

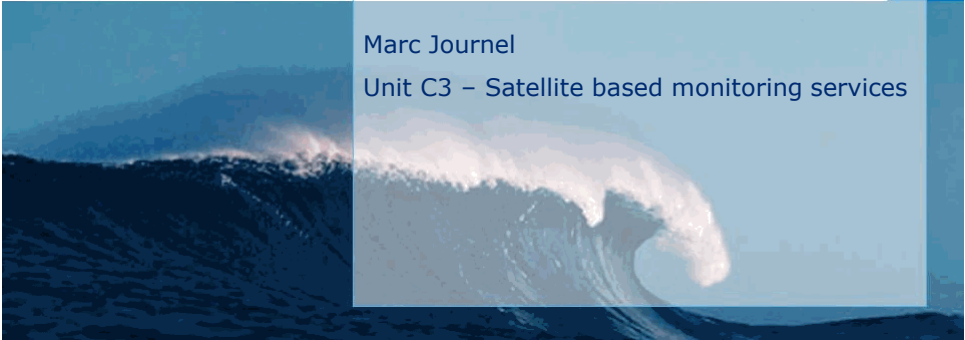
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### SAFEMED III Seminar on IMO Audit Scheme


3-6 March 2014, Lisbon

### CleanSeaNet

Marc Journal  
Unit C3 – Satellite based monitoring services



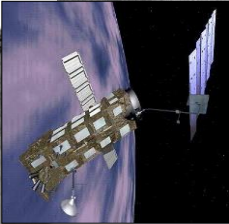
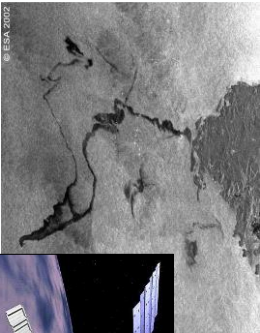
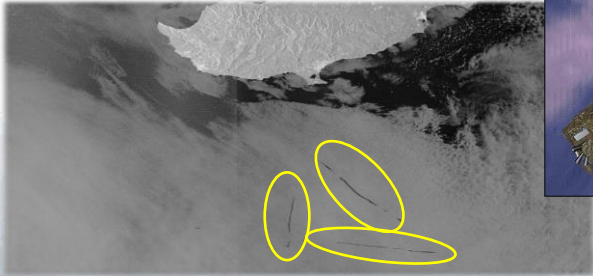
1



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### CleanSeaNet

- The European satellite oil pollution and vessel detection and monitoring system
- Linked into national/regional response chain strengthening operational pollution surveillance and response for deliberate and accidental spills.



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## Operational use of CleanSeaNet

**Routine monitoring** of all European waters looking for illegal discharges :

- Detection of possible spills
- Detection of vessels
- Identification of polluters by combining CleanSeaNet and Vessel traffic information available through SafeSeaNet

3

**Supporting enforcement** actions by the Coastal States

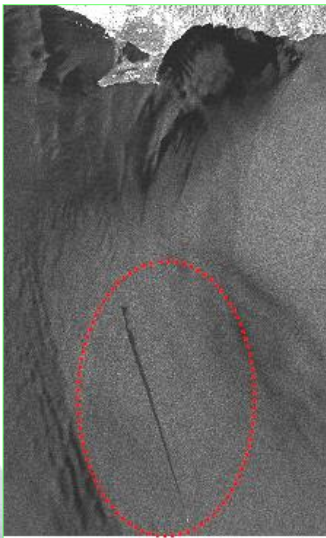
- On site verification and follow-up
- Inspection of suspected vessels in the next port of call

Supporting response operations to **accidental pollution**




## Oil Slick Detection Principle using SAR

- Synthetic Aperture Radar (SAR) emits electromagnetic pulses
- Radar signal bounced back by sea ripples created by the wind
- SAR sensor measures the level of the backscattered signal i.e. Ocean's roughness
- **Oily films**
  - smooth the sea surface
  - reduce the backscattered signal
  - **appear as darker areas**



