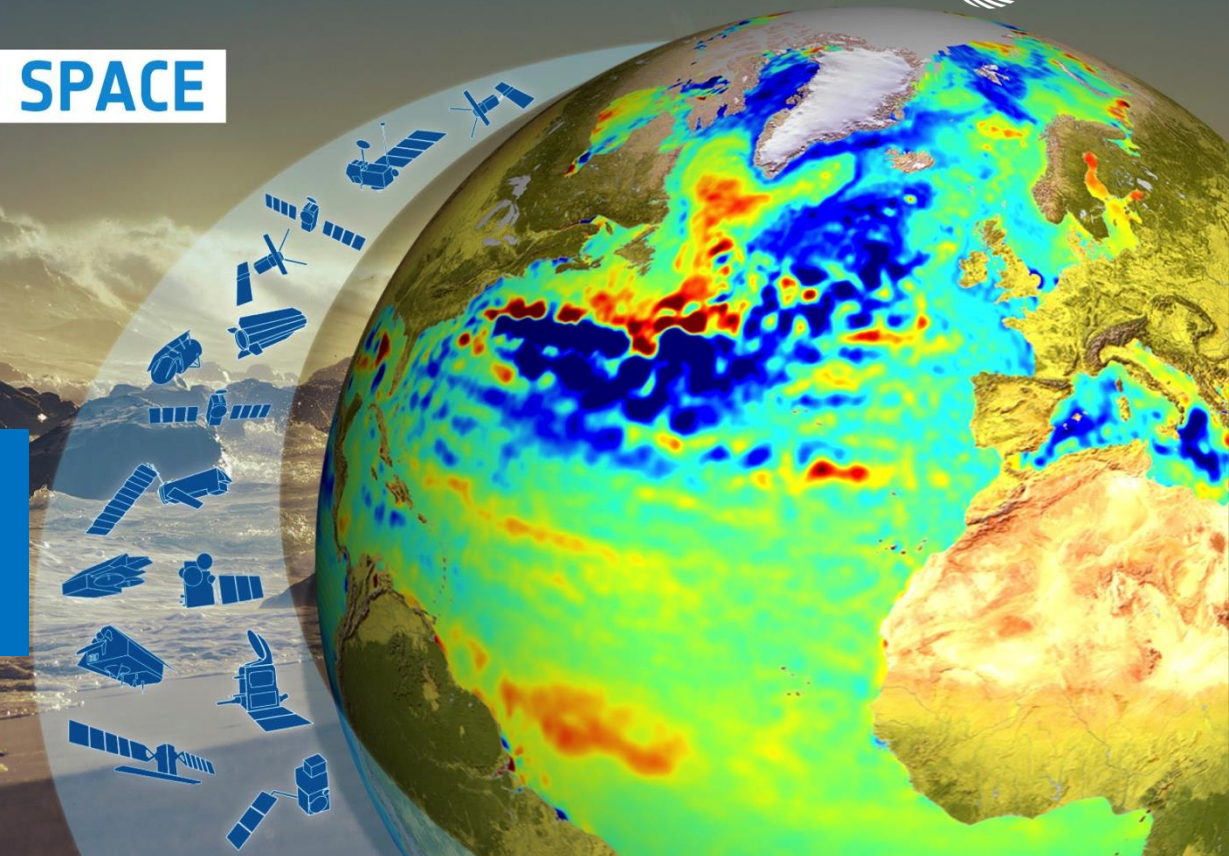
→ ATLANTIC FROM SPACE WORKSHOP

23–25 January 2019
National Oceanography Centre
Southampton, UK

Provision of Near Real Time Optical and SAR-based Satellite Services for the Atlantic

João Vasco Lopes

EDISOFT



Presentation structure

1. EDISOFT & UNINOVA presentation
2. Current Atlantic capabilities for NRT EO imagery provision
3. Market-based solutions: future services
4. NRT Optical and SAR-based Satellite Services for the Atlantic
5. Questions & Answers

1. EDISOFT & UNINOVA Presentation

Employees

108

Shareholder´s

65%
THALES

17,5%
NAV E.P.E.

