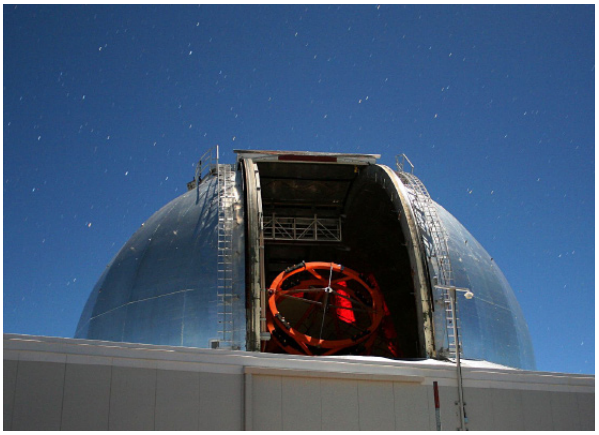
NASAfacts

A Grand Challenge: Find and Plan for All Asteroid Threats

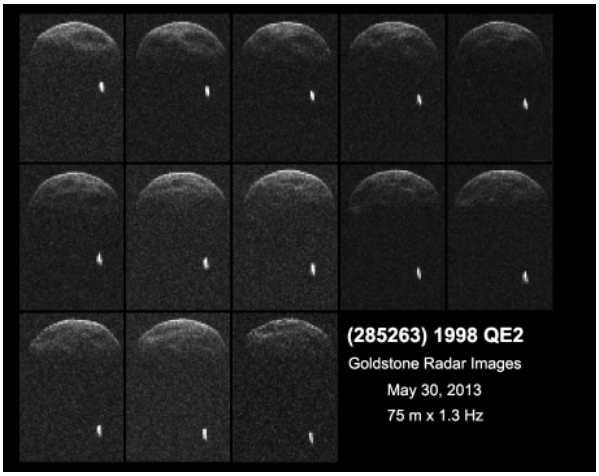
NASA anticipated the close flyby of asteroid 2012 DA14 on February 15, 2013, but the asteroid explosion above Chelyabinsk, Russia that same day was unexpected. With over 1,000 injuries and millions of dollars in damages, it was a powerful reminder of potential hazards to our home planet. The safe flyby of 1998 QE2 in May further emphasized that asteroid encounters happen more often than most people realize.

Since 1998, NASA's Near Earth Object Observation (NEOO) Program has led the global effort to find potentially hazardous asteroids, and has successfully found 95 percent of the potentially devastating 1 km wide near-Earth asteroids. More needs to be done; asteroid impacts and explosions from objects much smaller than 1 km, like the one over Russia, have the capability of rendering massive devastation. It will take a global effort with innovative solutions to find all of these potentially hazardous asteroids. NASA understands the importance of addressing this challenge in collaboration with the numerous entities around the world that have been actively working on these issues for some time. Recognizing the global importance of completing a catalog of asteroid threats, NASA is seeking to engage the world in a coordinated effort to: *Find All Asteroid Threats to Human Populations and Know What to Do About Them.*

Observatories and organizations around the world already coordinate extensively with each other and



NASA's Infrared Telescope Facility (IRTF), located at the summit of Mauna Kea, Hawaii, is a 3.0 meter telescope which can provide rapid response characterization observations of newly discovered NEOs within 24 hours (weather permitting). Over 600 asteroids have been observed to date, as small as 5-7 meters in size. Credit: NASA/IRTF.



A sequence of radar images of 1998 QE2, a 1.7-mile wide asteroid, was obtained on the evening of May 29, 2013, by NASA scientists using the Deep Space Network antenna at Goldstone, Calif., when it was about 3.75 million miles (6 million kilometers) from Earth. Credit: NASA/JPL-Caltech/GSSR.

