# Updates on ESA Tools Supporting Debris Laser Ranging

Q. Funke [1], T. Flohrer [2], and V. Braun [1]
[1] IMS Space Consultancy at ESA, Robert-Bosch-Str. 5, 64293 Darmstadt, Germany, Email: quirin.funke@esa.int, vitali.braun@esa.int
[2] ESA, Robert-Bosch-Str. 5, 64293 Darmstadt, Germany, Email: tim.flohrer@esa.int

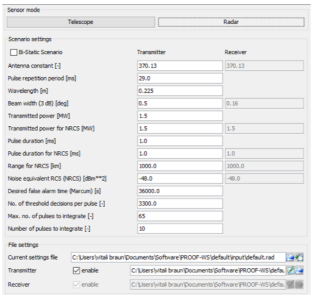
## Space Debris User Portal

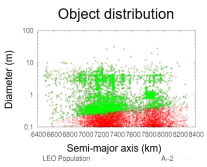
### https://sdup.esoc.esa.int

- Main entry point to all frontends
- Download and support for
  - DRAMA – Risk and mitigation analyses for planned missions
  - MASTER – Space Debris population model
  - PROOF – Observation Forecasting
- Online re-entry risk computation with Oriundo

## PROOF

- Radar and Optical Observation Forecasting
- Link budget calculations
- Currently being upgraded
- New features foreseen:
  - Laser performance model
  - Improvements in existing optical and radar performance models
  - Measurement generation (incl. SNR-dependent noise)
  - Multi-static sensor network simulation
  - Tracking analysis
  - Standardised data formats: OEM, OPM, TDM, CRD
  - More detailed object properties (e.g. to indicate if it has retro-reflectors)
  - Modern web-based GUI

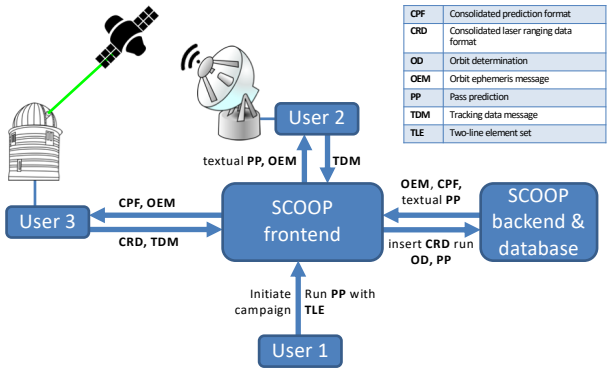





## SCOOP

### https://scoop.esoc.esa.int

- Web based tool supporting collaboration in tracking and survey campaigns
- Combining radars, telescopes, and laser ranging
- ILRS data formats supported
- Currently in validation
- Registration via email to space.debris.support@esa.int

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|---|---|
| CPF | Consolidated prediction format |
| CRD | Consolidated laser ranging data format |
| OD | Orbit determination |
| OEM | Orbit ephemeris message |
| PP | Pass prediction |
| TDM | Tracking data message |
| TLE | Two-line element set |

## DISCOSweb

### https://discosweb.esoc.esa.int

- Online access to the space object database DISCOS
- More than 42,000 objects
- Physical properties for more than 15,000 objects, suitable for link budget calculations
- Launch and launcher information
- Space debris environment statistics
- Free to register for everyone
- New machine friendly REST API for collision avoidance or other satellite operations use (registration with email including description of planned use to space.debris.support@esa.int)