constellr

HiVE: Thermal infrared Earth observation for food security and water supply management

About constellr

Mission to measure temperature, water and carbon from space – to hold the world accountable

Founded in 2020, ca. 60 employees in Freiburg & Brussels

European and North American investor base – Deep Tech, Space Tech, US Gov't, Agriculture

1st space asset on International Space Station in 2022

Acquired ScanWorld – A leader in hyperspectral satellite technology in 2022

Leveraging the expertise and the heritage of our partners: ESA, OHB, Fraunhofer
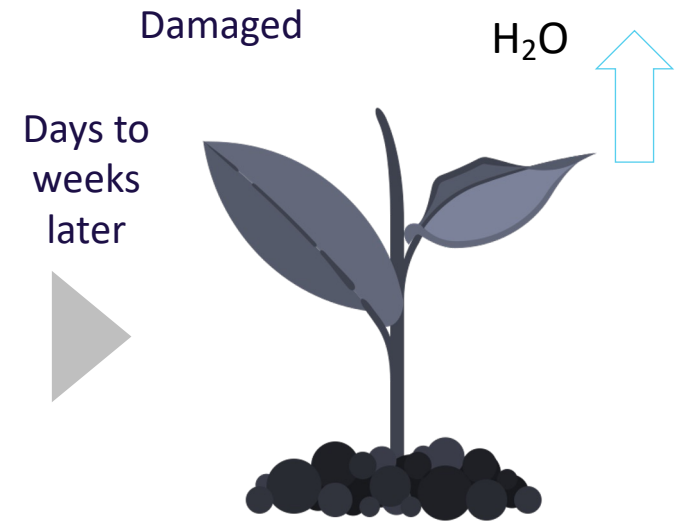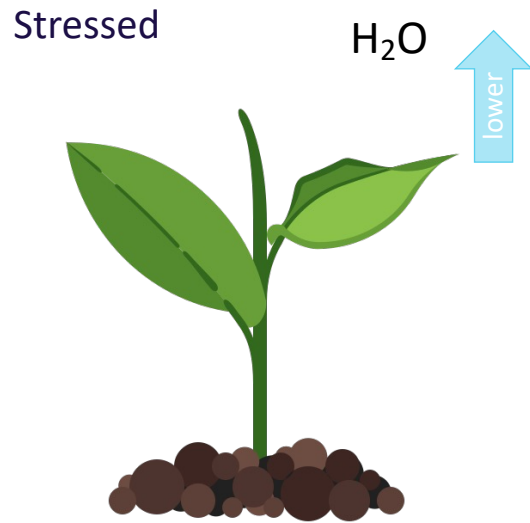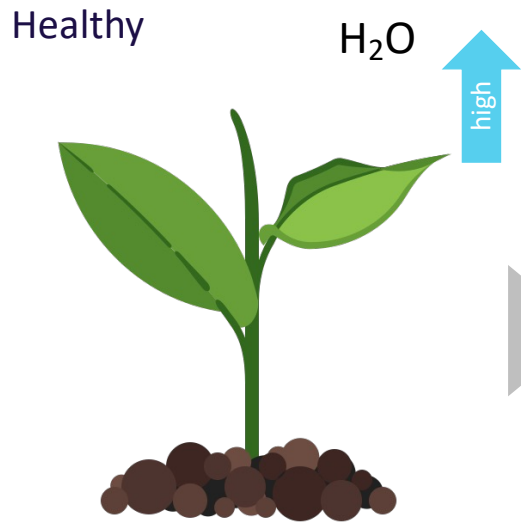
Commercial data available since 2022.

Launch of own satellite constellation in 2024.

