GI WACAF Webinar Series

Webinar #4

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

November 2020

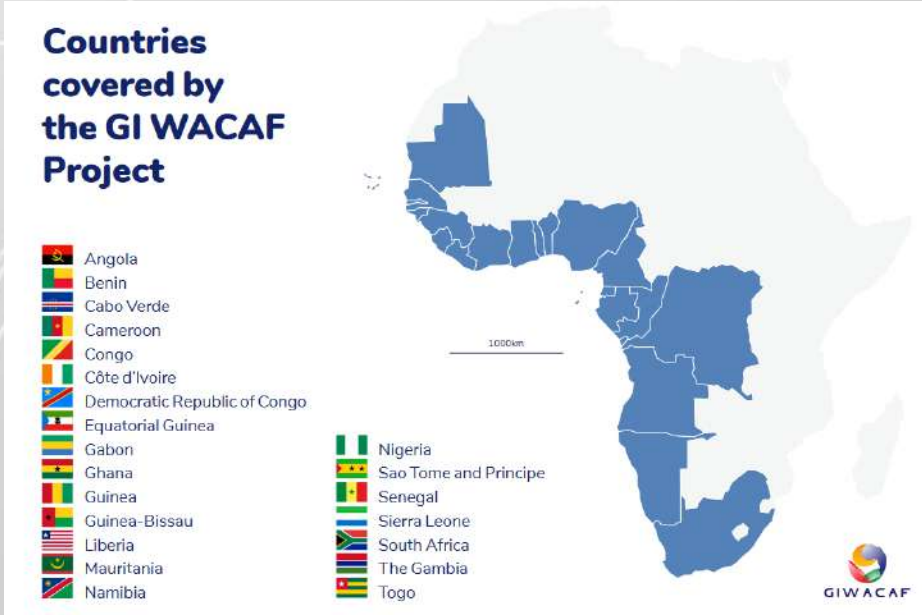
Julien Favier
GI WACAF Project Manager

The Global Initiative for West, Central and Southern Africa

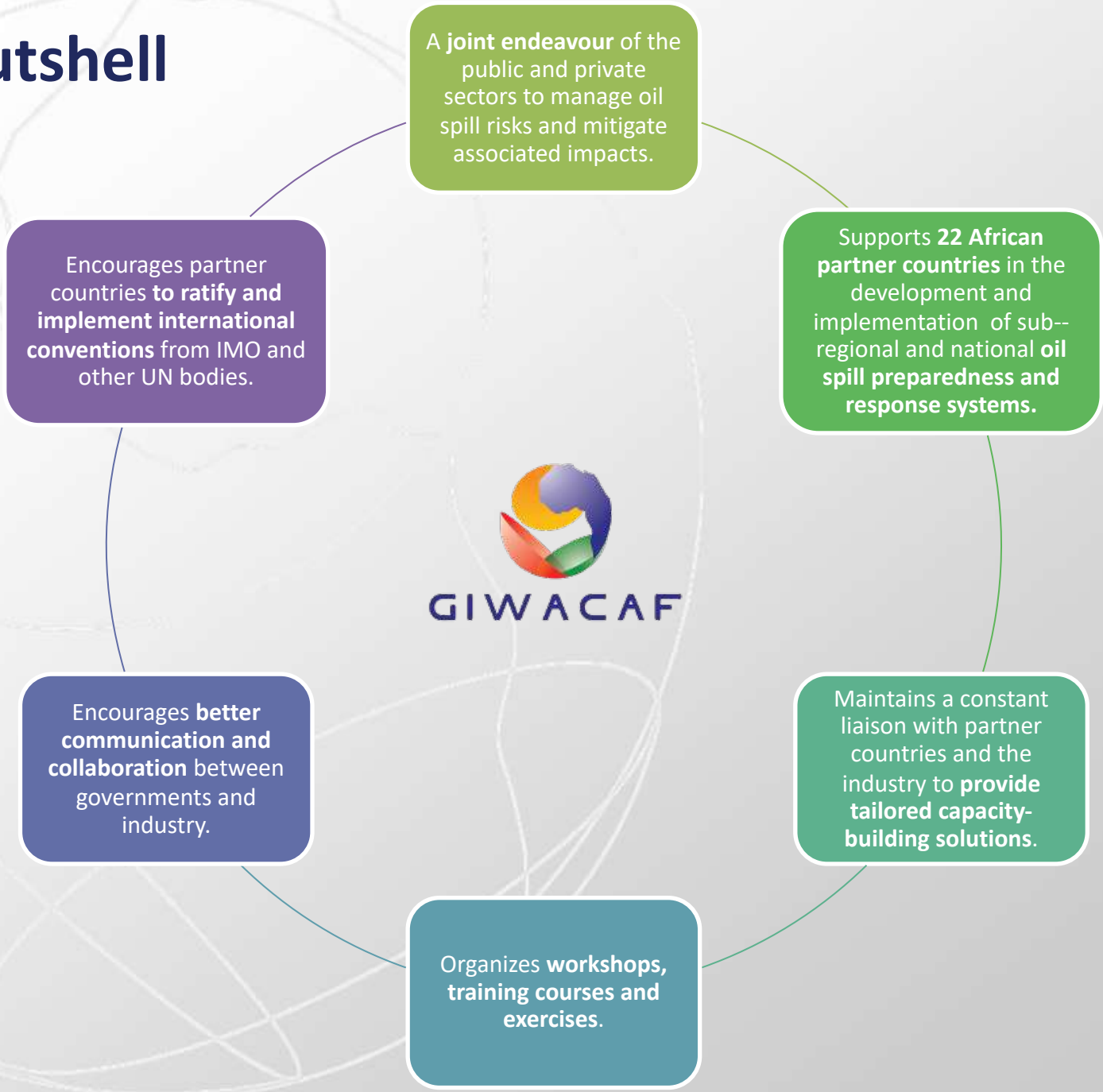
- **Launch of the Project in** 2006 in the framework of the Global Initiative (GI) launched in 1996

