


EUROPEAN MARITIME SAFETY AGENCY  
QUALITY SHIPPING, SAFER SEAS, CLEANER OCEANS

### SAFEMED III Seminar on EMSA's Oil Pollution Response Services


13th-14th May 2014, Lisbon

#### Role of EMSA – CleanSeaNet

Marc Journel/Siegfried Schmuck  
Unit C3 – Satellite based monitoring services



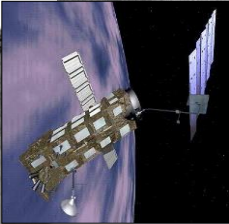
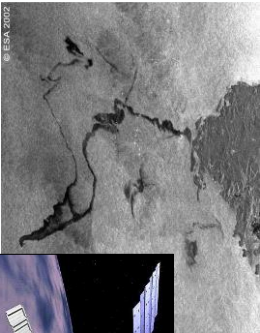
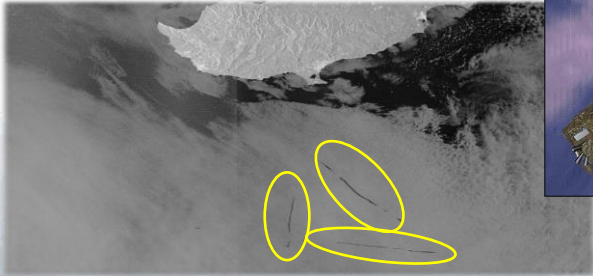
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### CleanSeaNet

- 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

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**Supporting enforcement** actions by the Coastal States

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

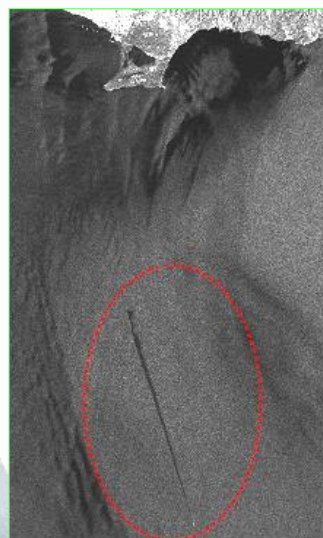
Supporting response operations to **accidental pollution**




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## 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**



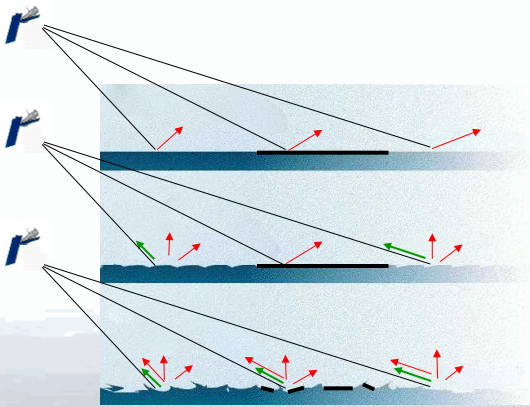
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## Oil Slick Detection in SAR images

### 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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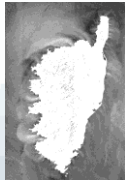



## Oil Slick Detection in SAR images – Look-alikes

- 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...




Current fronts

Low wind, rain cells and oil seepage

Algae

Land breeze

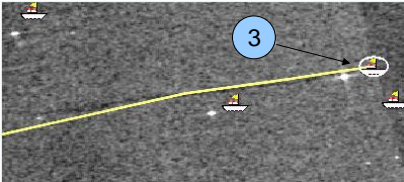
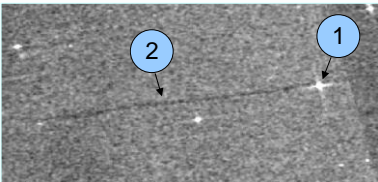
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### Detection of Discharging Vessels

- 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

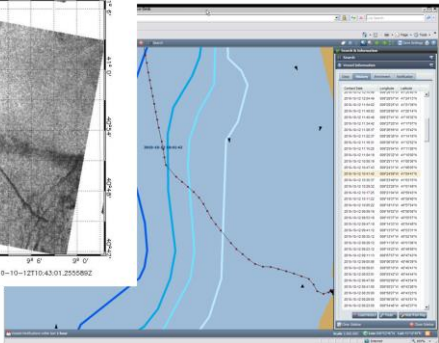
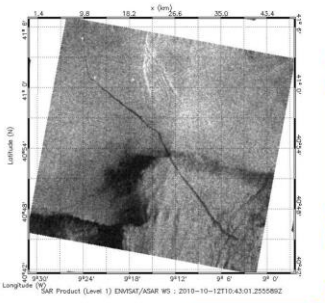
SafeSeaNet interlinks all national SafeSeaNet information systems