Scalable crop stress detection

Healthy

H_2O

high

Stressed

H_2O

lower

Damaged

H_2O

Days to weeks later

	Healthy	Stressed	Damaged
Symptom	None	None visible	Visible wilting & browning of leaves
Underlying cause	None	Reduced transpiration	Chlorophyll disappears
Effect	None	Leaf temperature rises	Yield loss

constellr

Existing space imagery only notices when the plant is already damaged

Actionable land surface temperature (LST) data
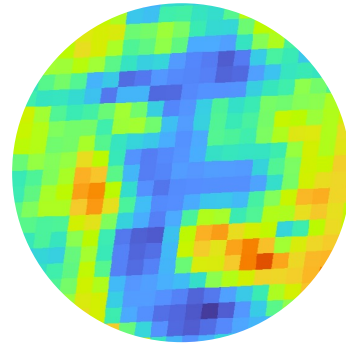
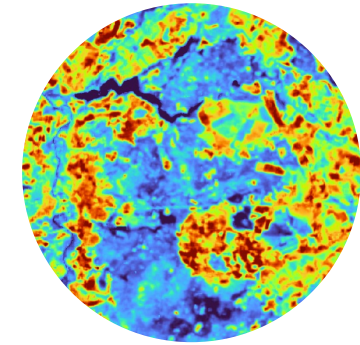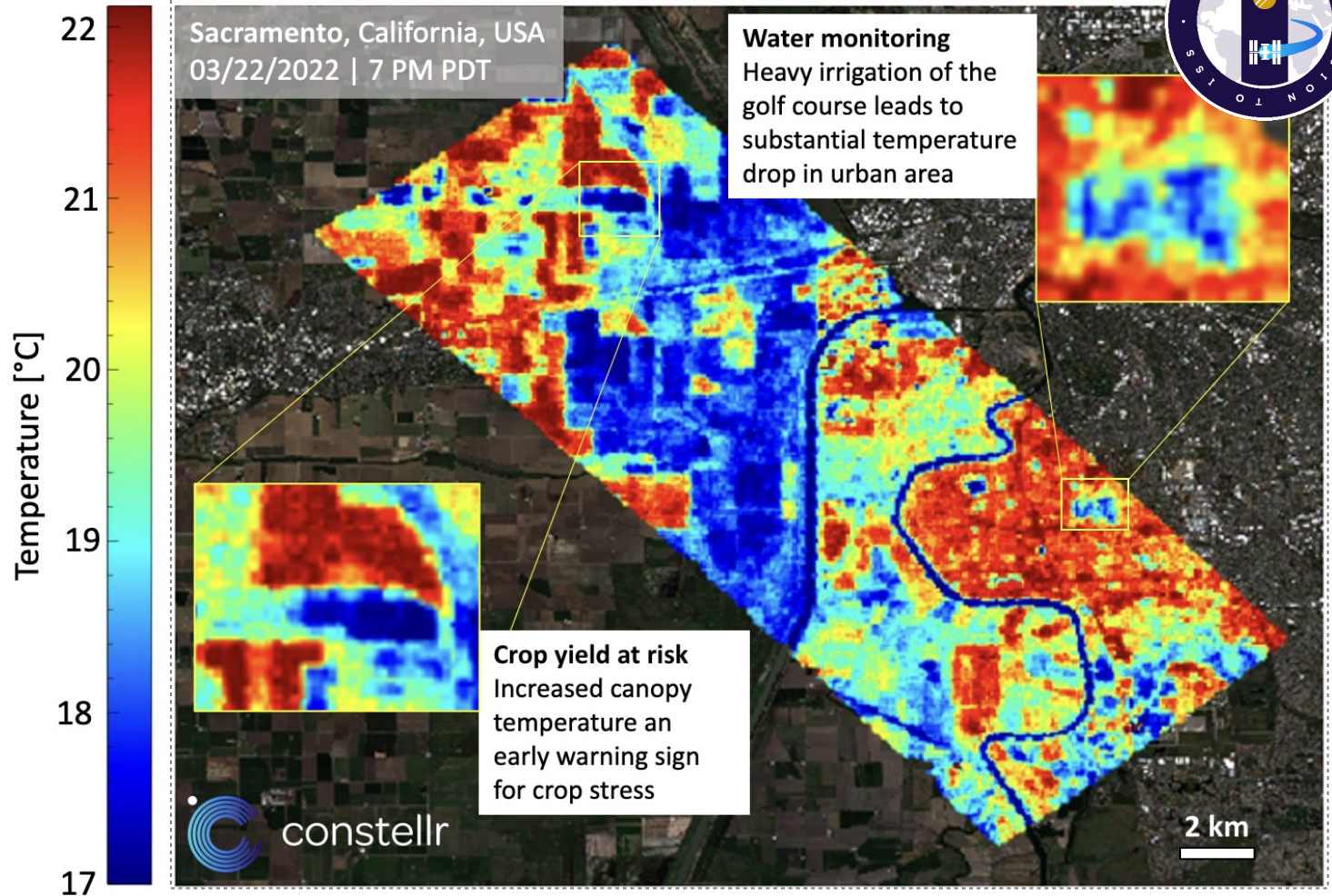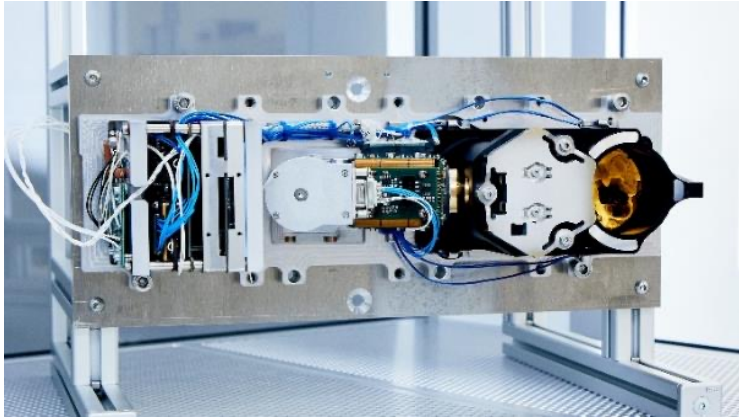| Visual RGB image	Public missions	constellr
	17 °C ▬▬▬▬▬ 38 °C	17 °C ▬▬▬▬▬ 38 °C
Reflectance	Low resolution 1km Variable Frequency	High Resolution, 30m Frequency, Subweekly (Cloud permitting)

