

---

# **International Asteroid Warning Network Report to STSC 2016**

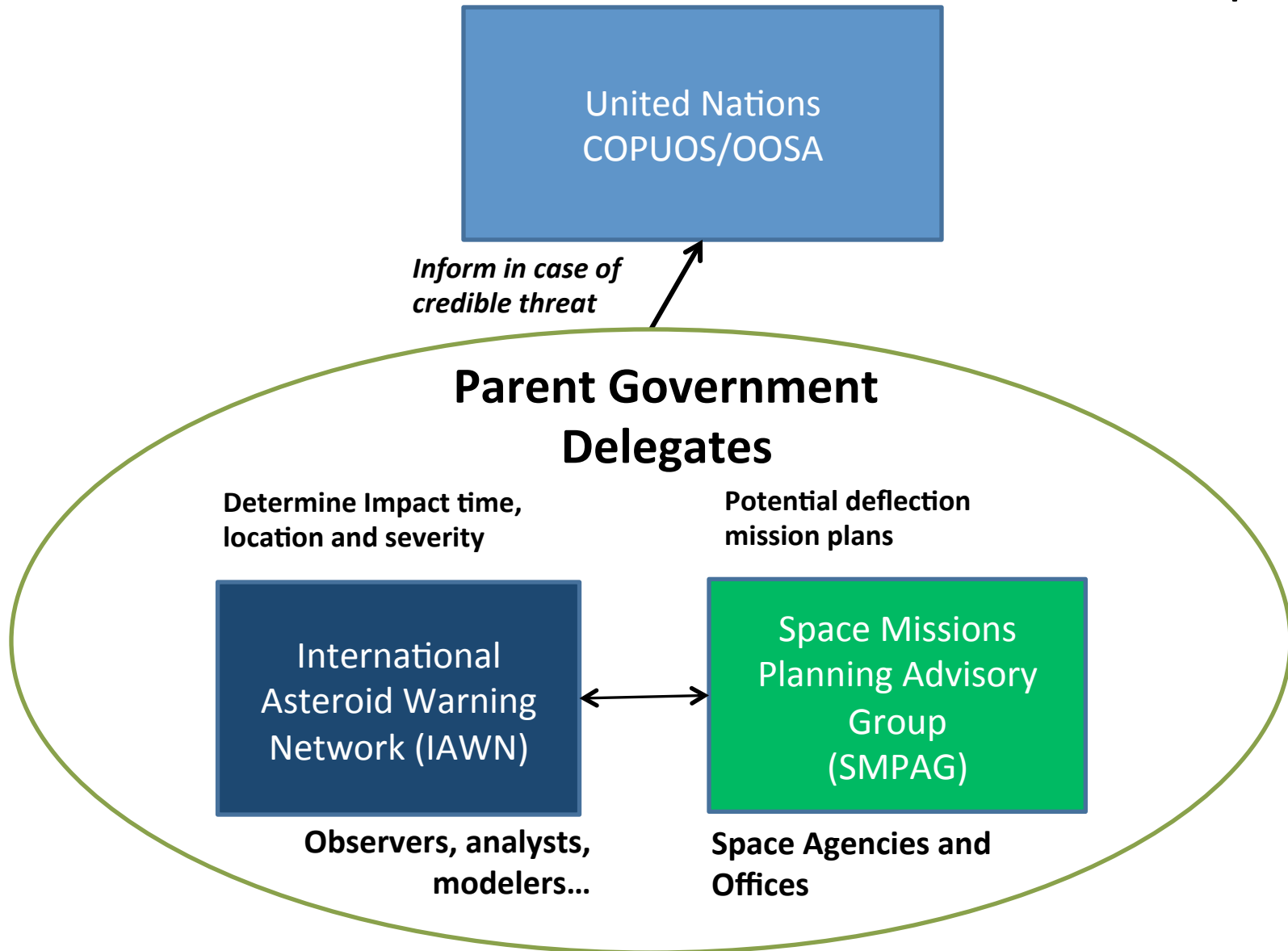
Lindley Johnson

Program Executive / Planetary Defense Officer

