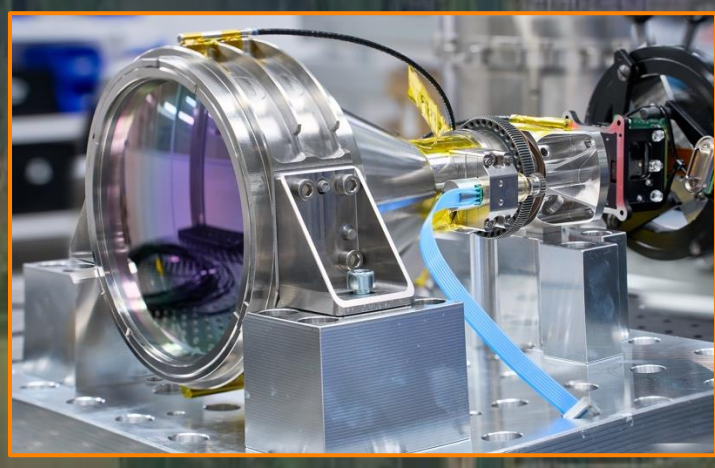# The worlds most precise thermometer from space

Our mission

constellr operates precise thermal sensors in space that monitor Earth's water, energy, and carbon cycles. Specifically, we deliver precise, daily, global, high-resolution land surface temperature (LST) data for environmental monitoring.

Our way to achieve this

constellr is building up a proprietary, cutting-edge constellation of infrared monitoring microsatellites. Each microsatellite is equipped with a multispectral cryocooled TIR sensor for acquiring thermal data and a multispectral VNIR sensor to enable precise geolocation, atmospheric correction, and cloud detection.

Our technical USPs

- Patented calibration methodology for accurate radiometric correction, allows miniaturizing the payload.
- Temperature-stabilized, cryocooled sensors for highest image quality.
- LST data acquisition at a 1-day global temporal resolution (4 satellites), up to 10m spatial resolution with <0.1 K temperature sensitivity and 1.5K total radiometric uncertainty.

Our Space Segment

A constellation of microsatellites in the 120 kg class, flying in constellation in the same sun-synchronous orbital plane at an altitude of 540 km with a Local Time of the Descending Node (LTDN) of 1:30 pm. With the maximum field of regard of 30° off-nadir, global daily revisit time is reached with four satellites in orbit.

High agility satellite bus enabling a high duty cycle

TIR sensor

- Spectral Range: 8.45 µm - 12.00 µm with four spectral bands
- High temperature accuracy (1.5 K) and sensitivity (0.07 K)
- Ground Sampling Distance 28 m at nadir
- Swath 18.5 km at 540 km altitude

VNIR sensor

- Spectral Range: 400 nm to 1000 nm with ten spectral channels with Ground Sampling Distance of 10 m
- Swath of 21 km at 540 km altitude

Data acquisition and delivery

- Up to 1.000.000 km² daily imaging capacity
- Operation in mapping or in targeting mode
- Data delivery within 12 hours from recording

Payload

- Composed of two main elements: a Thermal Infrared (TIR) Instrument and a Visible and Near Infrared (VNIR) Instrument.
- Imaging payload data generation rate: 50.2 Mbit/s
- Weight: ~ 30 kg

Our Ground Segment

Mission Operations Center		Image Processing System
• Operates satellites	Raw Data →	• Raw data to LST data
User Platform	Request for data ↑	LST data ↓
• Interface with customers		

