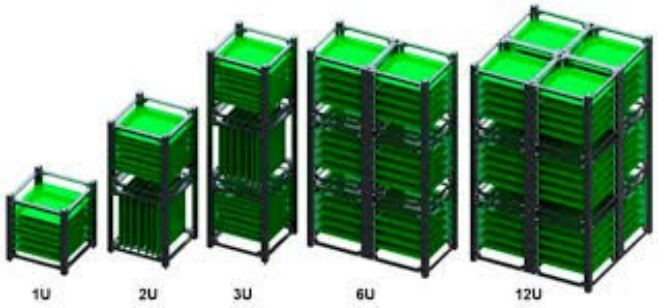
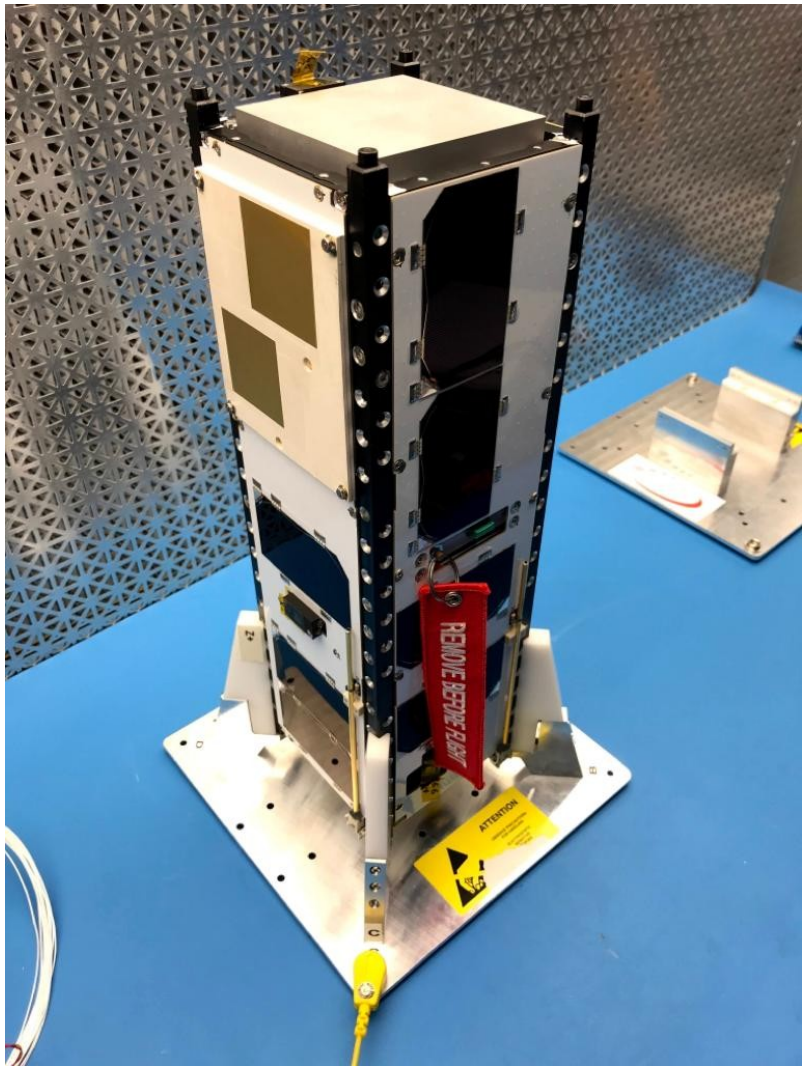
CubeSat- studio dei Terrestrial Gamma-Ray Flashes (TGF) dallo spazio

