



GI WACAF Webinar Series

Webinar #4

The responder's toolbox: part 1 – at sea response techniques

November 2020

Julien Favier
GI WACAF Project Manager

The Global Initiative for West, Central and Southern Africa

- **Launch of the Project in 2006** in the framework of the Global Initiative (GI) launched in 1996



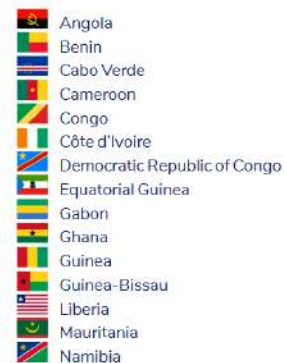
ipieca

- **Objective:** enhance the capacity of 22 partner countries to prepare for and respond to oil spills, so that they can better protect their marine and coastal environment and communities

- **Activities:**

- National or sub-regional workshops,
- Trainings (tailored to the needs),
- Exercises (table-top and deployment),
- Biennial conferences,
- Technical assistance

Countries covered by the GI WACAF Project



In a nutshell

Encourages partner countries **to ratify and implement international conventions** from IMO and other UN bodies.

A joint endeavour of the public and private sectors to manage oil spill risks and mitigate associated impacts.

Supports **22 African partner countries** in the development and implementation of sub-regional and national **oil spill preparedness and response systems**.



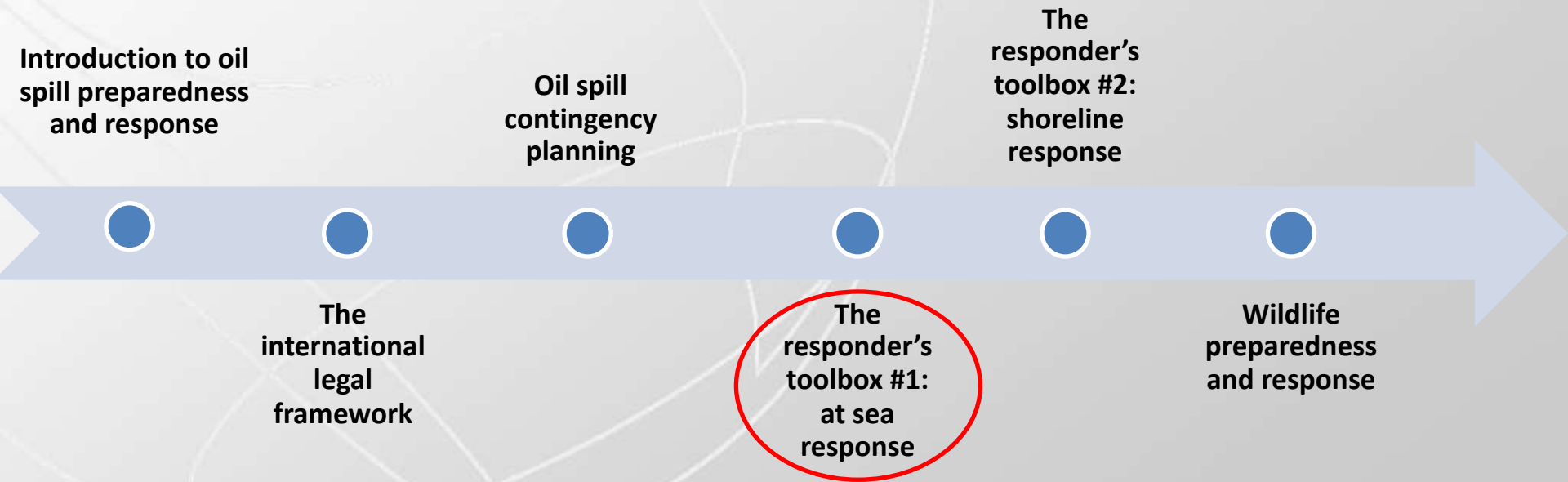
Encourages **better communication and collaboration** between governments and industry.

Organizes **workshops, training courses and exercises**.

Maintains a constant liaison with partner countries and the industry to **provide tailored capacity-building solutions**.

GI WACAF webinar series

A series of webinars covering the various dimensions of oil spill preparedness and response (technical, legal, institutional, operational)



Introduction to oil spill preparedness and response

The international legal framework

Oil spill contingency planning

The responder's toolbox #1: at sea response

The responder's toolbox #2: shoreline response

Wildlife preparedness and response

Webinar #4

The responder's toolbox: part 1 – at sea response techniques

Objectives



1. Gain an understanding of the **available response techniques during an oil spill at sea** and understand their key strengths and limits;
2. Gain knowledge of the **available decision-making tools** when choosing between the different at-sea response techniques available, including NEBA and SIMA; and
3. Gain knowledge on the challenges and successes faced when responding to an oil pollution at-sea through **case studies** and lessons learned.

Speakers

1. **Lucy Short**, Principal Consultant, OSRL - *Introduction to at-sea response techniques*



2. **Dr. Annabelle Nicolas-Kopec**, Senior Technical Adviser, ITOPF – *Presentation of a case study on at-sea response techniques*



3. **Peter Taylor**, Senior consultant and OSPRI Project Manager – *Decision-making tools: NEBA and SIMA*



Thank you for your attention!

More on our website:

<https://www.giwacaf.net/en/>



Julien Favier
GI WACAF Project Manager



GIWACAF Webinar #4

The responders toolbox: part 1 - at sea response techniques

Lucy Short, Oil Spill Response
18th November 2020

OSRL

Who we are

Largest
International
industry funded
cooperative

Owned by major oil
& gas production /
transportation
companies

Train and respond
effectively anywhere
in the world



OSRL

Where we are



At sea response options - overview

Aim

Understand the main at sea response options that may be used

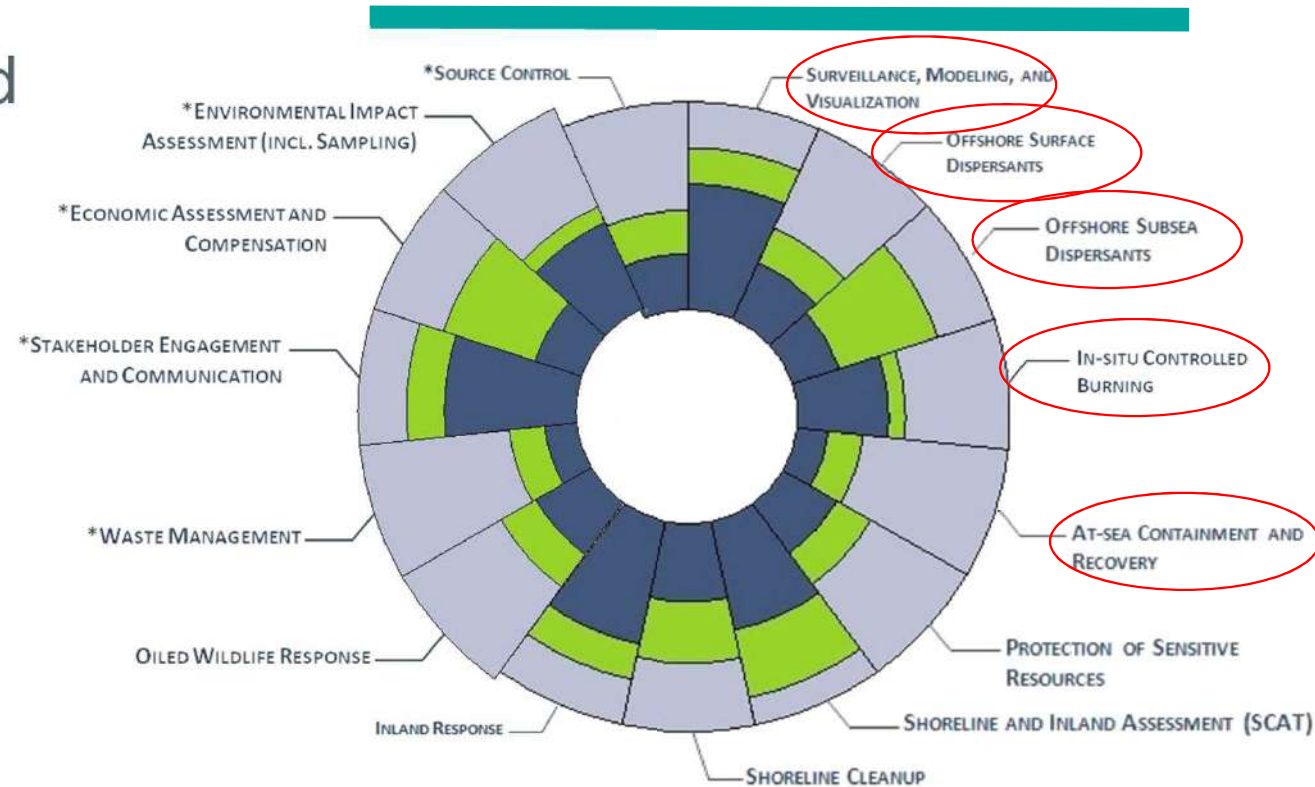
Learning Objectives

- > Name the primary at sea response techniques available
- > Explain when each might be used
- > Explain their key strengths and limitations
- > Explain the role of preparedness to ensure a fast and efficient response at sea



At sea response options

- Surveillance, modelling and visualisation
- Containment and recovery
- Surface dispersants
- Sub-surface dispersants
- Controlled in-situ burning





Surveillance, Modelling and Visualisation

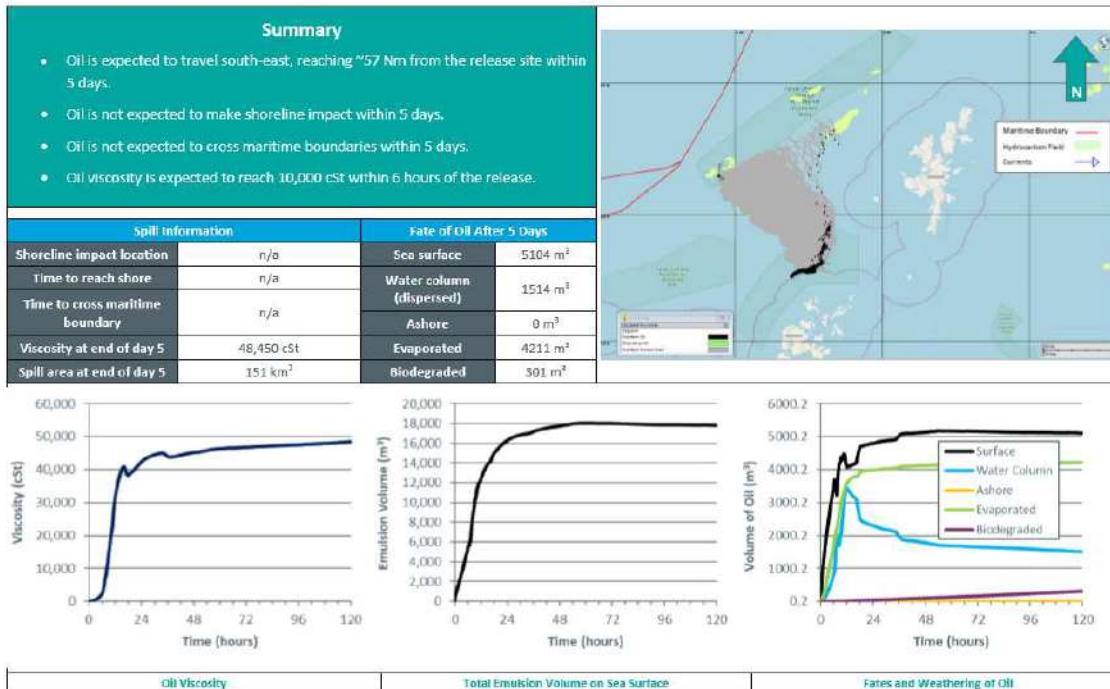
Surveillance

Why carry out surveillance?

- 💧 Clarification of initial reports
- 💧 Elimination of 'false alarms'
- 💧 Locate
- 💧 Quantification and fate
- 💧 Origin and movement
- 💧 NEBA favours a passive response



Response Modelling



Models are;

- 💧 A tool in the tool box
- 💧 Used along with aerial and/or satellite surveillance

Modelling Caveat:

Response strategies should not be based solely on modelling results

– as with any model, results are dependent on the quality of the environmental parameters and scenario inputs

2D Surface model

- 💧 100% current and 3% wind
- 💧 Based on specific oil properties
- 💧 Need weather forecast



Containment and Recovery

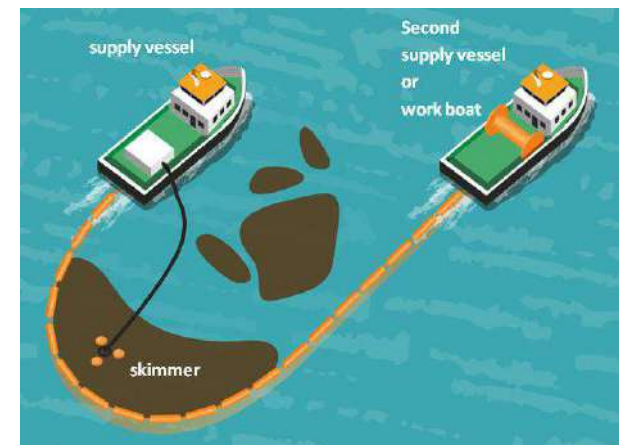
At-sea Containment and Recovery

- The controlled encounter and collection of spilled oil on the waters surface
- Floating Barriers / Booms are used to corral and concentrate the oil to suitable surface thickness to allow the mechanical removal of oil from the sea's surface



At-sea Containment and Recovery

- Used offshore or inshore
- Expect typically < 20% oil recovery
- Operation limited by weather conditions and day light (safety)
- Longer response time
- Requires significant logistical support:
 - Recovered oil storage
 - Spotter planes
 - Oil disposal



