International Asteroid Warning Network
Report to STSC 2016

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Science Mission Directorate
NASA HQ

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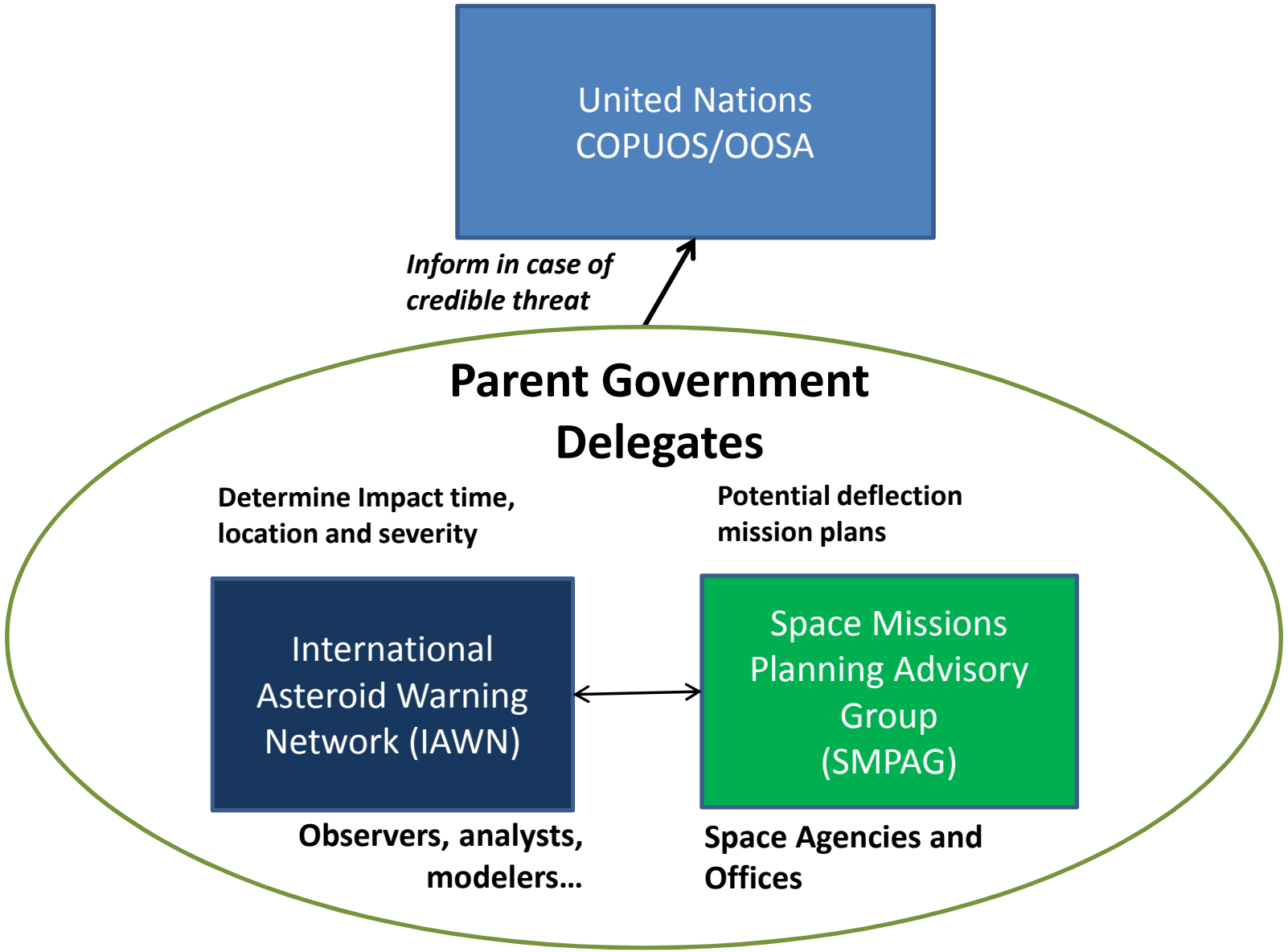
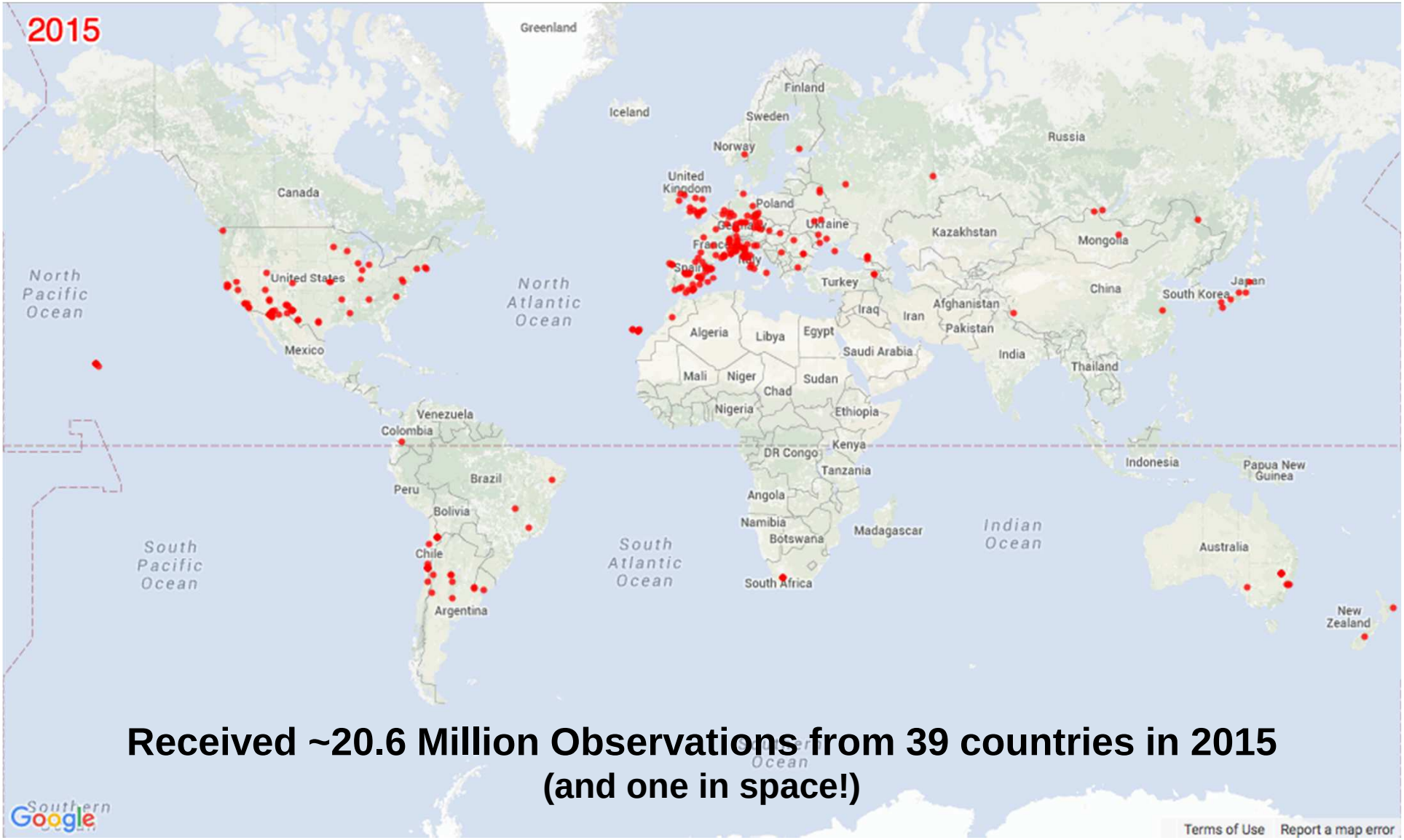
UN Office of Outer Space Affairs
Committee on Peaceful Uses of Outer Space