CubeSat

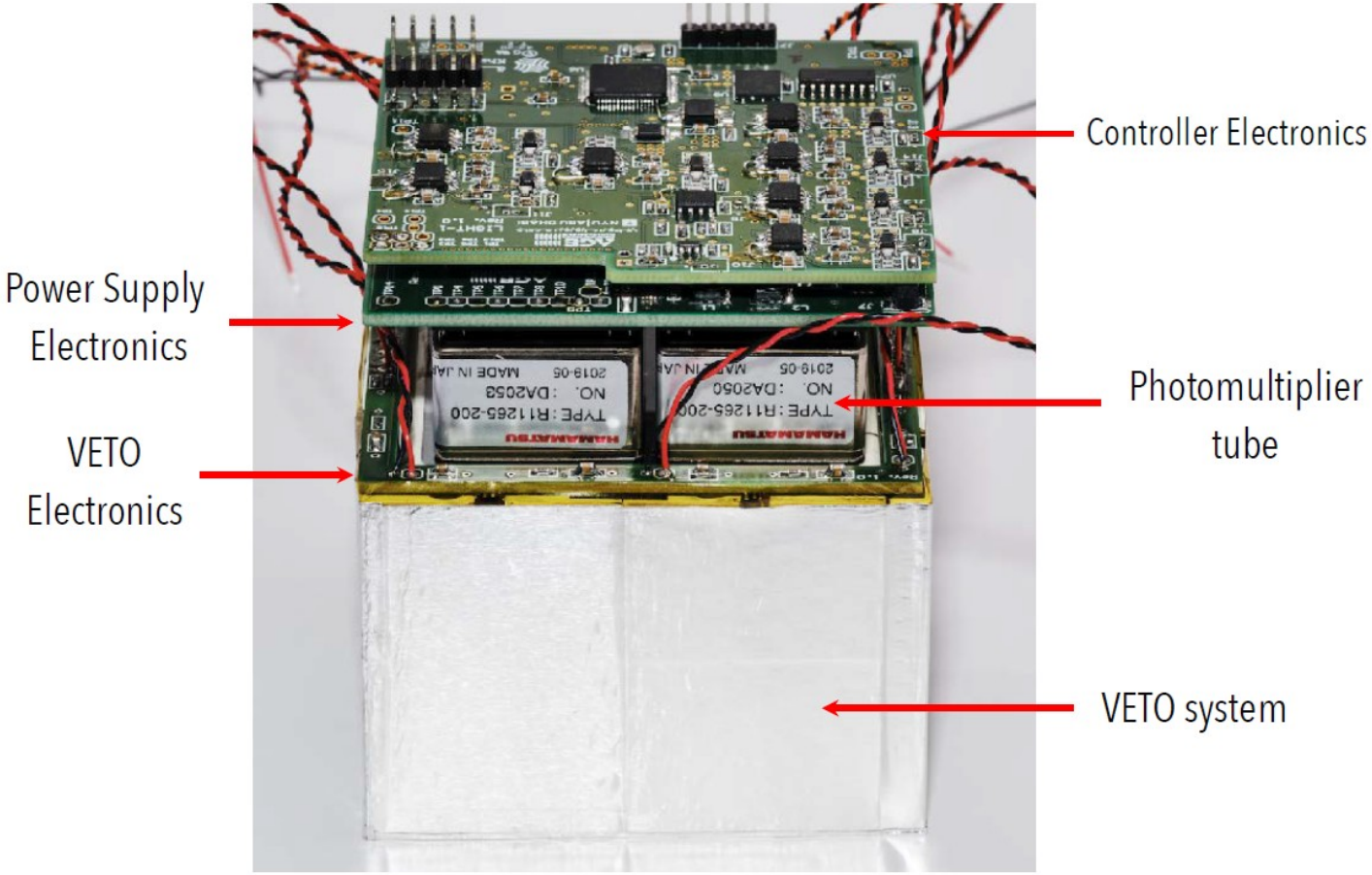
- 1dm³
- Quick development
- Low budget (50/80 K€)
- Flexibility





