

# **TILBA<sup>®</sup>-OGS** Unlock 10+ Gbps communications with space

Turnkey optical ground station with turbulence management, to deploy free-space optical communications

**Fully compliant** with CCSDS & SDA standards

**Higher throughput** with bi-directional laser communications

**Reliable laser links** with integrated Rx and Tx atmospheric turbulence management



# Why use laser communications?

Free space optical communications are essential for future networks to supplement RF communications and enable:



**Very high throughput links**

above the 1 Gbps cap of RF links (> 10 Gbps and more)



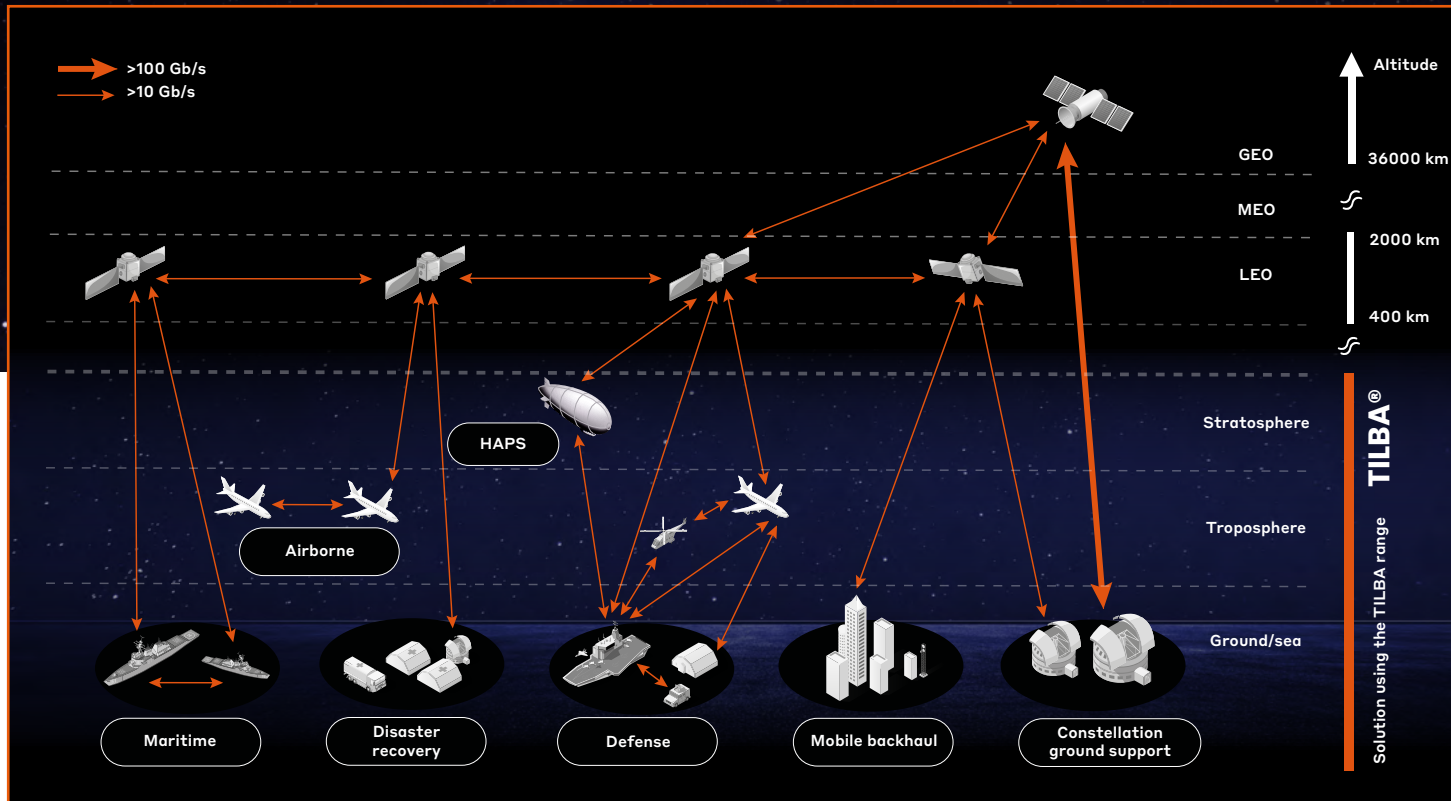
**Highly secure**

non-jammable links with Low Probability of Detection and Interception



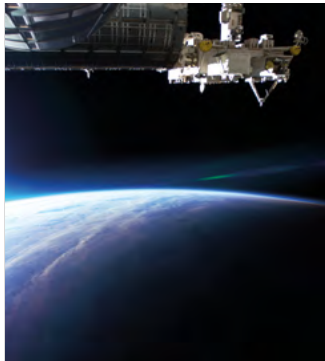
**Licence-free**

frequency spectrum



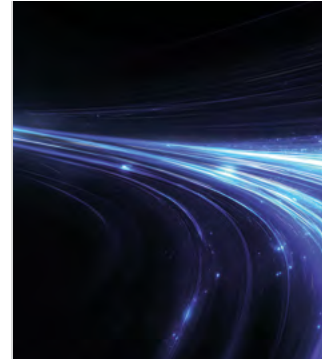
Cailabs designs, develops, and manufactures optical communication terminals for all atmospheric links with built-in turbulence mitigation.

# Laser communications are essential for *operational use*



## **Earth observation from space**

**Enable high-speed downlink** for high-resolution, up-to-date Earth observation data with smaller communication payload and no licensing restrictions compared to RF links.



## **Telecom**

Increase the capacity of high-speed telecommunication constellations thanks to very **high throughput** optical feeder links and high-speed, low latency and license-free optical downlinks.



