



SATELLITE GROUND SEGMENT

VERS. 1.0 del 11/03/2025

BUSINESS UNIT: **Satellite Ground Segment**

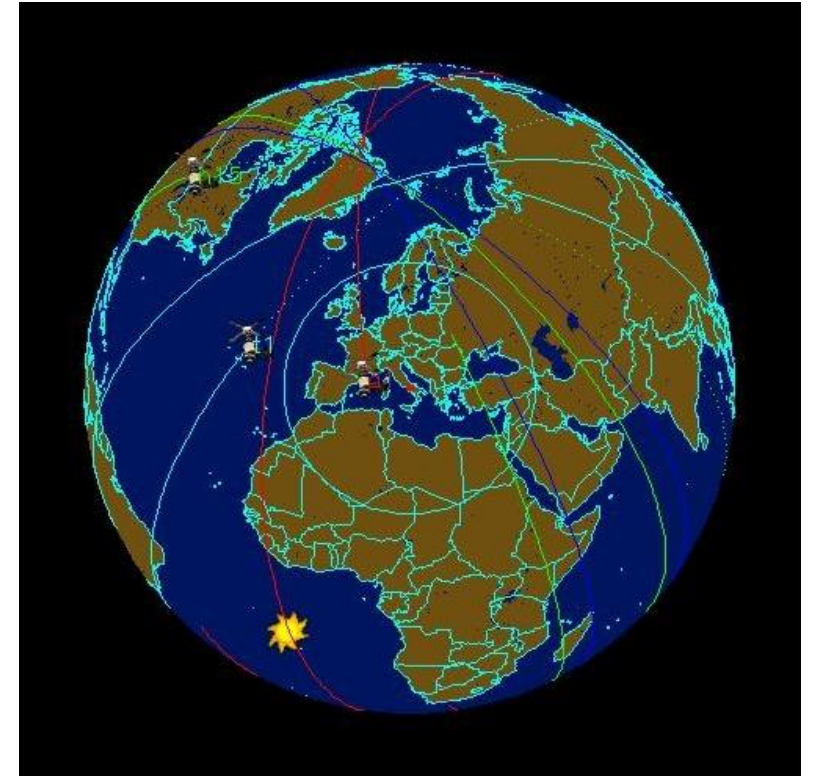
COMPANY: **MapSat s.r.l.**

Summary

A1. Satellite Ground Segment

A2. Remote Sensing Data Processing

A3. Software for New Satellite Missions



A1. Satellite Ground Segment Unit - Team

Eng. Claudio Di Paola (BU manager)

Eng. Costanzo Mercurio

Prof. Dr. Antonio Leone (Advisor, CNR)

A1. Satellite Ground Segment - Antennas

MAPSAT
we see the world for you



X band
GSaaS

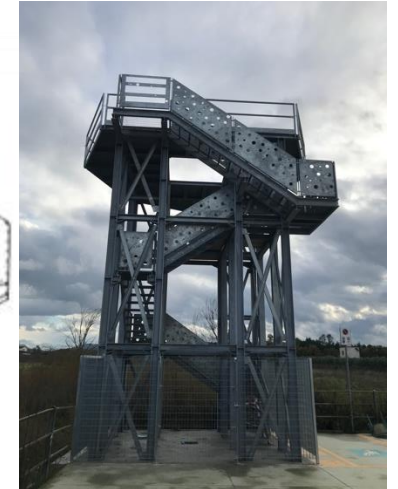
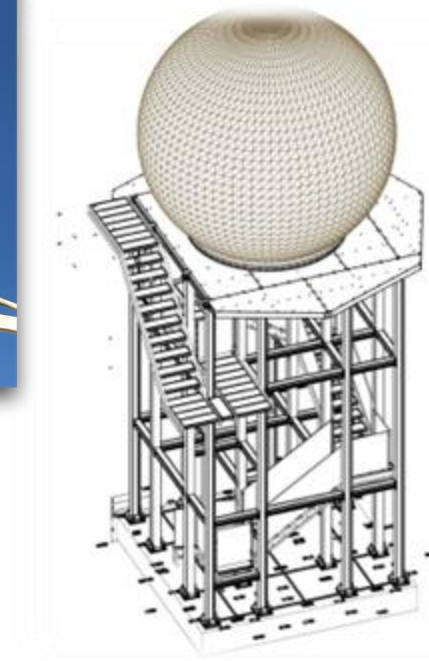
LOCKHEED MARTIN

Tyvak
A Terran Orbital Corporation

TERRAN ORBITAL

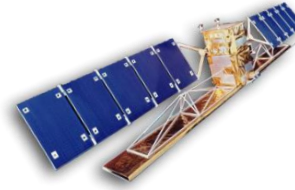
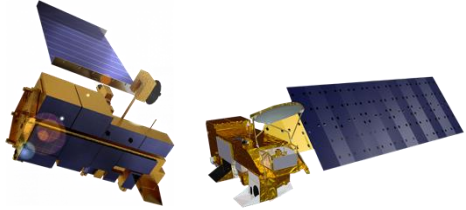


UHF band
Hosting



S/X bands
Housing

A1: Satellite Ground Segment - history (X band)



- OptSat-3000 launch
- From in-house to private company
- It isn't a Satellite owner



Market ask for:

- More near real-time services
- Increasing time resolution
- Increasing data volume downlink
- Reducing Network Ground Segment costs

