

DEFENCE AND SPACE

Radar Constellation Products & Capabilities

Matteo EMANUELLI
Manager Future SAR Programs

Atelier de DINAMIS
11.06.2021

AIRBUS

Why Radar?

Radar:

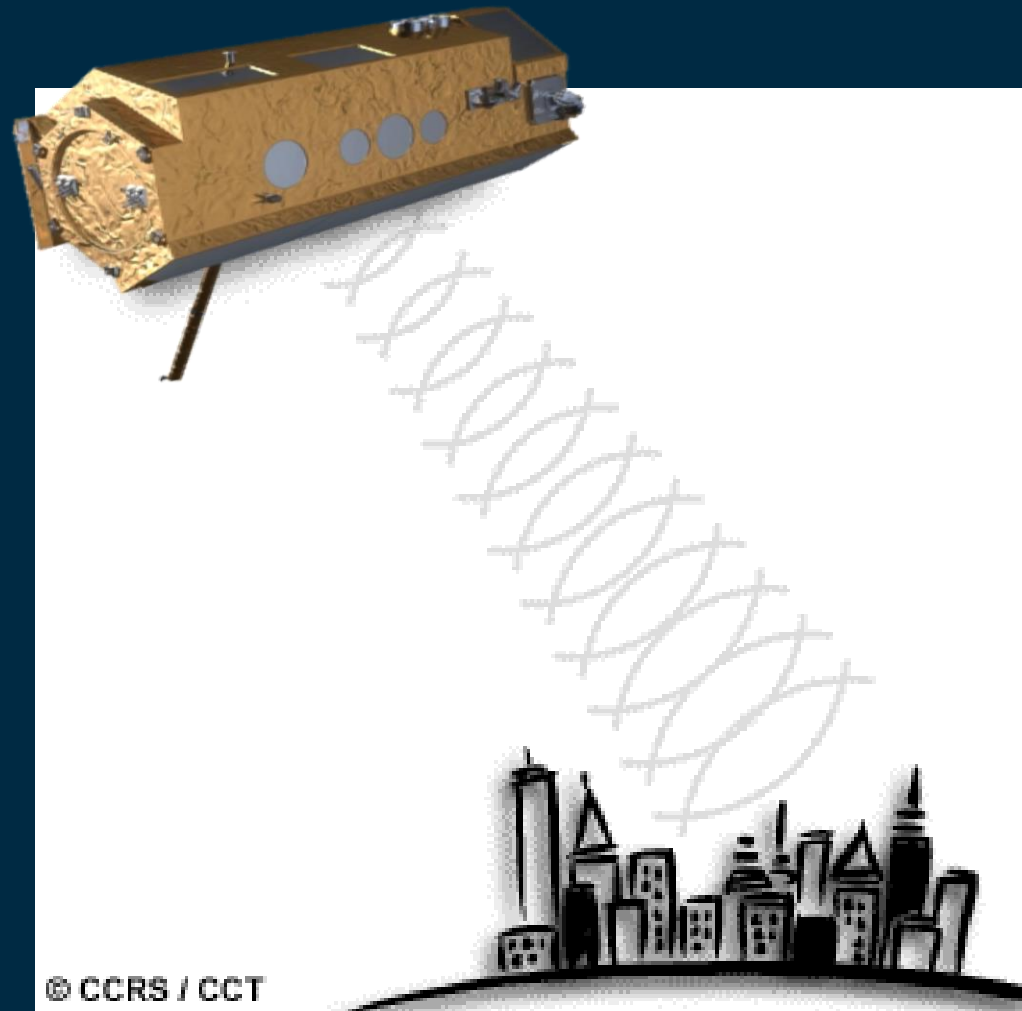
Basic Principle

**RADAR: RAdio Detecting
And Ranging**

**Detection of objects
(targets) by**

- transmitting electromagnetic waves
- receiving the waves reflected by the targets

