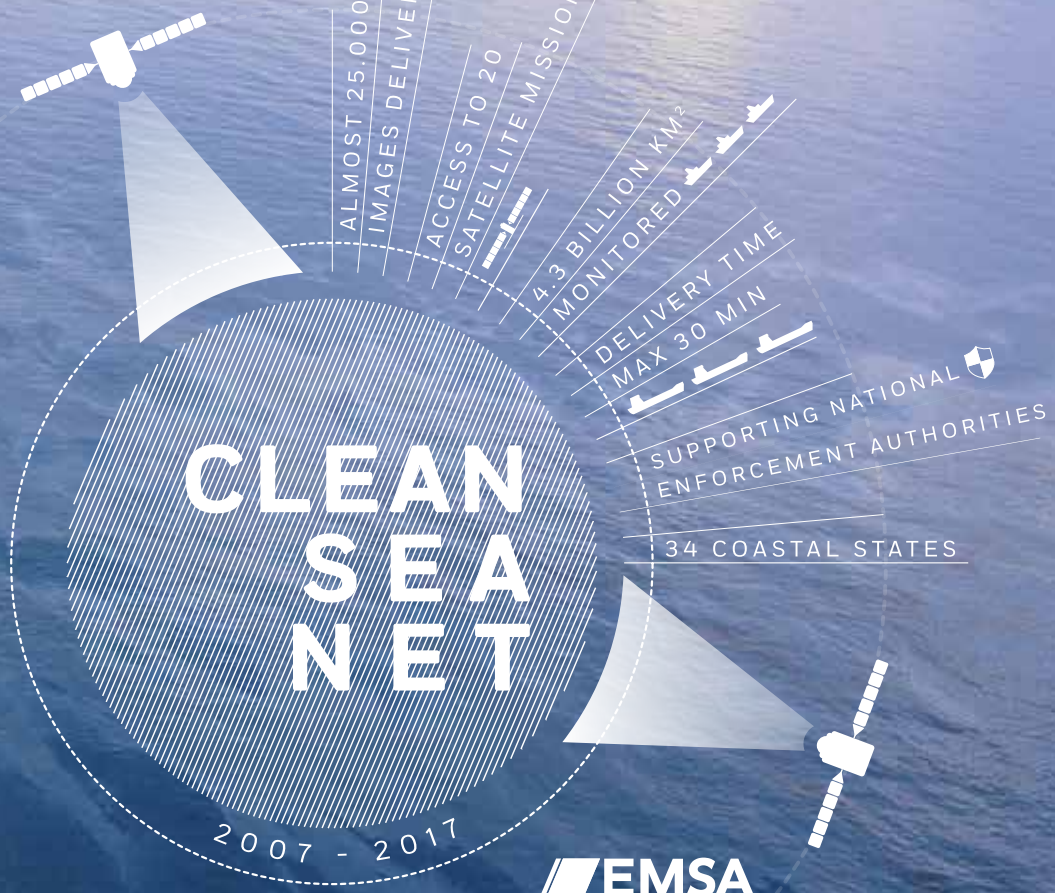
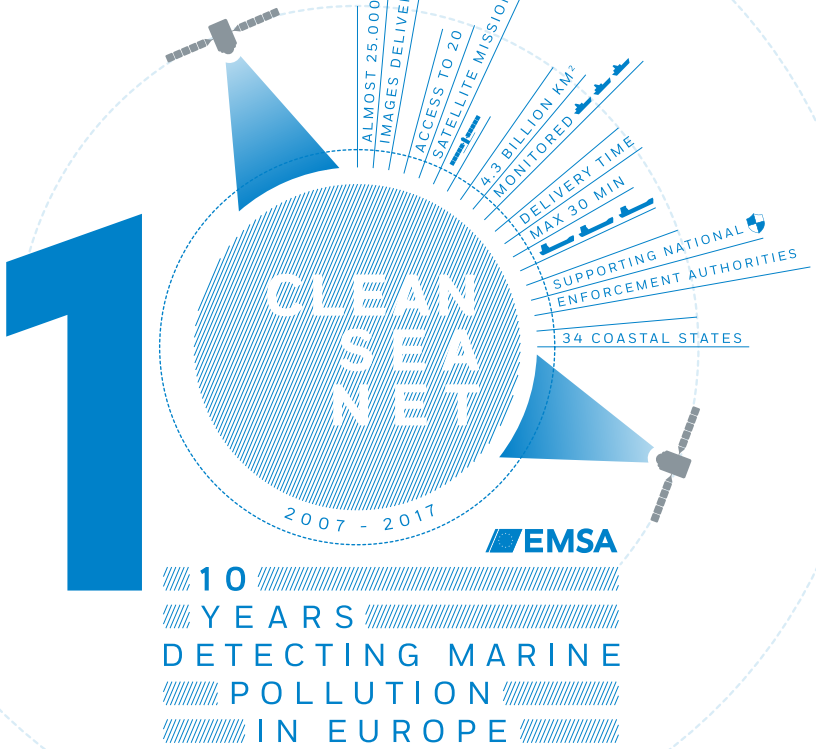
European Maritime Safety Agency

CELEBRATING THE CLEANSEANET SERVICE

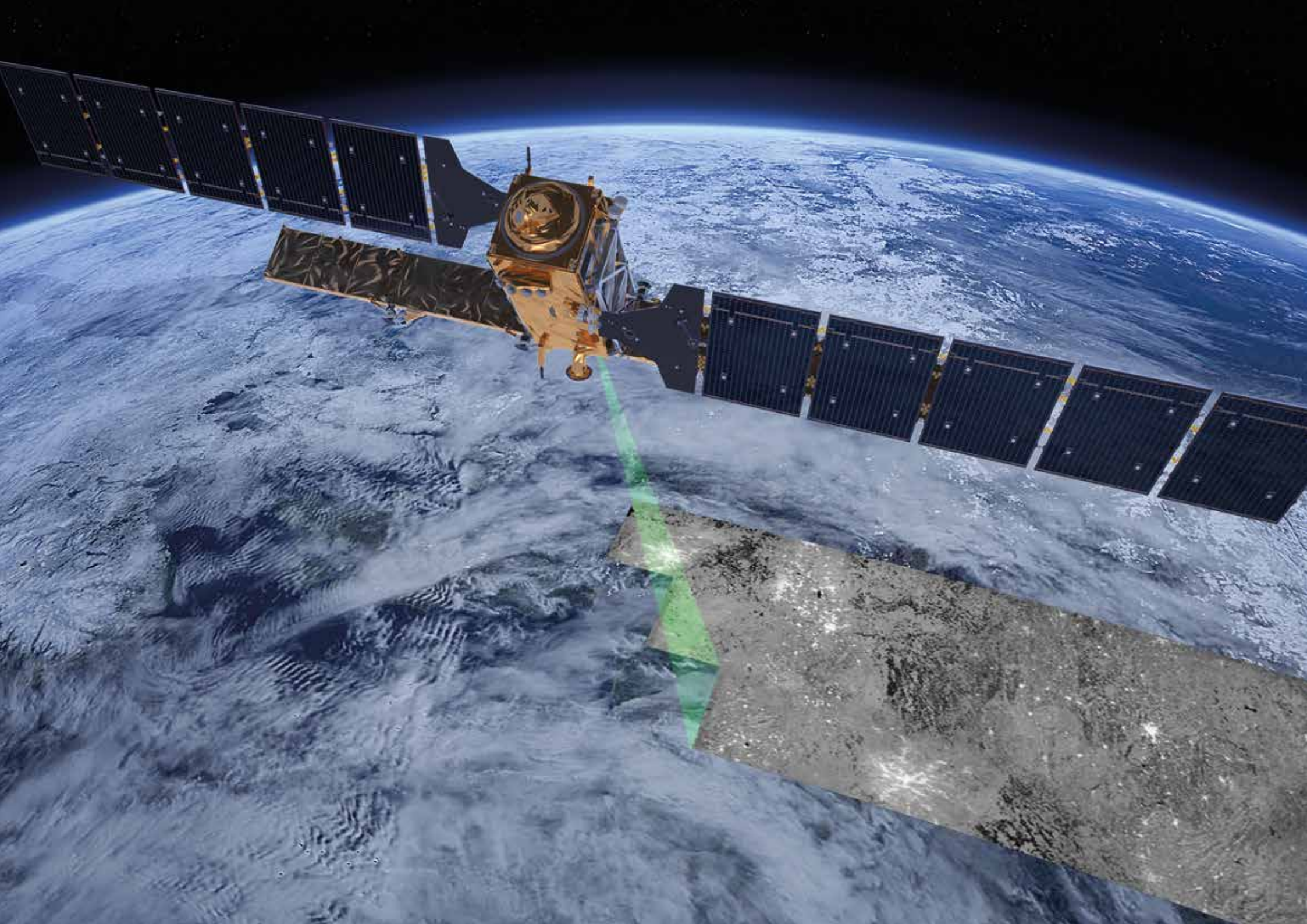
A TEN YEAR ANNIVERSARY PUBLICATION



10 YEARS DETECTING MARINE POLLUTION IN EUROPE



CONTENTS



FOREWORD

Over the past decade, almost 25,000 images have been delivered by the CleanSeaNet service, providing coverage of 4,300 million km² of sea surface. The number of possible spills detected in European waters has dropped by half during this period, from an average of 11 possible spills per km² monitored in 2007 to five possible spills per km² monitored in 2017. In this period, CleanSeaNet also supported European coastal States in responding to 31 large accidental spills and oil related emergencies. Technical developments over the last ten years and the phasing in of a wide range of satellite missions have contributed to the accuracy of the service, improving value adding services.

