

OUFTI-NEXT: THE SECOND CUBESAT OF THE UNIVERSITY OF LIÈGE



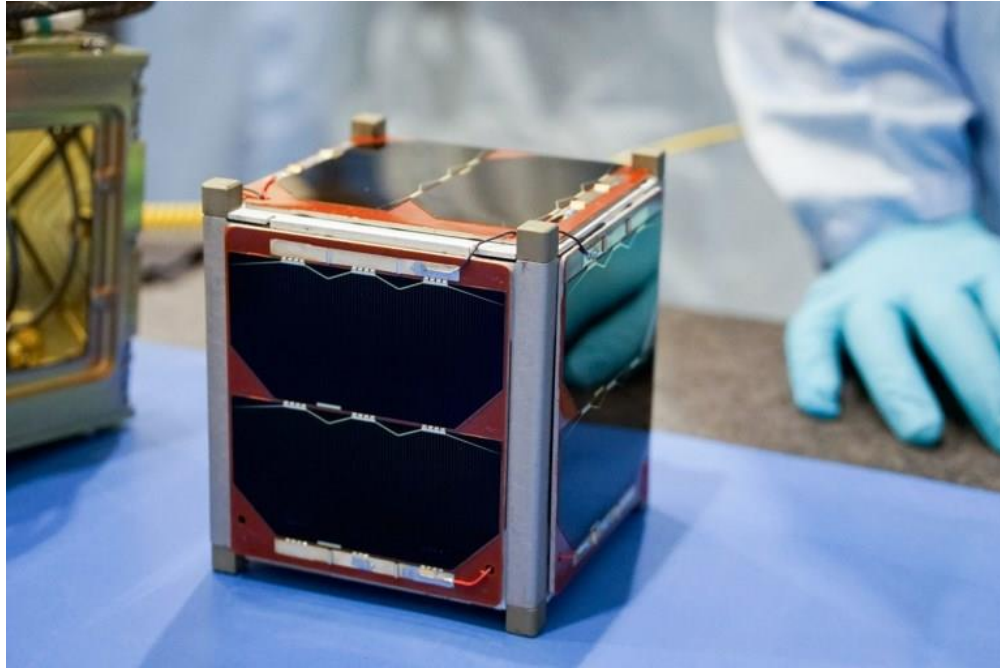
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OUFTI-1

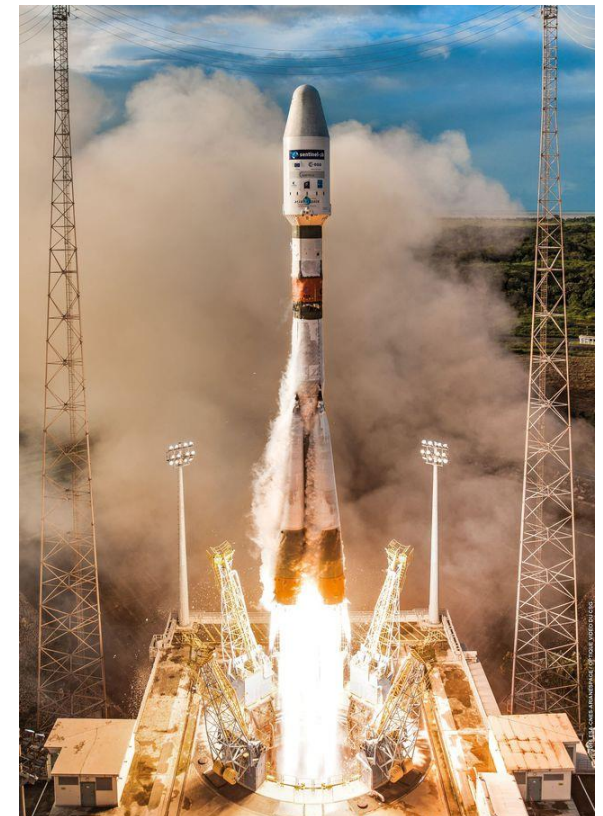
Orbital Utility For Telecommunication Innovation-1





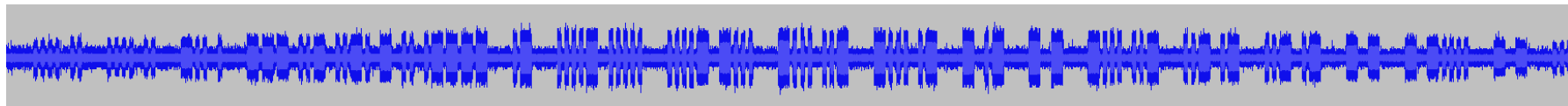
- First 100% Belgian satellite
- Educational satellite
- D-STAR HAM radio protocol
- High efficiency solar panels

- Launched from Kourou, 25th Apr. 2016
- Soyuz VS-14
- FYS! program



OUFTI-1 heard all over the world!

