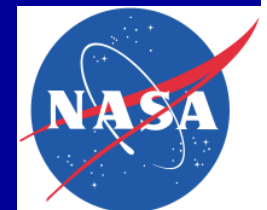


# Minor Planet Center Operations and Update

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# Outline, background, and info

- MPC –what we do and to whom we report
- Current operation of the MPC and data volume
- NEO coordination
- The MPC in the next generation of surveys and spacecraft missions

# The MPC—who we are

- Tim Spahr--director
- Gareth Williams—associate director
- Sonia Keys, Mike Rudenko, Jose Galache (programming, IT, programming)
- Carl Hergenrother (weekend mercenary)

# MPC computers

- LINUX cluster, running rocks
- 100+ CPUs
- Capable of tens of millions of orbit improvements per day
- Old VMS system still operating and is still useful. Especially as backup system.

# MPC “charter”—what we do

- Duty is to process, quality-check, archive and distribute all observations made worldwide of minor planets and comets
- Current database ~90,000,000 observations of ~600,000 different objects
- 7726 NEOs currently known
- Most objects are routine main-belt asteroids

# MPC “charter”—to whom do we report

- The MPC operates from the Smithsonian Astrophysical Observatory (SAO) in Cambridge, MA
- Granted authority by the International Astronomical Union (IAU)
- Funded 100% by NASA/NEOO
- I report to Charles Alcock, SAO director, the IAU (various committees), NASA NEOO PE (Lindley Johnson), plus the entire observing community



# MPC focus is on NEOs

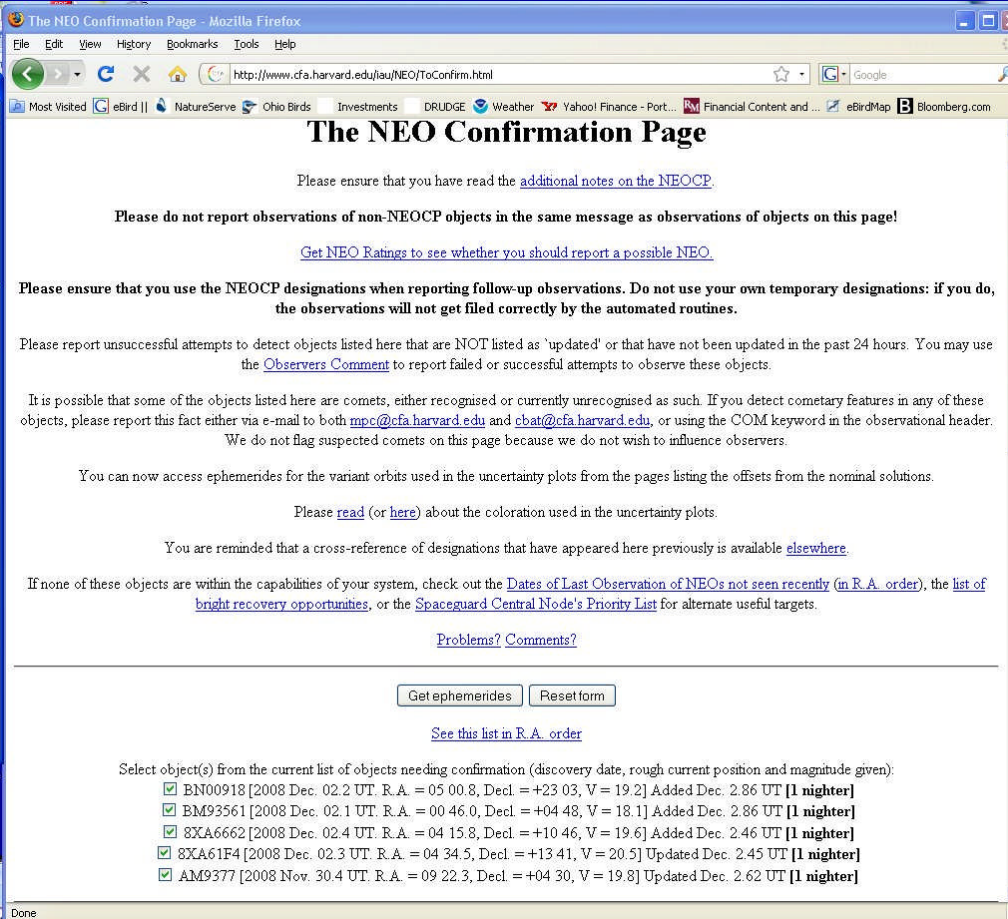
- MPC processes all incoming batches of unknowns and searches these for NEOs
- New NEOs are posted on the web (Near-Earth Object Confirmation Page) automatically to facilitate orbit refinement
- MPC processes must be run automatically, and 24/7/365. Most data & products are publicly available daily
- Alert JPL NEO PO and NASA HQ on newly discovered high interest objects

