

[MUSIC PLAYING] Brains On.

MOLLY BLOOM: You're listening to Brains On, where we're serious about being curious. And sometimes, we get curious about little offhanded remarks we hear from scientists. Like recently, when our co-host, Destiny Rodriguez, asked NASA volcano expert Carolyn Parcheta this simple question.

DESTINY RODRIGUEZ: Where is the biggest volcano? Mauna Loa is our planet's biggest volcano. It's not the biggest in the solar system, but Mauna Loa is the biggest on Earth.

MOLLY BLOOM: Not the biggest in the solar system? It turns out there are much bigger volcanoes out there. Earth doesn't even have the most volcanoes in the solar system. So today, we're going to explore this further. Get ready for [CLEARSTHROAT] volcanoes in space. Stay tuned.

[MUSIC PLAYING]

This is Brains On from Minnesota Public Radio and Southern California Public Radio. I'm Molly Bloom. With me to talk about volcanoes on other planets and moons is our pal, Sanden Totten.

SANDEN TOTTEN: Hey, Molly. Maybe we should call them spacecanoes?

MOLLY BLOOM: Or lunar lava flows? Either way, there are a lot of them. So let's start with Destiny's original question.

DESTINY RODRIGUEZ: Where is the biggest volcano?

SANDEN TOTTEN: That would be on Mars. The biggest one we know of is called Olympus Mons. And it is ginormous, almost three times the height of Mount Everest, which is Earth's tallest mountain. And keep in mind, Molly, Mars is only about half the size of Earth. Here's how Carolyn Parcheta explained Olympus Mons to Destiny.

CAROLYN PARCHETA: You can google a picture of this if you don't believe me, but the base where it touches the ground, the circular footprint of the volcano, is as big as the state of Arizona. And it reaches several miles high into the air.

DESTINY RODRIGUEZ: That's huge.

MOLLY BLOOM: The size of Arizona? How did it get so big?

SANDEN TOTTEN: Lots and lots of eruptions over many, many, many, many years. But Mars actually has an unfair advantage when it comes to growing really big volcanoes.

MOLLY BLOOM: What's that?

SANDEN TOTTEN: Well, this is going to take some explaining. But, you know how in the volcano episode, we talked about how Earth is made up of all these different layers?

MOLLY BLOOM: Yep, I remember. If you haven't heard that episode, you might want to go back and check it out.

SANDEN Right. Now, the top layer of the Earth sits on something called a tectonic plate. These aren't like dinner plates,
TOTTEN: they're actually massive plates of rock, the size of entire continents. So these huge plates, they're are actually moving all the time, just really, really, really slowly, about the same speed your toenails grow.

MOLLY BLOOM: That is slow.

SANDEN Yeah. So, we don't notice them moving most of the time. OK, so on to volcanoes. Volcanoes form when magma,
TOTTEN: hot magmas bubbling up from deep inside the Earth, it'll build pressure and crack a hole in one of these plates.

[RUMBLING SOUND]

And the hotspot will then start pumping out lava onto the surface. Then, more lava comes out. It'll pile on and on, up and up, until it forms a giant mountain.

[MUSIC PLAYING]

MOLLY BLOOM: That's how volcanoes grow.

SANDEN Exactly. But, remember how I told you these giant tectonic plates are always moving?
TOTTEN:

MOLLY BLOOM: Yes. So how does that affect it?

SANDEN So, the hole that was cracked open where the volcano formed, over time, as the plate slides, that hole will just
TOTTEN: move away from the hotspot where the magma is bubbling. When that happens, the magma is covered up again. Now eventually, the pressure will build again. It'll crack a new hole in the ground. The lava piles back up. And a new volcano is built. But then, that hole moves away too. A new crack forms, more lava builds up, another big mountain. And the cycle repeats over and over again. A new crack forms.

MOLLY BLOOM: More lava builds up.

SANDEN Another big mountain. A new crack forms.
TOTTEN:

MOLLY BLOOM: More lava builds up.

SANDEN Another big mountain. A new crack forms.
TOTTEN:

MOLLY BLOOM: More lava builds up.

SANDEN Another big mountain. A new crack forms.
TOTTEN:

MOLLY BLOOM: More lava builds up.

SANDEN Another big mountain. OK, wait. Sorry, I'm getting carried away. Where were we?
TOTTEN:

MOLLY BLOOM: A new crack forms, more lava builds up, another big mountain.

SANDEN Right, right. OK, so that's why on Earth, volcanoes can only get so big before they lose their steam.

TOTTEN:

MOLLY BLOOM: Very cool, but what does this have to do with volcanoes on Mars?