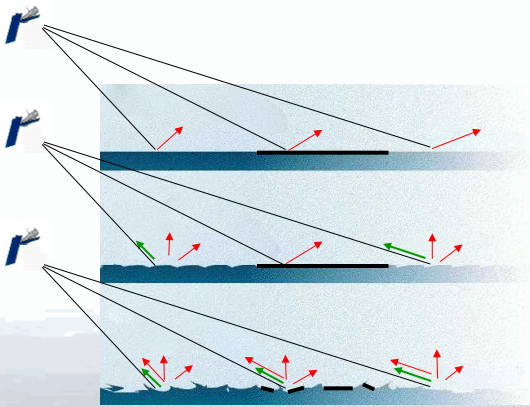
4



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## Oil Slick Detection in SAR images

### Moderate winds favourable for oil slick detection




**Low wind:** Weak backscattered signal - Low contrast between oil slick and surrounding waters

**Moderate winds:** strong contrast between oil slick and surrounding waters

**High winds:** Useful signal lost in the ambient noise - Oil slicks often broken and dispersed into the water column

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## Oil Slick Detection in SAR images – Look-alikes

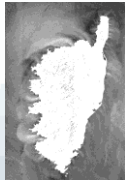



- SAR sensors detect all films that, like oil, smooth the sea surface

CleanSeaNet detects:


**NOT “OIL SPILLS” BUT “POSSIBLE OIL SPILLS”**

- Look-alikes: Other man-made substances: fish or vegetable oil, chemical, sewage, other...
- Natural phenomena: low wind area, algae, current front, upwelling area...

6



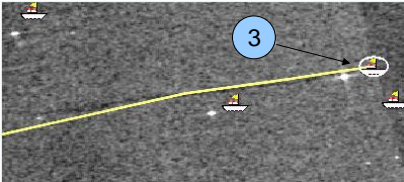
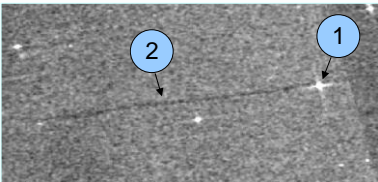
Current fronts      Low wind, rain cells and oil seepage      Algae      Land breeze



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### Detection of Discharging Vessels

- Ship detected on SAR image (Bright Spot) 1
- Long and linear possible spill trailing in the wake 2
- Vessel identified 3




CleanSeaNet is able to:

