JPL

Jet Propulsion Laboratory

Universe

MAY 2018
VOLUME 48
NUMBER 5

Bridenstine is new NASA chief

Oklahoma Rep. Jim Bridenstine won Senate confirmation as NASA administrator April 19.

He succeeds Robert Lightfoot, who served in an acting role following the retirement of Administrator Charles Bolden.

"It is an honor to be confirmed by the United States Senate to serve as NASA Administrator," said Bridenstine in a press statement. "I am humbled by this opportunity, and I once again thank President Donald Trump and Vice President Mike Pence for their confidence. I look forward to working with the outstanding team at NASA to achieve the president's vision for American leadership in space."

"I'm very pleased to welcome Jim Bridenstine to NASA," said Lightfoot. "He joins our great agency at a time when we are poised to accomplish historic milestones across the full spectrum of our work. Jim now takes the reins of this agency and its talented and dedicated workforce. I'm looking forward to him building on our great momentum and sharing our many strengths to help us make the next giants leaps on behalf of humanity. I also want to express my heart-

Continued on page 5

VP Pence visits JPL

Vice President Mike Pence visited JPL on Saturday, April 28 in a tour that previewed the upcoming Mars InSight launch and showcased past, present and future missions.

The afternoon visit by the vice president, his wife, Karen, and daughter Charlotte, included a stop at Mission Control, where engineers will communicate with JPL's Interior Exploration using Seismic Investigations, Geodesy and Heat Transport (InSight) lander, which launched May 5 from Vandenberg Air Force Base. InSight will be the first interplanetary mission to depart from the West Coast, and the first to study the interior of Mars.

The Mission Control building, a National Historic Landmark, has served as a hub for communications with countless spacecraft since 1964, including some of NASA's Apollo moon missions, the twin Voyager spacecraft now at the edge of our solar system, and the Cassini mission to Saturn.

The tour included a stop at the JPL Mars Yard, the outdoor test facility strewn with soil and Hawaiian lava rocks to simulate the Martian landscape. There, the Pence family tried their hands at maneuvering a test Mars rover. They also visited the Spacecraft Assembly Facility, where the Mars 2020 mission hardware is being assembled. That mission will search for signs of habitability and microbial life in Mars' ancient past.

"We were honored to show the vice president, who has a strong commitment to space exploration, some of our special sites and space missions," said JPL Director Michael Watkins, who presented the vice president with a plaque depicting the Mars Science Laboratory rover Curiosity on the surface of Mars.

NASA/Bill Ingalls.

Vice President Mike Pence is presented a plaque by JPL Director Michael Watkins during a tour of JPL on April 28. The plaque presents a view of the Mars Science Laboratory rover Curiosity on the Red Planet.

"With JPL's rich history, which includes

Continued on page 5

How JPL is going green

Labwide changes have reduced energy consumption more than 15 percent

By Carl Marziali

Sustainability on Lab goes mostly unnoticed, save for one very large and prominent exception to come.

Late arrivals to Lab currently are shunted to the rooftop level of the parking structure. They are punished with a sweltering car on their return, with seats like hot plates.

In a boon for the planet and for those with late-starting shifts, a massive solar array will shade the roof of the structure by late 2018. The 1-megawatt system will be more than three times more powerful than the 300 kW array mounted on top of 301 in 2016, and 30 times bigger than a pilot project on 302 installed in 2007.

At peak, the arrays will offset nearly 7 percent of the Lab's power use. They also reduce air conditioning costs for the cars or buildings in their shadow. And they save money in the long run, after 10 to 15 years.

JPL's sustainability team is eyeing solar arrays for the parking lot on Cardiac Hill and other buildings on Lab. Future projects will depend on NASA approval and funding.

Not all buildings are suited for rooftop solar, and even if they were, the Lab could not rely on solar energy alone to power itself sustainably. Solar at best could supply about 12 percent of the Lab's electricity.

JPL is making progress in other ways. Water use has dropped from 45 gallons per square foot of Lab space in 2007 to 30 gallons today. As people use less water, their energy use decreases. About one fifth of the state's electricity goes into moving and treating water.

