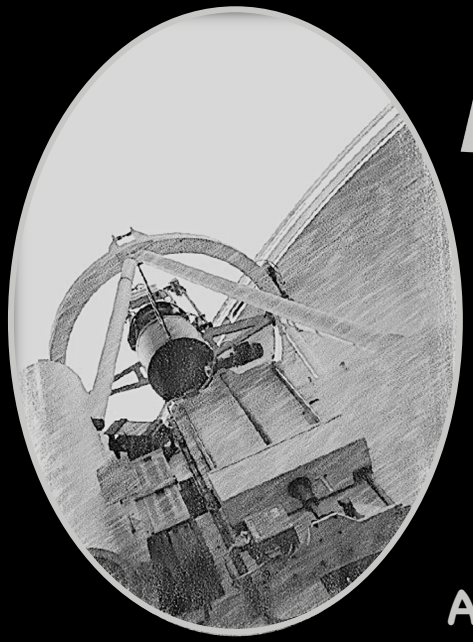
# DebrisWatch: on the sky

**James Blake***, Paul Chote, Don Pollacco

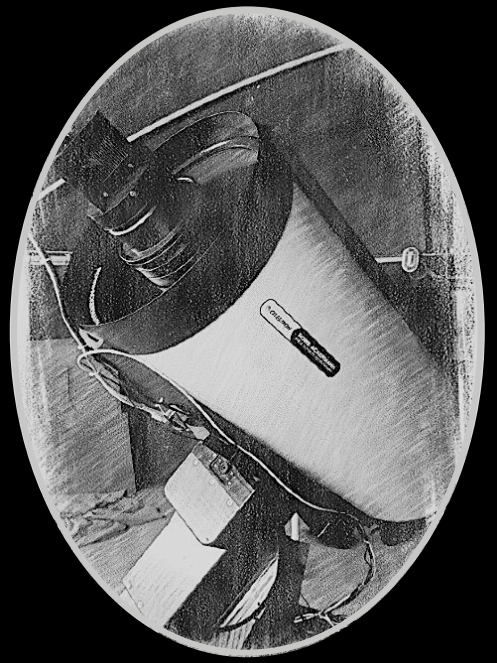
In September 2018, we conducted a survey of the geosynchronous region, located 36000km above the Earth's Equator.

We made use of two telescopes: the Isaac Newton Telescope and a robotic astrograph, both situated in La Palma, Canary Islands.



**Isaac Newton Telescope**
2.54m

**Astrograph**
0.36m



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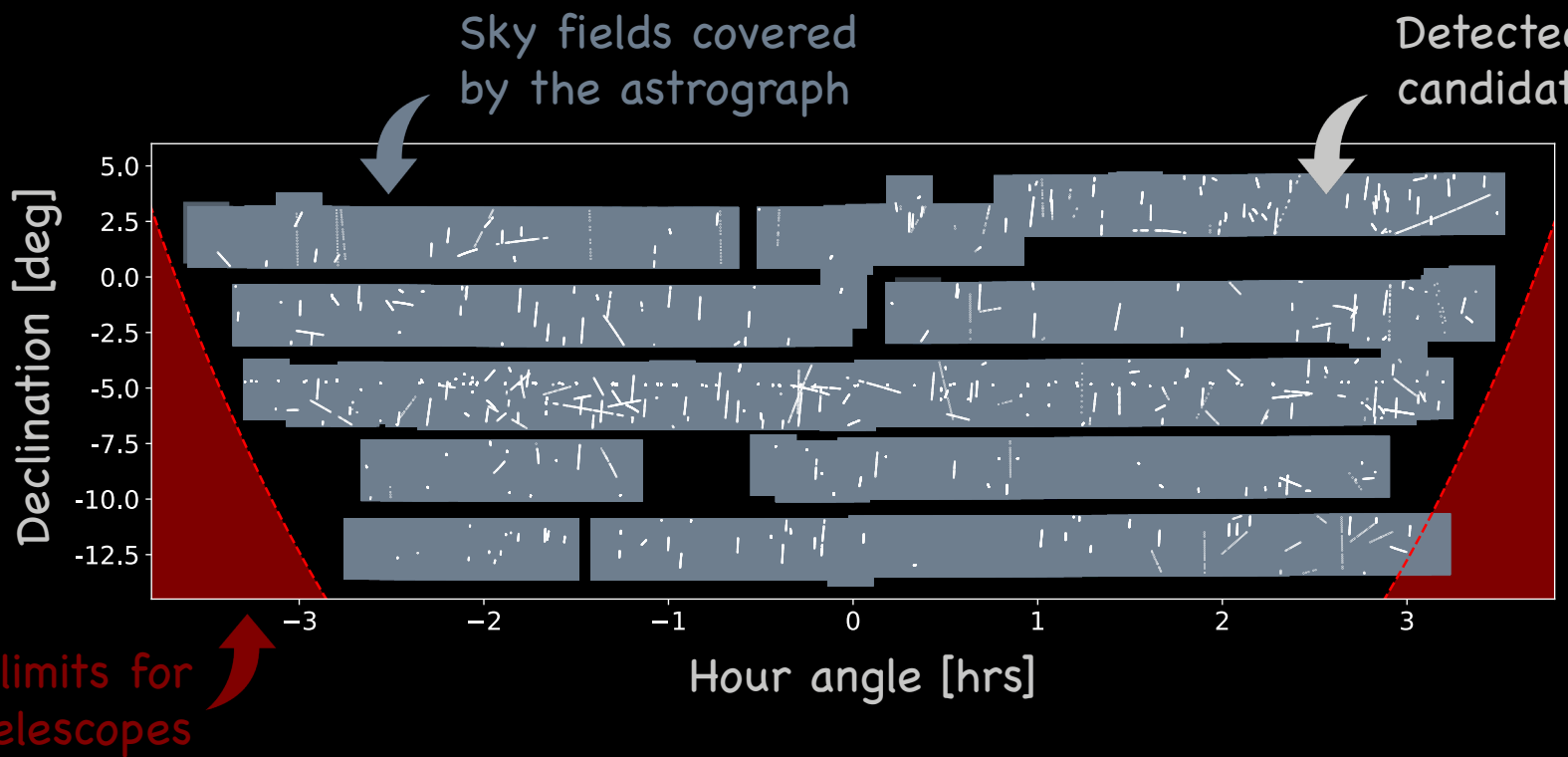
THE UNIVERSITY OF WARWICK

