

Remarks by NASA Deputy Administrator Lori B. Garver  
Intrepid Sea, Air, and Space Museum  
New York, New York  
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Thank you for that introduction and good morning to you all.

It is a pleasure to be here on this amazing vessel. The view of the city is truly awe inspiring.

Speaking of awe-inspiring, I'd like to show you a video...[run video]...Now from Starship Enterprise back to the Intrepid.

The USS Intrepid and NASA share a rich history. Some of you may know that as a recovery vessel for NASA, she recovered Mercury astronaut - Scott Carpenter and his Aurora 7 capsule (May 24, 1962) and Gemini astronauts John Young and Gus Grissom, Gemini 3. Mercury and Gemini set the stage for Apollo, and this year we celebrate Apollo 12's 40<sup>th</sup> anniversary. You can see these displays on the second deck in the Exploreum... And of course, all of this led to the Space Shuttle, and I had the privilege of seeing the launch of Space Shuttle Atlantis from Florida earlier this week.

Since 2003, NASA has enjoyed being a part of the annual Kid's Week at the Intrepid, which occurs each spring. I understand NASA Day continues to be one of the most popular attractions here at the Museum.

Today, at the Intrepid, Scouts are being recognized. There is an amazing correlation between kids that achieve the rank of Eagle Scout or Gold Award and their future success in life. I am a true believer in the power of the young generation, and today I want to talk with you about how those in science, technology, engineering, and mathematics fields who work at NASA develop innovations that help us all. I hope some of you will consider pursuing a career in a science or technical field.

As for New York, a little known fact is that the Empire State has the second largest number of astronauts.

NASA has over \$53M in contracts and grants in New York (2007 figure), and New York industries and academia are vital to NASA's mission. These successful partnerships have directly benefited America's continuing quest to explore our universe and better our lives here on Earth. For example, the Goddard Institute for Space Studies in Manhattan is a laboratory of the Earth Sciences Division at Goddard Space Flight Center and a unit of the Columbia University Earth Institute that studies global climate change.

As I speak, NASA has fifteen Earth science satellites and instruments orbiting the Earth that are studying our oceans, atmosphere, land, biosphere and cryosphere. Several more are planned in the near future.

But what if I told you there was a way for every water manager, city planner, farmer, boy scout and girl scout to fly alongside these NASA spacecraft – without ever having to leave their computer? That is what the amazing Global Climate Change web site at [climate.nasa.gov](http://climate.nasa.gov); and its Eyes on Earth 3D feature can do. Think of it as a way to check Earth's vital signs. This Global Climate Change web site offers an astounding amount of information about our environment in a dynamic, interactive format.

With the Climate Time Machine you can explore the sea level from space, track the arctic sea ice, carbon dioxide levels in the atmosphere, map global temperatures, and see the 10.5 million square miles of the ozone hole. The Eyes on the Earth 3D feature displays our satellites as they orbit, in real time and with actual data that is no more than three or four hours old. You can see how the Earth's temperatures and climate have evolved, track how the satellites' orbits overlap, switch your view to that of the satellite itself, where you can zoom in and fly along. You can compare each individual spacecraft to a car or a scientist, and there are blogs and even a game that measures the relationship between carbon dioxide and Earth's cities. You can create maps of the data that in some cases can be displayed in three dimensions.

Taking the pulse of our planet isn't just for scientists. It's something everyone can do—whenever you can turn on your computer. So using this NASA data, those who actually need this information can benefit from the government's investment in these spacecraft. The return to the taxpayer is in the utilization of the data and this is an innovative way to distribute critical scientific information. Now you can take our planet for a spin, without even leaving the ground!

Providing public value could not be more important. NASA's budget must compete with many other valuable scientific programs and vital government services. To earn our trust from the taxpayers, we must help create a better future through programs that are aligned with both short and long term national interests. We then must better explain what we do – and show that value lies in all of our missions.

Many of the benefits we get from our civil space program come from innovative technologies, technologies designed to reveal new scientific truths but which also enhance our understanding of the world we all live in. A collaboration featured in this year's NASA Spinoff magazine is with Early Warning, Inc of Troy, New York.

In order to help detect biological traces on Mars, scientists at Ames Research Center began work on an ultrasensitive biosensor in 2002. Early Warning Inc. initially developed a working version of the NASA biosensor calibrated to automatically detect pathogenic bacteria, viruses and parasites in water. The Biohazard Water Analyzer detects actual pathogens within three hours in a water line or water/food/biotech plant at a lower cost, a drastic improvement over typical laboratory-based water sampling, which can take several days to a week.