Since the very beginning, the CleanSeaNet service has also had the explicit purpose of providing support during accidental large-scale pollution events. EMSA was founded following the Erika spill in 1999, and the Agency's pollution prevention and response tasks were extended further following the accident of the Prestige and resulting pollution in 2002. Fortunately there have not been any pollution incidents in Europe of such a large scale since, but the CleanSeaNet service has been activated regularly (31 times) to monitor the occurrence and evolution of unexpected incidents, and is always ready to respond when needed.

Significant progress has been made by coastal States in addressing illegal discharges of oil (and other substances) in the marine environment over the past decade. The enforcement process involves a number of stages - from monitoring the marine environment, to vessel inspections, and administrative and judicial enforcement procedures - and CleanSeaNet is one valuable element of the overall chain in place to detect and combat marine pollution. CleanSeaNet has so far proven to be an important resource for monitoring maritime areas, providing detections that allow for prompt follow-up actions.

Likewise, national authorities have been working hard to put in place effective pollution response plans. CleanSeaNet is their main resource for obtaining satellite images. EMSA is pleased to have been a part of the significant developments which have occurred over the past decade, and is willing to contribute to further improvements in the years to come, improving the marine environment for all.

Markku Mylly, Executive Director

10 KEY FACTS
ABOUT THE CLEANSEANET SERVICE

16 APRIL **2007**

THE SERVICE BECAME OPERATIONAL

24,571 **IMAGES**

DELIVERED

23,319 **POSSIBLE SPILLS**

DETECTED

4,300 **MILLION KM²**

MONITORED

MORE THAN

3,000 **IMAGES PER YEAR**

DELIVERED IN

34 **STATES**

CleanSeaNet is the European satellite-based Oil Spill Monitoring and Vessel Detection service. The service analyses images, mainly from SAR but also from optical missions, to detect possible oil spills on the sea surface, and identify potential polluters. The service was launched ten years ago in April 2007 and supports Member States' actions to combat deliberate or accidental pollution in the marine environment. EMSA developed and operates the CleanSeaNet service.

SCENE SIZE

UP TO **400 X 1,600 KM**

FOR MONITORING OF LARGE SEA AREAS

STANDARD IMAGE TAKES

LESS THAN **30 MIN**

TO BE ACQUIRED, PROCESSED, ANALYSED AND DELIVERED

ACCESS TO DATA FROM

20 DIFFERENT **SATELLITES**

12 OPTICAL
8 SAR

NUMBER OF

POTENTIAL SPILLS DETECTED PER 1,000 KM^2 HAS HALVED

FROM AN AVERAGE OF 11 TO AN AVERAGE OF 5

SUPPORTING EU STATES IN RESPONDING TO

31 **LARGE** ACCIDENTAL SPILLS

AND OIL RELATED EMERGENCIES

Directive 2005/35/EC on ship-source pollution and the introduction of penalties, states that EMSA shall 'work with the Member States in developing technical solutions and providing technical assistance (...) in actions such as tracing discharges by satellite monitoring and surveillance' . EMSA's role was reinforced in 2013, with the revision of the Agency's Founding Regulation which states that one of the Agency's core tasks is to 'facilitate cooperation between the Member States and the Commission (...) in improving the identification and pursuit of ships making unlawful discharges in accordance with Directive 2005/35/EC on ship–source pollution and on the introduction of penalties for infringements.'

SERVICE OVERVIEW

CleanSeaNet offers assistance to participating States for the following activities:

- Identifying and tracing ship-sourced discharges (e.g. oil pollution) on the sea surface
- Monitoring accidental pollution during emergencies
- Contributing to the identification of polluters.

The CleanSeaNet service is based on the regular ordering of synthetic aperture radar (SAR) satellite images, which provide day and night coverage of maritime areas independent of fog and cloud cover, with worldwide coverage. Data from these satellites is processed into images, and analysed for oil spill, vessel and meteorological variables. Extracted information includes among others: spill location, area, length and confidence level of the detection, and estimates of the wind and swell obtained from the SAR data.

When a possible oil spill is detected in national waters, an alert message is delivered to the relevant country. In cases of high alert level spills, EMSA Maritime Support Service (MSS) may call the coastal State to ensure that the alert has been received and to offer additional support. Analysed images are available to national contact points in near real time, in less than 30 minutes after the satellite acquires the image. The service includes the identification of potential polluters by combining the image taken by the satellite with vessel traffic information. After receiving the enriched information the national authority then decides on the appropriate operational response, for example, sending an asset such as an aircraft to check the area and verify the spill, or requesting an inspection of the vessel in the next port of call. The adjoining map displays the images delivered during a typical month of operations with approx. 250 acquisitions per month.

left: EU coastal States (except French Outermost Regions), Iceland, Norway, Turkey and Montenegro; right: French Outermost Regions

Monitoring and surveillance by satellite can make a difference in a number of ways:

1. For illegal discharges:

- The likelihood that violations will be detected is substantially increased by extending the areas monitored, irrespective of weather conditions.
- Authorities can plan their own monitoring activities more effectively in the knowledge that wide areas are monitored by satellite at given times per day.
- The rapid exchange of information based on the common use of CleanSeaNet supports a tighter link between detections and follow-up, promoting more efficient use of limited resources.
- CleanSeaNet provides a vessel identification service which, based on traffic monitoring information, can provide the identity of a potential polluter.
- The use of CleanSeaNet enhances the harmonisation of practices across Europe, thereby addressing to some extent the difficulties encountered in law enforcement in an international context such as the maritime sector.
- Awareness in the shipping community that there is remote monitoring provides a strong deterrence to potential polluters, reducing the number of violations committed.

2. For accidental spills:

- It can provide an early indication of the extent of the spill.
- It can provide updated information on the evolution of the spill.
- Coastal States are better able to plan the allocation of resources to combat the spill, and/or to anticipate where the spill will affect the coastline.

In case of accidental pollution, coastal States can request additional support from the service through increased satellite coverage over the accident area. This facilitates monitoring of the evolution of the spill over time, providing input to response operations and areas at risk of pollution. Additionally, EMSA can provide very high resolution optical products, which deliver a detailed overview of the accident area.

Requests for additional images can also be accepted to support specific coastal State activities, like Tour D'Horizon operations, Coordinated Extended Pollution Control Operations (CEPCOs), Ship-To-Ship Transfer monitoring, pollution response exercises and support to wreck removal operations.

The CleanSeaNet service offers **reliable**, high quality information in a **user-friendly** format.

The service is currently being used by

23 EU
member states

2 EFTA
coastal states

3 candidate countries

Dutch Caribbean, French Antilles, Greenland

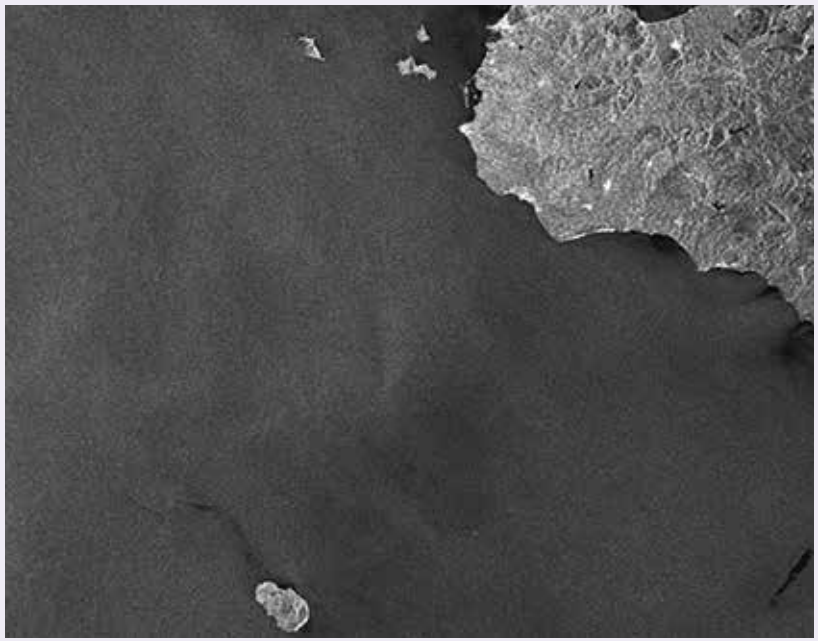
and **European neighbourhood partner** countries across the Mediterranean, Black and Caspian seas.

