

Glaciers on the edge



NASA Earth Expeditions Photo

The research ship M/V Cape Race on Greenland's northwest coast during OMG's survey of the seafloor.

Josh Willis is on a NASA Gulfstream jet, arcing across the northern edge of the world. Flying along the coast of Greenland, the plane visits scenery no other aircraft has ever visited before, tucking into narrow, ice-covered fjords, masses of brilliant white ice below carving its way through steep brown valleys into open ocean water.

"In most of these places," says the JPL oceanographer, "there's been no temperature and salinity data collected. Ever."

Those readings are at the heart of an ocean expedition that's now in its second

year of a five-year mission. Willis, who serves as its principal investigator, named the campaign Oceans Melting Greenland, or OMG for short, a deliberate play on the text-messaging shorthand for shock and distress.

"By comparing data from the first and second years," he says, "we'll be able to observe changes in Greenland's glaciers and coastal ocean water."

Willis is excited about his initiative to measure the rise in sea level at Greenland, where glaciers around its jagged coastline have been melting into the ocean at an

accelerated pace. Tracking the amount of ice mass loss today will help us understand the impact of future changes, Willis says.

Earth's ocean, more than the atmosphere, is responsible for creating a stable climate. As global warming increases the temperature of the ocean waters surrounding Greenland, that warmer ocean water is melting the ice sheet from its edges. "The ocean is eating away at the ice sheet," says Willis. His team is now measuring how much of that warm

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water could be increasing due to climate change.

The seawater around 400 meters deep at Greenland is 3 to 4 degrees Celsius warmer than the water floating near the sea surface. And the depth of the sea floor influences how much of that warm, subsurface layer can reach into the fjords and melt the glaciers.

To explore where the bottom of the ice sheet reaches out over the seawater and down into the ocean, team members mapped undersea canyons on the *M/V Cape Race*, a ship equipped with an echo sounder. The crew sailed up the continental shelf surrounding Greenland, weaving in and out of narrow fjords and around floating icebergs, to reach places where warmer Atlantic Ocean water meets the bottoms of glaciers. The *Cape Race* used a multi-beam echo sounder to map undersea canyons where warm seawater comes in contact with and melts the glaciers.

In the spring of 2016, the team began surveying elevations where the glaciers meet the sea. They measured the edges of the ice sheet using the Airborne Glacier and Land Ice Surface Topography Inter-



OMG principal investigator Josh Willis (center) joins Tom Parent (left) and Dick Clark as they pilot NASA's Gulfstream-III over the eastern coast of Greenland.

“In most of these places, there’s been no temperature and salinity data collected. Ever.”

— Josh Willis
OMG principal investigator

ferometer, a radar instrument attached to the bottom of a NASA G-III aircraft.

In addition, the team dropped more than 200 probes through a hole in the bottom of the plane, to measure ocean temperature and salinity around Greenland, from the sea surface to the sea floor.

Parts of Greenland’s coastline are re-

mote and difficult to access, and many areas remain uncharted—especially those covered with seasonal ice. The glacier has retreated so recently that the complicated, winding coastline is changing as fast or even faster than we can study it.

The team plans to drop more ocean probes across the same locations to collect data to find out “when the water is this warm, how much ice melts,” what the melt rate is, and how much that rate is increasing. Data collected this spring, and over the next four years, can be compared with data already collected so that we can find out how fast the glaciers are melting.

“OMG is a big-picture project,” explains Willis, who also serves as project scientist for the Jason 3 satellite mission. “We want to see what’s happening in the ocean on the large scale, and what’s happening to the ice sheet on the largest scales.”

“This year,” he adds, “we’re gonna bring it!”



NASA Earth Expeditions Photo

Visions of future societies



A gift for employees and on-site contractors will be presented Tuesday, Feb. 28 at JPL's Mardi Gras free lunch. This "Clubs for the Modern Explorer" gift is a collection of 12 stickers, a patch and a poster. This gift celebrates JPL's tradition of breaking new ground and leading the way, and imagines a future made possible by our innovative spirit.

The gift was created by a team of artists, designers and strategists at The Studio of JPL.



Mark Simons

Simons named chief scientist

Mark Simons has been named JPL's new chief scientist.