## **Data Relay**

**Securely transfer** massive amounts of data across the globe at low latency through optical feeder links and satellite constellations.



## **Secure communications**

Secure sovereign and tactical transmissions with **undetectable, non-jammable** and non-interceptable optical satellite-to-ground links and communication bubbles.

# 10+ Gbps industrial optical ground stations with *turbulence management*

**Cailabs' TILBA®-OGS are future-proof, eye-safe, resilient optical communication terminals offering:**

- 100 Mbps to 10+ Gbps bidirectional space-to-ground optical communications
- CCSDS and SDA compliance
- Built-in atmospheric turbulence mitigation with no mechanical elements
- Multi-mission capacity

Cailabs' Optical Ground Stations are adapted to the specific needs of space-ground links at data rates from **100 Mbps to 10 Gbps and higher**. For data rates above a few Gbps, turbulence management is essential.

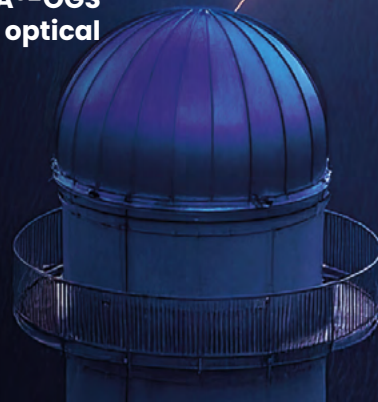
This is why Cailabs' TILBA®-OGS integrates our unique Rx and Tx turbulence management solutions based on our know-how in light shaping and our core technology, Multi-Plane Light Conversion (MPLC).

Thanks to this unique turbulence mitigation, TILBA®-OGS can perform resilient space-to-ground optical communications with satellites.

