

# A Vacation Really Out of This World

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Tourists in space? Vacationing in an orbiting space resort? A romantic honeymoon excursion, literally to the moon? It's not as far off as you might think.

In 2001, Los Angeles millionaire Dennis Tito paid an eight-day visit to the International Space Station aboard a Russian Soyuz rocket. Last year, Michael Melvill piloted the first civilian-made reusable rocket, SpaceShipOne, into space and back. This feat was repeated five days later, capturing the ship's builder, Burt Rutan, the \$10 million X-Prize. (SpaceShipOne, now donated to the Smithsonian, will hang alongside Charles Lindbergh's Spirit of St. Louis at the National Air and Space Museum.)

Now comes Robert Bigelow, owner of Budget Suites of America hotels and Las Vegas-based Bigelow Aerospace, Inc., with plans to put a "proof of concept" compact, light-weight, self-inflating space station, Genesis, into space as early as this November. It will be the precursor to a 22-by-45-foot Nautilus unmanned module he plans to put into orbit by 2008, with manned modules ready by 2010 for leasing to tenants for research, manufacturing, movie-making and, yes, hotel stays.

Bigelow is betting \$500 million of his own money on it and offering a \$50 million jackpot to the first American to design and build a shuttle that can ferry guests to and from his space station's landing dock.

If he builds it, will they come? Definitely, says APS Charter Member Harvey Wichman, director of the Aerospace Psychology Laboratory at Claremont McKenna College. "It's clear that people will go to space and they will have a lot of fun doing it. They can't wait to do it."

He points to the excitement of subjects who have participated in simulated space flights in his laboratory. After a weekend of weightlessness, "Those people were so high when they came out of that simulator, they took each other's names and had reunions," he said.

APS Fellow Peter Suedfeld, University of British Columbia, agrees that excitement will trump fear. Space tourism "will flourish," he said, "because many people are more excited by the unknown than they are afraid of it."

Space travel comes in several forms, and only long-duration flights pose truly big challenges: bone calcium loss, cardiovascular problems, disruption of circadian rhythms, speech-drowning noise (levels on space shuttles approximate the noise level of driving 60 mph with the windows open), and personal hygiene, to mention but a few.

Early space tourism, Wichman said, will range from up-and-back visits for a few minutes of weightlessness, "hardly more than an extended theme park ride"; to globe-hopping sub-orbital jaunts, say Los Angeles to Paris in 38 minutes; to Low Earth Orbits of a few days to a week or so.

Suedfeld, who has been fascinated by adventurers and science fiction since reading Jules Verne as a child, said those early trips will be “without real psychological risk. People will be back on Earth before any of the psychological problems can arise — except anxiety about their safety, but people have that every time their plane takes off.”

Civilians need little more than an hour of group dynamics training to prepare for these short space trips, Wichman discovered in his flight simulation experiments. Negative interactions during the confinements of 48-hour “flights” were dramatically fewer among those who received such training than among untrained controls.

Wichman, who came to aerospace research out of a lifelong love of aviation (he flew a Piper Cub solo while still in high school), said the main problems for space tourists will arise from weightlessness: personal hygiene when water doesn’t “flow,” say, or food drifting off a fork, or a sock floating away while you’re changing.

“You’re always obligated, anytime you see anything loose, to pick it up and secure it,” he said. “You don’t want stuff jamming up the fans. Fans are critical. If your fan stopped, you’d die very quickly — the air you exhale won’t go anywhere.

Soviet cosmonauts, who have experienced extended stays in space, discovered another issue: when “translating” (pushing off and drifting across a room), it’s important to stay oriented in the same direction as the person you’re passing by, not upside-down. “People can get really irritated at translating foot to face,” Wichman said.

Longer flights, a couple of weeks at an orbiting hotel or research lab, for example, will probably require simulating Earth’s gravity to avoid such difficulties. Bigelow’s ultimate hotel, for example, will likely be a giant gyroscope, with hotel pods at the ends of arms that extend from a recreational hub, where guests can experience weightlessness.

Beyond orbiting hotels? Wichman predicted that “within my children’s lifetime” we may be carrying passengers on round-trip lunar excursions aboard a cruiser (will it be named the SS Jules Verne?) that continually orbits both the Earth and moon in giant Figure 8s, using the gravity of each to sling it back and forth. All it requires is a shuttle bus to ferry passengers from Earth to the lunar cruiser and back.

And after that? Why not inflatable habitats toled to the moon and inserted into lunar lava tubes, left behind by volcanic eruptions when the moon was young, Wichman said? “Now you have a pressure chamber on the moon, with Earth air pressure, maybe 30 feet down, protecting you from radiation. Landing on the moon and taking off is easy. The big trick is getting up to Earth orbit. After that, it’s a cinch getting anywhere else.”

Cinch or not, interplanetary tourism is still beyond the horizon and will require considerably more research. In fact, in 2001 the Institute of Medicine urged that the International Space Station be exploited as “the single most important test bed” for clinical research into physical and behavioral reactions to extended space travel.

Unfortunately, that’s not being done, primarily because the crew was cut from seven to three; they

simply don't have time for experiments. Why the cut? "The Soyuz vehicle that is used as the lifeboat, if anything goes wrong, only holds three people," explained Wichman. "The US promised the international community it would build a seven-person transport shuttle. This was a promise we made that was not fulfilled. The money wasn't available."

Suedfeld added, somewhat wistfully, "It would be nice to be able to do research on the early tourists, though." Maybe he'll get his chance on Bigelow's private space station.