Simons is a professor of geophysics in the Seismological Laboratory at Caltech. He received a B.S. in geophysics and space physics from UCLA in 1989 and a Ph.D. in geophysics from MIT in 1996. He joined Caltech as a postdoctoral scholar in 1995 and served as assistant and associate professor before being named professor in 2007. He has also been a visiting professor at the Institut de Physique du Globe de Paris, the École Normale Supérieure in Paris, and the Université Joseph Fourier in Grenoble.

In collaboration with JPL, Simons currently serves as Caltech's co-principal scientist for the Advanced Rapid Imaging and Analysis (ARIA) Center for Natural Hazards. He also serves on JPL's solid Earth scientist search committee.



Dan Goebel

Goebel elected to inventors academy

JPL Senior Research Scientist Dan Goebel was recently elected Fellow of the National Academy of Inventors.

Goebel was elected based on his 52 patents and the impact those patents have on society. Election to Fellow status is the highest professional distinction accorded to inventors, he said. Fellows have generated more than 8,500 licensed technologies and companies and created more than 1.1 million jobs, with more than \$100 billion in revenue generated based on their discoveries, the academy said.

The organization recognizes the top 3,000 inventors in the United States, and Fellow status is awarded to the top 750 members, Goebel added.

Goebel has been at JPL since 2003. He works primarily in electric propulsion, and was the lead flight system engineer on the recently won Psyche Discovery mission. He is the only JPL member who has been elected to the National Academy of Inventors.

Soderstrom joins Fed 100

JPL chief technology and innovation officer Tomas Soderstrom has been named among winners of the Fed 100 awards, bestowed by technology newsletter Federal Computer Week.

Winners will be honored at the Federal 100 Awards March 30 in Washington, DC, recognizing government and industry leaders who have played pivotal roles in the federal government information technology community.

For more information, visit <https://fcw.com/articles/2017/02/07/2017-federal-100-winners.aspx>.



Tom Soderstrom

Better service with fabrication upgrade

Just in time to better serve JPL projects in one of the Lab's busiest periods ever, the Electronic Fabrication Service Center has received a desperately needed upgrade.

The labs in Building 103 have been upgraded to increase throughput for electronic board assembly and cable harness fabrication to meet projects' needs. The upgrades include an expansion to accommodate more technicians, a second production line of surface mount technology with state-of-the-art equipment, a new polymeric laboratory and a clean cable harness lab in order to support increasing project demands.

"This project will support us for the next couple of decades," said JPL Deputy Director Larry James at the dedication ceremony in February. "This investment is an important statement about the value of the work these labs provide to JPL," added Jordan Evans, deputy director, Engineering and Science Directorate.

The upgrade, noted Charlene Ung, manager of the Electronic Manufacturing, Packaging & Technical Services Section, included the replacement of about 80 percent of the lab's equipment, including screen printers and reflow ovens. "This expansion allows us to double our capacity immediately," Ung said.



Technician Yolanda Walters works on polymeric conformal coating of an electronics board at the Electronic Fabrication Service Center.

The Electronic Fabrication Service Center supports JPL missions by providing high-quality electronic assemblies such as printed wiring assemblies, cable harness assemblies and hybrid/microelectronic assemblies—including multi-chip modules—and photonic devices for both flight and ground-based operations.

The center's technicians and engineers develop and implement fabrication techniques to solve unique requirements of space electronics, and support the subsystem and system-level integration including assembly, test and launch operations onsite, offsite and at the launch site.

Passings

Mark Allen, 67, a retired astrochemist, died Oct. 22.

Allen employed chemical models to study the atmospheres of Earth and other planets, comets, interstellar space and exoplanets, and was a major contributor to the NASA Astrobiology Institute. He retired in 2015 after a 37-year career at JPL and Caltech.

Allen is survived by his wife, Emily, and children Boh and Philip. Services were held at Temple Sinai in Glendale. His family requests consideration of donations in his memory to Caltech or Columbia College.

Raymond Heacock, 88, former project manager for the Voyager mission, died Dec. 20.

Heacock worked at JPL from 1953 to 1990. In the 1950s, he contributed to some of the earliest JPL projects, including the Sergeant missile and the first American Earth satellite, Explorer 1. In the 1960s he was a co-investigator on the Ranger Imaging Science Team, which was responsible for obtaining the first high-resolution images of the moon. He later served as spacecraft system manager and then project manager for Voyager.

