

EMSA Space for Arctic workshop

Space for Climate and Environmental Challenges Panel

Unit 2.2 Surveillance

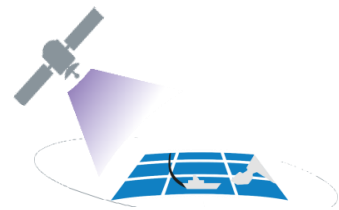
Earth Observation Services

Tromsø, Norway / 2 July 2024



EMSA EO services

EMSA User communities



CleanSeaNet



Maritime Surveillance



Border control



Emergencies - Coast Guard Cooperation

SATELITE MISSIONS



SAR

SENTINEL-1A
PAZ 1
TERRASAR-X
TANDEM-X
RADARSAT-2
ICEYE



OPTICAL

GEOEYE-1
PLEIADES 1A and 1B
WORLDVIEW-1, 2 and 3
SPOT 6
SENTINEL-2

SERVICE PROVIDERS



SAR

KSAT
CLS
EGEOS
EDISOFT



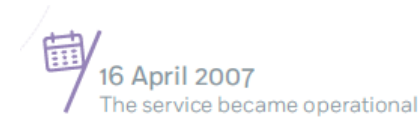
OPTICAL

AIRBUS/EUSI
KSAT
EDISOFT

EO DATA CENTRE



DELIVERY TO USERS VIA:
WEB PORTAL
MOBILE APP
SYSTEM TO SYSTEM
ALERTS AND NOTIFICATIONS



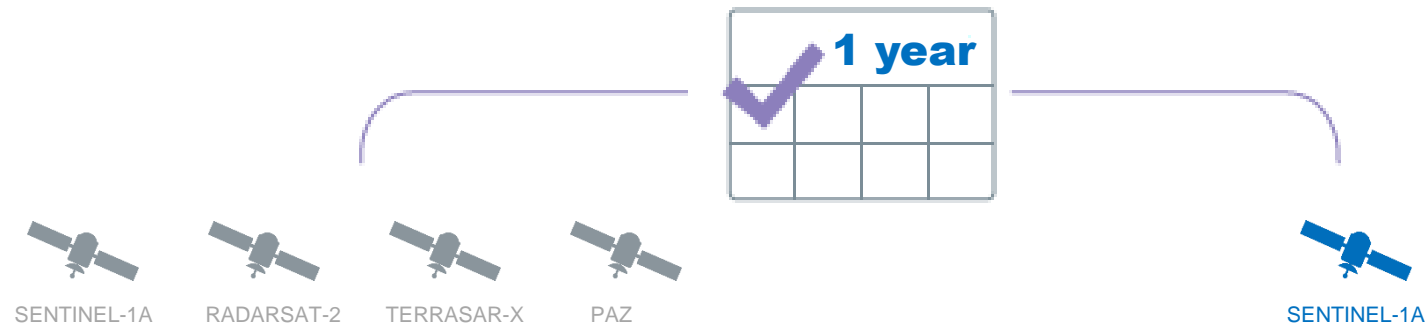
CleanSeaNet is the European satellite-based oil spill monitoring and vessel detection service. It analyses images, mainly from synthetic aperture radar (SAR) but also from optical missions, to:

- detect possible oil on the sea surface, including illegal discharges of mineral oil
- identify potential polluters, and
- monitor the spread of oil during maritime emergencies.

The service was developed and is operated by EMSA, and is available to all EU member states, EFTA/EEA member states, candidate countries and ENP participating countries



