



nIT

New Imaging Technologies

SWIR imaging and space applications

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1 Impasse de la Noisette
Verrières le Buisson
91370
FRANCE



COMPANY OVERVIEW



Visible and SWIR
SENSORS, CAMERAS
AND MODULES



22 EMPLOYEES
BASED IN PARIS



80%
EXPORT



WDR SOLUTIONS IN
VISIBLE AND SWIR

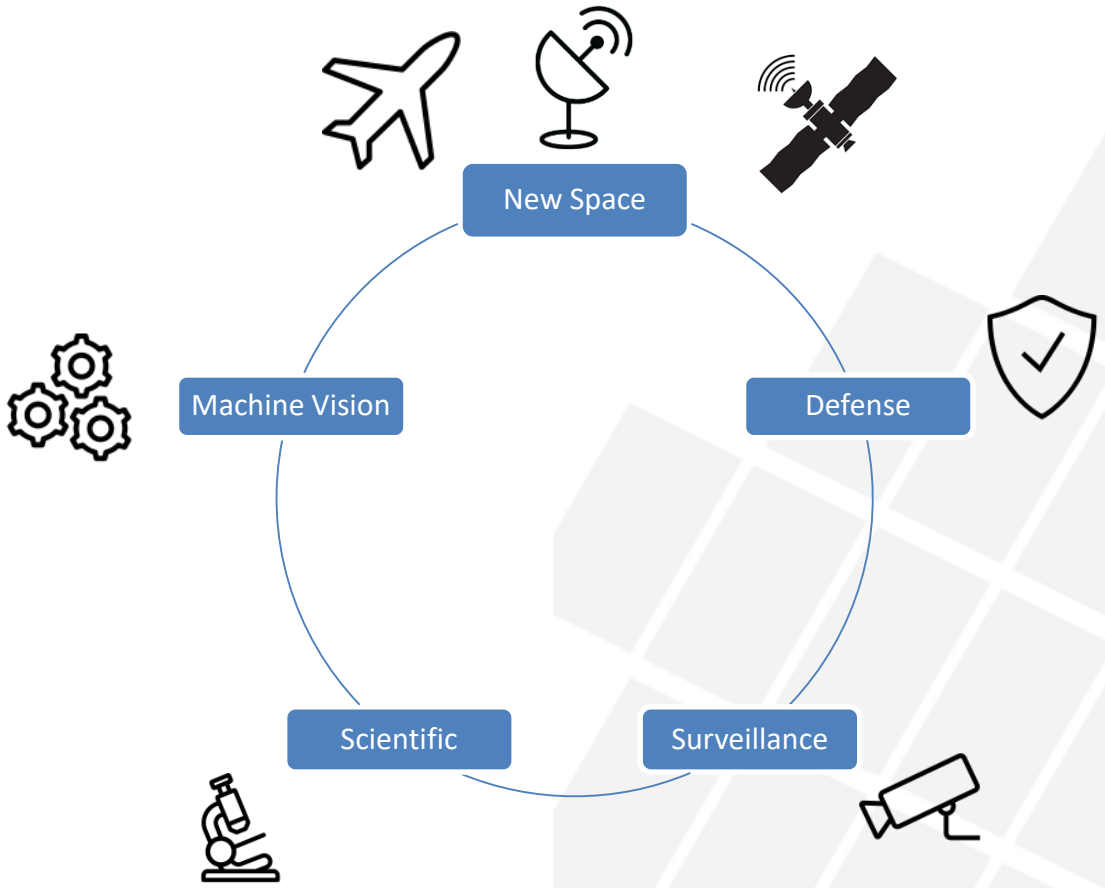


15
YEARS OF
RESEARCH

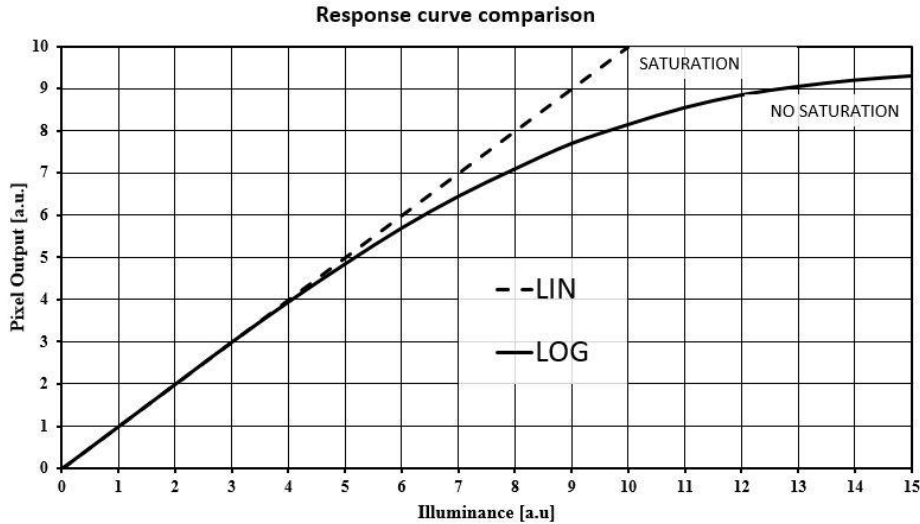


> 20
PATENTS

●○ MARKETS AND CUSTOMER INTEGRATIONS

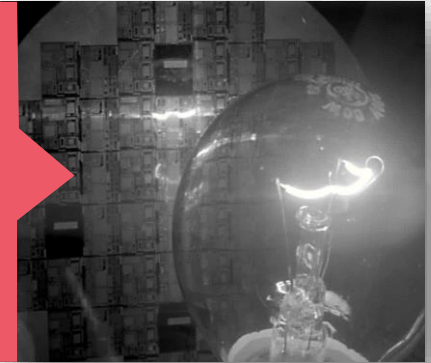


CORE TECHNOLOGY – HDR PIXEL



Illustration

High Dynamic range from pixels

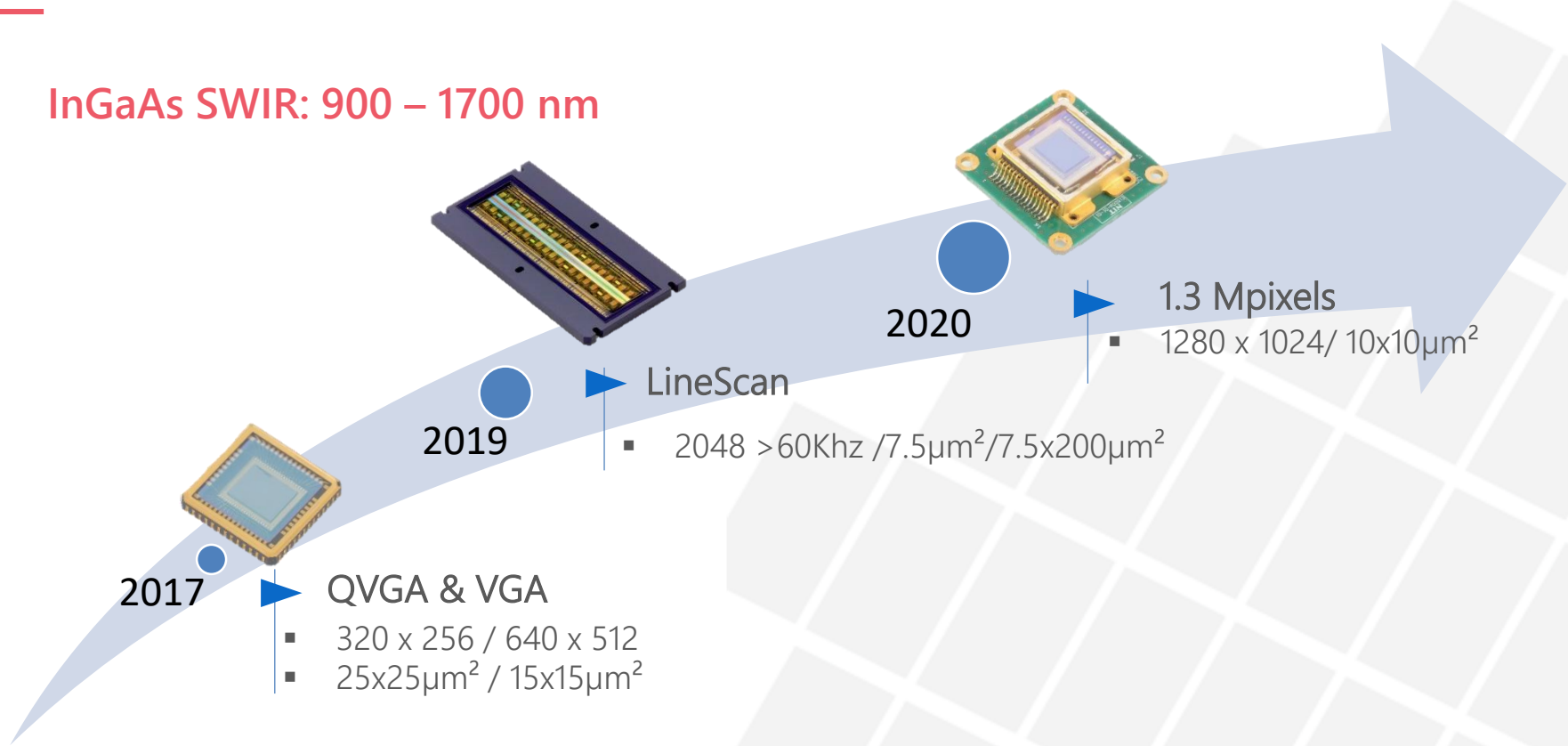


- ▶ IN PIXEL HDR : 140dB – NO SATURATION
- ▶ SINGLE EXPOSURE FITS ALL LIGHTING SITUATIONS
- ▶ EXTREMELY SIMPLE CONTROLS AND SETTINGS (no cooling system)