# NEO coordination

- MPC maintains Near Earth Object Confirmation Page (NEOCP) on the web
- We check all new NEOs for potential impacts in the next few days; text alerts for warnings!
- MPC maintains sky coverage page to inform surveys which parts of sky were recently observed
- MPC checks and distributes all NEO observations daily



# The NEOCP--coordination



The screenshot shows a web browser window titled "The NEO Confirmation Page - Mozilla Firefox". The address bar shows the URL <http://www.cfa.harvard.edu/iau/NEO/ToConfirm.html>. The page content includes the following text:

**The NEO Confirmation Page**

Please ensure that you have read the [additional notes on the NEOCP](#).

**Please do not report observations of non-NEOCP objects in the same message as observations of objects on this page!**

[Get NEO Ratings to see whether you should report a possible NEO.](#)

**Please ensure that you use the NEOCP designations when reporting follow-up observations. Do not use your own temporary designations: if you do, the observations will not get filed correctly by the automated routines.**

Please report unsuccessful attempts to detect objects listed here that are NOT listed as 'updated' or that have not been updated in the past 24 hours. You may use the [Observers Comment](#) to report failed or successful attempts to observe these objects.

It is possible that some of the objects listed here are comets, either recognised or currently unrecognised as such. If you detect cometary features in any of these objects, please report this fact either via e-mail to both [mpec@cfa.harvard.edu](mailto:mpec@cfa.harvard.edu) and [cbat@cfa.harvard.edu](mailto:cbat@cfa.harvard.edu), or using the COM keyword in the observational header. We do not flag suspected comets on this page because we do not wish to influence observers.

You can now access ephemerides for the variant orbits used in the uncertainty plots from the pages listing the offsets from the nominal solutions.

Please [read](#) (or [here](#)) about the coloration used in the uncertainty plots.

You are reminded that a cross-reference of designations that have appeared here previously is available [elsewhere](#).

If none of these objects are within the capabilities of your system, check out the [Dates of Last Observation of NEOs not seen recently \(in R.A. order\)](#), the [list of bright recovery opportunities](#), or the [Spaceguard Central Node's Priority List](#) for alternate useful targets.

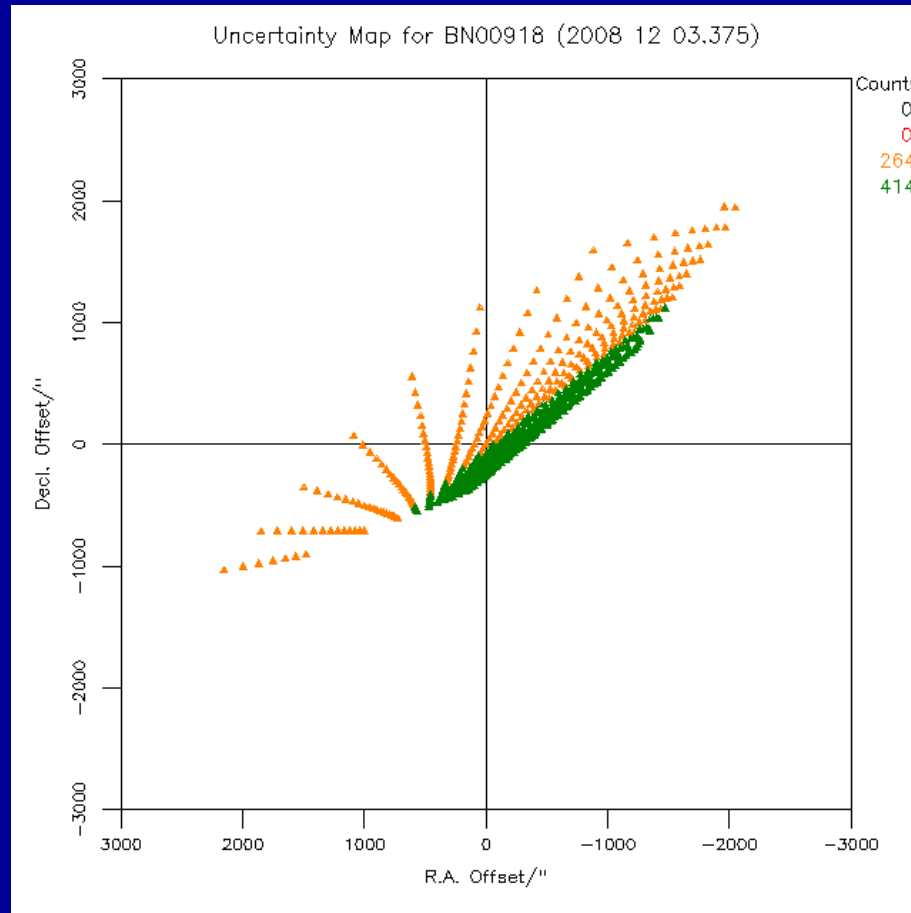
[Problems? Comments?](#)