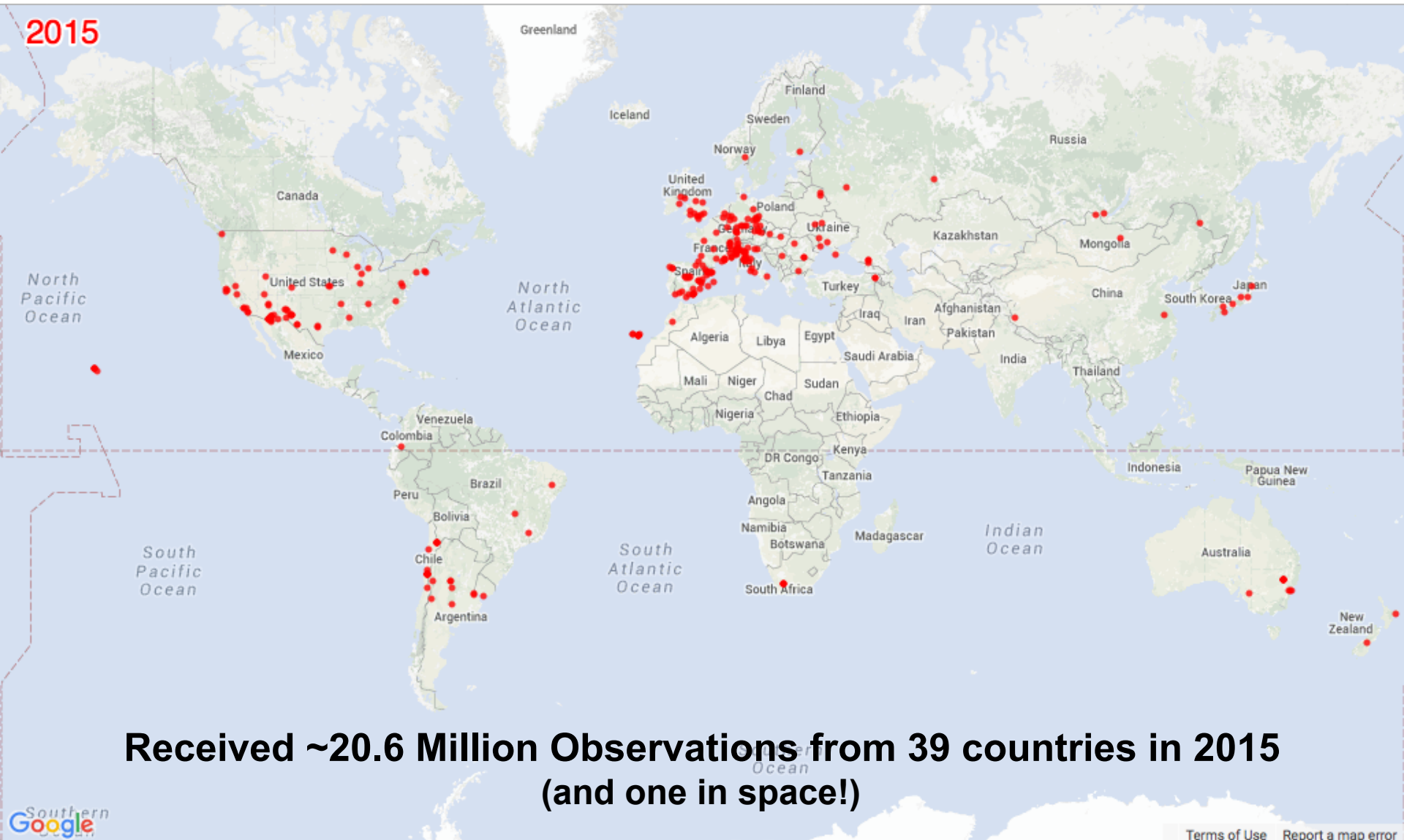
Science Mission Directorate

NASA HQ

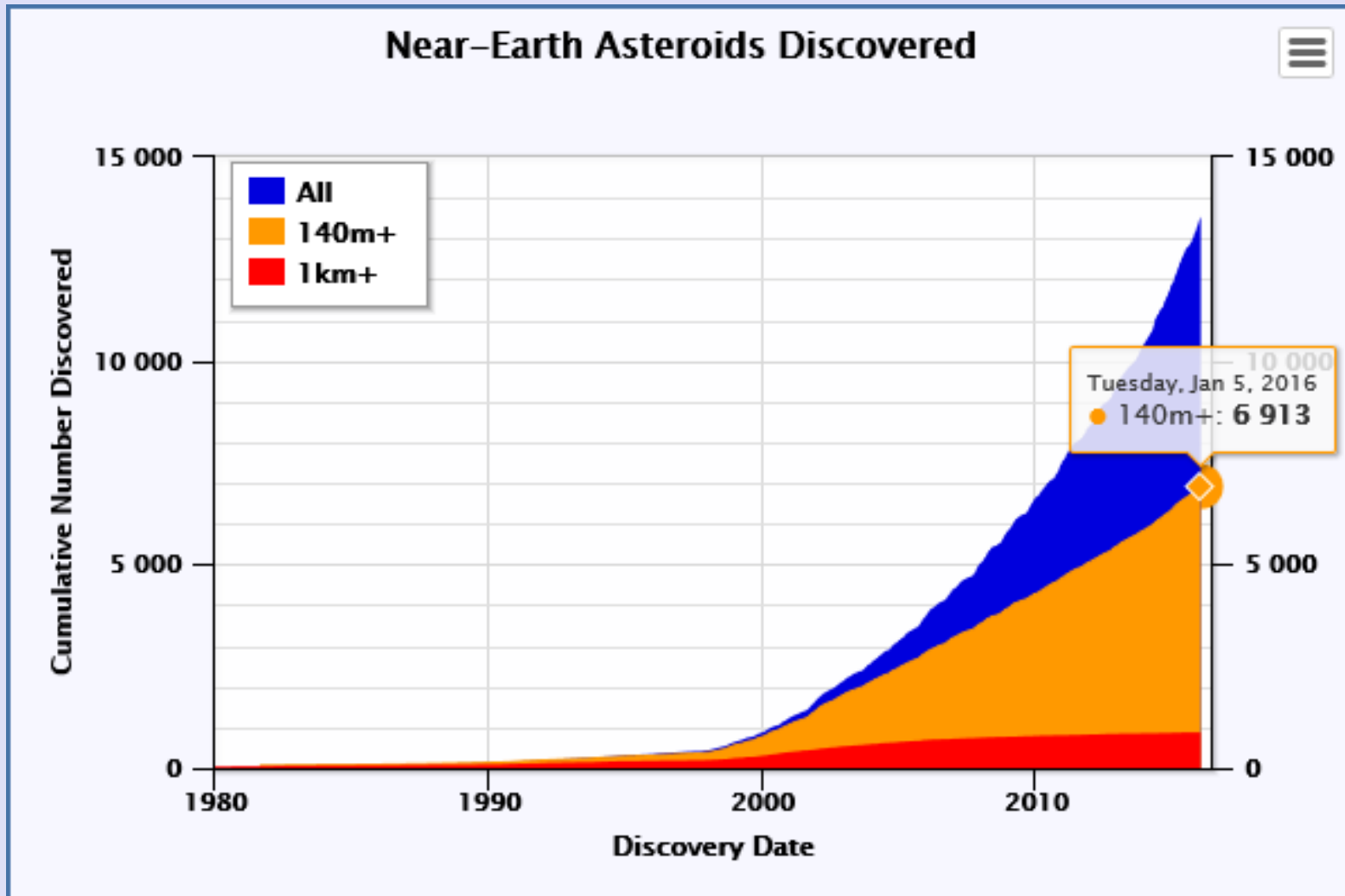
February 16, 2016



# Worldwide Observing Network



# Known