Terra & Aqua
2004

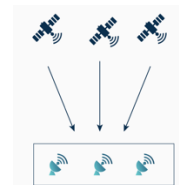
EROS-A
2005

Radarsat-1
2006

EROS-B
2009

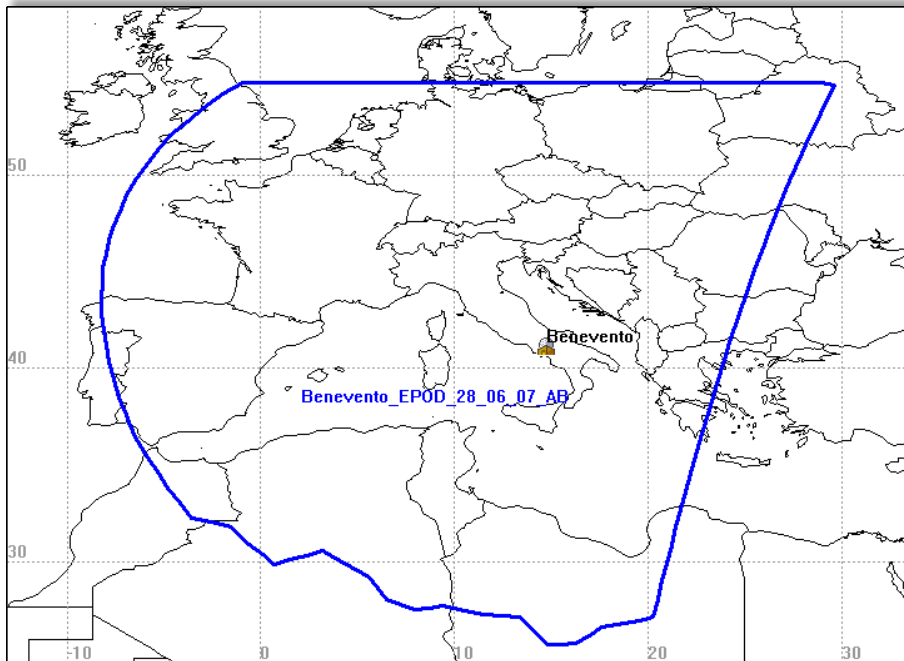
X band data downlink

MPS



GSaaS

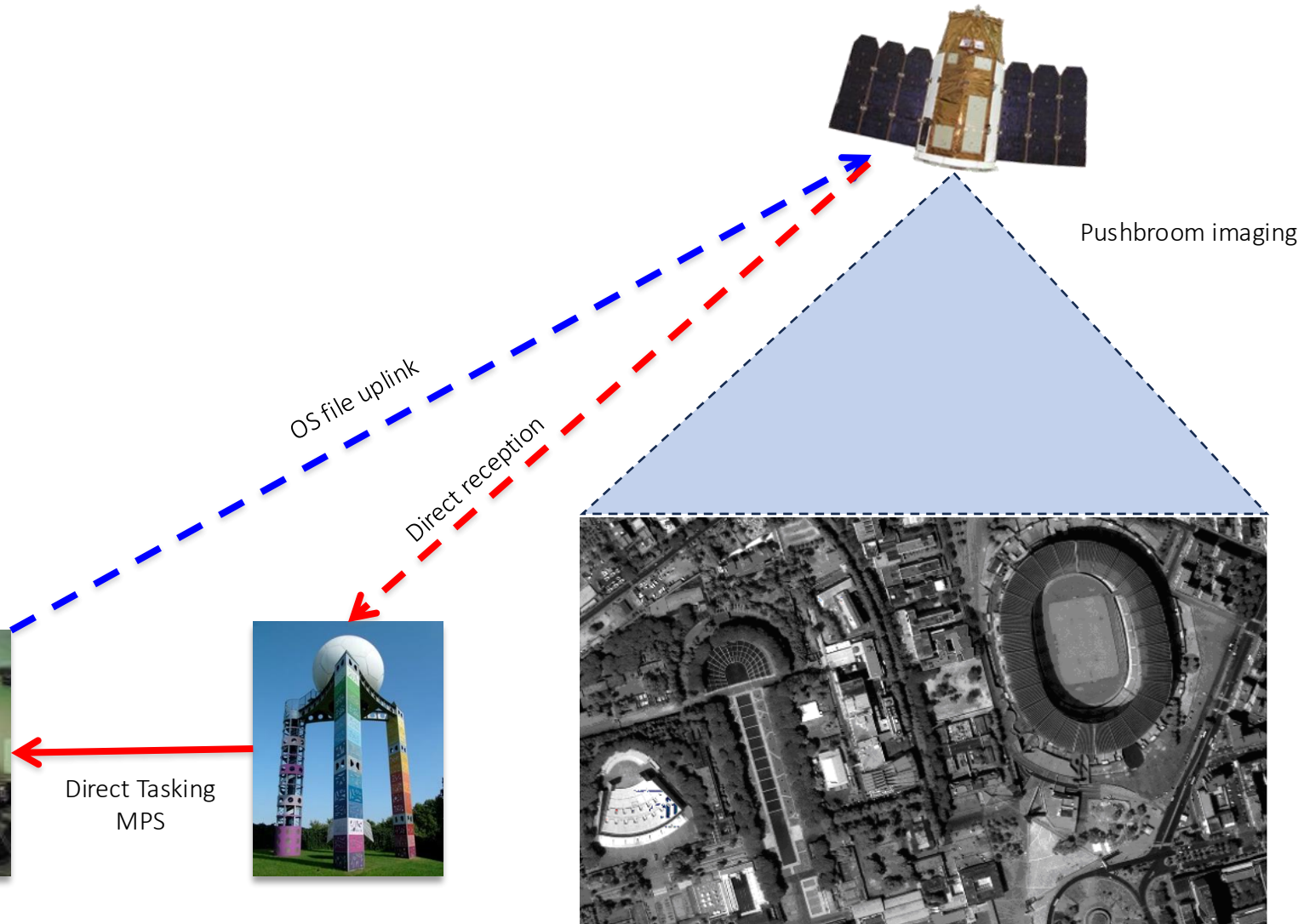
A1: Satellite Ground Segment - EPOD Program



