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FEATURES

DEPARTMENTS

COVER

Astronaut Joseph Acaba '90, STS-119 mission specialist, work with the robotic arm during the March 23, 2009, spacewalk, which was the mission's third

New Heights: Alumni Astronauts Share their Stories - *By Vic Cox '64*

Leroy Chiao '87 and Joseph Acaba '90 have worked on the International Space Station, and Jose Hernandez '86 will go there this month. Photos: NASA.

A human-sized, white blur stands against the stark darkness of space at one end of the International Space Station (ISS), which orbits the Earth at a distance of more than 200 miles. The solitary spacewalker is dwarfed by eight nearby, 115-foot solar power arrays. Amateur astronomer Ralf Vandebergh captured the remarkable image with a video camera through a backyard telescope in the Netherlands as the space station flew overhead. The craft was visible for only a few seconds before it entered the planet's shadow. But the astronaut has been identified as Joe Acaba, a 1990 graduate in geological sciences from UC Santa Barbara.

Asked if he was the unknowing model for the dramatic shot, Acaba said he'd seen the blurry image and that, "I was out there and I know I worked in that general area." But, he "cannot confirm" he was the white-suited astronaut in question since teams of two perform mission outings. However, the timing of the photograph and Earth's orientation of the figure matched U.S. National Aeronautics and Space Administration logs of Acaba's work outside the station on March 21, 2009, according to Vandebergh.

"It's a pretty spectacular photo" in any event, said Acaba, and it stirred a vivid memory of the rookie's first space walk. "It was probably the scariest thing I've ever done," he recalled, "and the most fun I've ever had." Such emotional swings are common among the few humans who have ever been on an Extravehicular Activity (EVA), as NASA calls the space walks. These excursions outside spacecraft, like the shuttle or ISS, present unique views that are difficult to describe but always impress.

Leroy Chiao Ph.D. '87, a former career astronaut whose nearly 230 days in space included 36 hours over six separate EVAs, has said that the unrestricted view of space generated "a rush of emotions," dominated by amazement. "It's a surreal experience to climb out of an airlock for the first time," he recalled. For example, Chiao told Theme magazine, he was surprised and exhilarated to see sunlight glow as it penetrated the atmosphere. It created "an incredible fluorescent blue line that is hard to capture with photos because the reflection of the sun on clouds tends to wash it out."

After 15 years of helping to build, then run, the space station, Chiao retired from NASA in December 2005. He is now a space commercialization entrepreneur and consultant, and lives in a suburb of Houston with his wife and twin children. Recently, President Barack Obama appointed him to a national commission, widely known as the Augustine Committee, charged with defining options for the future of U.S. human space flight programs. Chiao, who is a mid-1980s UC Santa Barbara graduate with an M.S. and a Ph.D. in chemical engineering, emphasized that the group's sole purpose is independent advice. "This is an important difference from giving recommendations," he added.

Another former UC Santa Barbara grad student from the mid-'80s, whose own future

the mission's third scheduled session of extravehicular activity as construction and maintenance continue on the International Space Station.

Credit: NASA

with NASA may hinge on which Augustine Committee options the president selects, is astronaut Jose M. Hernandez '86. He is scheduled to rocket into space this summer (now scheduled for Aug. 24) aboard the Discovery space shuttle. Hernandez's path to becoming an astronaut was more circuitous than Chiao's, but after 12 years of steadily improving qualifications on his annual application he won a place in the Class of 2004. Selectees must complete more than a year of rigorous training before becoming members of the elite Professional Astronaut Corps. Of the 10 other astronaut candidates in Hernandez's class, one was Joe Acaba.

"We're the best of friends," Hernandez recently said from Houston where he lives with his wife and five children. He does not mind that Acaba, who has three children and is a neighbor, made it into space before him with the complex mission of helping to deliver and install the last of the solar arrays needed to complete the power backbone of the ISS.

Hernandez is simply happy to be flying to the space station with a load of supplies, replacement equipment, a newly designed exercise treadmill (named C.O.L.B.E.R.T.) and, most importantly, racks of electronic experiments. These will be contained in the Leonardo, an Italian-made, pressurized laboratory module carried in the payload bay.

Trained as a flight engineer and robotic arm operator, Hernandez is not scheduled for an EVA on the approaching mission. He will sit behind Discovery's pilot and commander in order to facilitate the cockpit's smooth functioning during launch and landing, as well as to provide backup should a malfunction occur. Once at their destination, he will manipulate the shuttle's 50-foot arm to help the ISS attach the school bus-sized lab to a port on the international science platform. Other Discovery crewmembers will make EVAs to repair and replace equipment.

Mission Control will have the astronauts' time planned in detail: Each will have a daily schedule of mission tasks, exercises to counter the effects of microgravity on the human body, food preparation, eating, and relaxation time. With access to the 357-foot-long ISS, visiting astronauts enjoy more amenities as well as room. Though the space station has recreational resources, such as DVDs and e-books, and personal communication links, like email, most astronauts spend their free time at the windows, marveling at the Earth's ever-changing play of land, sea, and clouds.