THE FIRST STEPS

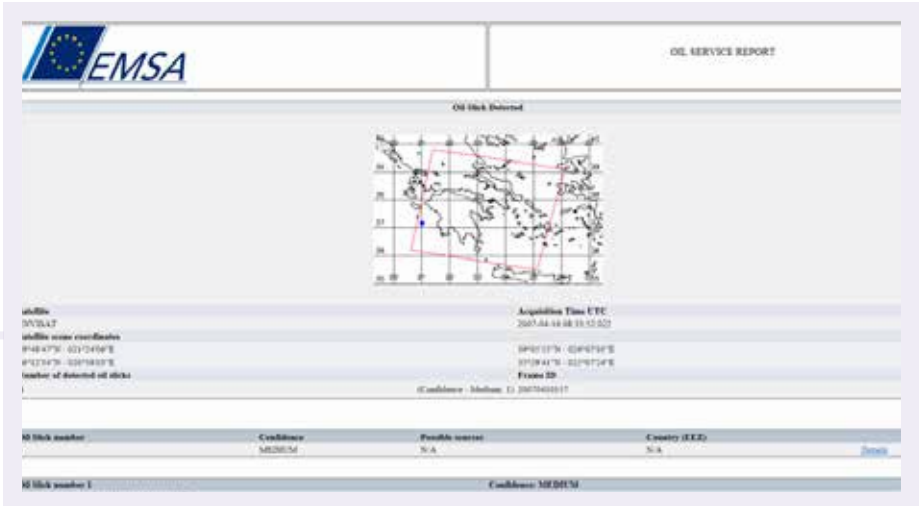
The first CleanSeaNet service (end-to-end test) was a Radarsat-2 image acquired on 11 April 2007. Following this successful acquisition, operations started on 16 April 2007, with an Envisat image acquired by Telespazio (now e-GEOS), containing one possible oil spill.

First CleanSeaNet alert report, generated from an Envisat acquisition.

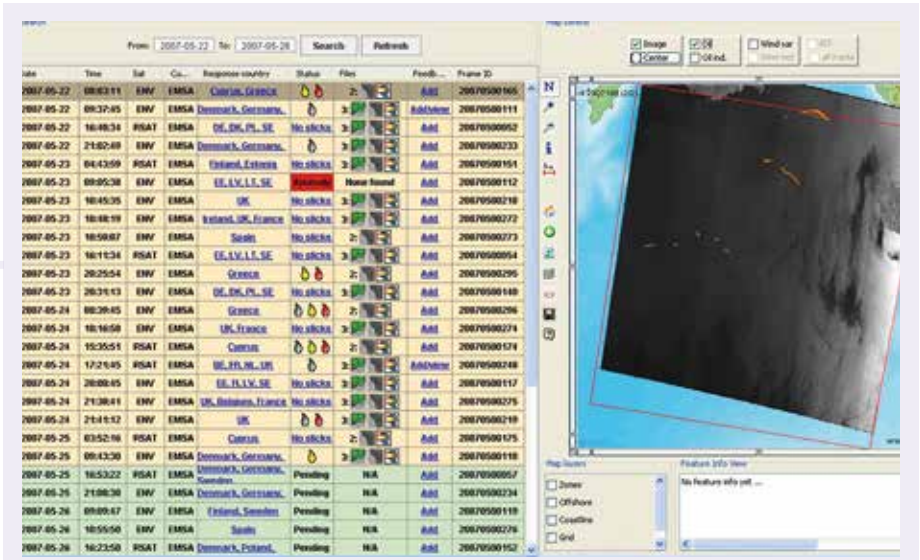
In the beginning, services were accessible through a web interface operated by KSAT.



CleanSeaNet image delivered in the first end-to-end service



The first CSN alert report operationally delivered, 16 April 2017



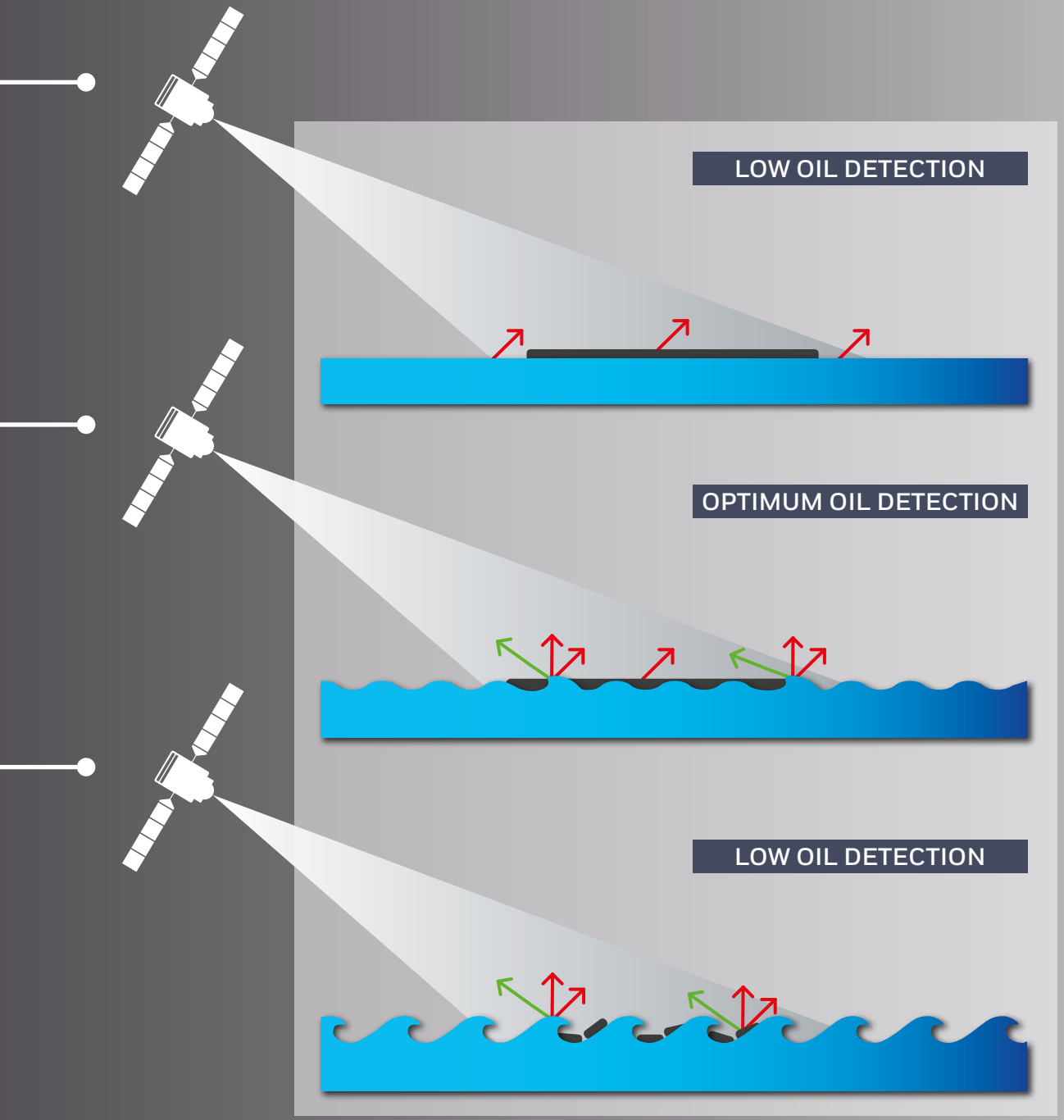
First CSN web interface, operated by KSAT

HOW DOES SYNTHETIC APERTURE RADAR DETECTION WORK?

CleanSeaNet is capable of monitoring wide areas at regular intervals. Long range detection is mainly based on radar sensors that measure the roughness of the sea surface. Radars generate electromagnetic pulses that 'illuminate' the ocean surface. Radar pulses are reflected by capillary waves which the wind creates at the surface of the sea (sea clutter). Radar systems will therefore detect any phenomena that suppress capillary waves. Some substances, for example oil, smooth the sea surface and reduce the level of the signal returned to the emitter. The signal is processed into an image where a clean sea will appear as a grey background; oil spills will appear as dark areas and vessels and platforms as bright spots. Oil, but also other substances and natural phenomena such as certain current patterns, ice and surface slicks associated with biological activity, will also appear as dark patterns on the radar image.

SAR radars are to a large extent able to detect very thin oil films floating on the sea surface day and night and through the cloud cover. There are limitations to this process as sea roughness is driven by the local wind speed and direction. Wind speeds below 2-3 m/s mask the dampening effect whereas speeds above 15 m/s also reduce detection capability.

For EO image products covering 400 km by 400 km in medium resolution, the analysis is provided within a maximum of 30 minutes. For images of different dimensions the time varies slightly. The earth observation data centre (EODC) has the capacity to acquire satellite images of 500 km wide and up to 1,600 km long.