> 500 Beacon messages received from HAM operators

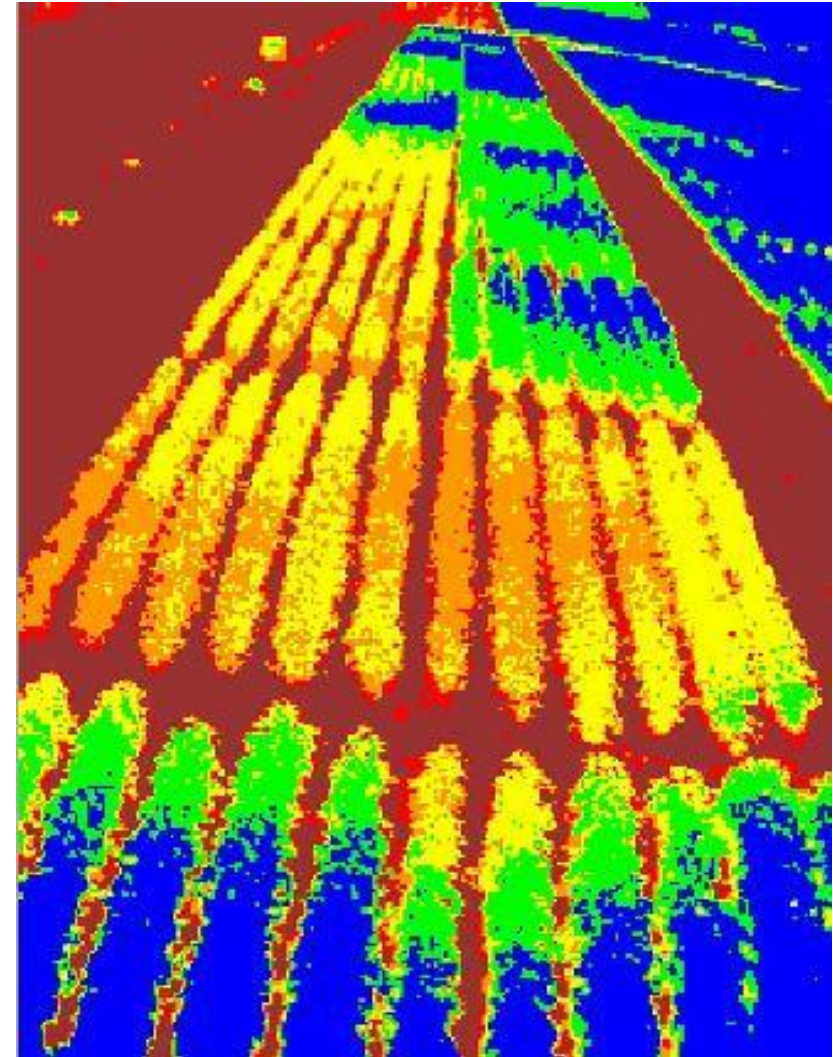


OUFTI-NEXT

Orbital Utility For Thermal Imaging

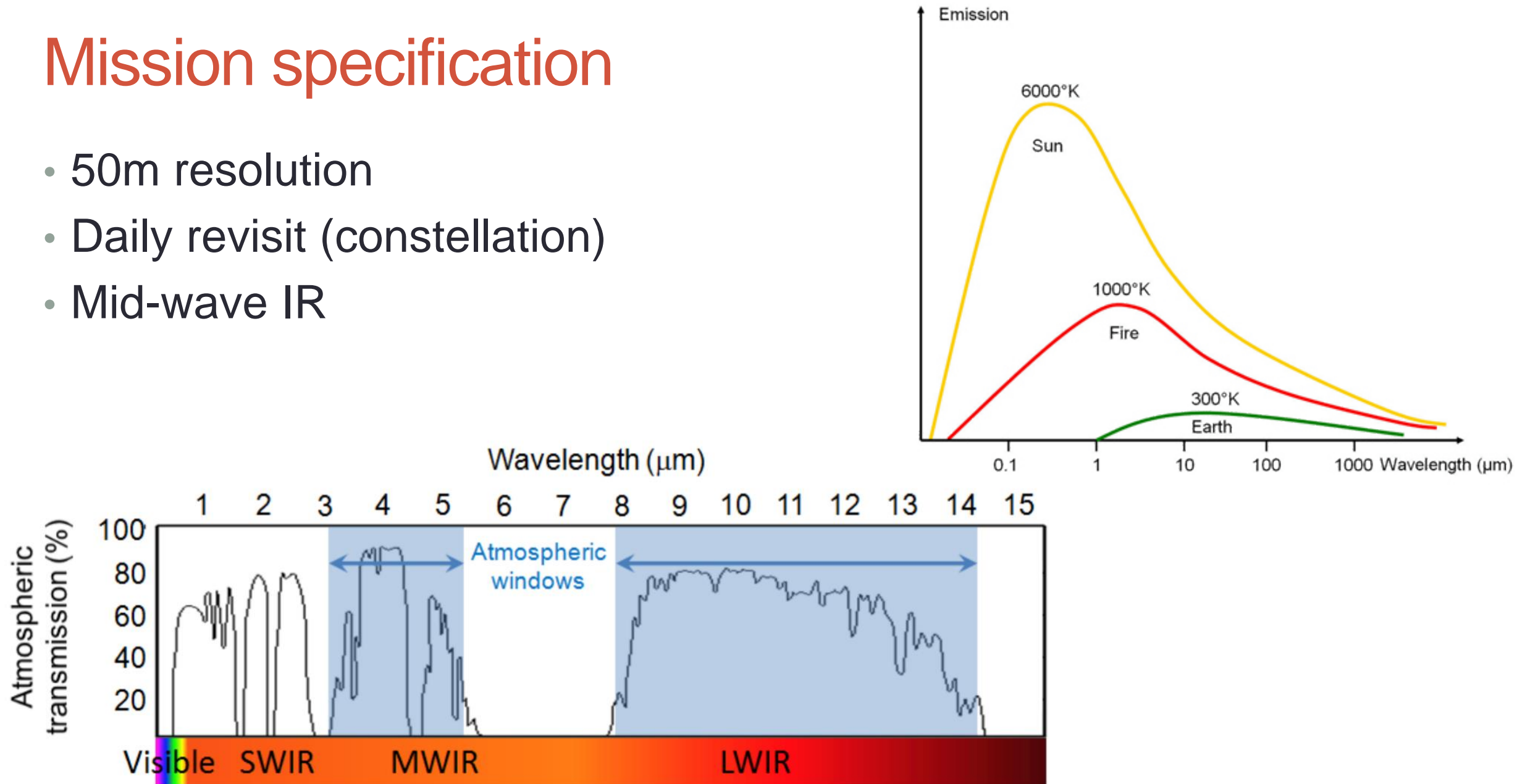
Mission concept

- Smart irrigation strategy of agricultural fields
→ Possibility to detect lack of water by monitoring the leaf surface temperature
- 69% of water used for agriculture
- 40% of the fields are irrigated
→ high potential applications



