

MOONS OF JUPITER



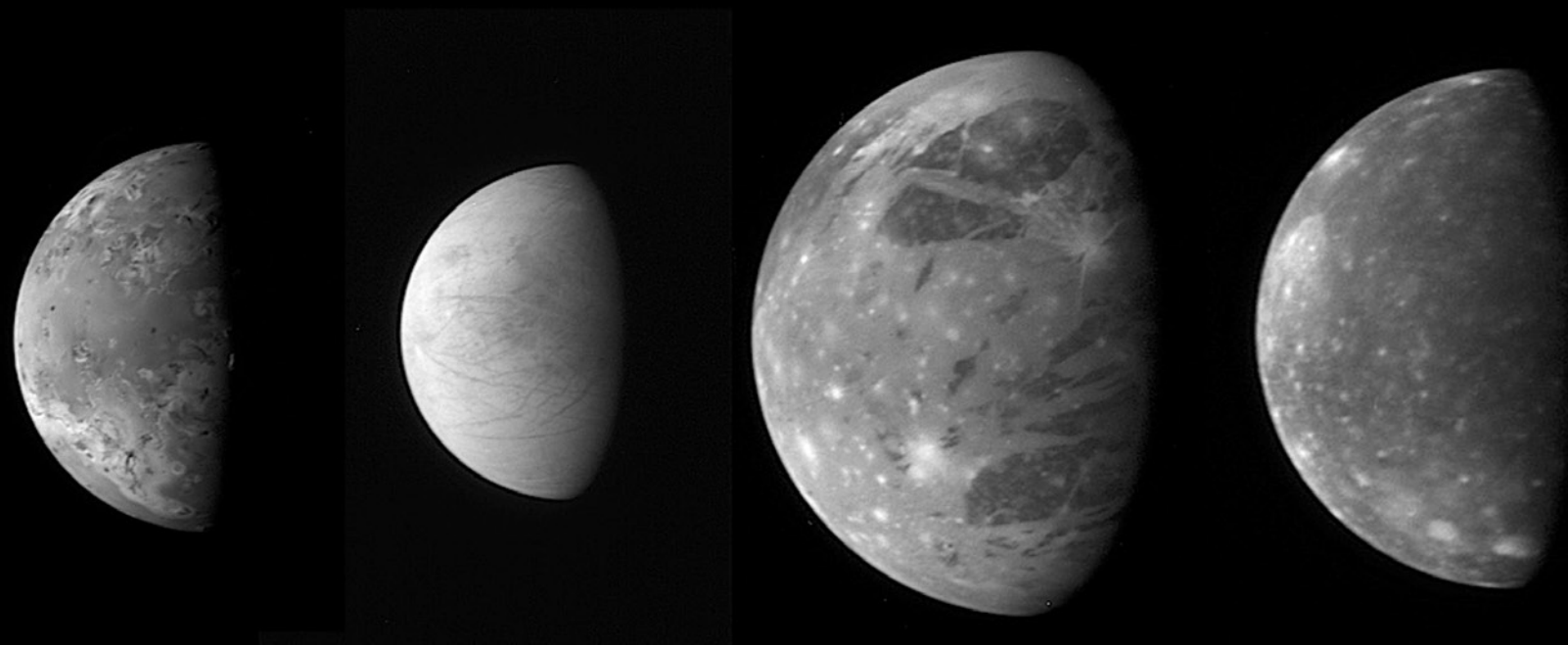
CARL SCHMIDT '00 STUDIES PLANETARY ATMOSPHERES

STORY BY
DARRY MADDEN

When Carl Schmidt '00 was a graduate student, he found himself somewhere in the vast desert of West Texas, where the sky is as big as the night is dark, pointing tiny telescopes at Mercury and at the moon.

He asked—he says “naively” but perhaps better described as with a “beginner’s mind”—why he couldn’t use the moon telescope on Mercury. So he tried it and, serendipitously, it was just the right time in the planet’s orbit to make a discovery—Mercury had a long, comet-like tail that was approximately a thousand times the size of the planet (previous estimates had the extended atmosphere at 10 to 20 times the size of the planet itself).

Now a research assistant professor at Boston University’s Center for Space Physics working primarily on NASA-funded research grants, he ended up completing his PhD thesis on this discovery.



It’s apropos that the Mercury discovery was made in the breathtaking quiet. Schmidt credits Putney, and Vermont, with showing him the power of that simple and, now, rarefied silence.

“The more quiet you can make your environment, the more in touch you are with your own ideas, and the more in touch you are with nature. That’s a good foundation for astronomy,” he said. “My time at Putney solidified that realization for me.”

His work focuses on the (silent) tenuous planetary atmospheres—or exospheres—of Mercury, Earth’s moon, Jupiter’s moons Io and Europa, and of comets. He works exclusively with telescopes, collecting his own data, as opposed to using the data gathered on missions by NASA and its equivalents (which is how about 80-90% of this type of research is conducted). He says he is, scientifically, standing on the shoulders of giants, chipping away at relatively small pieces of the enormous puzzle that is the solar system.

Mercury’s tail is made of sodium atoms. Schmidt, now clear that he could use his telescopes to study sodium, asked where else it could be found in the solar system. This led him to Io and Europa, two of the moons orbiting Jupiter, one of which—Io—is covered with hundreds of active volcanoes that are changing the atmosphere nearly constantly. Schmidt loves to watch it evolve and change—it’s losing its atmosphere at about a ton per second, and what is lost is trapped in Jupiter’s magnetic field, creating a “big wobbly donut” around Jupiter called the plasma torus.

What are the implications of this type of research? One example has to do with the sodium. The moon Europa is believed to have an ocean under ten kilometers of solid ice—it is two to three times the volume of earth’s oceans, but saltwater, like ours. And what exists in these conditions? Life.

Another example has to do with atmospheric change and the long-term climate on earth. The planet Venus is considered to have a “runaway greenhouse effect”—in terms of the total amount of sunlight it gets, it should not be nearly as hot as it is. Some point to it as an example of what could happen to earth in time (Schmidt says the direct connections with earth’s climate are “speculative”).

Back on earth, Schmidt loves the immense perspective his work provides.

“It’s nice to have something that’s just so abstract that it stretches what you can conceive of as routine in your life,” he said. “Where I go from thinking about these really abstract things back to just hanging out with my daughter, playing Connect Four. Having that broad perspective helps you keep an open mind—it’s impactful.”

Schmidt was not a model student at Putney. But, like Europa, he did have, somewhere beneath ten kilometers of adolescent troubles, an interest in astronomy. He credits Glenn Littledale '76 with being a tremendously inspiring teacher who did not judge kids prematurely. He was also a fun teacher. Schmidt recalls Littledale timing him riding his skateboard down Intimidation Hill as part of an experiment, and breaking his watch as he threw it across the room to demonstrate general relativity.

Putney offered him Glenn, and, in general, an ethos (perhaps best articulated by Yoda) of there being no “try”—“Do...or do not. There is no try,” said the legendary Jedi master.

“It was the idea that I didn’t need to know or be taught how to do something—I could try my hand at it and learn it experientially,” said Schmidt.

Schmidt doesn’t think that all students are necessarily capable of this kind of self-discipline, self-discovery, and self-determination. However, neither can those that are capable discover it in a vacuum.

“You can create an environment that allows them the freedom to discover it in themselves,” he said. “And Putney was pretty good at that.” ■

