VERA C. RUBIN OBSERVATORY

Satellite updates

Meredith Rawls | Science Pipelines Group | February 16, 2022

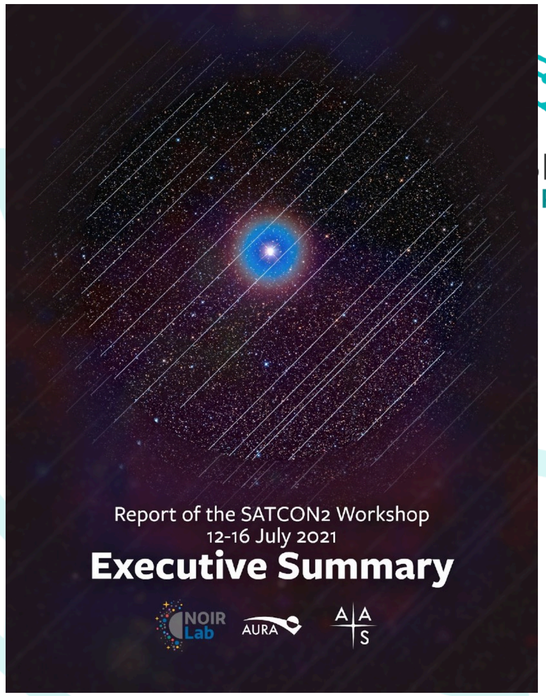
LSST Legacy Survey of Space and Time

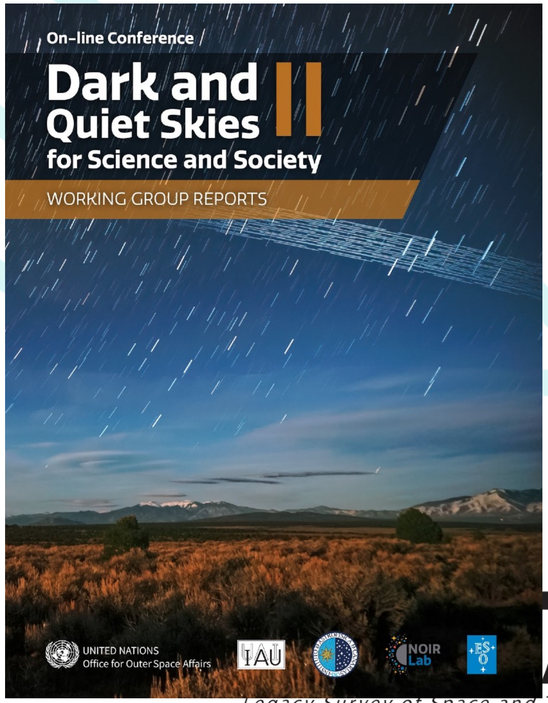
NSF NOIRLab AURA SLAC U.S. DEPARTMENT OF ENERGY