Near Earth Asteroid Population



As of  
**12/31/15**  
**13,514**

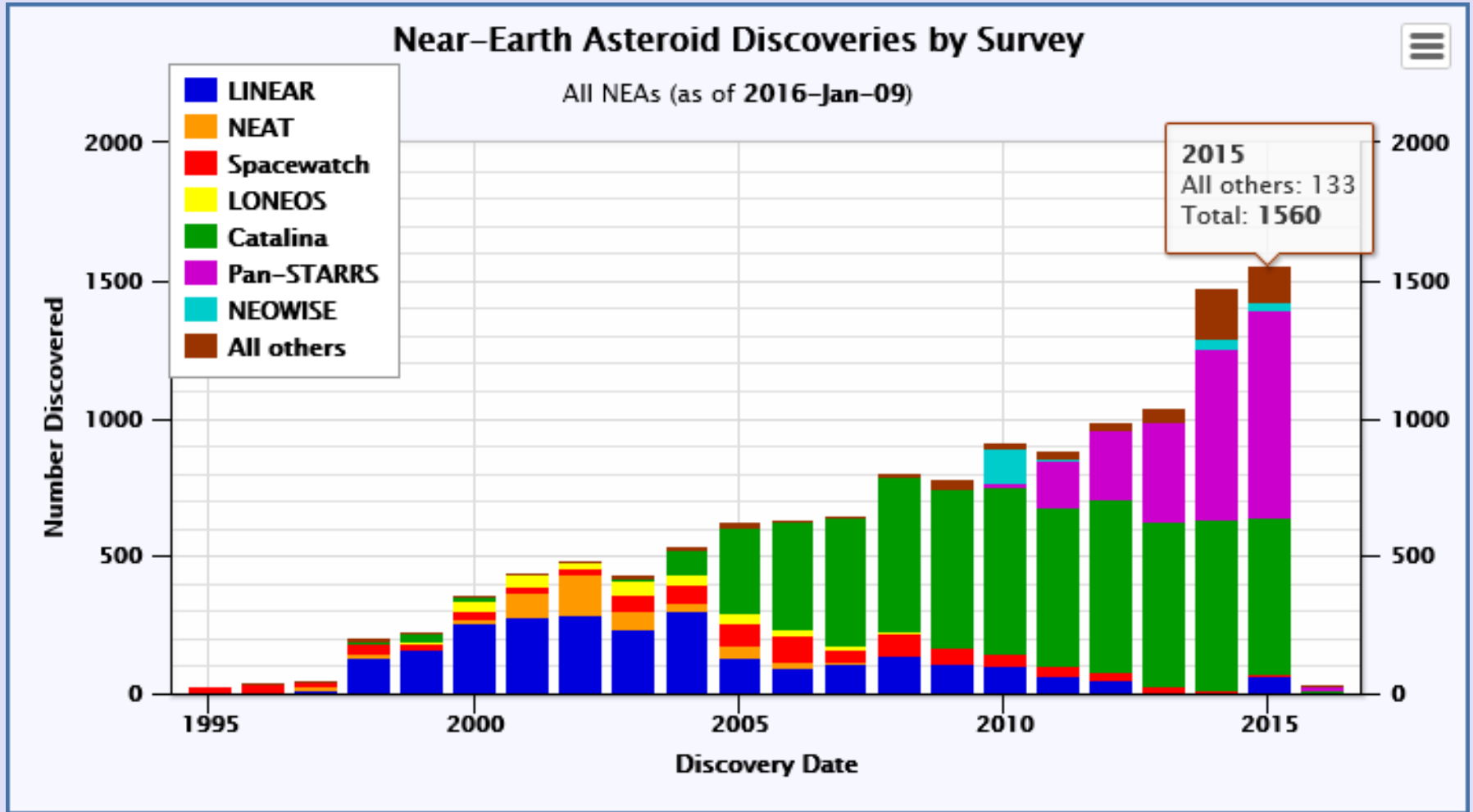
Also 104  
comets

**1650**  
Potentially  
Hazardous  
Asteroids  