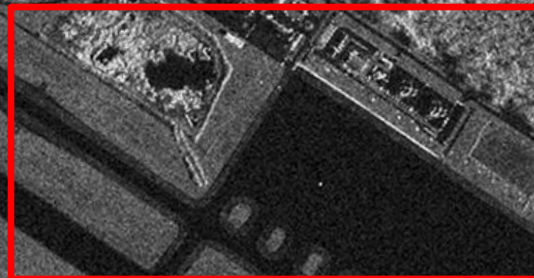
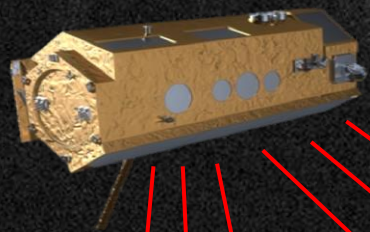
**Determination of distance
to target (range) from
round-trip travel time of
the wave**



**Radar =
ACTIVE System!**

**→ Transmitting
and Receiving**

Benefit of Radar



Radar Constellation: Introduction – Facts – Improvements

DEFENCE AND SPACE

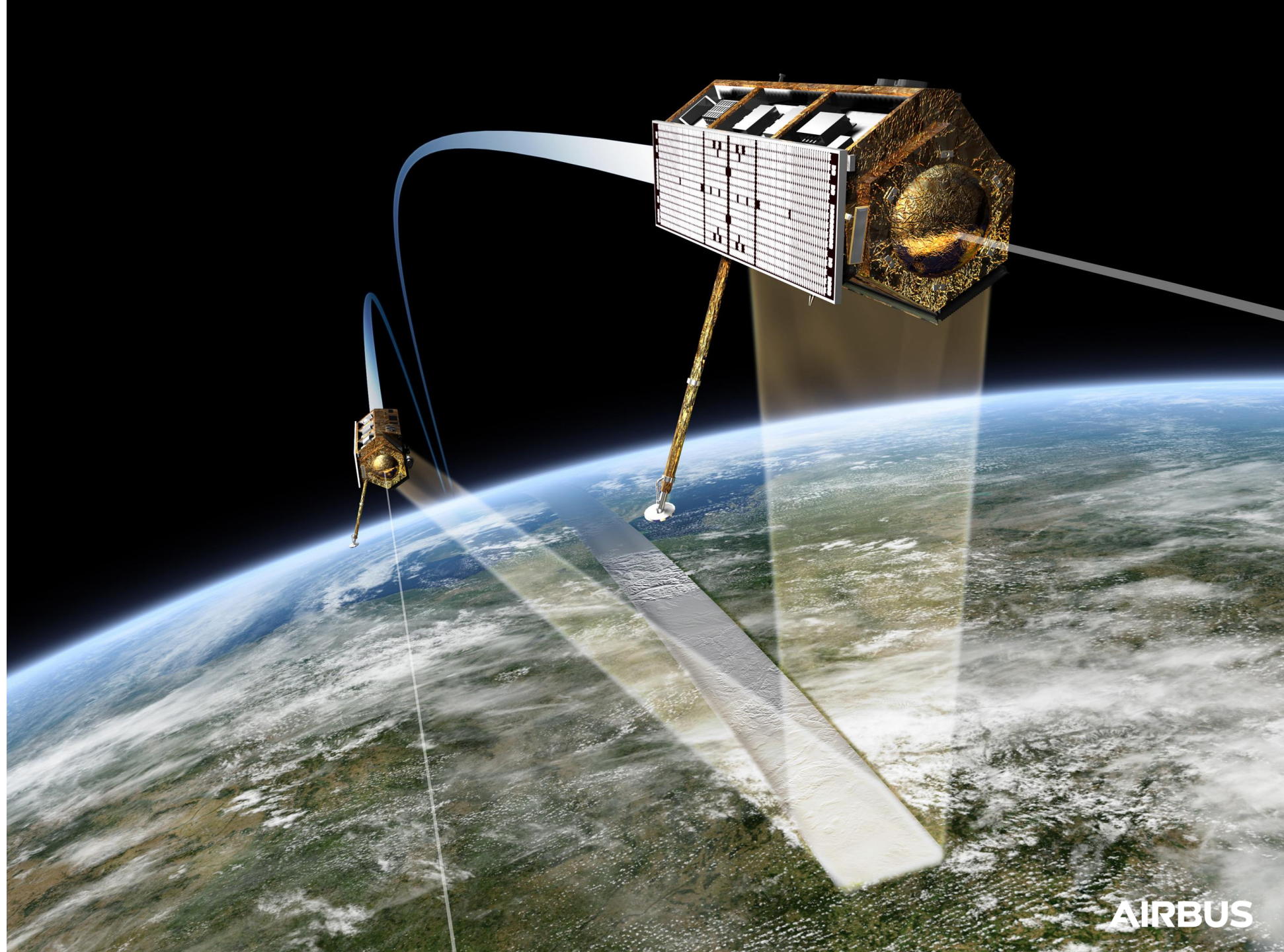
TerraSAR-X / TanDEM-X Formation

(TerraSAR Mission, est. 2007)

Reliability

Precision

Flexibility



AIRBUS

PAZ

(PAZ Mission, est. 2018)

Satellite built by Airbus.
Owned & managed by
Hisdesat.



TerraSAR-X / TanDEM-X, PAZ

All satellites operating in
the same Orbit Plane =

Radar Constellation

Extension of the existing
TerraSAR-X offer.

TerraSAR-X



TanDEM-X



PAZ



Radar Constellation

(Commercial Launch 2019)

Improvements / Key Selling Factors:

Acquisition Capacity

➔ IMPROVED

Overall Revisit Rate

➔ INCREASED

InSAR Repeat Cycle

➔ REDUCED



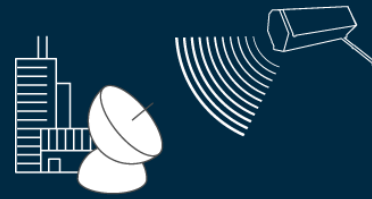
AIRBUS



Radar Constellation

Experience ...

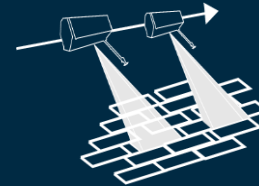
Coordinated Tasking ...



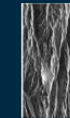
... and Delivery