Mission specification

- 50m resolution
- Daily revisit (constellation)
- Mid-wave IR

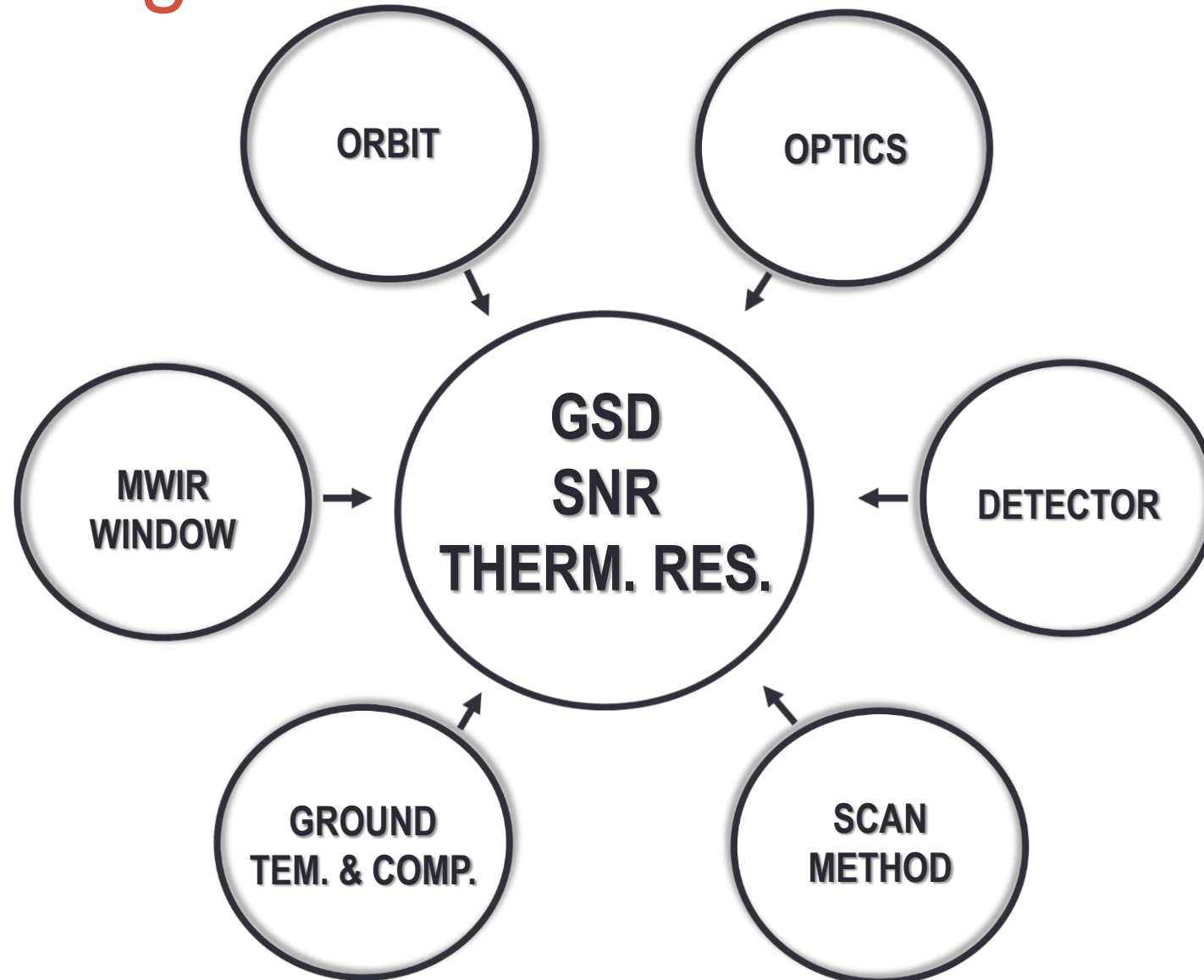


Demonstrator

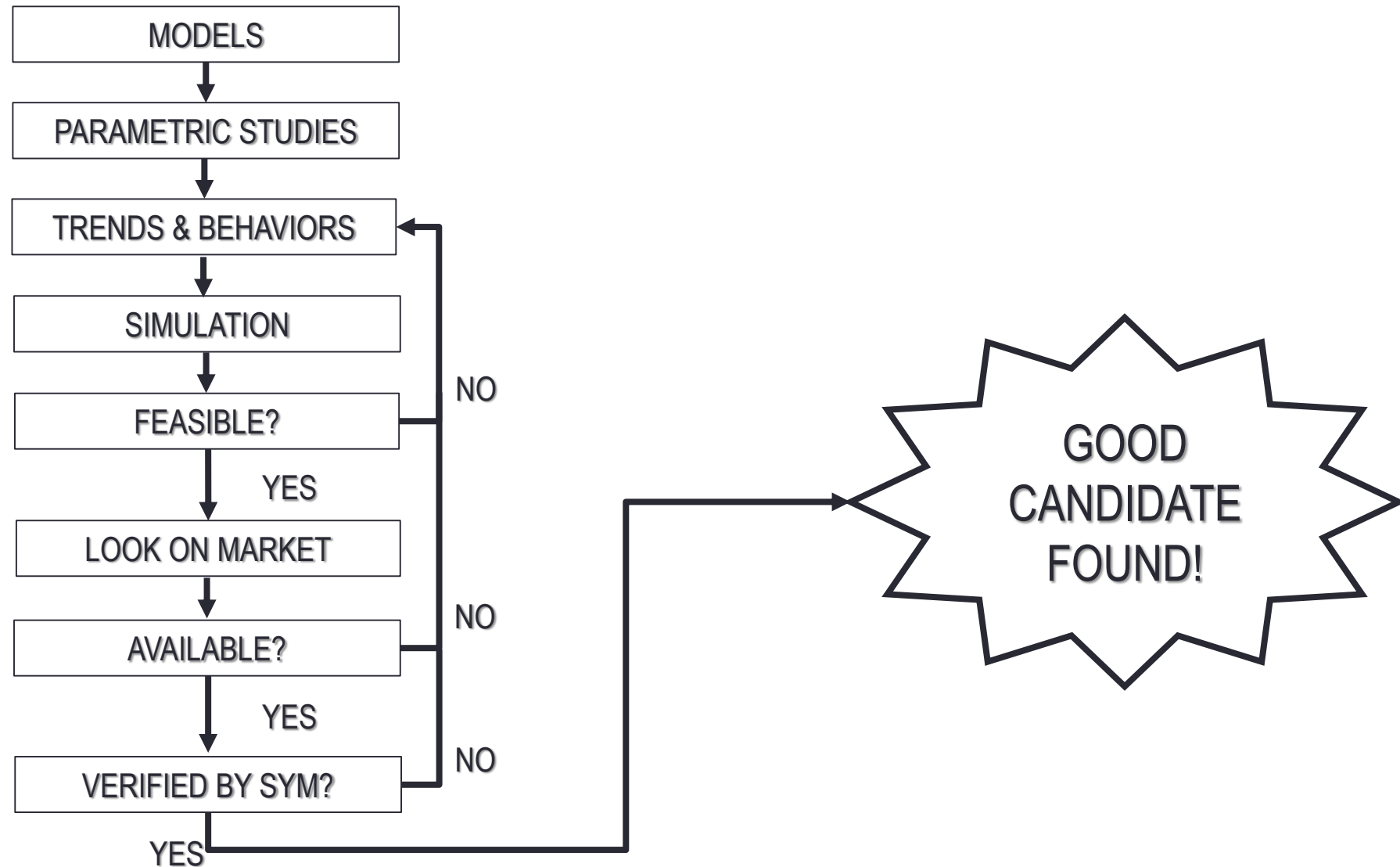
- Mid-wave IR
 - Several days revisit
 - 100m resolution
- 3U CubeSat
- Proof of concept + testing payload



Payload design structure



Feasibility study



Selected camera



SCD's Kinglet

- Pupil diameter: 40mm
- $f/\# = 2.5$
- Digital resolution: 8bit
- Observed band: 3.60 to 4.20 μm
- FPA size: 640x512
- Material: XBn (InAsSb)
- Pixel size: 15 μm
- Detector temperature: 150K



FLIR's Neutrino

- Pupil diameter: 40mm
- $f/\# = 2.5$
- Digital resolution: 8bit
- Observed band: 3.00 to 5.00 μm
- FPA size: 640x512
- Material: InSb
- Pixel size: 15 μm
- Detector temperature: 80K

Simulation results



SCD's Kinglet

- **GSD: 90m**
- Swadth: 57km
- Detectable temperatures: 254 to 332 K
- SNR: 100 to 1470
- **ΔT : 1.14@295K**



FLIR's Neutrino

- **GSD: 90m**
- Swadth: 57km
- Detectable temperatures: 255 to 327 K
- SNR: 100 to 1470
- **ΔT : 1.22@295K**