Offshore Boom

Types of boom

Inflatable boom



Active boom systems



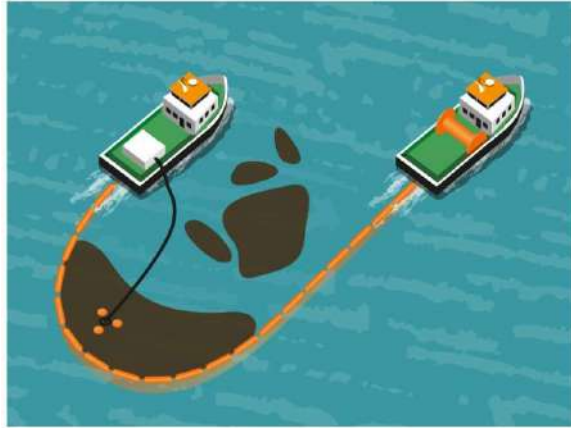
High speed booms



Reasons for booming

- Collection and recovery
- Reduce shoreline impact

Offshore Booming Formations



Offshore Skimmers

Types of skimmer

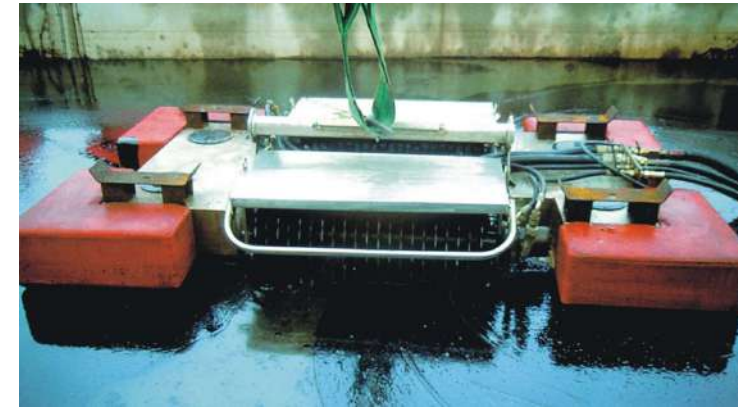
Weir skimmer



Oleophilic skimmer



Mechanical skimmer



Skimmer choice factors

- Type of oil
- Volume of oil

Advantages/disadvantages of Offshore Containment and Recovery



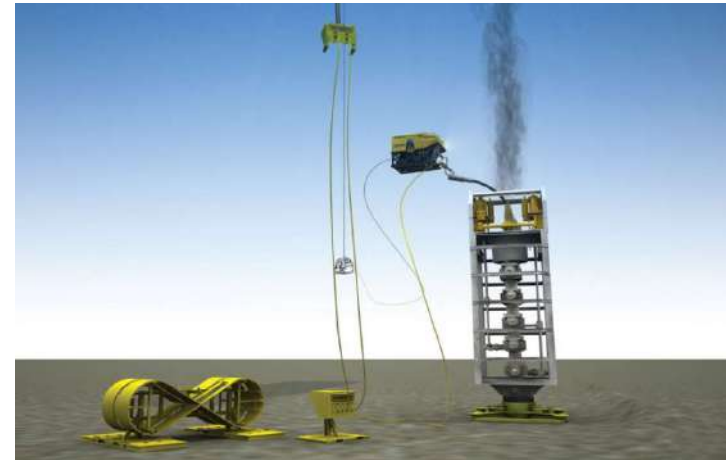
- Oil removed from the water surface
- Various equipment types for operational areas
- Applicable for a broad range of oil types
- 10%-20% recovery rate
- Weather dependant
- Manpower
- Logistics



Dispersants

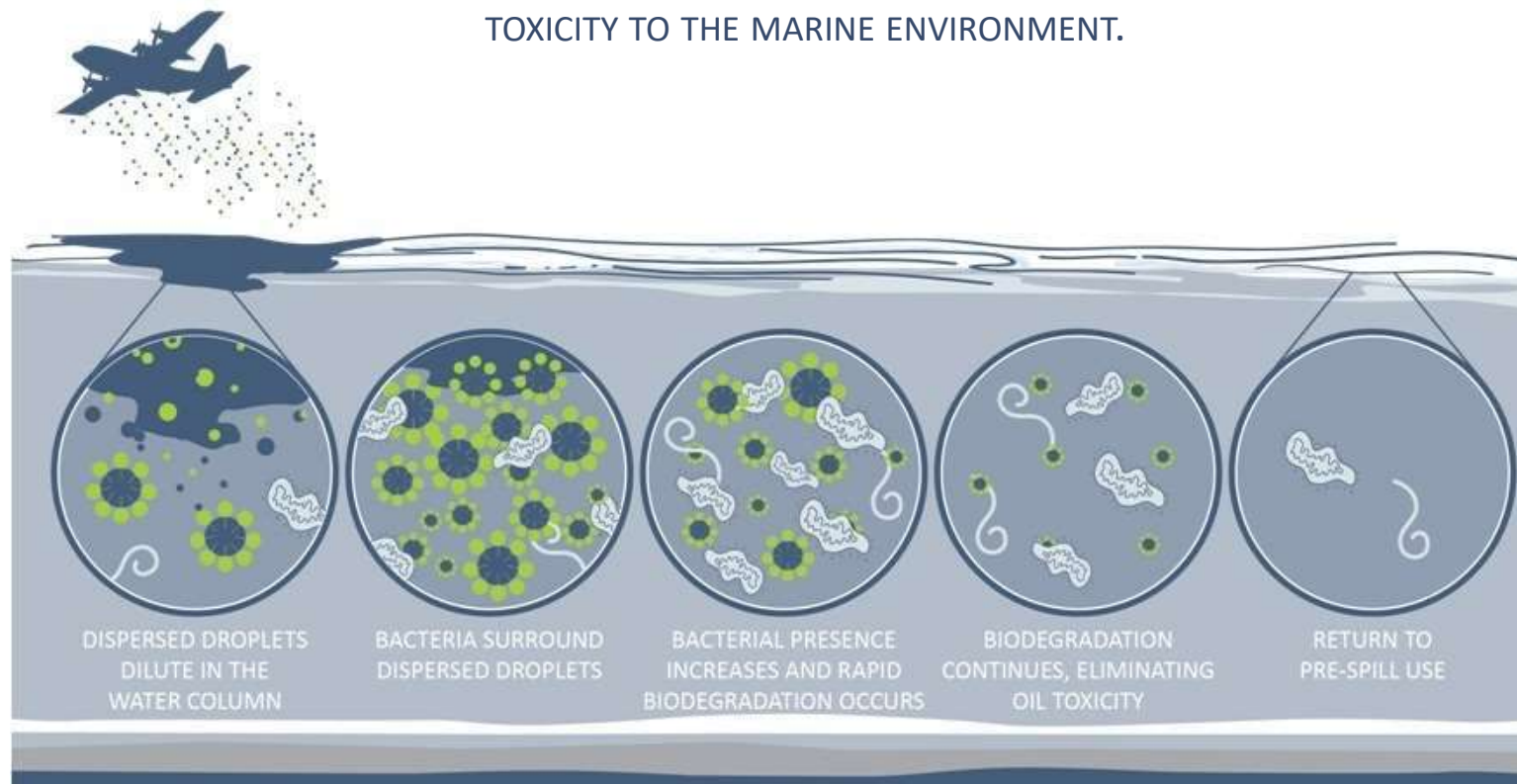
Dispersant Application

- 💧 Aerial
- 💧 Vessel
- 💧 Subsea



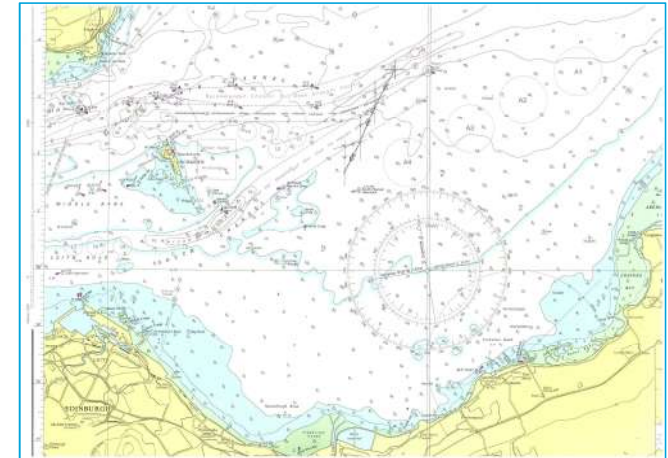
How Do Dispersants Affect Oil Toxicity?

DISPERSANTS HELP TO BREAK APART THE OIL SLICK INTO TINY DROPLETS THAT THEN BIODEGRADE IN THE WATER COLUMN. THIS REDUCES THE EFFECTS OF OIL TOXICITY TO THE MARINE ENVIRONMENT.



Offshore Surface Dispersants Considerations

- Ensure all necessary regulatory approvals are obtained
- Regulatory approval is usually needed
- Ensure the correct dispersant oil ratio (DOR)
- Typical surface dispersant : oil ratio of 1:20 for Type 2/3 dispersant

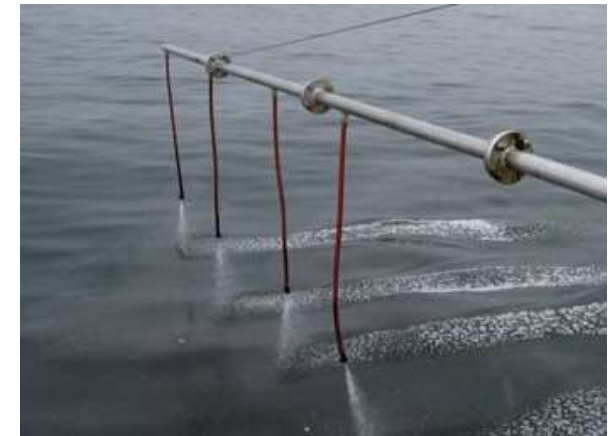


Typical dispersant you may come across

Description and Generation	UK Type	Sprayed from	Recommended treatment rate	Comments
“Concentrate” or “Third generation”	UK Type 3 “Concentrate”	<ul style="list-style-type: none">• Aircraft• Ships• Boats	Low treatment rate 1:20 – 30 (3 – 5%)	Low toxicity Low treatment rate Used undiluted (or ‘neat’)

(Adapted from EMSA Manual of Applicability of Oil Spill Dispersants)

- 💧 Corexit 9500 & 9527
- 💧 Finasol OSR 52 & 51
- 💧 Dasic Slickgone NS & LTSW
- 💧 Agma
- 💧 Super-dispersant 25



A NET ENVIRONMENTAL BENEFIT ANALYSIS (NEBA) IS CONDUCTED FOR SPILL RESPONSE SITUATIONS TO MINIMIZE THE IMPACTS ON PEOPLE AND THE ENVIRONMENT.



BENEFITS

- REACHES AND TREATS SIGNIFICANTLY MORE OIL THAN OTHER RESPONSE OPTIONS
- CAN BE APPLIED OVER A BROADER RANGE OF WEATHER CONDITIONS
- SPEEDS UP OIL REMOVAL FROM THE WATER COLUMN BY ENHANCING NATURAL BIODEGRADATION
- PREVENTS OIL IN A SUBSEA SPILL FROM SURFACING, MITIGATING HARM TO SEA BIRDS, MAMMALS, AND OTHER WILDLIFE
- PREVENTS OIL FROM SPREADING TO SHORELINE, REDUCING RISK FOR SENSITIVE SHORELINE VEGETATION AND WILDLIFE
- REDUCES IMPACT ON COMMUNITY ASSETS AND LOCAL INDUSTRIES

DRAWBACKS

- DOES NOT DIRECTLY COLLECT THE OIL FROM THE ENVIRONMENT, BUT RATHER TRANSFERS IT FROM THE SURFACE TO THE WATER COLUMN WHERE IT CAN BE BIODEGRADED
- POTENTIAL EFFECTS OF DISPERSED OIL ON WATER COLUMN-DWELLING WILDLIFE AND VEGETATION (ANTICIPATE SHORT-LIVED AND LOCALIZED EXPOSURES)
- WILL NOT WORK ON HIGH VISCOSITY FUEL OILS IN CALM, COLD SEAS
- HAS A LIMITED "WINDOW OF OPPORTUNITY" FOR USE
- POTENTIAL IMPACT TO FISHING INDUSTRIES DUE TO PUBLIC MISUNDERSTANDING OF DISPERSANTS' EFFECTS ON SEAFOOD

Dispersant Effectiveness

Visual Monitoring:

No change



Coffee Colour



Milky White



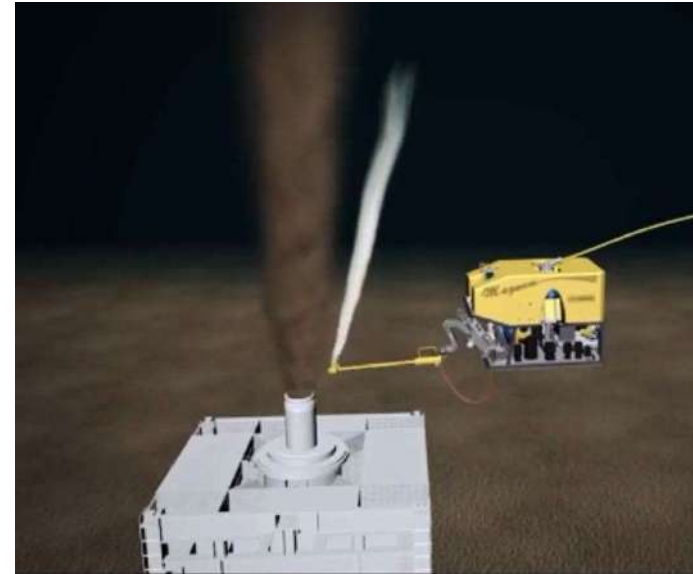
Offshore Subsea Dispersants

Benefits:

- In the case of a subsea blow-out, direct injection at the well head can disperse oil before it reaches the surface
- Intimate mixing improves efficiency, so the dispersant : oil ratio can be decreased to 1:100 or more

Drawbacks:

- Knowledge of baseline data is limited
- Long-term effects?