17,5%
PT MOD EMPORDEF

Facilities

HQ, Oeiras, Paço de Arcos

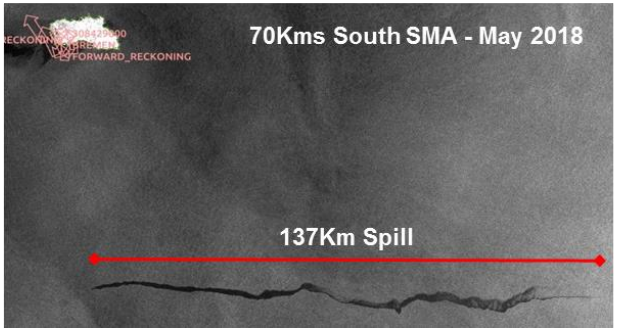
Viana do Castelo, Shipyard

Santa Maria, Azores

Earth Observation

Synthetic Aperture Radar (SAR)

- Acquisitions and processing of all RADARSAT-2 and Sentinel-1 modes
- Use of **algorithms & expert analysis** for: oil spill detection, vessel, behavior and change detections in Near Real Time (NRT)
- CleanSeaNet contractor since 2007, providing maritime surveillance services to the European Maritime Safety Agency - EMSA

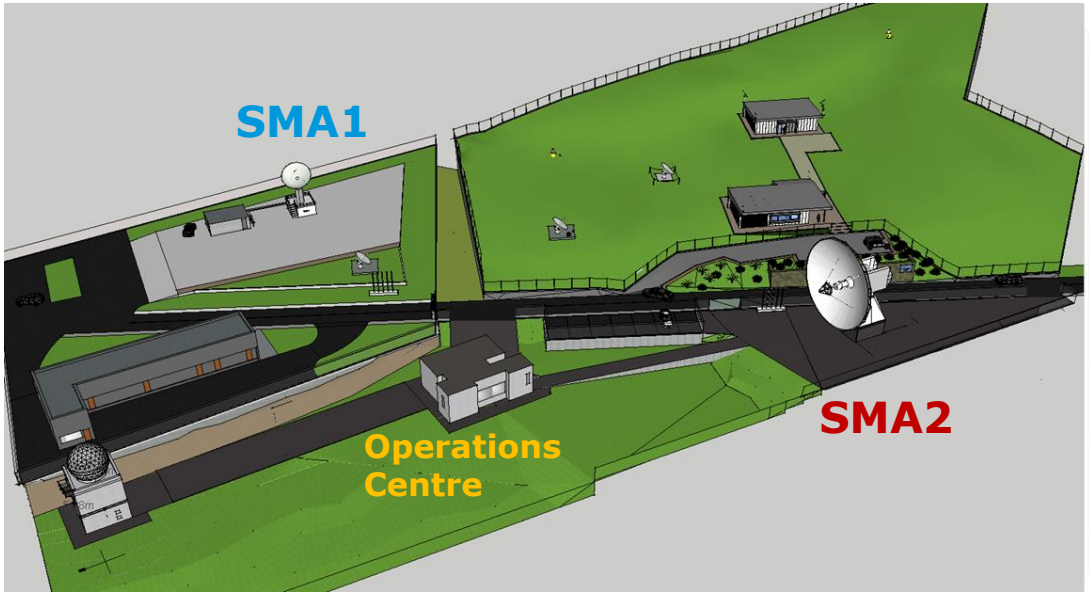


EDISOFT TELEPORT IN SANTA MARIA AZORES

Assets

- **ESA Tracking station** incl. X/S Band Antenna (5,5m)
- **Earth Observation** processing chain
- **Copernicus** collaborative station
- **Galileo Sensor Station** (GSS)
- **X/S Band Antenna (15m)** – ***part of Expansion Plan***
- **EUMETSAT** Post EPS-SG Station
- **SAT-AIS** receiving station
- **Hosting services** (Spire Global,, Rocket Lab, more to come…)