[See this list in R.A. order](#)

Select object(s) from the current list of objects needing confirmation (discovery date, rough current position and magnitude given):

- EN00918 [2008 Dec. 02.2 UT. R.A. = 05 00.8, Decl. = +23 03, V = 19.2] Added Dec. 2.86 UT [1 nighter]
- BM93561 [2008 Dec. 02.1 UT. R.A. = 00 46.0, Decl. = +04 48, V = 18.1] Added Dec. 2.86 UT [1 nighter]
- 8XA6662 [2008 Dec. 02.4 UT. R.A. = 04 15.8, Decl. = +10 46, V = 19.6] Added Dec. 2.46 UT [1 nighter]
- 8XA61F4 [2008 Dec. 02.3 UT. R.A. = 04 34.5, Decl. = +13 41, V = 20.5] Updated Dec. 2.45 UT [1 nighter]
- AM9377 [2008 Nov. 30.4 UT. R.A. = 09 22.3, Decl. = +04 30, V = 19.8] Updated Dec. 2.62 UT [1 nighter]

# The NEOCP uncertainty maps



# NEO coordination--more

- MPC maintains Near Earth Object Confirmation Page BLOG also!
- Enables real-time communication for observers
- MPC will be unveiling new follow-up priority system for ALL NEOs in the next few days
- One high probability category will include low delta-V NEOs. We want to make sure these objects are observed well!

# Finding accessible targets

- Since all NEOs go through the MPC, if an accessible target for a mission is discovered, we'll know and be involved
- MPC will be providing direction on follow-up priority to aid orbit improvement for a target
- NOTE! Many 100-200 meter objects are **EXTREMELY DIFFICULT** to observe post-discovery. Possible a good target will simply be lost due to faintness!!

# Next-generation surveys

- MPC handles spacecraft data already (WISE)
- MPC handles Pan-STARRS data already (dozens of NEO candidates per night)
- MPC is ready to handle an even larger data increase from the next “bigger” survey
- Continuously tweaking our processing

# Conclusion

- MPC is handling current data rate easily, and can handle the next generation of surveys
- The MPC will assist the assessment of accessible targets for a mission, or the discovery of new targets, through our routine operations
- The MPC will be assisting target assessment by stimulating follow-up for low delta-V objects
- We are improving our process continuously

## ***THE INNER SOLAR SYSTEM***

This animation shows the motion of the inner part of the solar system over a two-year time period. The sun is at the center and the orbits of the planets Mercury, Venus, Earth and Mars are shown in light blue (the locations of each planet are shown as large crossed circles). Comets are shown as blue squares (numbered periodic comets are filled squares, other comets are outline squares). Main-belt minor planets are displayed as green circles, near-Earth minor planets are shown as red circles.

The individual frames were generated on an OpenVMS system, using the PGPLOT graphics library. The animation was put together on a RISC OS 4.03 system using !InterGif.