In Situ Controlled Burning (ISB)

In-situ Controlled Burning

- Very specialist technique
- Needs specialist equipment
- Used for ongoing release



Advantages:

- Used offshore, inland, in snow and ice
- Reduces need for offshore storage

Disadvantages:

- Needs 2-3mm thickness of oil
- Needs ideal weather conditions
- Special permits required
- Atmospheric pollution
- Airborne particulate monitoring required
- Produces residues which do not readily biodegrade



Preparedness

Role of preparedness

Exercises and training

- Practice makes perfect
- Ensures the users are familiar with their actions
- Webinars

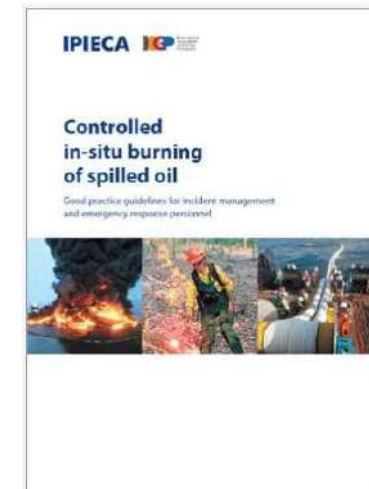
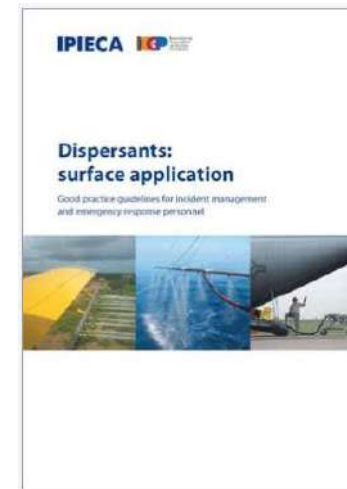
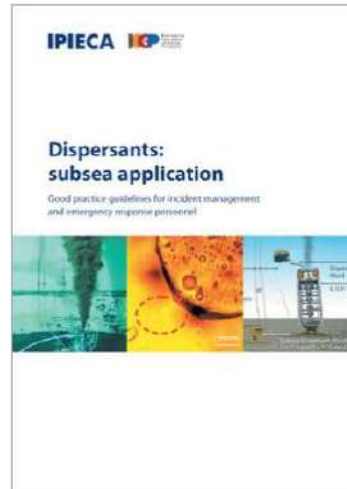
Contingency planning

- Understanding your risk
- Preparing for your worst case scenario
- Stakeholder engagement
- Possible pre-approvals
- Relationship building
- Identifying a preferred response technique

Equipment

- Having access to the right equipment
- Selection of the type, number and amount of equipment
- Selection of the most efficient recovery device
- Access to VOO
- Proximity to ports/staging areas
- Access to competent, trained personnel

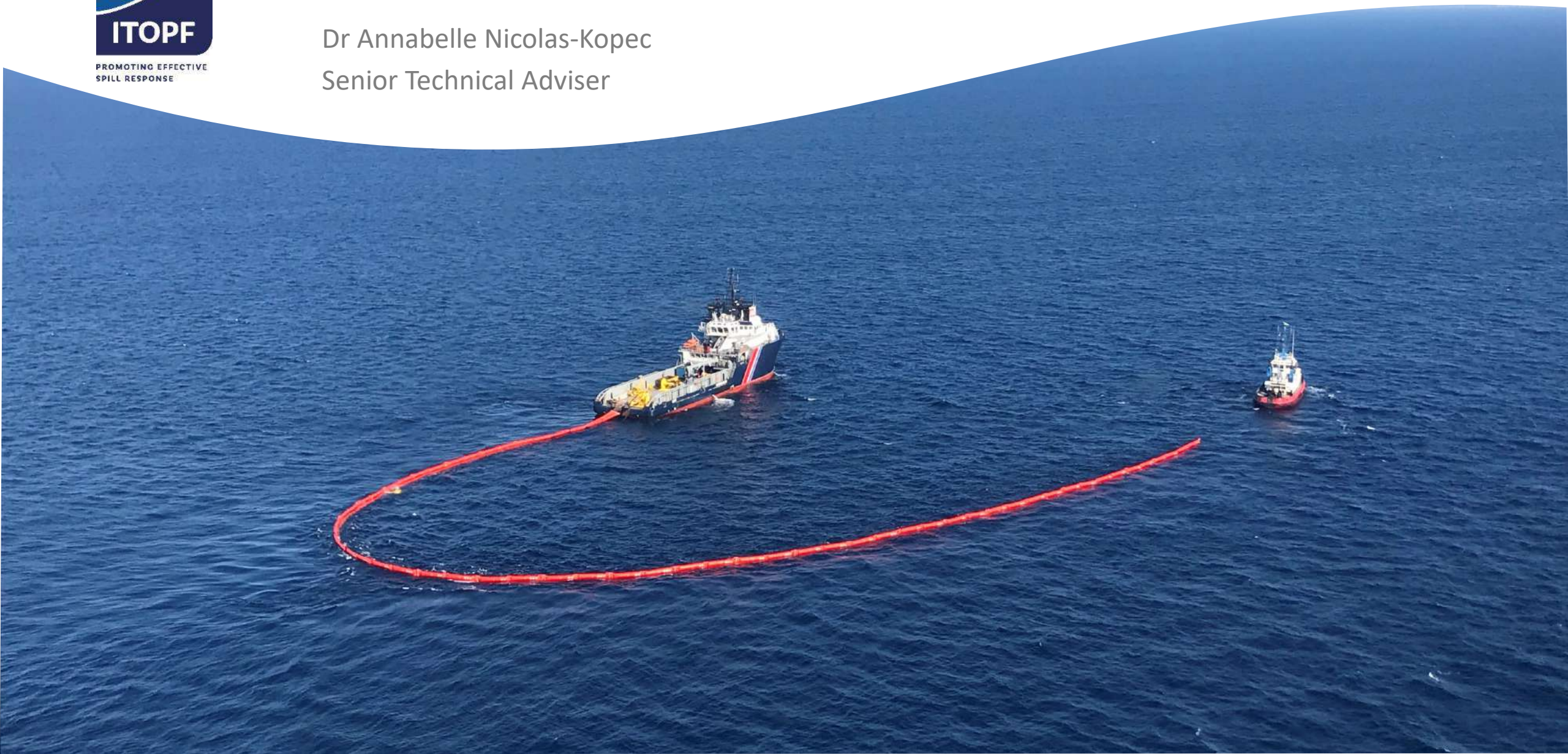
At sea response options – online reading and resources

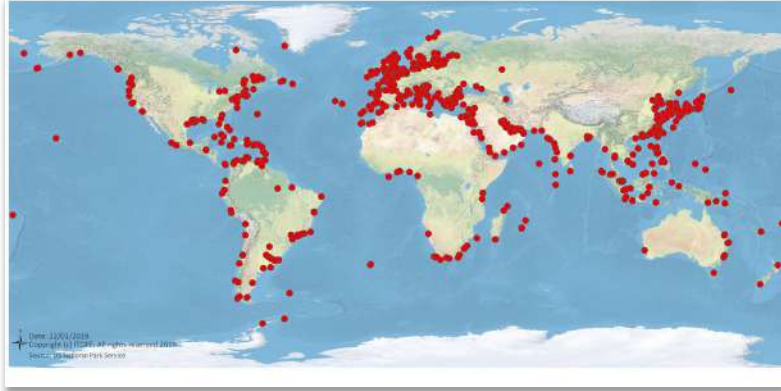




Case Study: At sea response

Dr Annabelle Nicolas-Kopec
Senior Technical Adviser





- Non-profit making organisation
- Role: on-site spill response advice
- Available 24 hrs a day, 365 days a year
- Attendance at 15–25 incidents/year
- Total of ~800 spills in 100 countries

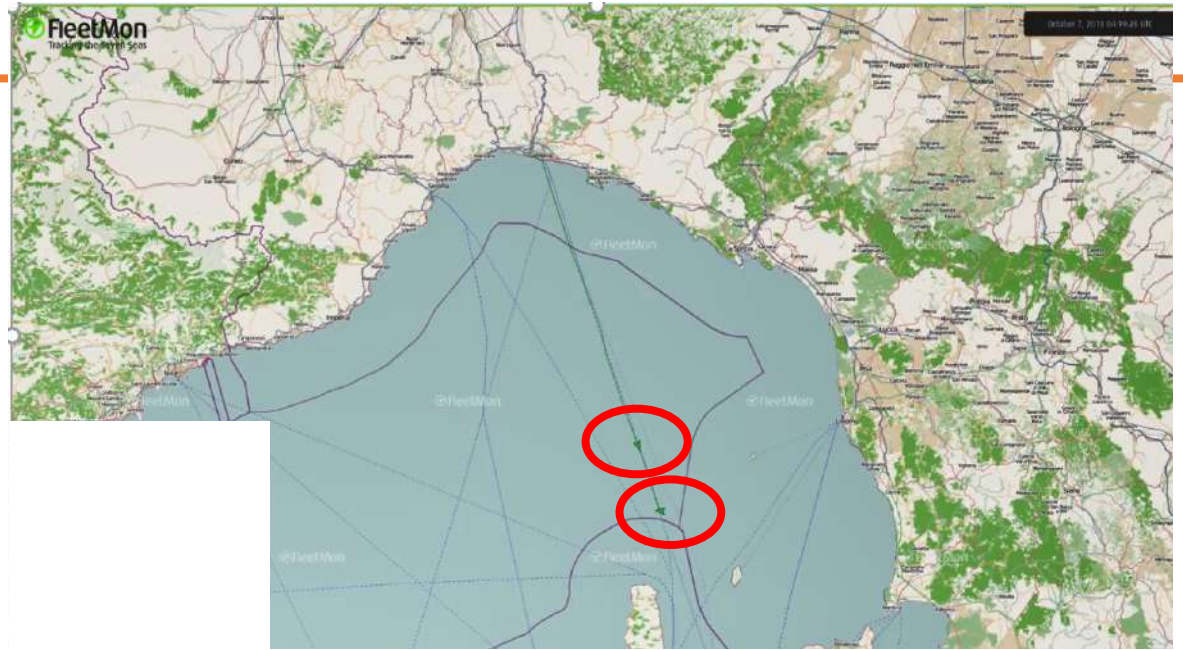
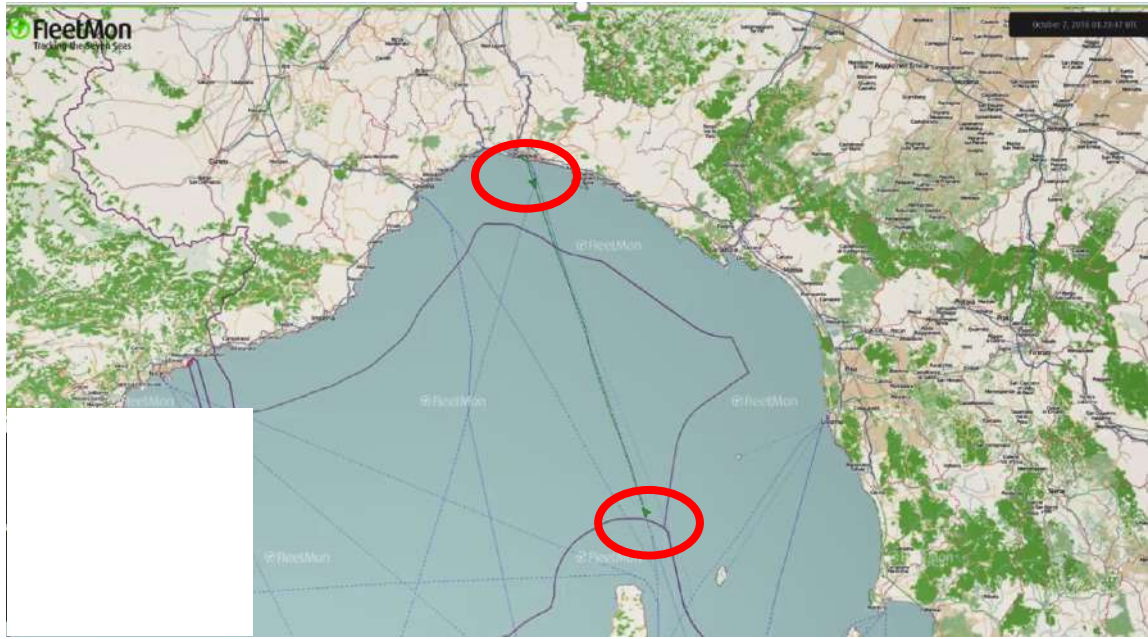