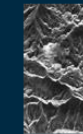
Same Acquisition Modes ...



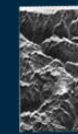
... and Processing Levels



SSC



MGD

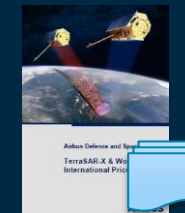


GEC



EEC

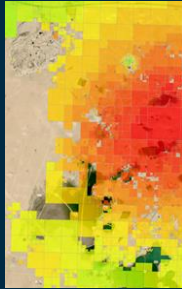
Joint Pricelist



Radar Constellation

Prime Objective:

Boost customer applications by providing continuously fresh data with increased revisit and coverage capability.



Interferometry / Surface Movement

- Improved interferometric repeat times
- Used for: Engineering and mining companies to efficiently monitor and manage operations, **to avoid damage to infrastructure and human lives**



Change Detection

- Improved revisit and interferometric repeat times
- Used for: Agriculture (growth), Deforestation, Site monitoring, infrastructure monitoring and Business Intelligence



Maritime Surveillance

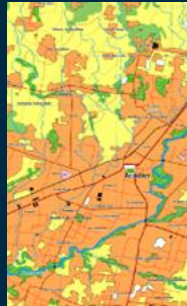
- Improved revisit times and capacity
- Used for: Ship detection, oil-pollution monitoring and sea ice observation



Radar Constellation

Prime Objective:

Boost customer applications by providing continuously fresh data with increased revisit and coverage capability.



