

## Satellite Mega Constellations

(Dated: May 3, 2023)

### ABSTRACT

Updates on how satellite mega constellations could impact observations of solar system objects and the overall fraction of pixels that could be lost to satellite streaks

### 1. INTRODUCTION

We construct a Gen 2 Starlink satellite constellation as in [Hu et al. \(2022\)](#). xxx-basic stats of the constellation.

### 2. PIXEL IMPACT

After year 1, 8% of images would be streaked. Per image, the mean streak length comes to 15.3 arcmin, so a 60 arcsecond streak mask would result in 0.04% of pixels being lost.

#### 2.1. *Toss a Snap*

We can consider a “worst-case” scenario that if a visit contains a satellite streak, then that snap with the streak is discarded and a visit is reduced to a single 15s exposure rather than two 15s exposures. This would result in the  $5\text{-}\sigma$  limiting depth being 0.37 mags shallower than if there was no streak.

In [Figure 1](#), we show the result for rejecting snaps with streaks for the first year of the baseline v3.0 survey in  $r$ .

For this subset of exposures ( $r$  band in the first year, only 30s visits so no twilight NEO observations), we find that of the 44,000 visits, 5% would be streaked by an illuminated satellite. A large portion of the sky would be unaffected, with the mean change in coadded depth being 0.011 mags.

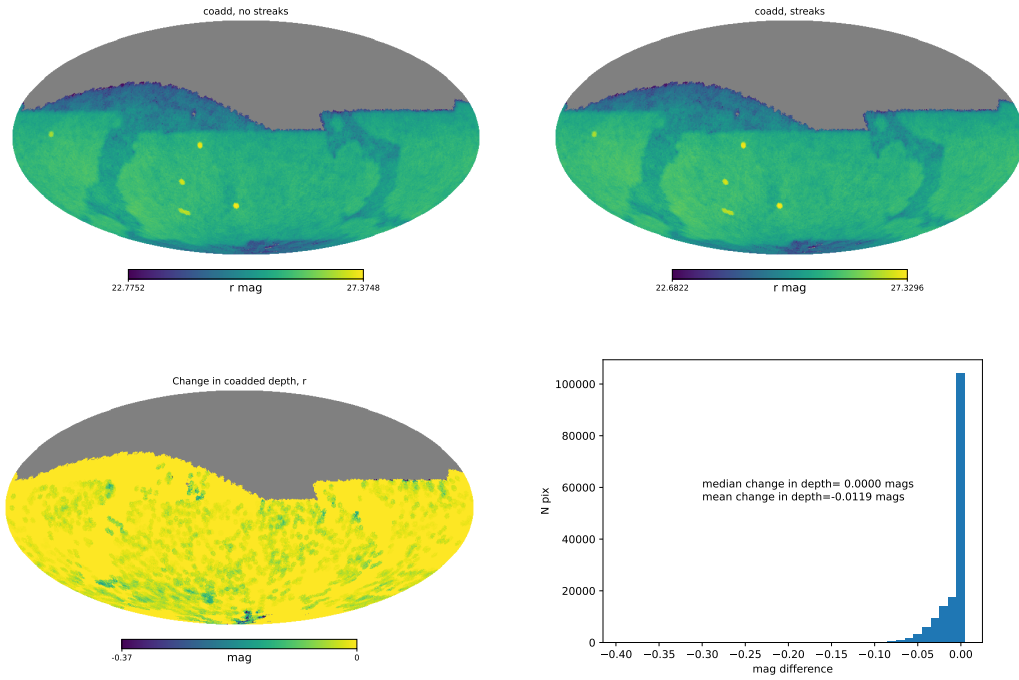
### 3. SOLAR SYSTEM IMPACT

This is the LSST overview paper: [Ivezić et al. \(2019\)](#).

First paper on satellites [Hu et al. \(2022\)](#)

### APPENDIX

#### A. REFERENCES



**Figure 1.**

#### REFERENCES

Hu, J. A., Rawls, M. L., Yoachim, P., & Ivezic, Ž. 2022, *ApJL*, 941, L15

Ivezic, Ž., Kahn, S. M., Tyson, J. A., et al. 2019, *ApJ*, 873, 111

## B. ACRONYMS

<b>Acronym</b>	<b>Description</b>
LSST	Legacy Survey of Space and Time (formerly Large Synoptic Survey Telescope)
NEO	Near-Earth Object
arcmin	arcminute minute of arc (unit of angle)