Overview for NEO Threat Response

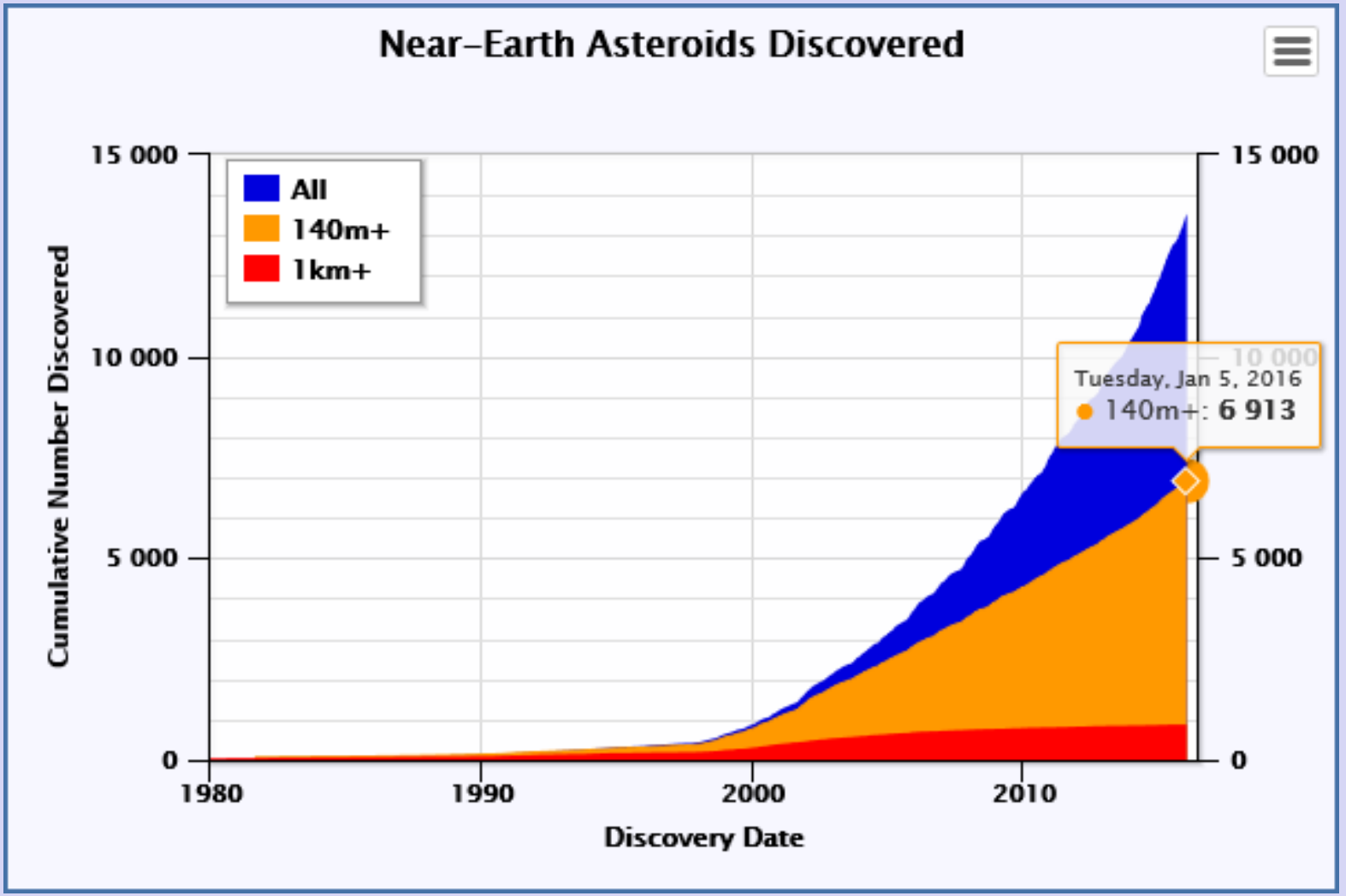


Worldwide Observing Network



Received ~20.6 Million Observations from 39 countries in 2015
(and one in space!)