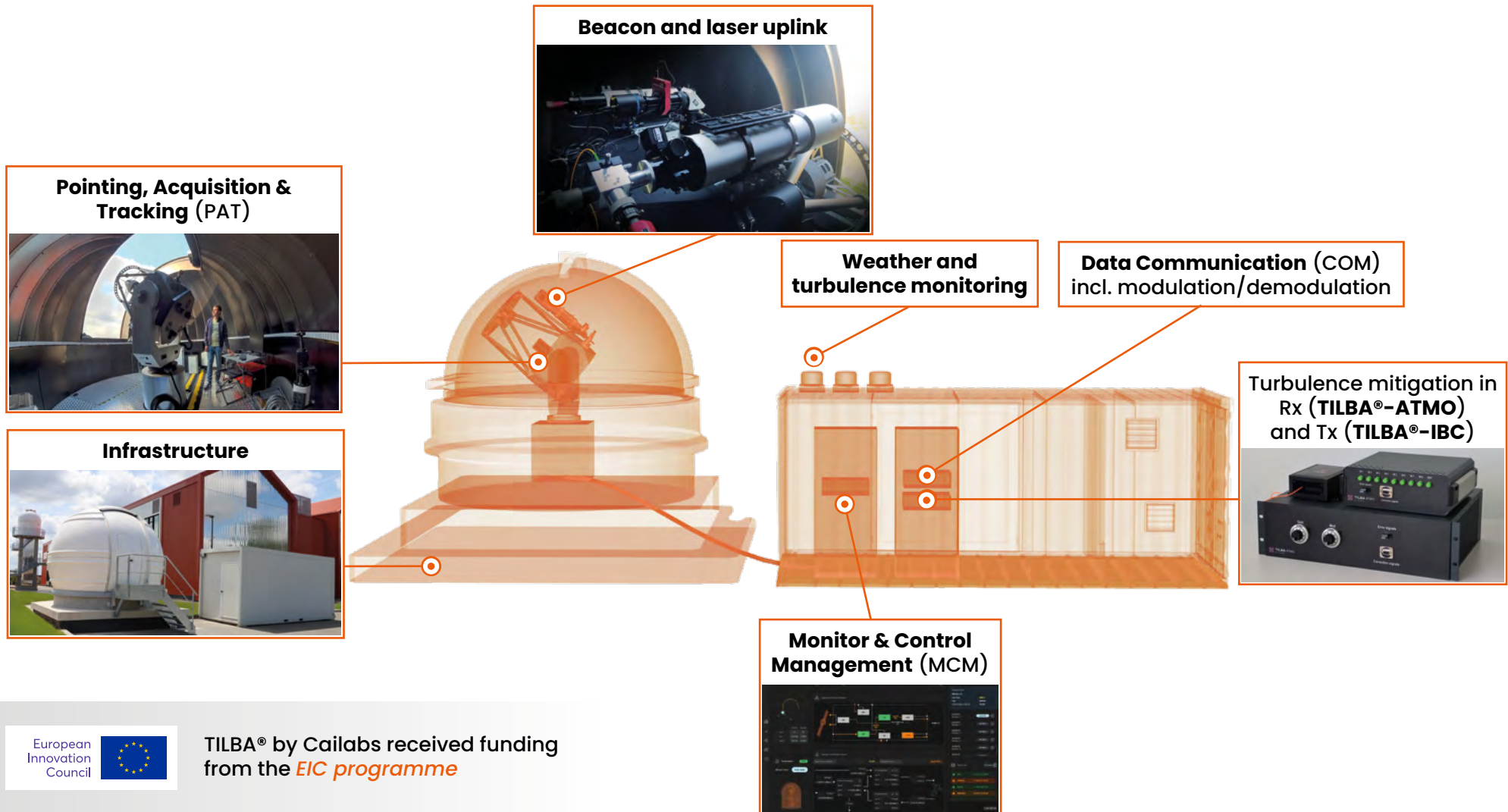


## ***They trust us***

Cailabs designed and built the first pilot optical ground station on its premises in Rennes, as part of the Keraunos project supported by the **DGA and AID**. In 2022, SSC (Swedish Space Corporation) and, in 2023 CONTEC ordered a Cailabs TILBA®-OGS to start building their Optical Ground Station networks. GreekObs2OGS and Corossol are among the other projects that include TILBA®-OGS.



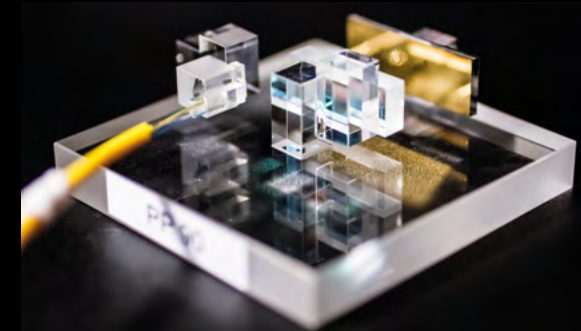
# TILBA®-OGS architecture



TILBA® by Cailabs received funding from the *EIC programme*

# TILBA® technological building blocks

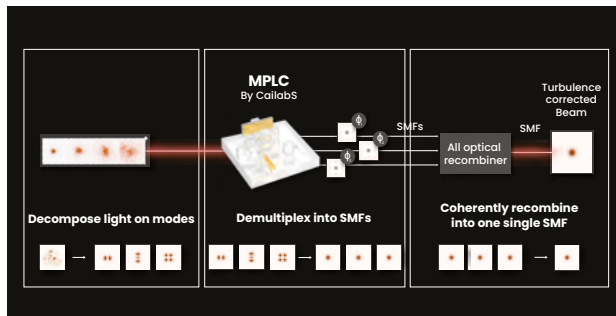
Three unique technologies developed in-house enable our OGS to address the challenges posed by atmospheric turbulence in free-space laser communications. They are based on Cailabs' unique and patented light shaping technology, Multi-Plane Light Conversion (MPLC).