Come within  
5 million miles  
of Earth orbit

**878**  
**153 PHAs**

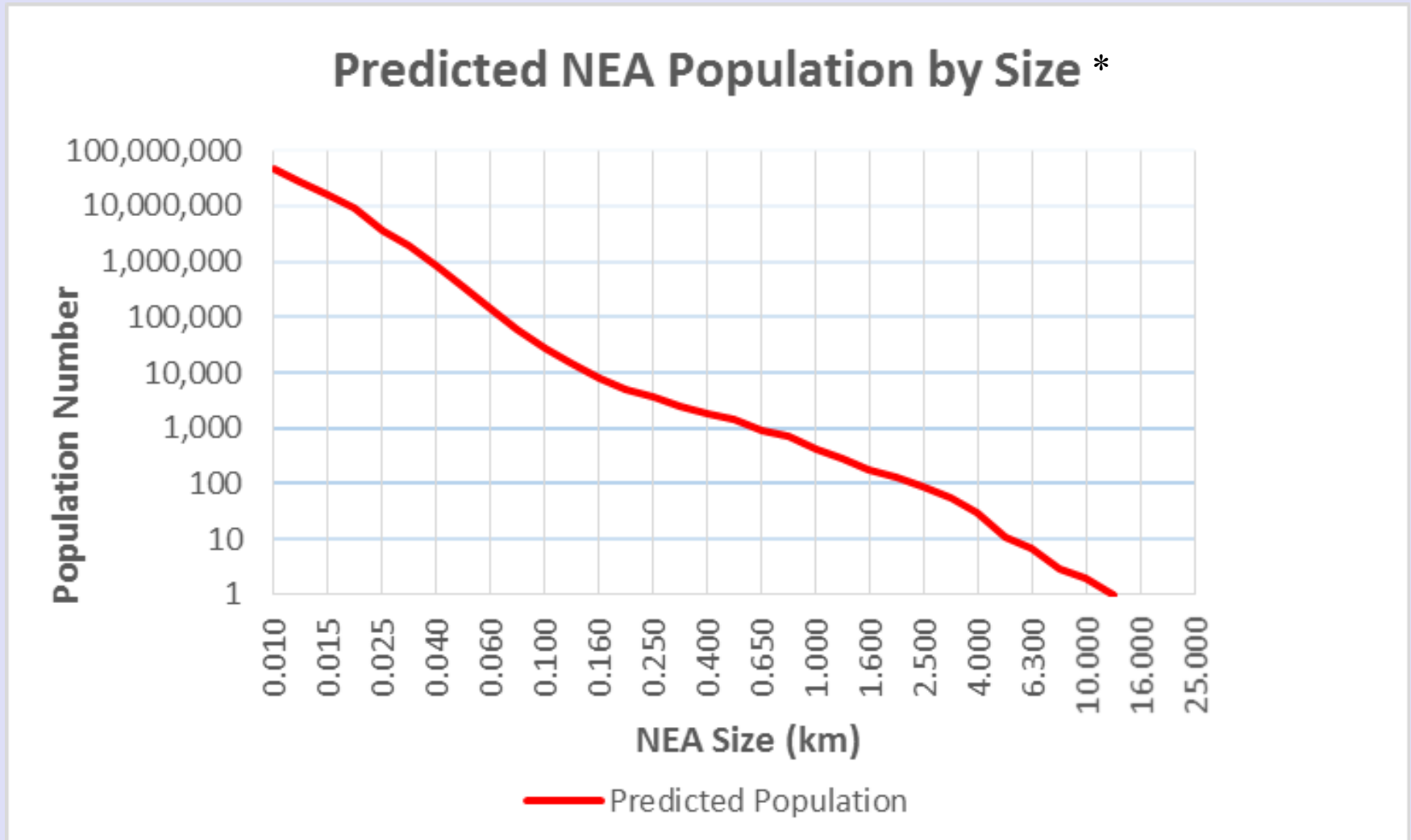
All statistics available at <http://neo.jpl.nasa.gov/stats/>

