

# → THE ESA EARTH OBSERVATION $\Phi$ -WEEK

## EO Open Science and FutureEO

12-16 November 2018 | ESA-ESRIN | Frascati (Rome), Italy

A sub 5m GSD remote sensing payload for 3U Cubesats

Thys Cronje – Simera Sense

14/11/2018

More detail. Less satellite.

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Simera Sense is a remote sensing product company

We are on a mission to increase the detail that can be sensed with small satellites.

**xScape100**



## Limited commercial use

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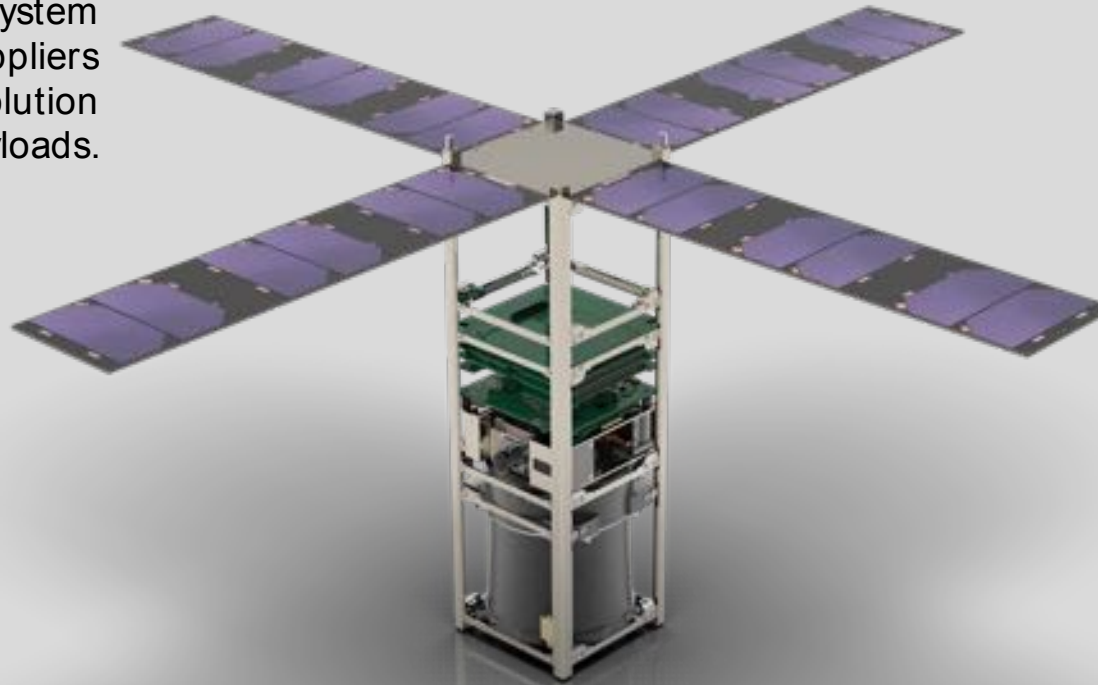
There is a believe in the market that remote sensing data from small satellites have poor image quality and accuracy with restricted commercial use.



# Non optimal for remote sensing

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The modular, off-the-shelf subsystem approach of CubeSat suppliers results in a non-optimized solution for remote sensing payloads.



We produce an exceptional  
powerful remote sensing  
payload for the smallest  
space

