

Commercial Space and Astronomy Partnering in Best Practices and Guidelines for Brightness Mitigation



OneWeb

28 June 2022



Leadership in Responsible Space

OneWeb is already a thought-leader in **Environmental, Social, and Governance** (ESG).

ESG defines **criteria** that socially conscious investors/customers/regulators use to screen potential investments/products/licences.

- **Environmental:** consider how a company performs as a steward of nature.
- **Social:** examine relationships with employees, suppliers, customers, and communities
- **Governance:** deals with a company's leadership, executive pay, audits, internal controls, and shareholder rights.

Lifetime

Collision
Avoidance

Space
Traffic
Mngmnt

Assisted
Disposal
and
Removal

Reliability

Green
Launchers

Optical
Astronomy

Radio
Astronomy



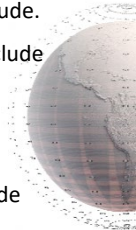
Responsible Space

1

SSA

Space Situational Awareness

- Constellations should not overlap in altitude.
- Reliability metrics before launch shall include the reliability for de-orbiting.
- Propulsion should be required for orbits higher than 400 km.
- Risk should be evaluated on a system-wide basis (not per satellite).

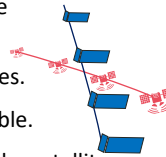


2

STM

Space Traffic Management

- Act responsibly to avoid top-down traffic control imposed on us by regulators
- Transparent coordination among operators is key.
- Actively engaging with WEF on satellite collision avoidance “Right of Way”.
- NASA’s collision metric requires updates.
- Retaining control for as long and possible.
- Passivate before losing contact with the satellite.

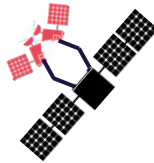


3

ADR

Assisted Disposal & Removal

- In Orbit Servicing is uncharted territory.
- Satellite should either be ‘designed for demise’ or for targeted re-entry
- Foster diversity.
- Avoid monopolistic scenarios.
- Develop “Breakdown Cover” agreement.



4

RF Interference

Radio Astronomy

- Astronomers use a band adjacent to the Ku band that OneWeb uses.
- OW avoids using our Ch. 1 to avoid interfering into their RF band



5

Brightness

Optical Astronomy

- Share Two Line Elements (TLEs)
- Target is above 7 magnitude.

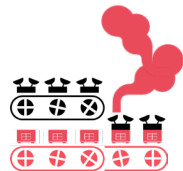


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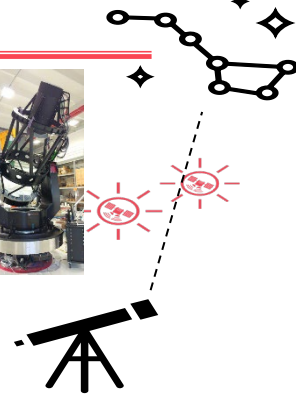
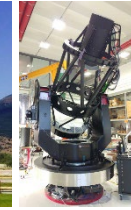
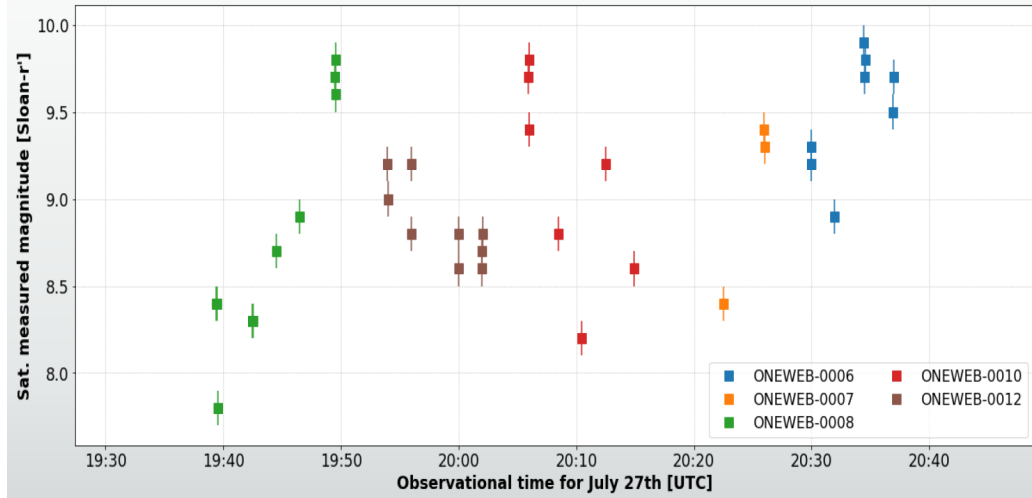
Carbon Footprint