Trained operators are able to distinguish between natural phenomena and discharges from vessels. In particular, when an image shows the bright echo of a vessel at the end of a linear dark feature and when the shape of this feature matches the track of the vessel, there is little doubt that this vessel has been discharging. The discharged product could be oil but could also be another substance that would produce the same dampening effect. To confirm the nature of the substance detected and that the discharge exceeds the legal limits of the MARPOL Convention, the collection of additional information on site and/or in port is required.

CleanSeaNet can also make use of images from multiple optical satellites to support Member States in their response operations. Normally these images are used to provide a detailed view of the accident area by enabling the mapping of affected coastal areas (i.e. highlight oil on the beach or near the shore) or to provide detailed overview of the accident area (i.e. high resolution of the wreck, vessel grounding area, etc.).

Given the limitations of radar detection for the identification of spills, it is important to note that CleanSeaNet does not detect ‘oil spills’ but ‘possible oil spills’. Other substances with a similar effect include, for example ice, algae, sandbanks or low wind areas. The system does not discriminate vegetable or fish from mineral oil.

OUR SERVICE PROVIDERS

EMSA's earth observation services resort to several providers (contractors), which acquire, process, analyse and deliver the requested imagery and results to EMSA Data Centre. CleanSeaNet then makes the service results available to Member States, supporting oil pollution monitoring and vessel detection operations, and generates Alert Reports to the end-users.

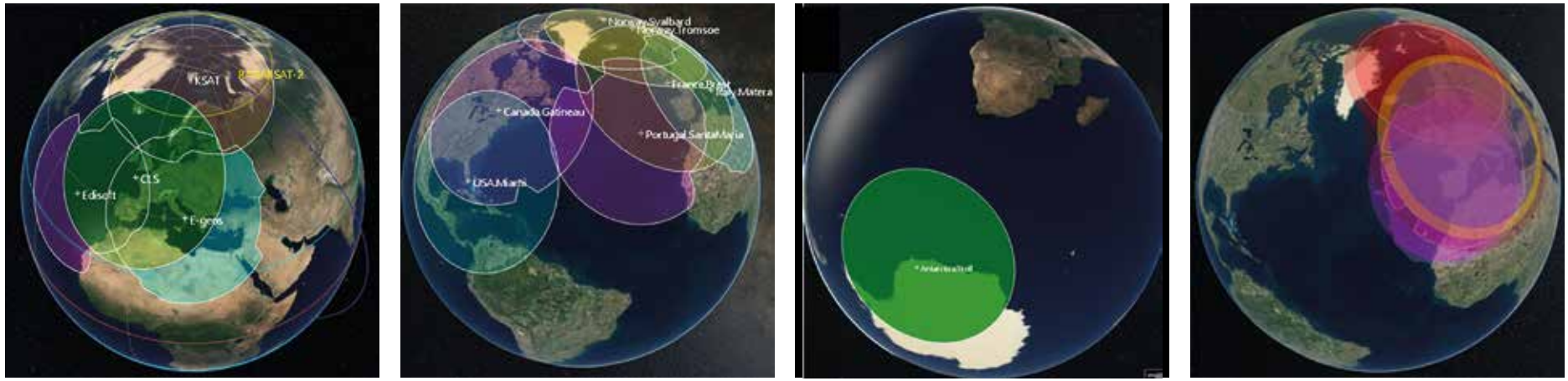
In total, CSN has seven SAR and Optical service providers, namely CLS, KSAT, MDA, EDISOFT, e-GEOS, Airbus-DS and EUSI. These companies operate a network of ground stations distributed worldwide (see images below), to ensure Near Real Time delivery.

MED / NORTH SEAS / BALTIC / ARCTIC

NORTH ATLANTIC

ANTARCTIC

EUROPE



Ground stations of the SAR service providers in the Mediterranean, North, Baltic and Arctic seas (left), North Atlantic (centre), and Antarctic (right)

Ground stations of the optical service providers in Europe

AIRBUS

"MDA is proud to have been a supplier to EMSA for the CleanSeaNet program over the past decade. We would like to congratulate EMSA in demonstrating that a single Maritime Domain Awareness solution can provide valuable and timely information by pulling together the collective capabilities of multiple agencies, multiple governments and multiple suppliers. The program has continued to evolve and has set a standard for other agencies to strive towards. MDA looks forward to providing continued support to EMSA based on RADARSAT data and value added services into the future. MDA is a business of Maxar Technologies."

Wayne Hoyle, MDA

"The Airbus group already contributes to make the sea a safer and more secure maritime environment through numerous proven and operational products such as planes of maritime patrol, helicopters, coastal surveillance and sea traffic management systems or satellite based maritime surveillance services. In order to continue supporting its customers who face new challenges with the continuous development of the blue economy and its digital transformation, Airbus develops a wide range of digital services allowing every category of users to increase its knowledge of the maritime domain, without discontinuity from the open sea up to the coastline."

Olivier Surly, Airbus DS Geo SA

CLS

e-geos
AN ASI / TELESPAZIO COMPANY

"Kongsberg Satellite Services AS (KSAT) is a Norwegian enterprise, uniquely positioned to provide ground station and earth observation services for polar orbiting satellites. The KSAT network spans over 120 antennas at 20 ground station locations across the globe (including Pole to Pole coverage from Antarctica to the Arctic). KSAT supports 24/7 Near Real Time data processing and services from Radarsat, TerraSAR-X, COSMO-SkyMed and Sentinel-1. A KSAT led consortium was in 2006 awarded the first EMSA contract for provision of oil spill and vessel detection services. Partners were Telespazio (now e-Geos) and EDISOFT. With CSN, EMSA has extended the capacity of the European monitoring services for safety and environmental protection and KSAT supports this effort by offering the advantage of a global ground network, in-house capacities and expertise."

Line Steinbakk, Energy, Environment and Security, KSAT

EDISOFT
DEFENCE & AEROSPACE TECHNOLOGIES

"European Space Imaging have a long standing working relationship with EMSA, providing very high resolution optical imagery (<50cm) and adding value for vessel, activity or change detection in near real time to meet all of their service requirements in the maritime safety and security domain. As the required imagery is time sensitive, we are able to utilise our ground station located in Munich, enabling image delivery within 45 minutes. This is critical for rapid response and a key component of CleanSeaNet's pollution and vessel detection service."

Melanie Rankl, EUSI

"Ten years of dedicated services to EMSA, either in house at EDISOFT or in Azores, at Santa Maria Ground Station, supported by a dedicated team of expert engineers with only one commitment, to serve better EMSA ensuring CleanSeaNet meets its purpose. EDISOFT credibility and long lasting trustful relationship with EMSA has been backing the rising impact of CleanSeaNet in today's maritime challenges. Together we share the same vision for a better ocean and we cooperate for the sustainability of our planet."

Tiago Sepúlveda, EDISOFT

EUROPEAN SPACE IMAGING

KSAT
KONGSBERG SATELLITE SERVICES

"CleanSeaNet is one of the first real cases where EO based industrial capacity met the User Community's needs in an operational service. EMSA has been able to build a strong valued collaboration with European Member States, European Commission and Industries, becoming the European Provider for Integrated Maritime Surveillance services. In cooperation with the European Organisations Frontex, EFCA, EC Navfor, MAOC-N, EMSA empowered the services, from environment and safety to security and fisheries domains, in addition to the original mandate. Thanks to EMSA, along the years, industries continue evolving the technologies according to Agency's challenging requirements, generating improved and standardised value added products. e-GEOS, one of the industrial precursor of Earth Observation services at global level, is one of the EMSA's Contractor since the beginning of the service, in April 2007."

Federica Mastracci, e-GEOS

"We have been involved in CleanSeaNet service since 2007. As a subsidiary of the French space agency, we accompany EMSA in its daily mission through training and service delivery (since 2010). We are continuously enhancing our expertise and improving our services to support evolving EMSA needs. In 2014, we extended our service to high resolution imagery.
In 2015, we integrated the Sentinel-1 missions: we upgraded the whole reception and processing chain and extended the antenna coverage. CLS is a solid and experienced worldwide company. Pioneer provider of monitoring and surveillance solutions for the Earth since 1986, our mission is to deploy innovative space-based solutions to understand and protect our planet, and to manage its resources sustainably. CLS employs 700 people, at its headquarters in Toulouse (France) and in its 26 other sites around the world."