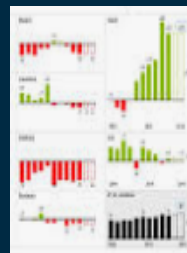
Emergency Response & Mapping

- Faster and secure access to data over AOIs, improved capacity
- Used for: Topo- and Thematic Mapping, Humanitarian and crisis intervention to support efficient coordination and management of rescue activities



Defence & Security / IMINT

- Faster and secure access to substantiated ground information for mission management
- Ability to react rapidly to new developments on the ground
- Used for: Military operations



Analytics

- Improved revisit times and capacity
- Ability to reliably provide fresh data in short intervals
- Used for: Input for Data Analytics (e.g. Oil Tank Monitoring)



Radar Constellation: Commercial Offer

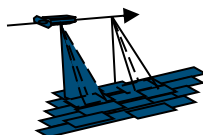


Imagery – Acquisition Modes

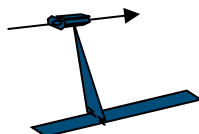
Wide ScanSAR*



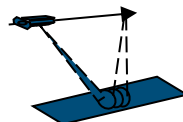
ScanSAR



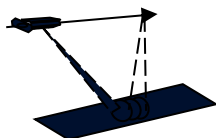
StripMap



High Res. SpotLight & SpotLight



Staring SpotLight*



**Multi-resolution – Multi-scale – Multi-polarized:
Acquisition Modes for various Applications**

40m Resolution

200 - 270 x 200km

Large area maritime
monitoring of traffic, oil, ice

18m Resolution

100 x 150km

Detailed maritime
monitoring & detection

3m Resolution

30 x 50km

Detection & classification
of vessels, infrastructure,
etc.

1m/2m Resolution

10 x 5 km / 10 x 10 km

Recognition of objects
(aircrafts, hangars,
vessels,...)