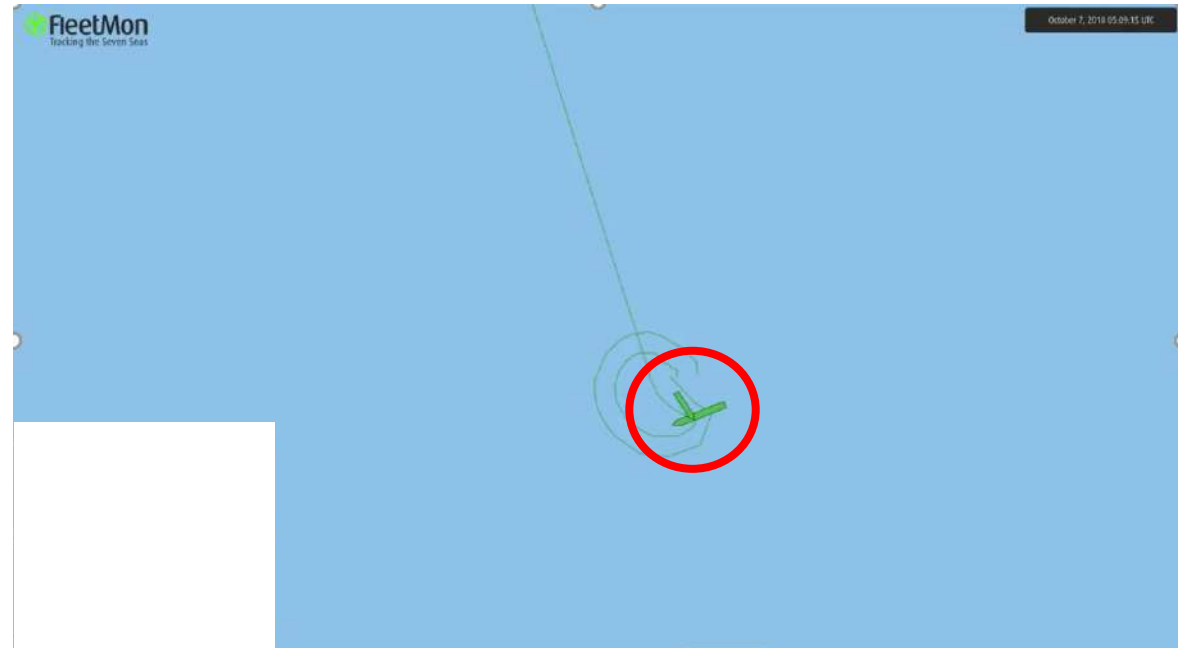
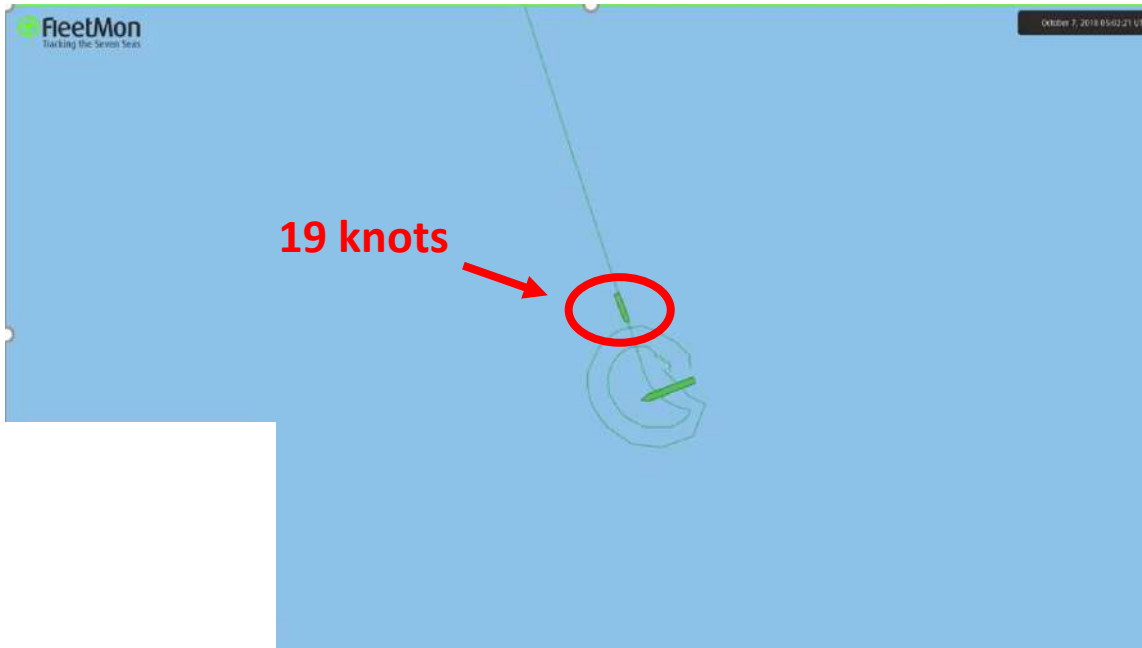
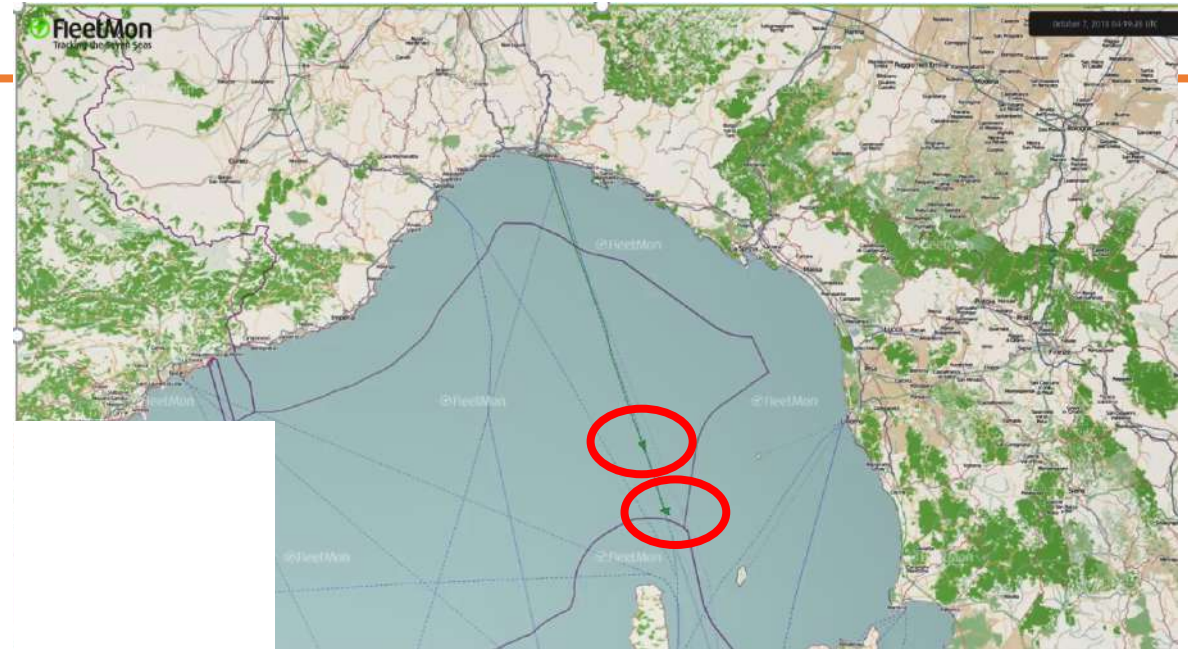
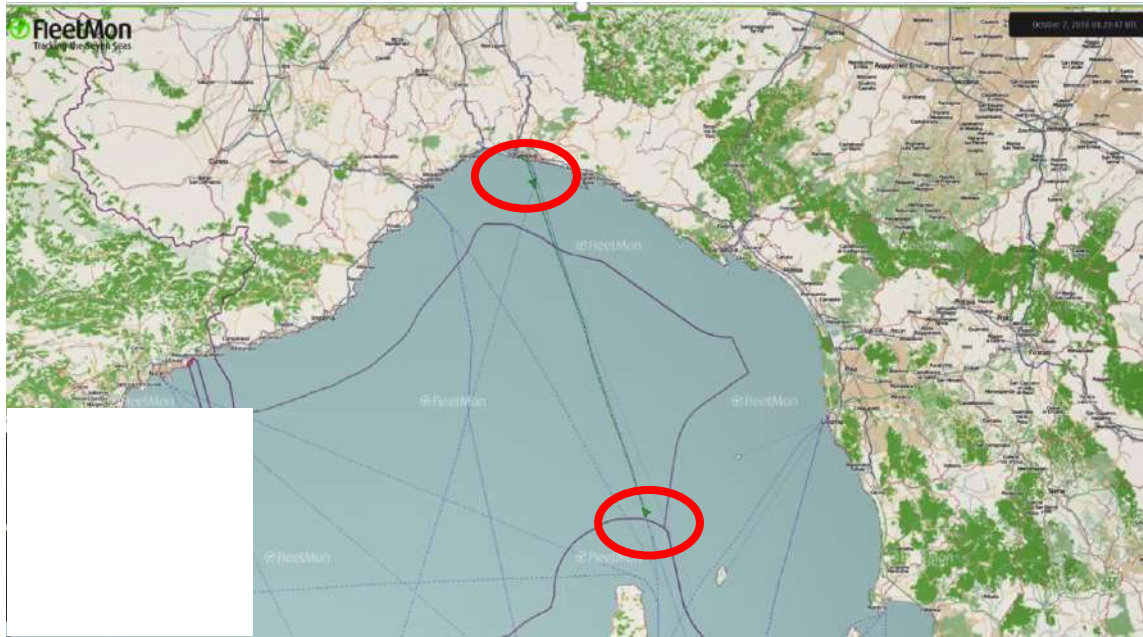


- Non-profit making organisation
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- Available 24 hrs a day, 365 days a year
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- Technical Team with 15 responders
- Scientific or technical background
- Based in London but we operate globally



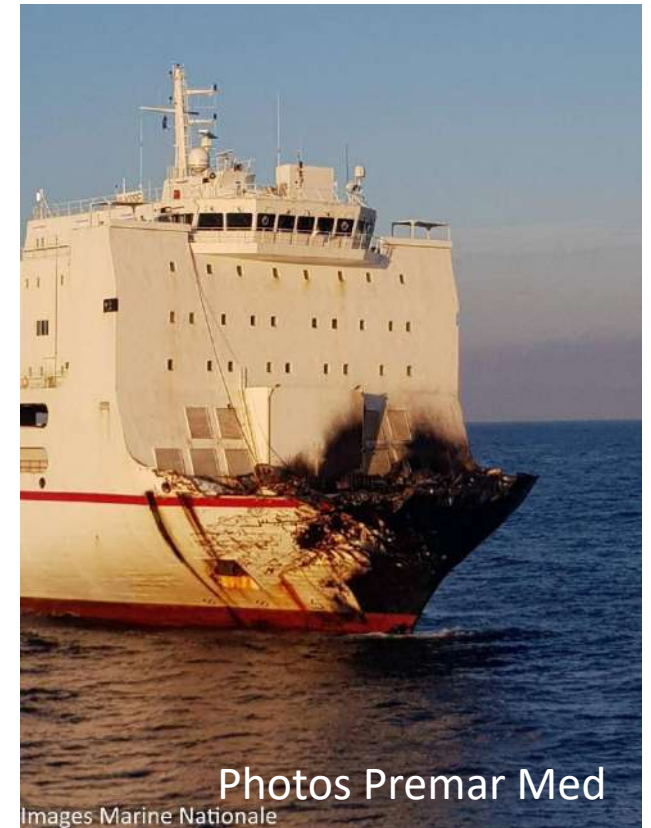




- 15NM off Cap Corse, France
- Collision between a Ro-Ro/passenger ship and a containership
- 694 m³ off MFO 380 onboard
- ~ 550 m³ lost at sea

NOTE: The bunker certificate and the exact properties of the bunker fuel can be long to obtain. The first actions at sea are often based on generic bunker properties.





Vessels separated themselves without assistance, due to a combine force of the inclement sea and the previous dislodging attempts

7 October (D-0)



Aspect of the slick at sea over time

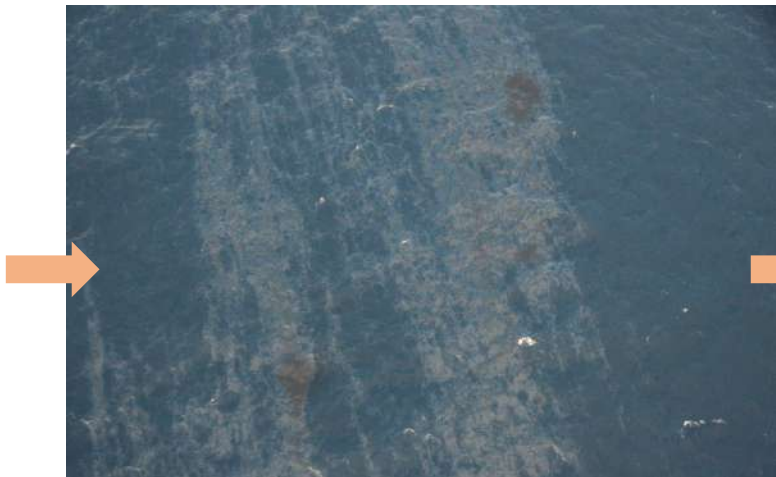
7 October (D-0)



8 October (D-1)



9 October (D-2)

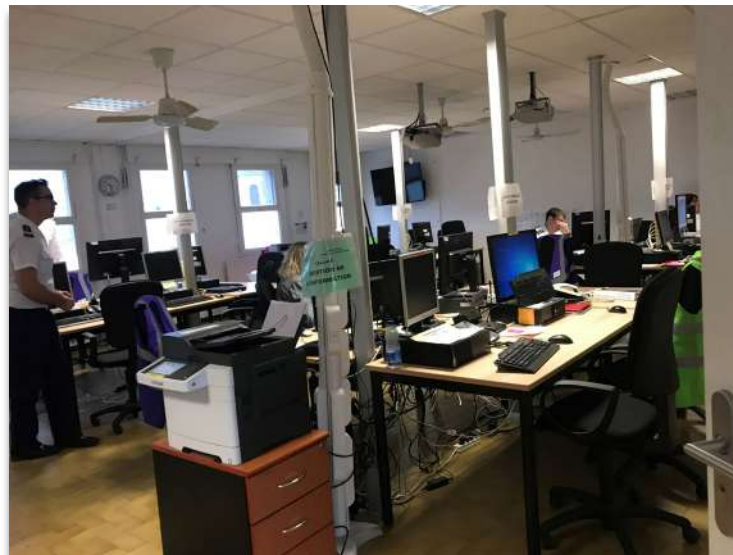


10 October (D-3)



12 October (D-5)

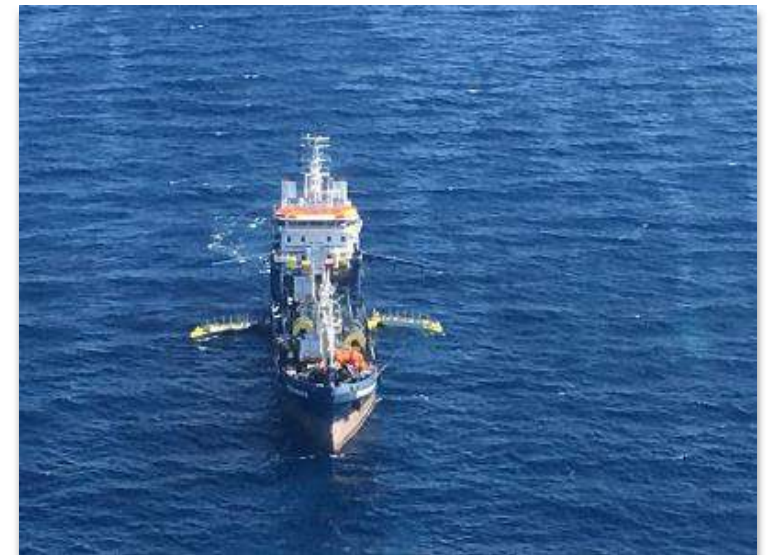
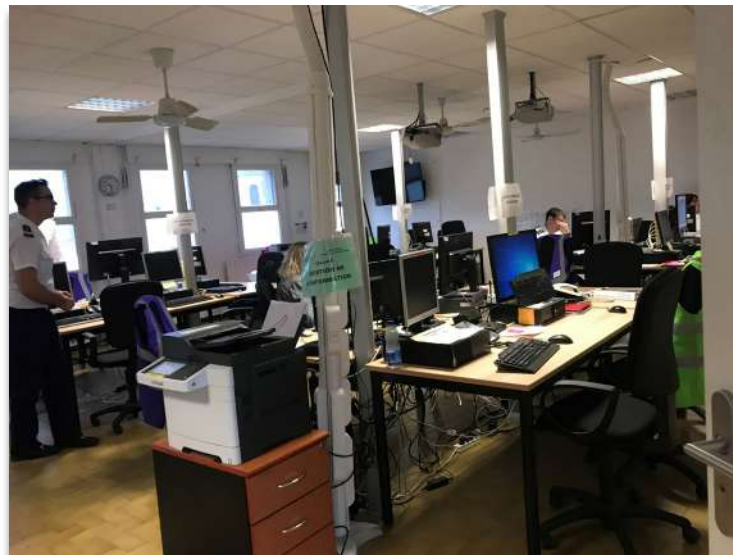
- Coordination by France in French waters
- OSC onboard JASON but Command Centre in Toulon – Issues of communication
- Cooperation with Italy and Monaco through regional agreement RAMOGEPOL
- Italian coordination in Italian waters