Greenhouse Gas (GHG)

- Include Carbon Footprint Guidelines in Gen2 RFI.
- Engage with WEF on Space Sustainability Rating.
- Collect and verify Carbon Footprint for OW, launch partners + supply chain



Satellite Brightness



01 Simulate

Simulate orbital scenario to predict the brightness of Gen1 satellites.

02 Observe

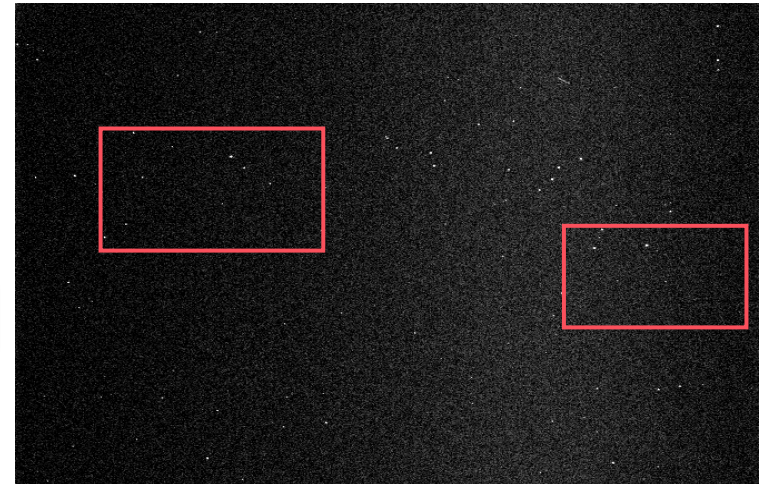
Engage with a network of institutional astronomical observatories to perform a series of campaigns to measure Gen1 brightness.