0.25m Resolution

4 x 3.7km or 2.5 x 7.5km

Identification of objects

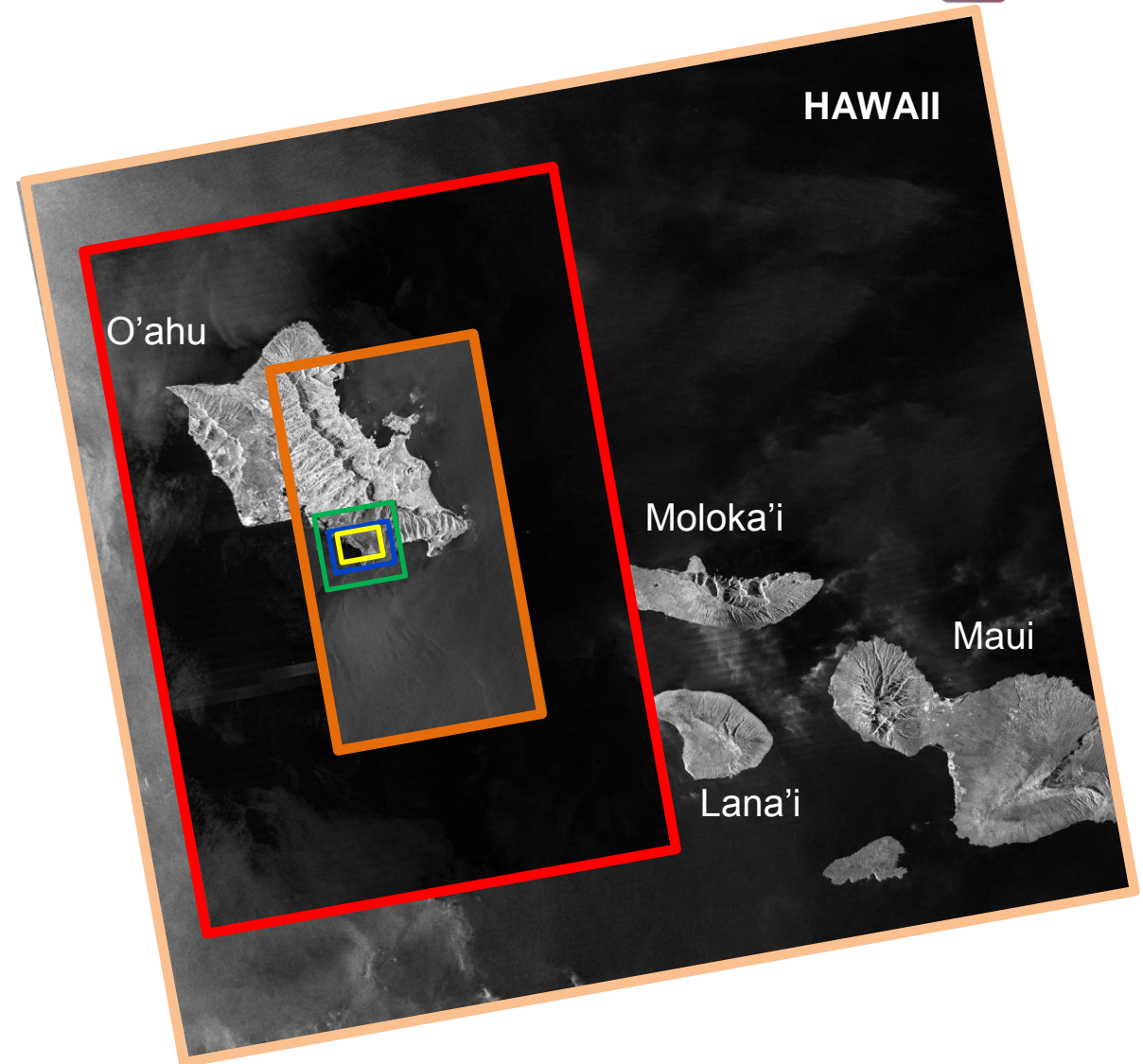
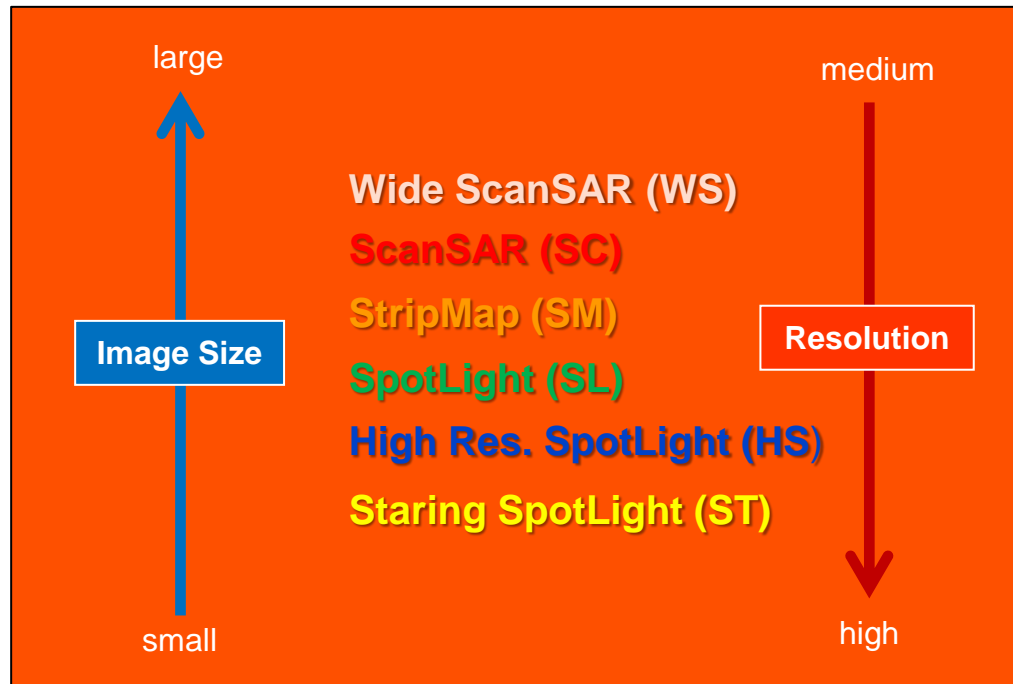
Monitoring & Detection