# Growth in Capability



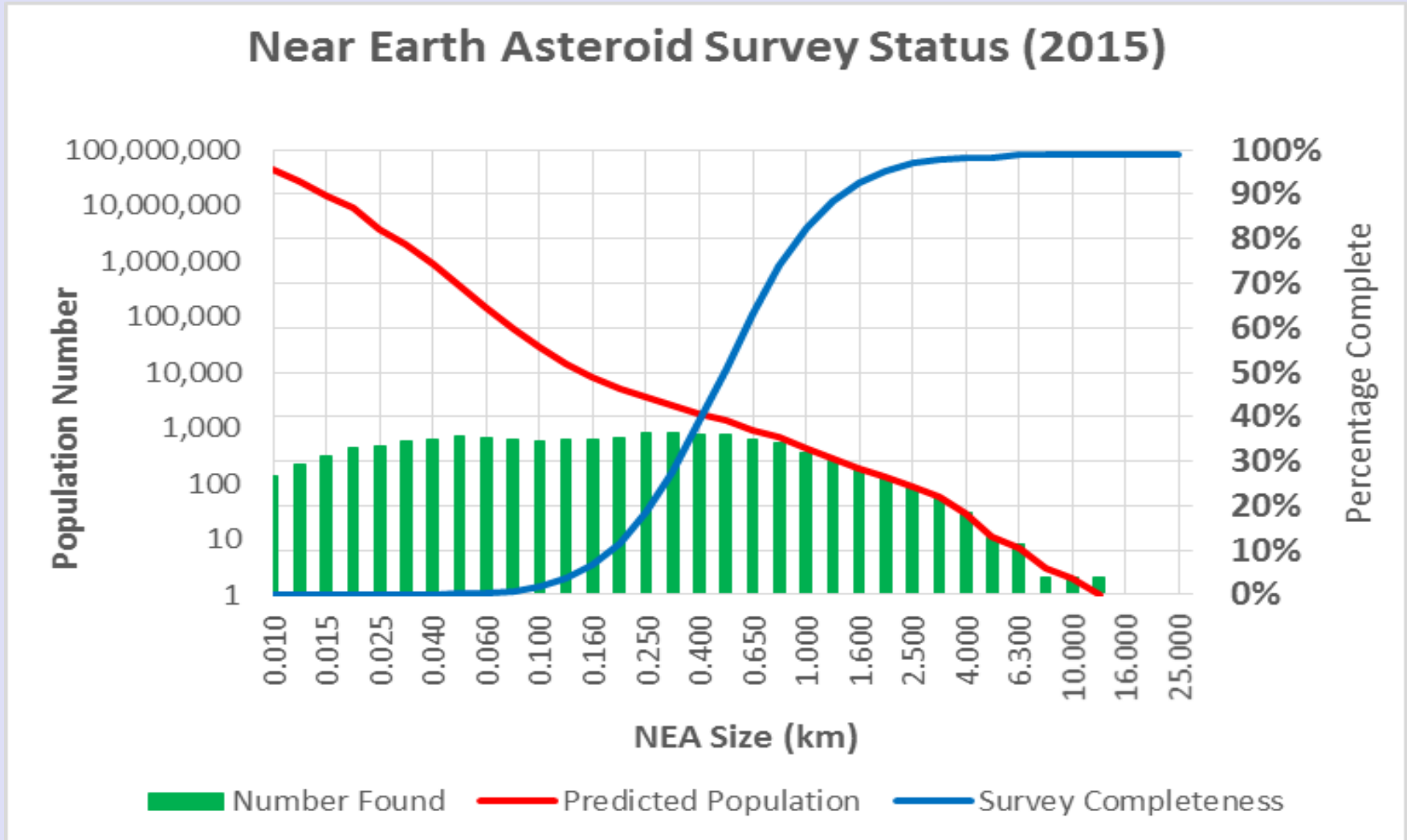
All statistics available at <http://neo.jpl.nasa.gov/stats/>

