National Aeronautics and Space Administration

Goddard View

Volume 11 Issue 8
September 2015

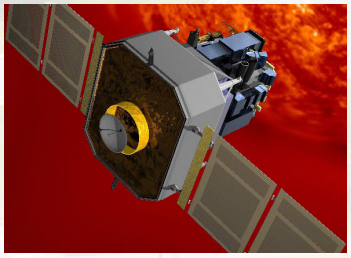
www.nasa.gov

GoddardView

TRENDING

MAVEN Celebrates One Year at Mars
The Mars Atmosphere and Volatile Evolution spacecraft completed one Earth year in orbit around Mars on Sept. 21. MAVEN, which includes instruments built at Goddard, is the first mission dedicated to studying the upper atmosphere of the Red Planet.

Goddard Scientist Awarded AGU Medal
The American Geophysical Union awarded Anne Thompson, Goddard research physical scientist, its Roger Revelle Medal for 2015. The medal recognizes individuals for "outstanding contributions in atmospheric sciences."



SOHO Discovers 3,000th Comet
The Solar and Heliospheric Observatory – a joint project between NASA and the European Space Agency – discovered its 3,000th comet on Sept. 13. SOHO launched in 1995, and its mission control operations are based at Goddard.

GEWA Opens New Store at Visitor Center
The Goddard Employees Welfare Association has opened its newly renovated gift shop at the visitor center. Goddard Associate Center Director Nancy Abell joined GEWA in a ribbon-cutting ceremony.

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On the cover: The newly arrived backplane of the James Webb Space Telescope in the clean room at NASA's Goddard Space Flight Center.

Photo credit: NASA/Goddard/Chris Gunn

NP-2015-9-334-GSFC

GoddardView Info

Goddard View is an official publication of NASA's Goddard Space Flight Center in Greenbelt, Maryland. Goddard View showcases people and achievements in the Goddard community that support the center's mission to explore, discover and understand our dynamic universe. Goddard View is published by the Goddard Office of Communications.

You may submit story ideas to the editor at darrell.d.delarosa@nasa.gov. All contributions are subject to editing and will be published as space allows.

By Elizabeth Zubritsky

A laser-based instrument for mapping the 3-D structure of Earth's forests has passed a major milestone toward deployment on the International Space Station. The Global Ecosystem Dynamics Investigation, led by the University of Maryland, College Park, and built by NASA's Goddard Space Flight Center, successfully transitioned to Phase B, moving from requirements development and mission definition to preliminary design. GEDI will provide the first comprehensive, high-resolution measurements of the vertical canopy structure of Earth's temperate and tropical forests.

These data will enable scientists to better address key questions about Earth's carbon cycle and biodiversity. NASA selected the GEDI proposal in July 2014 to join a growing suite of technologies deployed on the space station that provide key observations about Earth's environment.

"The largest uncertainties in the global carbon cycle concern the net impact of forest disturbance and subsequent regrowth on the amount of carbon stored in forest biomass and its impact on atmospheric CO2," said Ralph Dubayah, GEDI's principal investigator and a professor and assistant chair of the University of Maryland's Department of Geographical Sciences. "With these data from GEDI, we will advance our ability to model the role of forests in the carbon cycle and to evaluate the impact of potential policy actions to mitigate CO2 emissions, such as planting trees or reducing deforestation."

Forest degradation and loss is also negatively impacting habitat quality and putting increasing pressure on already fragile biological resources. By making detailed maps of forest vertical structure, the GEDI science team members, working together with forest managers and those who make environmental policy, will help protect ecosystems and the vital services they provide.

GEDI will use a system of laser beams to map the forest 3-D structure – including canopy height of Earth's forests. The instrument is scheduled for launch to the space station in 2018.

"The time is right for this mission," said Jim Garvin, Goddard chief scientist. "The technology and the algorithms are doable, the team is ready, and the science is of the highest importance. The International Space Station will give us an opportunity to make this approach work very well."

On Aug. 26, NASA's Science Mission Directorate Program Management Council granted approval for GEDI to continue to Phase B and praised the mission for its technical maturity, as well as the competency of its engineering and management teams. Michael Freilich, NASA's Earth Science Division director, lauded the mission's "peerless science."