**DETECT AND IDENTIFY DISCHARGING VESSELS**

Remark: Similar vessels in vicinity at similar course and speed => not a wake

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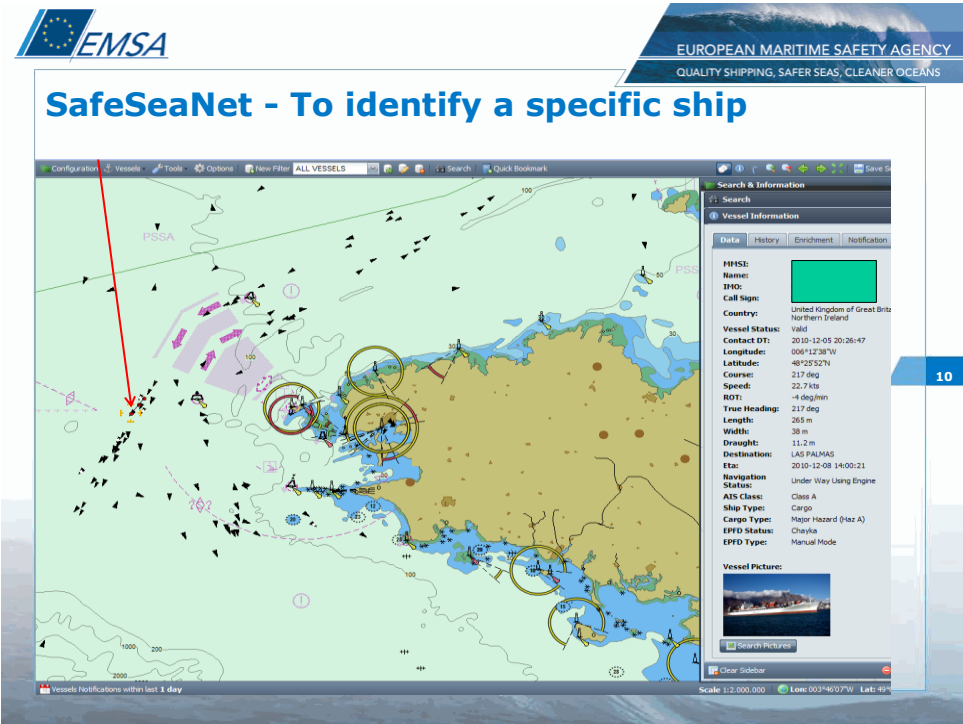
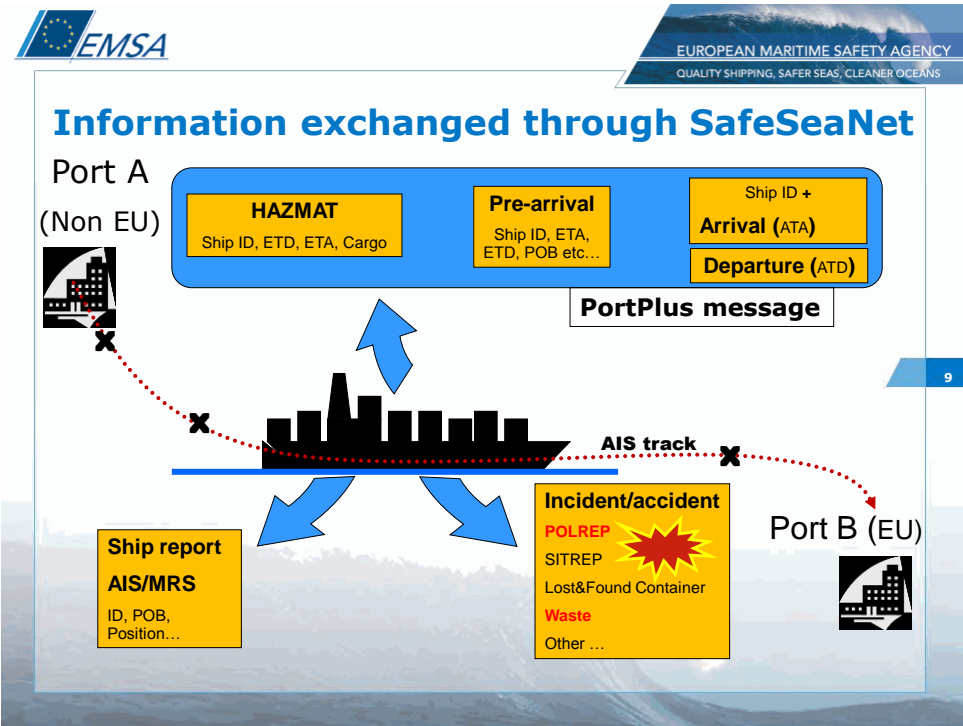
### Identification of discharging Vessels SafeSeaNet

**SafeSeaNet** is the community vessel traffic monitoring and information system, established by Directive **2002/59/EC** (as amended),

- ➔ It enables the EU Member States, plus Iceland and Norway, to **exchange information on vessel traffic and cargo movements** (notification and Request/Response mechanism)
- ➔ Initiated in October 2004, and became fully operational in **2009**
- ➔ Operated by EMSA at Central level, by MSs at national level

SafeSeaNet interlinks all national SafeSeaNet information systems

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## SafeSeaNet – Risk vessels Categories

HAZMAT



Ships carrying dangerous or polluting goods (Dir 2002/59 art 13)

BANNED




Ships banned from EU ports (Paris MoU List)

ALERT




Ships posing a potential hazard to shipping or a threat to maritime safety, the safety of individuals or the environment. (Dir 2002/59 art 16) E.g.: POLREP, Waste, lost containers...

SHT

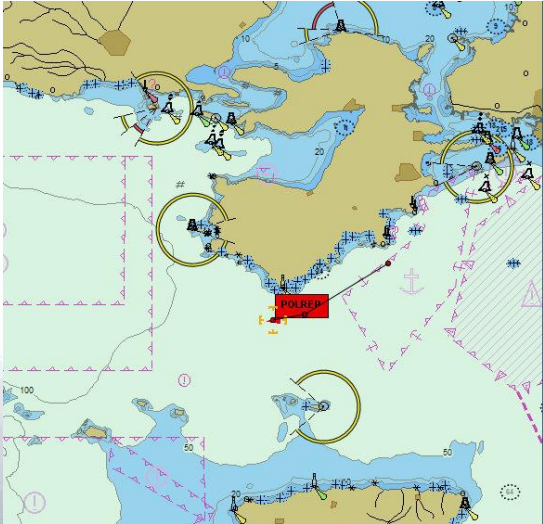


Single hull tankers



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## SafeSeaNet – Alert – e.g.: POLREP