constellr offers superior accuracy for temperature, water and carbon measurements

Proprietary Thermal Infrared Data LisR

LisR recorded more than 150 million hectares per day – Over 9 million Images

LisR-ISS

Sacramento, California, USA
03/22/2022 | 7 PM PDT

Temperature [°C]

Water monitoring
Heavy irrigation of the golf course leads to substantial temperature drop in urban area

Crop yield at risk
Increased canopy temperature an early warning sign for crop stress
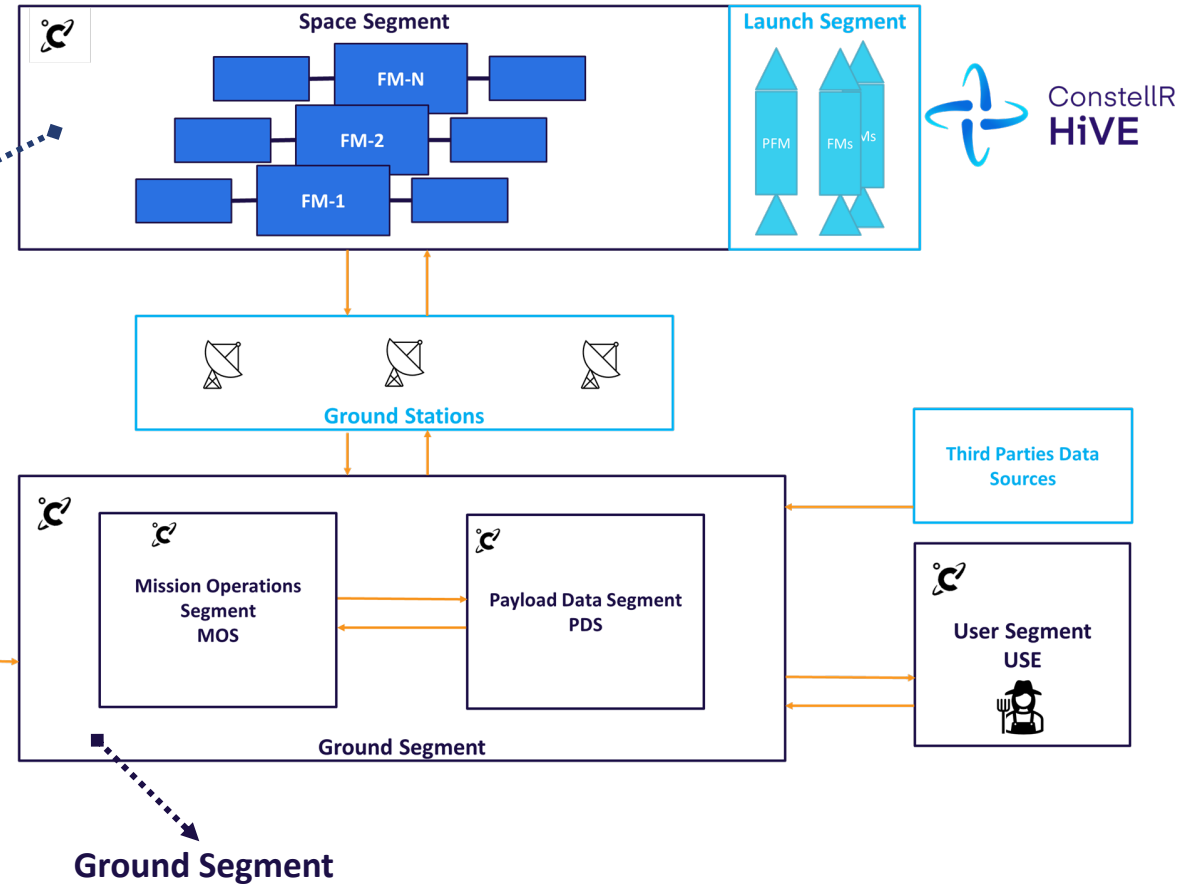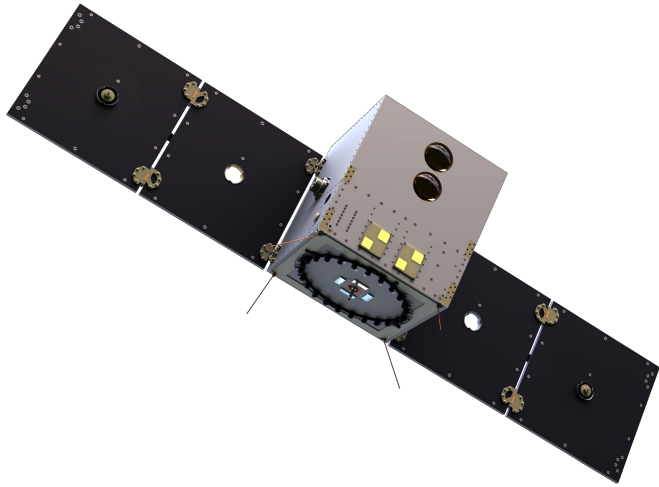
constellr

2 km

Mission Overview

Mission architecture for operational service

optimized for high resolution imagery, high radiometric accuracy, high revisit frequencies, low latencies, global scalability

