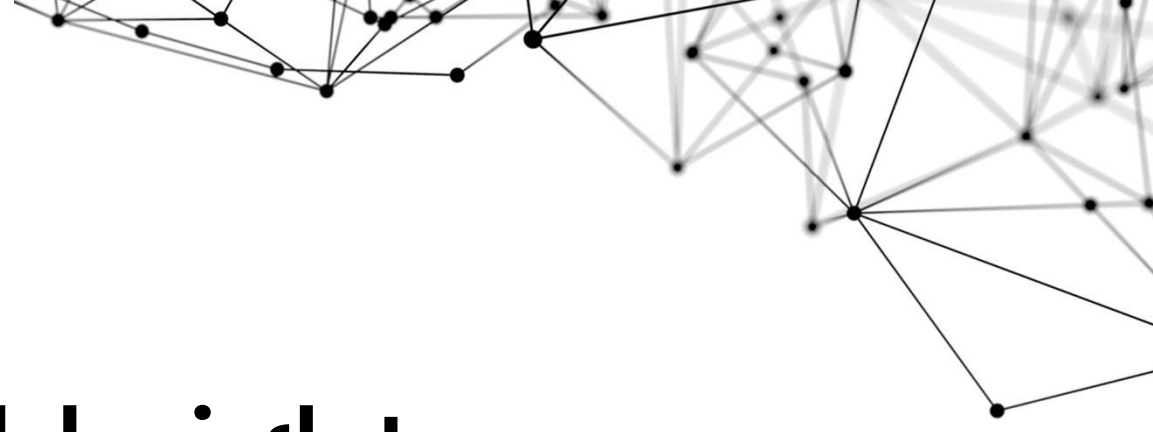




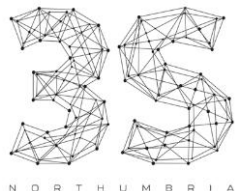
Satellite optical brightness modelling

Ryan Moodie

3S Northumbria, UK

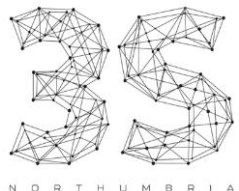
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10 Dec 2025



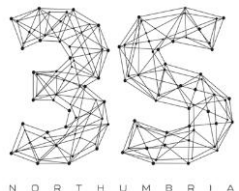
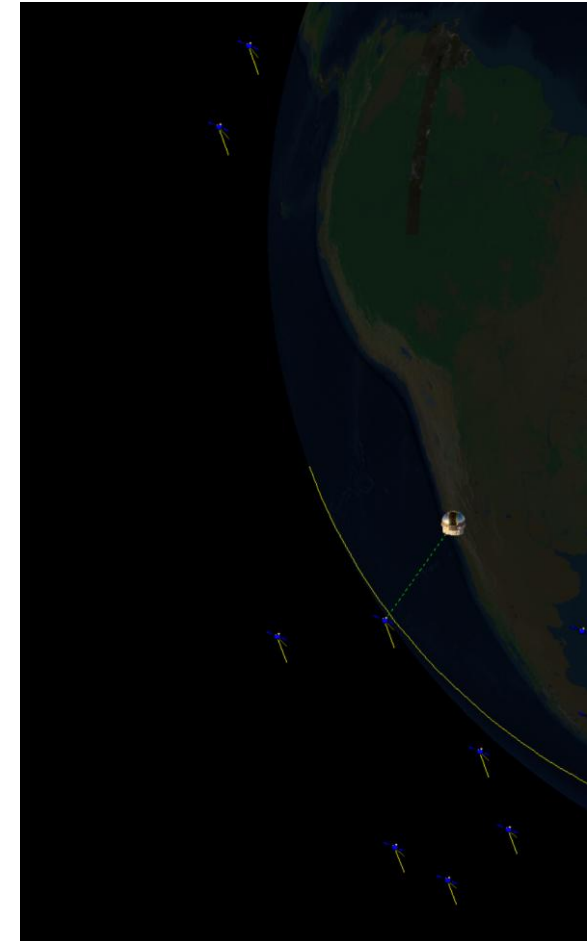
Introductions

- 3S Northumbria:
sustainable space solutions
 - Modelling and simulation
 - Space situational awareness
- Part of ExoAnalytic Solutions
- UKSA study:
optical interference from
satellites



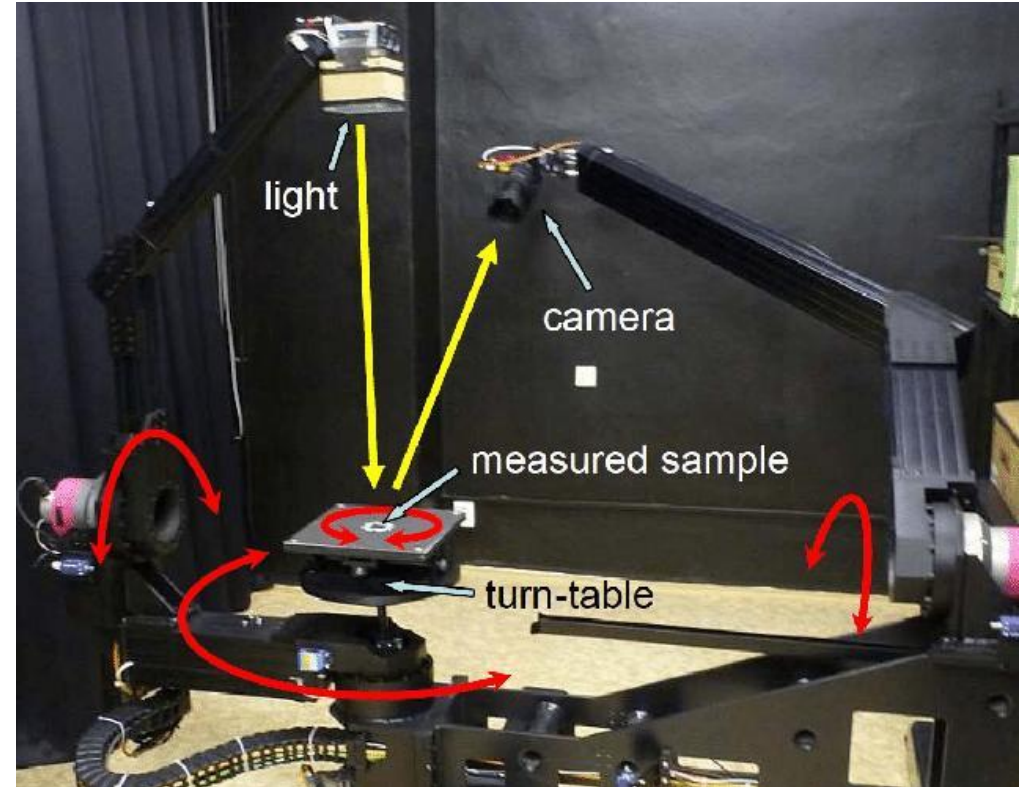
Reflection modelling

- Sun and earthshine
- Satellite geometric model: surface(s)
- Bidirectional reflectance distribution function (BRDF)
- Empirical: fit **model** against measured **data**
- **Software:**
 - Lumos-Sat (Starlink)
 - OneWeb Brightness/Constellation tools
 - SEAS (ours)



Bottleneck

- BRDF data
- Expensive
- Proprietary
- Public repository
- Design compliance
- Brightness forecast



Gonioreflectometer. From: Filip et al. 2013. Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition.

Thank you

Let's continue the conversation

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