Gaetan Fabritius, CLS

MDA

10 YEARS

DETECTING MARINE POLLUTION

1ST CLEANSEANET IMAGE DELIVERED

2007

2008

2009

2010

2011

ENVISAT
RADARSAT-1
RADARSAT-2
Services available

ESA-EMSA
agreement on space data

esa | EMSA

Users have access
to AIS data for
identification of
potential polluters

24/7

EMSA Maritime Support
Service started

ESA-EMSA agreement
on space data and services

esa | EMSA

CleanSeaNet
2nd Generation System
entered into operations

10

CLEAN SENSE NET

2012

2013

2014

2015

2016

2017

COSMO SKYMED
Service available

High Resolution
optical images and value
adding services available

Extension of services
to Greenland

Extension of services
to SAFEMED (Mediterrean)
and TRACECA (Black and
Caspian Sea) programmes

Copernicus
Europe's eyes on Earth

Copernicus Delegation
Agreement, SENTINEL 1-A
Services available

TerraSAR-X
TANDEM-X
Services available

SENTINEL-1B
Services available

PENALTIES AND PROSECUTIONS

SOME EXAMPLES OF FOLLOW-UP FROM THE CLEANSEANET SERVICE

Following a CleanSeaNet detection, the successful enforcement of pollution regulations will usually require further collection of evidence, whether on site, on board the vessel, or both. Collecting evidence on site requires rapid action, as the time window to obtain information can be short: visible evidence of the spill at sea will often weather out in a couple of hours and vessels can move away from the position of the pollution. Aircraft and helicopters, and in particular aircraft equipped with specialised remote sensing equipment, are the most appropriate assets to investigate on-site initial indications of possible discharges in a timely manner. Collecting evidence in port as a result of shipboard investigation is also a possibility. This will often involve actions requiring cooperation at national and international level. After all available evidence has been collected the relevant authorities decide whether the evidence is sufficient to bring the case to court, or whether other administrative actions such as fines are more appropriate.

Unfortunately, EMSA is not always informed of the full scope of follow-up actions which occur following CleanSeaNet detections. Often the case is passed from the institutions involved in monitoring and surveillance to specialist administrative or legal teams. Resolution of cases can take many years, and in some countries privacy issues prevent the full details being disclosed publically. Nonetheless, a number of examples have been brought to the Agency's attention over the years. Three examples are provided here, each highlighting different elements of the CleanSeaNet service: how it contributes to international cooperation; the value of interacting information systems; and the importance that even a standalone image can have.

2016 - COOPERATION BETWEEN THE NETHERLANDS AND GERMANY, PROMPTED BY A CLEANSEANET SERVICE

A CleanSeaNet alert report was sent regarding a possible detected spill, which was partly in the Netherlands alert areas and partly in the German alert area. The Netherlands – which routinely organises surveillance flights timed to coincide with expected CleanSeaNet services – sent an aerial surveillance asset, and the vessel was identified. Pictures were taken showing discharge of MARPOL Annex II cargo residues via a hose which was discharging above the waterline.

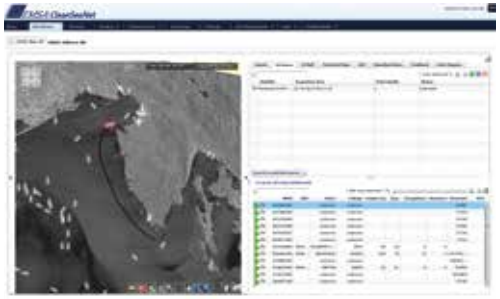
The ship's master confirmed that a tank washing operation of palm oil was taking place, but asserted that it was in line with MARPOL Annex 2 regulations. The authorities in the Netherlands contacted the relevant German authorities and sent them the information which had been collected. The German authorities then conducted investigations on board the vessel once it berthed in Hamburg port. As the discharge pipe was above the waterline, the German prosecutor found that the discharge was not in compliance with MARPOL and a fine was issued.

The image above shows the CleanSeaNet report which triggered the investigation of the discharge by the vessel. Aerial photos from surveillance aircraft show that the discharge was being made above the waterline.

2013 - EMSA SYSTEMS WORKING TOGETHER (CROATIA AND SLOVENIA)

On 22 March 2013, a possible pollution was detected by CleanSeaNet in Croatia's territorial waters. Based on information available in EMSA's SafeSeaNet vessel tracking system, the possible source was identified (MMSI number), and a vessel track generated. This information was submitted to the port state control information system, THETIS, making an inspection in the next port of call mandatory.

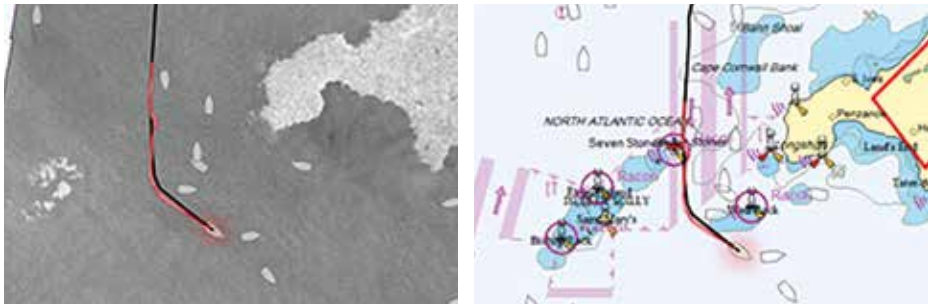
The next port of call, Slovenia, was identified in THETIS based on SafeSeaNet information. The inspection in port found evidence that an illegal discharge of oily waste had taken place (oil residues in the Oil Water Separator, and oil spots on starboard side hull), and a fine was imposed.



CleanSeaNet Alert Report, 22 March 2013 (Service ID: 124923), showing spill detected in Croatian waters (left) and the satellite image with a vessel information layer in the user interface (right)

2012 - SATELLITE IMAGES AS PRIMARY EVIDENCE IN UK COURT

Satellite images should always be combined with supporting information when prosecuting a maritime pollution case, but the images themselves may be admitted as primary evidence. On 25 February 2012, EMSA detected a possible pollution on a satellite image of the waters off the coast of Cornwall, UK. By combining the satellite image with AIS vessel track information from SafeSeaNet, the vessel was identified. The vessel was contacted by the UK's Maritime and Coastguard Agency, and initially denied that it was trailing a slick. It then admitted to be cleaning the tank and discharging waste (palm oil and tank cleaning solution) but stated that this was outside the UK's 12 nautical mile territorial sea (i.e. where certain discharges are permitted, provided conditions are met). Evidence from the satellite image showed that the slick was inside the territorial sea, and that the discharge was thereby illegal. Following a court case, on 4 October 2013 the owner of the vessel was found guilty and fined. According to the investigating officer of the Maritime and Coastguard Agency's enforcement unit, it would not have been possible to achieve the prosecution without the satellite evidence.