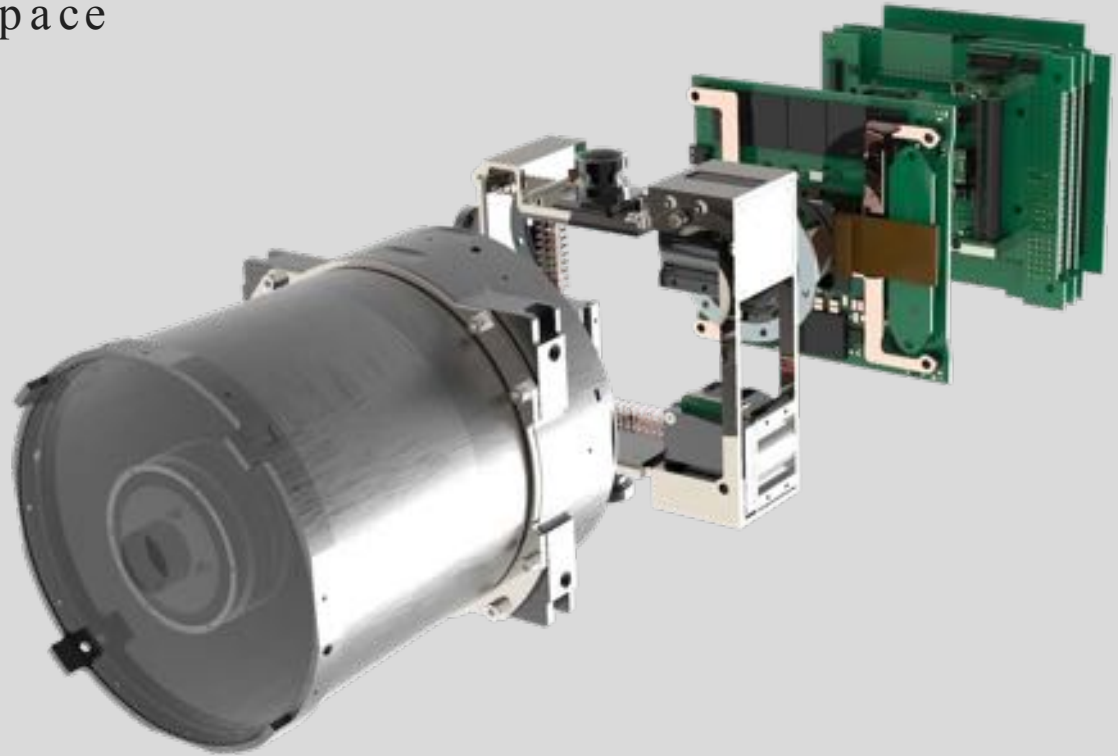
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More detail

More Bands

More Depth

More Often





# The xScape100 payload series

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## xScape100

### TriScape100

Super HD format sensor with video capabilities.

### MultiScape100

7-Band multispectral VNIR with TDI capabilities.

### HyperScape100

154-band hyperspectral capability with 5nm FWHM



# xScape100 Optical Front-End

Designed to maximize the performance within the constraints of a 3U structure.