"Our success in passing this milestone is the result of the dedicated effort of the entire GEDI team," said Dubayah. "I could not be happier with the collaboration between the University of Maryland and Goddard. The compelling science of GEDI depends upon an instrument whose lasers are capable of providing billions of highly accurate measurements of the Earth's forests and topography from space. This is a remarkably challenging engineering endeavor, but one that is uniquely suited to NASA, given its strong heritage in the deployment of space-based lidar technology." ■

Above: An aerial view of the International Space Station. The Global Ecosystem Dynamics Investigation lidar, designed to map the 3-D structure of Earth's forests, is scheduled for launch to the space station in 2018.

Photo credit: NASA

GEDI PASSES A MAJOR MILESTONE

AFTER 200 DAYS IN SPACE, ASTRONAUTS MAKE A LANDING AT GODDARD

By Jenny Hottle

Astronauts Terry Virts and Samantha Cristoforetti spent 200 days conducting some of the most complex science experiments in a zero-gravity environment aboard the International Space Station. Three months after returning, Virts and Cristoforetti are now dedicating part of their time to sharing their spaceflight adventures with the public and inspiring future generations of space explorers.

In September, in front of a packed auditorium, both astronauts presented their experiences during a visit to NASA's Goddard Space Flight Center.

Along with Russian cosmonaut Anton Shkaplerov, they returned to Earth in June aboard a Soyuz spacecraft after serving on Expeditions 42 and 43 aboard the space station. Cristoforetti worked as a flight engineer on both expeditions. Virts worked as a flight engineer on the former and commanded the latter.

During their video presentation, the astronauts recalled projects and everyday tasks such as using 3-D printers to make a wrench, going on a spacewalk and even attempting to cut each other's hair.

"Life in space is fun. It's also a lot of hard work," said Virts. "It's a very busy 200 days. It takes a lot of effort to keep all of the pieces and parts of the space station moving."

Having graduated from the U.S. Air Force Academy, Virts is also a military pilot with more than 3,000 flight hours in more than 40 different aircraft. He was selected as a NASA astronaut in 2000 and piloted STS-130, an Endeavour mission to the space station, in 2010.

"The biggest part of a mission is training for it," Virts said of his latest trip to the orbiting laboratory. "We did a lot of training on the ground to learn about the types of scientific experiments we would do in space."

Cristoforetti, a member of the European Space Agency's astronaut corps since 2009, holds the record for the longest single spaceflight by a woman after her latest voyage. She is the first Italian woman in space and also holds the record for the longest uninterrupted spaceflight by a European astronaut. She attended Space Camp in Huntsville, Alabama, during her teenage years and is its second alumna to fly into space.

In addition, Cristoforetti is the first astronaut to brew an espresso outside of Earth. On weekends, when the astronauts had some downtime, they built an espresso machine that had been planned for several years.

"I was contacted a couple of years ago before the flight by an Italian espresso company," she said. "I started to put people in contact, and then there was this project to put together an espresso machine. I thought, 'This is a crazy, but motivated, team.'"

During additional free time, the astronauts chatted with family and friends over the phone and had dinner with their Russian colleagues.

The international effort of space exploration helps bring countries together for a common goal, according to Cristoforetti.

"When you have a common interest, you can't afford to let differences deteriorate or escalate," Cristoforetti said. "We should work together as much as possible to get things done in the world." ■

Center: NASA astronaut Terry Virts (left) and European Space Agency astronaut Samantha Cristoforetti (right) pose with Goddard Center Director Chris Scolese. Photo credit: NASA/Goddard/Debora McCallum

Opposite (top): ESA astronaut Samantha Cristoforetti talks about returning to Earth aboard a Soyuz spacecraft during a video presentation given to a Goddard audience. Photo credit: NASA/Goddard/Debora McCallum

Opposite (bottom): Astronauts Terry Virts and Samantha Cristoforetti sign lithographs for Goddard personnel. Photo credit: NASA/Goddard/Debora McCallum

OPEN HOUSE SNEAK PEEK: EXPLORE

By Ashley Morrow

Since it last opened its gates to the public in 2011, NASA's Goddard Space Flight Center has seen rapid growth and discovery in its four science disciplines: astrophysics, Earth science, heliophysics and planetary science. At Explore@NASAGoddard on Saturday, Sept. 26, 2015, the public will have an opportunity to learn about the center's most recent scientific missions and findings.