- **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

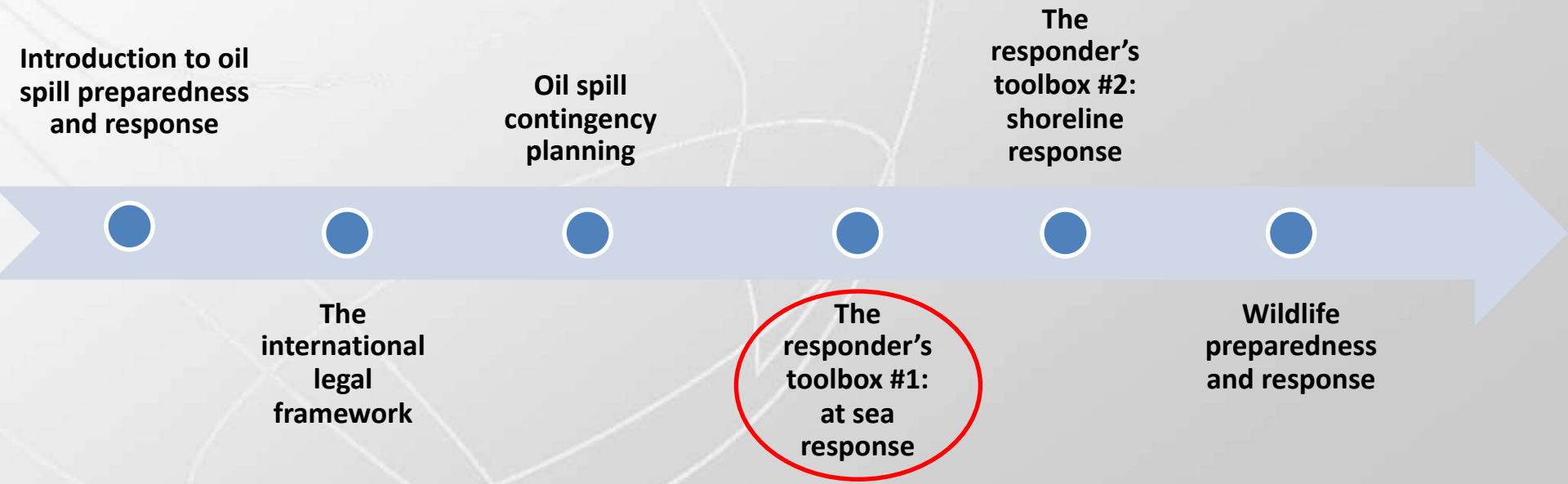


In a nutshell



GI WACAF webinar series

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



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*

Oil Spill Response

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

ITOPF

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

ipieca

Thank you for your attention!

More on our website:
https://www.giwacaf.net/en/

Julien Favier
GI WACAF Project Manager

GIWACAF

GIWACAF Webinar #4
The responders toolbox: part 1- at sea response techniques

Lucy Short, Oil Spill Response
18th November 2020

Oil Spill Response

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

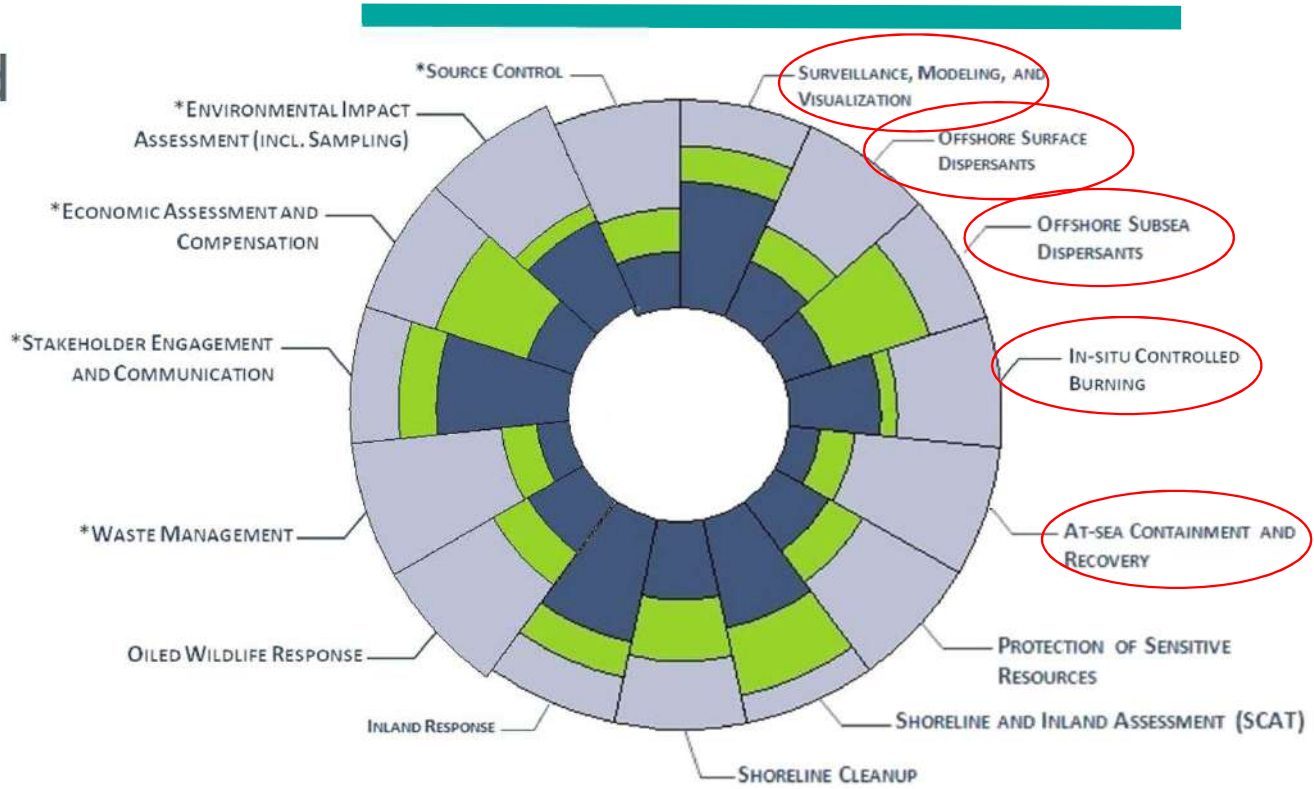
Understand the main at sea response options that may be used