Reports released recently

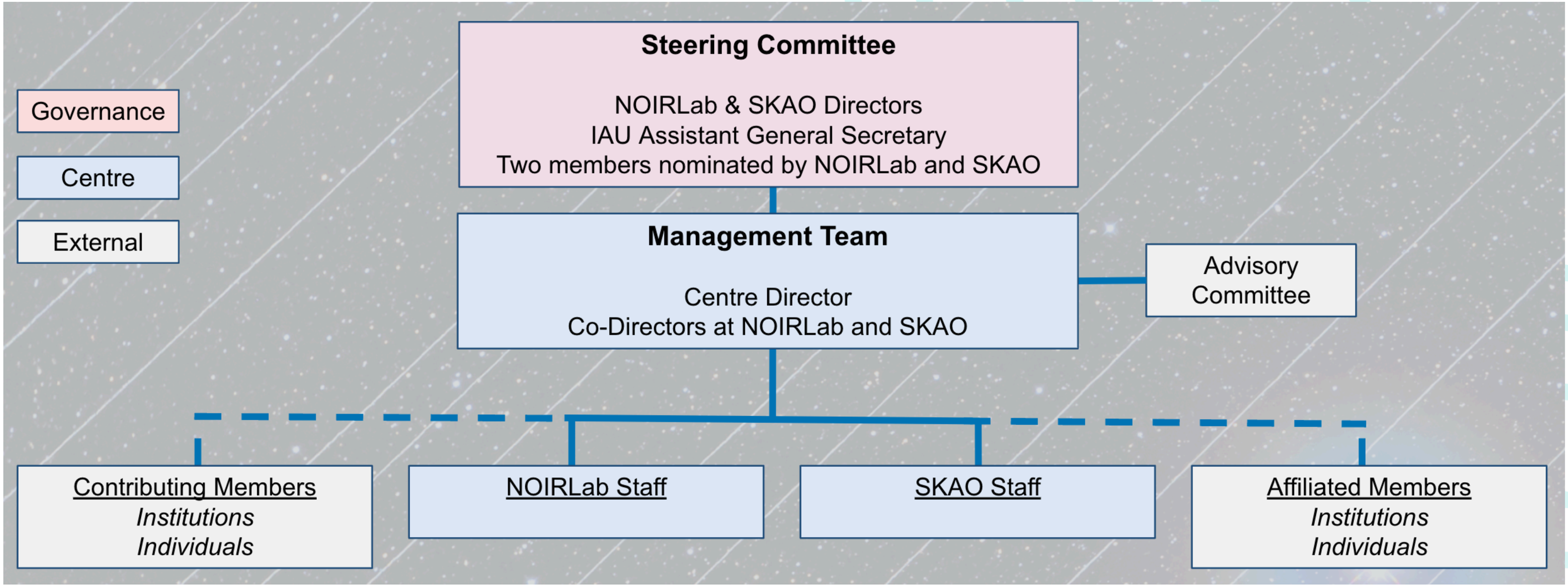
- **SATCON2:** noirlab.edu/science/events/websites/satcon2/publications
  - Observations Working Group (chaired by me!)
  - Algorithms Working Group
  - Policy Working Group
  - Community Engagement Working Group

- **Dark & Quiet Skies II:** noirlab.edu/public/products/techdocs/techdoc051
  - International considerations
  - All forms of light pollution, including radio



