Citizen Science Using Remote Telescopes

-Brad Young, Astronomy Club of Tulsa

Part Two: Asteroids, Satellites, and Comets

"To confine our attention to terrestrial matters would be to limit the human spirit."- Stephen Hawking

As discussed in Part One, there are many ways to pursue citizen science using remote telescopes. If you are not equipped with high-end imaging, visual or radio telescope equipment, using either commercial or academic resources available remotely may be an answer for you. Or, if you tire of long stretches of poor weather with no observing, having access to clear skies may be a welcome relief.

Asteroids

"Noise proves nothing. Often a hen who has merely laid an egg cackles as if she laid an asteroid." – Mark Twain

With asteroids, there are several opportunities open to amateurs using remote imaging. The Minor Planet Center (MPC) provides orbital data for all known asteroids and comets to use for preparing observations. The MPC also processes both astrometry (positional) and photometry (brightness) data for nearly all minor planets. Information you gather can be reported to them in MPC format, which most software will prepare automatically. Association of Lunar and Planetary Observers publishes the Minor Planet Bulletin four times a year, a journal of various findings, especially determination of rotational period for asteroids. You can either use their template to write an article for their journal, or if you prefer, you can use data you've gathered and the methodology and determine rotational periods yourself. (fig. 1)

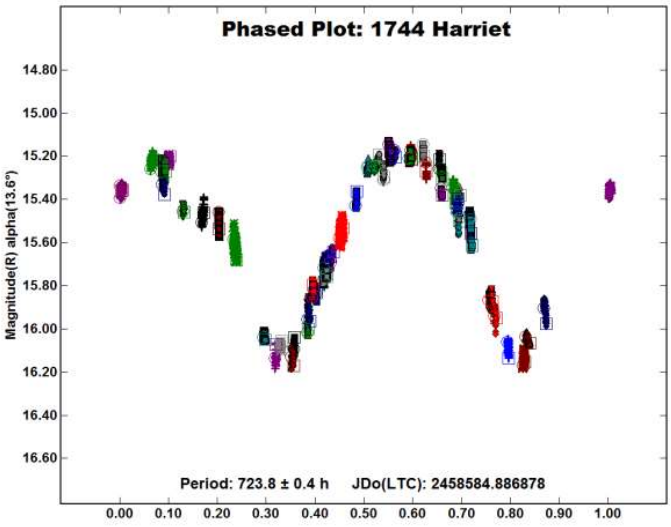

Fig. 1
Pilcher, Klinglesmith III, and Oey, MPB VOLUME 46, NUMBER 4, A.D. 2019 OCTOBER-DECEMBER
Note: I chose example of 1744 Harriet for my wife

Other useful data in the MPB is the annual list of "Minor Planets at Unusually Favorable Apparitions", which appears in every Jan-Mar issue of the Bulletin.

Another way that remote telescopes are used in minor planet studies is the Astronomical League's Target NEO program (formerly Target Asteroids program co-sponsored by NASA and University of Arizona). This effort is centered on determining characteristics of asteroids that are Near Earth Objects, and others that may be worth visiting, landing on, or even returning samples from such as the recent success at Bennu . They accept reports in MPC format so you won't have to do any extra work to provide the data; however, in their case you will need to provide the FITS (image) file in addition to the report.

Although it is probably beyond the reach of most amateurs, you could do image surveys for Near Earth Objects. A better use of your time might be to join a group that processes images from the PanSTARRS or Catalina Sky Survey such as via the IASC (International Astronomical Search Collaboration).

Satellites

Satellite tracking is another observing situation where remote telescopes are often useful. There are many satellites that are geosynchronous and will never appear in your sky, as their orbit is designed to stay over one spot on the Earth's surface. These can be imaged or tracked by radio remotely if the equipment is at the proper location.

Another use for tracking satellites are the ones that may be confused with Near Earth Objects because they are in solar or highly elliptical orbits and were often rocket bodies or other debris from early launches. Project Pluto is an effort to determine and

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follow some of these very high orbit objects so that they are not using up valuable survey effort and can be discounted as a threat to the Earth (fig. 2).

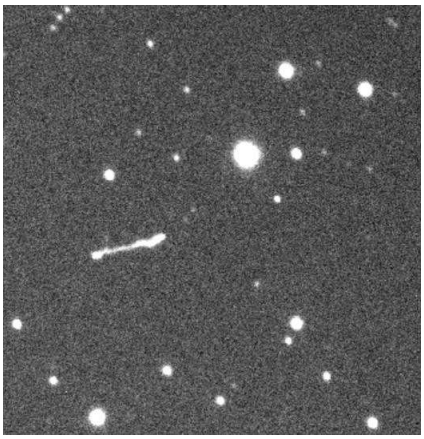

Fig. 2
Spektr-R was a Russian scientific satellite with a 10 m (33 ft) radio telescope

Seen here 9 Feb 2022 at 345,000 km from telescope at apogee (Image by Author)

Remote telescopes have also been useful, at least in my case, in identifying objects that are listed in the ISON (International Scientific Optical Network) catalog but are not listed in the US Space Command catalog (aka Space-Track). This goes beyond just the classified satellites - although those do appear in that list. I'm more interested in the ones that are not matched with a classified payload but are indeed tracked by one system and not matched to another. I recently published my final version of this study which I performed over a period of nearly three years.

Comets

"I came in with Halley's Comet (he was born in 1835). It is coming again next year. The Almighty has said, no doubt, 'Now there are these two unaccountable freaks; they came in together, they must go out together. '" He died on April 21, 1910—one day after the comet had once again reached its perihelion.

Comets are notorious for being on the other side of the world from where you are when they're at their best. Or they will be here, just as soon as they round the sun…

This is another way that remote imaging may be useful to you, as you may be able to find a telescope that has a better view of the comet you can't see well or at all. As a bonus, you can always report data on the comet to the COBS (Comet Observation Data Base) and add to our general knowledge of comets through citizen science.

I hope that these two articles have shown you that remote imaging can be useful across a variety of astronomical targets and scientific studies.

References:

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