TESAT SPACECOM

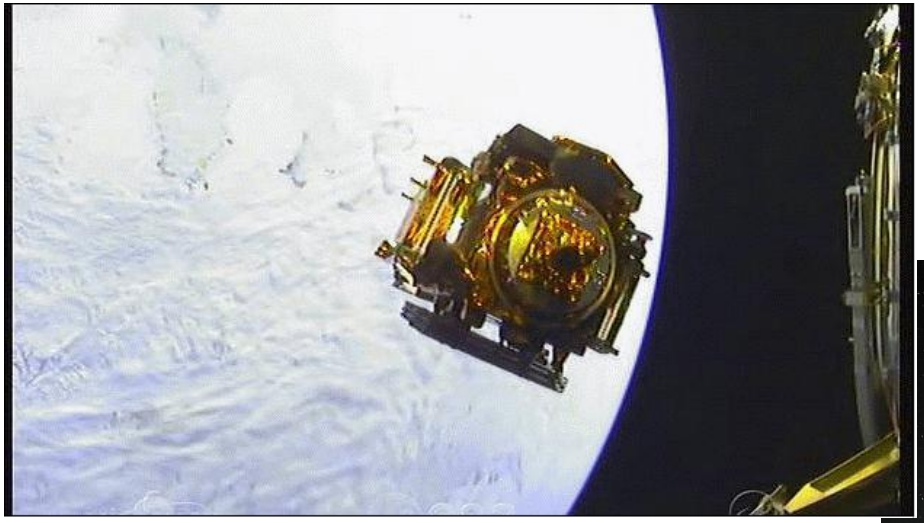
PIONEERING WITH PASSION

TESAT LASERCOM STATUS

Frank Heine

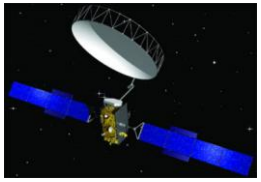
Alpha and Omega

» Sen1 A with LCT in clamp ring separating from Fregat booster stage April 2014

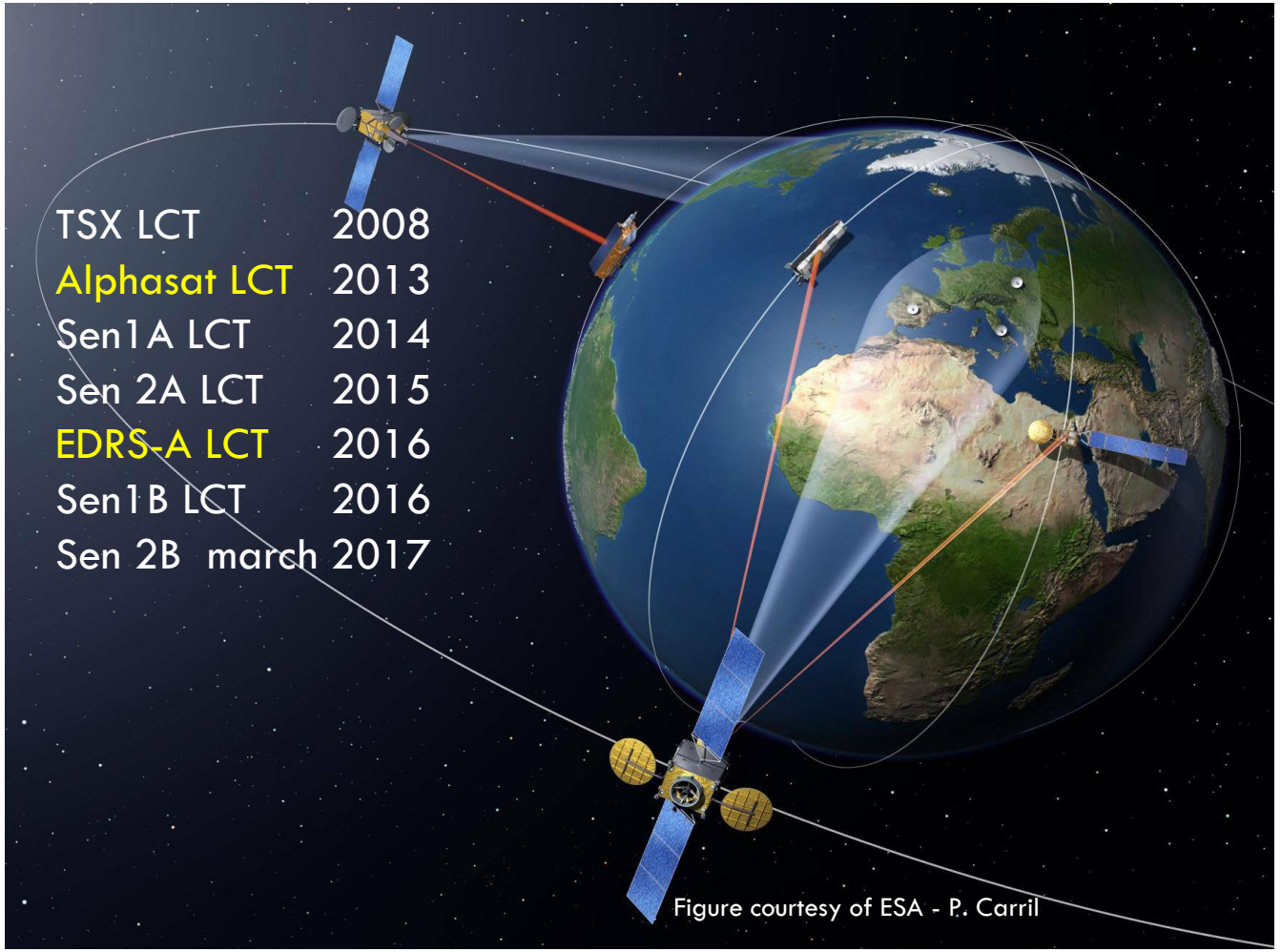