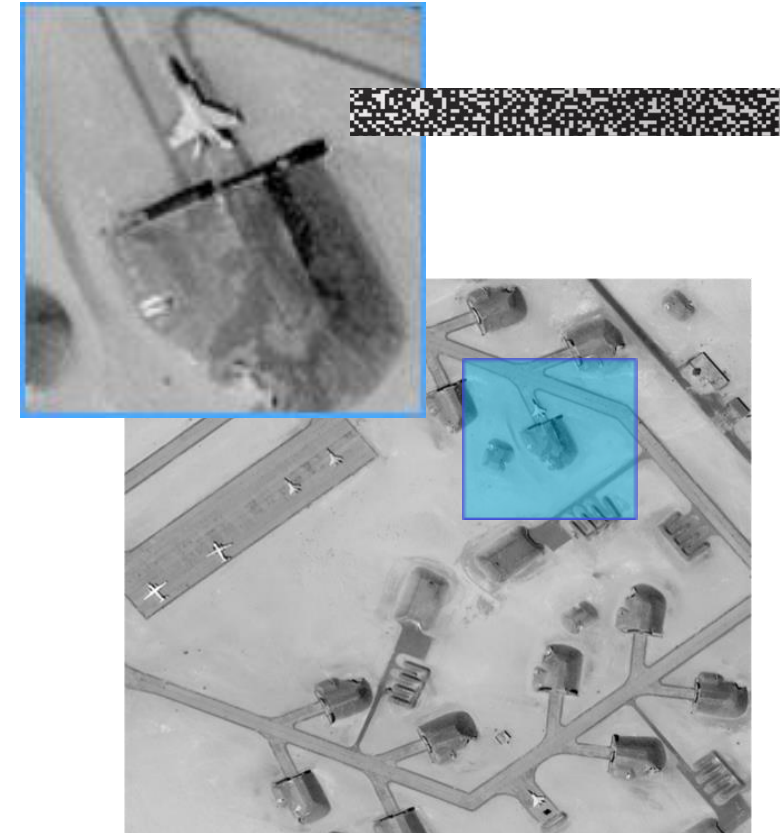
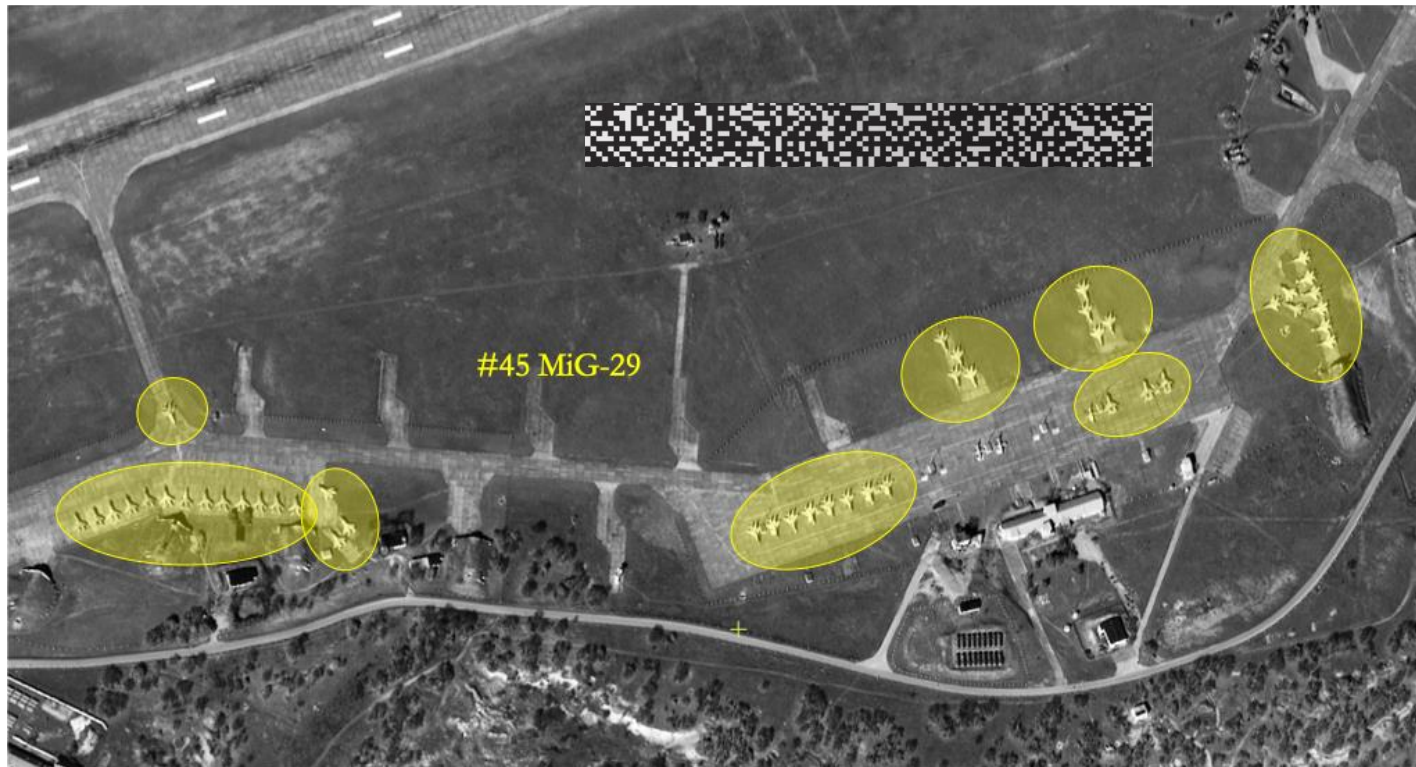
Exclusivity: exclusive control over all images acquired on *selected orbit*

Autonomy: full and independent control to use satellite *camera*

Flexibility: select *imaging parameter* (type of images, imaging resolution, scanning angle, time of integration)



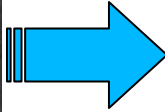
A1: Satellite Ground Segment - NRT Imagery Service



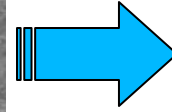
A2: RS data processing – Levels L0, L1, L2