Recognition & Classification

Identification

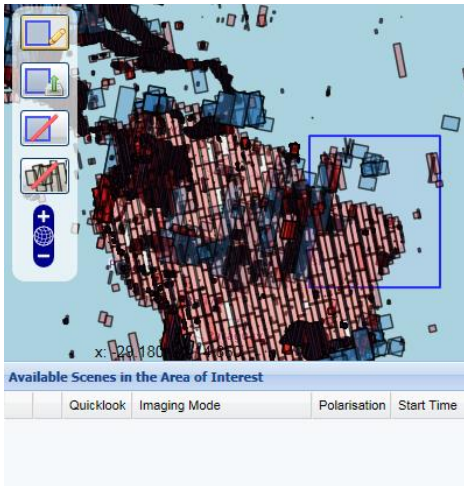


Imagery - Acquisition Modes



Radar Constellation

Archive



TSX/TDX Archive growing since 2007.

PAZ Archive building since 2018.

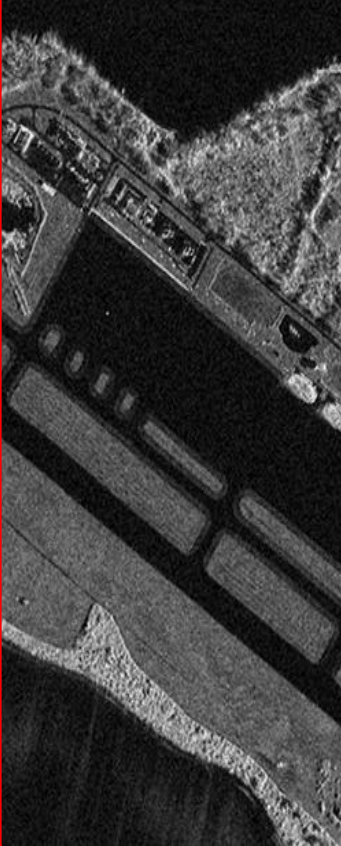
Coordinated Background Mission (Smart Archive) started in April 2019.

→ Focus: **Interferometric Data Stacks**

Coordinated Archive query via Airbus Customer Service.


Radar Products and Capabilities

Imagery / Data



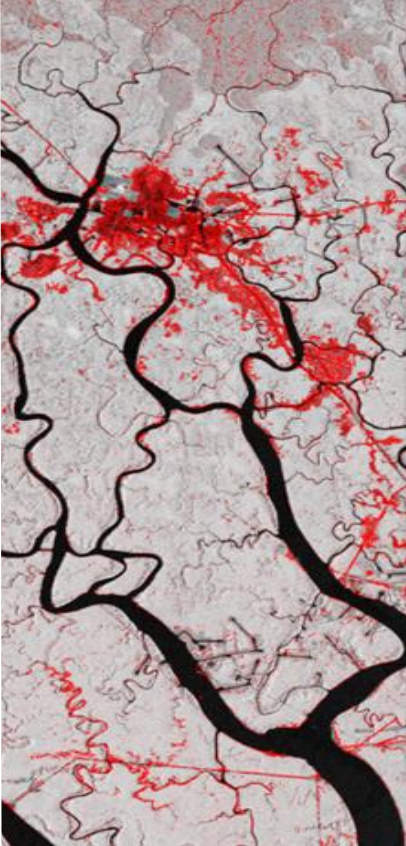
Radar Constellation offer

Surface Movement Monitoring



Average Velocity (mm/yr) Min/Max Values (mm/yr) Coherence Unit

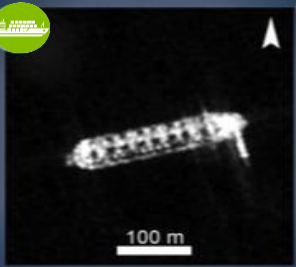
Change Indicator



Vessel Detection

AIRBUS DETECTED OBJECT D1

LAT 36.129832°
LON -4.589716°
DATE 2015-10-26
TIME 06:23:21




SPEED 17 kts 75%
ORIENTATION 260° 95%
LENGTH 270 m 95%
WIDTH 45 m 95%
CLASS Cargo Vessel 80%
STATUS Moving 90%
CONFIDENCE 95%
PRODUCT Classify