In an organization of about 1,000 scientists working on advanced research, in addition to numerous technologists and engineers, Goddard Chief Scientist Jim Garvin said it's impossible to choose a top achievement. "It's like trying to rank quarterbacks in college football," he said. "Who knows? They all play better than I could ever walk."

Science missions at Goddard serve both as a magnifying glass on our own planet and as a telescope to the rest of the universe. Much of the center's effort currently balances the two, focused on finding and exploring worlds like our own, as well as studying the world we live on to improve our lives here.

Hubble and Beyond

NASA's Hubble Space Telescope, operated and serviced by Goddard and celebrating its 25th launch anniversary this year, and NASA's Kepler mission began a study of planets outside our solar system – collectively called exoplanets – in the mid-1990s. The Kepler mission specifically searches the Milky Way for Earth-sized and larger planets in stars' habitable zones, or the areas around stars where planets offer environmental conditions that can support liquid water on their surfaces.

Two astrophysics missions under construction at Goddard, the James Webb Space Telescope and the Transiting Exoplanet Survey Satellite will take exoplanet exploration one step further.

"If TESS works how the folks building it think it will, we'll have a thousand exoplanets discovered and classified," Garvin said. "In a sense, it's a recon mission. They will be used as targets for the Webb telescope and beyond."

Goddard employees will provide Explore@NASAGoddard visitors a closer look at TESS, the Webb telescope and some of the other missions associated with exoplanet exploration. There will be opportunities to learn about Hubble from the experts as well as a chance to see where engineers are building the Webb telescope and other spacecraft.

Goddard's Role in the Journey to Mars

As exploration of these outer planets begins, Goddard scientists have definitively found signs of what we would call the building blocks of life on other planets in our own solar system.

NASA launched the Mars Science Laboratory Curiosity rover in November 2011 to determine Mars' potential habitability. Sample Analysis at Mars, a suite of instruments on Curiosity built by Goddard scientists and engineers with colleagues in France and at NASA's Jet Propulsion Laboratory, discovered evidence of organic molecules on the Red Planet in December 2014.

"The discovery gives us hope that we could find a record of ancient life on Mars," Garvin said. "Ten or 15 years ago,

GODDARD'S LATEST SCIENCE

when we started what became Curiosity, a lot of people said we couldn't do this. But we did it, thanks to Paul Mahaffy's team. We found something this cool that'll shape how we explore Mars for the next 50 years."

Visitors can see a full-scale model of the Curiosity rover and chat with scientists who use its data, as well as explore other Goddard Mars missions, during the open house. Garvin himself will speak about Goddard's work on Mars.

Understanding Magnetic Reconnection

Newer missions are no less important to Goddard scientists' current studies. The Magnetospheric Multiscale mission, launched in early 2015 to study magnetic interaction between Earth and the sun, has sent back its earliest glimmers of data about solar phenomena.

MMS consists of four honeycomb-shaped spacecraft that fly in a tetrahedral formation to observe magnetic reconnection. A full model of one of the spacecraft will be on display at the open house.

"We've flown funny-looking satellites that look at the Earth or that look out, but doing so with four big smart satellites, all inter-cooperating, as we study something really complicated, is amazing," said Garvin.

Magnetic reconnection can cause solar storms, flares and other violent space events, which can cause beautiful effects on Earth such as aurorae as well as adverse reactions like power blackouts. Explore@NASAGoddard will feature a game through which visitors can understand how solar storms create aurorae.

Circling Back to Earth

While it is easy to see how the study of solar events might help protect Earth's inhabitants, they also affect, to some extent, the ability of scientists to understand our home planet.

"I don't see space as a final frontier," Garvin said. "It's the forever frontier because we live in space. Earth is our lifeboat in the universe."

The Goddard Earth Sciences Division currently focuses on understanding the changes – such as sea level rise and ice melt – that the planet undergoes as a result of climate variation. Visitors will have the chance to handle a real Greenland ice core – a piece of ice drilled from Earth – and use it as a tool to determine how past climate events occurred. Scientists will also speak about Landsat, Terra and other Earth-observing missions throughout the day.

The science at Goddard comes full circle as the understanding of regulating factors on Earth aids in the development of other missions.