Known Near Earth Asteroid Population



As of 12/31/15 13,514

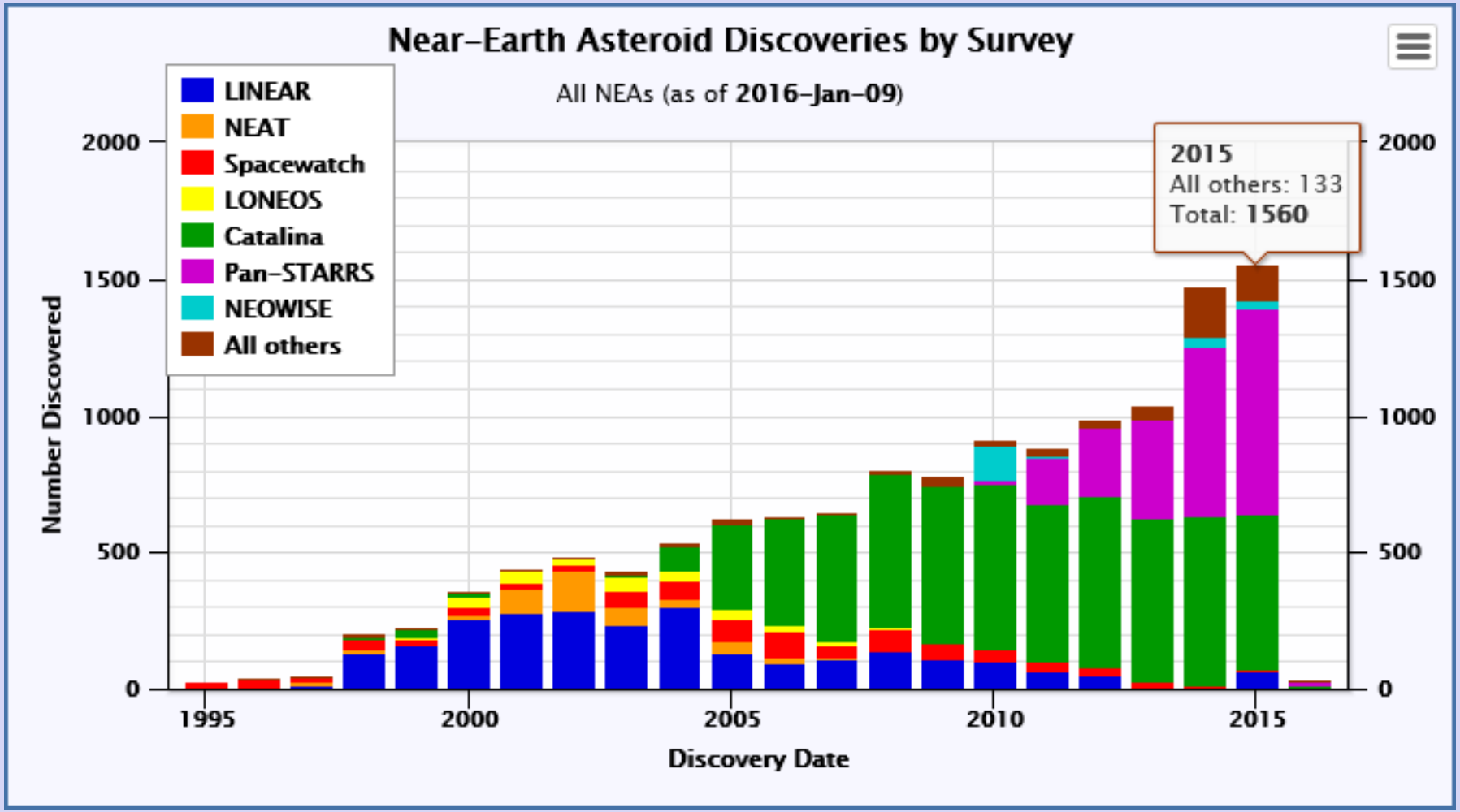
Also 104 comets

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