Activities Covering

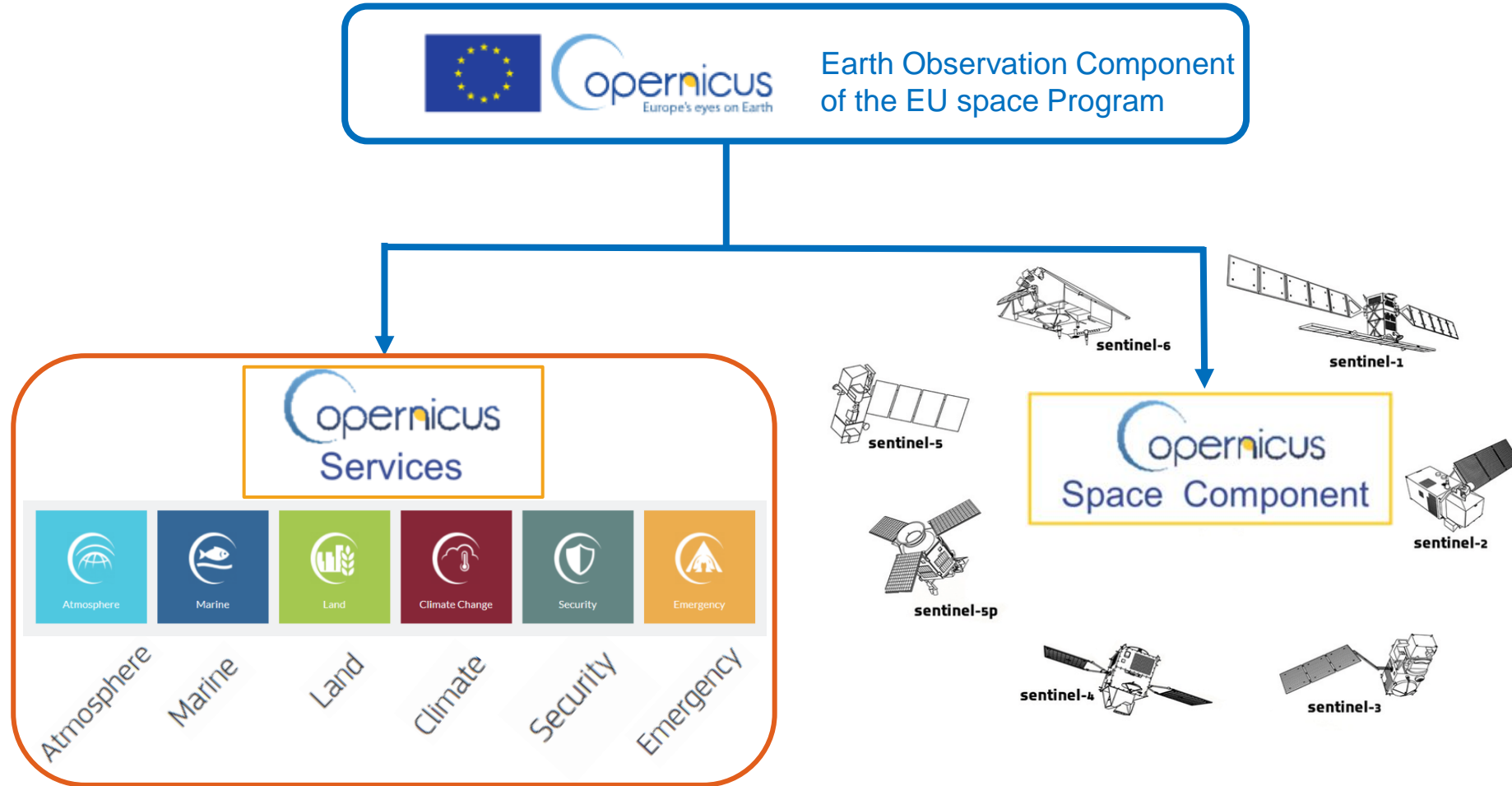


1183 MILLION KM² MONITORED IN QRT/NRT
7067 SAR IMAGES
7513 POSSIBLE OIL SPILLS DETECTED
(APPROX. 6 SPILLS PER MILLION KM² MONITORED)

997 MILLION KM² MONITORED IN QRT/NRT (84% OF OVERALL MONITORED AREA)
4528 SENTINEL-1A IMAGES (64% OF OVERALL CSN IMAGES)
99% OF DELIVERY RELIABILITY FOR SENTINEL-1A IMAGES

(1) 36 coastal states : 22 coastal European Union (EU) , 2 European Free Trade Association (EFTA), 2 candidate countries, 10 countries in the context of the European Neighbourhood Policy (ENP) SAFEMED and BCSEA projects

What is Copernicus?



