

Apollo Chronicles: Jack Skis the Moon

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Apollo 15 astronaut Dave Scott ascends the cushiony base of Mt. Hadley Delta.
Photo credit: Jim Irwin

Now *this* is a ski report: Clear skies, no wind, sweet slopes and deep powder--not expected to melt for at least five billion years. Grab your poles and pack your bags. Just don't forget your spacesuit, because you're going to the moon.

The moon's dust-covered mountains reminded more than one Apollo astronaut of a winter wonderland: "My snowsuit's ready," joked Apollo 14 pilot Ed Mitchell after donning his spacesuit for a walk around Fra Mauro. Commander Al Shepard agreed, "You're ready to go out and play in the snow."

"Oh, boy, it's beautiful out here! Reminds me of Sun Valley (a ski resort in Idaho)," radioed Apollo 15's Jim Irwin from his landing site near the sinuous Hadley Rille. Underfoot, the soil was cushiony like "soft powder snow." Towering 11,000+ feet above him, Mount Hadley Delta strangely

resembled "Dollar Mountain at Sun Valley, a practice hill with great skiing conditions."

(After the mission, Irwin lamented "If I'd realized that Sun Valley was going to invite me up as their guest, I would have mentioned all the other great ski areas in the world!")

"Man this is a fun ride!" exclaimed Charlie Duke, test-driving the Apollo 16 moon buggy around the Descartes Highlands. "Occasionally, the back end breaks loose," he reported, "but there's no problem." In the passenger seat, commander John Young chipped in, "It's just like driving on snow, Houston. By golly!"

Strange but true: A quarter million miles from Earth on a world where the midday sun heats the ground hotter than boiling water, Apollo astronauts couldn't stop talking about snow.

No one had the bug worse than Apollo 17 geologist Harrison "Jack" Schmitt.

"Too bad I don't have my skis!" he radioed Houston from a geology-stop in the mountain-lined Taurus-Littrow Valley.

"Jack, did you get a pan up here?" Commander Gene Cernan reminds Schmitt to photograph the site.

Schmitt: "No, I forgot. I got interested in skiing."

Cernan: "I'll get one." He does the job himself.

Jack switches to a two-footed skiing stance and makes repeated sounds of skis gliding: "Shhh. Shhh. Shhh. Shhh. Shhh. Shhh. Whoo! Can't keep my edges. (Pause) Shhhoomp. Shhhoomp. Little hard to get a good hip

rotation."

Using trial and error to refine his technique, Schmitt quickly invented a no-gear method for lunar skiing. Call it "lunar cross country skiing."

"In the moon's low gravity," he explains 35 years later, "you can ski above the moondust--and I did. Imagine swinging your arms and legs cross-country style. With each push of your toe, your body glides forward above ground. Swing, glide, swing, glide. The only marks you leave in the moondust are the toe-pushes."

Cernan called this "loping," and he didn't think so much of it, preferring his own "kangaroo hop" for locomotion. But that's another story.

If he could've, Schmitt would have tried downhill skiing: sketch. "I think downhill techniques would work very well on the moon," he says. "You even have built-in moguls, the impact craters on the slopes. Lunar gravity would allow all kinds of jumps and hops that you might find difficult on Earth."



Skier Diane Winger telemarks on sand at the Great Sand Dunes National Park in Colorado. Photo credit: Charlie Winger.

There's just one problem: Unlike true snow, "moondust is very abrasive." Apollo astronauts found this out when it got on their spacesuits. Moondust infiltrated every nook and cranny, causing air leaks, binding joints and scratching ball bearings. It was a tremendous nuisance.

Moondust is abrasive because of the way it is formed--by violence. For billions of years, asteroids large and small have been hitting the moon's surface, shattering rocks and fusing topsoil into glass. The ceaseless pounding (which still goes on today) has rounded the moon's jagged mountains into ski-friendly slopes and coated the moon with a powdery residue of broken glass and sharp-edged rock--moondust.

"To ski the moon, you'd need gear that could slide over this very abrasive material. Maybe Teflon-coated skis would work," Schmitt suggests. (Teflon has the lowest coefficient of friction of any known solid material.)

It's not such a crazy idea. Here on Earth, people ski on sand dunes, for instance, at the Great Sand Dunes National Park in Colorado. Ordinary skis sprayed with silicon lubricant or WD-40 shoot down the dunes as if they were groomed snow trails. Sleds fashioned from cardboard and duct tape work well, too.

But, cautions Schmitt, "moondust is much more abrasive than sand." Typical grains of Earth-sand measure 250 to 500 microns (millionths of a meter) across and have rounded edges. They easily slip, slide and roll. A typical grain of moondust, on the other hand, measures less than 100 microns wide and has very sharp edges. The fine grains lock together "like Velcro," says Schmitt, "and scratch anything that comes in contact with them." A Teflon ski-coating might not last long.

Time to invent a new material? NASA is going back to the moon, with a first wave of astronauts due to arrive in 2018 or so. The long-term goal is

to establish a permanent outpost. Skis and sleds might come in handy for workaday transportation or weekend recreation.

Schmitt wishes he could go, too. The powder is out of this world.

Source: Science@NASA (by Dr. Tony Phillips)

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