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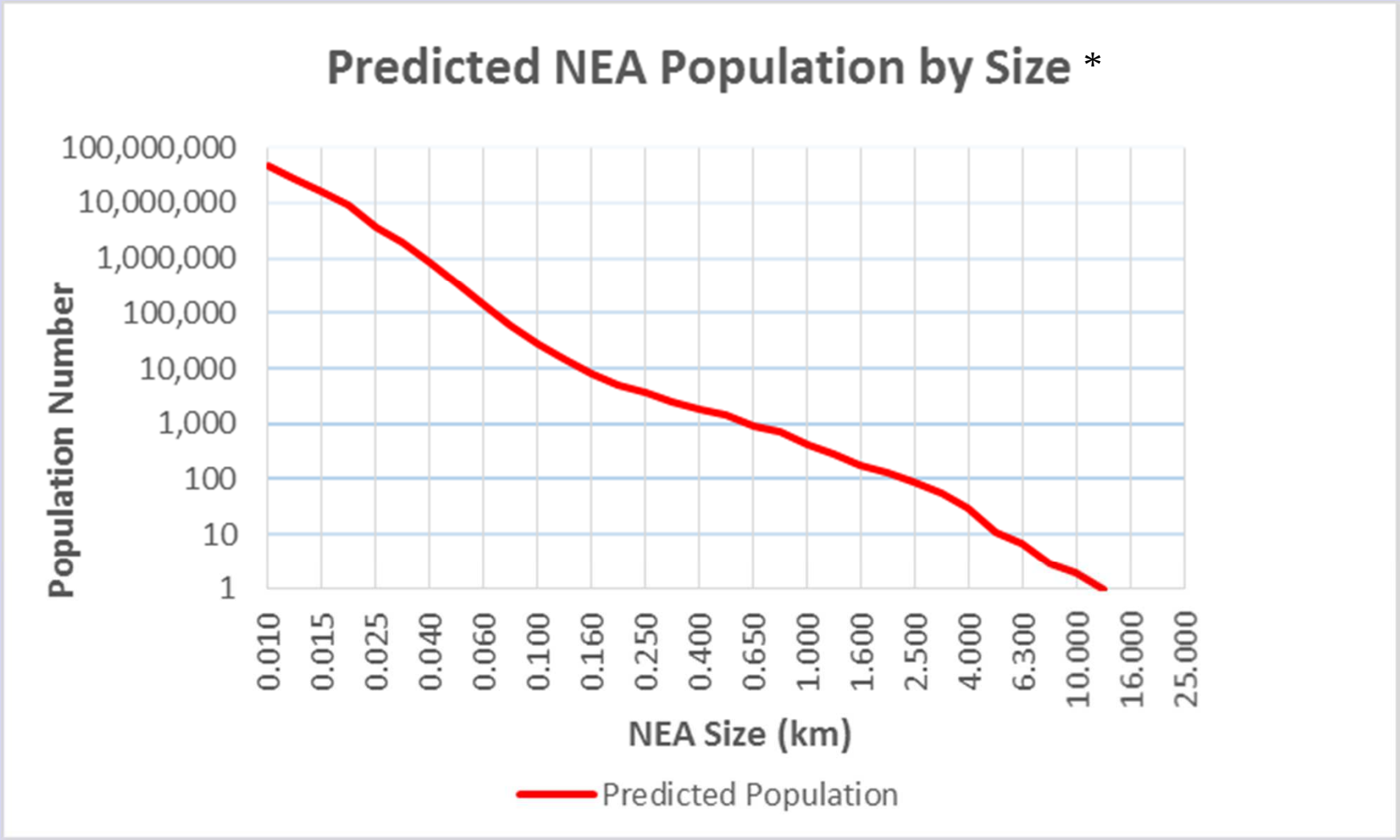
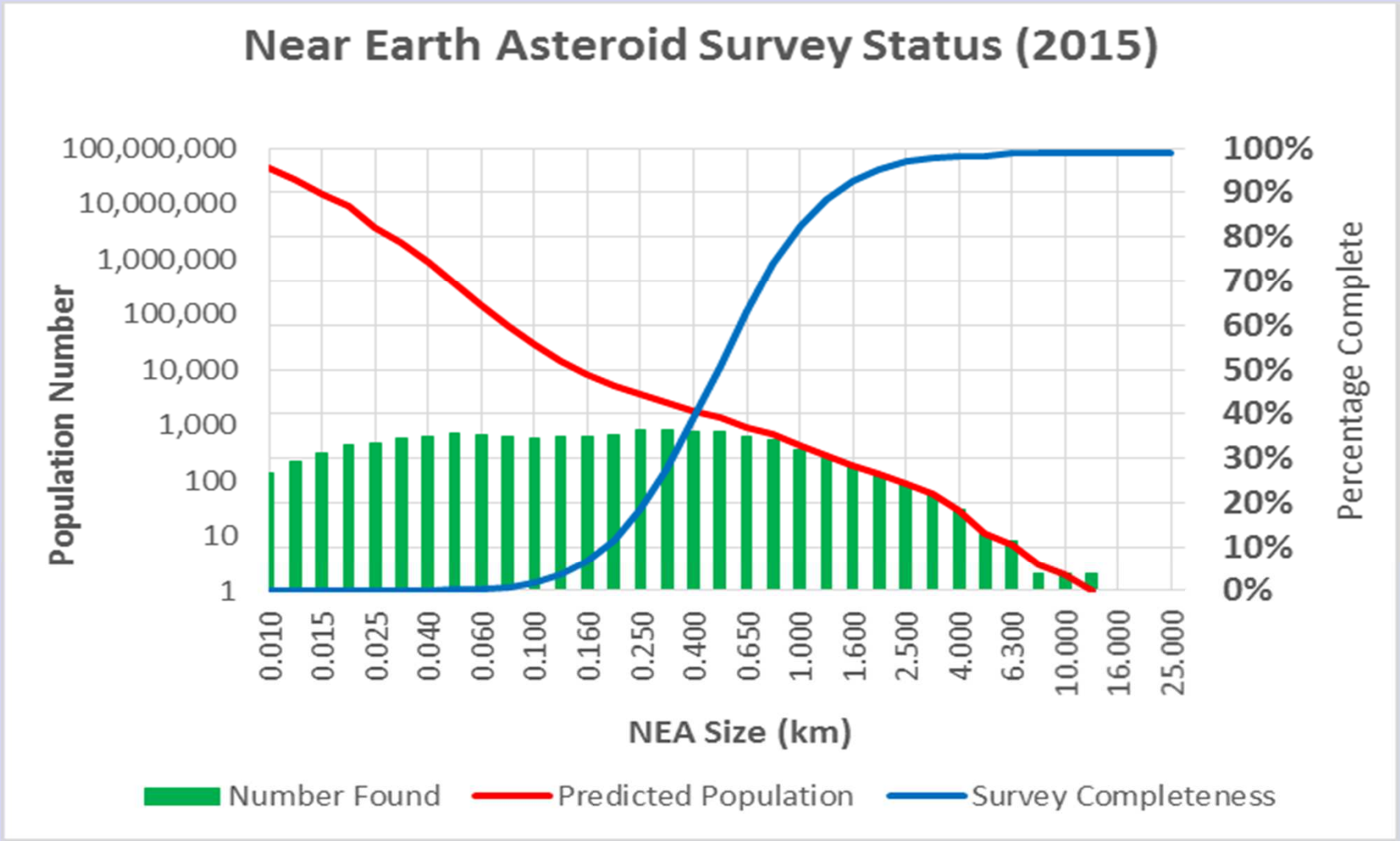
Near Earth Asteroid Survey Status