In 1981, Heacock received NASA's Distinguished Service Medal and the National Space Club's Astronautics Engineer Award.

Marilyn Scott, 84, retired Flight Project Support Office scheduling lead, died Jan. 14.

From 1957 to 1959, Scott performed computing for various JPL missions' telemetry processing. After leaving to begin raising a family, she returned to work in 1979 at the Rocket Propulsion Laboratory at Edwards Air Force Base as a programming lead. She returned to JPL in 1985 and led project scheduling on the original development of the Advanced Multi-mission Operations System for the Magellan Project, still in use today.



Mark Allen



Ray Heacock

She retired in 1993.

Scott is survived by her children Jim, Janet and JPL employee Charles Scott, as well as grandchildren Eren, Taner, Steven, Michael and Brian. In lieu of flowers, donations are requested for the Estherville Animal Shelter, 100 Russell Rd., Greenfield Center, NY 12833 or the Arbor Day Foundation.



Marilyn Scott

James King Jr., 83, former assistant Laboratory director for technical divisions, died Jan. 28.

King earned a master's and doctorate in chemistry at Caltech. He joined JPL in 1962. In 1988 King was named deputy assistant laboratory director in the Office of Technical Divisions, then became ALD for technical divisions in 1993. He previously had served as technical manager for space science and applications, as program manager for astronomy and astrophysics, and program manager for atmospheric sciences.

King also served for two years in managerial positions in the Office of Manned Space Flight and in the Office of Space Sciences at NASA Headquarters.

King is survived by daughter Jennifer Schlickbernd and son Jeff King.

King was laid to rest Feb. 2 in Atlanta. A memorial service was held Feb. 23 in Pasadena.

Former JPL Fire Department Capt. Michael Tyler, 72, died Jan. 29.

Tyler worked for the Sierra Madre Fire Department before joining JPL in 1988. He worked at the Laboratory for 29 years.

Tyler is survived by his wife, Barbara, son Mike Jr., three grandchildren and two great-grandchildren. Services will be held March 4 at 11 a.m. at the Episcopal Church of the Ascension in Sierra Madre.



James King



Michael Tyler

Retirees

The following JPL employees recently announced their retirements:

December

Leigh Rosenberg, 39 years, Section 312D; **Alona Benson**, 32 years, Section 3314.

November

Marie Case, 35 years, Section 3317; **Robert Vargo**, 32 years, Section 3000; **Frederick Fuentes**, 17 years, Section 2127; **Mark Thomson**, 10 years, Section 3550.

Letters

Thank you so much for the beautiful flower arrangement sent by JPL to my husband John's celebration of life event. I was comforted to see so many friends from John's years at JPL who were able to attend.

Pat Gerpheide

On behalf of the Farr and Stukes families, I would like thank JPL for the lovely peace lily sent for the passing of our mother, Barbara Farr. She was a retired aerospace engineer and was so proud of the fact she had a daughter who worked at JPL. She followed our projects closely and knew many JPLers. Our families greatly appreciate all of the support and kindness from the JPL family.

Sherry Stukes, Section 394F

Imagine what it must have taken to raise me! My mother was truly a special person and will be greatly missed. I want to thank each of my JPL friends and colleagues who reached out to me following her passing with kind words, cards, flowers and warm thoughts. Your support was felt and is appreciated more than words could ever express. Thank you.

Jackie Clennan Price

My family and I would like to thank our JPL friends for condolences and a lovely plant upon the passing of my mother, Maya. Your thoughts and kind words are much appreciated.

Boris Shenker

Thank you to the Deep Space Network for the kind thoughts and warm wishes.

Hilda and Michael Sniffin

Classifieds

Ads submitted Feb. 11 to 17.

For Sale

BED, new Simmons Beauty Rest full-size mattress & box spring; includes steel frame with rollers & wood headboard, \$600. 818-259-3865

MISC.: ski wear, mini steam iron, Rollerblades (men's 8), Nordica ski boot (woman's size 8), Bloody Mary set, stemless decanter set, board games, Waring Pro Juicerator, fleece-like throw, boxed insulated/microwaveable soup mugs, boxed pewter motion frame, scarf/glove set, Movietickets.com gift cards (2). 818-272-3262.