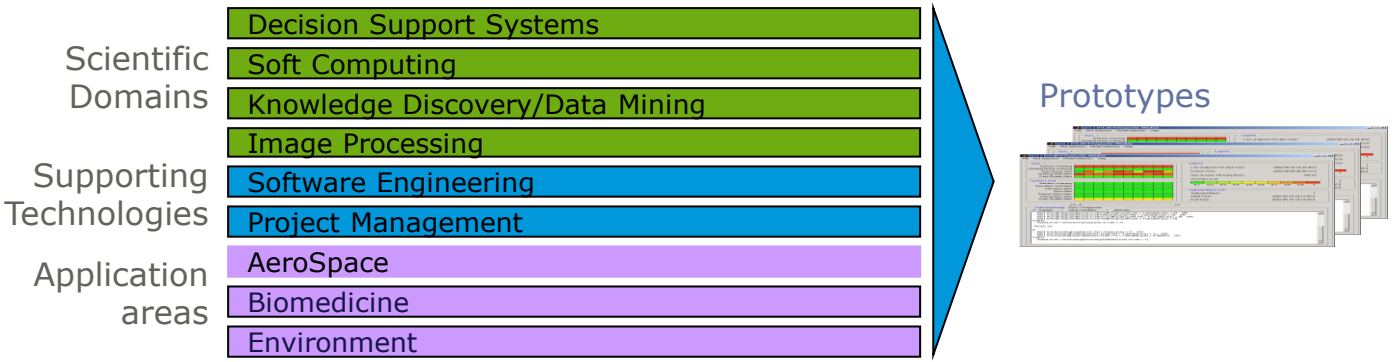
Teleport Expansion Plan



Antennas	SMA-1	SMA-2
Dish Size [m]	5.5	15
GDS Name	SMA-1 (ESTRACK)	SMA-2 (antenna being upgraded)
Band	S & X	S & X
Frequency [GHz] (Receive) down	S (2200-2300) & X (8025-8400)	S (2200-2300) & X (8025-8500)
Frequency [GHz] (Transmit) up	N/A	S (2025-2120) & X (7145-7235)
3dB Beam width (Transmit) [deg]	S(Rx: 1,7) & X(Rx: 0,5)	S(Rx: 0,60 Tx: 0,65) & X(Rx: 0,16 Tx: 0,18)
TX Gain [dBi] @ feed aperture	N/A	S: 47,48 dBi ; X : 60,1 dBi
G/T [dB/K] @ elevation [°]	S (16,0 @ 90°) & X(30,0 @ 90°)	S (28,9 @ 90°) & X(37,5 @ 90°)
Pointing Accuracy [deg]	150mdeg	80mdeg
Max. EIRP [dBW]	N/A	S: 73.2 (400W - SSPA) ; X: 82,8 (500W - SSPA)
Polarisation	RHCP & LHCP (RX only)	RHCP & LHCP (Simultaneous in RX, either-or in TX)
Telemetry in Band	S & X	S & X
Command in Band	N/A	S & X
Tracking in Band	S	S & X
Tracking Speed AZ; EL [°/s]	Az:5°/s ; El:5°/s	Az:15°/s ; El:5°/s

UNINOVA – Institute for Development of New Technologies

- Research Institute, non-profit organization, major owned by New University of Lisbon
- CA³ - Research Group on Computational Intelligence
  - Since 2001 (after Portugal joined ESA) the group has been highly involved in Space related projects
  - 21 projects approved by ESA, so far
  - http://WWW.CA3-UNINOVA.ORG



2. Current Atlantic capabilities for NRT EO imagery provision

EDISOFT has been providing NRT SAR-based Maritime Surveillance services to EMSA since 2007, through its Santa Maria Ground Station in the Azores.