## TILBA®-ATMO

### Rx turbulence compensation

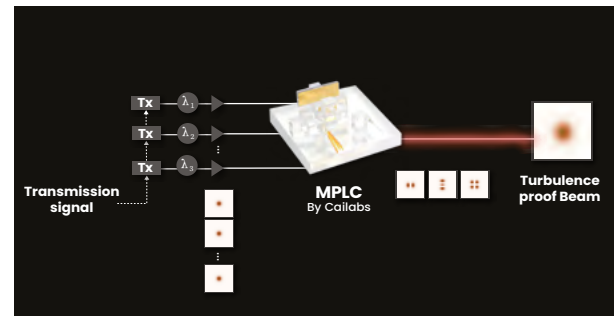
The TILBA®-ATMO technology mitigates atmospheric turbulence at the receiver end, enabling reliable coupling of satellite-to-ground communication signals into telecom fibers and enhancing the reliability of high-speed free-space optical links.



## TILBA®-IBC

### Tx turbulence management

The TILBA®-IBC technology utilizes incoherent beam combining to create spatial diversity during transmission. Once integrated into our OGS, it enables turbulence management prior to transmission, leading to more robust optical uplinks.

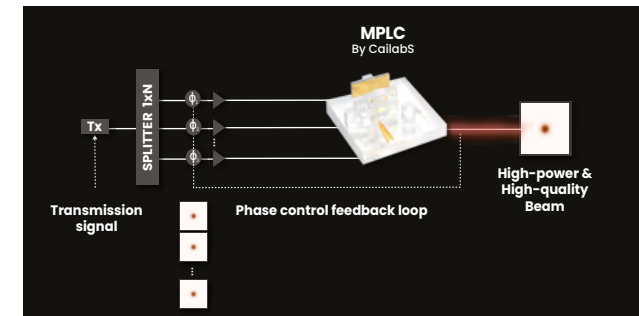


## TILBA®-CBC

### Feederlink performance

The TILBA®-CBC technology enhances the range and data rate of ground-to-space optical feeder links through coherent combining of high-power optical sources.

Cailabs is contributing to the CO-OP consortium, overseen by CNES, by developing a very high-power source (>50 W) for a GEO feeder link capable of reaching Tbps.



# Manufacturing Excellence

Cailabs is a pioneering industrial firm with a portfolio of over 26 active patent families. In 2023, in response to the surging demand for optical ground stations (OGS) in North America, Cailabs extended its reach by inaugurating a new office in **Washington DC, USA**.

**Our core expertise** lies in precision light shaping through our patented Multi-Plane Light Conversion (MPLC) technology, the fruit of decades of research in quantum optics conducted at the Kastler Brossel Laboratories in Paris.

Today, Cailabs stands as an industrial powerhouse, driven by a team of **120 dedicated professionals**, operating within a 3,500m<sup>2</sup> facility meant for experimentation and production. This facility includes **state-of-the-art laboratories, cutting-edge technical rooms, and ISO-compliant spaces and storage and production zones**, all dedicated to the manufacturing of our four product lines, including the TILBA®-OGS optical ground stations. In addition, Cailabs owns and operates a pilot OGS located at its headquarters in Rennes, which enables the essential experiments required to meet the diverse needs of our clients.

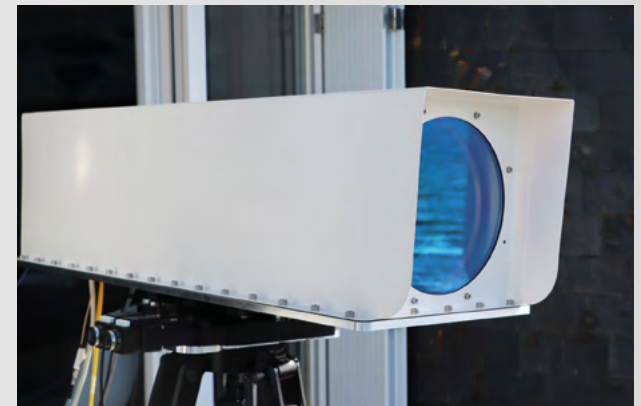


## Discover TILBA®-LOS: a communication terminal for line-of-sight free space laser communications

Cailabs offers optical communication terminals for **point-to-point optical links of 10 Gbps over distances greater than 10 km**.

The TILBA®-LOS terminals will be available for land, airborne and naval links.

■ Contact us to find out more.





Founded in 2013, Cailabs is a global deeptech company that combines outstanding engineering and expertise in laser light to design, manufacture and sell innovative optical solutions for defense, space, telecoms, and laser machining industries. Cailabs manufactures turnkey optical ground stations, integrating its atmospheric turbulence compensation technology. That makes it one of the first companies to exploit the very high throughput rates enabled by optics in a ground station on an industrial scale. By combining its mastery of the science of light with outstanding engineering, Cailabs is pushing the boundaries of what's possible, accelerating progress and paving the way for a brighter future.

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