As Leroy Chiao has said, "The greatest show is right outside the window." During his four space missions, the last of which placed him at the helm of the international station for six months as its first Chinese American commander and chief science officer, he spent his free time taking photographs of what he witnessed. (A selection is on his Web site www.leroychiao.com). *See below*.

Opportunities to observe such special beauty come with a cloud of risk that, for spacefarers, is always present, at least in the back of their minds. The fact that some astronauts and cosmonauts have died in the American and Russian space programs is never ignored. Safety is a paramount concern during astronaut training, but some things are beyond the reach of training: The crews on two of the five original shuttles, for example, were lost in accidents in the course of a launch or a landing.

During Chiao's career he flew on the shuttles Columbia (in 1994), Endeavor (in 1996), and Discovery (in 2000). Twenty months after the destruction of Columbia in 2003, Chiao took his last flight to the space station aboard the Russian Soyuz TMA-5. He knew all seven of the Columbia's crew, including one "particularly good friend" who had helped him find the house in which his family currently lives. "It could've been me," he acknowledged. "On the other hand, it's part of what we (astronauts) do and we're aware of the risks of flying in space. It's not that it's

With Earth's horizon at his back, astronaut and Expedition 10 commander Leroy Chiao '87 installs work platforms and performs several robotic scientific experiments during a

easier for us, but we understand."

five-hour Extravehicular Activity atop the Zvezda Service Module. Donning a Russian Orian spacesuit, Chiao and cosmonaut Salizhan D. Sharipov (out of frame) worked together on this six-month mission. Photo: NASA.

Though no one has been reported injured, much less died, on an EVA, the hazards were on Joe Acaba's mind as he worked around the support truss for the solar wings. "I think with anything we do in space, from a launch to a space walk to coming back home, there's lots of risk," he said matter-of-factly. Even with safety systems such as partners, tethers, and backpack rescue jets, problems occur.

"We're (outside) for 6 1/2 hours, and working on, probably, hundreds if not thousands of specific tasks," Acaba noted. "We have to change out our safety tethers, so there's a huge possibility to make a mistake — and it just takes one for you to have a really bad day. Once you're done, I think you're more tired mentally than physically."

Given the demands of the astronaut's job, it is no surprise that striving persistently after the dream of personal spaceflight is a common, though not universal, thread among those chosen for the corps. The three astronauts with UC Santa Barbara ties demonstrate this trait in their own ways:

Chiao had wanted to become an astronaut ever since he saw the 1969 Apollo moon landing televised when he was an 8-year-old in Danville, Calif. As a boy, he said he "was always fiddling with things, taking things apart to see how they worked." Once he was inspired to build a version of a Rogallo Wing, an airfoil originally designed by a NASA engineer to substitute for the parachutes used to land the Apollo crew capsules safely. (Today the wing is commonly used for hang gliders.) Fortunately, Chiao and his older sister, whom he persuaded to be a test pilot, were too heavy to get airborne.

His Chinese-born parents trained in Taiwan as engineers and encouraged their children to go to college. Chiao's undergraduate years were at UC Berkeley, which he exited in 1983 with a B.S. in chemical engineering. "I had to work really hard to get through Berkeley, studying late into the night and on weekends," he recalled. "That was the hardest single thing I've ever done in my life." He graduated with a 3.2 GPA and declared himself "proud to get out withthat. Persevere and work hard; it's not all talent."

At UC Santa Barbara, Chiao continued to work hard, but he also got lucky: His first summer on campus he met Chemical Engineering Professor Robert Rinker and was hired as a research assistant. Subsequently, Rinker became his mentor and doctorate adviser. Now retired, he remembers Chiao as a mature, creative student who "enjoyed developing solutions to unsolved problems." Rinker, who delighted in speeding on the local freeway in his '62 Chevy Impala, recalls that when Chiao rode with him, "I knew then that Leroy had nerves of steel."

Their friendship endured long after Chiao received his Ph.D. in 1987. During a 2005 Web cast from the space station to high school science and math students meeting at UC Santa Barbara, Chiao surprised Rinker by conducting an award presentation for his former mentor. Chiao, who has spoken on campus several times, including the 2008 Commencement, said "Bob played a big role in the person I became, and UCSB certainly did as well."

Jose Hernandez's philosophy echoes the themes of hard work and perseverance but adds careful planning to the equation. As the youngest of four children in a migrant field worker's family from Michoacan, Hernandez was born in French Camp, near Stockton on the family's annual trip from Mexico to Northern California. Due to the itinerant nature of following the harvests, the children did not attend school for more than a few months at a time, though they always took loads of homework back to Mexico for the Christmas holidays. One consequence was that Hernandez was 12 before he felt comfortable with the English language. Fortunately, his parents decided to make Stockton their permanent home so that their children could gain an education and free themselves from the fields.

Though he remembered the end of the Apollo era and was "infatuated with becoming an astronaut" as a boy, it was his senior year of high school in 1979 before Hernandez dedicated himself to that goal. "When I heard that Dr. Franklin Chang-Diaz had been selected as the first Latino American astronaut, that sealed the deal for me," he said.