One of my favorite innovative NASA technologies that promises enormous benefits is a project I learned about at Ames Research Center a couple of weeks ago. We are looking at a way to use algae to produce clean biofuels for jet fuel. You might ask why is NASA involved in this research? What do we bring to the table that the Department of Energy and others do not? It is the unique NASA perspective of systems engineering combined with our ability to look at closed life cycle systems that is so crucial. This NASA project is called OMEGA for Offshore Membrane Enclosure for Growing Algae. Growing algae for fuel is not a new idea, but growing freshwater algae in the ocean is. In the OMEGA project, plastic bags filled with sewage are dropped to float in the ocean. Algae are placed in the sewage-filled bags that have material we developed originally for recycling astronaut's wastewater on long space missions. Inside the bags, the algae eat the sewage, and produce a fat-soluble oil molecule that can be used later for fuel. The bags let freshwater out but keep saltwater from coming in. Oxygen and fresh, cleaned water are released into the ocean. All that is needed for the process are water, sewage, solar energy and carbon dioxide. The plastic bags can last three years, and the end result, oil for fuel, fertilizer and fresh water are produced basically energy-free. Someday, millions of acres of these floating bags could produce enough oil for aviation and other uses, 21 billion barrels a day, and help solve the planet's energy needs.

Another example of NASA innovation providing hope for our future comes from the Marshall Space Flight Center. When disaster struck in the Dominican Republic last spring, officials knew just where to get help, thanks to a NASA project called SERVIR. In Spanish, SERVIR means "to serve" and NASA, in a partnership with the U.S. Agency for International Development (USAID), uses satellite imagery to zero in on locations where destruction has taken place, perhaps from a hurricane, earthquake, fire, or in the case of the Dominican Republic, a massive flood around Lake Enriquillo. Researchers combine satellite data with observations made on the ground and create a real-time map of the crisis points. With a glance at the computer screen, officials know where the most severe damage had occurred and can best route help more quickly. Historical data in the NASA archives was also used to look and compare this flood with past flooding events. The Lake Enriquillo map was even published on the front page of the Dominican Republic's largest newspaper "Hoy"—providing critical information to the general public. The SERVIR project currently operates in Central America, East Africa, and soon, the Himalaya Mountain region. What can this NASA technology do? It can save lives in an emergency and it helps protect the environment.

Today NASA programs are revealing the world with details, depth and clarity --literally. A few years ago, NASA's Jet Propulsion Laboratory and Cornell University designed a special high-resolution camera called "Pancam" for the Mars rovers Spirit and Opportunity. Each of the twin rovers is equipped with a Pancam able to tilt 180 degrees and rotate 360 degrees, so the robotic geologists can snap photos in all directions. Special software stitches individual 1-megapixel digital images together into a high-resolution panorama and smooths out any anomalies. Applying that technology and software is now revolutionizing the art and science of photography.

Anyone can take pictures using a common digital camera and the commercially available Gigapan camera mount. Those photos are downloaded to a computer and software "stitches" them together into one large image -- a "Gigapan", which stands for gigapixel panorama. I invite you to visit the Gigapan.org site for amazingly detailed views of the USS Intrepid. (As a side note, NASA had Gigapan cameras at the Presidential Inauguration. That image continues to be the most popular of all the images on the site).

NASA benefits us all by providing the data to read our planet's vital signs in real time, by creating advanced technologies that could produce green energy for transportation, by merging space and ground data to help disaster victims, and by using the International Space Station for medical research... all of these examples tell us how much NASA contributes to improving life on Earth. And did you know that the International Space Station is orbiting overhead every 90 minutes? Here in New York, you can actually see it with optimal viewing through November 30<sup>th</sup>. Search on "ISS sightings" for actual viewing times (website is <http://www.jsc.nasa.gov/sightings/>).

Speaking of ISS, we recently had the return of our longest serving "astronaut". Yes, Buzz Lightyear was up on station for more than fifteen months. When you go to the NASA website, you can play online games and play a series of six different games with Buzz on ISS.

As I said earlier, the International Space Station is currently orbiting overhead. One of the really exciting experiments is called, "Butterflies in Space". It was built by experts in the University of Colorado in Boulder (UCB) Aerospace Engineering Department and will be monitored by thousands of students from around the United States to compare the on-orbit "butterflyonauts" with their control group counterparts on the ground. Anyone can view their progress at <http://www.bioedonline.org> or follow them on Facebook and Twitter. Buzz Lightyear and the Butterflyonauts are two examples of how NASA is engaging you in our exploration quest. Through new technologies you are helping us discover answers to scientific questions real time!

So, in summary, NASA is committed to meeting new challenges such as those that impact our environment, energy, health and economy. We will increase our investment in innovation and technology that will help create not only the industries of tomorrow, but this investment can help create the valuable jobs for a growing scientific and technical workforce and will continue to inspire the children and citizens of the world. Thank you...