- NFIRE photo bombing an Aurea Borealis photo Nov 2015

COMMERCIAL SERVICE OFFERED IN EDRS – EUROPEAN DATA RELAY SYSTEM

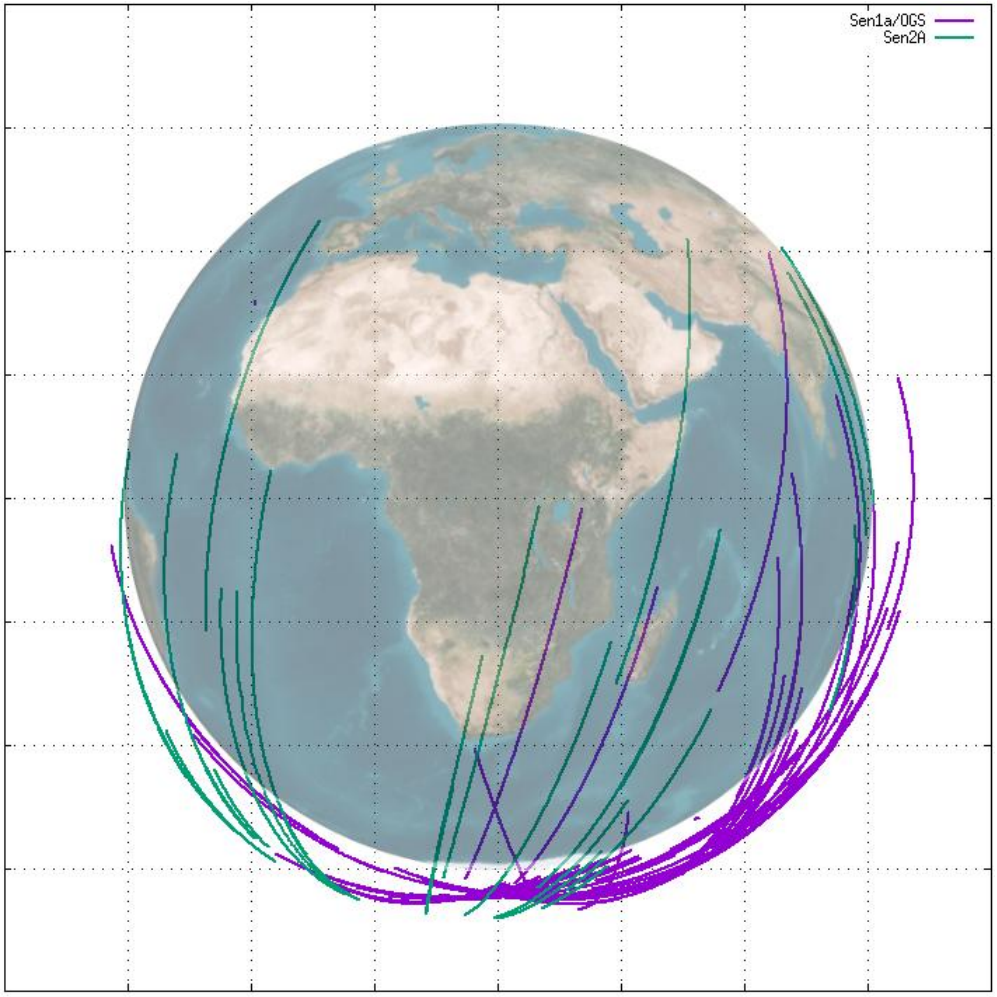


Copernicus

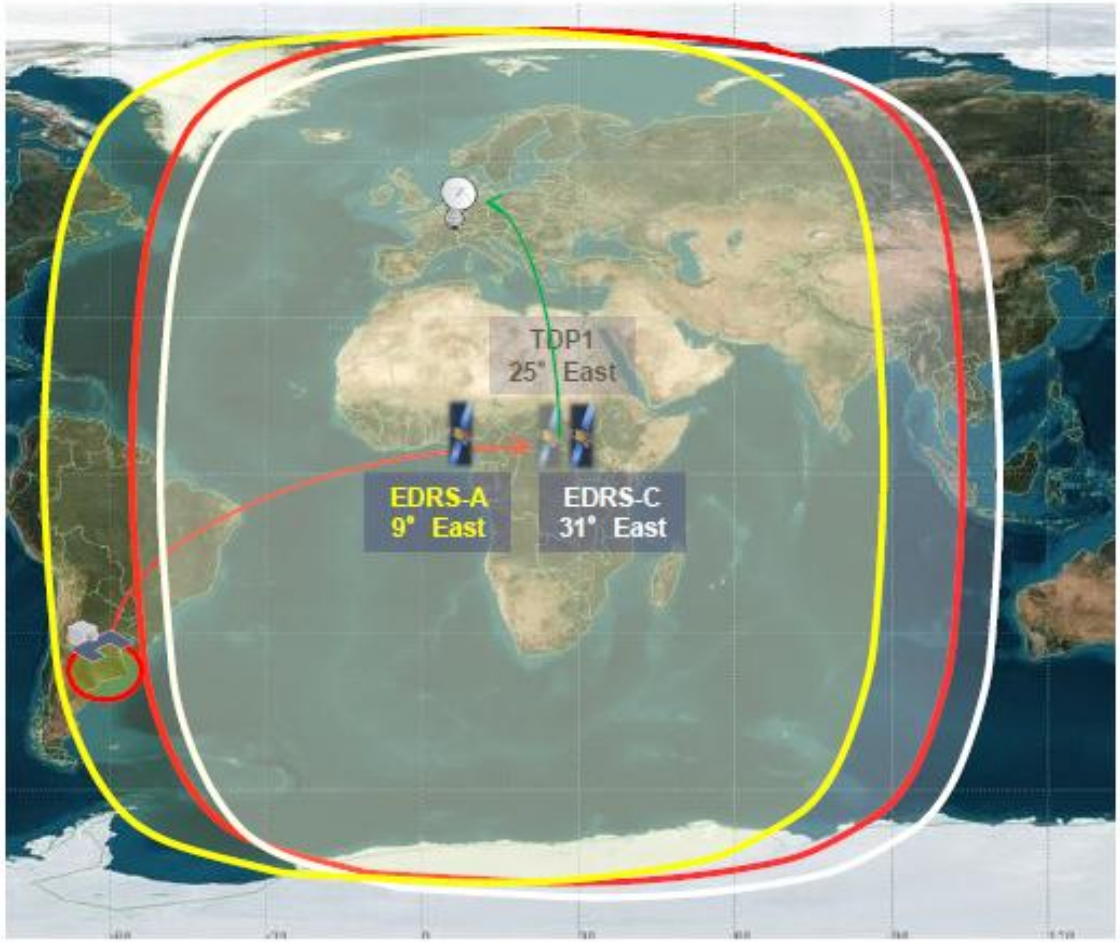


Virtual Ground Stations for Sentinel S/C