j.blake@warwick.ac.uk
jamesblake95

The two telescopes were synchronized to observe the same sky fields. Geosynchronous satellites have orbital periods that match the Earth's rotation, so they remain fixed or trace localized paths in the sky over the course of a sidereal day. To optimize our search, we disabled tracking so that the target objects would be point-like or short trails in our images, while stars would streak across at the sidereal rate.




For each telescope pointing, we took several exposures to reveal the paths (or arcs) mapped out by the objects and confirm them to be real.

Paper available here soon!

Blake et al., *AMOSTECH*, 2020

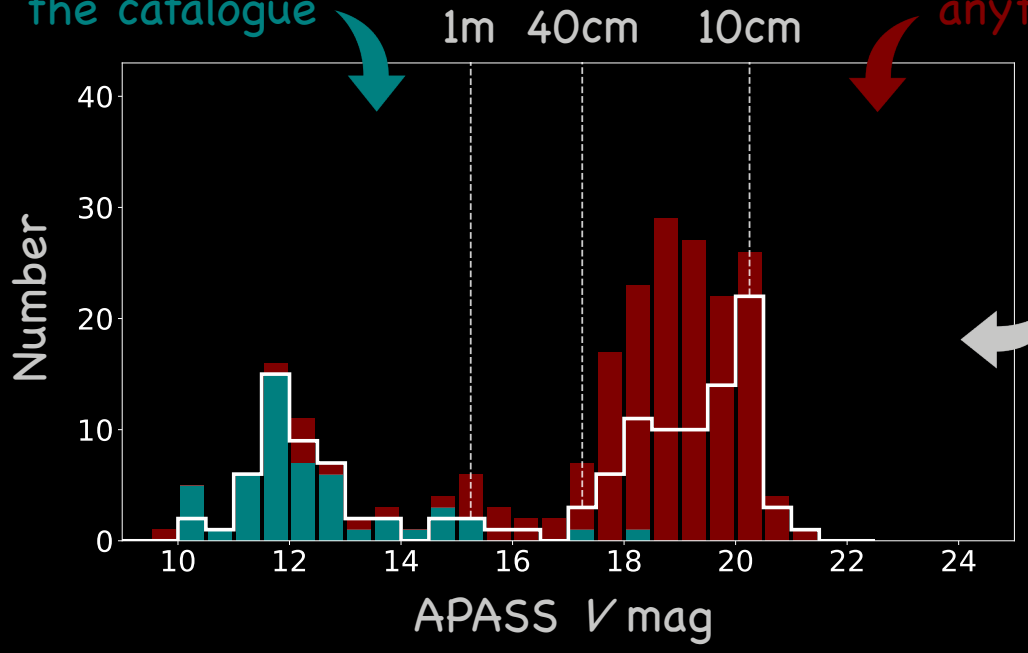
Over ¾ of the arcs detected by the large-aperture Isaac Newton Telescope were too faint to be regularly monitored and tracked as part of the public US Strategic Command catalogue, with its cut-off for geosynchronous objects at around 1m. With standard (yet very uncertain!) assumptions in place, we probe to roughly 10cm in size.