Present and future SWIR sensors

InGaAs SWIR: 900 – 1700 nm



2017

QVGA & VGA

- 320 x 256 / 640 x 512
- 25x25 μm^2 / 15x15 μm^2

2019

LineScan

- 2048 >60Khz / 7.5 μm^2 / 7.5x200 μm^2

2020

1.3 Mpixels

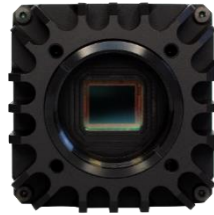
- 1280 x 1024 / 10x10 μm^2

●○ OUR PRODUCTS FOR YOUR APPLICATION



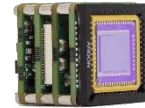
▶ WiDy SWIR

- VGA and QVGA (HDR)
- Gated Imaging option
- Cost effective solutions



▶ WiDy SenS

- VGA
- High Sensitivity and HDR
- Gated Imaging option
- **SWIR imaging swiss-knife**



▶ WiDy Nano

- VGA (HDR)
- HDR 120dB
- Miniature size

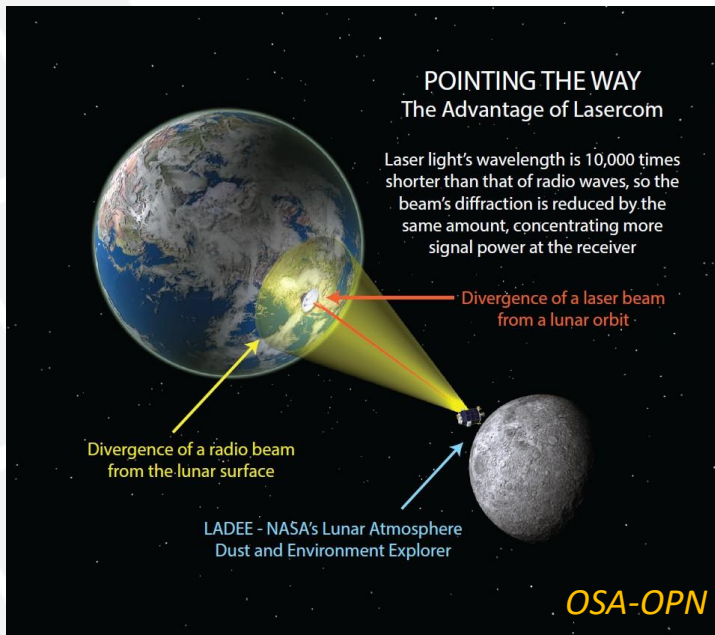
SWIR applications for **new space**

Three typical and future use cases

- ▶ Space optical telecommunications (TRL 6-8)
- ▶ Cooled cameras for Astronomy (TRL 4-6)
- ▶ Hyperspectral SWIR cameras for earth monitoring (TRL 3-5)



Use case 1 – spatial optical telecommunications



- Radio frequency link



- Laser-based optical link
 - Power efficient
 - More secure information (beam waist /1000-20000)
 - High speed (x100-300)
 - Lower SWaP
 - No license

Requirements

- High frame rate (230-5000fps)
- High sensitivity
- High dynamic (120 dB)
- Cost-effective
- Short lead time



USE CASE 2 - Astronomy

- Needs
 - Very long exposure time ($\gg 1\text{sec}$)
 - Low dark current and readout noise
 - Cooling capabilities
 - Acceptable SWaP
- What **we propose**
 - Cooling capabilities flexibility
 - Single/double Peltier cooled
 - Cryogenic cooled
 - High performances
 - Advantages of SWIR (higher transmission through the atmosphere, ...)
 - Cost-effective solutions