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



Oil Spill Response

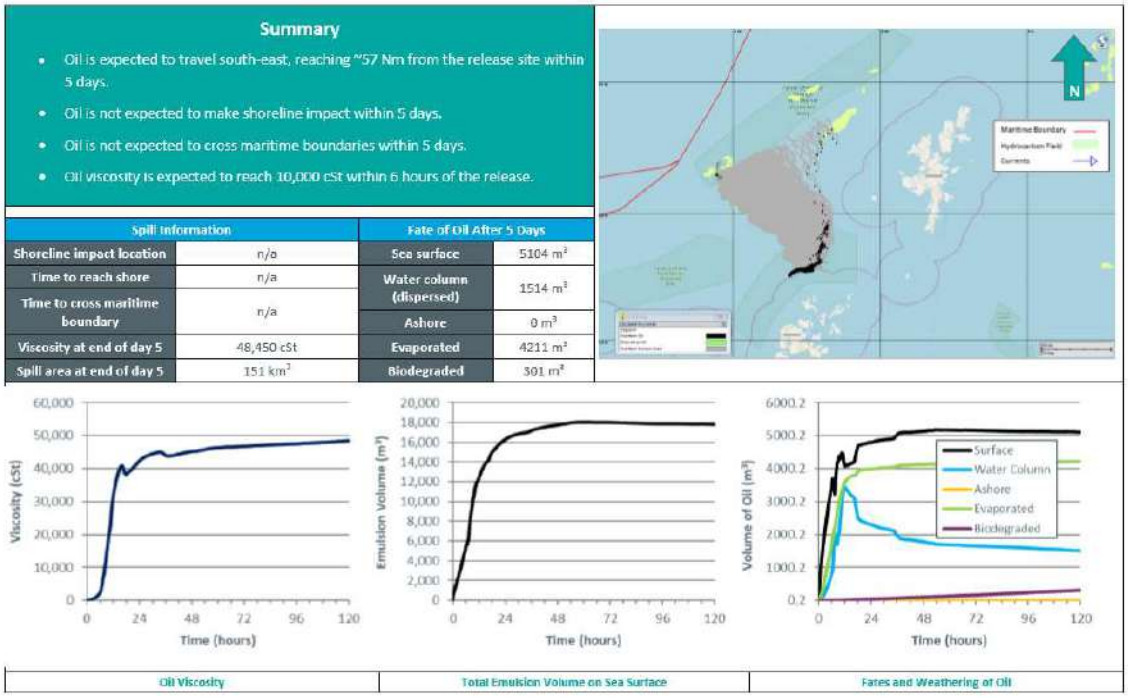
Surveillance, Modelling and Visualisation