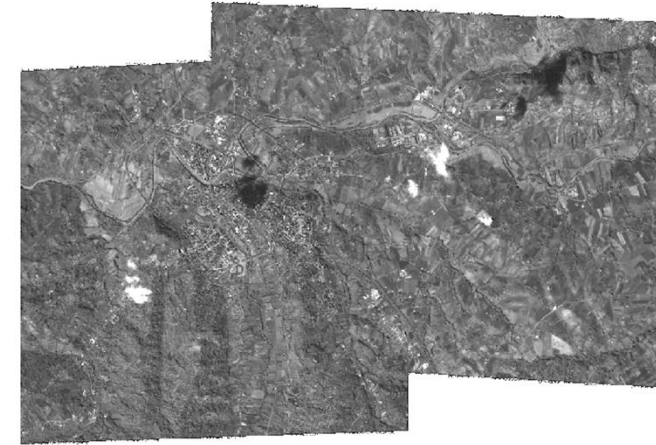
Level 0A



Level 1A



Level 1B



Mosaic

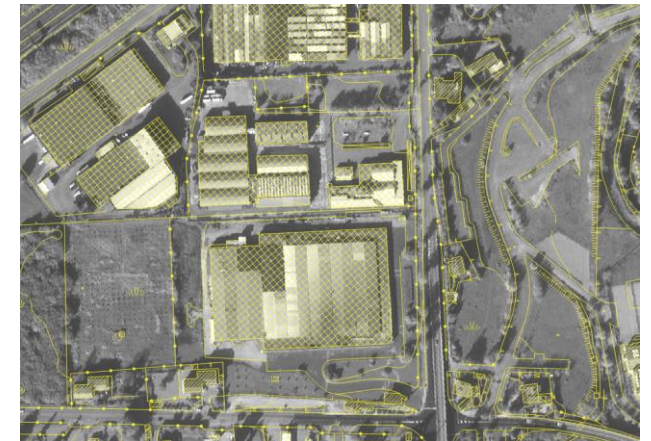
Sentinel-2, 2017
AtmCor



Kompsat-3A, 2023
Corrected & Pansharpened, Agriculture



EROS-B, 2014
ortho-rectification



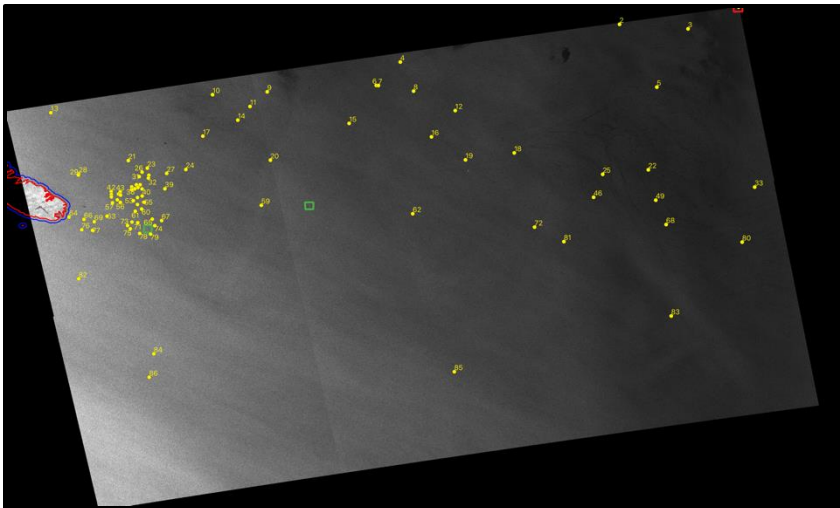
A2: RS data processing - Maritime Awareness System



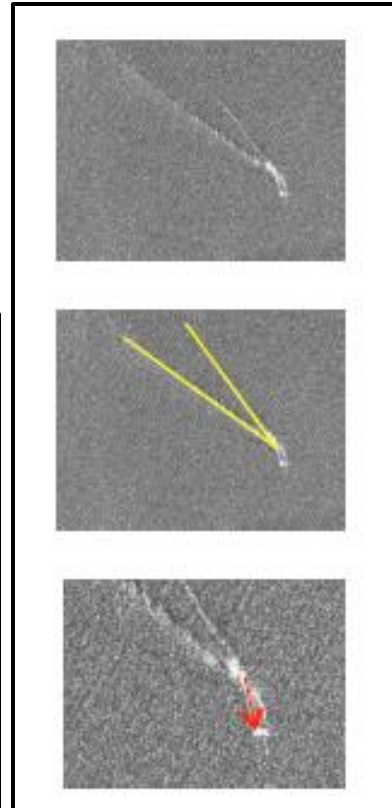
European Space Agency

OSIRIS R&D Project
MapSat, CNR, SisTer

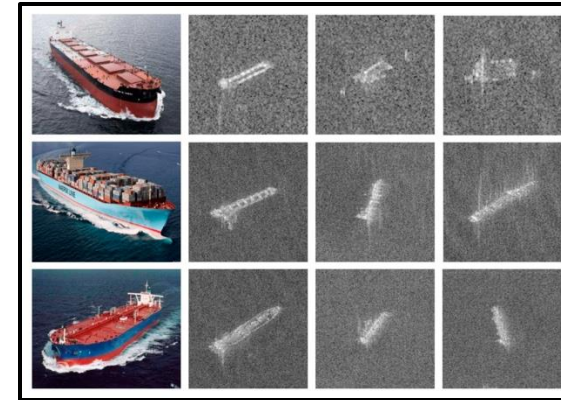
SD



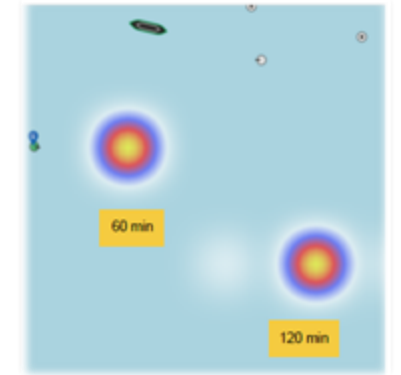
AIS Data Fusion
-Not cooperative vessels