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### 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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### 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

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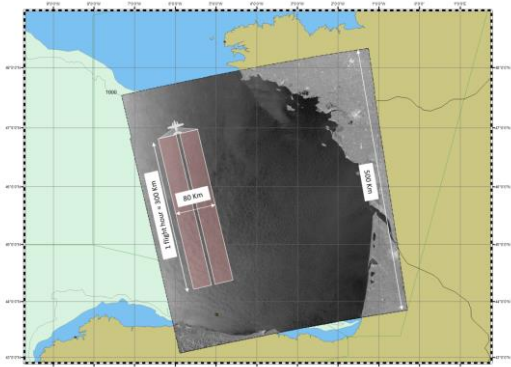




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### Catching Polluters – On Site Follow-up

- 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)



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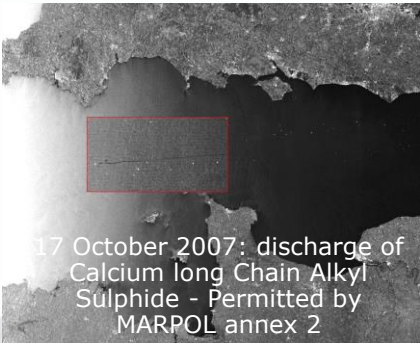
Statistics on CSN detections  
Checked within 3 hours  
50% confirmed



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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



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

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




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

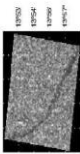
Scene ID: 124923

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 - 2613-03-22 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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### Caught by CleanSeaNet



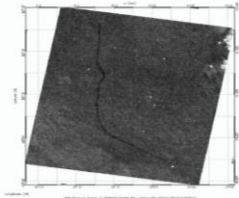

CleanSeaNet Oil Spill Warning


UNITED KINGDOM

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

Scene ID: 19294

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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EMSA Maritime Support Services 24/7 - Tel.: +351 21 1209 415 - Fax: +351 21 1209 480

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

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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

[GIS Viewer](#)




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

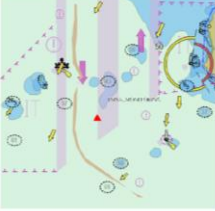
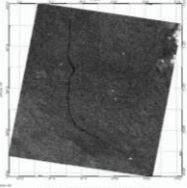
ENVISAT - ASAR/WS