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

Oil Spill Response

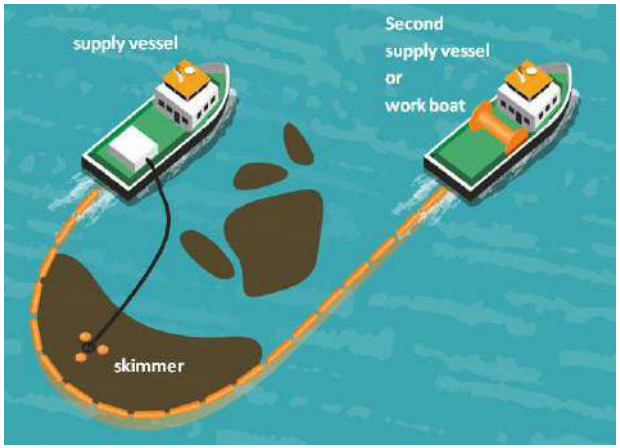
Containment and Recovery

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

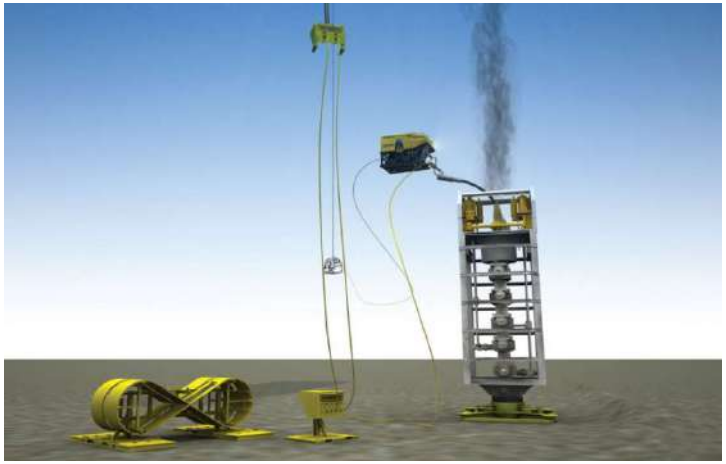
- Oil removed from the water surface
- Various equipment types for operational areas
- Applicable for a broad range of oil types
- 10%-20% recovery rate
- Weather dependant
- Manpower
- Logistics