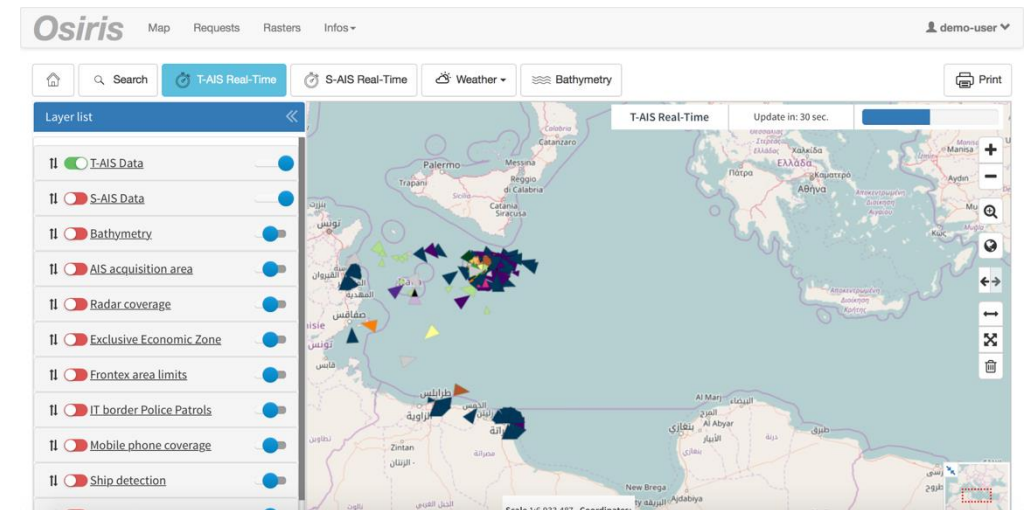
SK



SC



SRP



webGIS

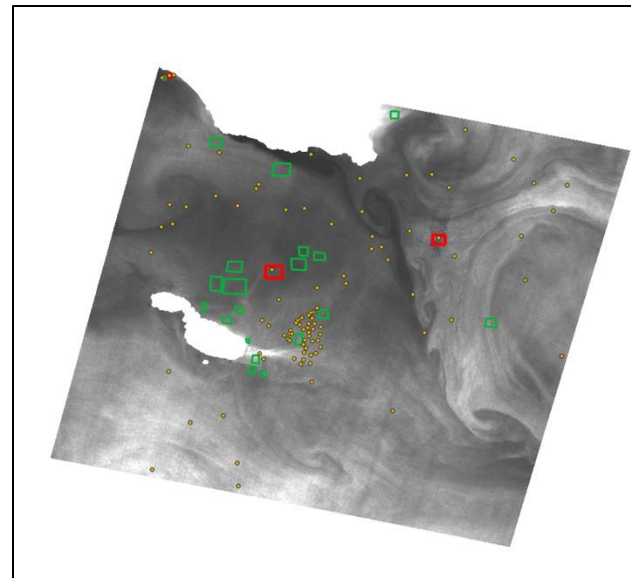
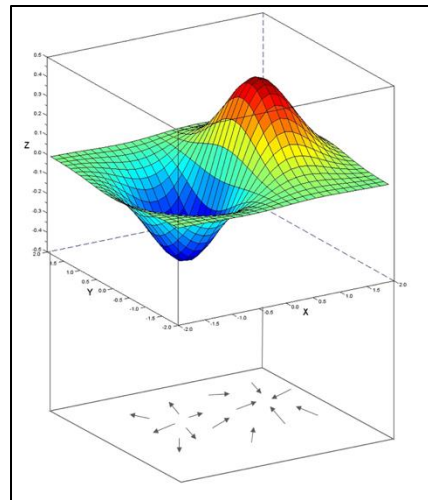
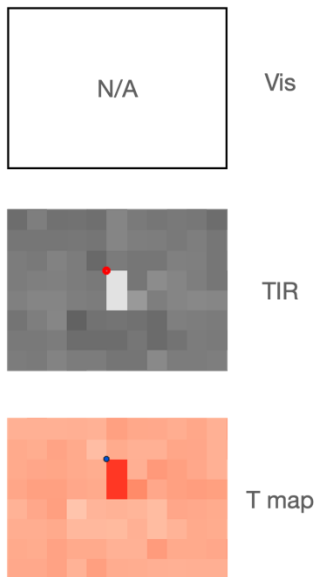
A2: RS data processing - Maritime Awareness System



OSIRIS Follow-On R&D Project

MapSat, CNR, SisTer

- exploring new data/bands
- New algorithms for kinematic



TIR - diurnal



TIR nocturnal

A2: RS data processing - Maritime Awareness System



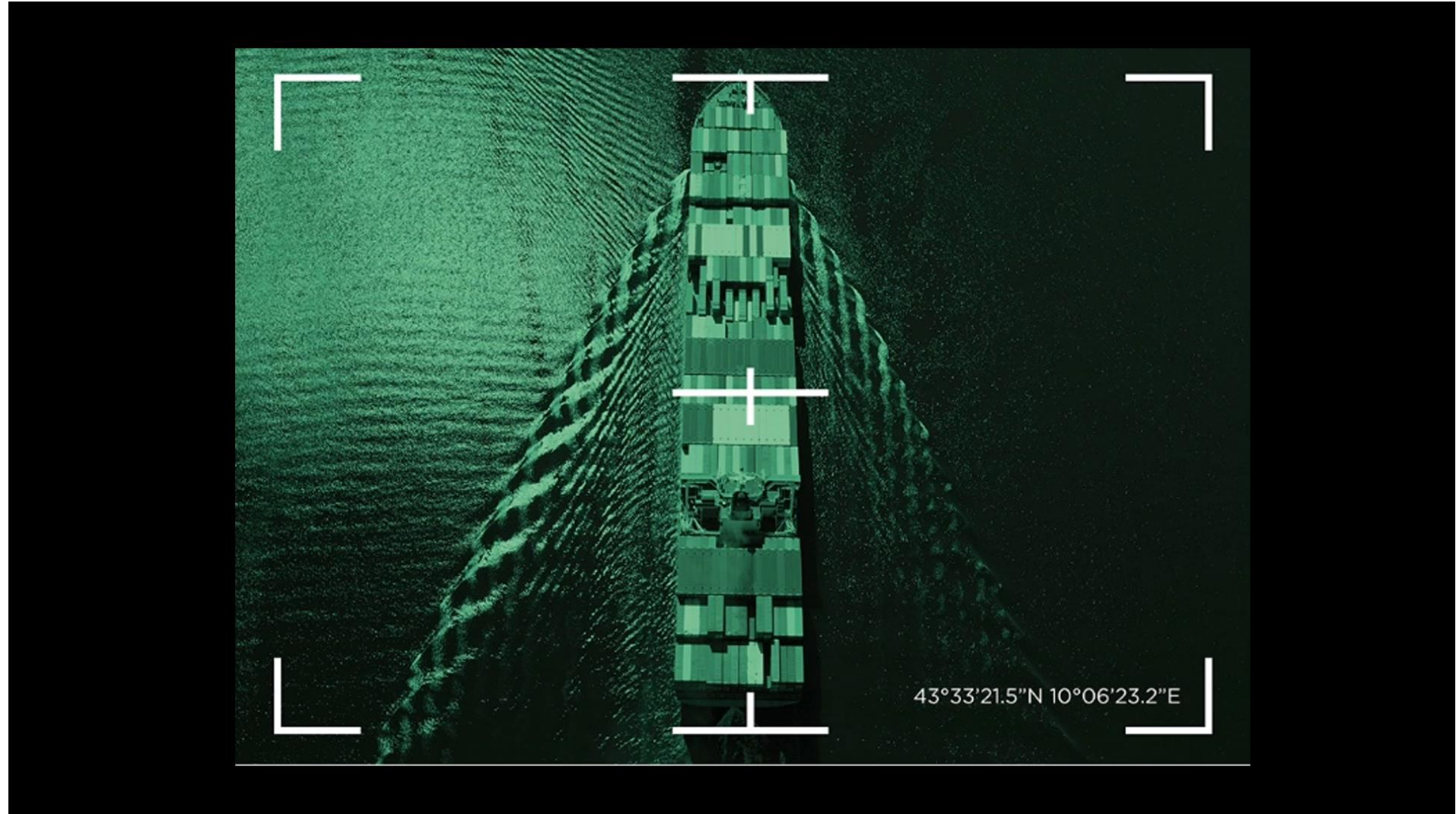
PARSIFAL R&T Project
SMD - Accordi bilaterali Italia-Israele