# Near Earth Asteroid Survey Status

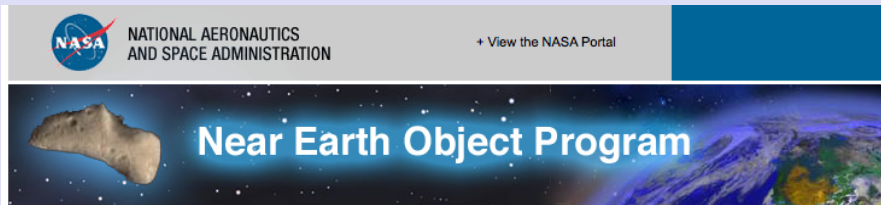


\*Harris & D’Abramo, “The population of near-Earth asteroids”, *Icarus* 257 (2015) 302–312, <http://dx.doi.org/10.1016/j.icarus.2015.05.004>

# Near Earth Asteroid Survey Status



# Orbit Prediction and Assessment of Impact Risk



Sentry Risk Table

Object Designation	Year Range	Potential Impacts	Impact Prob. (cum.)	V <sub>infinity</sub> (km/s)	H (mag)	Est. Diam. (km)	Palermo Scale (cum.)	Palermo Scale (max.)	Torino Scale (max.)
29075 (1950 DA)	2880-2880	1	1.2e-04	14.10	17.6	1.300	-1.42	-1.42	(*)
101955 Benu (1999 RQ36)	2175-2199	78	3.7e-04	5.99	20.2	0.490	-1.71	-2.32	(*)
410777 (2009 FD)	2185-2198	7	1.6e-03	15.87	22.1	0.160	-1.78	-1.83	(*)
1994 WR12	2054-2109	116	1.1e-04	9.84	22.1	0.130	-2.74	-3.49	0
1979 XB	2056-2113	5	9.9e-07	23.63	18.6	0.657	-2.75	-3.07	0
99942 Apophis (2004 MN4)	2060-2105	12	8.9e-06	5.85	19.1	0.370	-2.83	-2.93	0
2000 SG344	2069-2113	104	2.2e-03	1.36	24.8	0.037	-2.93	-3.26	0
2007 FT3	2019-2114	138	1.1e-06	17.05	20.0	0.340	-3.08	-3.67	0
2010 RF12	2095-2115	52	6.5e-02	5.10	28.4	0.007	-3.20	-3.20	0

<http://neo.jpl.nasa.gov/>

NEODyS-2 Near Earth Objects - Dynamic Site

Sponsored by ESA, UNIVERSITÀ DI PISA, SpaceDyS

Home Objects Observatories Search Risk page NEA elements Related sites Info & Credits

RISK PAGE RISK LIST

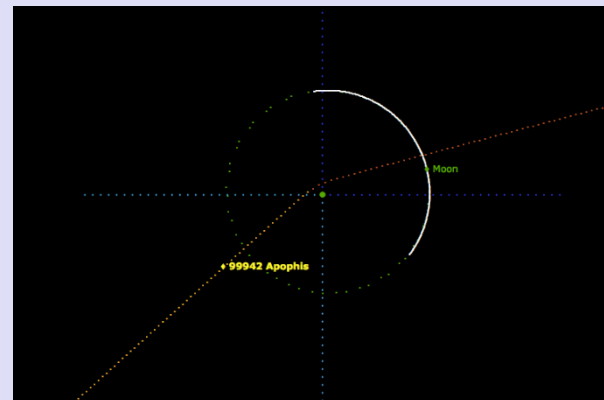
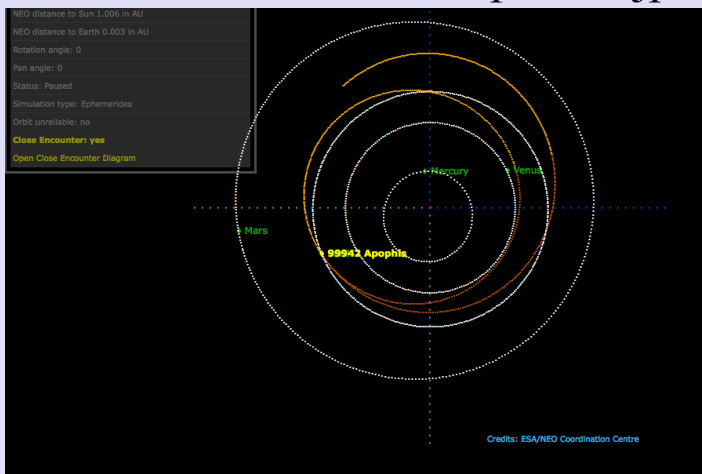
Last updated: 2016-02-12 09:53:29

There are currently 520 NEAs in the NEODyS risk list. Please, use the links above the table to display all or part of the list. The list can be sorted by clicking on the table headers.