- Operator chooses optimal location for data down link according to his conops and surveillance schedule
- North pole and Europe already covered by X-band RF data downlink



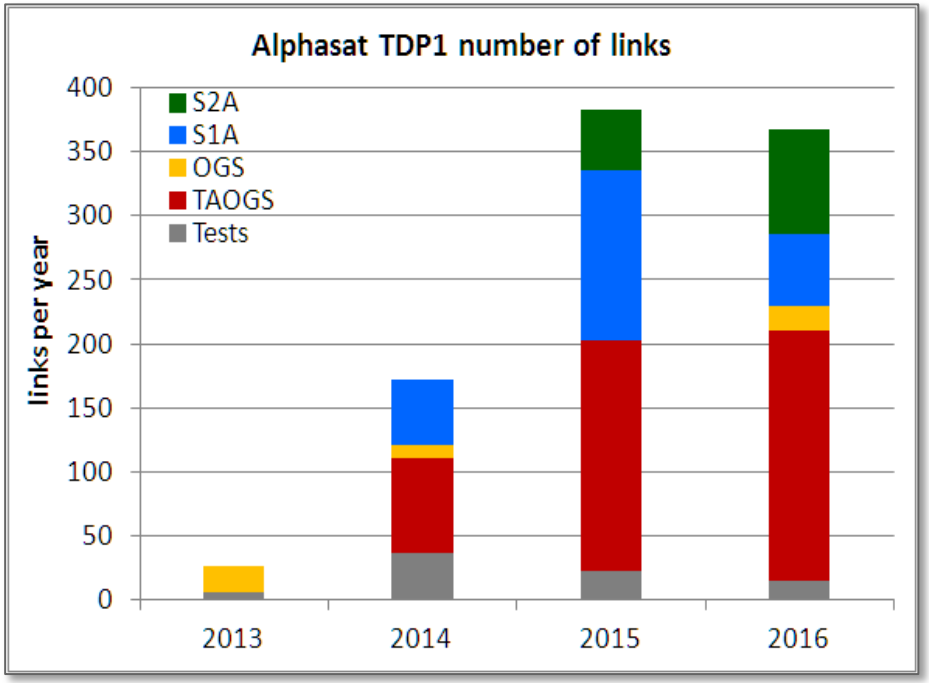
Low Latency Data Products

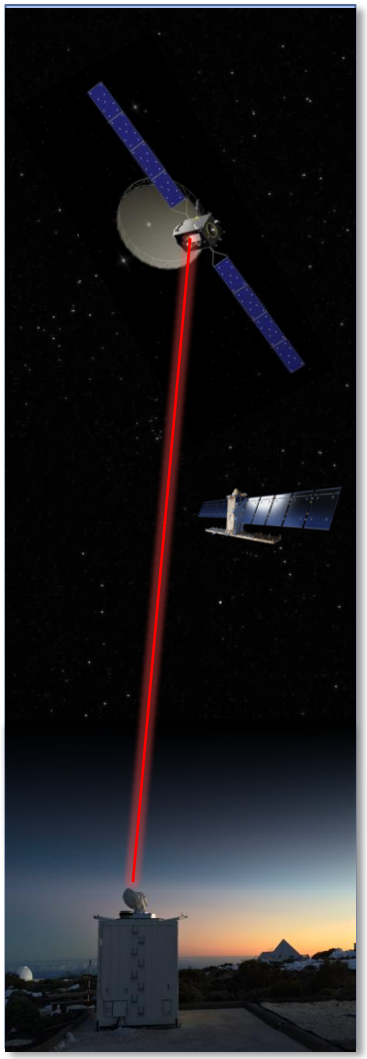


- Image collection by Sentinel 1 SAR sensor over Argentinan coast (~10s)
- Link establishement with TDP1 (2min)
- Transferred from TDP1 to the EDRS ground station in Germany (0,25s) and send to the processing facility (3min)
- Raw data processed in Germany (8 min) and Preliminary detection Analysis (5min)
- Product send by email from Germany to Lisboa (10min)