e-geos
AN AST/TELESPAZIO COMPANY



mapsat
we see the world for you

SAR-Opt synchronization



A2: RS data processing - Maritime Awareness System



PARSIFAL R&T Project

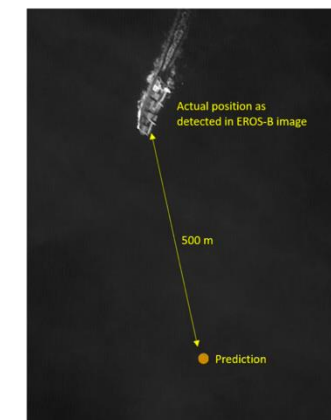
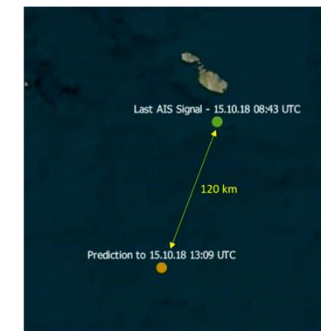
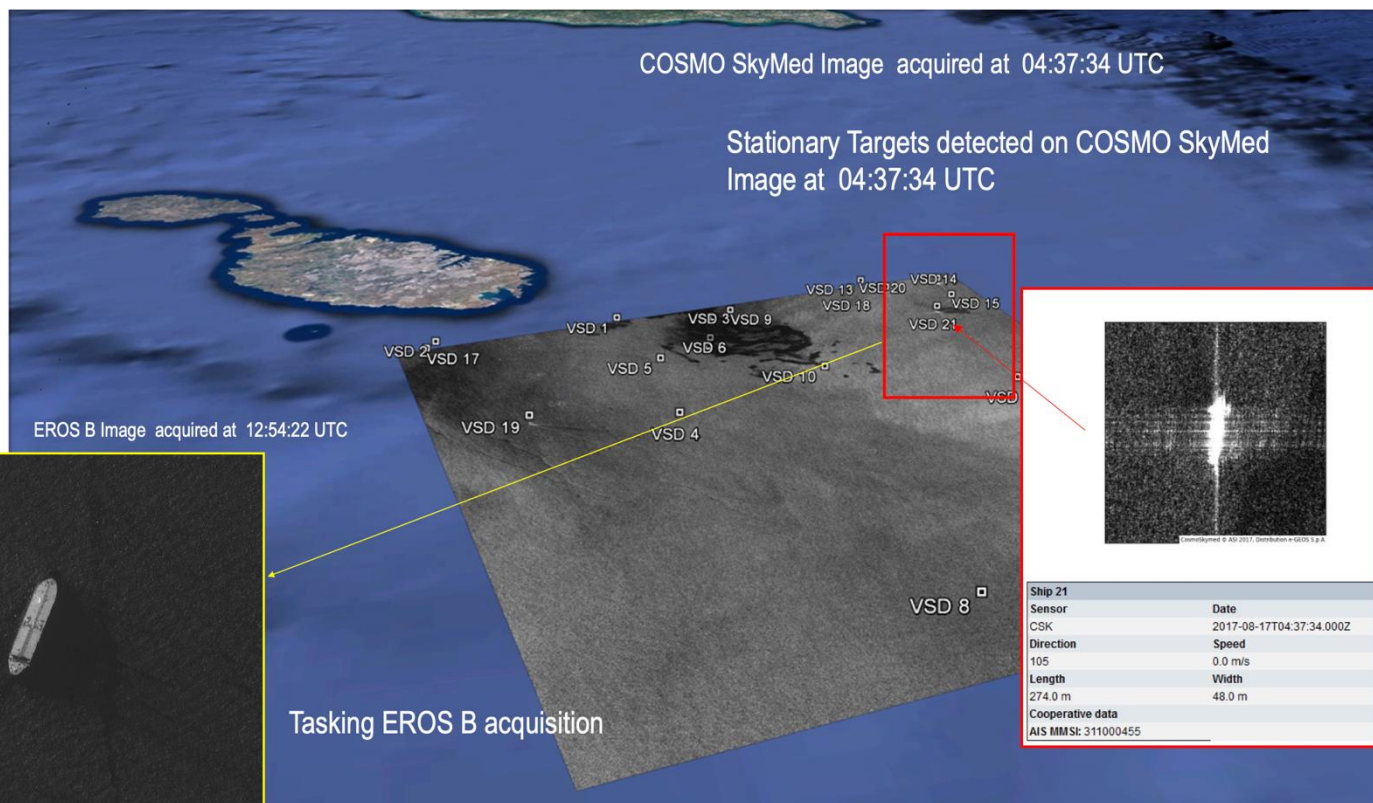
SMD - Accordi bilaterali Italia-Israele