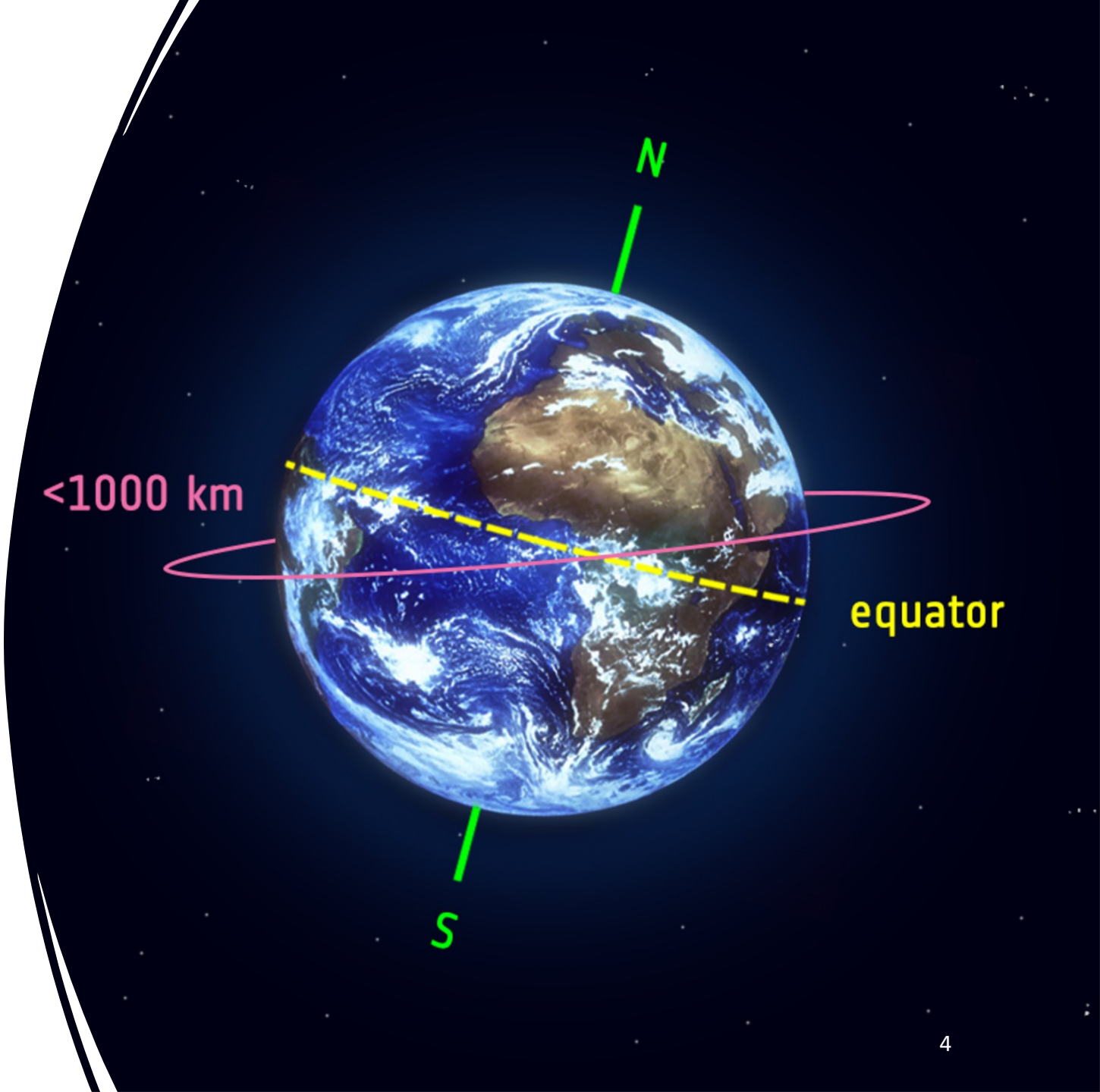
Electronic components

- COTS
- LEO orbit
- Low radiation dose

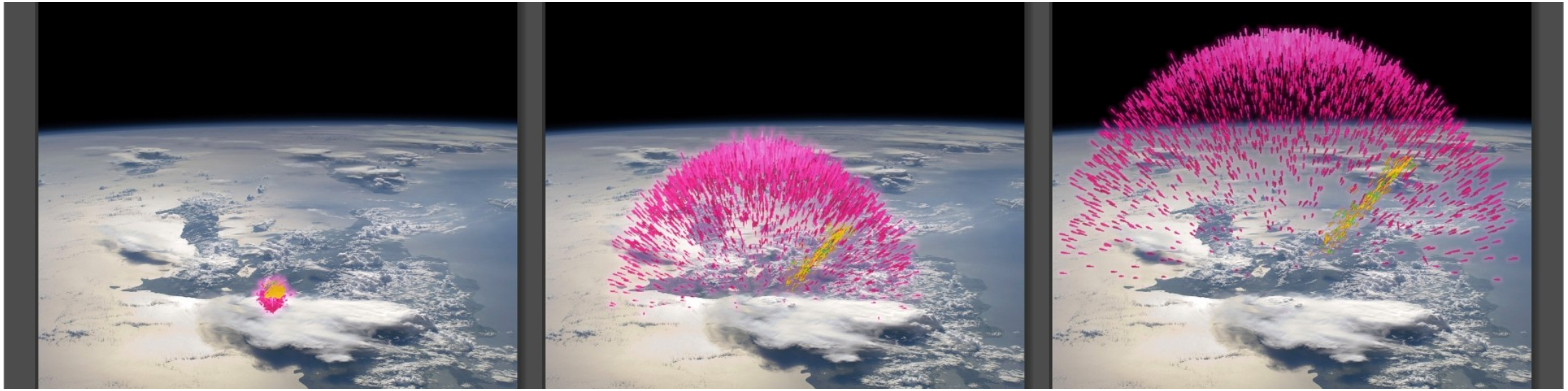


LEO orbit