Payload comparison



SCD's Kinglet

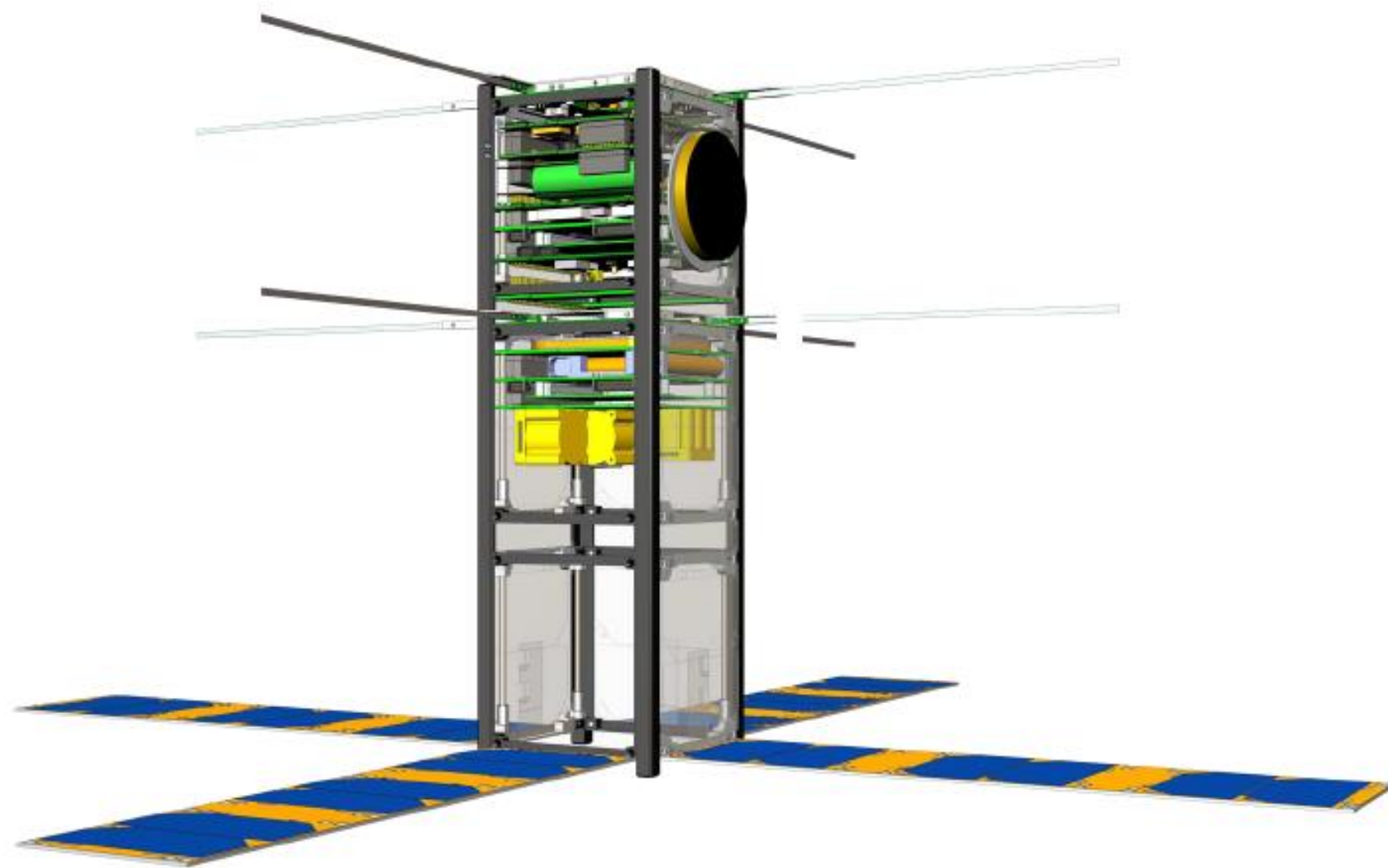


FLIR's Neutrino

	KINGLET	NEUTRINO
SIZE	80X38X60mm	127x51x74mm
MASS	<300g	<450g
OPERATIVE TEMPERATURE	150K	80K
INPUT POWER	<3.5W	<5W
DETECTOR MATERIAL	XBn (InAsSb)	InSb
DETECTOR DARK NOISE	$2 \cdot 10^6 \text{ e}^-/s$	$9 \cdot 10^8 \text{ e}^-/s$

Platform

- 3U CubeSat
- ~1,5U for payload
- S-band channel



Students involvement

- 2016-2017: 2 master thesis
 - Feasibility studies (payload and platform)
- 2017-2018: 7 master thesis
 - Thermal aspects (global and sensor)
 - Attitude control
 - Optics (reflective and refractive)
 - Optics: Fresnel lens
 - System



Conclusion

- More than 70 students involved so far in OUFTI's
- Mission feasibility established
- Big challenge for a 3U CubeSat (cooling)
- OUFTI-NEXT not earlier than Q4 2019



**Thanks for
your keen
interest!**