"The work our science and engineering people do is amazing," Garvin added. "You haven't seen anything yet." ■

Above, left: A self-portrait taken by the Mars rover Curiosity. A full-scale model of the rover will be on display at Explore@NASAGoddard. Photo credit: NASA

Above, right: A scientist deploys sensors on the surface of the Greenland ice sheet. Scientists from the Goddard Earth Sciences Division will discuss melting ice on Greenland and other climate events during Explore@NASAGoddard. Photo credit: NASA/Goddard/Jefferson Beck

EMPLOYEE SPOTLIGHT

Goddard is pleased to welcome these new employees to the NASA community.

Kristin Ferencik

Code 763, Pathways Student Trainee; Wallops Information Technology and Communications Branch

Why Goddard?: I love all of the innovative technology NASA uses.

Hobbies/interests: hiking, swimming, reading

Neil Mallik

Code 450, Human Space Flight Deputy Network Director

Why Goddard?: Allows me to play a major role in furthering human exploration of space.

Hobbies/interests: working out, cars, soccer

Jenny Hottle

Code 130, Pathways Intern

Why Goddard?: I have dreamed about being part of this great agency.

Hobbies/interests: volleyball, traveling, University of Maryland football and basketball games

Jeremy Knittel

Code 595, Mission and Trajectory Design Engineer

Why Goddard?: Who wouldn't want to get paid to design interplanetary spacecraft trajectories?!

Hobbies/interests: tennis, biking, skydiving, sailing, kayaking

John Yorks

Code 612, Research Physical Scientist

Why Goddard?: It is a great environment to do impactful research and develop new technologies.

Hobbies/interests: family, ice hockey, traveling

Marta Shelton

Code 569, Engineering Trainee

Why Goddard?: I have been studying what it takes to have a successful mission, and now I'm happy to be a part of it.

Hobbies/interests: science fiction, math, puzzles, parasailing

Kenji Numata

Code 554, Electronics Engineer

Hobbies/interests: family, drums, guitar, technology

VISITOR CENTER UNVEILS NEW WEBB EXHIBIT

By Clare Skelly

As the backplane of the James Webb Space Telescope arrived at NASA's Goddard Space Flight Center, the center's visitor center put the finishing touches on a new astrophysics exhibit dedicated to the next generation space telescope. As Webb's assembly continues, the exhibit allows space enthusiasts and others to learn more between now and a 2018 launch date.

A ribbon-cutting ceremony on Sept. 14 officially unveiled the exhibit to Goddard members on the Webb team.

"This exhibit is a way to inspire the next generation of kids. It's not just about the importance of scientists and engineers, but for them to think, 'I want to work at NASA,'" said Bill Ochs, project manager for the Webb telescope, just before cutting the ribbon.

Kristin Metropoulos, program manager at the Goddard Visitor Center, and Lynn Chandler, communications officer for the Webb telescope, worked together on the exhibit for more than a year.

"There are so many fascinating parts of the Webb telescope that we really had to consider what aspects have the biggest 'wow' factor," Chandler said.

Colorful walls feature Hubble Space Telescope images and frame the interactive displays intended to entice visitors. Visitors can view their reflections on a scaled model of one of Webb's primary mirror segments. On the actual telescope, 18 of those segments in three panels will deploy after launch and come together to form the largest mirror ever flown in space. The mirror, six times larger than Hubble's, will allow Webb to see distant and faint objects in deep space.

Two interactive camera displays explain infrared light and the advantages of infrared telescopes. To create an infrared image, one camera senses heat radiating from visitors' bodies and assigns different colors based on temperature. In space, infrared light can travel through dust that blocks visible light emissions.

The Webb telescope will look at the universe in infrared light and observe the first galaxies to form after the big bang. Hubble has a near infrared camera, but the Webb telescope's infrared capabilities will be much more powerful.

"Hubble answered questions we didn't even know to ask, and we'll get the same results with Webb," added Chandler.