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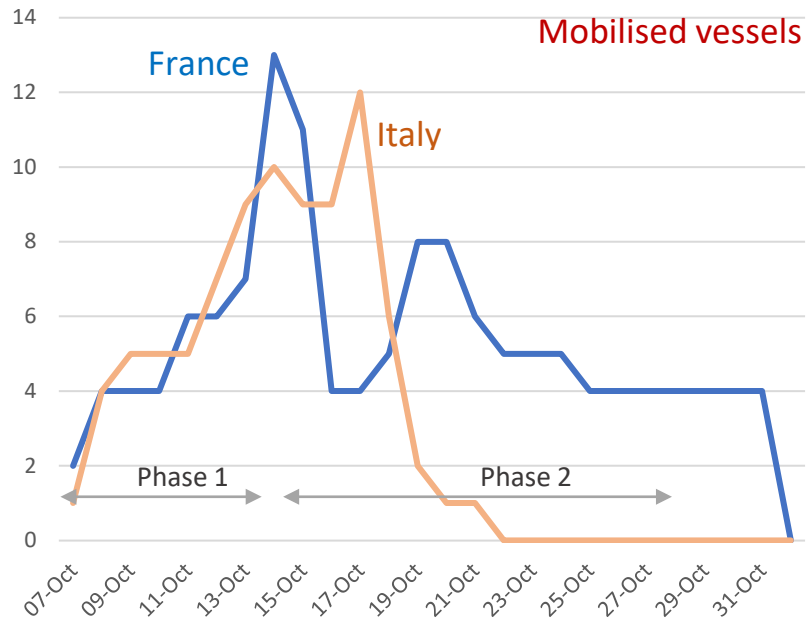
Areas to improve

- Civil operation led by Military (Navy, Préfecture Maritime) but antipol experts are civilians : issues with access if documents/polrep → delays in advice
- Italian representative present in the Command Centre only after 4 days. Difficult to obtain information on Italian vessel and establish common at sea strategy.



Vessels involved in the response

- Up to 34 French and Italian vessels involved
- Use of EMSA anti-pollution vessel BREZZAMARE



First phase – response offshore

- At sea response for 20 days with different phases and assets
- First phase: containment and recovery by big ETVs



Containment
Booms in U configuration
Or sweeping arms





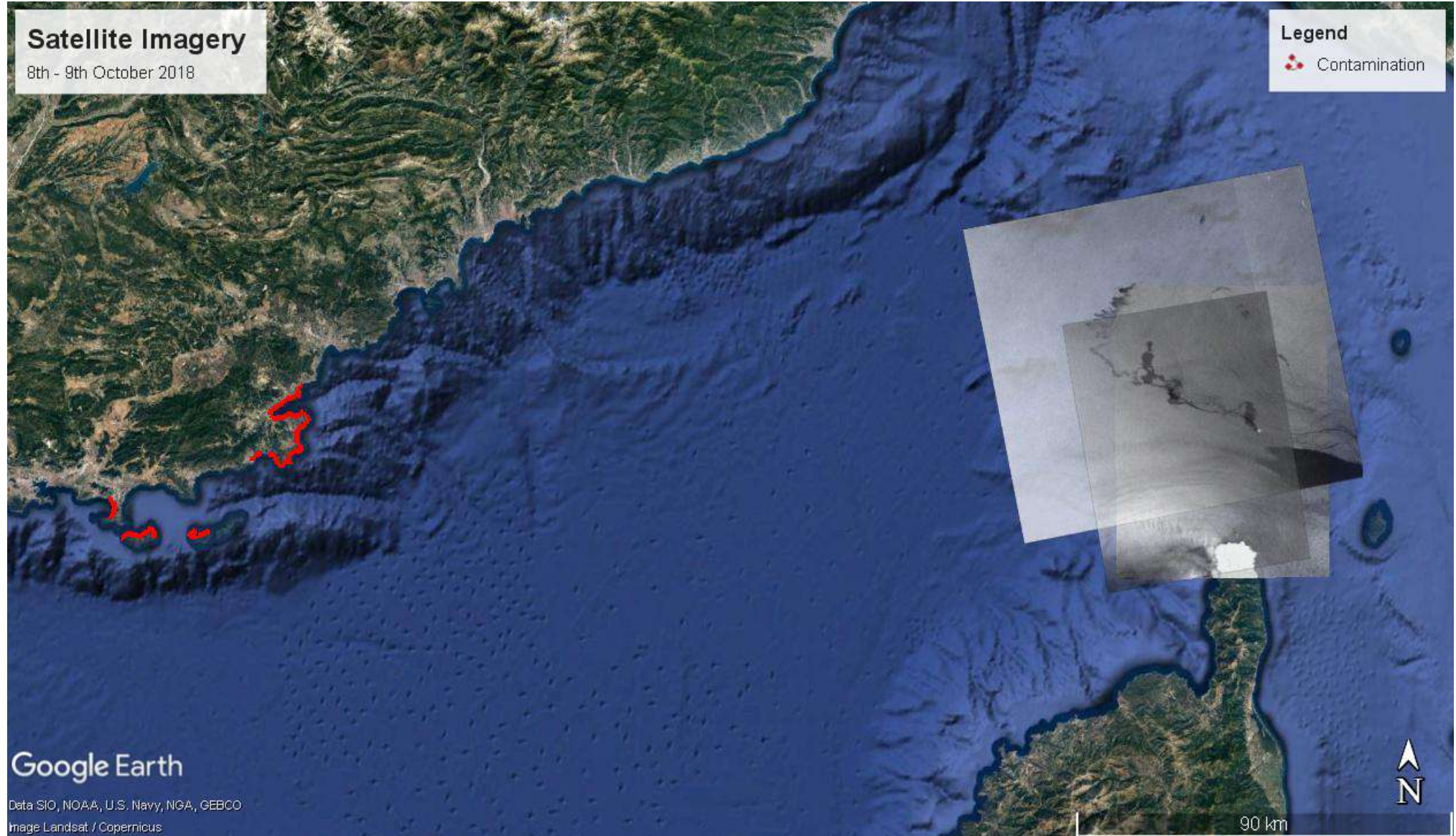
- Up to 11 aircrafts involved (crew transfer, aerial observation, security etc.)
- ~ 2 daily flights to reposition antipol vessels on the slicks at the beginning and middle of the day

Issue: Lengthy processing time of the data received through the polreps

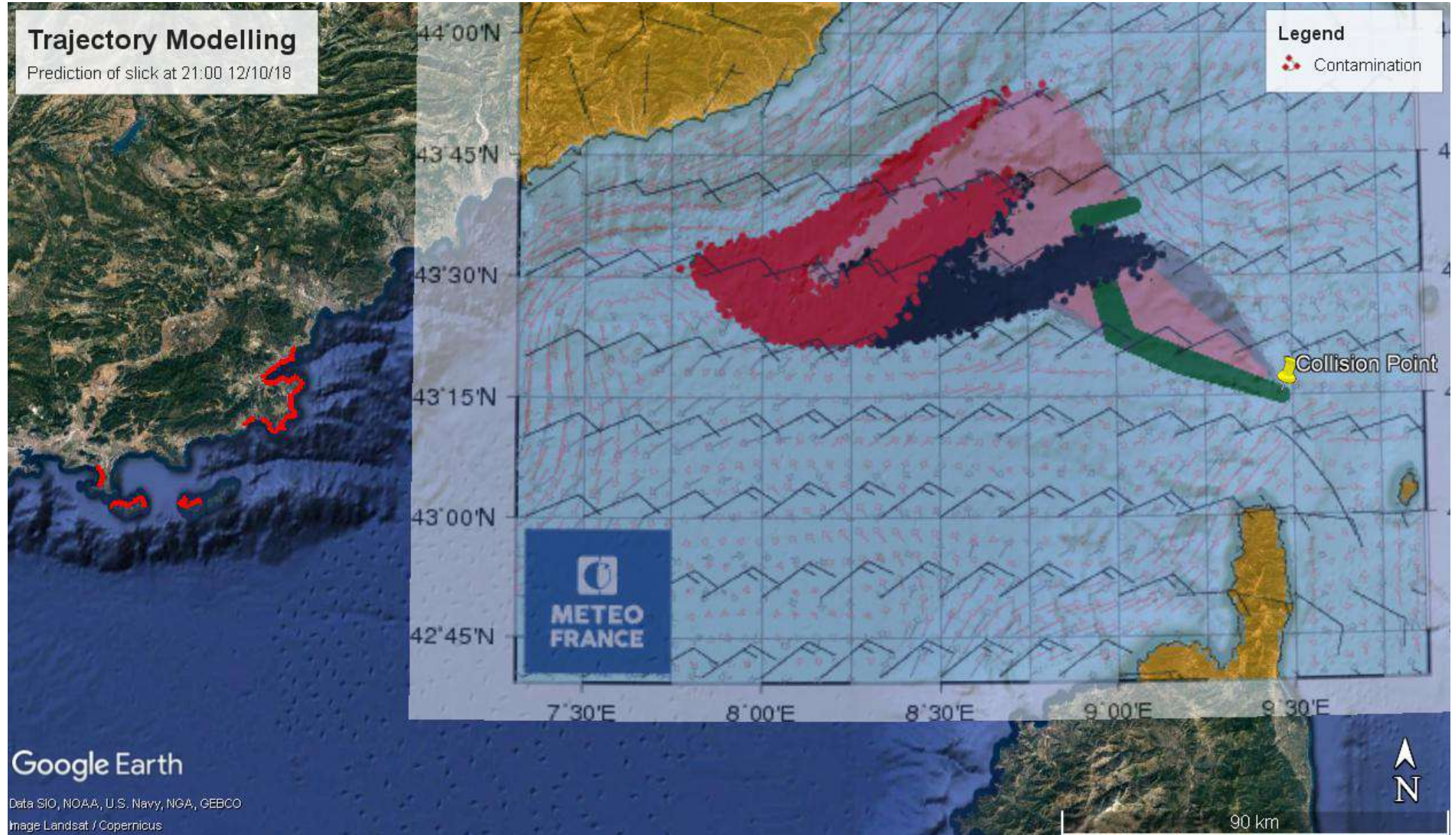
- Use of a UAV after 10 days of response, on board an ETV for better guidance of the response means on the small slicks.