Copernicus Services

All services are free of charge to the users

- Land Monitoring
- Marine Environment Monitoring
- Atmosphere Monitoring
- Emergency Management
- Climate Change

Full and open access

data accessible to all;
mostly available
online

- Security
 - Border Surveillance
 - Support to External and Security Actions (SESA)



Restricted access

specific conditions;
delivered directly and
securely to user

Maritime Surveillance

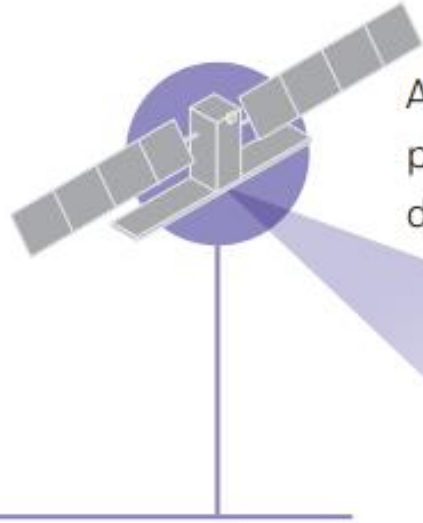


Key facts about CMS

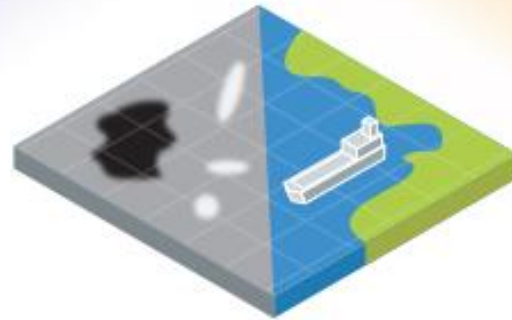
- Global coverage
- 74 registered organisations
- Access to a wider range of SAR and optical missions
- 344 million km² monitored*
- 6713 image products delivered*
- 20 minutes after satellite acquisition information is delivered to the CMS users via secured web interface



* Statistics for year 2023



A comprehensive maritime picture assisting the end-user's decision-making in everyday operations.



EO images and value-added products in quasi-real time to support the end-user's maritime operations by monitoring human activity at sea.

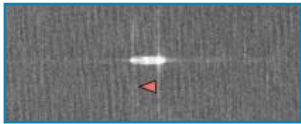
Radar (SAR) Satellites

- Access to 5 satellite missions
- Resolution: $\leq 1\text{m}$ - $\leq 100\text{m}$
- Not affected by weather and cloud cover
- Reflective objects (vessels, installations) are visible as bright spots
- Oil spills and low wind areas appear as dark patches

Optical Satellites

- Access to 4 satellite missions
- Resolution: 30cm to 1.5m
- Easy image interpretation and object identification due to true colour images
- Affected by cloud coverage
- Dependent on sunlight

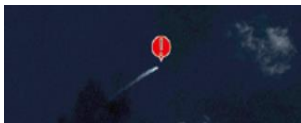
Value-added products



Vessel detection



Feature detection



Activity detection



Oil spill detection



Change detection



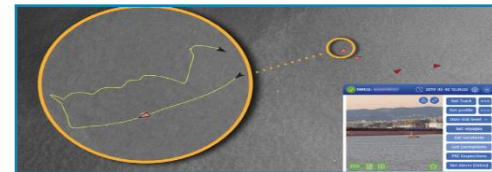
Wind and wave

Fusion products

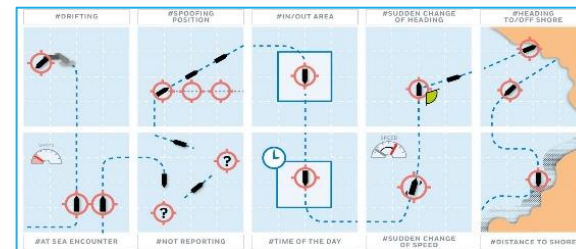
Oil spill notifications



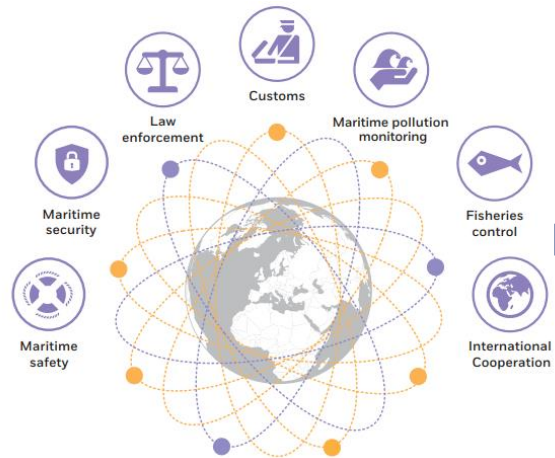
Correlation with vessel reporting information