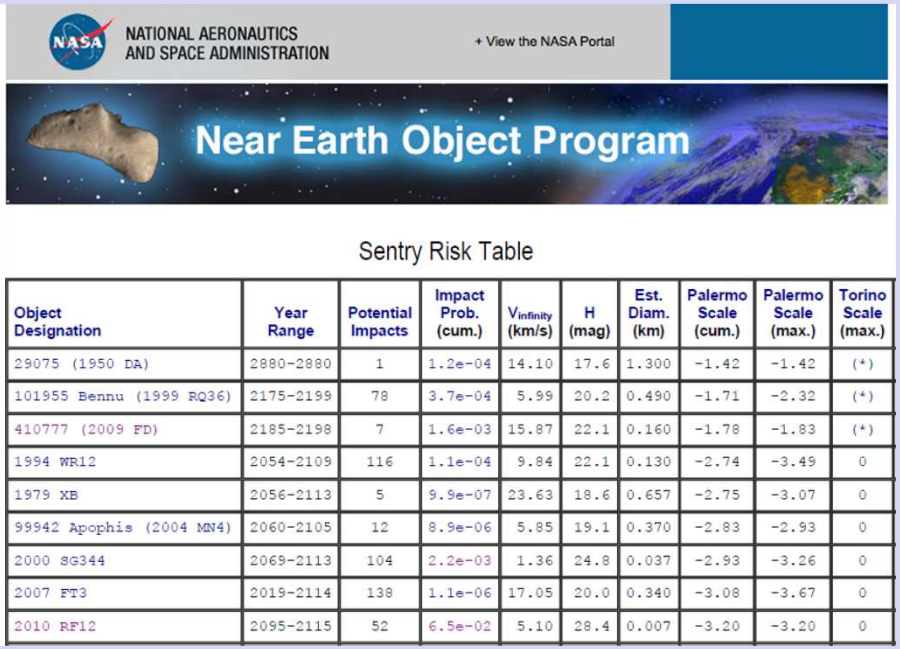


*Harris & D'Abramo, "The population of near-Earth asteroids", Icarus 257 (2015) 302–312, http://dx.doi.org/10.1016/j.icarus.2015.05.004

Near Earth Asteroid Survey Status



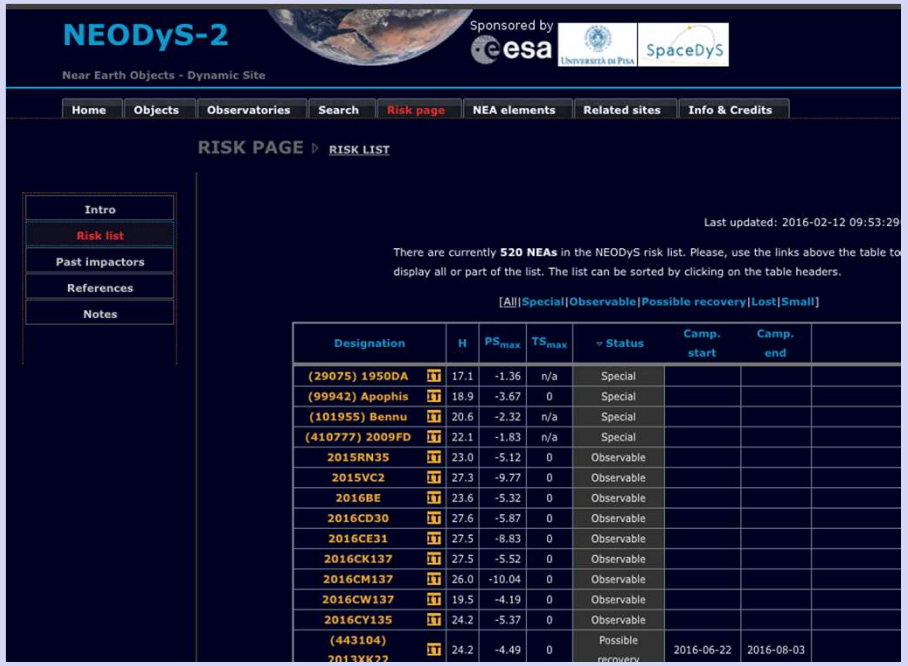
Orbit Prediction and Assessment of Impact Risk