ALPHASAT TDP1: 3 YEARS OPTICAL LINKS, ROUTINE OPERATIONS

- Launch: July 2013
- First link: October 2013
- Nearly 1000 links to LEO and Ground





Pictures: Arianespace, TESAT, ESA, Inmarsat

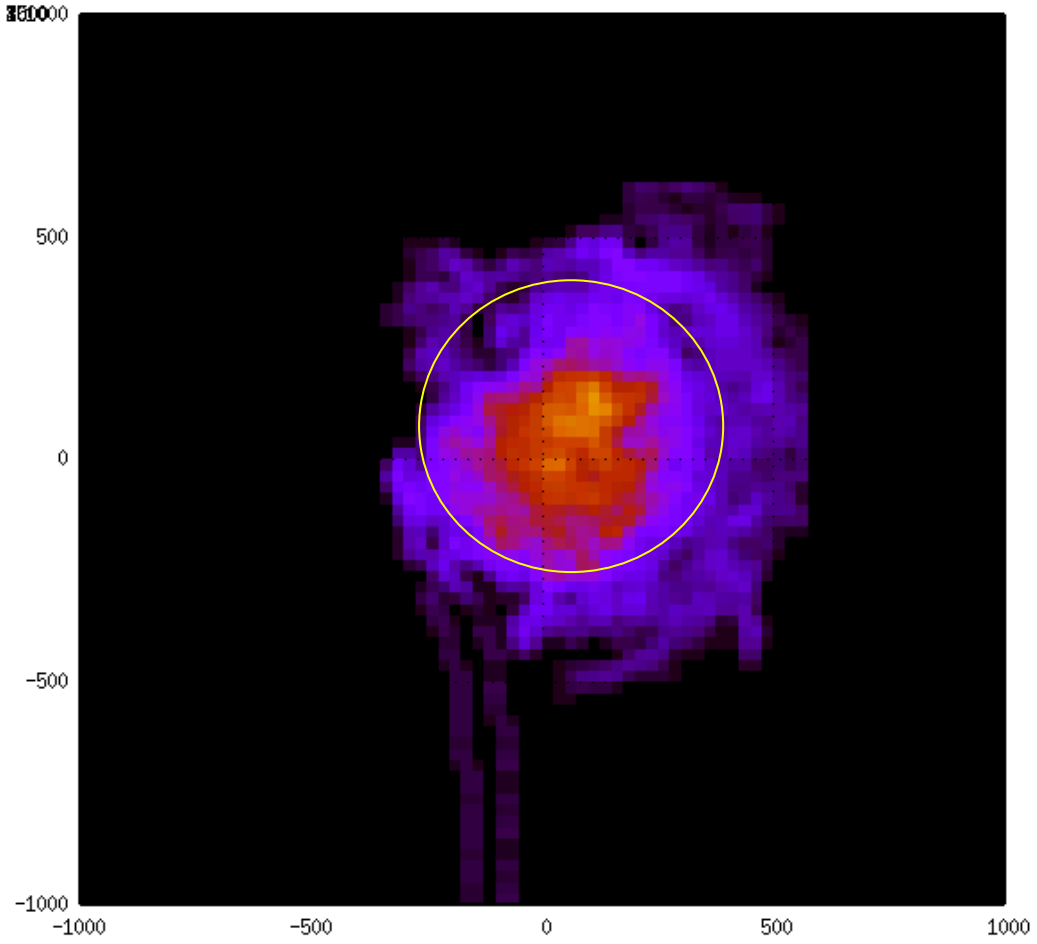
GEO MONITORING LIFE TM !