03 Iterate

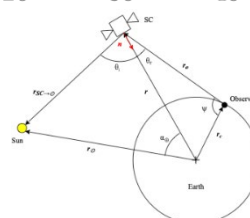
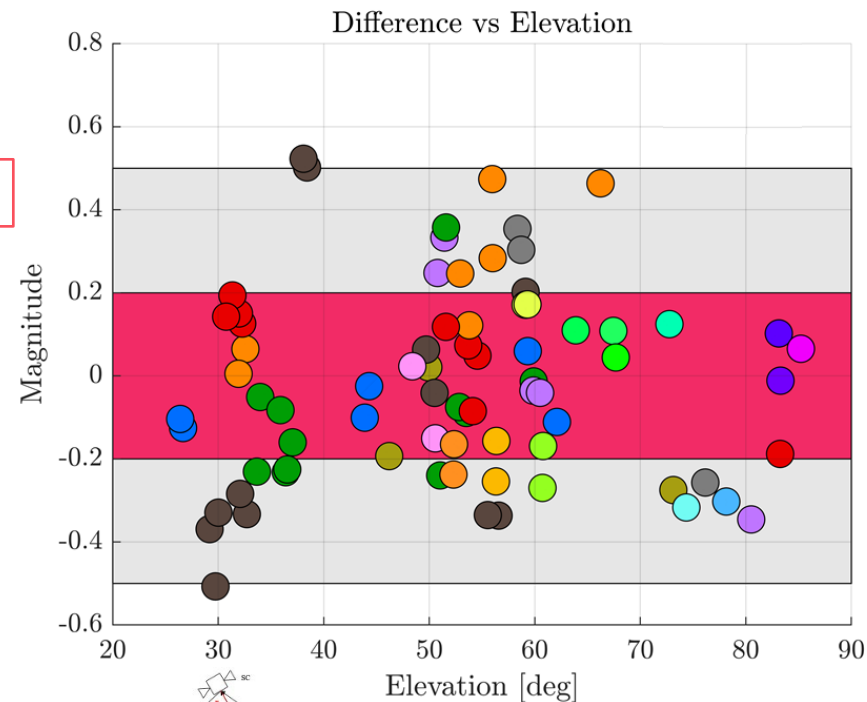
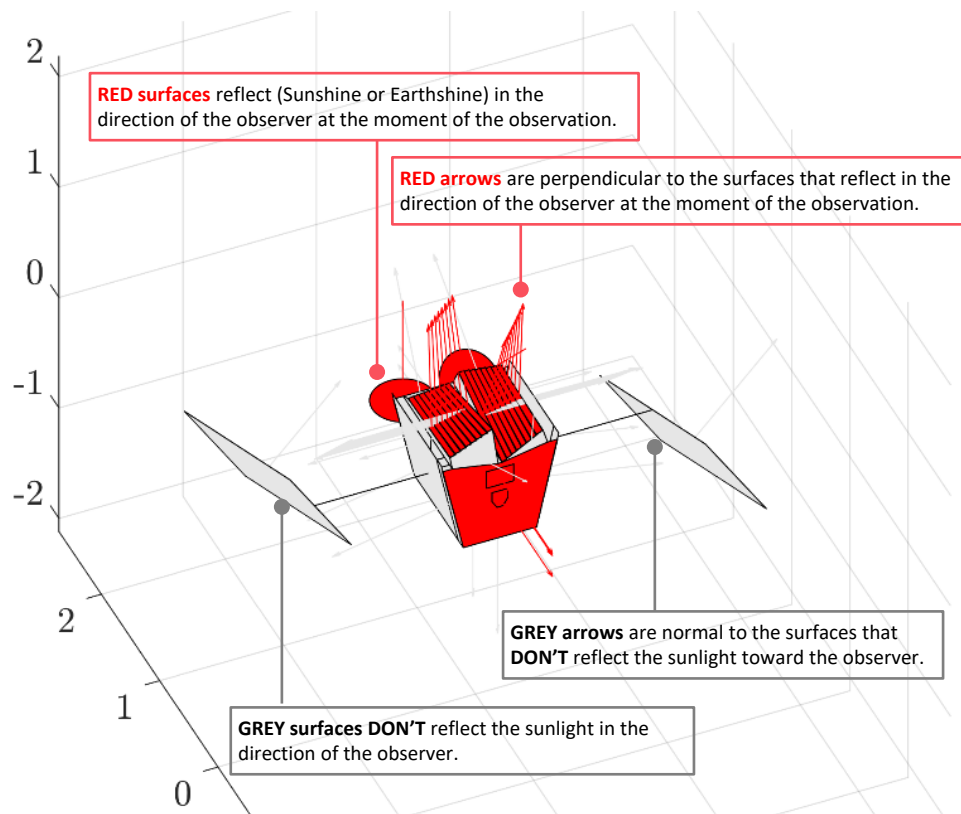
Correlate the simulation to the observed data – so that any future improvements will be based on a reliable model.