Bob Develle, the Lab's recently retired sustainability manager, credits more efficient landscaping and irrigation for most of the water reduction. Starting in 2009, the Facilities team modernized the outdoor watering system by computerizing irrigation controls, planting less thirsty species, removing thousands of square feet of turf—even changing sprinkler heads to spray larger droplets so the water has a chance to seep into the soil before it evaporates.

The biggest improvements have been invisible. The Facilities team has replaced 37 HVAC chillers around Lab with more efficient models. Every chiller uses as much power as all the panels on building 301. Environmental researchers rank improvements in air conditioning as the most effective measure to fight climate change, well ahead of electric vehicles and solar farms.

Facilities plans to focus on other unglamorous projects, such as weatherstripping and better windows. All of the Lab's outdoor lights have already been converted to LEDs.

The Lab's combined sustainability efforts have reduced energy intensity—energy use per square foot of floor space—by 16 percent since 2003.

The newest effort may be the most significant, even though energy savings are not the prime motivation. The Flexwork program has the potential to cut thousands of vehicle miles of carbon emissions – and, ironically, to make solar shade in the parking structure a bit less valuable.

Plant walk explores a green universe

By Carl Marziali

Roger Klemm leads a native plant walk behind JPL

Step outside the east gate for an incidental hour and you may find:

• Yellow mustard flowers that taste like broccoli because, it turns out, they're both in the same plant family

• A hallucinogenic plant whose flowers are pollinated at dusk by sphinx moths that fly like hummingbirds

• Coast Live Oaks, found naturally nowhere else in the world outside California

• Manroot, a vine that waits out the dry season by reducing to its 45 lb. bulbous core

• Laurel sumac, a shrub that stores so much water it is the last to go up in a wildfire, often erupting behind the front.

Roger Klemm of the Green Club led about 20 JPLers on a plant walk April 18 in anticipation of Earth Day, scattering more nature nuggets in an hour than seeds from a busy bird.

Less than a minute's walk from the east gate are three plant communities stacked on top of each other: riparian woodland along a creekbed, southern oak woodland a few feet above it, and coastal sage scrub and chaparral rising to the top of the canyon.

Each community holds dozens of distinctive plants, grasses and shrubs, examples of the region's high degree of endemism: an ecology unique to a particular climate and geographical area. Of the six to eight thousand types of plants native to California, about a third are found naturally nowhere else on Earth, Klemm told the group.

Southern California, like other Mediterranean climates, has a long summer drought, and Klemm described the different ways local plants adapt—from the alders and willows that thrive near water, to live oaks and sycamores whose roots burrow deep to the water table, to wildflowers and perennials that cope by shrinking down to seeds or tubers, and shrubs that drop their leaves or close their stomata to prevent evaporation.

He introduced the group to little known species such as toyon, the only local native plant to retain its indigenous name, whose red berries sustain migratory birds. He plucked and passed around leaves of the mugwort plant, said to be an antidote for poison oak rash.

And he railed genially against invasive species like castor bean, whose seeds are used to make the poison ricin, and Spanish broom, introduced by the Forest Service and other agencies to prevent erosion along road cuts.

Not so effectively, Klemm noted: "I can tell you its structure does not help against erosion. It has one tap root that goes straight down and doesn't do a damn thing against holding the hillside, as opposed to the buckwheats and sages that it replaces, which have a fine network of roots that go out and anchor the soil."

Klemm grew up with two shelves of house plants in his room, and cultivated the family's vegetable plot. His garden now includes mostly native plants carefully tended over more than 20 years.

"Native plants are my passion," he said. "I enjoy learning about them and sharing what I know."

His favorites are California buckwheat and manzanita, the first because it flowers from early spring through late fall, the second because it blooms in winter and has a distinctive and artistic structure.

His eyes squinted in delight under a wide-brim straw hat as he described the contrast of the manzanita's light gray leaves and its dark, crooked branches. But he has more than aesthetic reasons for choosing the plant.

"You're providing nectar for the hummingbirds at a time when not a whole lot else is blooming," he said.

"Anything that I plant, I want to be able to feed something. If it's not a food crop for us, I want it to feed nature.