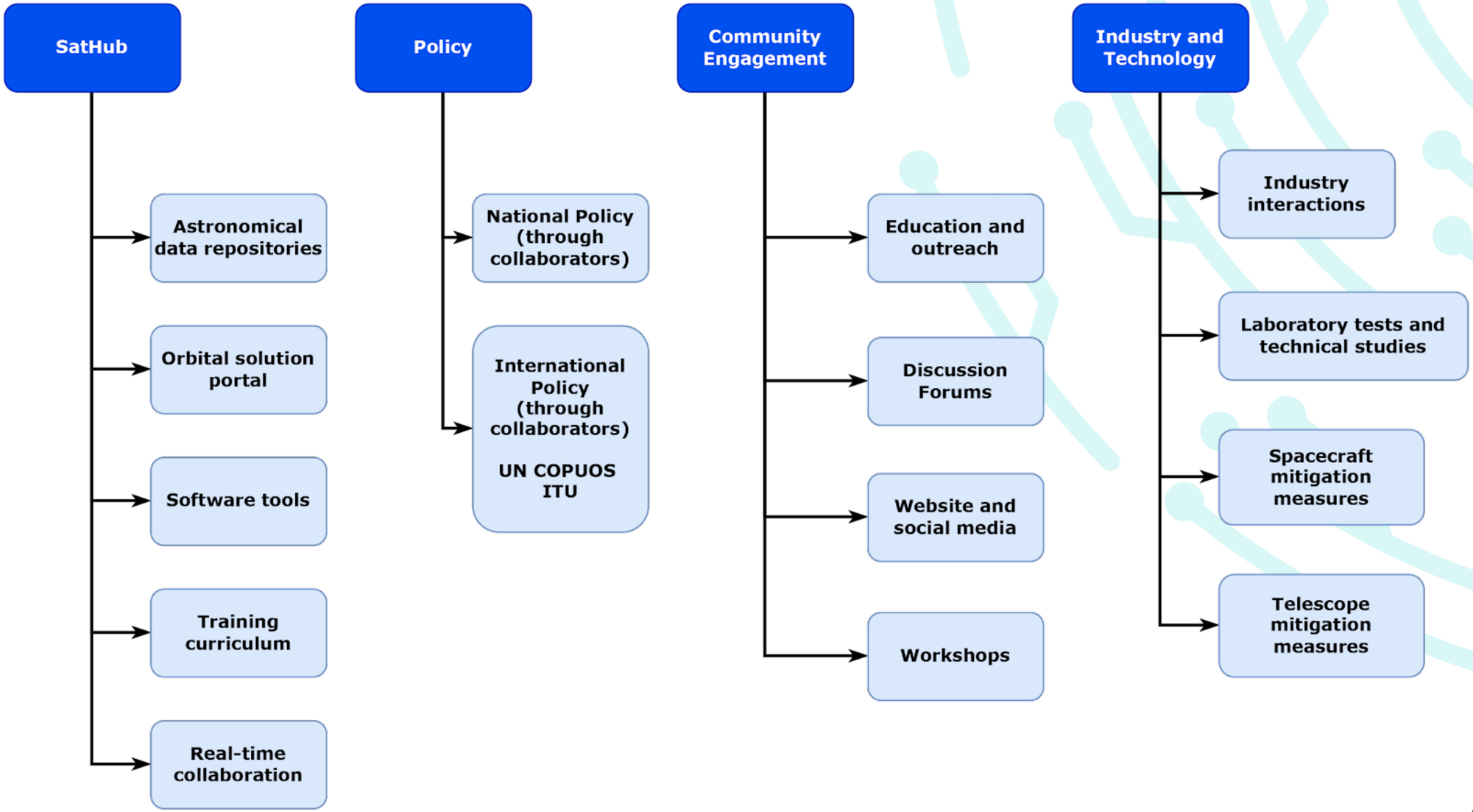


New IAU Centre for the Protection of the Dark and Quiet Sky from Satellite Constellation Interference