Space Segment

1st gen. constellation of 5x80kg MicroSats, flying in formation in SSO at 550km, embarking a multispectral VNIR+LWIR sensor
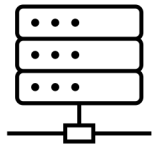

Ground Segment

tasking the constellation & delivering L2 LST data in 6 to 12 hours from observation in space to user delivery with 1 day response time (95% availability)
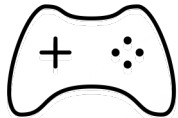
What are we developing?

...and where are we working with partners

In house

Data & Analytics Platform

System Design & Mission Operations

Algorithm & Application Development

Outsourced

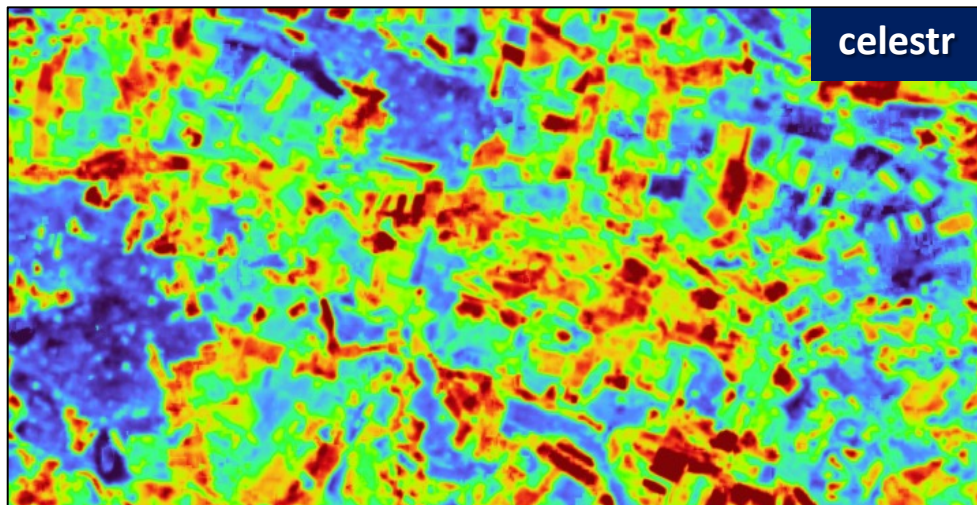Building Satellites: OHB, Nanoavionics, Fraunhofer etc.