[All] [Special] [Observable] [Possible recovery] [Lost] [Small]

Designation	H	PS <sub>max</sub>	TS <sub>max</sub>	Status	Camp. start	Camp. end
(29075) 1950DA	17.1	-1.36	n/a	Special		
(99942) Apophis	18.9	-3.67	0	Special		
(101955) Benu	20.6	-2.32	n/a	Special		
(410777) 2009FD	22.1	-1.83	n/a	Special		
2015RN35	23.0	-5.12	0	Observable		
2015VC2	27.3	-9.77	0	Observable		
2016BE	23.6	-5.32	0	Observable		
2016CD30	27.6	-5.87	0	Observable		
2016CE31	27.5	-8.83	0	Observable		
2016CK137	27.5	-5.52	0	Observable		
2016CM137	26.0	-10.04	0	Observable		
2016CW137	19.5	-4.19	0	Observable		
2016CY135	24.2	-5.37	0	Observable		
(443104)	24.2	-4.49	0	Possible recovery	2016-06-22	2016-08-03
2013YK22	24.2	-4.49	0	Possible recovery		

<http://newton.dm.unipi.it/neodyS/>



Parallel Websites at ESA and NASA contain all known information on discovered NEOs

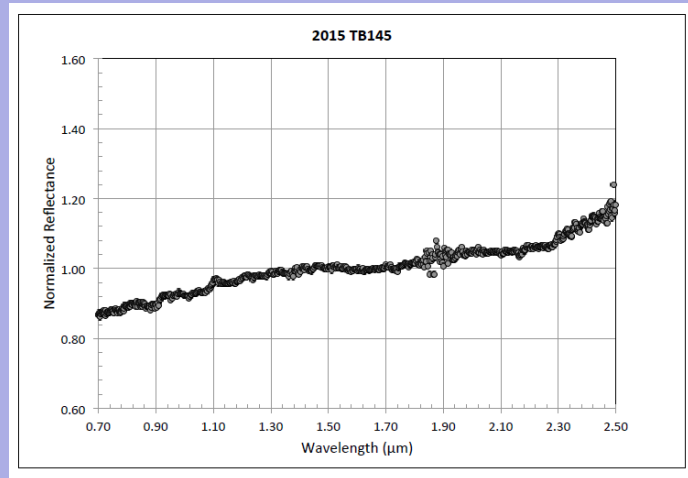
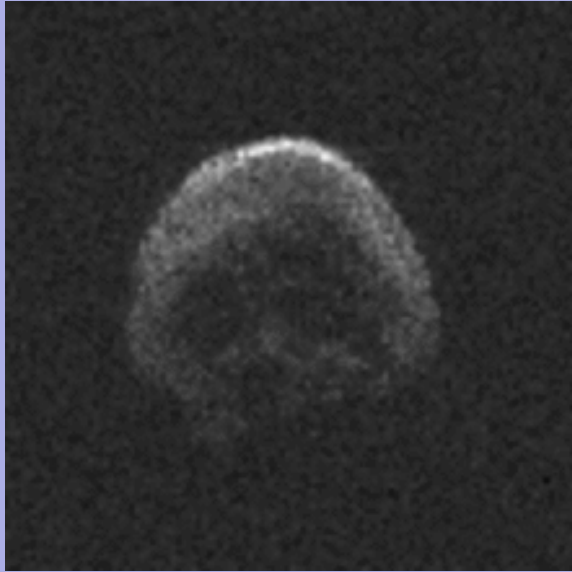