Starts April 2022

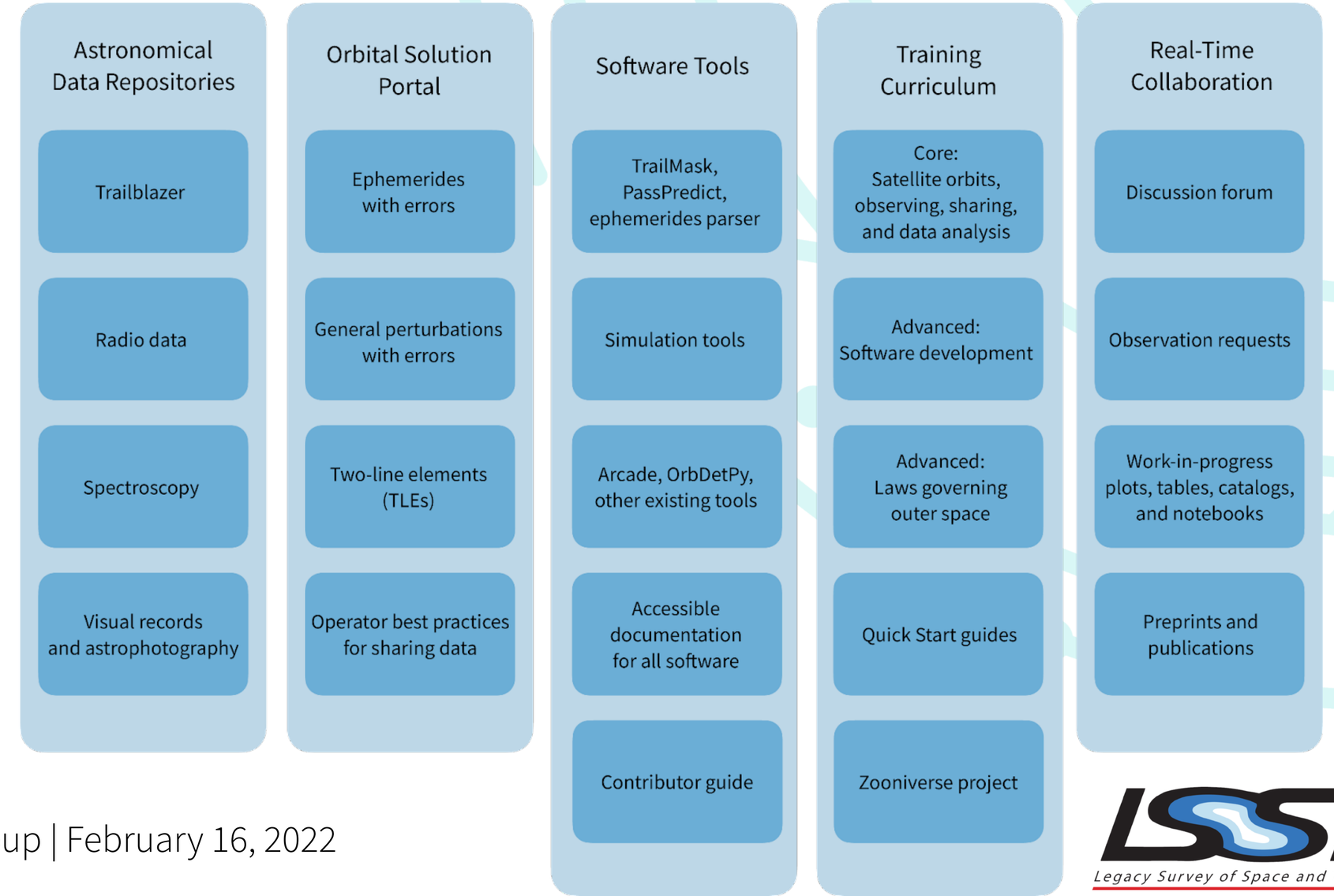
IAU Centre Organization Chart



Meredith Rawls | Science Pipelines Group | February 16, 2022

Observations — SatHub

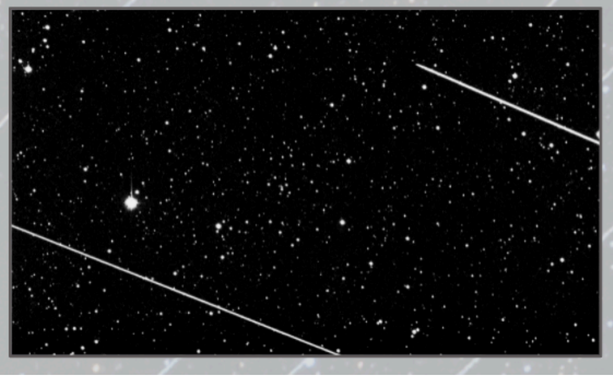
- A “one-stop shop” for training, outreach, and collection & analysis of satellite observations