SAFE, Sentry model DSW5840, capacity 2.0 cu. ft., brand new, still in box; paid \$289 + tax, asking for \$150. 626-373-6283.

Vehicles / Accessories

'98 HONDA Civic EX, green, 201K miles, fair to good condition, lowered suspension, custom wheels and tires, custom exhaust, interior clean, automatic, \$1,595. 818-731-9642.

Wanted

SPACE INFO/memorabilia from U.S. & other countries, past & present, for personal use (see <http://www.youtube.com/watch?v=S7PvjGp7mCU>). mrayman@alumni.princeton.edu, 818-790-8523, Marc Rayman.

For Rent

ALTADENA, bedroom in large 3 bd./2 bath house; avail. late May thru Aug. 2017, can be furnished if desired; 2 miles to JPL, multiple hiking & biking trails; shared common areas with 32-year-old JPL engineer: large kitchen w/ updated stainless appliances, large living room, washer/dryer, well-appointed backyard entertaining area and large driveway; all utilities and 50+ Mbps internet included; \$960/month + \$900 deposit. 626-524-3972 or bmarti@rocketmail.com.

ALTADENA (91001), quiet/cozy 2-bedroom, 2-bath home remodeled in 2012, available March 1; ideal for roommates, bedrooms and baths are at opposite ends of the house; kitchen: refrigerator w/icemaker and microwave; laundry: washer + dryer; gated parking

in driveway and carport; nearest cross-st. is Fair Oaks/Calaveras; 6- or 12-mo. lease avail.; renter pays utilities excl. trash; \$1,900/mo. mpauken@gmx.com, 818-237-0645, Mike.

LA CANADA, bright 3 bedrm./2-bath, 2,090 sq. ft single-family home in LCUSD on the Mesa above JPL, across from a beautiful park, playground, tennis courts + pool; stunning views, 15-min. walk to JPL; photos: <https://flic.kr/s/aHskTT4AES>; offered exclusively to JPL/Caltech employees/affiliates for \$7,000/mo. (dogs/cats OK). lindsay.hays@gmail.com, Lindsay.

PASADENA townhouse, 2 bedrooms, 1.5 baths, master walk-in closet, 2-car garage, new washer/dryer in unit, stainless steel appliances, central air/heat; walking distance to PCC/Caltech/Gold Line/Rose Parade route, 6 miles to JPL, minutes to 210 freeway; water and trash included; \$2,150 + security deposit, 1-year lease. 626-429-6096, glori1an@aol.com.

PASADENA, furn. room in a lovely 4-bd./2-bath house, big backyard, hardwood floor, big closet, shared bathroom, kitchen and laundry privileges; 2 miles to JPL, close to public transportation; short- or long-term lease available; must like dogs and be very clean; \$900 + \$900 deposit. 818-960-8654.

Vacation Rentals

MAMMOTH, Snowcreek, 2 bd., 2 ba. + loft, sleeps 6-8, fully equip'd kitchen incl. microwave, D/W, cable TV, VCR, phone, balcony w/ mtn. vw., Jacz., sauna, streams, fishponds, close to Mammoth Creek, JPL discount, no pets. 626-798-9222, 626-840-3749 or valeriee@caltech.edu.

MAMMOTH, Snowcreek, beautiful updated condo, 2 bd., 2 ba. + loft (sleeps 6-8), great location by pond/meadow, new appliances, TVs, DVD players, free wireless Internet and washer/dryer, no pets. 818-952-2696 or Big-MtnPrettySky@gmail.com.

MAMMOTH, remodeled 2 bed/2 bath + loft, short walk to Canyon Lodge; Courchevel 6 features full kitchen, cable/Internet TV, DVD, Blu-Ray, wireless hi-speed Internet, 2-car garage, Jacuzzis, grill, pool; no pets. <http://Courchevel6.com>.

MEXICO (1 bedrm.): Mayan Palace: Acapulco, Nuevo Vallarta, Riviera Maya, Puerto Vallarta; Sea Garden: Acapulco, Nuevo Vallarta, Mazatlan; trades available with II and RCI. 818-272-3262.



E-MAIL US AT
universe@jpl.nasa.gov

Editor

Mark Whalen

Universe

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