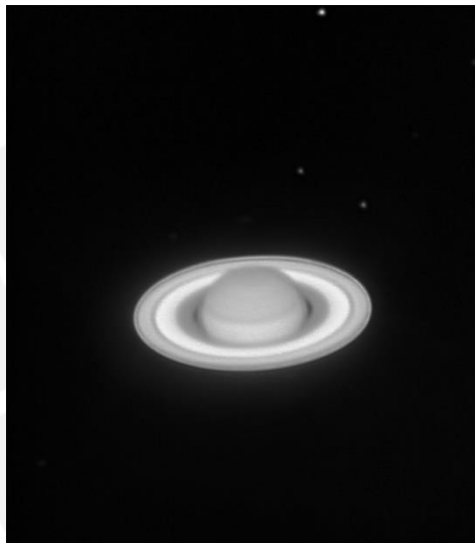
Parameter	Value
ΔT	60°C/150°C
Dark Current @ -40°C	<200 ^e -/sec
Frame rate	230 fps
Mode	NDRO / Linear / Log
Exposure time	$\gg 1\text{min}$
Size	$\sim H55 \times W75 \times L140 \text{ mm}$



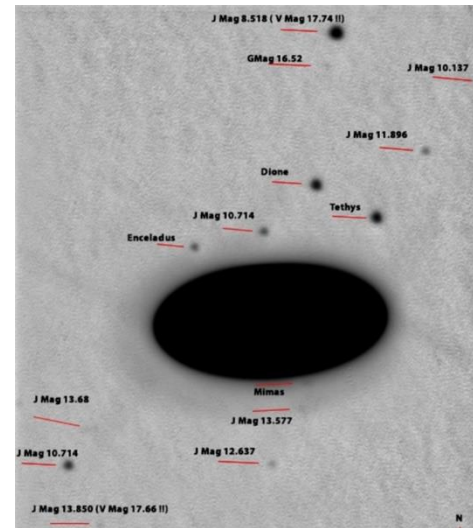
DEEP COOLED INGAAS CAMERA images



*Jupiter (H band filter:
1475-1700nm)*



*Saturn rings in SWIR (J band
filter: 1100-1325nm)*

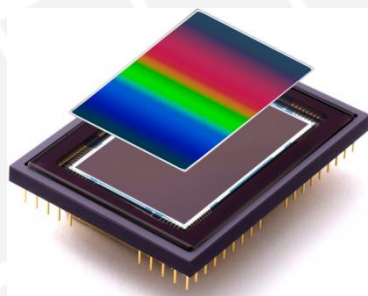
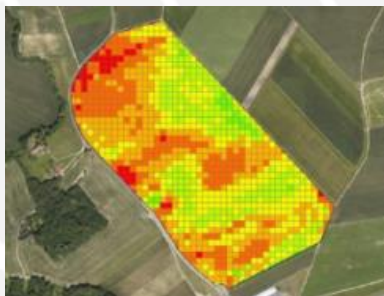


*Same image with contrast
reversed and stretched*

Use case 3 – hyperspectral earth mapping

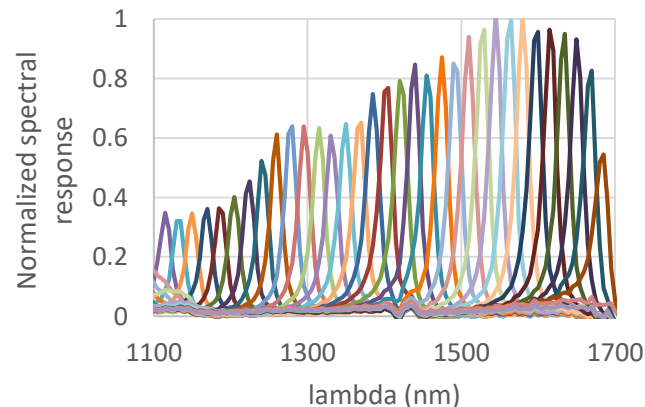
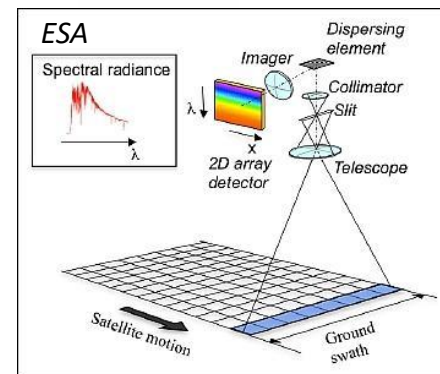
First approach: Linear Variable Filter (LVF)