- 200 – 1000 km
- 90 min
- ~ 28000 km/h

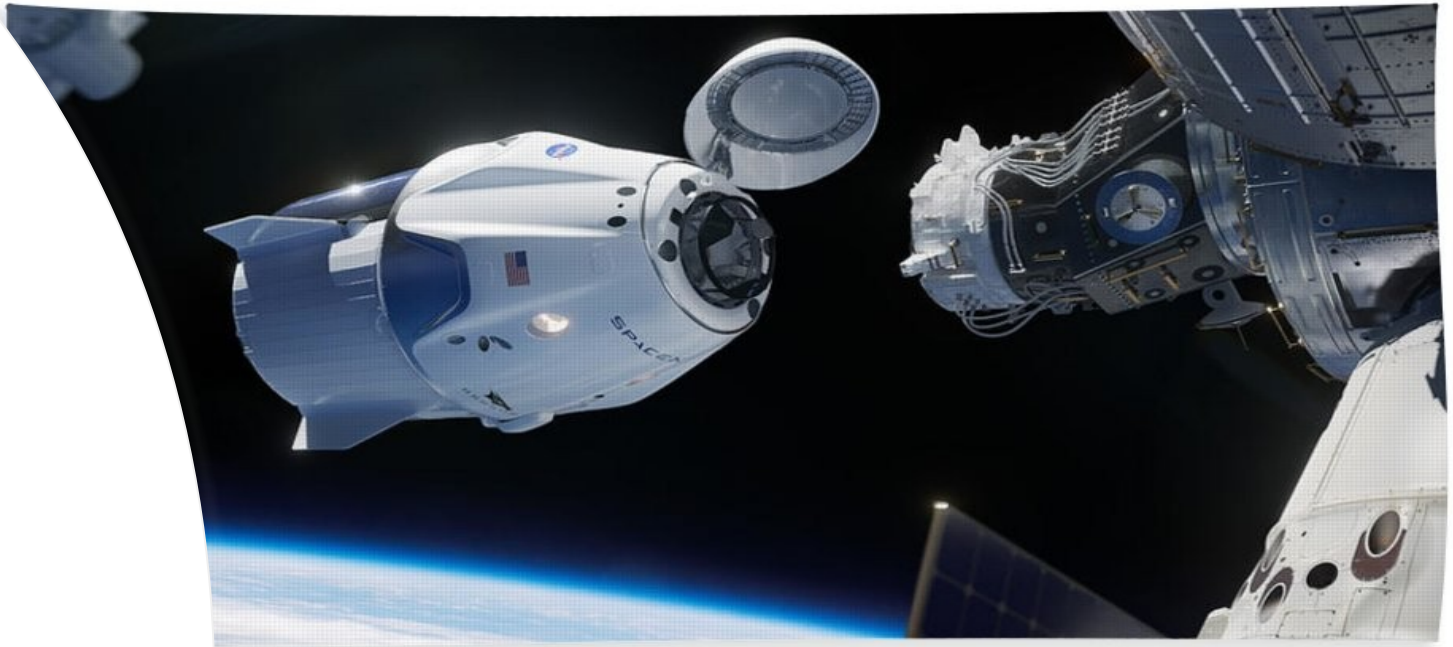


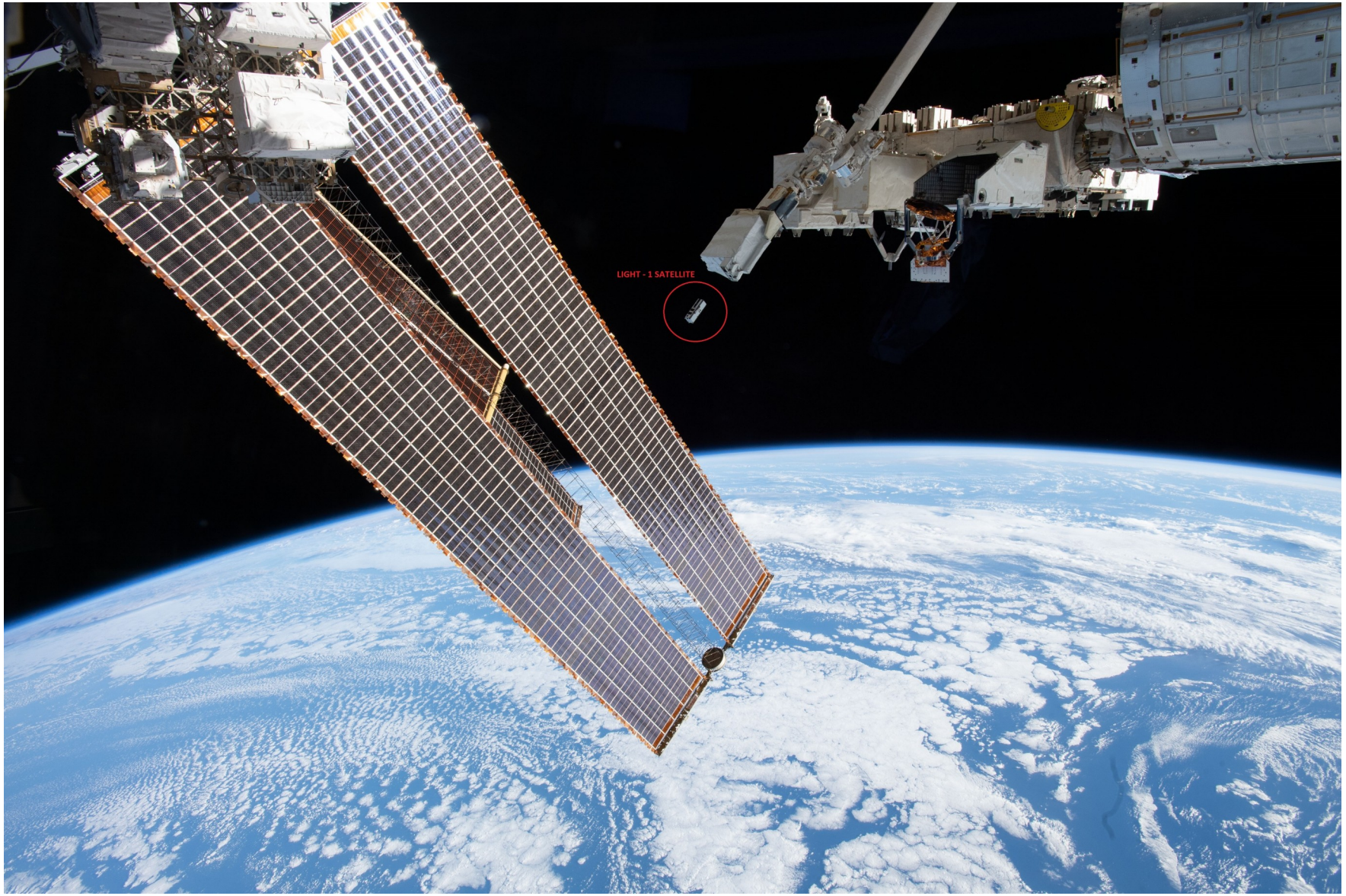
TGF : Terrestrial Gamma-Ray Flashes



- Most extreme natural gamma-ray emissions on our Planet
- May endanger the health of passengers on flights in the vicinity of such weather events