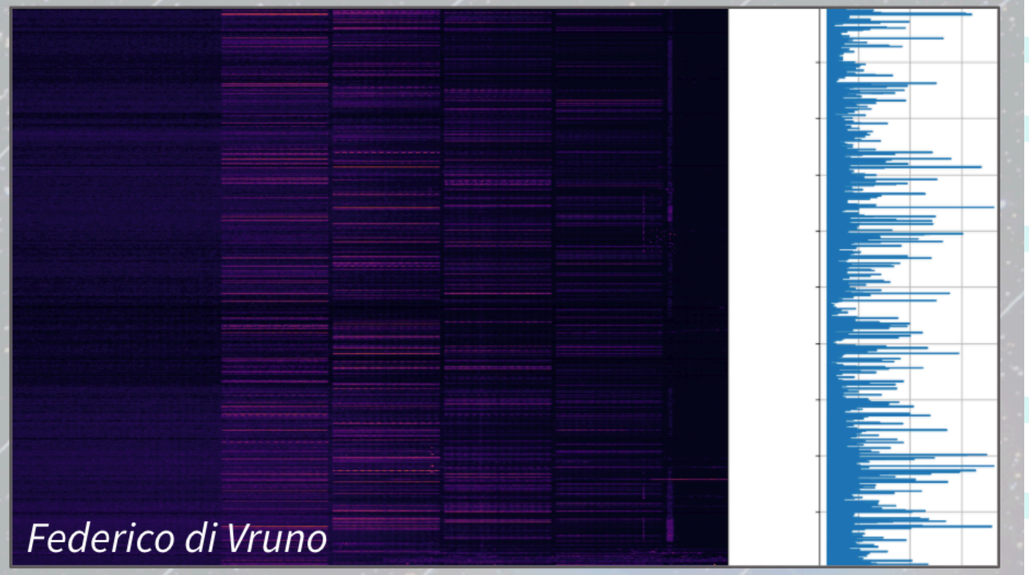


Astronomical data repositories

Publicly available, easily accessible, user-friendly, documented

- Collection of optical/near-IR images with satellite streaks (e.g., **Trailblazer**)
- Spectra contaminated with reflected solar spectrum
- Space-based observations from low-Earth orbit (e.g., Hubble)
- Radio data affected by satellite interference
- DSLR images, visual sightings, other formats





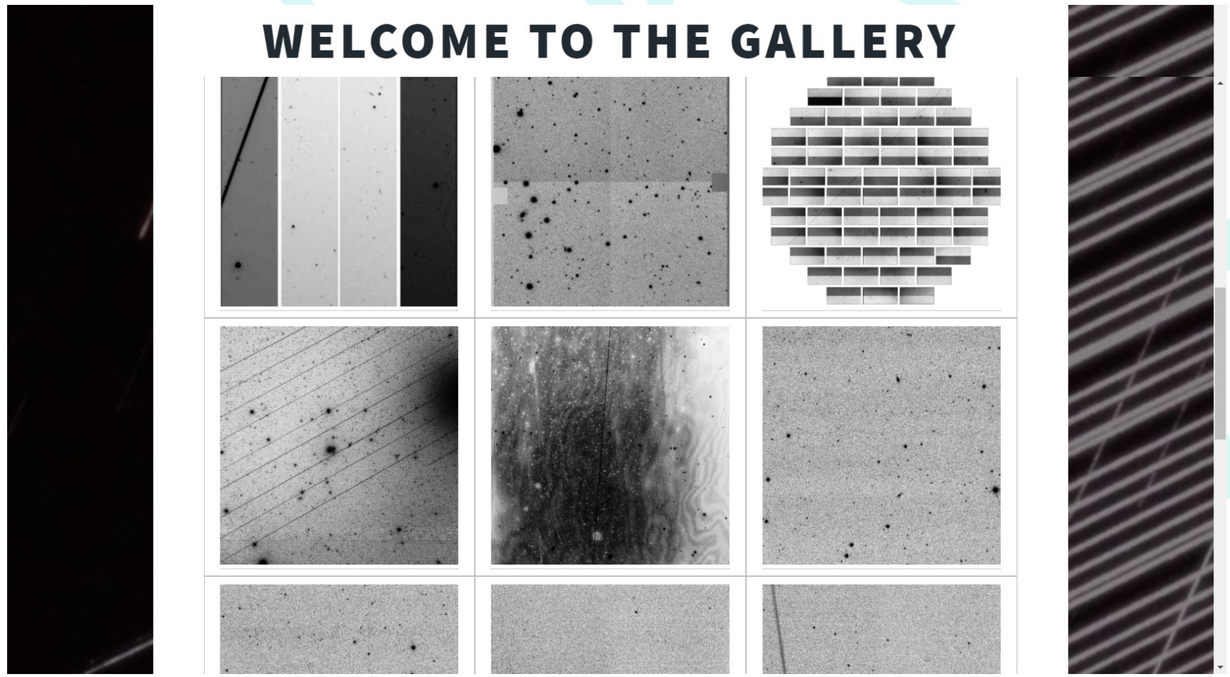
Trailblazer (project in progress)

An open data repository for astronomical data products affected by satellites

- Users can upload new data at any time (given vetted metadata)
- Users can access real representative data (FITS files) in minutes