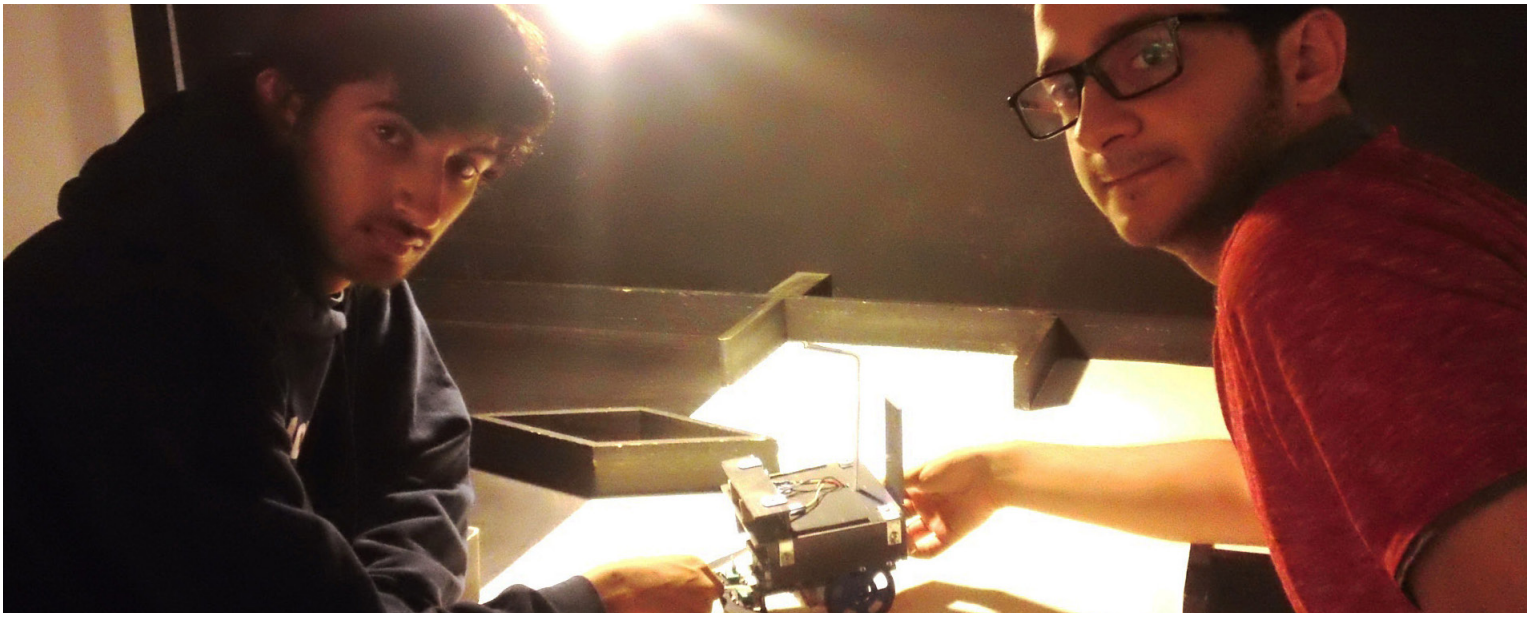
Multiple touchscreen kiosks also allow visitors to take virtual 3-D tours of the Webb telescope and learn about the telescope's parts, optics, instruments and systems – some of which were made and tested at Goddard.

While Goddard manages the overall effort, the Webb telescope is a global project. The international collaboration includes the European Space Agency and Canadian Space Agency.

"Without everyone in this room, across the country, over in Europe and up in Canada, there would be no exhibit here," Ochs added. ■

Above: Kristin Metropoulos (left), program manager at the Goddard Visitor Center, and Bill Ochs, project manager for the James Webb Space Telescope, prepare to unveil the new Webb exhibit at the visitor center during a ribbon-cutting ceremony on Sept. 14.

Photo credit: NASA/Goddard/Debora McCallum



By Max Gleber

Every summer, the New York City Research Initiative gives students and teachers the opportunity to work with scientists from NASA's Goddard Institute for Space Studies on NASA research projects. Each team in the program consists of a high school student, a college undergraduate, a high school teacher and a scientist.

"We really want to inspire our teachers, students, interns and communities with the great work NASA is doing," said Matthew Pearce, an education program specialist at GISS. "And they're bringing what they learned back to their classrooms."

Twelve teams this summer worked on such projects as building nanosatellites, creating climate models for the West Africa drought, measuring the heat island effect in New York and examining exoplanet biology.

Francesca Lingo, a sophomore at the City College of New York, is working alongside high school student Jonathan Chin and high school teacher Marianne Woody to understand how global climate conditions could have influenced the formation of life. She heard about the NYCRI program when Pearce spoke at her school about NASA opportunities for university students.

