International Asteroid Warning Network (IAWN)
Status Report to STSC 2018

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Representing IAWN
1 February 2018
UN Office of Outer Space Affairs
Committee on Peaceful Uses of Outer Space

Overview for NEO Threat Response

United Nations COPUOS/OOSA

Inform in case of credible threat

Parent Government Delegates

Determine Impact time, location and severity

Potential deflection mission plans

International Asteroid Warning Network (IAWN)

Observers, analysts, modelers...

Space Missions Planning Advisory Group (SMPAG)

Space Agencies and Offices
Signatories to IAWN

- KASI — Korean Astronomy Space Science Institute, Daejeon, South Korea
- INAOE - the National Institute of Astrophysics, Optics, and Electronics in Cholula, Mexico
- INASAN - the Institute of Astronomy, Russian Academy of Sciences, Moscow, Russia
- ESO - European Southern Observatory
- ESA – European Space Agency
- NASA – Includes Minor Planet Center, Center for NEO Studies, 4 major NEO search projects and several characterization projects
- University of Nariño, Pasto, Colombia
- Peter Birtwhistle, amateur astronomer, West Berkshire, England
- The Special Astrophysical Observatory (SAO)
- Kourovka Observatory, Ural Federal University
- The Institute of Solar-Terrestrial Physics (ISZF)
- CNSA – China National Space Administration
- Crimean Astrophysical Observatory
Worldwide Observing Network

Received ~22 million observations (~201,000 on NEOs) from 47 countries in 2017 (and one in space!)
Near-Earth Asteroids Discovered in 2017

Near-Earth Asteroid Discoveries by Survey
All NEAs (as of 2018–Jan–07)

https://cneos.jpl.nasa.gov/stats/

Alan Chamberlin (JPL/Caltech)

IAWN Report, Feb 2018
Known Near-Earth Asteroid Population

As of 1 Jan 2018:

17,460 NEAs

(plus 107 comets)

1,877 Potentially Hazardous Asteroids
(i.e., come within 7.5 million km of Earth’s orbit)
Recovery of 2012 TC₄

Goal:

Exercise the International Asteroid Warning Network (IAWN)

• **Recovery and Follow-up:** Recovery confirmed early August 2017

• **Characterization:** Light curves, photometry, spectroscopy, radar

• **Modeling:** Orbit determination, threat assessment and impact modeling exercises

• **Communications:**
  - Within the NEO community and with the public
  - Within governments and other agencies
Results of 2012 TC₄ Campaign

- Astronomers from the U.S., Canada, Colombia, Germany, Israel, Italy, Japan, Romania, Republic of Korea, the Netherlands, Russia and South Africa tracked 2012 TC₄.
- Close approach distance of 43,700 km (on 12 Oct 2017).
- Radar observations of 2012 TC₄ seem to indicate an oblong shape of about 6 x 12 meters in size.
- Light curve and then radar showed it tumbling with about a 12 minute period.
- Precision orbit determination was able to rule out any impact by 2012 TC₄ for the foreseeable future.
Radar Imagery of Florence

- Discovered in 1981 (1981 ET₃)
- Ranks 4th in size of large PHOs
- Came within 0.047 AU (~7 million km) of Earth on 1 Sept 2017
- 3rd NEO found to be a ternary system

Radar imagery of Florence, which measures just over 4 km across, revealed surface features along with two moonlets orbiting the asteroid. The inner moon is ~180 to 240 meters across while the outer moon is larger at ~360 meters in size.
On 19 October 2017, the Pan-STARRS 1 survey telescope on Haleakala discovered the first interstellar object; a small asteroidal body not bound to our Solar System. 1I/2017 U1 is highly elongated.
3200 Phaethon Close Approach

- Discovered in 1983
- ~5.8 km in diameter
- Came within 0.121 AU (~18 million km) of Earth on 10 Dec 2017
- Parent body of Geminids meteor shower