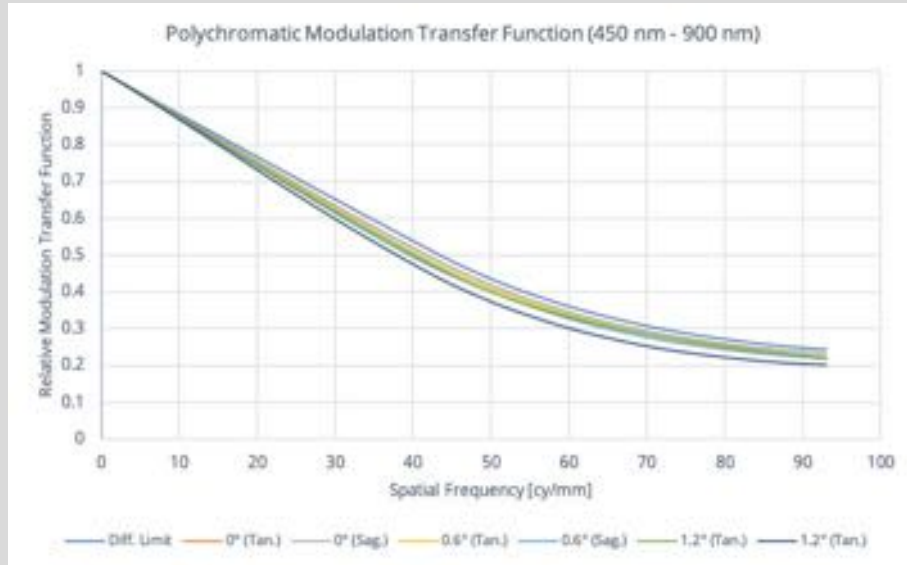
## Technical Specifications

Focal Length	580 mm
Front Aperture	94.8 mm
Obscuration	47.2 mm
Field of View	2.96°
Transmission	450 – 900 nm
Image Circle	30 mm
Operating Temperature	0°C - 40°C
MTF	40% @ 47 cy/mm 20% @ 93 cy/mm



# xScape100 Optical Front-End

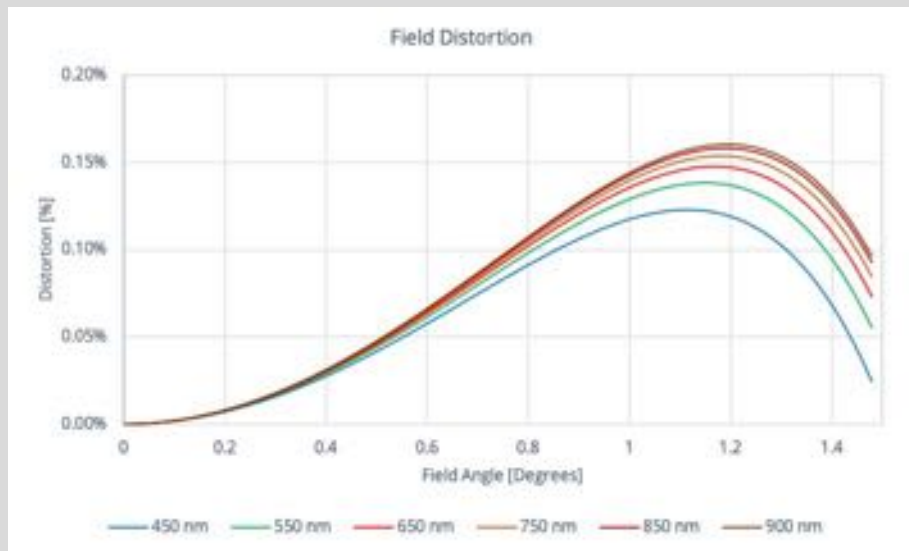
Designed to maximize the performance within the constraints of a 3U structure.





# xScape100 Optical Front-End

Designed to maximize the performance within the constraints of a 3U structure.