Sentry Risk Table

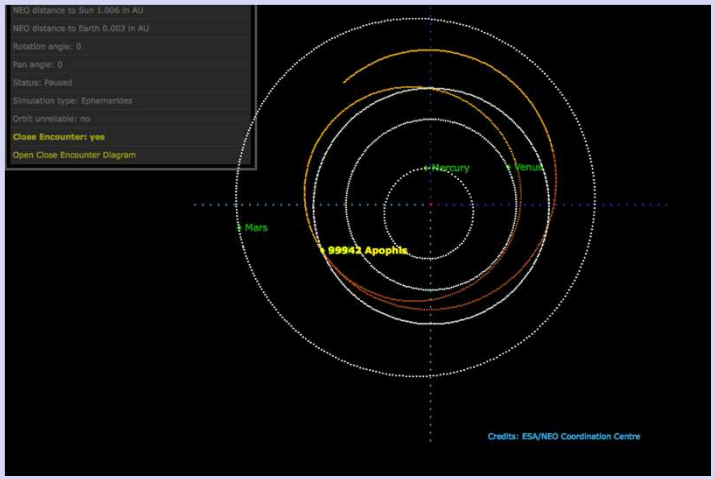
Object Designation	Year Range	Potential Impacts	Impact Prob. (cum.)	$V_{infinity}$ (km/s)	H (mag)	Est. Diam. (km)	Palermo Scale (cum.)	Palermo Scale (max.)	Torino Scale (max.)
29075 (1950 DA)	2880-2880	1	1.2e-04	14.10	17.6	1.300	-1.42	-1.42	(*)
101955 Bennu (1999 RQ36)	2175-2199	78	3.7e-04	5.99	20.2	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

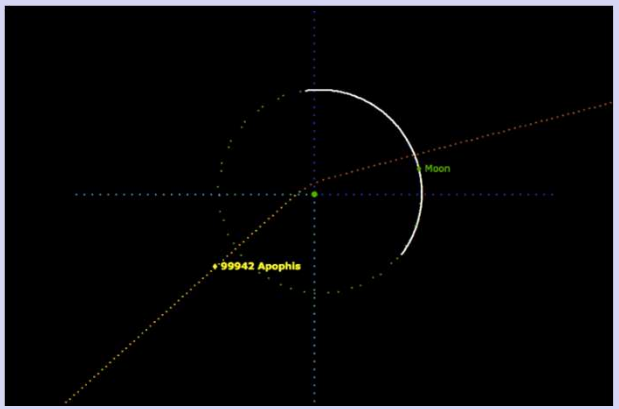
http://neo.jpl.nasa.gov/



Designation	H	PS_{max}	TS_{max}	Status	Camp. start	Camp. end
(29075) 1950DA	17.1	-1.36	n/a	Special		
(99942) Apophis	18.9	-3.67	0	Special		
(101955) Bennu	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) 2013XK22	24.2	-4.49	0	Possible recovery	2016-06-22	2016-08-03