Vessel Information

DataHistoryEnrichmentNotification

Relevant NotificationAll Notification

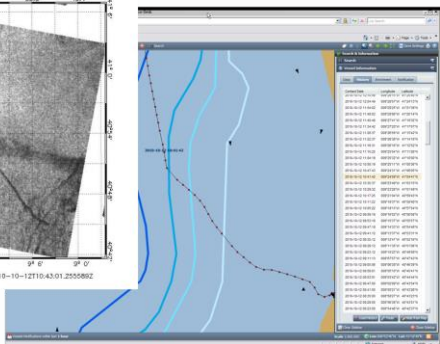
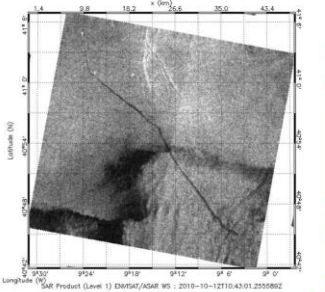
Type	Incident/Accident	ETDlastPort
ALERT	POLREP	
PORT		

EMSA

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### Catching Polluters



- A discharge detected by CleanSeaNet might be legal
- proving a MARPOL violation requires **COMPLEMENTARY EVIDENCE**
- Evidence can be collected **ON SITE AND/OR IN PORT**

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EMSA

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### Catching Polluters – On Site Follow-up

- CleanSeaNet detection initiates the action



Satellite image: © CSA/MDA/EMSA 2008  
SLAR image: © Swedish Coast Guard 2008  
Photo: © Swedish Coast Guard 2008


- On Site follow-up brings actionable evidence
- Satellite brings corroborating evidence

Full extent of the spill – Link between spill and polluter

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CEDRE Info Day


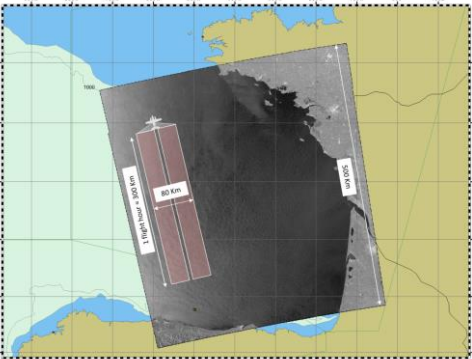
7



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### Catching Polluters – On Site Follow-up

- Spills weather out rapidly => TIME IS CRITICAL
- Timely Use of Aerial Surveillance essential for:
  - Catching polluters in the act
  - Collecting on-site actionable evidence (can also be collected in port)



Statistics on CSN detections  
Checked within 3 hours  
50% confirmed



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### Catching Polluters – Inspection in port

- **SUSPICION OF A DISCHARGE** of polluting substances? **YES**
- **MARPOL VIOLATION? POSSIBLE** (discharge might be legal)



17 October 2007: discharge of Calcium long Chain Alkyl Sulphide - Permitted by MARPOL annex 2

- **CleanSeaNet USED TO TRIGGER INSPECTIONS IN PORT**


A number of vessels detained and/or fined based on the evidence collected in port

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CEDRE Info Day

8



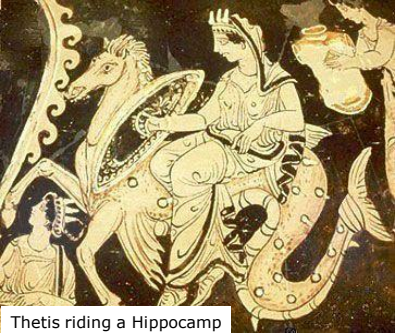


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## Catching Polluters – Inspection in port

### THETIS

#### From the Greek Mythology



Thetis riding a Hippocamp


The Nereides were the goddesses of the sea.

They were the patrons of sailors and fishermen, who came to the aid of men in distress, and goddesses who had in their care the sea's rich bounty.

The Nereid **Thetis** was their unofficial leader.