# TriScape100

## Technical Specifications

Resolution 12 MP – 4096 x 3072 pixels

Pixel Size 5.5 x 5.5  $\mu\text{m}$

Spectral Bands Monochrome or RGB

GSD  
4.00 m @ 420 km  
4.75 m @ 500 km  
5.20 m @ 550 km

Swath  
16.3 x 12.2 km  
19.4 x 14.5 km  
21.3 x 16.0 km

Video 1080p30

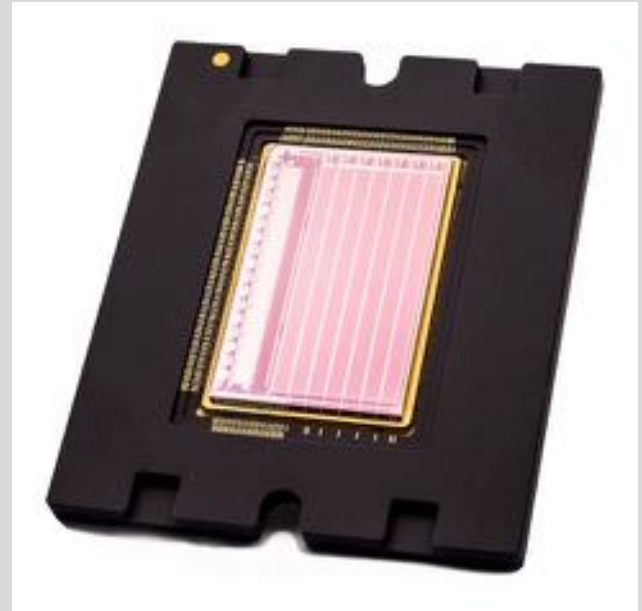


# MultiScape100

Creating the next-generation multispectral TDI imager in a push broom configuration.

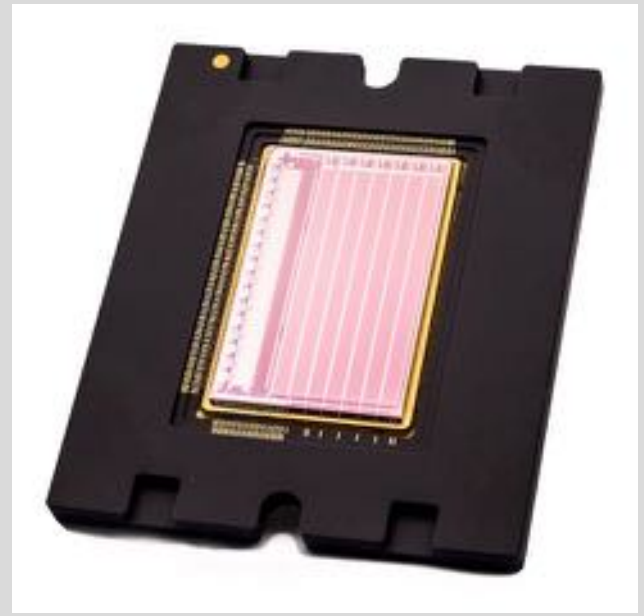
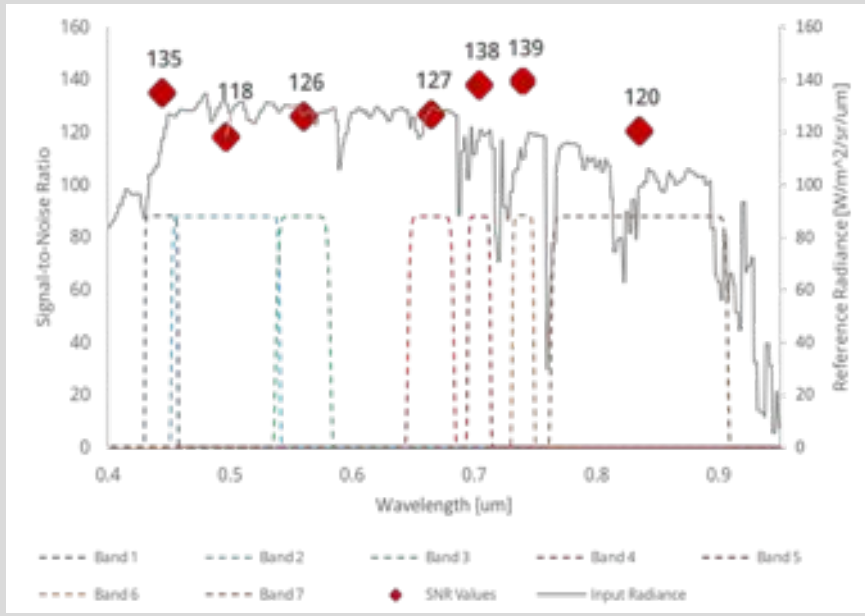
## Technical Specifications

Array Size	4096 pixels across track
Pixel Size	5.4 x 5.4 $\mu\text{m}$
Number of bands	7 Bands
TDI stages	1-to-256
Bit Depth	12 bits
GSD	3.90 m @ 420 km 4.65 m @ 500 km 5.12 m @ 550 km
Swath	16.0 km @ 420 km 19.0 km @ 500 km 21.0 km @ 550 km



# MultiScape100

Great images starts with a great sensor.