http://newton.dm.unipi.it/neodys/





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

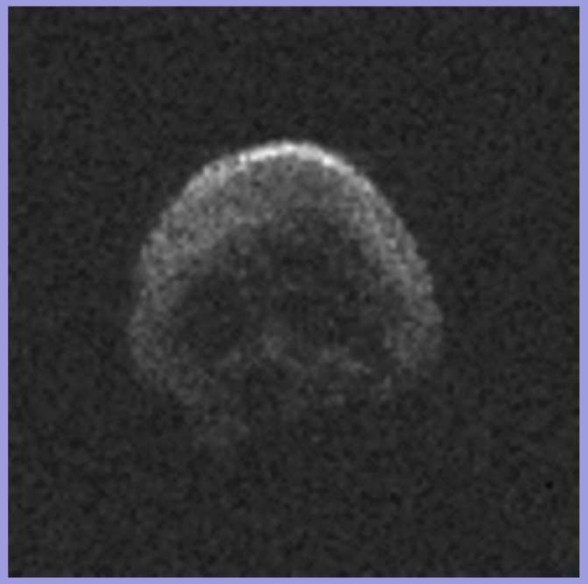
Dispelled Asteroid Impact Hoax

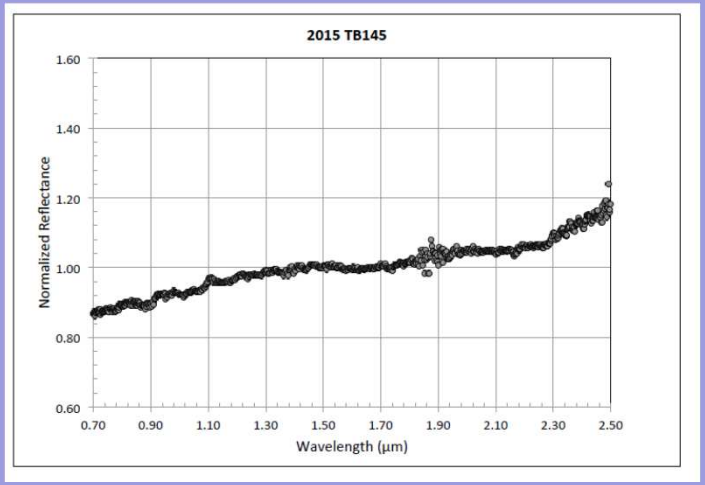
- Numerous blogs and web postings erroneously claimed that a large asteroid would impact Earth, sometime between Sept. 15 and 28, 2015. On one of those dates, as internet rumors speculated, there would be an impact -- "evidently" near Puerto Rico -- causing mass destruction to the Atlantic and Gulf coasts 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

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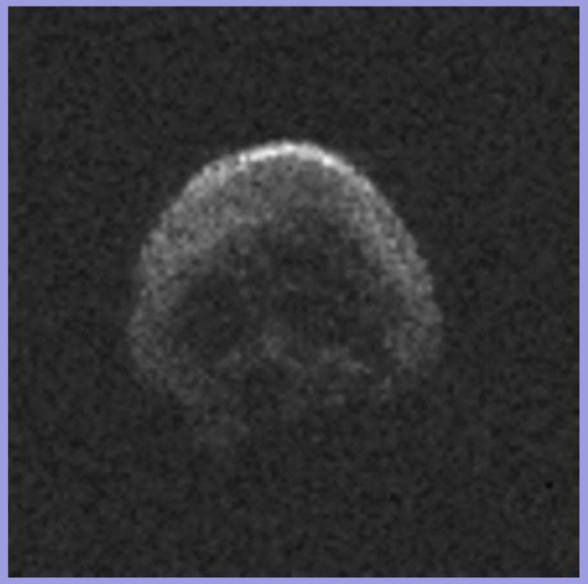

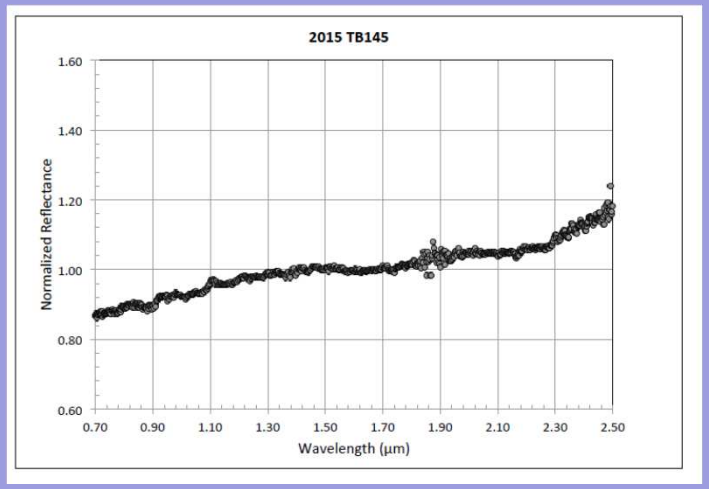

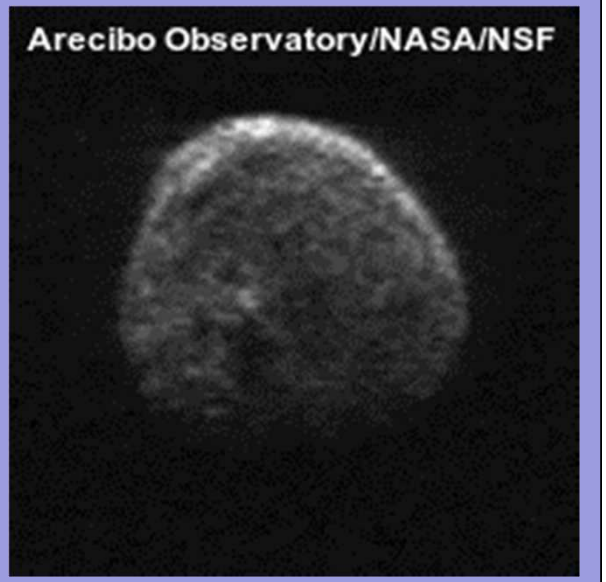

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Initial Signatories to IAWN

National Institute of Astrophysics, Optics & Electronics

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

Institute of Astronomy Russian Academy of Science (INASAN)

European Southern Observatory (ESO)

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

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