Vowing to pursue his dream by studying electrical engineering, he accepted a five-year

program at Stockton's University of the Pacific (UOP), which offered generous financial aid, and was able to live at home. "That was what life dealt me and I embraced it," he said. "I decided to get the best (undergraduate) education I could and go to a better school to get a master's degree. That's what I ended up doing at UC Santa Barbara."

As a UOP work-study student at Lawrence Livermore National Laboratory he met Sanjit Mitra, a UCSB professor of electrical engineering with projects at the lab. Mitra was impressed by the young man's thirst for education and encouraged him to apply to UCSB for his graduate degree. Later, Mitra would serve as graduate adviser and chair of Hernandez's comprehensive examination committee.

Coming to UC Santa Barbara on a full Graduate Engineering Minority Fellowship, Hernandez could for the first time devote himself full-time to his studies. He took his courses at warp speed and finished in 12 months. The only drawback was that Stockton is a long way from Santa Barbara and, like many, it was the first time he was away from his family. But UC SantaBarbara had the Minority Engineering Program, which became "a refuge, a (surrogate) family" for him, he recalled.

Hernandez worked full-time at the Livermore National Lab after securing his Master of Science degree in 1986. He would stay there 14 years, mostly as an electronics and materials engineer, but rising to manage a program to dismantle Russian nuclear bombs to reduce the threats of nuclear terrorism. Along the way he learned to speak Russian and to fly a private plane. As much as he enjoyed the challenges of the lab, he constantly honed his skills to enhance his chances of becoming an astronaut-candidate. In 2004, the effort bore fruit, which led, with the help of friends, to the creation of the Reaching for the Stars Foundation www.astrojh.com (*See below*) to help inspire young people to learn math and science.

It was different for Joe Acaba, who entered the corps as an educator rather than an engineer and is its first astronaut of Puerto Rican heritage. Born in Inglewood, Calif., and raised in Anaheim, Acaba read science fiction in his youth, and flirted with the idea of going into space. "I had that childhood dream, but becoming an astronaut is not an easy thing to do," he said. "I know people who, from a very young age, knew they wanted to be an astronaut. I cannot honestly say that was me; it was not a career I had planned."

As a young man, Acaba enjoyed outdoor sports and became interested in the environment. But for his first two years at UC Santa Barbara he had no major. "I was on the five-year plan, unintentionally," he laughed. "I knew I wanted to do something in math or science. Then I found a passion for earth sciences, which is why I studied geology." He also found passionate faculty geologists, like Arthur Sylvester and Jim Boles, who fanned his professional interests.

Boles, who once spent three weeks in the field with him, recalled Acaba as quiet and focused. "He was very independent and mature relative to the other geology students," he said. "I suppose I attributed that, in part, to the fact he was in the (U.S.) Marine Corps reserves." However, he said, "I never felt this guy would be famous."

It was Sylvester, Acaba remembered, who set in motion the process for a master's degree from the University of Arizona. The young Gaucho was already beginning interviews to go into the Peace Corps when his adviser told him that he might qualify for a UA scholarship in geology. Acaba jumped at the opening, figuring "it was an opportunity I wasn't going to get every day." The Peace Corps could wait.

After securing his master's and spending two years as a hydrogeologist working on Superfund sites, Acaba joined the Peace Corps. He served two years in the Dominican Republic as an environmental awareness volunteer where, he told Peace Corps Online, he set his sights on becoming a career teacher.

He taught science and math to

Astronaut Joseph Acaba, STS-119 mission specialist, along with other astronauts and mission staff, examine the bay of space shuttle Discovery during mission training at NASA's Johnson Space Center. Photo: NASA

Florida high school and middle school students for five years before NASA's new educator astronaut program caught his eye in 2003. Acaba was pleasantly surprised to find how well his background matched NASA's requirements. "It was almost scary that a lot of the educational and professional decisions I'd made were perfectly suited for the job I have now," he said.

Educator astronauts, of which there are three in the class of 2004 and none in the class of 2009, are eventually expected to take their experiences back to the classroom and inspire the next generation of space explorers, according to NASA's Web site. Though Acaba is one of the first educators chosen for full astronaut training, he is not the first. Barbara Morgan, the backup for the earlier Teacher in Space program that ended with the Challenger disaster, was the first educator to achieve full astronaut status. Twenty-one years after Christa McAuliffe's death, Morgan returned safely from a 13-day mission to the ISS in 2007.

Acaba's mission lasted 13 days, but he hopes to return to the space station for six months or so, for what NASA calls a long-duration mission. He and Hernandez expect they will fly into space sometime in the next few years, but many elements are currently in play.

Construction of the ISS is virtually complete and the shuttle fleet is scheduled for its final countdown in 2010. A new U.S. vehicle, called the Orion, is not expected to be ready before 2015, if then. Russian spacecraft will become the main transporter of humans, equipment, and supplies. And what programs will the Obama Administration keep or kill? As many of the nine newest astronaut-candidates say, it's an exciting time to be part of NASA.

Click here for Leroy Chiao's website www.leroychiao.com.

Click here for Reaching for the Stars Foundation website www.astrojh.com.