e-geos
AN AST/TELESPAZIO COMPANY

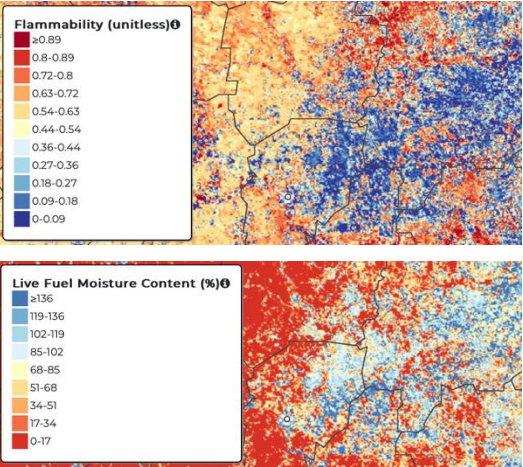


mapsat
we see the world for you

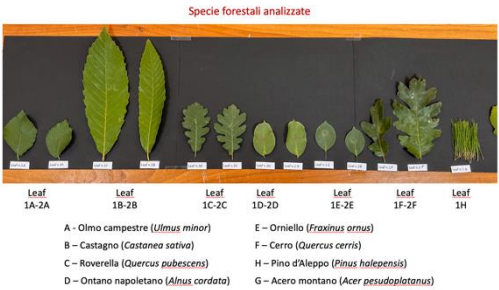
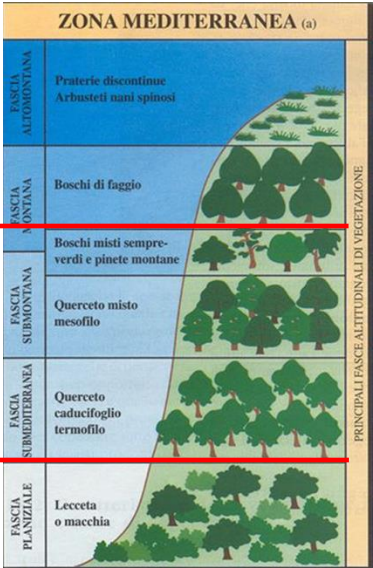
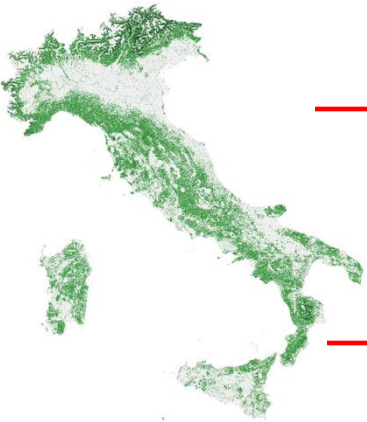
SAR-Opt synchronization



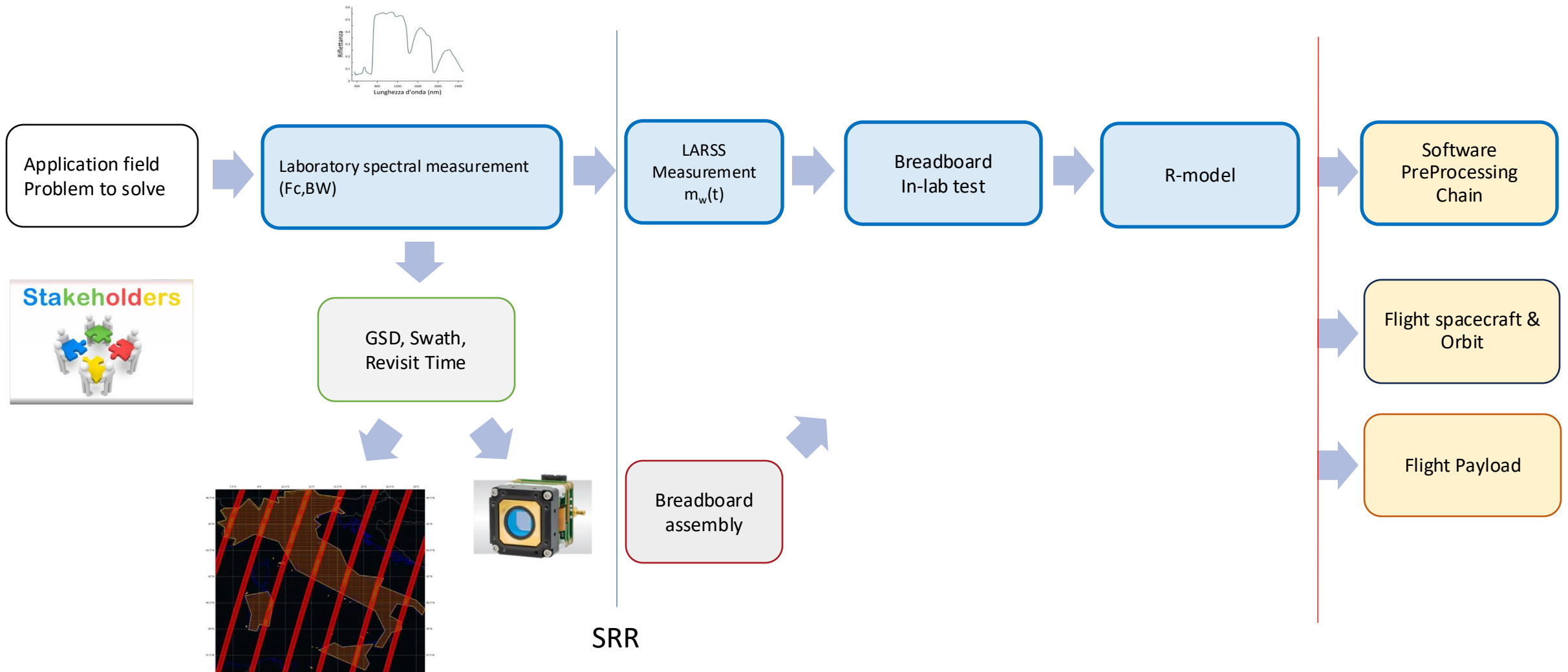
A3: R&D for New Satellite Missions – EFESTO



System	Output Data (index)	Status	Sat/Payload	SWIR Bands	GSD (m)	Revisit Time (d)
AFMS Australian Flammability Monitoring System	FI LPMC	Active	Terra-Aqua/MODIS	3	500	8
AFMS Australian Flammability Monitoring System	LPMC	Active	Sentinel-2/MSI	2	20	8
AFMS Australian Flammability Monitoring System	FI	Phase A	TBD / OzFuel Pathfinder	4	50-60	21
AFMS Australian Flammability Monitoring System	FI	TBD	TBD / OzFuel Full Op	>4	20-30	6-8
EFESTO	FI LPMC +	Payload breadboarding	TBD	6	50-70 (TBC)	7-14 (TBC)