Happening now

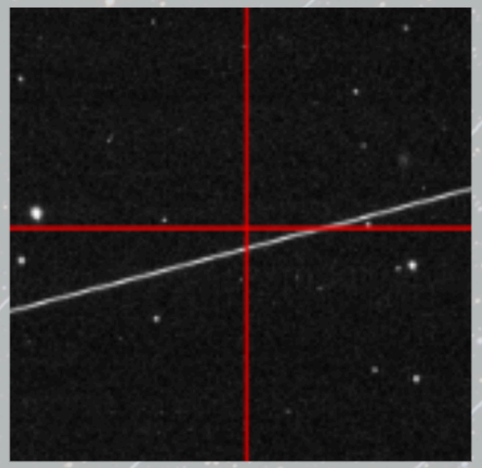
- Team of undergrads working with grad Dino Bektešević and me to build out web service
- Looking for longer-term funding
- Will be part of IAU Centre SatHub



Meredith Rawls | Science Pipelines Group | February 16, 2022

Orbital solution portal

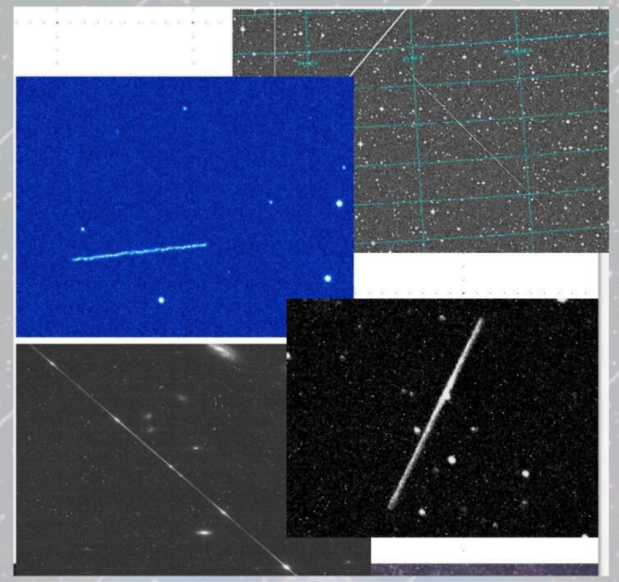
- Provide **public access to orbital solutions** every 8 hours or immediately following a maneuver, whichever is first, with **error bars**
- Ephemerides-style **and** general perturbation-style ("TLE") solutions
- Automatic synchronization with complementary services



Jeremy Tregloan-Reed

Software tools

- A home for PassPredict, TrailMask, Simulation & Modeling, etc.
- **User-friendly documentation**, support, and maintenance
- Standard **test suite** supporting a wide range of instrument and satellite signature properties to support software development



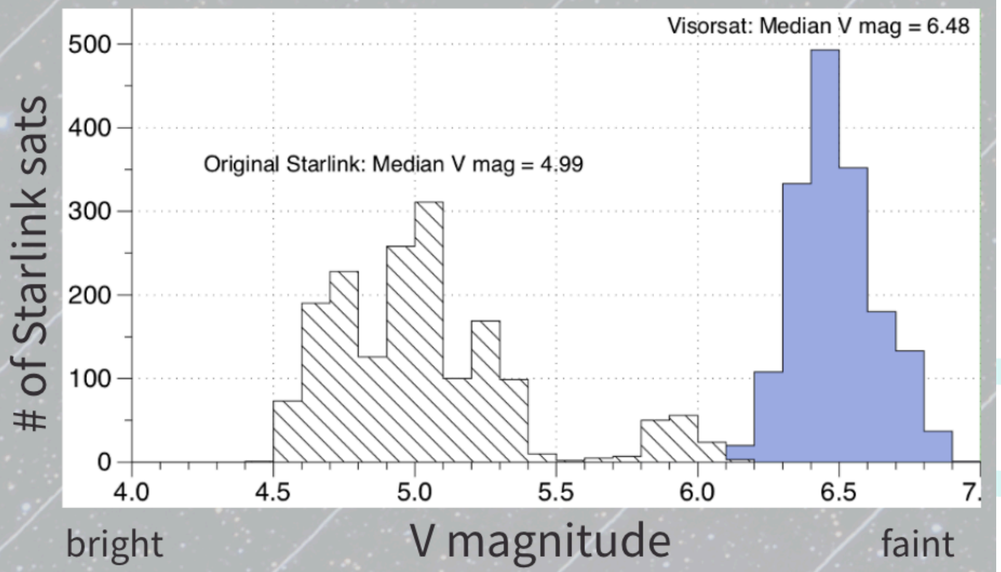
Jonathan McDowell

We want everyone to interface with SatHub

Sky observers, data analysts, software developers, industry experts, students…

- As the satellite population changes, evolving impacts require **observer-operator dialogs**
- Information in SatHub will be **public**, open, and accessible to support real-time collaboration
- We aim to join innovation with existing solutions, prioritize **ease of use**, and enable **coordination among multiple stakeholders**