These Earth Observation services contribute to the Atlantic maritime surveillance by helping to manage the actions and events that impact maritime safety and security, including

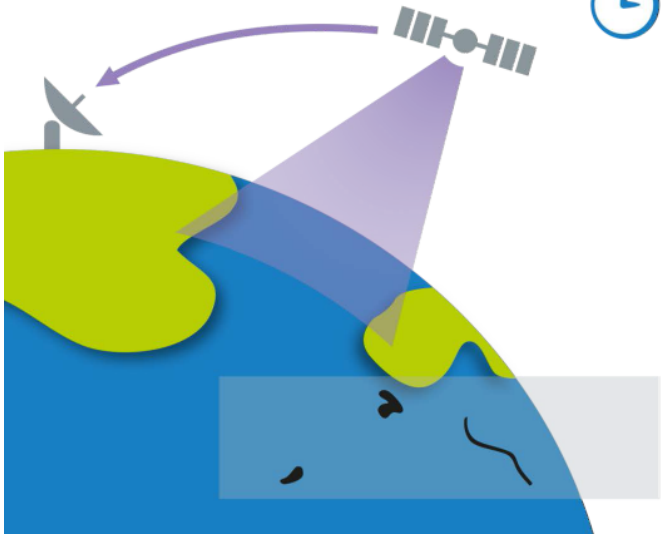
- maritime pollution;
- accident and disaster response;
- search and rescue;
- maritime border monitoring;
- fisheries control.

2. Current Atlantic capabilities for NRT EO imagery provision

Recently, EDISOFT updated its EO chain to encompass **all Radarsat-2 modes**, including VHR modes of up until 1 m resolution (Spotlight), in addition to **Sentinel-1**.

Thus, the North Atlantic is being currently monitored through SAR-based satellites in NRT, and **Value Added Products** provided include Oil Spill, Vessel, Activity and Feature Detections.

2. Current Atlantic capabilities for NRT EO imagery provision



SOURCE: EMSA

30 minutes

NEAR REAL TIME SERVICE

between satellite image acquisition and reporting of detection results to the affected coastal state

SAR images

HR2 (10m < res. <= 30m) and
MR1 (30m < res. <= 100m)
with single polarization (VV)