"It's comforting to see a leaf that's been nibbled on, because you know that there's a caterpillar that's been able to live because of what you planted. It's a very gratifying experience, to be out in your yard and hear the birds, see the butterflies, see the lizards, and know that they're all there because of what you planted.

"These creatures bring the garden to life, they animate it in a way that nothing else does."

Sparking innovation

By Taylor Hill

Groups on Lab showcased a range of resources available to JPLers at the Spark Innovation Universe event April 20.

Got an idea on how to make work and life a little better on Lab?

Spark can help. The institution-wide platform is a one-stop shop to find out about improvement projects underway at JPL, and discover the resources available to turn inspiration into concrete action.

On April 20, JPLers got a firsthand look at what Spark can do for their group during the "Innovation Universe" event on the Mall, intended to give JPLers a chance to explore the various resources available that can improve how we work at JPL. The booths included displays and information on the camera loaner program, where JPLers can borrow cameras and equipment at no charge for up to two weeks; the Innovation Foundry, which works to bring space mission ideas from early concept into a complete proposal package; and the 3-D printing program at the Hub, where JPLers can use 3-D printers free of charge for research or education projects.

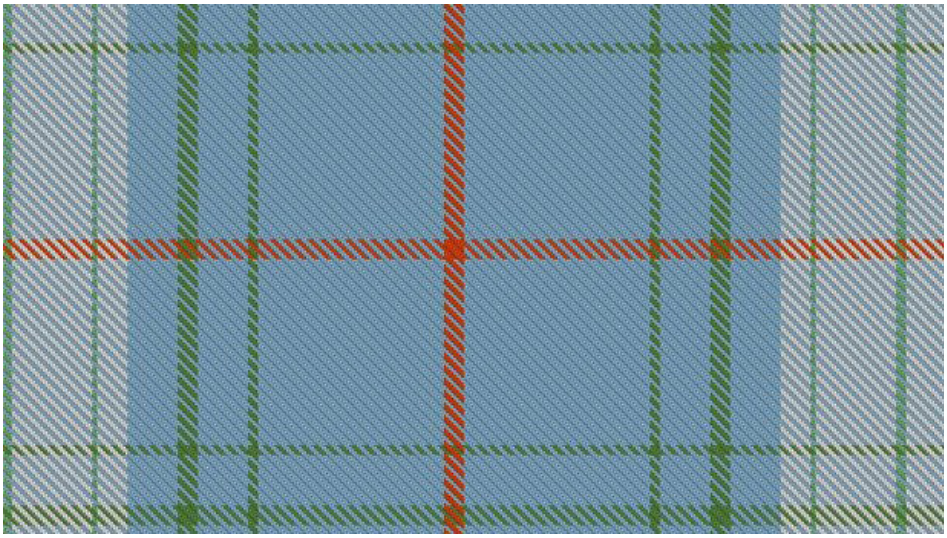
Between the various missions, directorates, and objectives at JPL, there is a tendency for groups or teams to work alone, says Laura Fisher, institutional process and assessment specialist at JPL, and that can lead to missed chances to collaborate, share knowledge, and improve how work gets done on Lab.

"This event was all about making the connection points," said Tom Soderstrom, IT chief technology officer at JPL.

Want to find out more about the amazing projects underway at JPL? Spark has 100 examples. Check out their improvement gallery at h*ttps://spark.jpl.nasa.gov.*

New tartan for ocean worlds

By Leslie Mullen



A new Scottish tartan is available for explorers of ocean worlds like Europa, Enceladus, Ceres and Titan.

Sharon Laubach, deputy integrated sequencing team chief on Mars Science Laboratory, has previously placed orders of a Mars tartan for JPLers. She's now also collecting names for the ocean worlds tartan, and will place the order when enough people sign up to meet the minimum weave length. Contact her at 3-1011 or email *Sharon.L.Laubach@jpl.nasa.gov.*

The colors of the tartan are primarily ice blue and white, to represent water and ice. The pattern includes thin green and red stripes to represent possible habitability and hydrothermal activity.