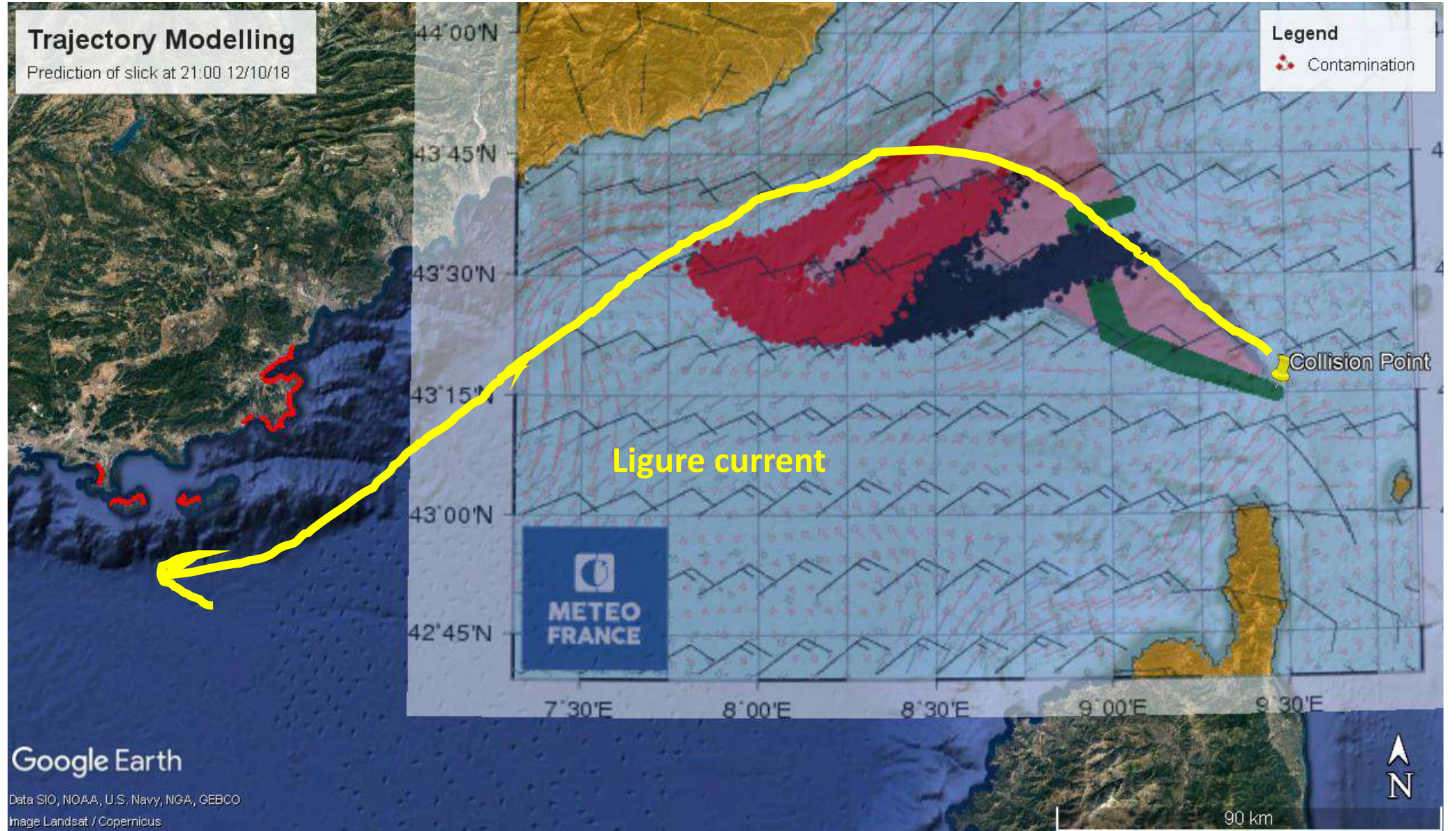




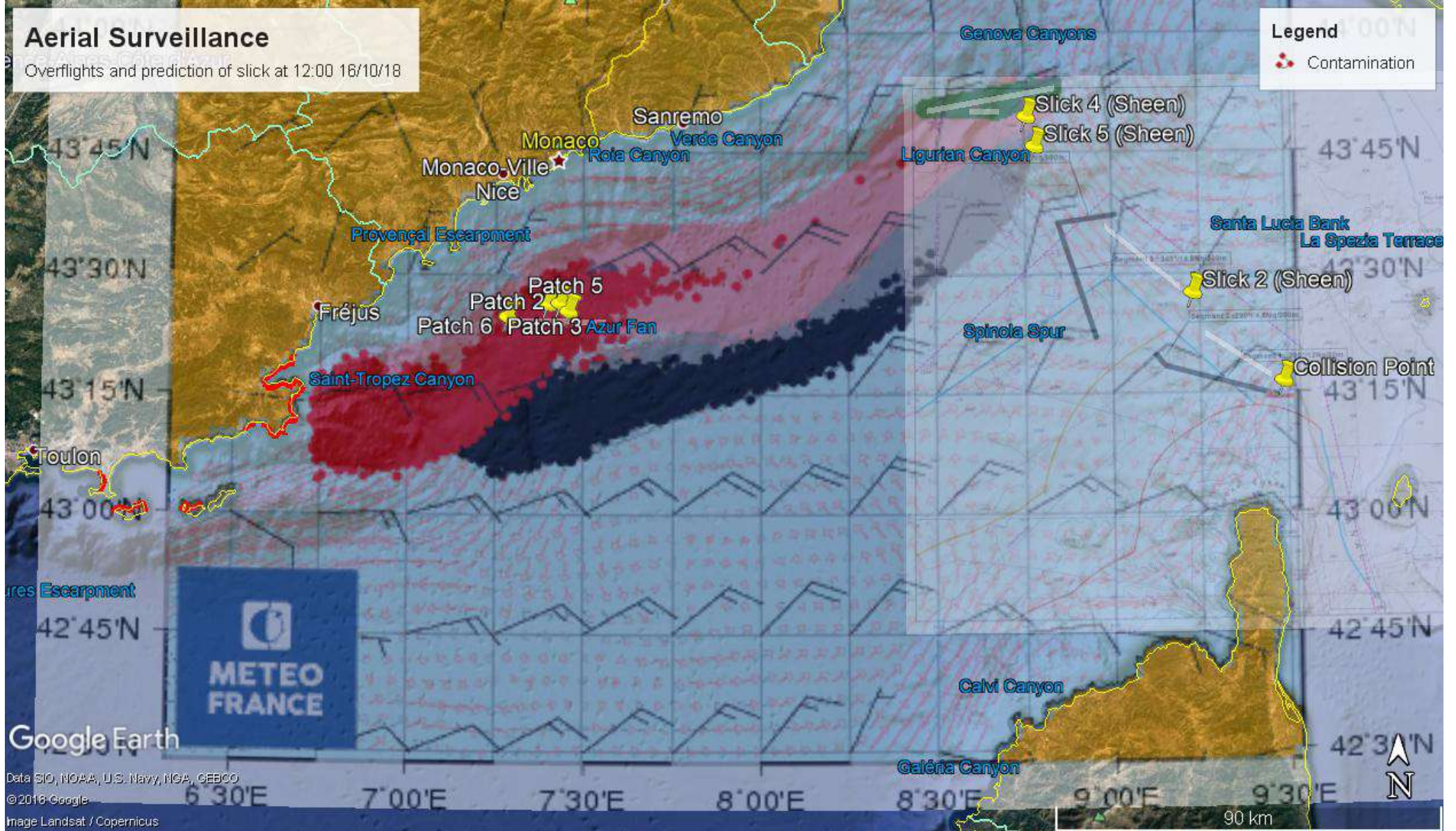


Modelisation (ITOPF) – for 12 october (D+5)





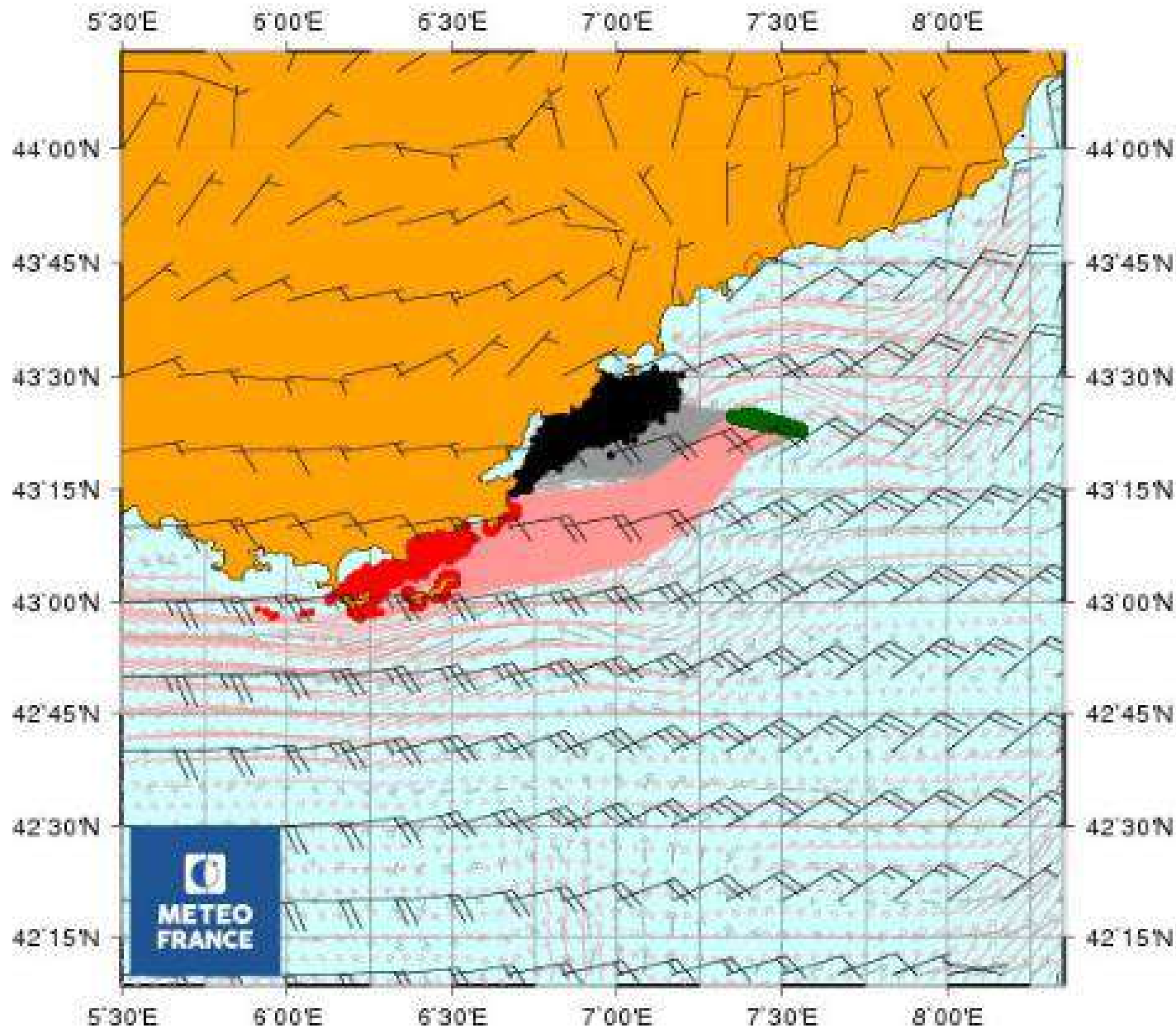
Modelisation – for 16 october (D+9)



Second phase – Coastal response

- Inclement weather limited the use of the equipment on few days, despite the presence of assets on site and damage of equipment.
 - Fragmentation of slicks
 - Pollutant spotted near the coast
- **Change of strategy:** use of small vessels with small trawls and scoops.





Initial position :
15/10/2018 at 06h00 UTC

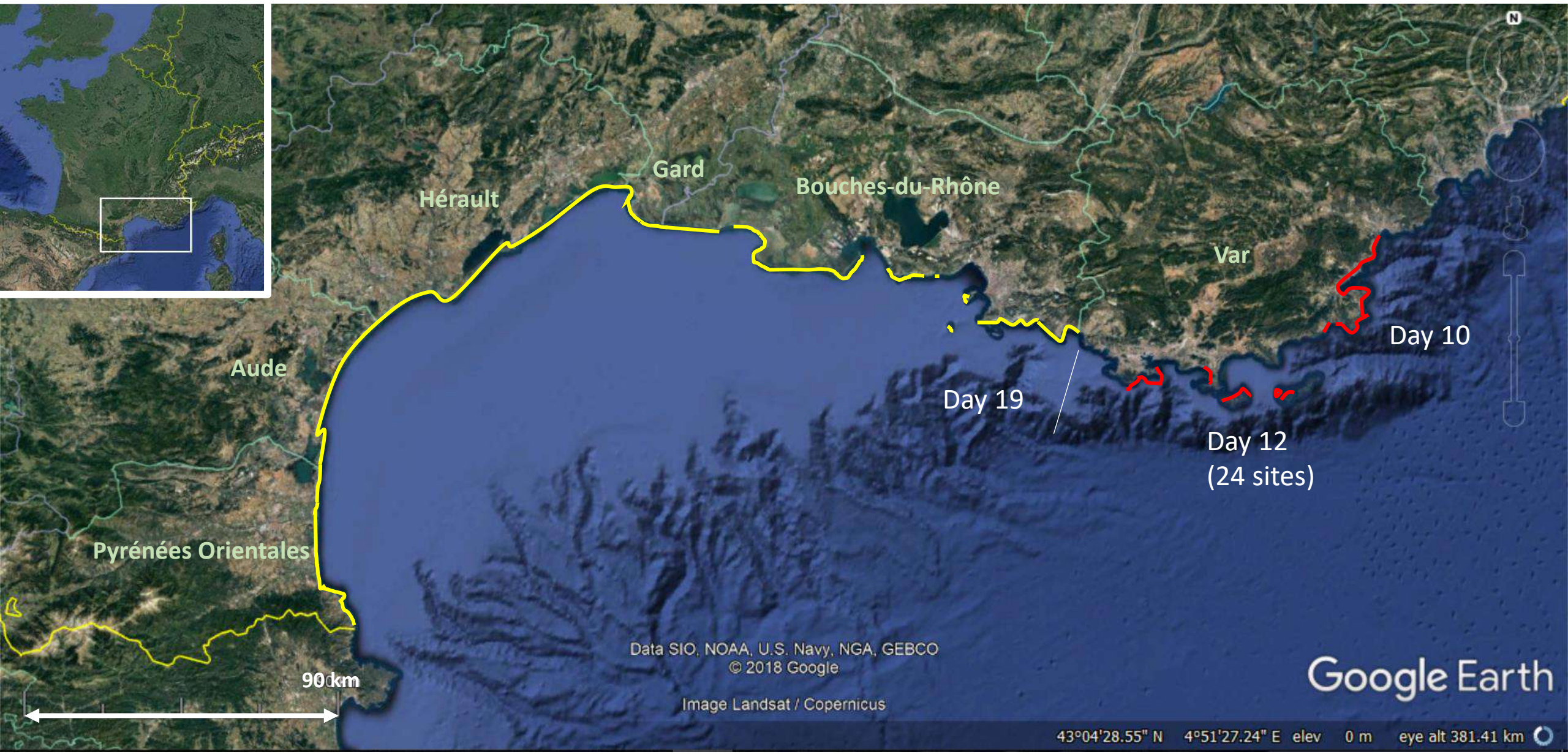
Pollutant : Other
Density : 974 kg/m³
Particles : 8670

Oil slick head
43°23,44'N / 6°51,97'E
43°05,45'N / 6°21,97'E

MERCATOR PSY4 1/12°
MFS 1/24°

Mer Ligure - Corse
Resolution: 1 (minute)

Geodetic system: WGS 84



Hérault

Gard

Bouches-du-Rhône

Var

Aude

Pyrénées Orientales

Day 10

Day 19

Day 12
(24 sites)

90 km

Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2018 Google

Image Landsat / Copernicus

Google Earth

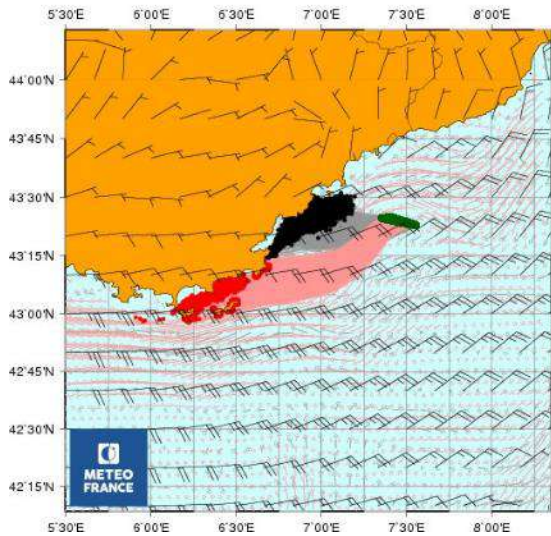
43°04'28.55" N 4°51'27.24" E elev 0 m eye alt 381.41 km



- 1.6 million tourists/year in Golfe de St Tropez
- En 2012, Var welcomed more than 9 million of tourists, weighting 5,9 milliards d'euros in the economy



MOTHY/CEP MULT1 : Forecast for 18/10/2018 at 00 UTC

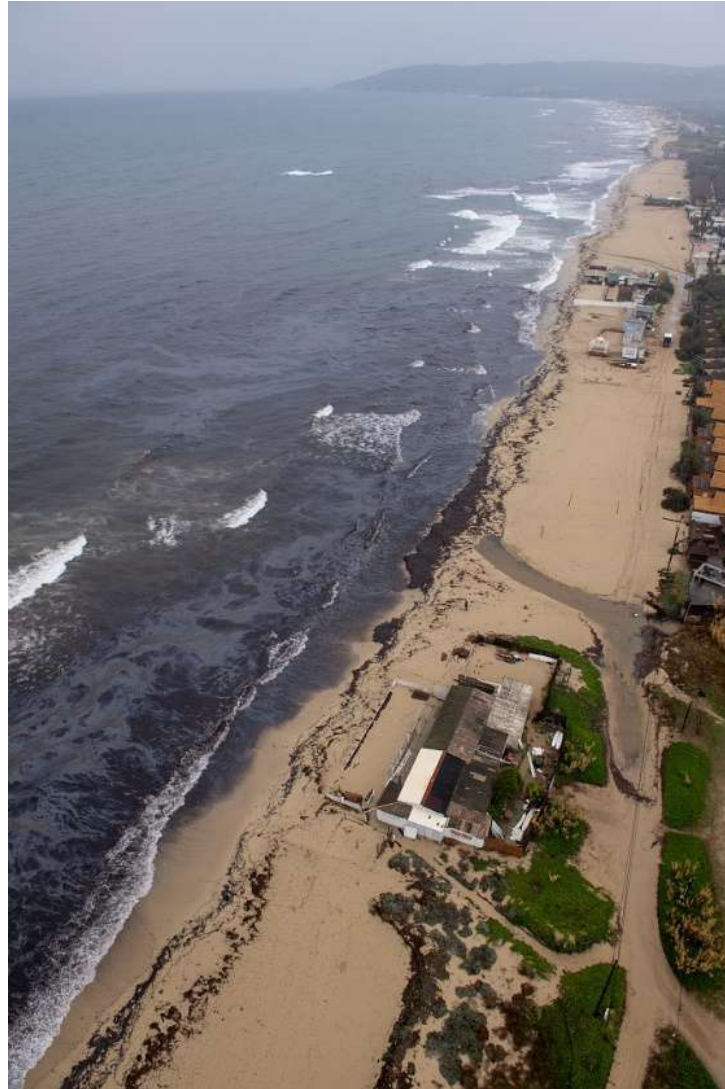


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MERCATOR PSY4 1/12°
MFS 1/24°
Mer Ligure - Corse
Resolution: 1 (minute)
Geodetic system: WGS 84



Join us at the next GI WACAF Webinar in December for the presentation of the clean-up actions of the shoreline...