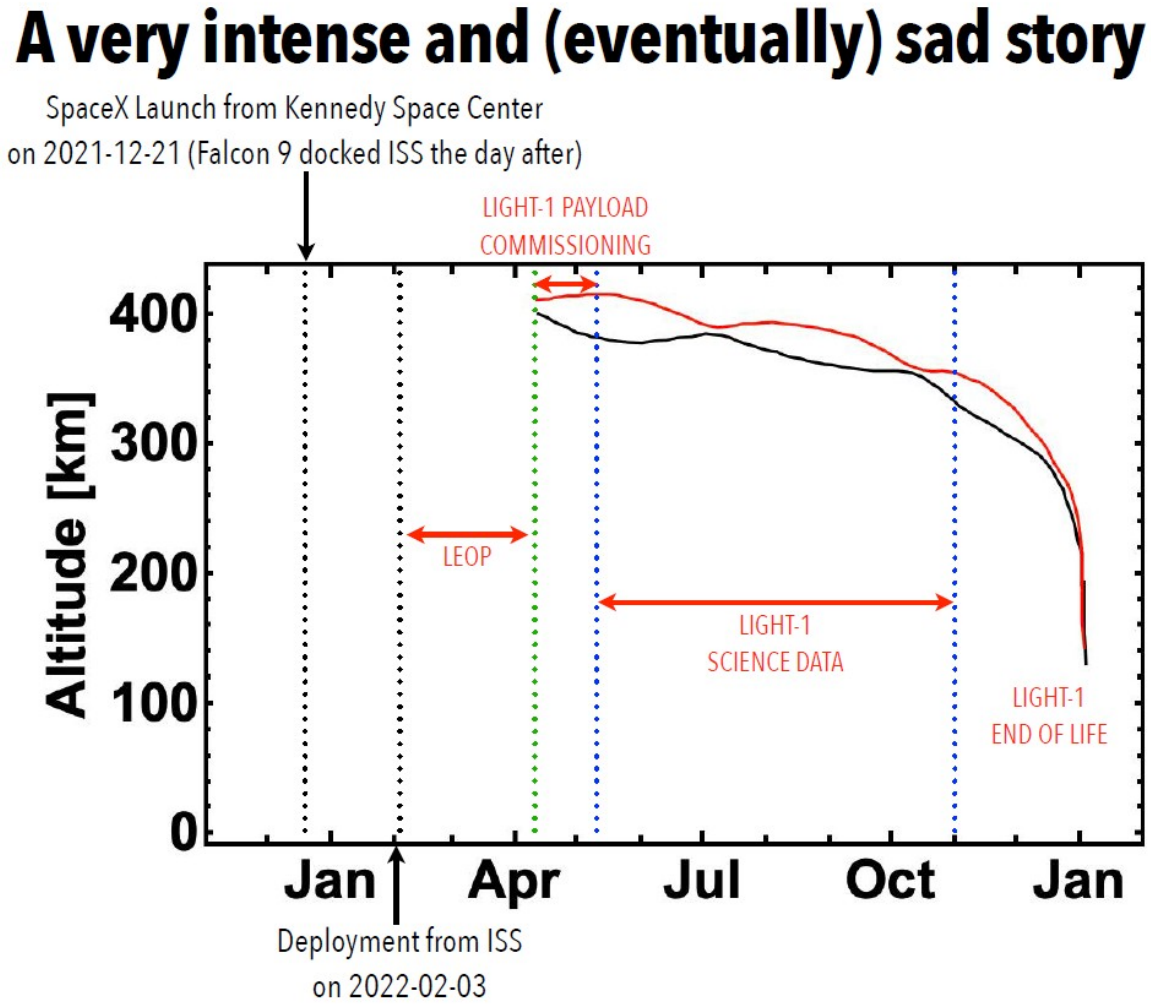
Cubesat launching



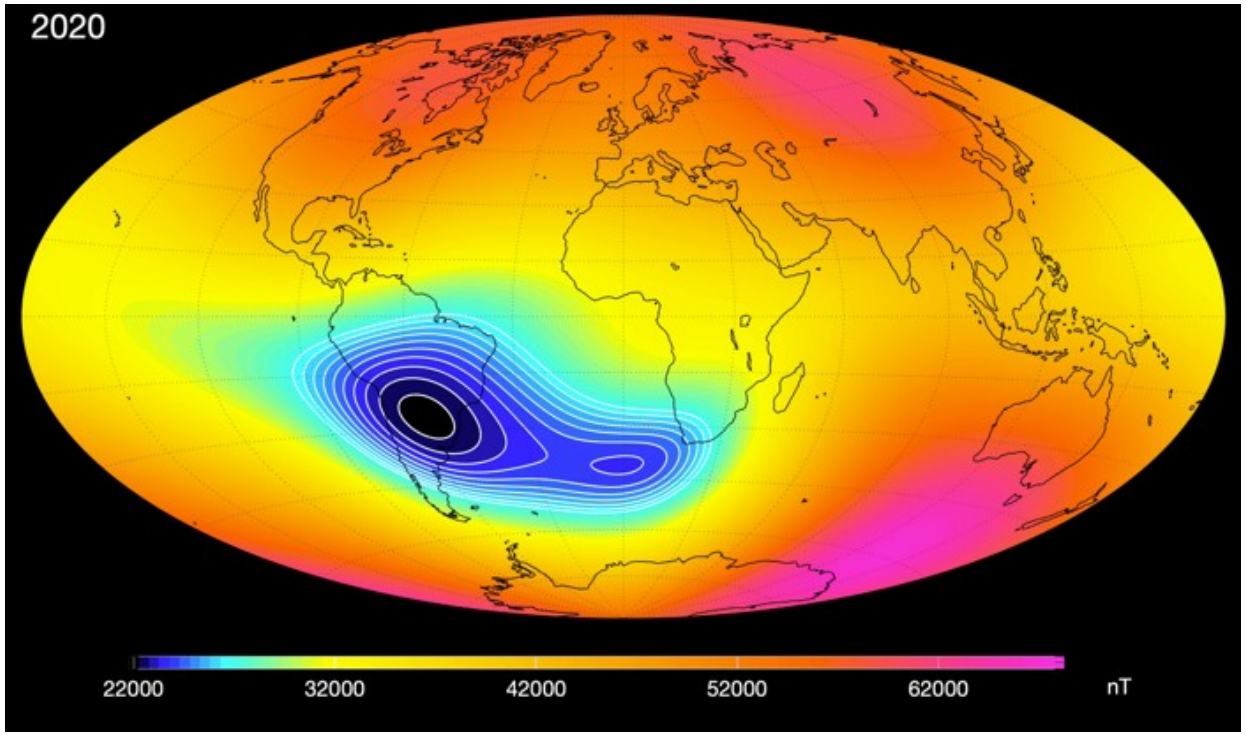


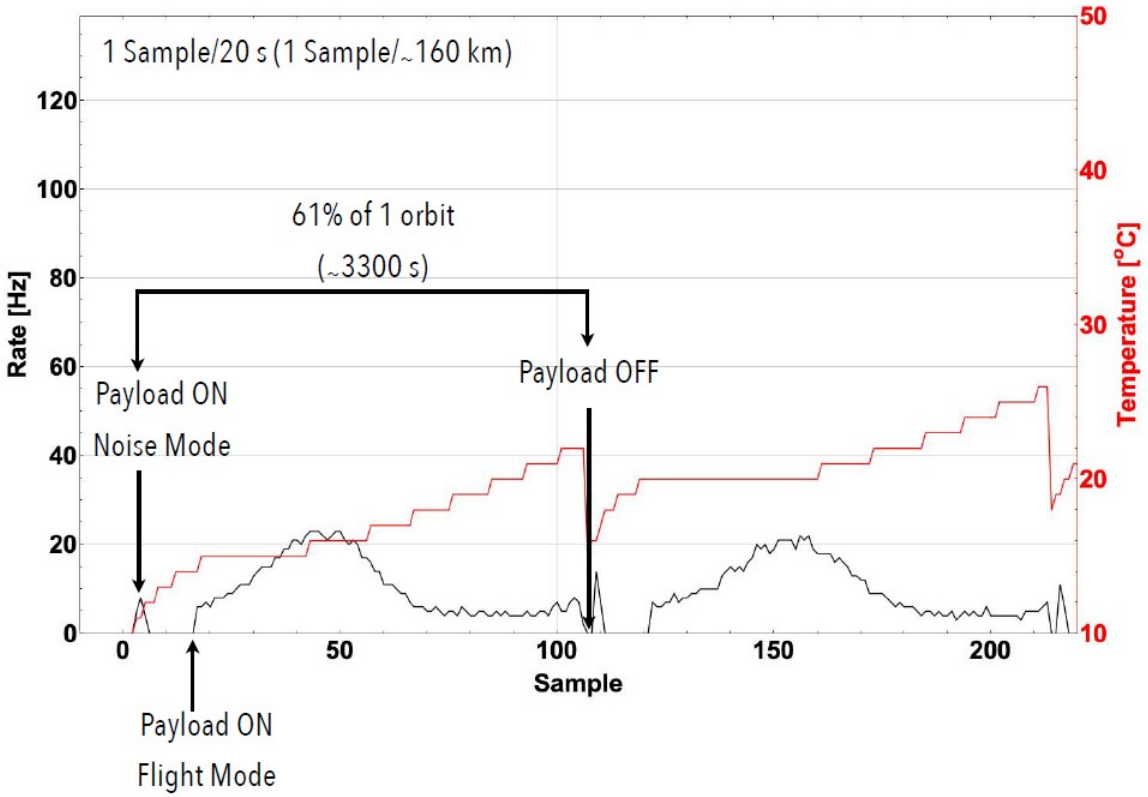
In-orbit release

Operations


A very intense and (eventually) sad story
SpaceX Launch from Kennedy Space Center
on 2021-12-21 (Falcon 9 docked ISS the day after)
LIGHT-1 PAYLOAD
COMMISSIONING
Altitude [km]
400
300
200
100
0
LEOP
LIGHT-1
SCIENCE DATA
LIGHT-1
END OF LIFE
Jan
Apr
Jul
Oct
Jan
Deployment from ISS
on 2022-02-03

Data and results





Potential developments and improvements

- Cubesat constellation to monitor TGFs more precisely (like starlink)
- Hardware improvement
- Thrusters to extend the lifespan of cubesats

Reference links

- https://www.nasa.gov/image-feature/a-view-of-the-deployed-light-1-cubesat
- https://www.gssi.it/communication/news-events/item/16528-anche-l-italia-nella-missione-light-1-per-i-terrestrial-gamma-ray-flashes
- https://indico.cern.ch/event/868940/contributions/3813897/attachments/2081331/3497853/LIGHT1_ICHEP.pdf
- https://www.youtube.com/watch?v=gzVy4J4ItC8
- https://www.agescientific.com

JAXA
LIVE
1 min to sending the command