The tartan can be found in the official Scottish Register of Tartans [*https://www.tartanregister.gov.uk/tartanDetails?ref=12130]*. It is the design of Charles Cockell, professor of astrobiology at the University of Edinburgh. Cockell also designed the tartan for Mars a few years ago. Read more about that at *https://js.jpl.nasa.gov/Pages/story.aspx?StoryID=24270*.

This new "ocean worlds" tartan is intended to be worn during science, ex-

Continued on page 5

News Briefs

Conway named a Guggenheim Fellow


Erik Conway

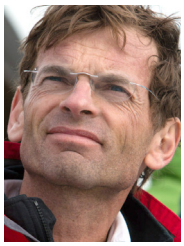
JPL historian Erik Conway has been named a Guggenheim Fellow.

Every year since 1925, the John Simon Guggenheim Memorial Foundation has awarded scholars, artists and scientists with the fellowships, which come with an undisclosed amount of money. The foundation says fellows are "appointed on the basis of prior achievement and exceptional promise."

Conway has been the historian for JPL for 14 years. His work focuses on the intersection between science and technology, with an emphasis on aerospace. He is currently completing a history of near-Earth objects research.

This year, 173 Fellows were chosen out of 3,000 applicants. Caltech astronomy professor Shrinivas Kulkarni was among them.

Rignot named to National Academy


Eric Rignot

JPL senior scientist Eric Rignot has been elected to the National Academy of Sciences.

Rignot, who studies the impact of climate change on Earth's polar regions, also serves as a professor of Earth system science at UC Irvine.

"I am deeply honored to be recognized by the National Academy of Sciences," said Rignot. "I wish to share this honor with the numerous colleagues and students who worked with me in the past decades at UCI and at JPL to study polar regions using exciting and new space technologies and make scientific advances possible."

Space Foundation honor for Cassini

The John L. "Jack" Swigert, Jr., Award for Space Exploration was presented to the Cassini mission team April 16 during the opening ceremony of the Space Foundation's 34th Space Symposium in Colorado Springs, Colo.

The award is given annually to recognize the most significant accomplishment in advancing the exploration of space during the previous year. Cassini's active mission of more than 20 years, and 4.9 billion miles traveled, provided a detailed understanding of the Saturn system, including its rings and moons.

Webby Awards honor NASA, JPL

NASA's digital communications were honored at the 2018 Webby Awards with one Webby, while three other NASA sites won People's Voice Awards, given by popular vote.

Winners, nominees and honorees for JPL-managed sites:

Solar System Exploration: First Webby Award and second People's Voice Award for science website.

Exoplanet Exploration: First nomination and first People's Voice Award, in the Weird category.

JPL social media: People's Voice award for Corporate Communications.

Climate Change website: Nominee in the Green category. The site has previously won two Webby Awards and two People's Voice Awards.

The Cassini project's Real-Time Grand Finale was honored in the Best Use of Online Media.

Winners and nominees for NASA communications:

NASA's flagship website: 10th People's Voice Award for government. This is the third consecutive People's Voice Award for the site, which has also won three Webbys.

NASA's Snapchat account: Nominee in the Education and Discovery category.

JPL manages the Solar System Exploration, Exoplanet, Climate Change and Cassini sites for NASA, and has produced many Webby and People's Voice winners over the years.


From left: Stephen Rizzi, Langley Research Center; Charles Elachi, JPL; Parimal Kopardekar, Ames Research Center; Steven Young, Langley.

Elachi receives AIAA Fellow honor

Former JPL Director Charles Elachi has received an honorary fellowship from the American Institute of Aeronautics and Astronautics.

Elachi was cited for his "distinguished leadership and sustained technical achievement that has fundamentally advanced and profoundly impacted the space science enterprise." The honor was bestowed May 2 the AIAA's annual Aerospace Spotlight Awards Gala in Washington, D.C.

At the event, two researchers from Langley Research Center and another from Ames Research Center also were inducted as AIAA Fellows.

Santa Monica second in ocean contest

Santa Monica High School, which won a regional round of the National Ocean Sciences Bowl held at JPL in February, finished second in the national competition held April 22 in Boulder, Colo.