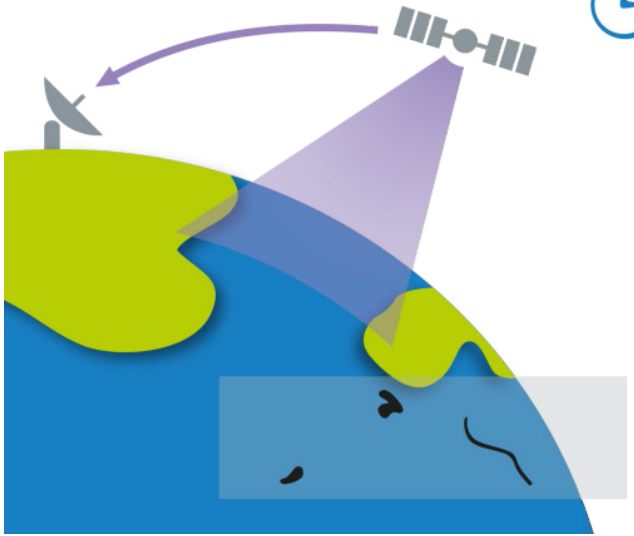
Delivery Success Rate

> 95%

approx. **25,000** images delivered in past 10 years

over **4,300** million km² sea surface

2. Current Atlantic capabilities for NRT EO imagery provision



SOURCE: EMSA

30 minutes

NEAR REAL TIME SERVICE

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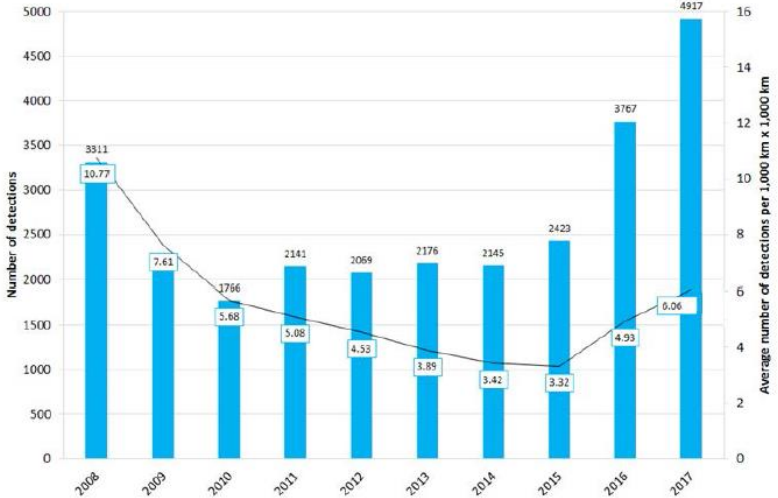
SAR images