Equipment clean-up and Waste Management

- At sea response can generate a large quantity of liquid and solid waste (oiled or unoled)
- Some equipment can be cleaned or repaired but others will need to be replaced.
- A cleaning operation of at sea assets is not insignificant and may require heavy logistics.

If the at-sea response is over a long period of time, the logistics of unloading waste, cleaning and repairing equipment is essential for the continuation of the response operations.



More than 1,500m³ of liquid waste collected onboard the vessels.



Human resource



Equipment needed

- Vacuum truck
- High pressure cleaner
- Degreaser
- PPE + consumable
- Scaffolding
- etc...



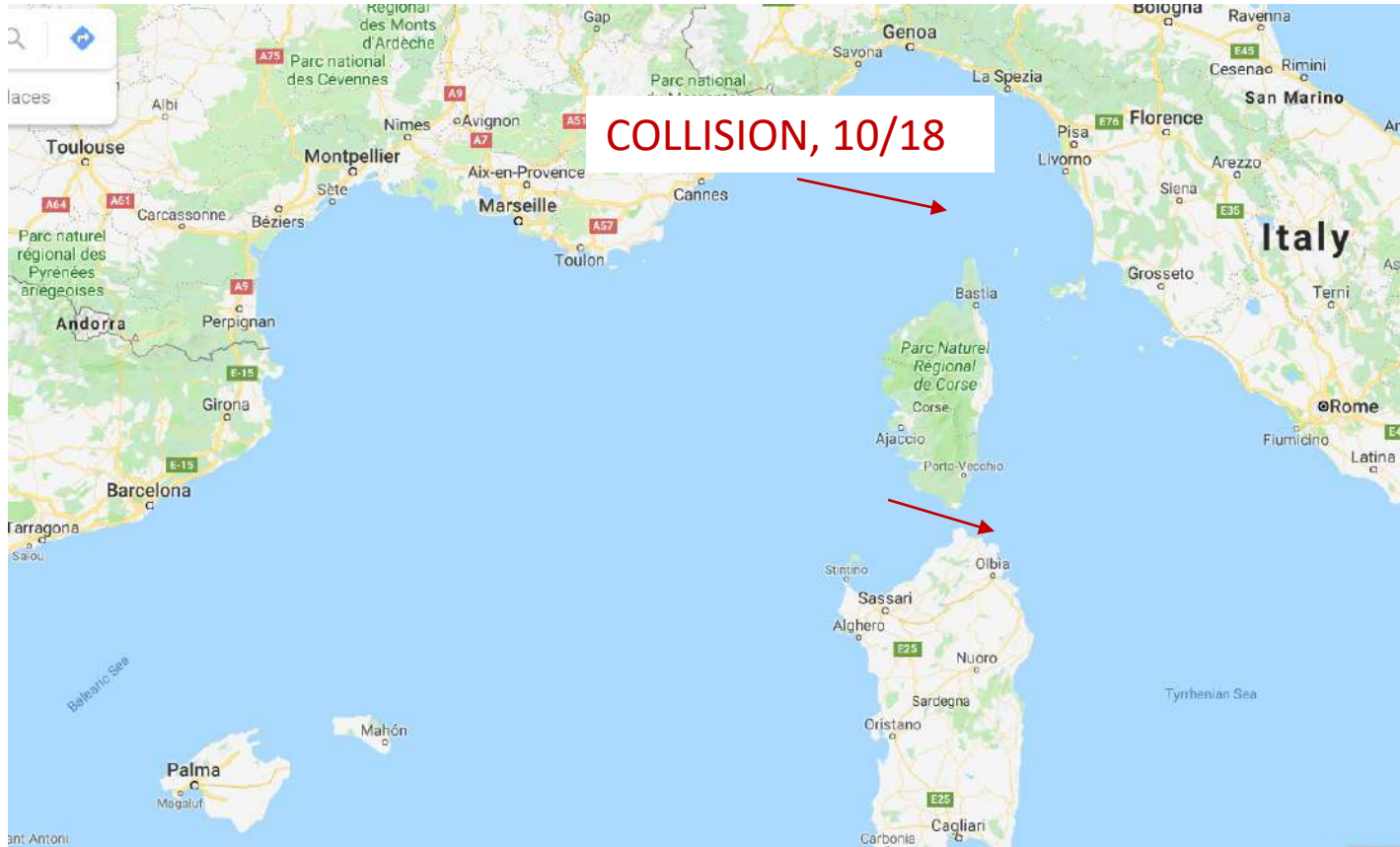
Long and expensive process depending on the size of the ship and the pollution

- Berth rental
- Installation of booms around the vessel
- Removal and treatment of waste skips
- Cleaning of the main deck (up to 2 weeks)
- Hull cleaning (up to 1 week)
- Cleaning of equipment
- Tank cleaning (up to 2 weeks)

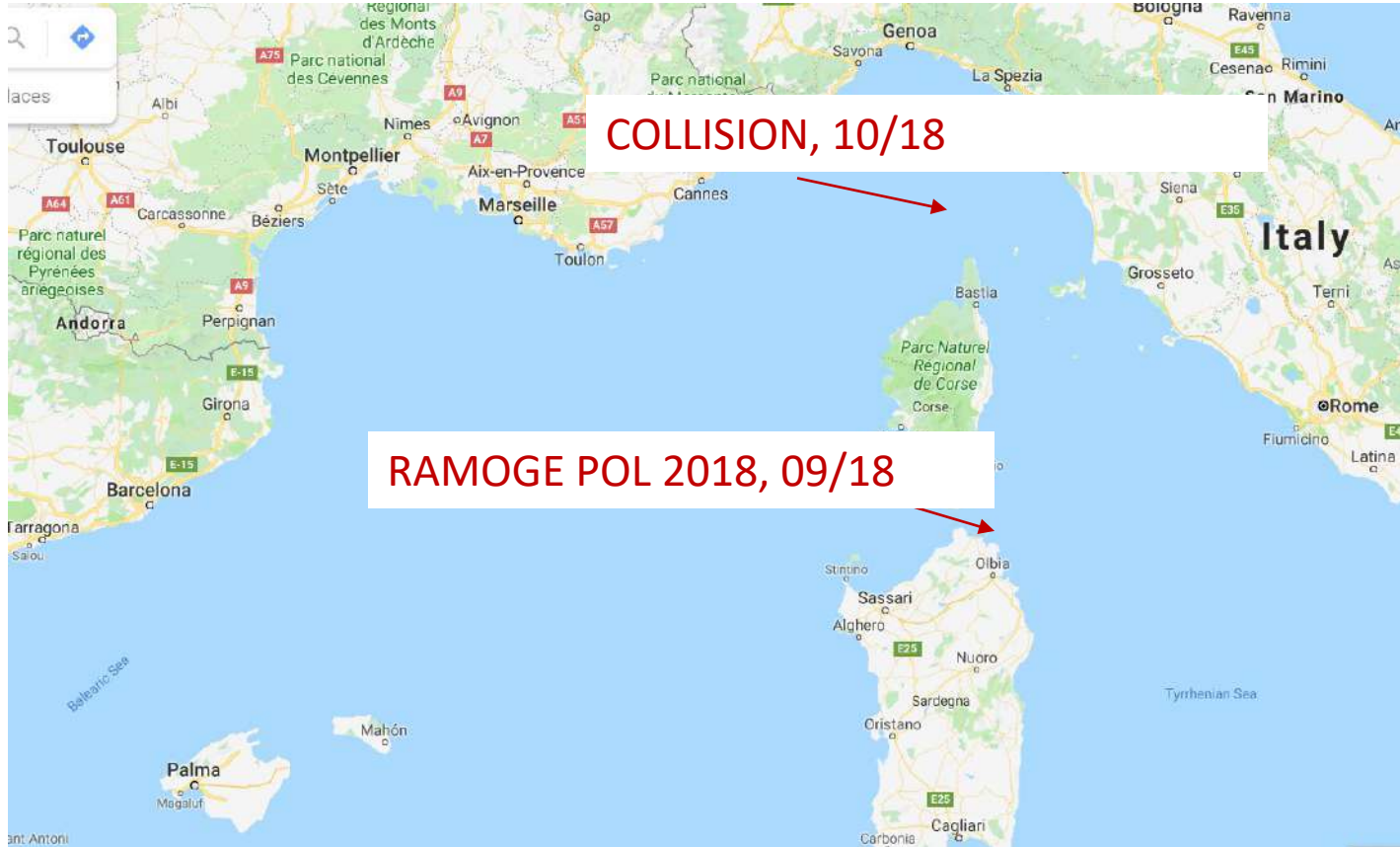


→ More than a month's work

Overall, a successful operation... why?



Overall, a successful operation... why?



Military Aviation

With the RAMOGE - POL 2018 exercise simulated the intervention in case of polluting spillage into

Latest news

- The AM operation in the service of the country continues unabated
- Campaign AIB 2019: from 15 June 511 firefighting air interventions
- Vueling focuses on innovation: Google Assistant for check in and payments
- SkyUp announces a new flight from Turin to Kiev
- Mid-August on the front line for Air Rescue crews of the Italian Air Force
- Alitalia confirms the flights between Milan Bergamo and Rome for the winter
- Mid-August week in growth for Palermo Airport
- At LABACE 2019 Leonardo gets new contracts for his VIP helicopters
- New rescue intervention for a helicopter of the Italian Air Force
- Fires in Greece: Italy sends two Canadair of the Fire Brigade

Overall, a successful operation... why?



PREPAREDNESS



Military Aviation

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Thank you

www.itopf.org





Primarily funded by the global shipping industry (annual fee)

- Membres: >97% of the world's ocean going tanker fleet
- Associates: >90% of the world's ocean going non-tanker fleet