For the past 19 years, JPL has hosted the Regional National Ocean Sciences "Surf Bowl." JPL employees in a variety of fields volunteer their time.

Montgomery Blair High School of Silver Spring, Md., won the finals among 23 competitors, with Marshfield High School of Marshfield, Wisc., finishing third.

For more information, visit *http://nosb.org.*

BRIDENSTINE *Continued from page 1*

felt appreciation to the NASA team for all they accomplished during my time leading the agency."

In a message to NASA employees, Lightfoot added: "I've been talking to Jim, and I know he's eager to begin leading this team. Please join me in giving him a big NASA Family welcome. He joins our great agency at a time when we are poised to accomplish historic milestones across the full spectrum of our work."

Bridenstine serves on the House of Representatives' Science, Space and Technology Committee, as well as on the House Armed Services Committee. A veteran of the U.S. Navy, he served as Executive Director of the Tulsa Air and Space Museum & Planetarium after leaving active duty. He was elected to Congress in 2012.

PENCE *Continued from page 1*

designing and building America's first satellite for launch in 1958, and with our cutting-edge scientific capabilities, we stand ready to advance exploration as we move forward into our revitalized space age."

The vice president, who chairs the National Space Council, was accompanied on the tour by Watkins, JPL Deputy Director Larry James, Mars Exploration Program Director Fuk Li, Caltech President Thomas Rosenbaum, National Space Council Executive Secretary Scott Pace, and Jim Ellis, chair of the NASA Space Council Users Advisory Group.

For caption information and more images, visit *https://flic.kr/s/aHsmeYAZF5.*

TARTAN *Continued from page 4*

ploration and outreach activities associated with icy worlds and planetary bodies with oceans or interior water.

The Scottish Register of Tartans Act of 2008 defines a tartan as "a design which is capable of being woven consisting of two or more alternating coloured stripes which combine vertically and horizontally to form a repeated chequered pattern." The patterns of a tartan were traditionally associated with specific locations due to the regional availability of natural dyes.

The ocean worlds tartan can be ordered from the designer Geoffrey (Tailor) Highland Crafts. However, there is a minimum order of 12 yards of cloth.

Letters

My son and I would like to thank my many friends and colleagues at JPL who provided food, flowers, cards, comfort and financial support during our time of need following my husband's sudden passing. Scott Brachman was a Solar System Ambassador who loved everything about JPL. He volunteered at many JPL Open House events, and became friends with many of my colleagues. He was always cheerful, friendly and helpful. We will miss him.

Rachel Zimmerman Brachman

My family and I would like to thank our friends and co-workers from IND, Voyager, Spitzer and the Director's Office for the lovely flowers, plants, cards and warm thoughts regarding the recent passing of my mother, Cynthia Rosik. She was proud of her daughter working at JPL and Caltech for NASA. It was her decades of support and encouragement that made it possible for me to achieve a unique and rewarding career in the space business.

Suzy Dodd

Universe

Editor
Mark Whalen

universe@jpl.nasa.gov

Universe is published by the Communications and Education Directorate of the Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109.

Classifieds

Ads submitted April 28-May 4.

For Sale

DOWNSIZING SALE: backpacking stuff, lots of math books, filing cabinets, tables, sofas, tools, etc.; Saturday, May 12, 8 to 6 at 10842 Terecita Road, Tujunga. 818-352-3244.

MACBOOK PRO SLEEVE, brand new, unused Incase CL60642 Icon with Tensaerlite for MacBook Pro Retina Display, 15-inch, black/gray, this is the "heathered" (tweed-look) fabric, purchased from Apple, is in the original packaging; Amazon doesn't have this model, it's $70 from Apple or B&H; can deliver to the Lab; $40 firm, cash only. dgumpertz@live.com.

Vehicles / Accessories

'17 CHEVY Camaro RS, showroom-new cond., only 200 miles, V6 auto, garnet red/blk leather, loaded with nav, hud, lane alert, performance exhaust, spectrum lighting, mint, covered & garaged, photos: https://tinyurl.com/ydhs47n7; $31,900. Call/text Chris: 818-351-9252.