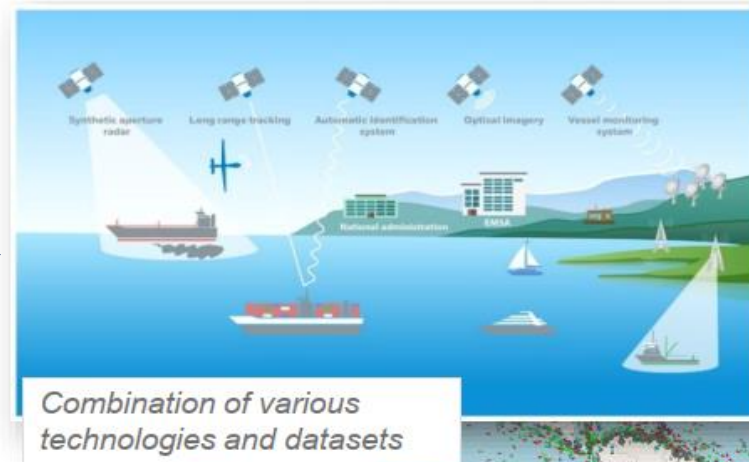
Automated Behaviour Monitoring



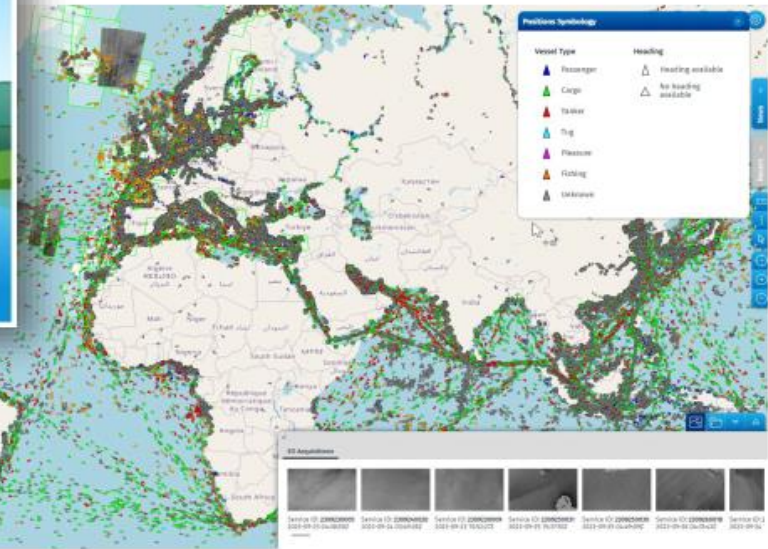
EU Integrated Maritime Policy



Copernicus Maritime Surveillance



Combination of various technologies and datasets



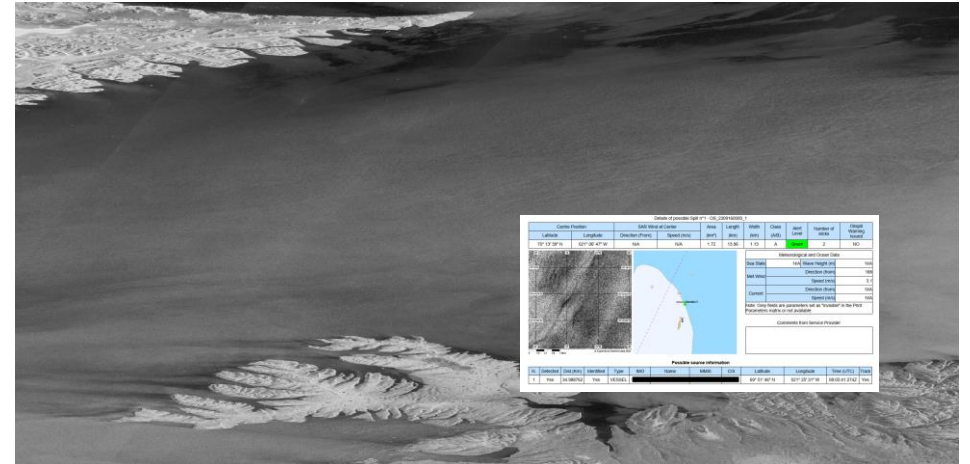
Coast guards and border guards, customs authorities, naval forces, pollution response centres, rescue coordination centres and vessel traffic management services — all need global, detailed, reliable information to perform their maritime surveillance duties effectively.