LCT Monitoring, Tasks

- Tesat is under contract for IOT, IOV and health monitoring for the current LEO-GEO LCTs and the T-AOGS
- Different customers and stakeholders (ESA-ESRIN, ESA-TIA, DLR, Airbus CIS)
- Using several proprietary data bases with web interfaces or FTP
- Programming and servicing pull or push services for LCT TM access
- Archiving all LCT TM in a common data base
- Automatic TM data for trending and status monitoring
- Ongoing work: Correlation of in-orbit and on ground measurements, validation of budgets and analysis

Distribution of Az/El pointing error of Alphasat S/C and LCT

- »Accumulation of pointing errors (23800 samples)
- »>100 links
- »Circle is Fine Akquisition Sensor FOV (350µrad radius)

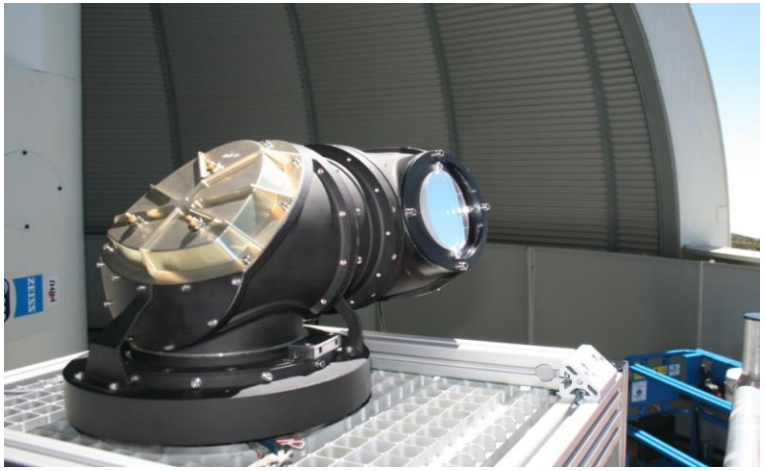


OGS on Travel

Allmersbach, Germany

Maui, Hawaii, US.