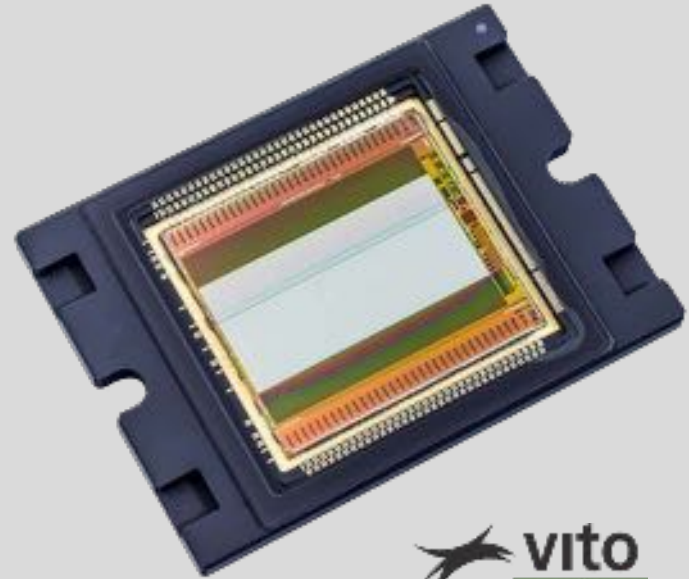


# HyperScape100

Hyperspectral performance in a very small package using the latest on-pixel filter technology.

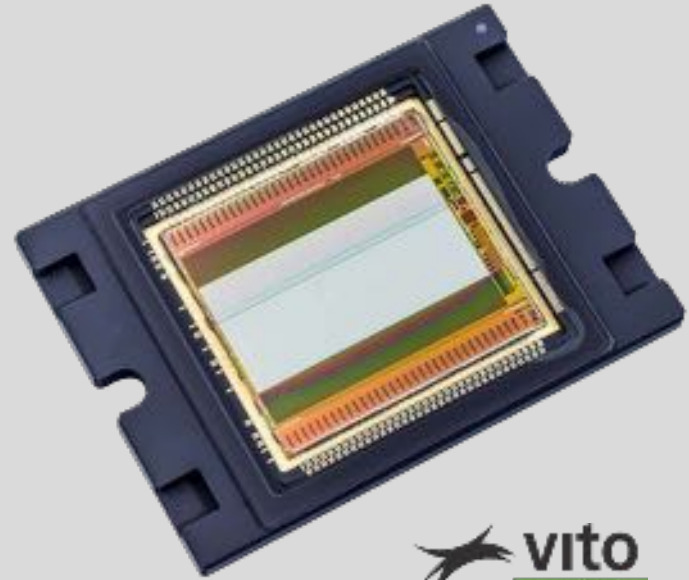
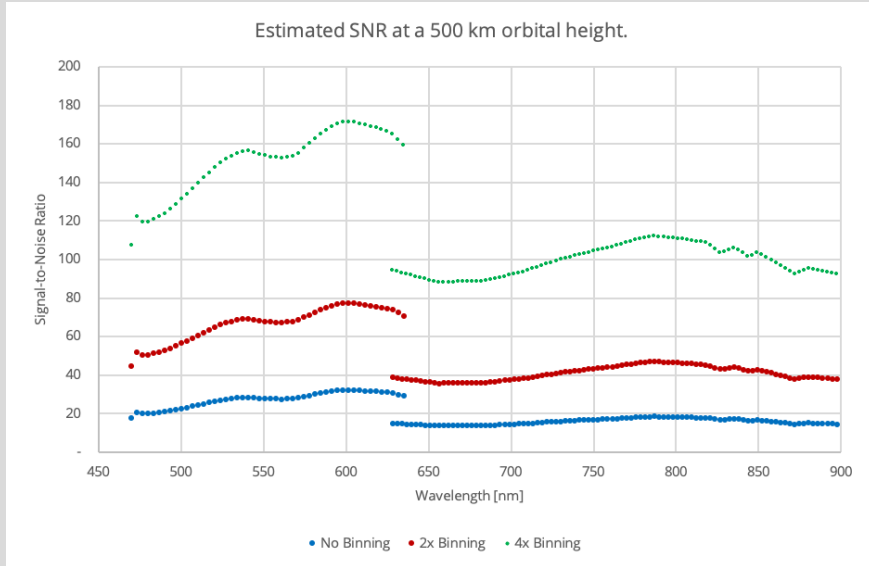
## Technical Specifications