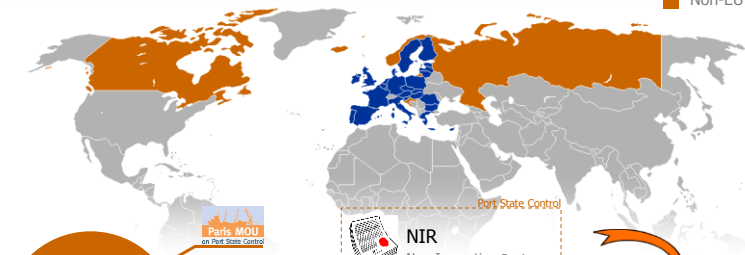
*In [www.theoi.com](http://www.theoi.com)*

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## Paris MoU Members States



■ EU Countries  
■ Non-EU Countries



Paris MoU on Port State Control

Port State Control

NIR  
New Inspection Regime

Directive on PSC

Directive on Ropax

**THETIS**

Directive 2009/16/EC on port State control  
Directive 1999/35/EC on Ro-Ro ferry and high-speed passenger craft (Ropax) surveys



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### Figures

- 1,600 users  
PSCOs and Administrators.
- 27 Paris MoU Member States  
including non EU members as Federation of Russia, Canada and Croatia
- 25,000 inspections/year
- 90,000 ships
- Available 24/7

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### NIR: Ship Risk Profile

- Generic Factors
  - Type of Ship
  - Age of Ship
  - Flag
  - RO
  - Company
- Historical Factors
  - Deficiencies
  - Detentions



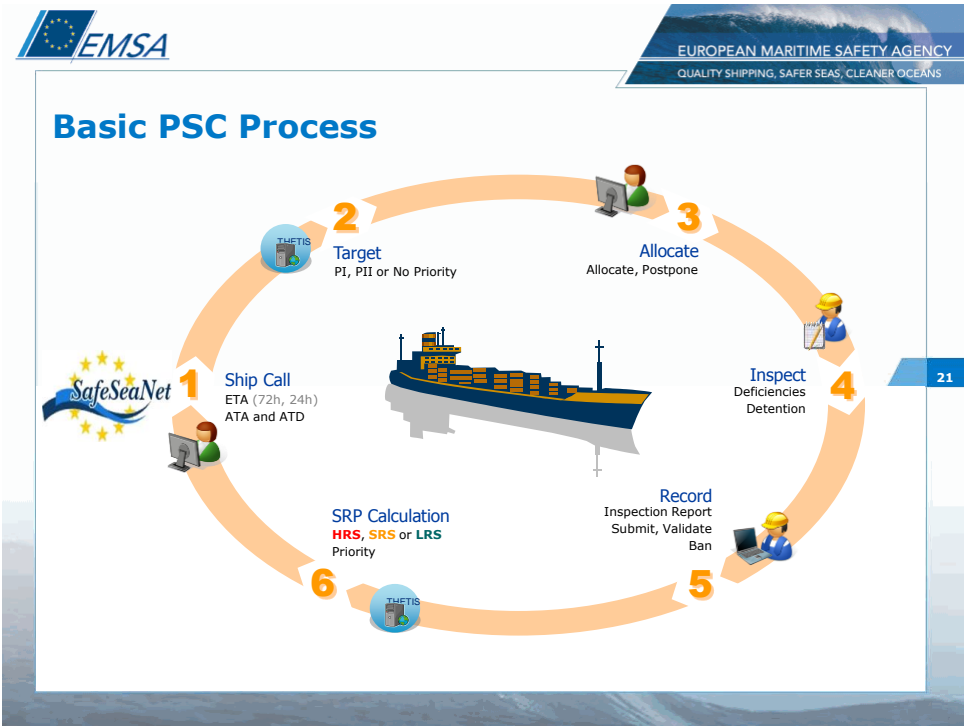
**HRS** – High Risk Ship


**SRS** – Standard Risk Ship

**LRS** – Low Risk Ships

(SRP is recalculated on a daily basis)

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### NIR: Overriding Factors (triggers PI)

- Ships reported by another Member State  
Excluding Unexpected Factors
- Collision, grounding or stranding
- Discharge of harmful substances or effluents
- Erratic or unsafe manoeuvring  
whereby routing measures adopted by IMO, or safe navigational practices and procedures not followed
- Class suspension/withdrawn for safety reasons after last PSC inspection
- Ships not identified in the database

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### NIR: Unexpected Factors (triggers PII)