Mission Operations Segment

- Automated and fully cloud-based constellation operations
- In-house developed scalable mission planning system
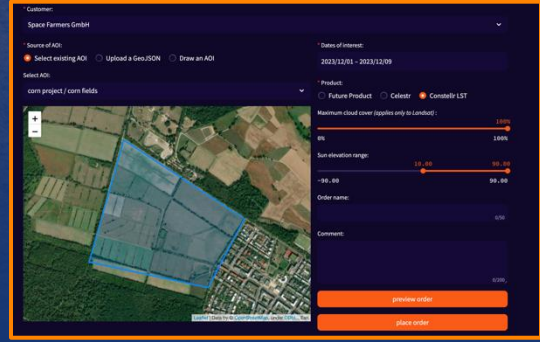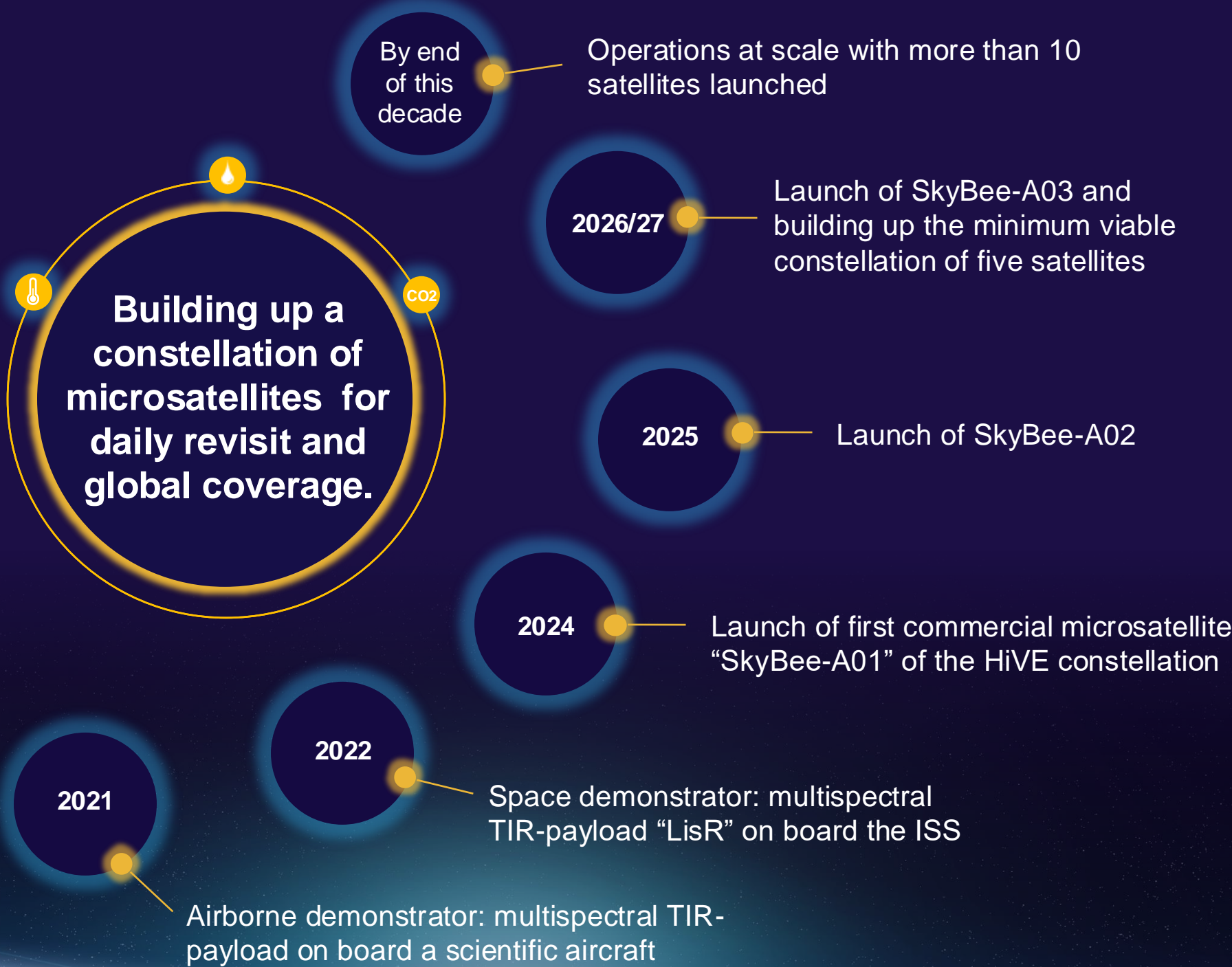- Image data downlink rate: 140 Mbit/s
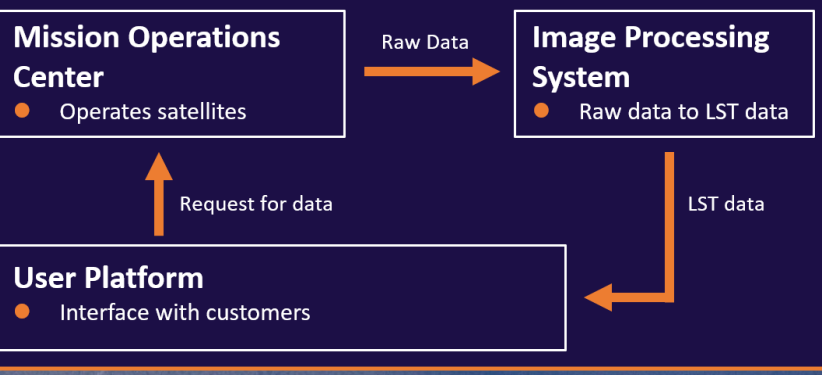
Payload Data Segment

- generating Level-2 Land Surface Temperature/Emissivity (L2 LST/LSE) data within 6 to 12 hours after acquisition
- Fully automated processing pipeline
- Geolocation accuracy: sub-pixel

User Segment

- System response time from tasking to delivery of less than 24h
- Searchable raw data and product archives
- Tasking and data collection API
- Area-of-interest-based data delivery
- Support of cloud-native geospatial standards

Our Constellation

Building up a constellation of microsatellites for daily revisit and global coverage.

- **By end of this decade** — Operations at scale with more than 10 satellites launched
- **2026/27** — Launch of SkyBee-A03 and building up the minimum viable constellation of five satellites
- **2025** — Launch of SkyBee-A02
- **2024** — Launch of first commercial microsatellite "SkyBee-A01" of the HiVE constellation
- **2022** — Space demonstrator: multispectral TIR-payload "LisR" on board the ISS
- **2021** — Airborne demonstrator: multispectral TIR-payload on board a scientific aircraft

esa

European Commission

NASA

Bundesministerium für Wirtschaft und Technologie