"Other programs won't tell you exactly what type of research they'll have you do," Lingo said. "But when I told Pearce my interest in astrobiology, he said he could absolutely find a fit for me."

Teachers in the program formulate NASA STEM curricula for their classes and receive guidance from their project's NASA scientist.

"My school holds an underserved population, with 95 percent of my students under a certain poverty rate," said Stephanie Stern, a computer education teacher who is studying ancient plant fossils under GISS scientist Dorothy Peteet. "Because of programs like NYCRI, my students understand there are opportunities out there."

NYCRI requires its participants to communicate their findings. Participants attend research seminars and a final summit with other government agencies, including the National Science Foundation, National Oceanic and Atmospheric Administration, the U.S. Department of Education and the U.S. Department of Defense.

"Right now, we're putting all of our work together in a poster, a PowerPoint presentation and a scientific paper," said Cassandra Kopans-Johnson, a senior at Horace Mann School in New York. "We're setting up the foundation for future work on how climate change is impacting ocean circulation. It's amazing that a high school student like myself can walk into this world of NASA and take that experience back to the classroom."

NYCRI encourages science, technology, engineering and math students and teachers in New York state, New Jersey, Connecticut and Maryland to apply for the program.

"NYCRI has a tremendous opportunity to affect underserved students, not only in elevating school programs and inspiring students, but also to improve and support STEM education in the region," added Pearce. "All of our teachers are becoming STEM experts and bringing classrooms to the cutting edge of science." ■

Above: NYCRI interns Sandeep Singh and Mohammid Fardos work on designing, constructing and programming an autonomous robot.

Photo credit: NASA/Goddard Institute for Space Studies

NYCRI ENGAGES STUDENTS AND TEACHERS IN NASA'S WORK

HACE LUNCHEON CELEBRATES HISPANIC HERITAGE MONTH

The Hispanic Advisory Committee for Employees at NASA's Goddard Space Flight Center, in partnership with the Goddard Flight Projects Directorate Diversity and Inclusion Committee, hosted its annual luncheon in observance of Hispanic Heritage Month.

Sandra Cauffman, deputy system program director for the Geostationary Operational Environmental Satellite R-Series program and former deputy project manager for the Mars Atmosphere and Volatile Evolution mission, delivered the keynote remarks. She spoke about being a Hispanic woman working in science, technology, engineering and math – or STEM – and shared her thoughts on the importance of diversity and inclusion within NASA.

Members of Arte Flamenco – a flamenco dance studio in Laurel, Maryland – performed for the attendees.

Observed from Sept. 15 to Oct. 15, Hispanic Heritage Month recognizes the contributions of Hispanic and Latino Americans to the United States and celebrates the group's heritage and culture. ■

Photo credits: NASA/Goddard/Debora McCallum

NASA Goddard Opens Its Doors

National Aeronautics and Space Administration

SAVE THE DATE!

- Explore the home of the Hubble Space Telescope
- Learn about the next-generation James Webb Space Telescope
- Discover where spacecraft are built and rigorously tested
- See a full-scale model of the Mars rover Curiosity
- Engage in Earth science satellite demonstrations
- View live close-up images of the sun
- Visit Goddard's robotics facilities
- Enjoy live music and other entertainment
- Play games and test your science knowledge
- Build LEGO® spacecraft
- Meet with NASA astronauts
- And much more!

Saturday, Sept. 26, 2015

NASA's Goddard Space Flight Center welcomes the public for a free open house event for all ages on Saturday, Sept. 26, 2015, from 11 a.m. to 5 p.m. We invite you to visit our center in Greenbelt, Maryland, for a day of activities, tours and hands-on demonstrations. Explore@NASAGoddard will engage visitors in Goddard's work in Earth science, heliophysics, planetary science, astrophysics, and engineering and technology.

In celebration of the Hubble Space Telescope's 25th anniversary, this year's theme will be "Celebrating Hubble and the Spirit of Exploration."

Bring your family and friends and come learn about the extraordinary work we are doing to better understand our dynamic universe. For more details, including parking information, please visit www.nasa.gov/explorenasagoddard.

#ExploreGoddard

Public parking will not be available on center. Free shuttle bus service will be provided from nearby metro stations and other parking lots. See website for details.

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