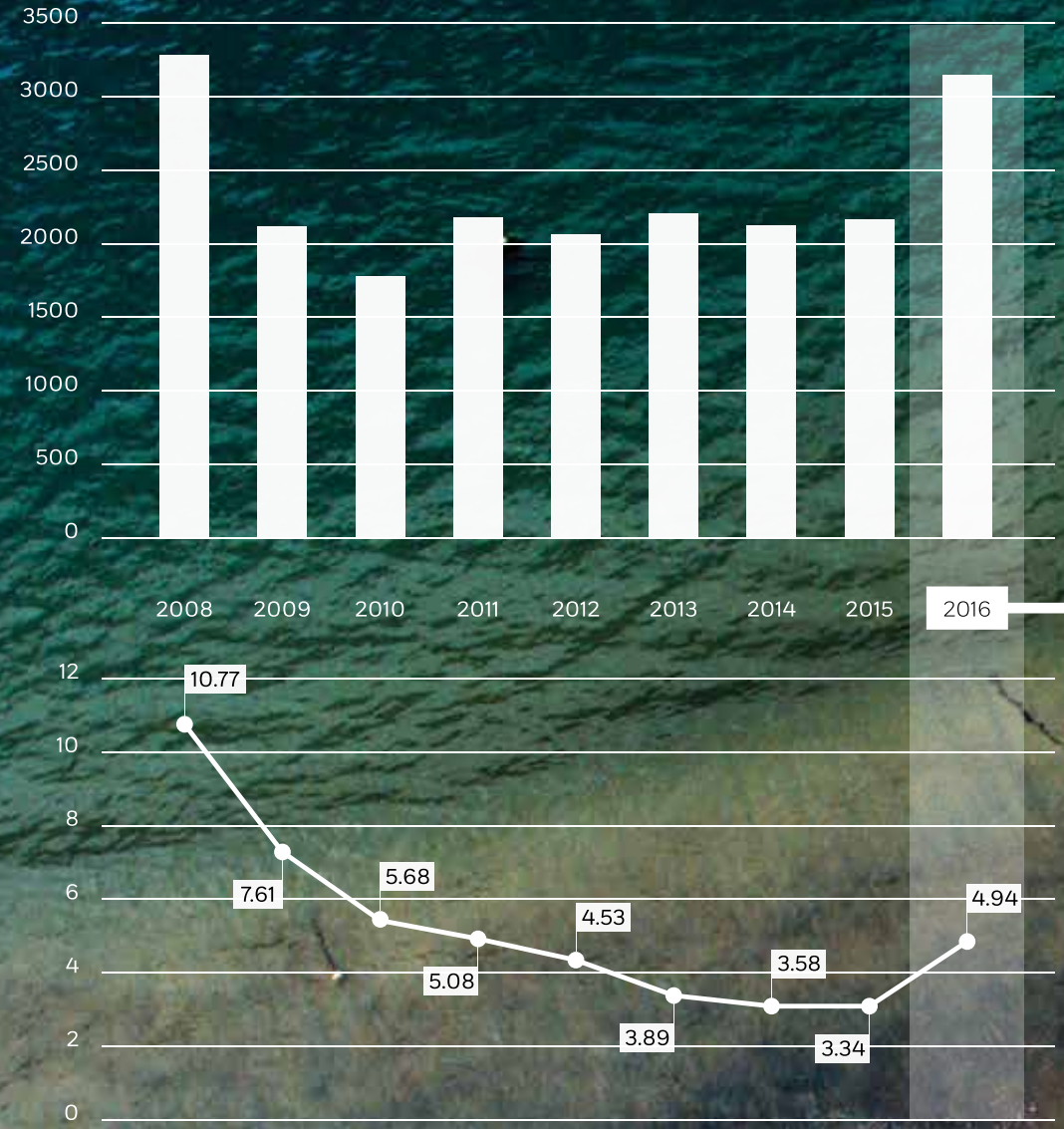


This image shows, on the left, a satellite radar image with the location, marked in red, of detected oil on the sea surface. The shape of the spill indicates a possible trailing slick of oily waste from an underway vessel. On the right, AIS vessel track information from SafeSeaNet identifies the tanker

DETECTION OF POSSIBLE SPILLS

TRENDS OVER A DECADE

Total number of possible spills detected in the years 2008 to 2016



CLEANSEANET 2008 - 2016: TRENDS IN POSSIBLE MARITIME POLLUTION DETECTED

The overall trend over most of the past decade has been a year-on-year reduction in the number of possible spills detected per million km² monitored, with a marked decrease per year in the period 2008-2010 (which coincided with the economic downturn in Europe, as well as an increase in awareness of maritime pollution related issues and an improvement in the provision of port reception facilities across the continent), and a more gradual decrease in the period 2010-2015.

In 2016 this trend reversed, with an increase in the number of possible spills detected. There are a number of possible reasons why the trend may have reversed:

- It is likely that the inclusion of new satellites, particularly Sentinel-1A, may have resulted in improved detection capabilities. The spatial resolution and quality of Sentinel-1 means that it is now possible to detect smaller spills than before; these smaller spills are more numerous and would not have been detected previously. The average size of spills detected in 2016 was 25% smaller than in 2015. In 2015 no spills below 0.1 km^2 were detected whereas this threshold decreased to 0.04 km^2 in 2016.

- Optimisation of CleanSeaNet planning, due to use of new tools, increased the ratio of sea surface to land surface captured on the images in 2016.

- To a lesser extent, an increase in shipping volume could have caused the increase in detections; the EU SafeSeaNet system registered a 5% increase in the number of ships calls from 2015 to 2016, while the Eurostat also records an increase in seaborne goods handled in European ports over recent years.

Map of possible spills detected in EU coastal States, Iceland, Norway, Turkey and Montenegro during 2016.

The dots in the map represent the spills which have a higher detection confidence level (in red) and a lower detection confidence level (in green). The probable spills accounted for 1586 detections in 2016, whilst the latter accounted for 1582 in the same year.

EMSA participated in the SuperCEPCO Baltic in August 2011. This was organised by the Finnish Environment Institute (SYKE), Finnish Border Guard and Swedish Coast Guard in Turku/Finland. Image depicts a Swedish surveillance aircraft, and the crews.

EMERGENCIES AND INCIDENTS

SELECTED CASES IN WHICH THE CLEANSEANET SERVICE WAS REQUESTED

In addition to routine monitoring of European seas for potentially illegal discharges from vessel and oil platforms, the CleanSeaNet service is available to coastal States upon request to support the monitoring of particular occurrences, events, accidents or incidents. This can be precautionary, for example if there is a possibility for an oil spill to occur in a coastal State and the objective is to detect it as soon as possible; or reactionary, when a spill has occurred and the coastal State requires its monitoring to evaluate the extent and spread of the pollution, or to best allocate response assets on the scene.

There have been 31 requests for such assistance in the 10 years of the CleanSeaNet service. A small sample of requests are presented in the following, showing a range of different circumstances in which the CleanSeaNet service has been mobilised, from collisions and groundings, to operational spills, from vessels and from oil platforms.

2009 – SHIP-TO-SHIP TRANSFER SPILL INVOLVING THE RUSSIAN AIRCRAFT CARRIER ADMIRAL KUZNETSOV, IRELAND

In areas regularly covered by the CleanSeaNet service, significant pollution is not likely to go unnoticed. Consequently, it becomes more and more risky for ship masters not to report accidental spills that they may have caused. The detection by CleanSeaNet of an unreported spill during a ship-to-ship operation off Ireland in February 2009, and subsequent cooperation with the Irish authorities, is a good illustration of this.

An Irish Coast Guard helicopter confirmed an oil spill off the Irish coast, and concluded that it was probably due to a refuelling-at-sea incident involving the Russian aircraft carrier Admiral Kuznetsov. Initial estimates put the spill at around 1,000 tonnes, but further aerial surveillance by the Irish and British maritime authorities concluded that it was in the region of 400-500 tonnes. On 17 February 2009, a CleanSeaNet image showed that the slick had expanded to 8 x 1km and had drifted around 30km East-North-East of the original position. The spill was closely monitored until it naturally dispersed without hitting the coastline. Fifteen SAR images were acquired between 14 February and 8 March 2009 to monitor the affected area.

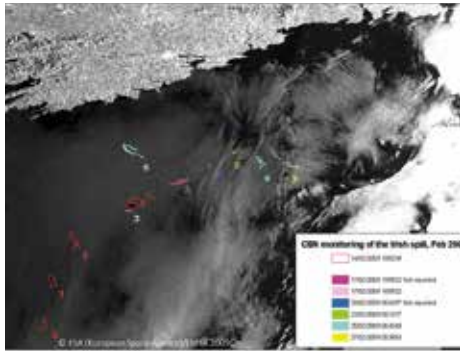


Image showing the spread over the oil spill over a number of days

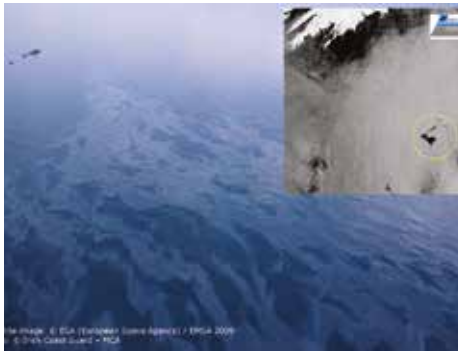
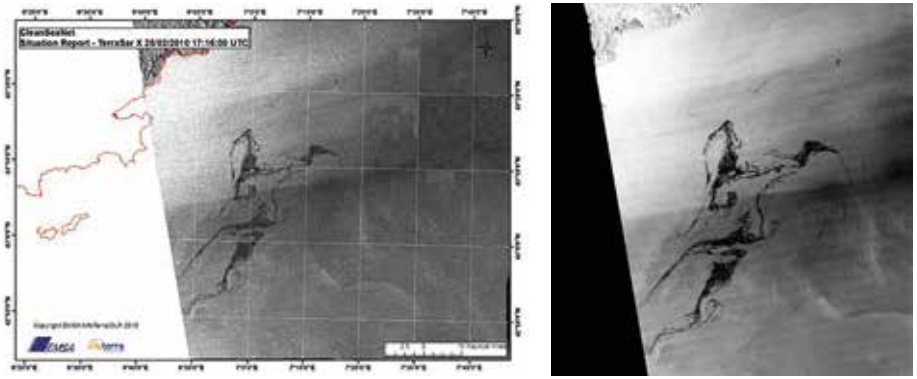


Photo taken by the Irish Coast Guard showing the oil on the sea surface

2010 - COLLISION BETWEEN THE STRAUSS AND THE FRANCIA, ITALY

On the morning of 19 February 2010, a collision occurred between the fully cellular container ship CMA CGM Strauss and the tug Francia around 1.5km off the Voltri terminal entrance at the port of Genoa, north-western Italy. This caused a hole in the fuel tank of the container ship and a spillage of an estimated 184 tonnes of fuel oil. Following a request from the French authorities, CleanSeaNet initially provided six satellite images to monitor the movement of the oil slick between Genoa and Toulon, and further images were provided through the activation an emergency acquisition procedure with the European Space Agency (ESA). The emergency situation lasted from 19 February to 2 March 2010. The image below, showing the full extent of the spill, was acquired within 30 hours of the emergency activation.



