with anything who knows where that research leads me? Yeah, do we find another crater? Maybe there's core from it. And maybe I'll look at that, or maybe I start looking at impact craters in you know, in different locations. And so--

D

Dylan Cave 1:00:25

That's so interesting. My friend and bandmate works as a geologist for oil and gas. And so it's really cool that there's probably like a ton of data because of how much we've invested in our oil and gas industry in Alberta. How much data we have gotten from those geologists studying the the doing doing those, what did you call them, the the pulses into the ground, seismic waves, seismic waves into the ground. So maybe that is good that we have all that extra information from that. [crosstalk] Yeah, absolutely-- [crosstalk] To help me with your studies.

B

Brittany Ekelund 1:00:59

[crosstalk] Got it? Might as well use it. [crosstalk] Might as well use it, yeah.

D

Dylan Cave 1:01:02

Even if it wasn't intended to be used that way. [laughter] Save some money.

E

Erin Walton 1:01:06

Well, a lot of impact craters are important economically. Like I mentioned Popigai is mined for diamonds. The Sudbury impact structure in Ontario is mined for you know, its nickel deposits. We have Steen River, is an oil and gas producer in the rim of the structure. And so there is also an economic incentive to find other craters because they can be traps for mineralization or oil and gas migration.

D

Dylan Cave 1:01:37

[So hopefully more meteors hit the Earth and we get more diamonds-- [laughter]

B

Brittany Ekelund 1:01:41

[crosstalk] Or more funding goes into identifying these buried craters for science.

E

Erin Walton 1:01:47

[crosstalk] Yeah. Yeah.

D

Dylan Cave 1:01:48

Literal-- you are literally hunting for treasure.

E

Erin Walton 1:01:51

[crosstalk] I am, yeah. [crosstalk] Yeah.

B

Brittany Ekelund 1:01:53

So, we are at the end of our time. Um, but the very last thing is, I do like to ask, Do you have any recommendations for other researchers in your fields - sspecially those kind of student researchers and anyone who's interested in studying geology and meteoritics? Like what, what are your words of wisdom for the for the Vestoids out there looking to kind of, you know, breakout on the scene?

E

Erin Walton 1:02:26

Yeah, um, well, I think just, um, knowledge that there are careers in almost anything you can think of out there. And for me, that was-- my lack of knowledge of the diversity of careers, you know, specifically, I think to women in science was-- inhibited me. Like I, you know, I didn't know. I was kind of lost in my undergrad. I didn't know what to take or what to do. And then I, you know, I happen to find geology. And so I think just arming yourself with the knowledge that there's such a diversity of careers out there, and really encouraging students to to speak to faculty at MacEwan, because we do have so much specifically undergraduate-concentrated research, there's so many opportunities at MacEwan for students to to learn more about, you know, a specific area in their degree program. And, you know, like, with scientific discovery, you never know where it's going to going to leave you, lead you. [laughter]

B

Brittany Ekelund 1:03:29

Lead you and leave you.

E

Erin Walton 1:03:30

Lead you and... [laughter]

D

Dylan Cave 1:03:34

That's amazing.

B

Brittany Ekelund 1:03:35

Yeah. Well, thank you so much, again, for joining us. It has been a pleasure.

E

Erin Walton 1:03:39

You're welcome. Pleasure to be here.

D

Dylan Cave 1:03:42

Thank you so much. All right. Well, that's all we have for today's episode of Research Recast(ed). If you want to keep on digging into today's episode, please follow up with the links in the episode description to learn more.

B

Brittany Ekelund 1:03:54

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D

Dylan Cave 1:04:12

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B

Brittany Ekelund 1:04:23

Research Recast(ed) is hosted and produced by Dylan cave and Brittany Ekelund. Music, sound design and editing are by DylanCave, with research, copyediting and scripting by Brittany Ekelund.