04 Disseminate

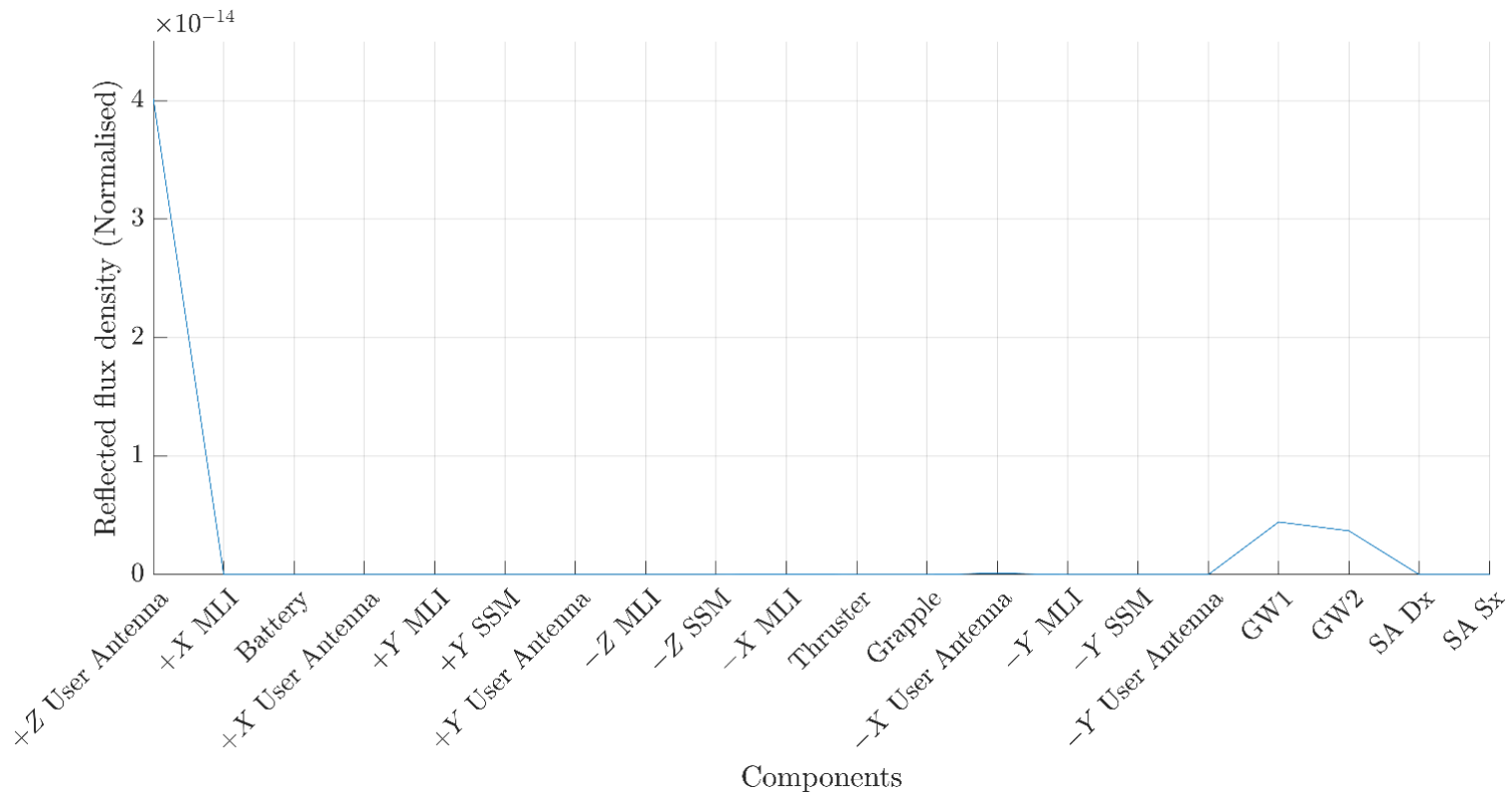
Refresh our communication plan. Become an active member of the Dark & Quiet Skies and Uncopous working groups



Brightness Prediction & Model Correlation



Surfaces and their reflectivity



Next steps

- The ultimate objective is to validate a tool that will be used in the design of OneWeb's Gen2 satellites to mitigate their brightness
- Continue working on the optimization of the model
- We welcome collaboration with the astronomical community:
 - In refining the model (OneWeb willing to share the source code)
 - Scheduling additional observations to collect new data sets (sharing satellites' TLEs and ephemeris)

Feel free to contact me: ruth@oneweb.net