Pat Seitzer

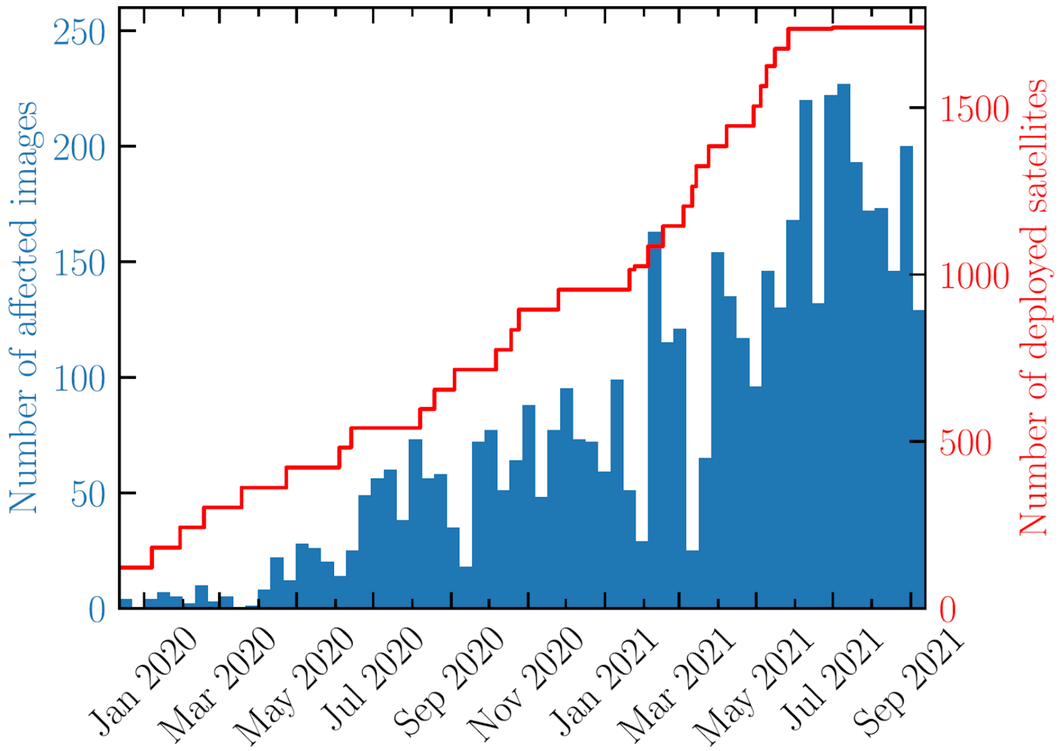


There will be many opportunities for individuals and organizations to contribute to SatHub!