PORSCHE LICENSE FRAME, brand new, solid brass with 2 brass screw covers, email for photo, $15. mb275c@gmail.com.

Wanted

RENTAL, 1 room/bathroom, 1 to 2 nights a week in Pasadena area for JPL employee, spouse and small King Charles Cavalier dog; can pay monthly or per night, would prefer separate access to room so as not to disturb other occupants. 626-221-7881 or ConfidentCanner@gmail.com.

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, quiet 1-bedroom, 1-bathroom guest house, close to JPL and Old Town Pasadena; newly updated with fresh paint, laminate and tile flooring; kitchen w/stove, sm. refrigerator, in-unit washer/dryer, air conditioning, great view of the San Gabriel Mountains; utilities and cable paid, no smoking/no pets; $1,700 /mo. 626-398-4462 or lasrmstrs@sbcglobal.net.

ALTADENA duplex, 5-min. drive from JPL, newly renovated w/private entry on a quiet tree-lined street w/view, furn w/gas stove, refrigerator, washer/dryer, granite countertops w/glass tile backsplash, new flooring, fireplace; large living & dining rm., large bedrm + office/multipurpose area w/large closet + closet storage system, newly tiled bathrm., shared backyard access, BBQ area, fruit trees; water + trash included, shared WiFIi possible, no pets, non-smoker; $2,000/mo. 626-460-8433 or Kmora89@gmail.com.

ALTADENA house, open house Saturday, May 12 from 2-5 p.m., 2291 Navarro Ave.; fully remodeled 3 bedrooms, 2 baths, updated master bedroom w/private updated bathroom and double sinks, updated guest bath, all new flooring, paint, recessed lighting and windows; updated kitchen w/new stainless steel appliances, private 1/4 acre lot w/new landscaping and beautiful patio area and outdoor security cameras, 2-car garage w/lots of storage, new A/C and heater, laundry hookup, gas fireplace and formal dining room; less than 2 miles to JPL, pets open for discussion. $3,600/month includes gardener and water w/2-year lease. Jennifer Franklin: 818-415-8334 or jenniferbfranklin@gmail.com.

ALTADENA (91001), 2-bedroom apt., ground floor, appliances optional, freshly painted, 1 bath, fireplace, good size closets and bedrooms, carpeting TBD, gray linoleum tile (slate look) in kitchen and bath, miniblinds throughout, carport parking, storage, laundry room on site, very close to bus/JPL/Odyssey Charter School/grocery stores/shops/pharmacy/24 hour fitness, clean; $850 share or $1,700 rent entire apt. 818-370-0601.

ALTADENA (91001), furnished loft w/awesome view for lease; non-smoker to share a beautiful 4-bedroom, 3-bath house across from community garden; close to local colleges, route to Kaplan, Pasadena city schools, Caltech, walk to JPL; utilities included, central air/heat, internet access, near 210/134/110/bus/shopping/banking/entertainment/restaurants; $750/mo. 818-370-0601.

GRANADA HILLS house for lease, 4 bedrooms, 1.75 baths, 1,486 sq. feet, in quiet neighborhood near Knollwood Country Club, central air, 2-car attached garage with laundry hookup, new carpet, tiles; $2,500/month plus security deposit, no pets. homarellc@gmail.com.

PASADENA (91107), for rent/lease: Tuscan-style Villa on hills above New York Drive with views of city lights and downtown L.A., offers private gated access shared with only 7 homes; 4 bedrooms, 5 baths, 3,622 SF; 1200 Hartwood Point Drive, MLS 818001808; 12-month lease, $6,700/month. 626-796-3100, Agent@Ours.com.

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

TEMPLE CITY, newly renovated 3 bed / 2 bath house with bonus storage room / bath behind attached garage, central air, alarm system, hardwood floors, stove, refrigerator and dryer included, walk to public transport, shops, restaurants, local award-winning schools; $2,600/mo. 949-829-3090.

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), near pond/meadow, new appliances, TVs, DVD players, free wireless internet, washer/dryer, no pets. 818-952-2696 or BigMtnPrettySky@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.