PDC2017
Tokyo, Japan

IAA-PDC-17-01-05

Please send your abstract to iaapdc (at) iaamail.org

You may visit www.pdc.iaaweb.org

(please choose one box to be checked)
(you may also add a general comment - see end of the page)

X Key International and Political Developments
☐ **Advancements and Progress in NEO Discovery**
☐ **NEO Characterization Results**
☐ **Deflection and Disruption Models & Testing**
☐ **Mission & Campaign Designs**
☐ **Impact Consequences**
☐ **Disaster Response**
☐ **Decision to Act**
☐ **Public Education & Communication**

Advancement of Planetary Defense in the United States

Lindley Johnson, Rob Landis, Kelly Fast, Victoria Friedensen[(1)]
[(1)]*NASA Headquarters, 300 E Street SW, Washington, DC 20546 USA*
+1(202)358-2314, lindley.johnson@nasa.gov

Keywords: *Planetary defense, NEO, NEO survey, NASA*

ABSTRACT

NASA Headquarters recently established an office to manage the Agency's planetary defense-related projects and coordinate activities across multiple U.S. agencies as well as with international efforts to plan appropriate response to the potential asteroid impact hazard. The creation of the Planetary Defense Coordination Office (PDCO) is a logical and formal step forward with NASA's NEO Observations program which began nearly two decades ago. Since the program's inception in 1998, NASA-funded efforts have discovered more than 98% of the more than 15,000 NEOs currently known.

As important as it is to mitigate a potential impact event, the essential first step is to find these near-Earth objects as early as possible. To that end, NASA's

PDCO leads national and international efforts to:

- detect any potential for significant impact of the Earth by natural objects;
- appraise the range of potential effects by any possible object; and
- develop strategies to mitigate impact effects on human welfare.

Since commencing the program in 1998, NASA has provided funding to upgrade and operate existing 1-meter class telescopes to conduct the search for NEOs. Today, NASA funds three primary ground-based survey capabilities: the Lincoln Near-Earth Asteroid Research (LINEAR) project, the Catalina Sky Survey (CSS), and the Panoramic Survey Telescope and Rapid Reporting System (Pan-STARRS). Recent enhancements to NASA's near-Earth object (NEO) Observations Program have led to ~83% increase in the discovery rate of near-Earth asteroids (NEAs) over the past three years.

These survey efforts are increasingly detecting close encounter events (i.e., < 0.001 AU) and some small Earth impact events (e.g., 2008 TC_3 and 2014 AA). Such encounters provide opportunities for NASA's Infrared Telescope Facility (IRTF) to make spectral measurements; or, in the case of planetary radars at Arecibo and Goldstone, refine the orbit of the object with great precision and even "image" the small primitive body.

Of critical importance is the Minor Planet Center (MPC), where automated systems process observations made by the search teams. The Center for NEO Studies at the Jet Propulsion Laboratory (JPL) determines precise orbits for the objects. Both JPL and the MPC utilize processes and procedures for NEO orbit determination and prediction that are sanctioned and monitored by the International Astronomical Union (IAU) and produce data catalogues on small bodies in the Solar System that are utilized world-wide by the astronomical community.

The Wide-field Infrared Survey Explorer (WISE) was reactivated for the purpose detecting NEOs and will continue to operate well into 2017. It is in Sun-synchronous, near-polar inclination (97.5°) orbit around the Earth. The NEOWISE

project uses WISE in 'warm mode' (at 3.4 and 4.6μm), and in conjunction with ground-based follow-up, this unique dataset has set limits on population statistics, orbital parameters, approximate sizes, and initial compositional knowledge of the asteroid population.

Further follow-up observations with visible and infrared telescopes (e.g., NASA's Infrared Telescope Facility, *Spitzer Space Telescope*, other NEOO-funded research) refine the astrometric positions of an NEO, photometric observations obtain detailed light curve information [thereby constraining NEO shapes and spin state], and collect albedo and spectral data on basic physical properties and mineralogy.