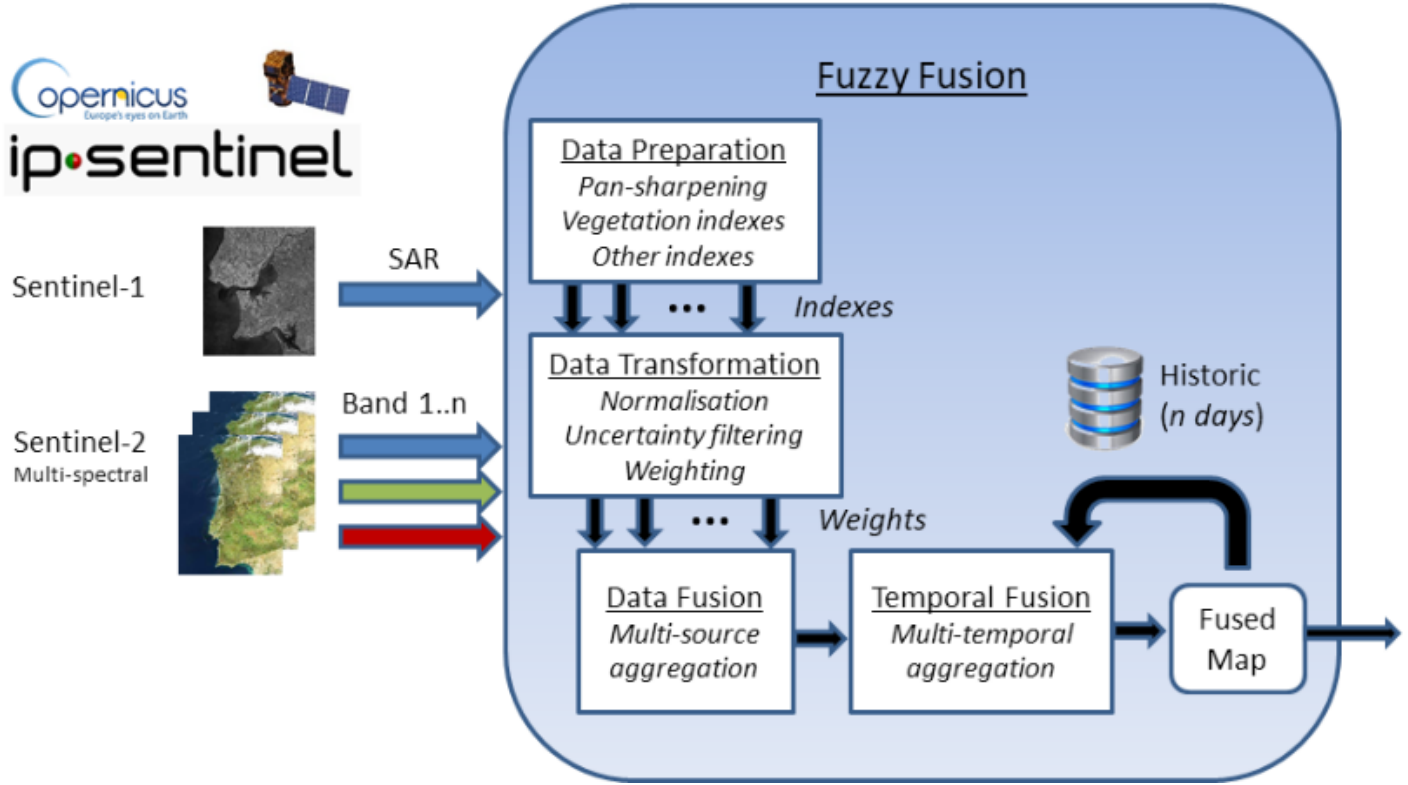
Global statistics on

- total number of possible spills detected during the period 2008 - 2017

- average number of detections per million km monitored



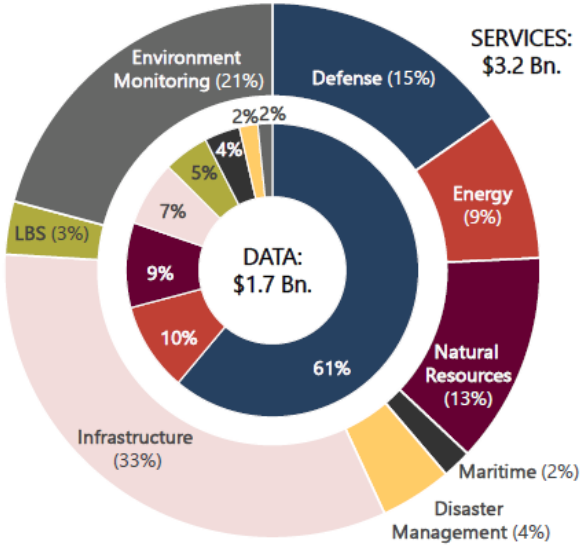
2. Current Atlantic capabilities for NRT EO imagery provision



3. Market-based solutions: future services

- Commercial data reached $1.7 billion in 2015, where 84% is represented by optical data; VAS market reached $3.2 billion in 2015
- In 2025, the market for commercial EO data is expected to reach $3 billion; and VAS $5.3 billion for 2025

Value Added Services



SOURCE: *"Towards disruptions in Earth Observation? New Earth Observation systems and markets evolution: Possible scenarios and impacts", 2017, Denis, G. et. al.*

3. Market-based solutions: future services

Optical GSD Resolution

0.3 m is the new benchmark

INSTITUTIONAL

EMSA; Frontex; OSPAR; Navy; …

PRIVATE SECTOR

Energy Sector; Fisheries; Shipping; …

Satellite	Highest Spatial Resolution Maximum GSD resolution (m)
WorldView-4	0.31
WorldView-3	0.31
EROS-C	0.4 (To be launched in 2019)
GeoEye-1	0.41
WorldView-2	0.46
WorldView-1	0.50
Pleiades-1A	0.70
Pleiades-1B	0.70
Spot-6	1.5
Spot-7	1.5
Sentinel-2	10

4. NRT Optical and SAR-based Satellite Services for the Atlantic

EDISOFT
DEFENCE & AEROSPACE TECHNOLOGIES

SAR
acquisition
processing
analysis

Optical
acquisition
processing
analysis

UNINOVA
Instituto de Desenvolvimento de Novas Tecnologias

AI
Machine Learning
Data Fusion

?
Plastic detection
In-situ measurements
Shipping & fishery
Environmental expertise

ESA support

New Space-based Value Added Products for the Atlantic

4. NRT Optical and SAR-based Satellite Services for the Atlantic

New Space-based Value Added Products for the Atlantic

- Market-driven approach;
- Focus on maritime surveillance applications of feature and activity detections for maritime global traffic, environment (e.g. oil spills, plastics) and new industries (e.g. aquaculture, ocean energy)
- Development of innovative products, building on joint EDISOFT & Uninova capabilities (e.g. data fusion EO products)
- …

5. Questions & Answers

For further information, please contact

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