SANDEN OK, well on Mars, the surface of the planet doesn't slide around like it does on Earth. So that one magma hot spot

TOTTEN: can keep growing and growing its volcano until it gets bigger and bigger and bigger. And that's why Mars can make such mighty volcanoes like Olympus Mons.

MOLLY BLOOM: I wonder what it would be like to see something that big erupt.

SANDEN Well, to find out, you'd need a spaceship to get to Mars and probably a time machine, since the last time

TOTTEN: Olympus Mons had a major eruption was probably 20 million years ago. But I spoke with Bruce Betts, who studies space for the planetary society. And he told me, when Olympus Mons would majorly erupt, most of Mars would notice.

BRUCE BETTS: Large, large scale eruptions, like out of the center, would have definitely sent out Mars quakes and affected things all over the place. But you also would have had thousands of smaller eruptions over time that wouldn't have been nearly as noticeable if you weren't nearby.

SANDEN Another cool thing Bruce Betts told me, volcanoes are everywhere in our solar system, on planets like Mercury
TOTTEN: and Venus. Even our own moon once had volcanoes. In fact, the most volcanically active spot we know of is one of Jupiter's moons named Io.

MOLLY BLOOM: Io, spelled just like it sounds, the letter I and the letter O.

SANDEN Yeah. Io has so many volcanoes erupting all the time, its surface kind of looks like melty, gooey cheese. Bruce
TOTTEN: Betts called it a space pizza.

BRUCE BETTS: The volcanoes look vaguely like pepperoni. And it has a range of types of volcanoes too. It's got silicate volcanoes that are like volcanoes on Earth. But it also has sulfur volcanoes that spew out sulfur and stuff that's called sulfur dioxide. And there's very little atmosphere, so the material goes flying up tens of kilometers into space, and then falls back down.

MOLLY BLOOM: Wow. That is not a place I would like to visit, sounds very hot and very noisy. But it's cool that volcanoes really are all over the place.

SANDEN Yeah, probably all across the universe. Anywhere there's a solid planet, near or super far away, there could be a
TOTTEN: volcano.

MOLLY BLOOM: Why do you think that is? Why are volcanoes so common?

SANDEN I asked Bruce Betts the same thing. And he told me volcanoes are just nature's way of releasing heat stored up
TOTTEN: inside planets and moons.

BRUCE BETTS: Just like if you heat up a pot of water, then you start getting bubbles, and you start getting the hot waters moving up. Well, when the interior of a planet is hot, either from its original formation or the radioactive materials making heat, that heat has to go somewhere. And the hot stuff likes to go up. Just like hot air rises, hot rock rises. And it keeps going until it hits the surface where it can come out and cool off.

MOLLY BLOOM: Very interesting. Thanks, Sanden, for sharing all of this.

SANDEN Any time, Molly.

TOTTEN:

[MUSIC PLAYING]

MOLLY BLOOM: Right now, we're working to find an answer to this question from one of our youngest listeners.

GIRL: Hi, my name is Casey. And I'm 4 3/4. My question is, how does the car GPS know where the car is going?

MOLLY BLOOM: Thanks, Casey. That is an excellent question. We will have an answer for you very soon.

[JINGLE] Ba ba ba ba ba ba ba ba ba ba Brains On.

One of the coolest parts about making brains on is hearing from you. We love it when you send in questions like Casey, or draw us pictures, or record your own mystery sound. And as a way to say thank you, we started the Brains honor roll. I present to you the next crop of Brains honor rollees. They are.

[LISTING HONOR ROLL]

I'm Molly Bloom, and thanks for-- wait, what did you say? I forgot who now? Oh, that's right, the mystery sound. We can't end this episode without putting your brain to work. Let's go.

[MUSIC PLAYING] Mystery sound.

Here it is.

[POPPING SOUNDS]

That sound is making me strangely hungry. Let's get 10-year-old Max to tell us the answer. He is the one who sent it to us after all.

BOY: That was the sound of popcorn popping. We popped it in the microwave.

MOLLY BLOOM: Thanks, Max. That mystery sound goes great with some butter and salt.

[MUSIC PLAYING]

Can you think of another sound that might come from a kitchen, the basement, the park, maybe right out your front door? Mystery sounds are everywhere. If you think you have a good one, email it to us, [brainson@m-- as in Minnesota-- pr.org](mailto:brainson@m--as.in.mn.pr.org). And you can always send questions, drawings, and high fives to that address too. If you're looking for more episodes of Brains On, head to our website brainson.org, or you can subscribe in your favorite podcast app. That's all for this episode. We'll be back soon with more answers to your questions. Thanks for listening.

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