Legacy Survey of Space and Time

Science impacts — ZTF

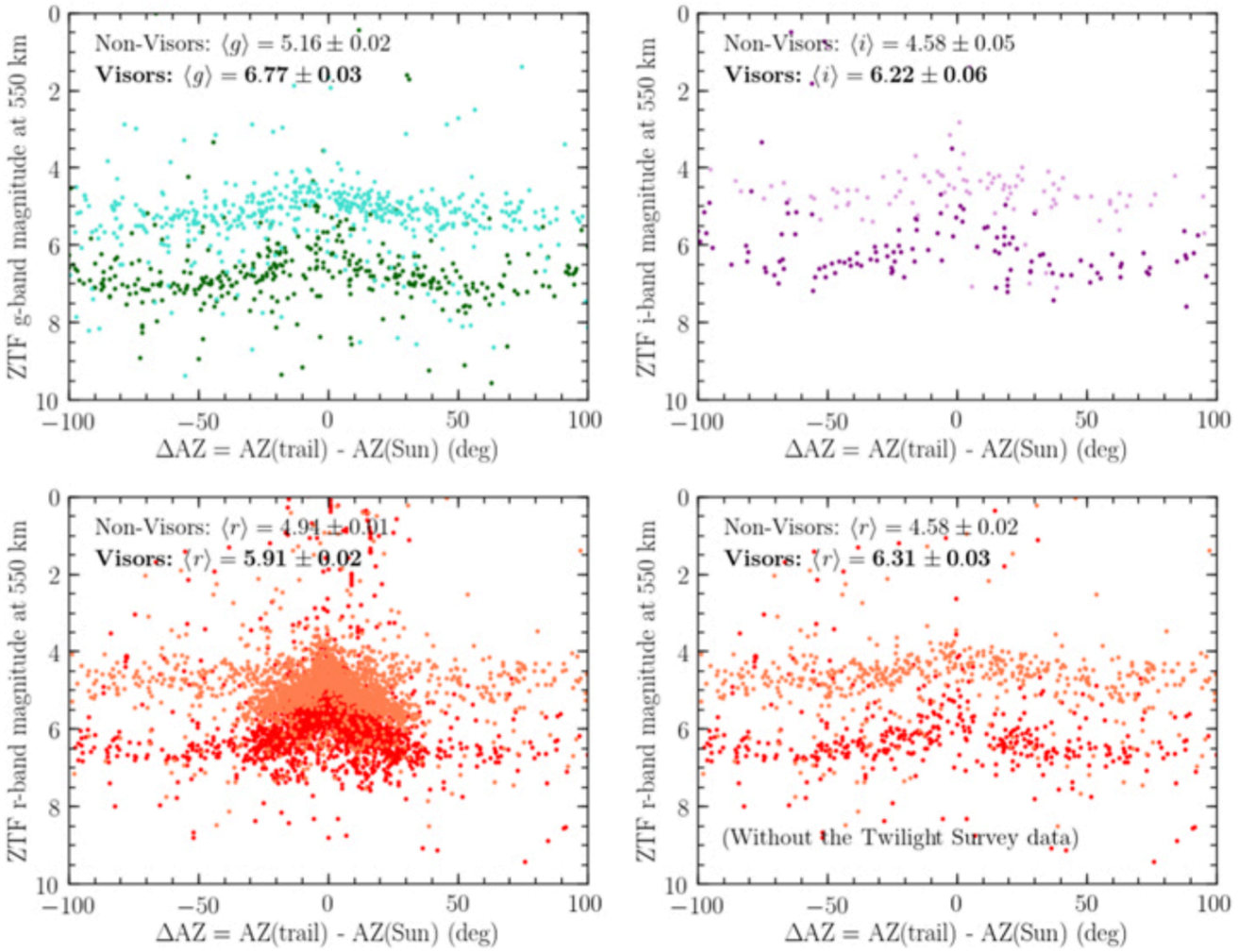
Mroz et al. 2022



"Despite the increase in satellite streaks observed during the analyzed period, the current science operations of ZTF are not **yet** strongly affected."

Science impacts — ZTF (Meredith's opinion zone)

- Visors do darken satellites (not enough)
- SpaceX has abandoned visors due to lasers
- ZTF study explicitly only considered ID'd Starlinks and ignored any/all other streaks
- Streaked images in twilight increased from 6% in late 2020 to 18% in mid 2021
- With 10,000 Starlinks, all twilight images anticipated to have a streak (>2000 have launched, ~1500 are operational now)
- Small telescope, large field of view = see lots of satellites, but they don't ruin much



Miscellaneous updates

- Astronomers and friends presented this week at the UN COPUOS STSC meeting, including comments about industry's willingness to work with us by Chris Hofer (Amazon Kuiper)
- I've recently participated in briefings with the FAA and the Department of Space Commerce
- I'm now on the AAS LPRISD (Light Pollution, Radio Interference, and Space Debris) committee

FEBRUARY 8, 2022

GEOMAGNETIC STORM AND RECENTLY DEPLOYED STARLINK SATELLITES