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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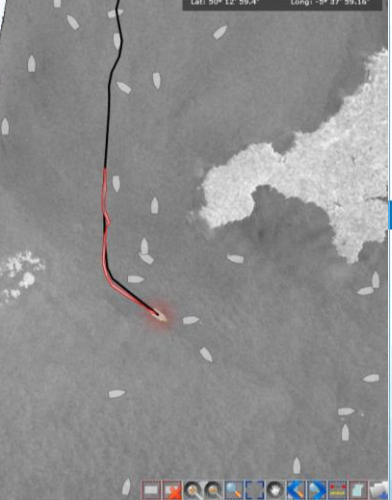
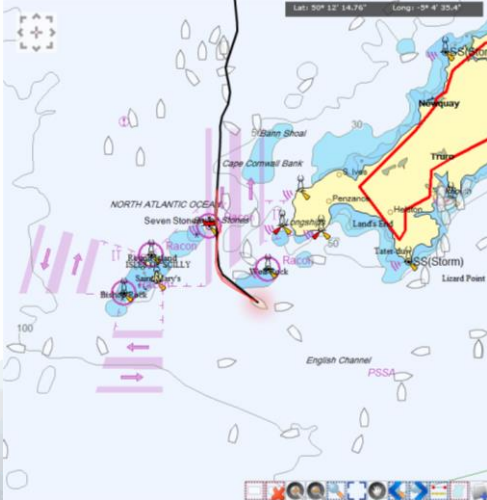
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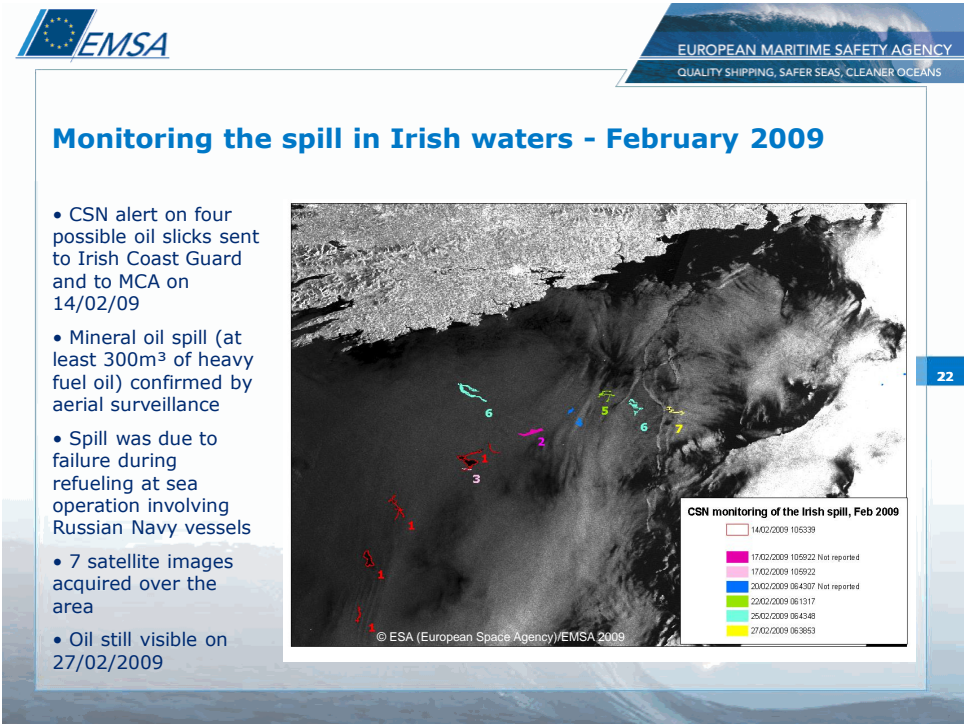
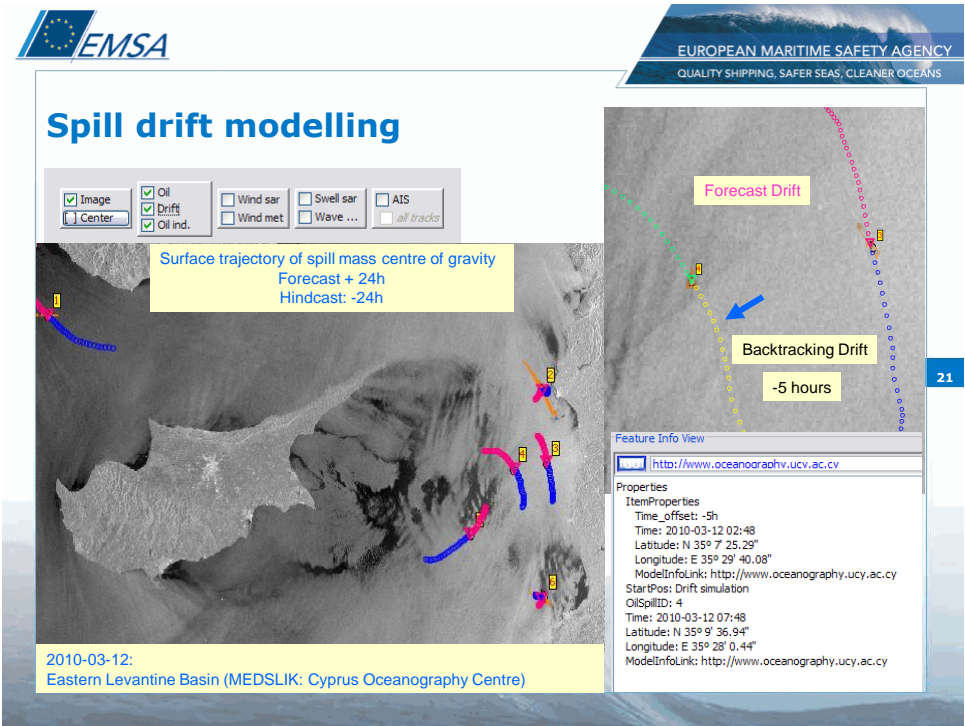
### Caught by CleanSeaNet




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CEDRE Info Day

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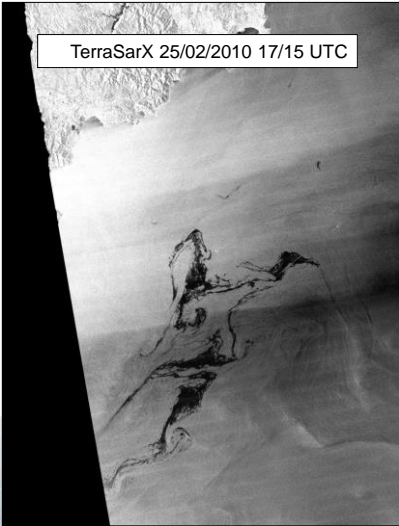


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### Access to other sensors via GMES for emergency support

- CosmoSkyMed
- TerraSarX
- Medium and High resolution Imagery

Example: support to French authorities in February 2010:



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