Widespread oil spill following the collision of the two vessels

2011 - GANNET F PLATFORM SPILL, UK

An accident occurred on 10 August 2011 on the Gannet F platform, approximately 176 km east of Aberdeen. The accident caused an oil spill of 200 metric tonnes. In the following days, efforts were made to control the leak but were not successful. On 16 August 2011 the UK's Maritime and Coastguard Agency (MCA) made a request for emergency satellite support from EMSA. The monitoring entailed daily coverage of the accident area and included nine high resolution radar images and eight high resolution optical images over the area of interest, with the first image being delivered on the same day of the request. On 21 August 2011 it was reported that the leak was contained and the monitoring was officially closed on the 24 August 2011.

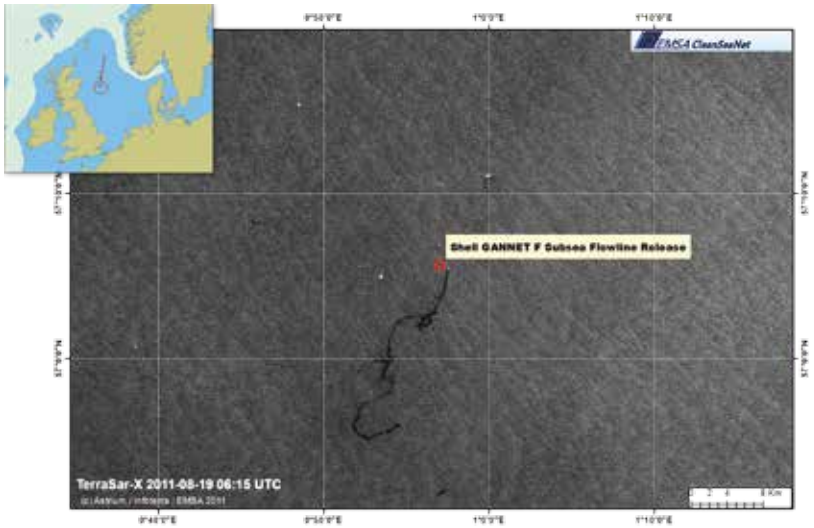


Image showing the leak from the Platform Gannet F

2012-2014 – COSTA CONCORDIA GROUNDING AND SUBSEQUENT MONITORING, ITALY

On 13 January 2012 the cruise ship Costa Concordia struck a rock near Isola del Giglio, Italy, about 100km northwest of Rome. The ship subsequently ran aground and partially sank in shallow water, requiring the evacuation of the 4,252 people on board. The bodies of 30 people were found, and a further two remained missing, presumed dead. The vessel contained a total of 2,300 m^3 of bunker oil (Heavy Fuel Oil) and grounded in an environmentally sensitive area, within one of the largest marine reserves in the Mediterranean Sea.

In the period between the grounding and when the vessel was safely lifted and towed, EMSA provided satellite monitoring assistance on three occasions:

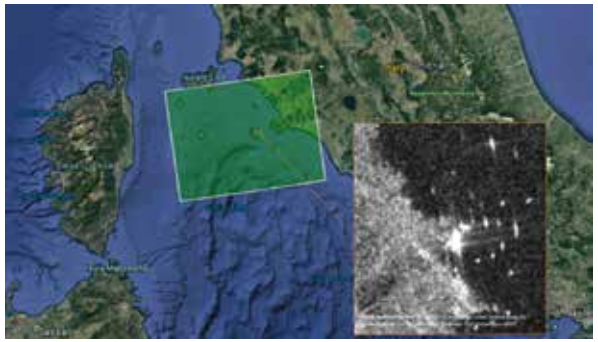
1. EARLY MONITORING AS PART OF A POLLUTION RESPONSE PLAN

Following the grounding of the Costa Concordia, the Italian Coast Guard contacted EMSA to request CleanSeaNet satellite images to monitor for potential oil leaks from the damaged ship. Approximately 40 CleanSeaNet satellite images were delivered to the Italian Coast Guard between 31 January and 14 March 2012. One high resolution optical image was also delivered by EMSA. During this period there was a lightering operation to remove fuel from the fuel tanks on board, which was completed in March 2012.

Optical image of the grounded Costa Concordia

2. RE-FLOATING OPERATION

As part of an ongoing salvage plan, the Costa Concordia had to be re-floated before preparations could be made for towing and scrapping. The Italian Coast Guard requested support to monitor a re-floating operation on 16-17 September 2013. Two SAR images were delivered over the area of Isola del Giglio. The purpose was to ensure early identification of any possible leaks as a consequence of the operation. No spills were detected. The image below is a CosmoSkyMed image acquired on 16 September at 05:09 UTC.



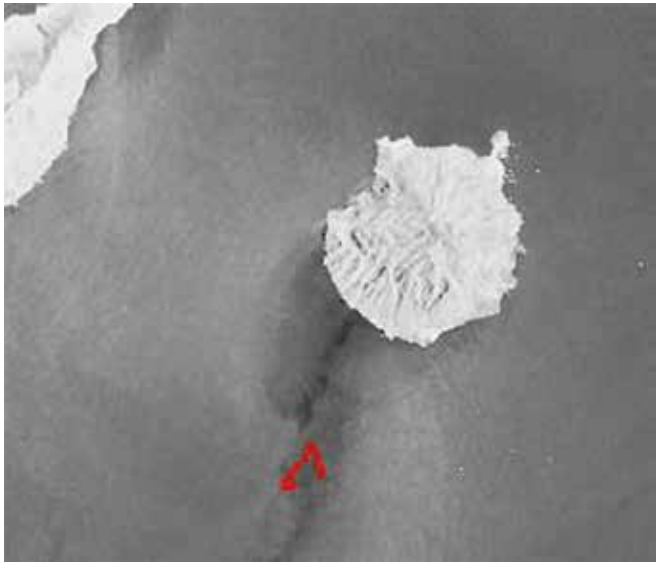
Satellite image of the area covered by Radarsat-2

3. TOWING OF COSTA CONCORDIA TO HARBOUR

Support was requested to monitor the progress of the Costa Concordia convoy from Giglio Island to Genova Harbour, which took four days, from 23-27 July 2014.

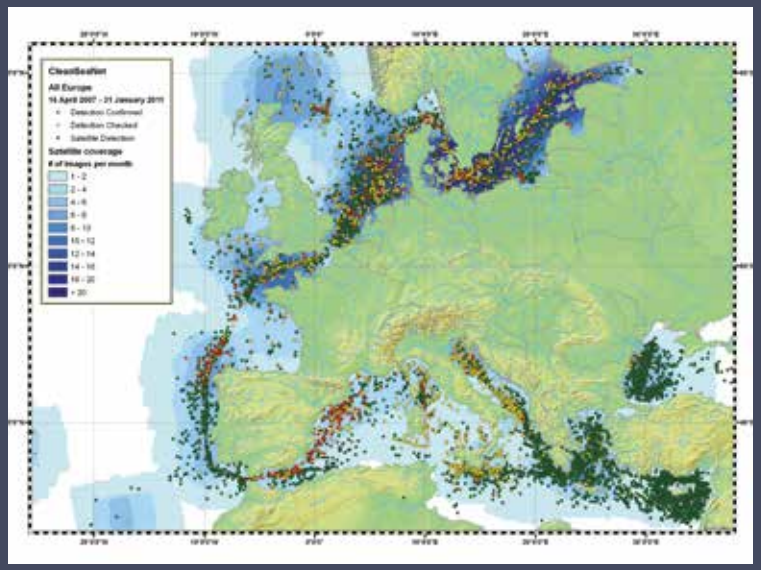
2015 – OLEG NAYDENOV SINKING, SPAIN

The Oleg Naydenov sank on 14 April 2015, 15 nautical miles south of the island of Gran Canaria (Spain) at a sea depth of 2,400 metres. No casualties were reported. The vessel was carrying 1,409 tonnes of fuel, 30 tonnes of gasoil and 65 tonnes of luboil. The vessel had been towed from the port of Las Palmas due to an uncontrolled fire that had broken out on Saturday 11 April. In addition to the routine planned monitoring over the area, Spain requested emergency satellite images to support the ongoing situation. An additional thirteen images were delivered.