- Many applications in **earth monitoring**
 - Smart agriculture
 - Mineral resources prospect
 - Fire fighting
 - Pollution surveillance
- Statement: hyperspectral cameras are not very space friendly
 - Optical and mechanical complexity
 - Bulky, fragile and expensive



AIRBUS

MBDA



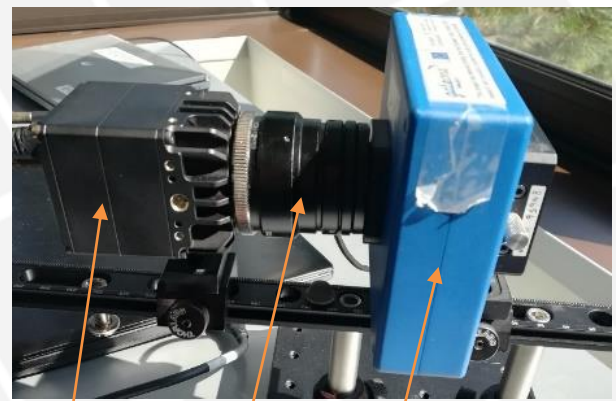


Use case 3 – hyperspectral earth mapping

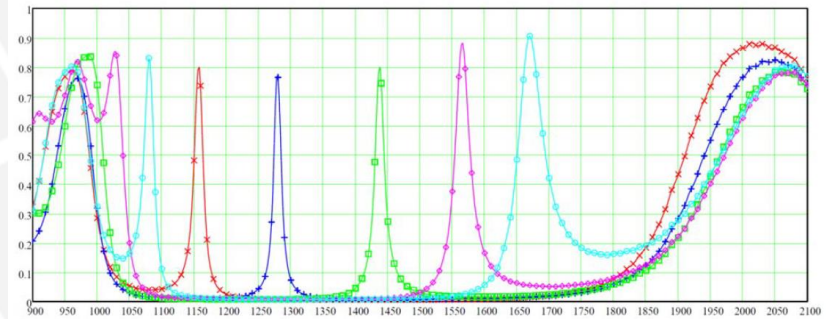
Second approach: Fabry P erot Interferometer (FPI)



- For snapshot 2D imaging
- Scanning from 1100nm to 1600 nm
- 25 wavelengths/seconds
- On drone tests to be led late 2019



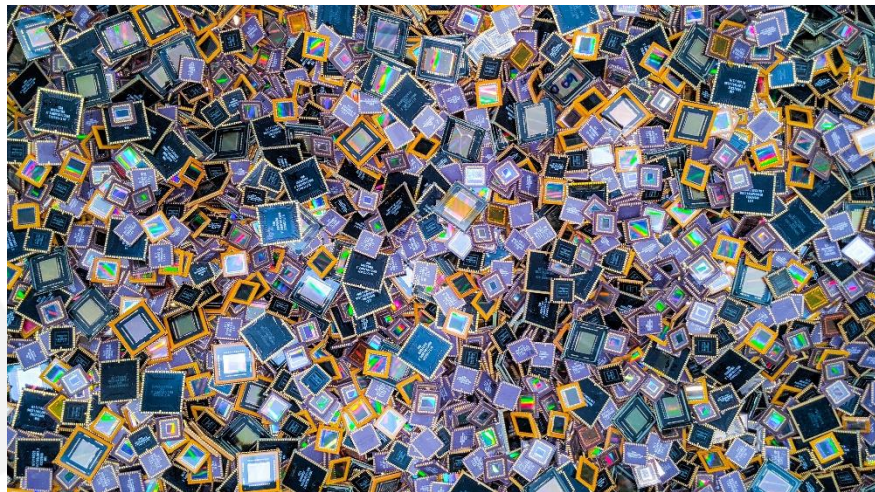
Camera Lens PFPI





Conclusion

- What we can offer: **SWIR camera** and sensors
 - HDR and high sensitivity
 - Fast framerate
 - Active imaging mode
 - Cost-effective solution
 - Short lead time
- What we are looking for (thank to EPIC!):
 - Market and field **feedbacks**
 - **Partnerships**



Danke



спасибо

Dank u

شكرا

σας ευχαριστώ

Merci

धन्यवाद

Grazie

谢谢

ありがとう

Terima kasih

Thank you

감사합니다

Teşekkür ederiz

Dziękuję

Gracias

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