- Ships reported by pilots or relevant authorities
- Fail to comply with reporting obligations  
ETA
- Outstanding deficiencies  
Only for Code 15 (rectify at next port) and 18 (rectify in 3 months)
- Previously detained more than 3 months ago
- Complain from crew, person or organization with legitimate interest  
Safe operation, living/working conditions and pollution
- Ship operated in a manner to pose a danger
- Reported cargo problems  
Noxious or dangerous cargo in particular
- Presumption of SRP higher than the provided by THETIS
- Certificates by a formerly (PMoU) RO where recognition was withdrawn
- Fail to comply with Baltic Sea recommendations

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22 March 2013 - The whole chain in action

- 1. CleanSeaNet detection on 22 March in Croatian waters. Analysis shows that the spill was detected approximately 5 hours after the discharge.
- 2. Possible source (MMSI) reported by the CSN service provider. Track available in alert report based on AIS information available in CSNDC
- 3. Slovenia enters an overriding factor message in Thetis regarding a possible pollution in Croatian waters
- 4. Inspectors found (source: feedback in CSN and Thetis) evidence of a discharge of oily products:
  - An OWS line containing oil residues
  - Oil spots on starboard side hull (about 10 square meters)
- 5. The master and the company were fined 4,600.00 Euros. The ship was not detained.

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22 March 2013 - The whole chain in action



CleanSeaNet Alert Report

CROATIA

Acquisition: 2013-03-22 05:16:37 UTC

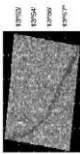
Scene ID: 124923

RADARSAT-2 - SAR\_R - SCWB


List of SpillsGIS Viewer

Details of possible Spill n°1 - OS\_124923\_1

Centre Position		SAR Wind at Center		Area	Length	Width	Class	Alert	Number of	Oilspill
Latitude	Longitude	Direction (From)	Speed (m/s)	(km²)	(km)	(km)	(A/B)	Level	slicks	Warning
44° 43' 43" N	013° 56' 14" E	64.00	3.91	3.44	7.61	0.45	A	Yellow	1	NO



RSAT-2 - 2013-03-22 05:17:20



Meteorological and Ocean Data

Sea State	Wave Height	0.2
Met.Wind	Direction (from)	64
	Speed (m/s)	4.2
Current	Direction (from)	N/A
	Speed (m/s)	N/A

Note: Grey fields are parameters set as "invisible" in the Print Parameters matrix or not available

Comments from Service Provider

Possible source information

N.	Detected	Dist.(Km)	Identified	Type	IMO	Name	MMSI	C/S	Latitude	Longitude	Time (UTC)	Track
1	Unknown	60.5	Yes	N/A	N/A	unknown		unknown	45° 08' 27" N	013° 25' 30" E	03:23:32Z	N/A

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### 22 March 2013 - The whole chain in action



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### Caught by CleanSeaNet

1. CleanSeaNet detection on 25 February 2012 in UK territorial waters. UK Coast Guard contacts vessel.

2. Master indicates a tank cleaning operation of palm oil that stopped at 13.5 nautical miles from the coast

3. CleanSeaNet clearly shows the ship discharging within the 12 nautical miles limit

4. Company pleads guilty


5. Fined £15,000 + £7,500 costs



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CEDRE Info Day


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### Caught by CleanSeaNet




CleanSeaNet Oil Spill Warning

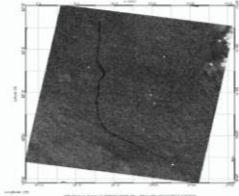
Scene ID: 19294

UNITED KINGDOM

Acquisition: 2012-02-25 10:37:49 UTC

ENVISAT - ASAR/WS





Possible Spill

Centre Position	
Latitude	Longitude
50° 00' 22" N	005° 59' 11" W

Meteorological and Ocean Data

Sea State	Wave Height
Met.Wind	Direction (from)
	Speed (m/s)
Current	Direction (from)
	Speed (m/s)

Note: Grey fields are parameters set as "invisible" in the Print Parameters matrix or not available

Possible source information


N.	Detected	Dist.(Km)	Identified	Type	IMO	Name	MMSI	C/S	Latitude	Longitude	Time (UTC)	Track
----	----------	-----------	------------	------	-----	------	------	-----	----------	-----------	------------	-------