EU Arctic Policy

In the Arctic, CMS significantly contributes to the protection and preservation of the environment, a key pillar of the EU's Arctic policy, with support being provided to Danish authorities with dedicated monitoring over Greenland waters. The area monitored in the Arctic is over 2 million square kilometres in total and has coastline that is more than 44 thousand kilometres long. The ecosystem in the region is extremely vulnerable to pollution with significant environmental risks in what concerns impacts to the marine environment.

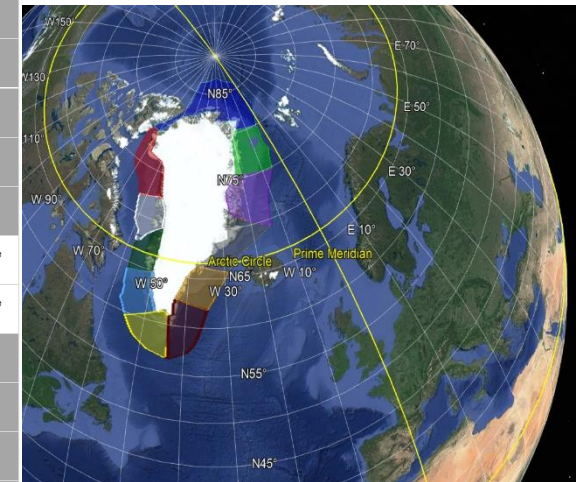
Moreover, it is important to note that Greenland – and the Arctic as a whole – is experiencing increased ship traffic. This presents challenges for safety of navigation and search and rescue activities.

CMS bring significant value to operations, optimize surveillance efforts and leverage EU's commitment for a peaceful, sustainable, and prosperous Arctic.



European Maritime Safety Agency, contains modified Copernicus Sentinel-1 data, (2023)

	GRL NW	GRL MW2	GRL MW1	GRL ME	GRL NE2	GRL NE	GRL N
January			Maritime Safety Marine Pollution				
February			Maritime Safety Marine Pollution	Maritime Safety			
March			Maritime Safety Marine Pollution	Maritime Safety			
April			Maritime Safety Marine Pollution	Maritime Safety			
May		Maritime Safety Marine Pollution	Maritime Safety Marine Pollution	Maritime Safety Marine Pollution			
June	Maritime Safety Marine Pollution	Maritime Safety Marine Pollution	Maritime Safety Marine Pollution	Maritime Safety Marine Pollution	Maritime Safety Marine Pollution		
July	Maritime Safety Marine Pollution	Maritime Safety Marine Pollution	Maritime Safety Marine Pollution	Maritime Safety Marine Pollution	Maritime Safety Marine Pollution	Maritime Safety	Maritime Safety
August	Maritime Safety Marine Pollution	Maritime Safety Marine Pollution	Maritime Safety Marine Pollution	Maritime Safety Marine Pollution	Maritime Safety Marine Pollution	Maritime Safety	Maritime Safety
September	Maritime Safety Marine Pollution	Maritime Safety Marine Pollution	Maritime Safety Marine Pollution	Maritime Safety Marine Pollution	Maritime Safety Marine Pollution		
October	Maritime Safety Marine Pollution	Maritime Safety Marine Pollution	Maritime Safety Marine Pollution	Maritime Safety Marine Pollution	Maritime Safety		
November		Maritime Safety Marine Pollution	Maritime Safety Marine Pollution	Maritime Safety Marine Pollution			
December		Maritime Safety	Maritime Safety Marine Pollution	Maritime Safety			



Timeline Plan

Public Procurement :

- Awarded to the service provider KSAT Q4 2023
- FWC Contract signed in Q1 2024

Deployment into operations

- 1st June 2024



Copernicus Sentinel-2B over Red Sea oil spill
@ Copernicus Sentinel data 2019



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