Size estimates assume that the objects are spheres with a particular reflectivity

For trailed detections in our images, we were able to extract high-resolution light curves...

Arcs that match with something in the catalogue

Arcs that don't match with anything in the catalogue

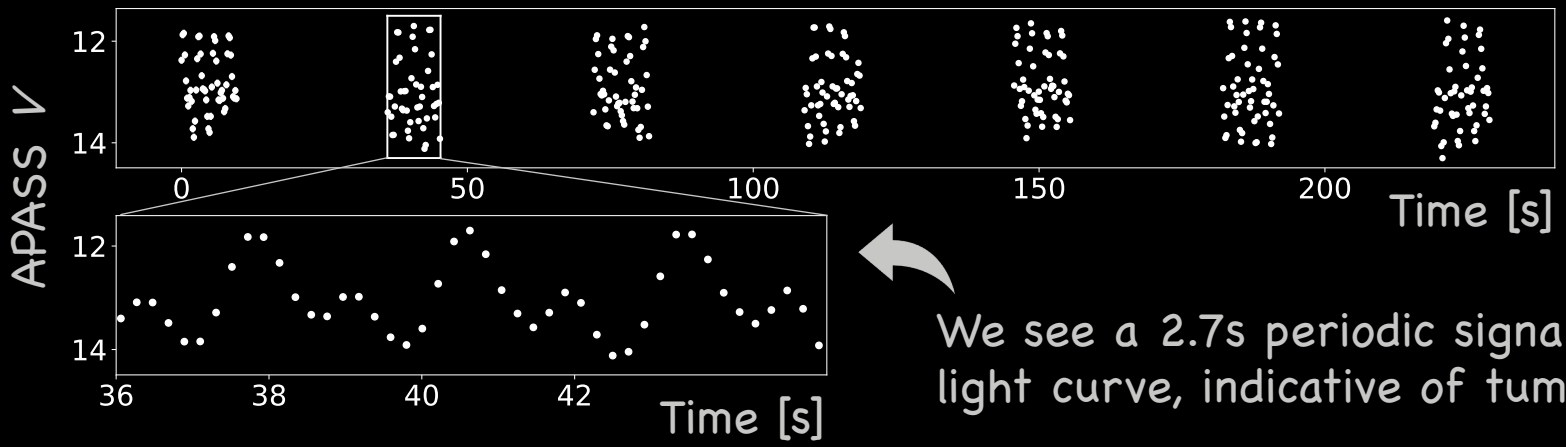



Arcs that are likely circular orbits within the geosynchronous region

Check out the paper for more information!

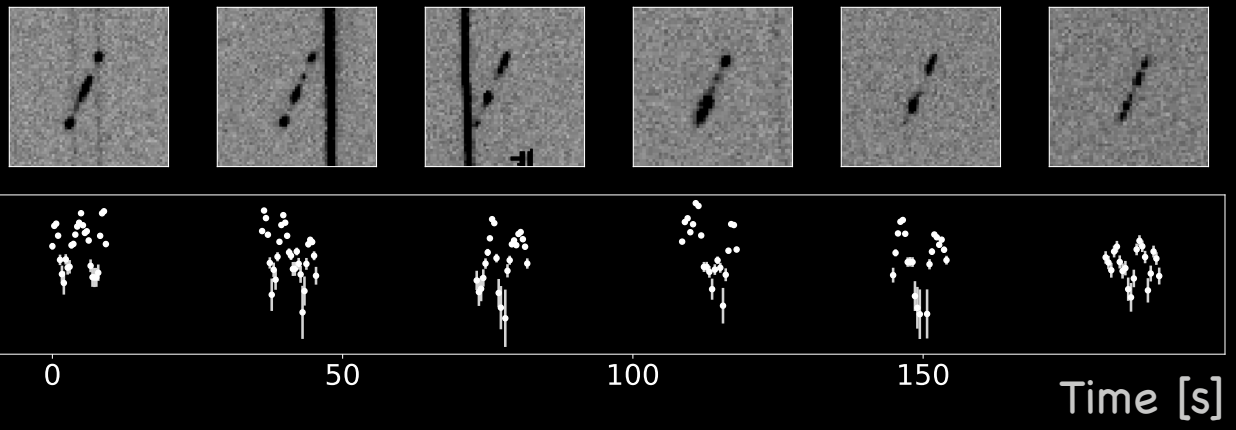
Blake et al., *Adv. Space Res.*, 2020

A detected arc that matches with SBS-3, a retired communications satellite.




We see a 2.7s periodic signal in SBS-3's light curve, indicative of tumbling.

A faint, unmatched arc that shows signs of tumbling, possibly a broken piece of solar panel.




Check out my webpage here!

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Check out the paper for more information!

Blake et al., *Adv. Space Res.*, 2020