Array Size	4096 pixels across track
Pixel Size	5.5 x 5.5 $\mu\text{m}$
Number of bands	154 Bands (470 – 900 nm)
FWHM	5 nm 10 nm (2 x 2 binning) 20 nm (4 x 4 binning)
TDI stages	12 Digital TDI
Bit Depth	10 bits
GSD @ 500km	4.75 m 9.50 m (2 x 2 binning) 19.0 m (4 x 4 binning)
Swath @ 500 km	19.4 km



# HyperScape100

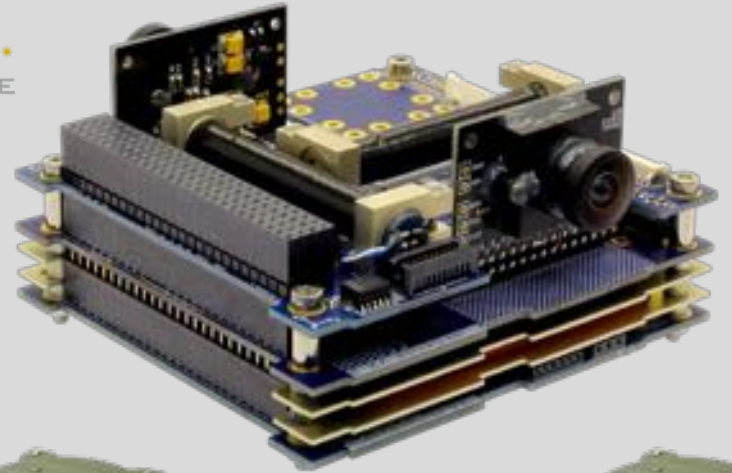
Spectral Response and SNR predictions.





# Embedded ADCS for 3-axis control

- Radiation tolerant onboard computer
- Sensor and actuator board with 3-axis gyro
  - Fine sun sensors
  - Three reaction wheels
  - Two torque rods & one torque coil
- One deployable 3-axis magnetometer
- Wide angle star tracker
- ADCS estimators and controllers for target tracking



# Embedded ADCS for 3-axis control

**Attitude measurement accuracy:**  
 $< 0.03^\circ (3\sigma)$

**Attitude control accuracy:**  
 $< 0.07^\circ (3\sigma)$  pointing;  
5 millideg/s rate stability



Robust. Compact. Light. Powerful.

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A deep learning FPGA platform with a convolutional neural network core option for onboard image processing.

Up to 1 Tbit of onboard NAND Flash storage.

16 Gbit DDR4 SDRAM memory

Weighs 1.82 kg



**June 2019:**

TriScape 100 in-orbit  
demonstration

**November 2019:**

MultiScape 100 in-orbit  
demonstration

**TriScape100**



# Become part of our value chain

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Research &  
Development



Assembly,  
Integration &  
Testing



Launch  
Partners &  
Regulatory



Mission  
Operations &  
Ground Stations



Calibration,  
Correction &  
Hosting



Solution &  
Application  
Development

SIMERA  
SENSE



# More Detail. Smaller Satellite.

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Imagine what we could do for your  
earth observation mission.

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