SPILL RESPONSE



DAMAGE ASSESSMENT & CLAIMS ANALYSIS



CONTINGENCY PLANNING & ADVISORY



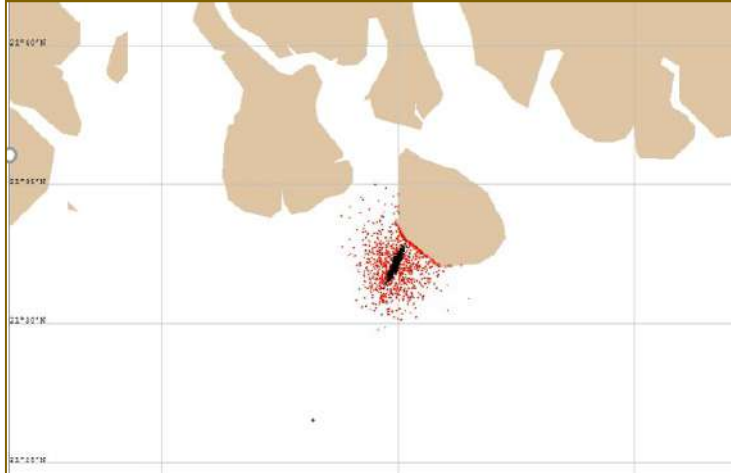
TRAINING & EDUCATION



INFORMATION SERVICES



FATE & BEHAVIOUR MODELLING



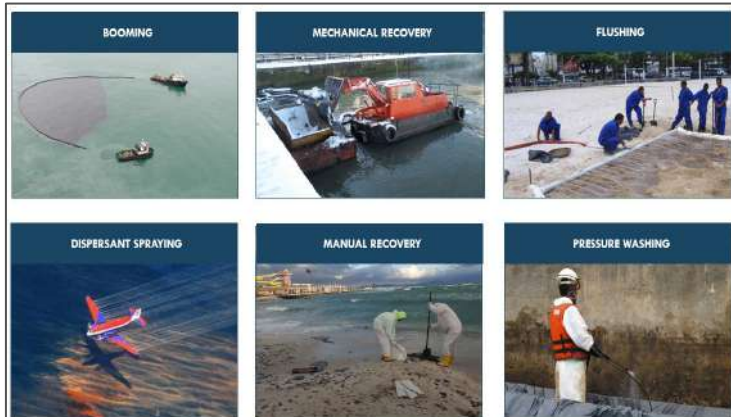
AERIAL SURVEILLANCE



SHORELINE & AT SEA SURVEYS



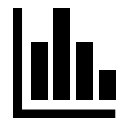
ADVISE on RESPONSE OPERATIONS

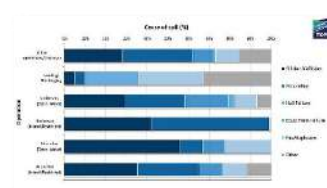
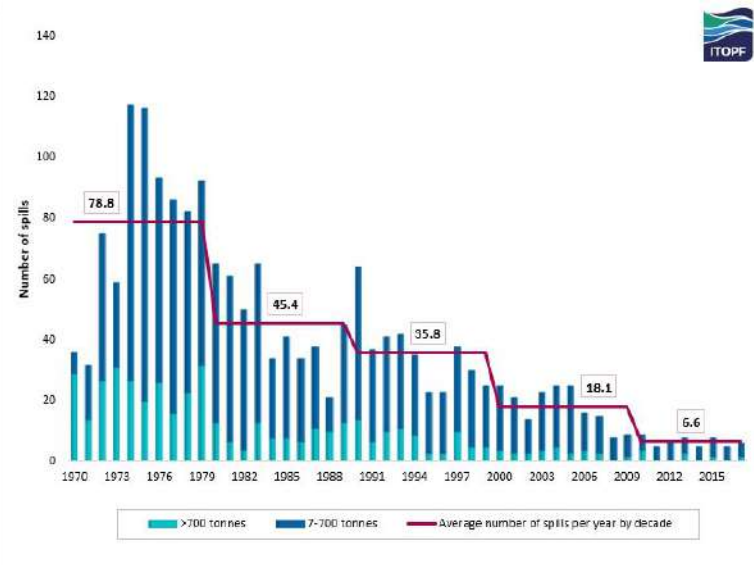
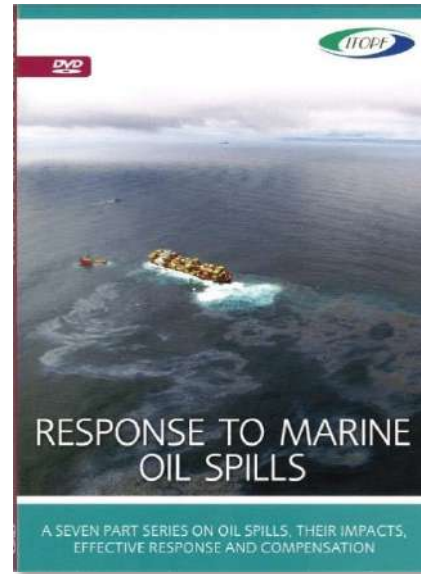
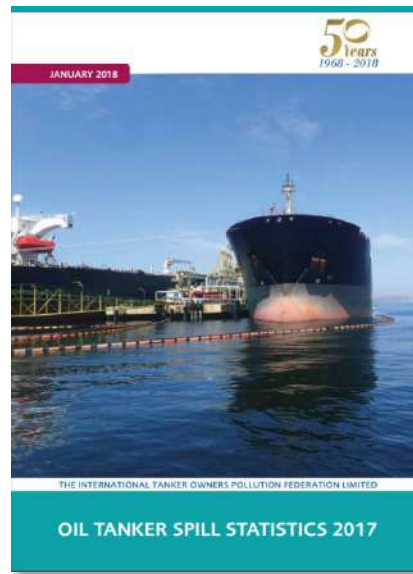
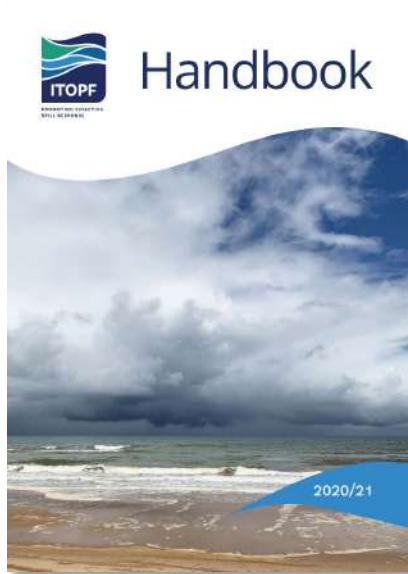


LIAISE with STAKEHOLDERS



REPORTING





Response Strategy Decision-Making

Net Environmental Benefit Analysis (**NEBA**)

&

Spill Impact Mitigation Assessment (**SIMA**)



NEBA origins go back >25 years:

Alaskan spill in 1989

Original proposal from State was to remove and wash rocks

NOAA stated “no net environmental benefit to be gained by shoreline excavation and washing” and that “this technology has the potential of aggravating the injury to the environment caused by the spill.”

IPIECA publication
described NEBA in 2000

IPIECA
REPORT
SERIES
VOLUME TEN

**CHOOSING SPILL
RESPONSE OPTIONS TO
MINIMIZE DAMAGE**

Net Environmental Benefit Analysis

RETIRED



International Petroleum Industry Environmental Cooperation Association

Net Environmental Benefit Analysis (NEBA)

Structured approach to compare the environmental benefits of potential response techniques, and develop a response strategy that will reduce the overall impact of an oil spill

Choosing response techniques to maximize mitigation of spill impacts

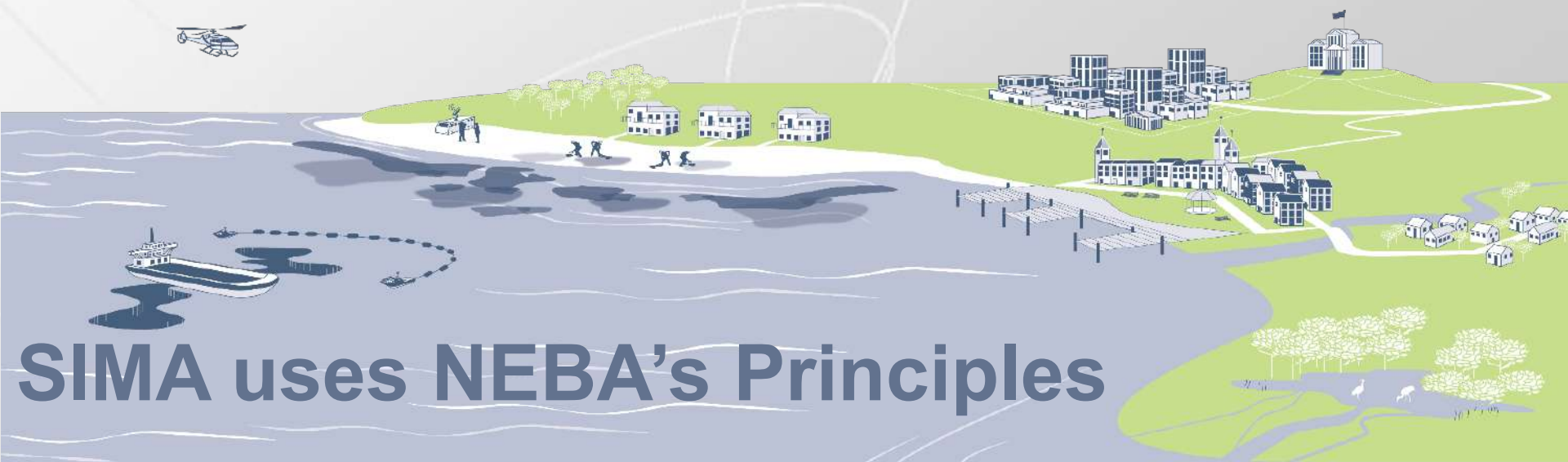
Incorporates stakeholder dialogue and can provide reassurance to communities

Spill Impact Mitigation Assessment (SIMA)

A tool to implement NEBA

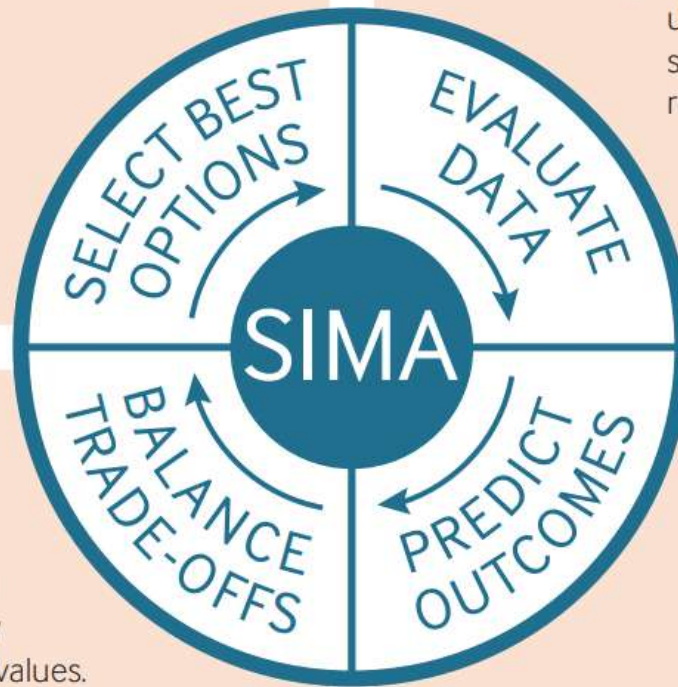
Part of contingency planning or incident management

Smaller or less complex spill scenarios may not need a formalized SIMA



SIMA uses NEBA's Principles

SIMA's methodological stages



Stage 4: Select best options

The best combination of response options is selected to create an appropriate response strategy. It is recommended that SIMA utilizes the complete response toolkit, including:

- No intervention
- At-sea containment and recovery
- Surface dispersant
- Subsea dispersant
- Controlled in-situ burning
- Shoreline booming

Stage 1: Evaluate data

- A selection of credible potential release scenarios is chosen.
- Oil fate and trajectory modelling is undertaken, and data on ecological, socio-economic and cultural resources evaluated.
- Resources at risk are determined, and the feasible response options identified.

Stage 3: Balance trade-offs

- Dialogue with key stakeholders provides the opportunity to explain potential trade-offs or to obtain new inputs on resource sensitivities and values.
- The total impact mitigation score and ranking for each response option is agreed.

Stage 2: Predict outcomes

- The potential relative impact of the spill on each resource at risk is assessed for the 'no-intervention' option.
- A preliminary prediction is made of how each feasible response option will modify the impact when compared with no intervention.

Who could be involved in SIMA?

- Aiming for informed consensus
- Where undertaken for contingency plans:
 - subject matter experts (e.g. modellers, environmental and other specialists, and experienced responders)
 - representatives of potentially affected groups (e.g. fishing, tourism and local community)
 - relevant authority representatives, including regulators and nature conservation agencies
- During incidents, a streamlined process is likely



SIMA comparative matrix

Response techniques

At-risk resources

COMPARTMENTS

Potential relative impact	NO INTERVENTION	CONTAINMENT AND RECOVERY		SURFACE DISPERSANT		SUBSEA DISPERSANT	CONTROLLED IN-SITU BURNING		SHORELINE BOOMING	
		Impact modification factor	Relative impact mitigation score	Impact modification factor	Relative impact mitigation score		Impact modification factor	Relative impact mitigation score	Impact modification factor	Relative impact mitigation score
	A	B1	A x B1	B2	A x B2		B4	A x B4	B5	A x B5
Seabed	None	1	0	0	0	Not feasible due to surface spill	0	0	0	0
Lower water column	None	1	0	0	0		0	0	0	0
Upper water column	Low	2	1	2	-2		0	0	0	0
Water surface	Medium	3	1	3	0		2	0	0	0
Air	Medium	3	1	3	0		0	0	0	0
Shorelines		3	1	3	3		2	6	1	3
Saltmarsh	High	4	1	4	3		2	4	1	3
Estuarine mudflats	High	4	1	4	3		2	4	1	3
Sandy beaches	Low	2	1	2	2		0	0	1	2
High value resources	Low	2	0	0	2		0	0	1	2
Socio-economic		4	1	4	2		1	4	3	2
Boat harbour	Medium	3	1	3	2		1	3	3	2
Water recreation	High	4	1	4	2		1	4	3	2
Cultural	None	1	0	0	2		1	1	1	1
Total impact mitigation score:			15		32			20		18
Ranking:			4th		1st			2nd		3rd

Assessment of impact mitigation potential

Assessment of response techniques' potential to modify spill impact on at-risk resources, compared to no intervention

Selecting Best Options

Typically a combination of techniques, prioritizing primary and supplementary options

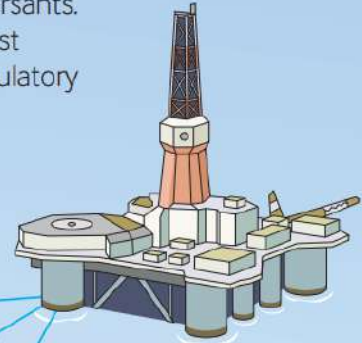
Primary response: comprises actions that are the most effective on fresh oil close to the source, e.g. the application of dispersants. It is important that pre-approvals are in place, or approval granted rapidly at the time of the incident, for this option to be most effective and achieve the feasible and desired optimum results. Alternatively, if the oil is not amenable to dispersants, or if regulatory restrictions preclude the use of this option, at-sea containment and recovery or ISB may be the first option to be used.

Supplementary response actions: supplements the primary response; additional response actions may be appropriate to supplement and enhance the outcomes.

Further response actions: further response actions may need to be considered depending on the behaviour and fate of the oil, and on changing conditions that may affect the choice of response operations

Nearshore response: involves the detection of oil approaching the shoreline, and the rapid deployment of localized mechanical recovery operations to reduce impacts on sensitive areas.

Shoreline response: provides protection using equipment such as booms, or management measures to minimize exposure, e.g. control of water intakes. Involves systematic shoreline assessment and prioritized clean-up in defined stages.



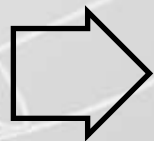
Primary response

Supplementary response actions

Further response actions

Nearshore response

Shoreline response



Tiered capability established or identified in alignment to strategy

Key Features

Transparent

Promotes dialogue



Holistic

Integrates ecological, socio-economic and cultural considerations



Qualitative assessment

Incorporates community values and expert judgement



Promotes all response techniques

Assessing their benefits and drawbacks



Flexible

Adaptable to local setting and concerns



Industry publications

IPIECA



Response strategy development using net environmental benefit analysis (NEBA)

Good practice guidelines for incident management and emergency response personnel



Describes the NEBA principles – updates the IPIECA 2000 publication

IPIECA



Guidelines on implementing spill impact mitigation assessment (SIMA)

A technical support document to accompany the IPIECA-IOGP guidance on net environmental benefit analysis (NEBA)



Describes the SIMA methodology

Summary

- SIMA implements NEBA and develops response strategy
- Suited to more complex spill planning scenarios
- Can be expedited for incident response
- Feeds into tiered preparedness and response capability

Industry publications freely available from www.iecea.org [search “SIMA” or “NEBA”]





Thank you for your attention