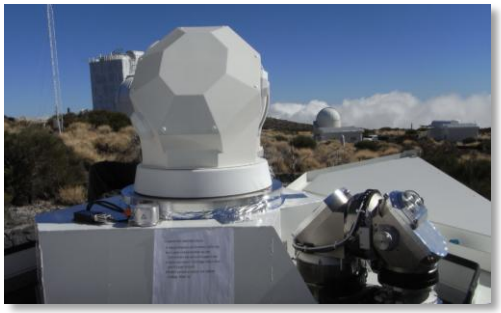
within ESA OGS, Teneriffa

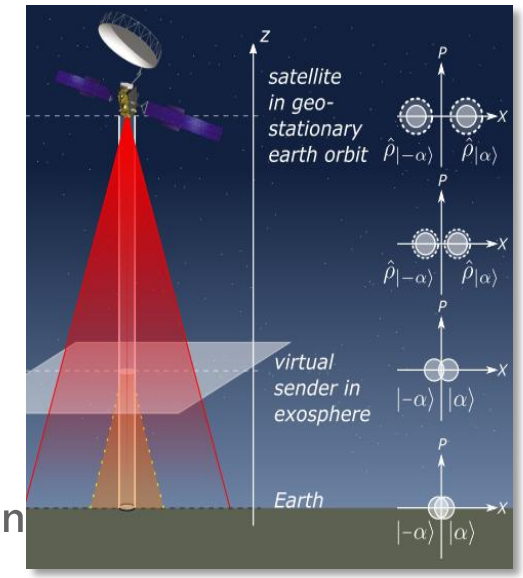


TAOGS: Optic container and operator container

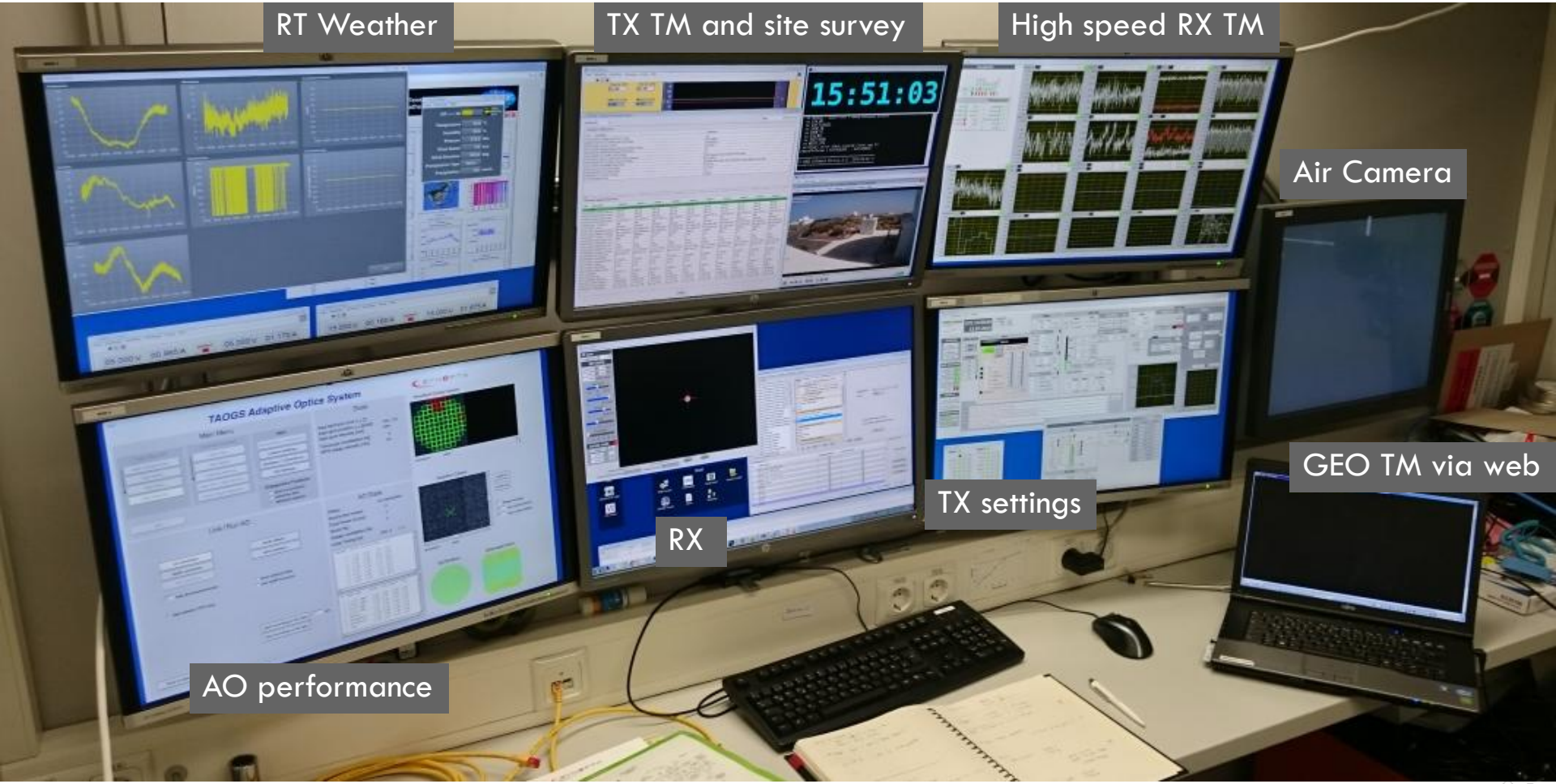
TASKS OF THE TAOGS

- **TAOGS** is part of TDP1 system
- Homodyne BPSK, 1064nm, 1.8Gbps
- Adaptive optic within downlink
- Up to 50W for uplink
- Several beam TX diameter
- Data for **atmospheric model** at 1064nm
  - 25kHz on TDP1
  - 5kHz on TAOGS
- **Site diversity** together with ESA OGS
- Modeling for gigabit **feederlinks**
- **New coding algorithms**
- **Quantum Key Distribution, QKD**
  Coherent Laser Communication is ideal for Encryption Applications e.g. Continous Variable Quantum Key Distribution (CVQKD)
- Development and validation of advanced **operational concepts**





WITHIN THE OPERATOR CONTAINER



Opt Comms: How it looks like