Launching Satellites: Exolaunch, Space-X etc.

Ground Stations

celestr
A satellite-agnostic data stream for high-revisit land surface temperature (LST)

RGB

celestr

What we are delivering

Data from different satellite sources delivered in spatially harmonized LST raster data, resampled to 50 m pixel size

Data captured from different sensors reaches a comparable processing state (partial removal of artifacts, pixel alignment, time correction, etc.)

Weekly image frequency (dependent on cloud coverage over scene)
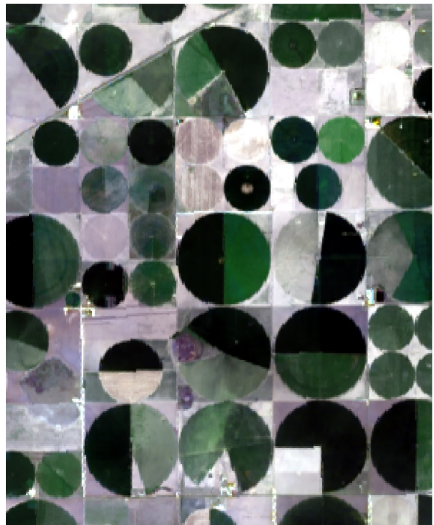
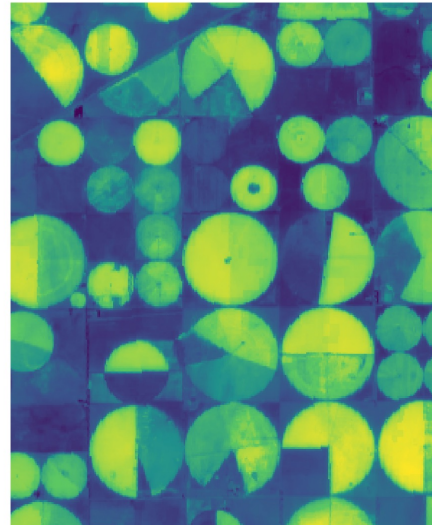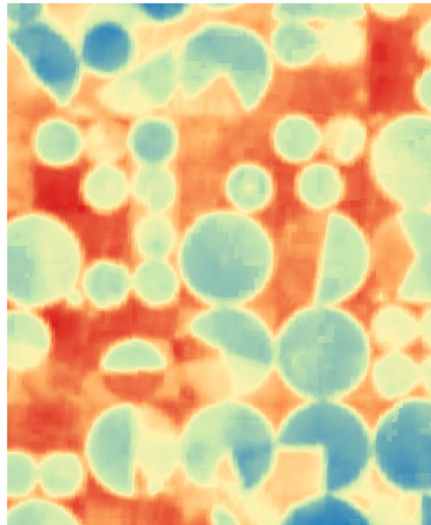Dataset per scene comprises: one LST raster, one cloud mask and meta data

Evapotranspiration
Satellite ET founded on proven algorithms, based on proprietary data

📍 Texas, USA

📅 August 5, 2022

🕐 LST @ 11:00 am

0   1   2 km

25 ▬▬▬ 55
LST [ºC]

1.5 ▬▬▬ 5.5
ET [mm/day]

What we are delivering

- **ET modelling:**
  - builds on *Celestr* to offer high quality and high temporal coverage
  - incorporates vegetation biophysical parameters, meteorology, and radiation data
  - Utilizes Scientifically proven models
- **Delivery of both models as:**
  - Instantaneous and day estimations of ET
  - 50 m resolution raster layers

constellr

Looking forward to talking to you!