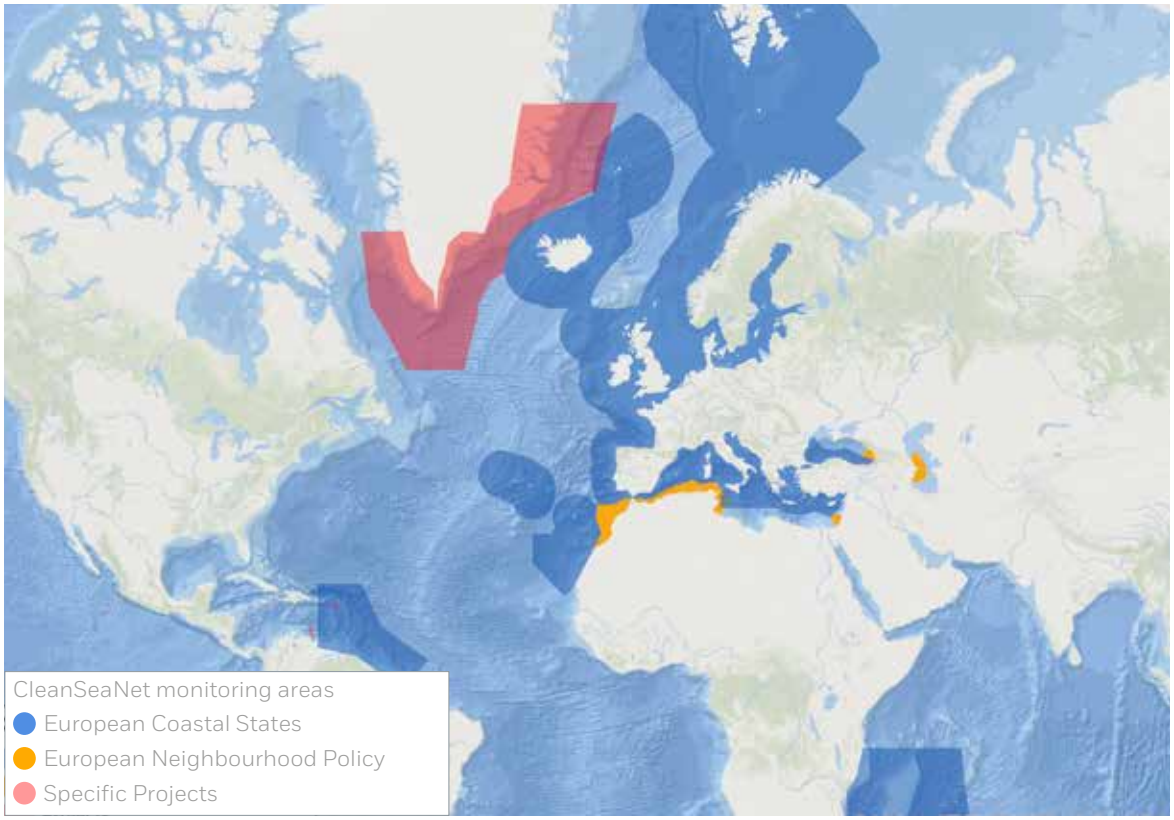


CleanSeaNet acquisition south of Gran Canaria on 19 April 2015

CLEANSEANET
FIRST GENERATION
ACROSS EUROPE



SERVICE COVERAGE



The image shows the alert areas from which CleanSeaNet services are delivered. To prevent potential pollution from going undetected, the alert area of a coastal State covers at least their Exclusive Economic Zone (EEZ). However, some coastal States have requested to also monitor areas outside their EEZ, in order to avoid the drift into their waters of an oil spill that occurred in a close geographical area. This preventive approach allows the coastal States to receive an early notification of potential pollution problems and, therefore, increase the efficiency of the national pollution response services.

For areas where the EEZ is undefined or contested, the following methodology is used: http://www.marineregions.org/eezmethodology.ph The definition of alert areas has no legal consequence on the delimitation of maritime boundaries.

TESTIMONIALS

WHAT USERS HAVE TO SAY ABOUT THE CLEANSEANET SERVICE

BULGARIA

CleanSeaNet plays an important role to raise the awareness of the seafarers and to significantly reduce the number of overboard discharges.
Veneta Georgieva

CROATIA

Ship masters know there are satellites which are taking pictures of the sea surface, and just knowing that drastically reduces the number of the oil spills coming from vessels.
Damian Dundović

CYPRUS

CleanSeaNet is a very useful tool specifically for monitoring huge sea areas. It facilitates tasks of the relevant authorities, enabling them to better organise and coordinate the patrol units, resulting in an efficient sea area control with parallel saving of resources.
Themis Evriviades

ITALY

The service has been useful for emergencies like the Costa Concordia, as well as to monitor marine reserve areas and detect operational discharges.
Dario Cau

IRELAND

CleanSeaNet has proved and continues to prove a vital tool in our work in trying to protect the environment. The alert function coupled with vessel position adds greatly to the timeliness of response.
Hugh Barry

ICELAND

The near real time capability of the system makes it a valuable tool to take timely decisions to protect the environment and investigate illegal discharges.
Snorre Greil

DENMARK

I really enjoy the User Group Meetings. It is very interesting to meet colleagues from other countries and exchange experience. Many good contacts have been made in these meetings.
Soeren Moenster

FINLAND

The service is helpful and reliable. Most useful is the GIS viewer, where the spill alerts and the shape and position of the spill are displayed, as well as AIS track information.
Kim Nyström

FRANCE

CleanSeaNet has helped the Maritime Rescue and Coordination Centres in charge of pollution monitoring, and has been very useful the last few years in the outermost regions. The alert is the most useful feature.
Yves Damay

GREECE

CleanSeaNet is a user-friendly and very helpful service which provides precise and reliable information about oil spills, supporting my tasks in the field of the marine environment protection.
Stylianos Markoulakis

GERMANY

CleanSeaNet is essential for monitoring broad sea areas far away from the coastline. The alert messages service and the information about the possible source of the pollution is extremely helpful in detecting illegal discharges and proceeding to follow up actions.
Hartmut Neumann

LATVIA

Considering that I use the CSN service as the main tool for oil spill detection at sea, all parts of the system are important for me in order to draw a full maritime awareness picture.
Ojars Gerke

LITHUANIA

CleanSeaNet is the main tool for oil spill detection at sea in Lithuania. Alerts are the most important part, to prompt the initial investigation. CleanSeaNet significantly supplements our existing limited air surveillance system for pollution detection.
Igor Kuzmenko

MALTA

Malta finds the service very useful to monitor oil spills, and I personally find the alerts and the facility to link vessels to possible spills very useful.
Mevric Zammit

1 CLEAN SEA NET

UK

We have used it to support emergency response during both shipping and offshore incidents; for routine monitoring; and for support of Bonn Agreement Tour d'Horizon flights. We have recently been using it to identify vessels that come specifically to the UK EEZ to conduct operational discharges.
Neil Chapman

SWEDEN

The satellite products have often given us an indication of possible oil spills that we might have missed or otherwise failed to investigate. The cooperation with EMSA and their support service always work well and we always get quick and good help.
Anders Litzén

MONTENEGRO

CleanSeaNet is a reliable state of the art service, and plays a substantial role in keeping European seas clean.
Nexhat Kapidani

NETHERLANDS

The delivery speed of data combined with all other information such as AIS, meteorological information, etc., makes it suitable for integration with aerial surveillance.
Michiel Visser

NORWAY

The service is used together with other national systems for a better overall picture of e.g. possible sources, environmental sensitivity and assets available in area.
Ove Njøten

SLOVENIA

The CleanSeaNet service provides valuable information and definitely deters polluters. I really appreciate the data export functionality.
Marko Perkovic

PORTUGAL

The CleanSeaNet service is a very useful tool to have an overview of a broad area and traffic dispersion; the service fills any gaps in the surveillance of vast areas.
Joana Jerónimo

CSN information day, Croatia, 2008

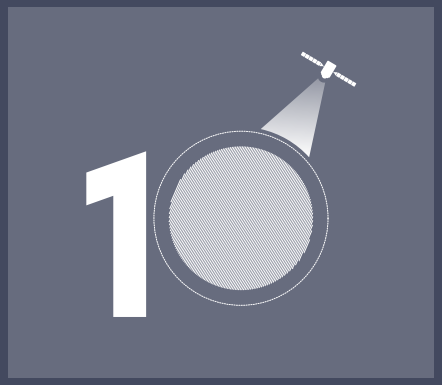
Regional training, Denmark, 2012

EMSA-ESA meeting, 2011

Volker Liebig and Willem de Ruiter sign 1st agreement between ESA and EMSA, Lisbon, 2007

Most recent training, 2017

CSN Information Day held in Croatia, 2008



CSN user group meeting, 2011

CSN receiving antenna, EMSA, 2009

CSN Training the trainer, EMSA, 2017

First CSN user group meeting, Italy, 2007

CSN Training the trainer, EMSA, 2017

Training CSN Officers, 2008

CSN training, Istanbul, 2010

Contract signature with industry

CSN training, France, 2012

ABOUT THE EUROPEAN MARITIME SAFETY AGENCY

The European Maritime Safety Agency is one of the European Union's decentralised agencies. Based in Lisbon, the Agency provides technical, operational and scientific assistance to the European member States in the fields of maritime safety, maritime security, prevention of, and response to, pollution caused by ships as well as response to marine pollution caused by oil and gas installations. The Agency contributes to the overall efficiency of maritime traffic and maritime transport.

www.emsa.europa.eu

Get in touch for more information

European Maritime Safety Agency
Praça Europa 4
1249–206 Lisboa Portugal

Tel +351 21 1209 200 / Fax +351 21 1209 210
www.emsa.europa.eu / Twitter EMSA_Lisbon