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Mail: [MaritimeSupportServices@emsa.europa.eu](mailto:MaritimeSupportServices@emsa.europa.eu)

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### Caught by CleanSeaNet




CleanSeaNet Alert Report

Scene ID: 19294

UNITED KINGDOM

Acquisition: 2012-02-25 10:37:49 UTC


ENVISAT - ASAR/WS



Comments

List of possible spills

Spill # on map	Spill Identifier	Centre Position		Area (km²)	Length (km)	Width (km)	Alert	Oil Spill Warning Issued	Possible Source	
		Latitude	Longitude						Detected	Identified
1	OS_19294_2	49° 59' 37" N	006° 00' 12" W	20.79	36.4554	8.8846	Red	N/A	Yes	No
2	OS_19294_3	53° 38' 47" N	003° 14' 03" W	7.34	4.1814	2.5221	Green	N/A	Yes	No
3	OS_19294_4	50° 22' 58" N	002° 14' 32" W	1.72	5.396	0.7452	Green	N/A	Yes	No


Note: Possible spills outside alert area are presented on map as  - Additional spills may also have been reported outside the map - Please consult GIS Viewer

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### Caught by CleanSeaNet



CleanSeaNet Alert Report

UNITED KINGDOM

Acquisition: 2012-02-25 10:37:49 UTC

Scene ID: 19294

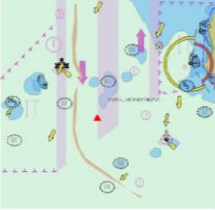
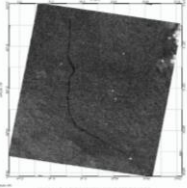
ENVISAT - ASAR/WS

List of Spills

GIS Viewer

Details of possible Spill n°1 - OS\_19294\_2

Centre Position		SAR Wind at Center		Area	Length	Width	Class	Alert	Number of	Oilspill
Latitude	Longitude	Direction (From)	Speed (m/s)	(km²)	(km)	(km)	(A/B)	Level	slicks	Warning
49° 59' 37" N	006° 00' 12" W	0	0	20.79	36.4554	8.8848	A	Red	1	Unknown



Meteorological and Ocean Data

Sea State	N/A	Wave Height	0
Met.Wind		Direction (from)	0
		Speed (m/s)	0
Current		Direction (from)	N/A
		Speed (m/s)	N/A

Note: Gray fields are parameters set as "invisible" in the Print Parameters matrix or not available

Comments from Service Provider

Possible source information


N.	Detected	Dist.(km)	Identified	Type	IMO	Name	MMSI	C/S	Latitude	Longitude	Time (UTC)	Track
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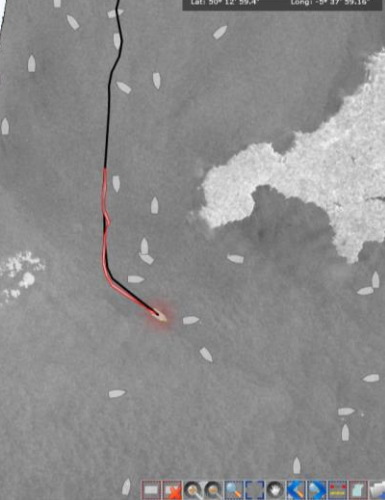
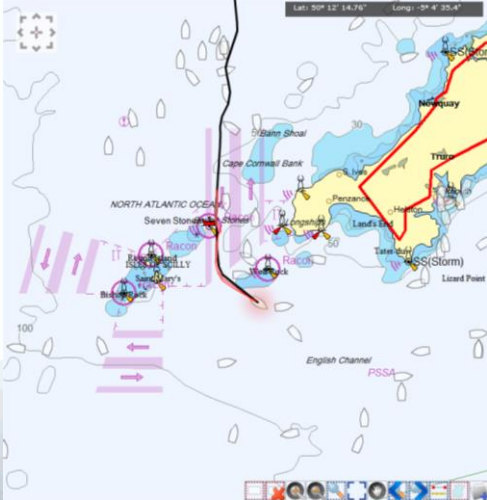
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### Caught by CleanSeaNet



Lat: 50° 12' 14.76" Long: -5° 4' 35.4"

Lat: 50° 12' 59.4" Long: -5° 37' 59.16"

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