Pluto mapper predicted dwarf planet's weird geology

Astronomer Marc Buie has studied the dwarf planet for decades.

Alexandra Witze

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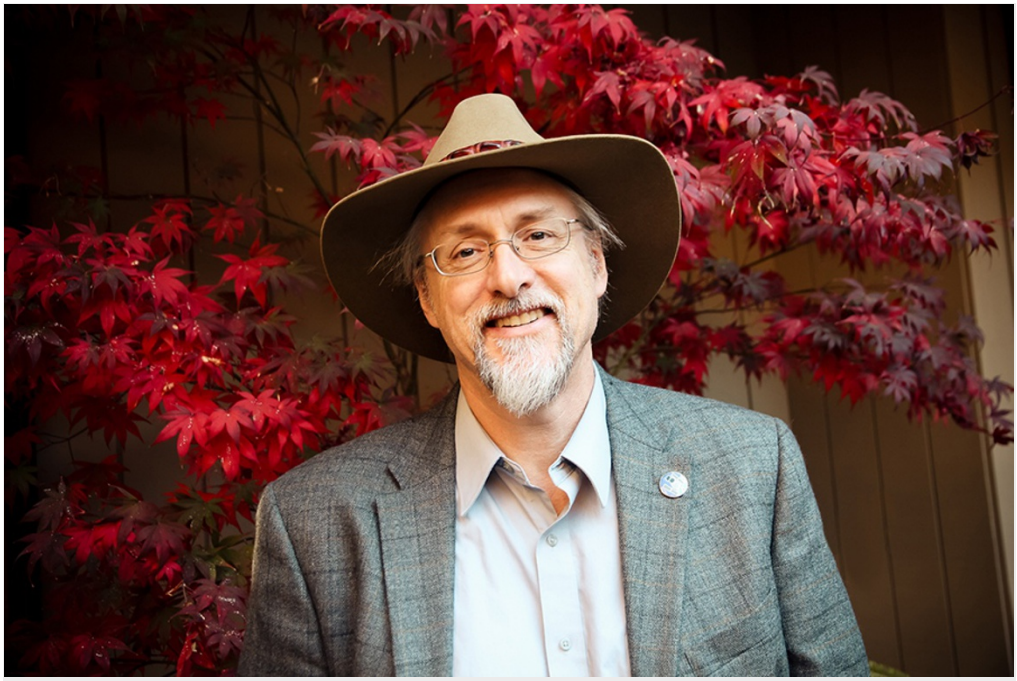

The Sentinel Mission

Marc Buie's maps of Pluto anticipated features revealed by the New Horizons mission.

Marc Buie may have spent more time looking at Pluto than any other human being. The planetary astronomer at the Southwest Research Institute in Boulder, Colorado, has spent more than a quarter of a century using telescopes on the ground and in orbit, such as the Hubble Space Telescope, to probe Pluto's secrets. Now he is one of the investigators on NASA's New Horizons mission, which flew past the dwarf planet on 14 July.

Buie spoke with *Nature* from mission control, at the Johns Hopkins University Applied Physics Laboratory in Laurel, Maryland. This interview has been edited and condensed for clarity.

***Nature* special:** Pluto and Ceres

Years ago you used Hubble to make maps of Pluto's surface that hint at some of the features in the images coming back from New Horizons. Why do they look so prescient now?
Nitrogen, methane, carbon monoxide ices — the sunlight vaporizes any of the stuff that's on Pluto and carries it to a colder part of the planet. It's been doing this since the north pole came into view in the late 1980s. The Hubble data showed there was a colour range on the surface of Pluto that was global in nature.

I've been working on these data sets since the 1980s. I've been building up these records and I knew, when I got the New Horizons data, that I could go back and reinterpret them to tell me what's happened over time. It's not instant science by any means. It's years' worth of hard work. But I'm used to that.

What do the new pictures tell you?
It's still too early to tell about a lot of this stuff. When it comes to geology, we absolutely have to know the topographic signatures: what's low, what's high, what are ridges, what are troughs. That will require the stereo data.

In the pictures, dark is old and white is new — seeing craters in the dark region is telling us that it's old. How old, I don't know.

The images in false colour are my favourite thing I've seen so far. You see how complex those geological units are. Every one of those

has a different story to tell. We're all just speculating as fast as we can talk, and throwing away ideas almost as fast.

Why do you think you know Pluto so well?
I think I have collected more photons from Pluto than any living soul. Seventy per cent of my career has been spent studying Pluto in one way or another.

It's always been a world in my mind. But when you get pictures like this, and everybody gets to see what's in my head, it's kind of fun.

What is it like to finally see Pluto in such detail?
It's still all kind of a blur. It's very distracting, because I just think about the images and I get new ideas. I think about how I want to make new connections to this data set or that data set. It's probably going to keep me busy the rest of my career, explaining the stuff we're getting down today.

Sometimes words just fail. I've been wandering around, and every once in a while I just zone out and I'm on Pluto, thinking about all the stuff I've seen and how to put everything together. It's going to be a real delight to work on that in the coming years.

After years of being one of just a few Pluto researchers, do you feel like you finally have company?
When I started working on this, Pluto was something one person could do. Nowadays it's much bigger. It takes the community as a whole to encompass all the ideas and strengths and knowledge to put together this bigger picture.

It's grown beyond my singular capabilities, but that's a good thing. I would like nothing better than to have a huge group of students and postdocs and collaborators to work on these problems.

It's going to happen. I'm looking forward to it.

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