MORE INFORMATION


AIS PANEL

© AIRBUS DS GmbH 2018

GCPs



WorldDEM

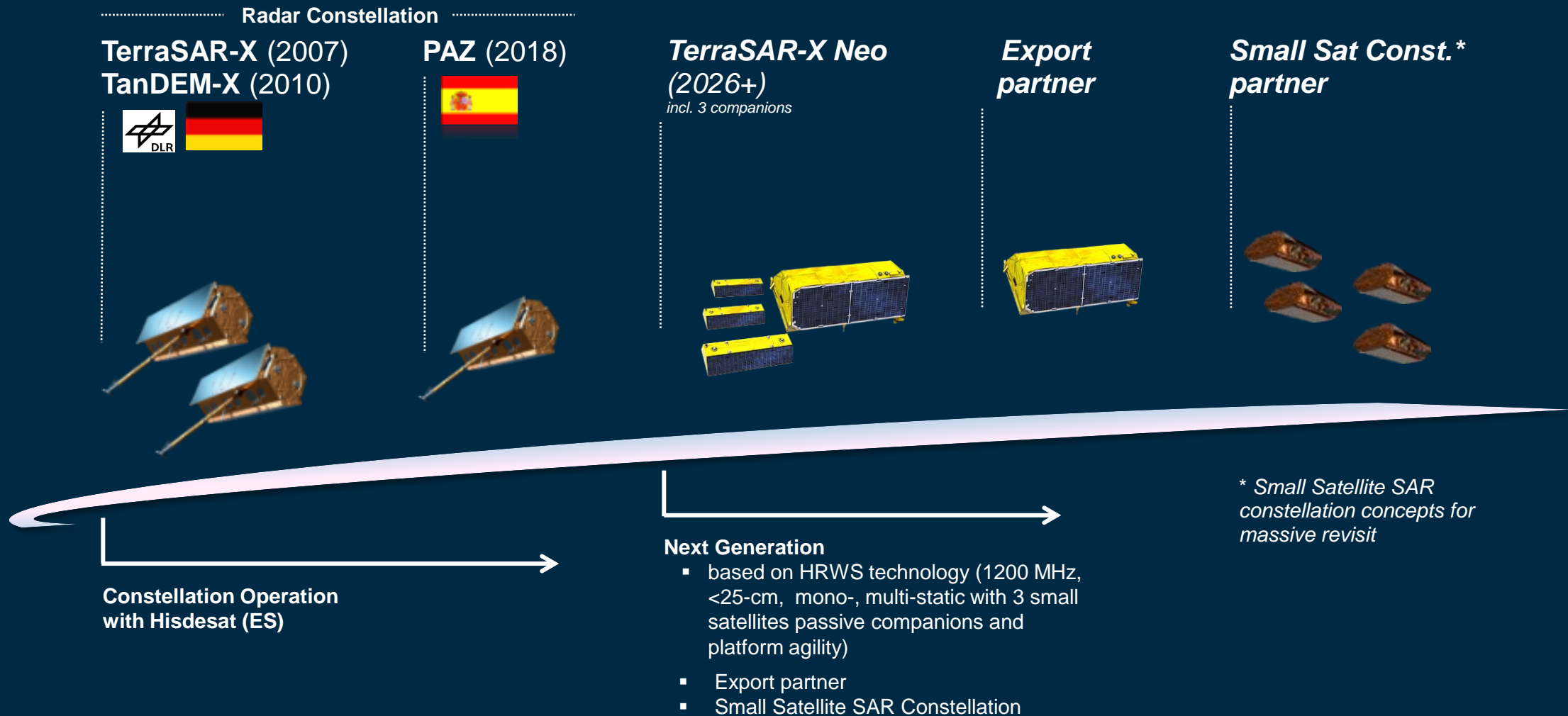


Airbus' Radar Services

powered by Radar Constellation increased Acquisition Capacity and Revisit

Present and Future:

Current and potential Future Missions



Thank you

Contacts:

Matteo EMANUELLI, matteo.emanuelli@airbus.com