# Dispelled Asteroid Impact Hoax

---

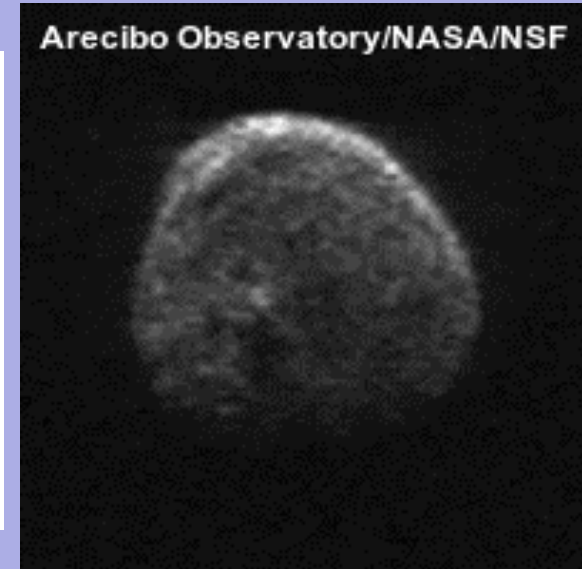
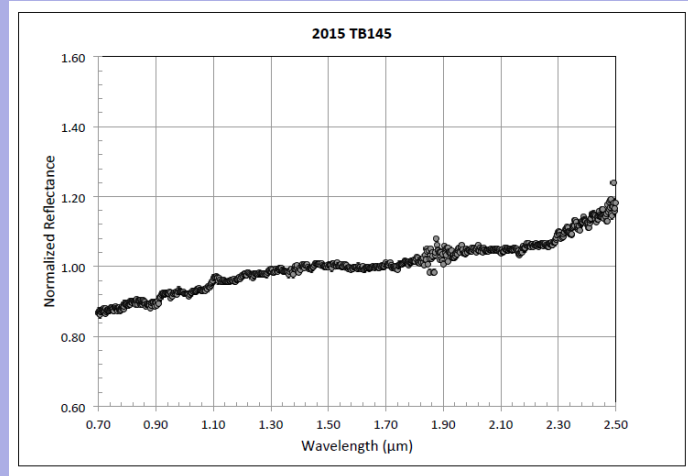
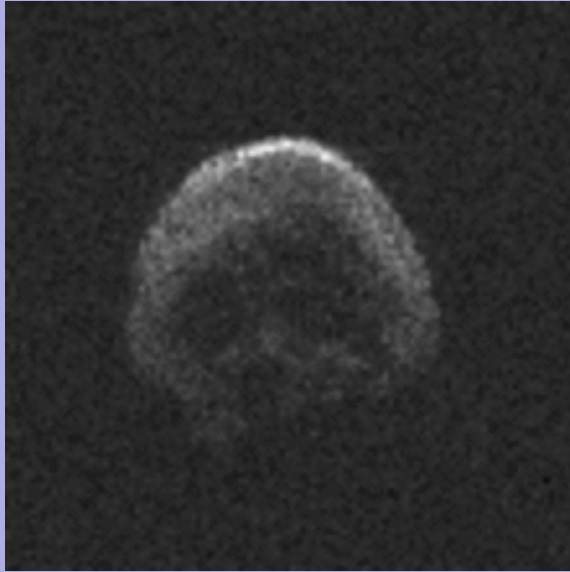
- Numerous blogs and web postings erroneously claimed that a large asteroid would impact Earth, sometime between Sept. 15 and 28, 2015. On one of those dates, as internet rumors speculated, there would be an impact -- "evidently" near Puerto Rico -- causing mass destruction to the Atlantic and Gulf coasts of the United States and Mexico, as well as Central and South America.
- Based on the world-wide data collected through IAWN, this statement was issued:
  - "There is no scientific basis -- not one shred of evidence -- that an asteroid or any other celestial object will impact Earth on those dates."

# 2015 TB145 - Halloween Asteroid Fly-by “The Great Pumpkin”



- Discovered by Pan-STARRS on October 10
- Close Approach of 1.3 Lunar Distance predicted for October 31
- Immediately drew some media attention – “Discovered only 3 weeks before it may hit”
- IRTF observations determined object is likely a dead comet that has shed volatiles
- Observed by Arecibo and bi-static with Greenbank receiving from Goldstone transmission
- Object is roughly spherical in shape and approximately 2,000 feet (600 meters) in diameter
- Resolution is ~4 meters

# 2015 TB145 - Halloween Asteroid Fly-by “The Great Pumpkin”



- Discovered by Pan-STARRS on October 10
- Close Approach of 1.3 Lunar Distance predicted for October 31
- Immediately drew some media attention – “Discovered only 3 weeks before it may hit”
- IRTF observations determined object is likely a dead comet that has shed volatiles
- Observed by Arecibo and bi-static with Greenbank receiving from Goldstone transmission
- Object is roughly spherical in shape and approximately 2,000 feet (600 meters) in diameter
- Resolution is ~4 meters

# Initial Signatories to IAWN



**National Institute of  
Astrophysics, Optics & Electronics**

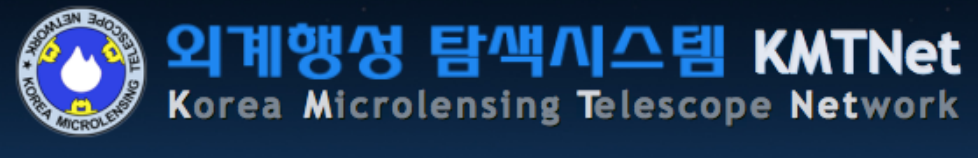
**Peter Birtwhistle (*amateur follow-up observer,  
UK*)**



**European Southern Observatory (ESO)**



**Institute of Astronomy Russian Academy  
of Science (INASAN)**



**Korean Astronomy & Space Science Institute  
(KASI)**

**and, NASA Planetary Defense  
Coordination Office (PDCO)**

# NASA Planetary Defense Coordination Office

---

This new office has just been established at NASA HQ to coordinate planetary defense related activities across NASA, and coordinate both US interagency and international efforts and projects to address and plan response to the asteroid impact hazard.

## **Planetary Defense Coordination Office**

### **Mission Statement:**

Lead national and international efforts to:

- Detect any potential for significant impact of planet Earth by natural objects
- Appraise the range of potential effects by any possible impact
- Develop strategies to mitigate impact effects on human welfare

More information is at: <http://www.nasa.gov/planetarydefense/overview>

USA capabilities with IAWN is at: [http://iawn.net/usa\\_contributions.pdf](http://iawn.net/usa_contributions.pdf)



Newly established IAWN Website:  
<http://iawn.net/>