NASA on finding and characterizing asteroid threats. Now is the time to expand the conversation regarding how we work together to meet this challenge. With the President's FY 2014 budget request, NASA intends to enhance our current ground-based detection facilities and is considering further improvements to existing programs to contribute to the global effort to find all of these threats. To know what to do about the potentially hazardous ones, NASA will expand its conversations about ways to work more collaboratively on technology development and threat mitigation. Recognizing the power of traditional and innovative collaboration – including the use of public private partnerships, citizen science, crowdsourcing, and incentive prizes, in addition to international and other cooperative partnerships – NASA will lead a dialogue addressing how to best use these methods to aid in solving this global problem, together.

As a first step, NASA is releasing a Request for Information (RFI) to gather ideas from the public. Following the RFI, NASA will host an event to discuss specific actions that can be taken to pursue innovative ideas and solutions. We will work to design an implementation plan with potential partners and continue to engage the public.

Background

In April 2010, President Obama announced a mission to send humans to an asteroid by 2025 and to Mars by the 2030s. NASA's FY 2014 budget supports an amplified focus on asteroids: a mission that combines robotic and human activities already underway to capture and redirect an asteroid and eventually send crews to it in a more cost-effective manner than other proposals, along with using innovative partnerships and approaches to help us identify and track asteroids and protect us from potential threats.

Global efforts to detect, track and characterize hazardous asteroids are important to understanding how to deal with any potential threat. Finding these objects and having a plan for dealing with them is one of the Obama Administration's 21st century "Grand Challenges" – ambitious but achievable goals on a national or global scale that capture the imagination and demand advances in innovation and breakthroughs in science and technology. Grand Challenges are an important element of President Obama's Strategy for American Innovation.

Traditional and Innovative Methods

NASA has a rich history of utilizing traditional and open innovation methods to engage a large audience of stakeholders in the pursuit if its endeavors. This effort to find all asteroid threats and have a plan for dealing with them will build upon that history.

- *Public Private Partnerships:* Under its Space Act authority, NASA works with diverse organizations in the private and public sector in order to meet wide-ranging NASA mission and program requirements and objectives. It is NASA's policy to utilize the authority granted to the Agency in the Space Act to further the Agency's missions.

- *Prizes:* NASA's successful prize program has contributed innovative solutions to NASA problems by reaching out to nontraditional audiences. The Centennial Challenges Program directly engages the public in the process of advanced technology development, and has led to new spacesuit components, robotic technology, all electric airplanes and a new class of sub-orbital reusable launch vehicles. The NASA Center of Excellence for Collaborative Innovation has found innovative solutions to NASA needs from a variety of unexpected places through the NASA Tournament Lab and the NASA Innovation Pavilion.

- *Citizen Science:* Amateur astronomers have historically contributed to the discovery of the near-Earth Objects (NEO). Because we have discovered the vast majority of the larger NEOs, the challenge of amateur astronomers directly assisting with new asteroid discovery will increase with time. However, amateur astronomers can still provide critical pieces of information for the characterization of known and newly discovered NEOs through light curve analysis. We hope to increase the number of these citizen scientists, as we anticipate a large increase in new NEO discoveries.

- *Crowdsourcing:* NASA is embracing the practice of enabling contributions from large groups of people, and especially from an online community. An example of a successful space-focused crowdsourcing effort is Galaxy Zoo, which already has hundreds of thousands of contributors from around the world classifying hundreds of thousands of galaxies using NASA's Hubble Space Telescope archive to help us understand how these galaxies, including our own, were formed.

Amateur astronomers brought more than a dozen telescopes with solar viewing filters to NASA Ames Research Center on June 5, 2012 to view Venus cross in front of, or transit, the sun.
Credit: NASA Ames/Eric James

- *International Cooperation:* Since its inception, NASA has enjoyed significant benefits to almost all of its programs through some level of international cooperation. Given the inherently global nature of this Grand Challenge, NASA plans to continue this tradition of significant international cooperation.

National Aeronautics and Space Administration

Headquarters
300 E Street, SW
Washington, DC 20546
www.nasa.gov/centers/hq

www.nasa.gov

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