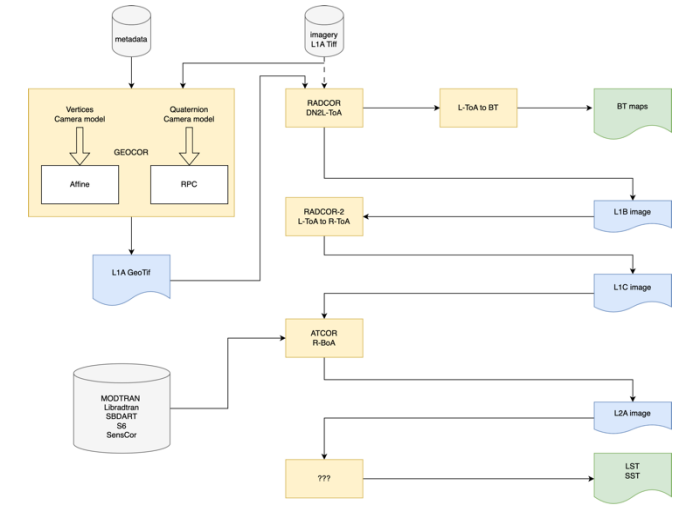
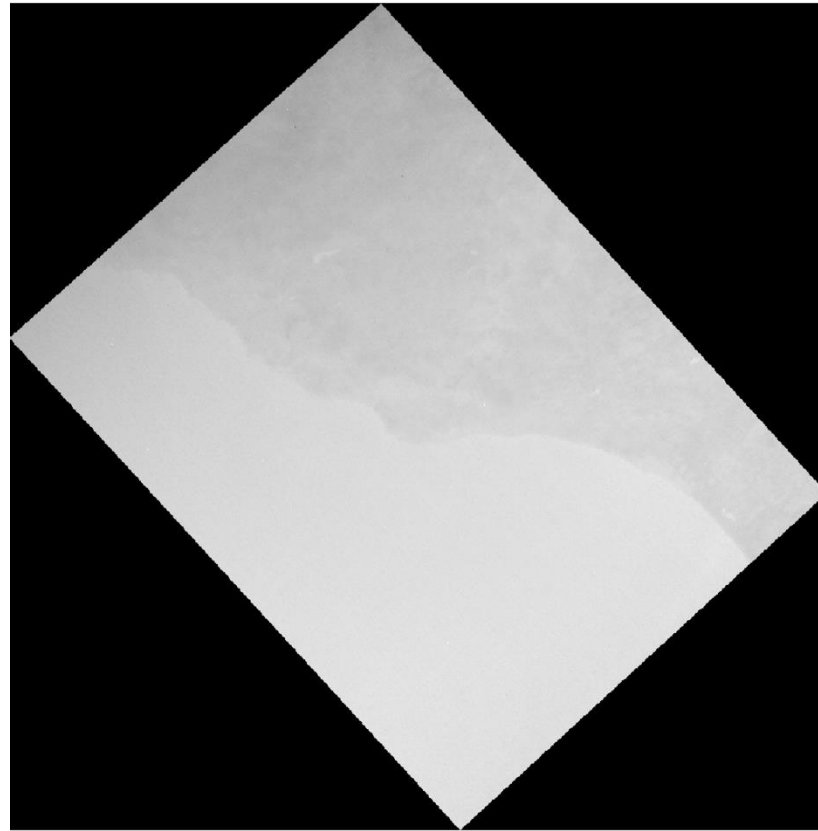


A3: R&D for New Satellite Missions – EFESTO



A3: R&D for New Satellite Missions – CEO

Sensor type: TIR
Sensore name: CIRC
Alos-2 / ISS-CALET (JAXA)



A3: Signal Processing Algorithms – Space It Up (Spok-2)



Literature survey and state-of-art study on methods and algorithms for **semantic segmentation** and **real-time object detection** in EO satellite imagery.

Digital Signal Processing

1. Ground Truth
2. Image Classification using Spectral indices to assign labels to pixels
3. Object Detection find object with bounding boxes or polygons
4. Image Segmentation

WP	TASK	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
WP 2.1 - Spoke management, dissemination and exploitation	2.1.1						M/D						M/D												M/D						M/D
	2.1.2						M/D						M/D												M/D						M/D
	2.1.3						M/D						M/D												M/D						M/D
	2.1.4						M/D						M/D												M/D						M/D
	2.1.5										M/D										M/D										M/D
WP 2.2 - Model-based concurrent engineering mission and systems design and analysis	2.2.1												M/D																		
	2.2.2																								M/D						
	2.2.3																														M/D
WP 2.3 - Additive manufacturing and smart production	2.3.1																		M/D												
	2.3.2																														M/D
WP 2.4 - Virtual reality for design, production, testing	2.4.1												M/D																		
	2.4.2																								M/D						
	2.4.3																								M/D						
	2.4.4																														M/D
WP 2.5 - Digital twins and artificial intelligence tools for EO missions and for the development of ETH	2.5.1																								M/D						
	2.5.2																														M/D
	2.5.3																			M/D											
WP 2.6 - Equipment and external services for system engineering and digital twin	2.6.1												M/D												M/D						M/D
	2.6.2												M/D												M/D						M/D
	2.6.3												M/D												M/D						M/D
	2.6.4												M/D												M/D						M/D

R&D Guest Editors



*remote sensing*

an Open Access Journal by MDPI

IMPACT
FACTOR
5.349

CITESCORE
7.4

Remote Sensing for Maritime Monitoring
and Vessel Identification

Guest Editors
Dr. Emanuele Salerno, Dr. Claudio Di Paola, Dr. Angelica Lo Duca

Deadline
30 April 2023

Special Issue
Invitation to submit

mdpi.com/si/128488

Titolo	Autore
 A Fine-Grained Ship-Radiated Noise Recognition System Using Deep Hybrid Neural Networks with Multi-Scale Features	Liu et al.
 A Novel Deep Learning Network with Deformable Convolution and Attention Mechanisms for Complex Scenes Ship Detection in SAR Images	Chen et al.
 Building a Practical Multi-Sensor Platform for Monitoring Vessel Activity near Marine Protected Areas: Case Studies from Urban and Remote Locations	Cope et al.
 Evolution of Maritime GNSS and RNSS Performance Standards	Zalewski et al.
 Marine Environmental Impact on CFAR Ship Detection as Measured by Wave Age in SAR Images	Bezerra et al.
 Maritime Infrared Target Detection Using a Dual-Mode Background Model	Zhou et al.
 Optical Remote Sensing Ship Recognition and Classification Based on Improved YOLOv5	Jian et al.
 Ship Classification in SAR Imagery by Shallow CNN Pre-Trained on Task-Specific Dataset with Feature Refinement	Lang et al.
 The Big Picture: An Improved Method for Mapping Shipping Activities	Troupiotis-Kapeliaris et al.
 Visual Detection and Association Tracking of Dim Small Ship Targets from Optical Image Sequences of Geostationary Satellite Using Multispectral Radiation Characteristics	Meng et al.

Question Time

Thank you
Claudio Di Paola