Oil Spill Response

Dispersants

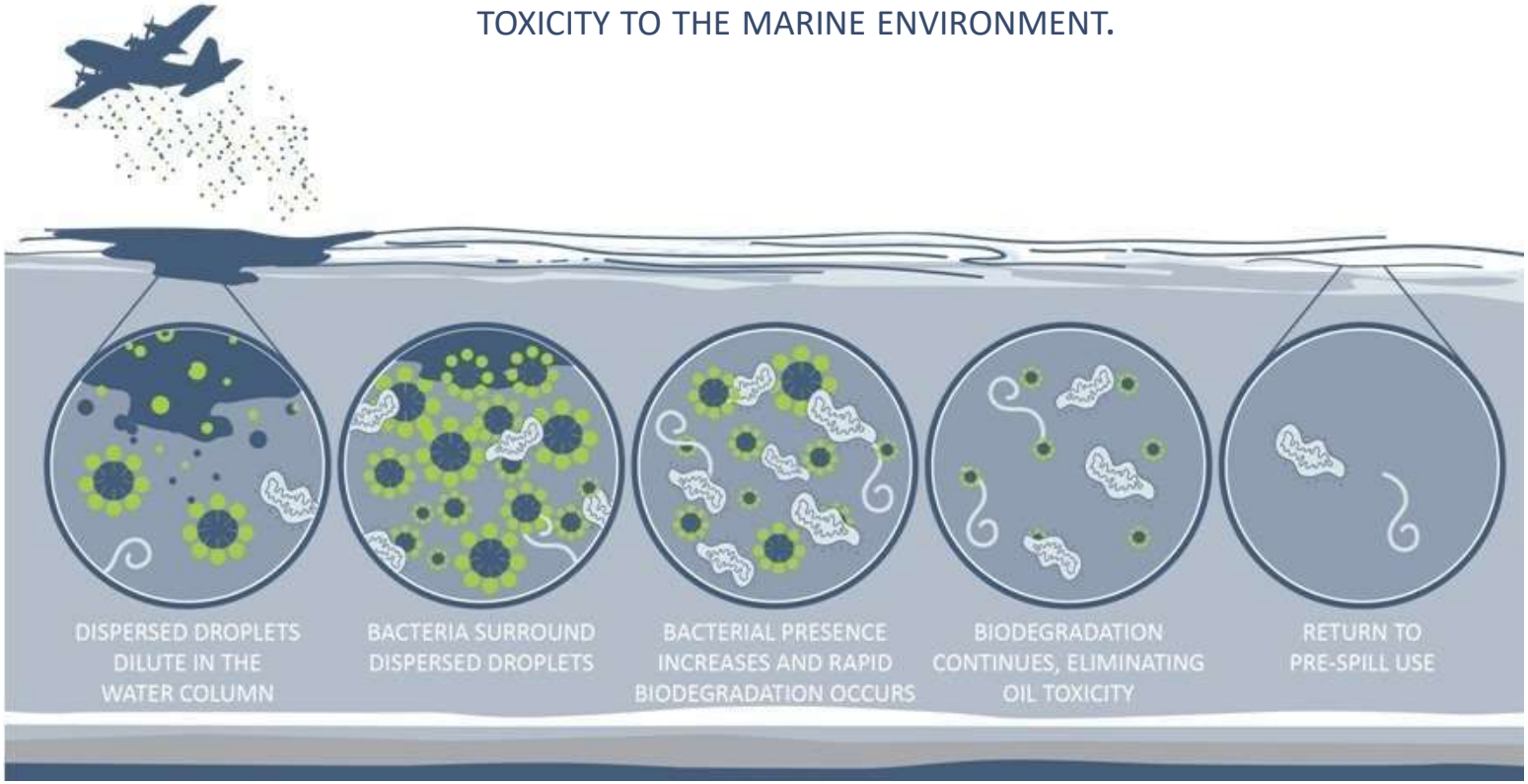
Dispersant Application

- Aerial
- Vessel
- Subsea



How Do Dispersants Affect Oil Toxicity?

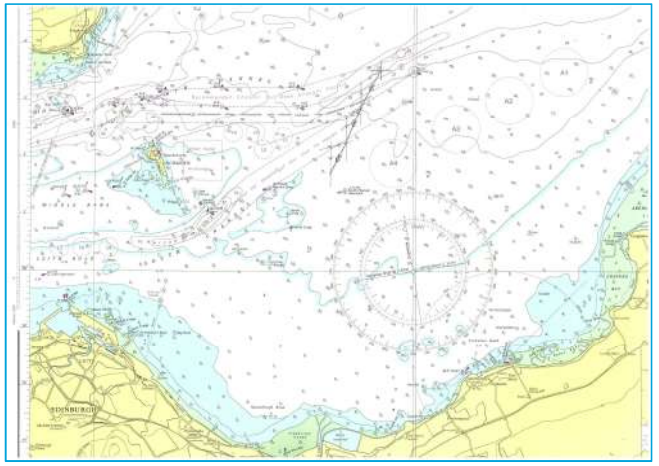
DISPERSANTS HELP TO BREAK APART THE OIL SLICK INTO TINY DROPLETS THAT THEN BIODEGRADE IN THE WATER COLUMN. THIS REDUCES THE EFFECTS OF OIL TOXICITY TO THE MARINE ENVIRONMENT.



GRAPHIC CONSISTENT WITH VENOSA & HOLDER, EPA 2007

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

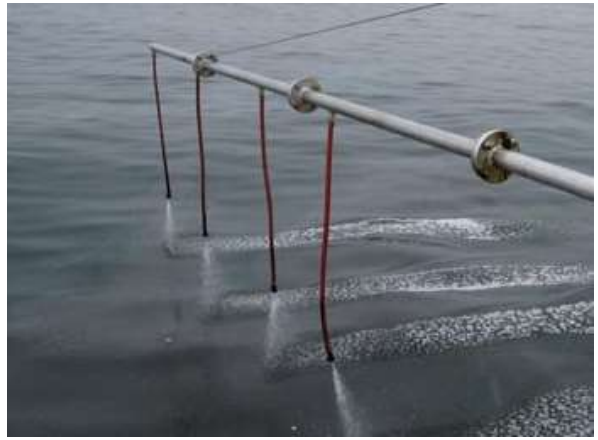


Typical dispersant you may come across

Description and Generation	UK Type	Sprayed from	Recommended treatment rate	Comments
"Concentrate" or "Third generation"	UK Type 3 "Concentrate"	• 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

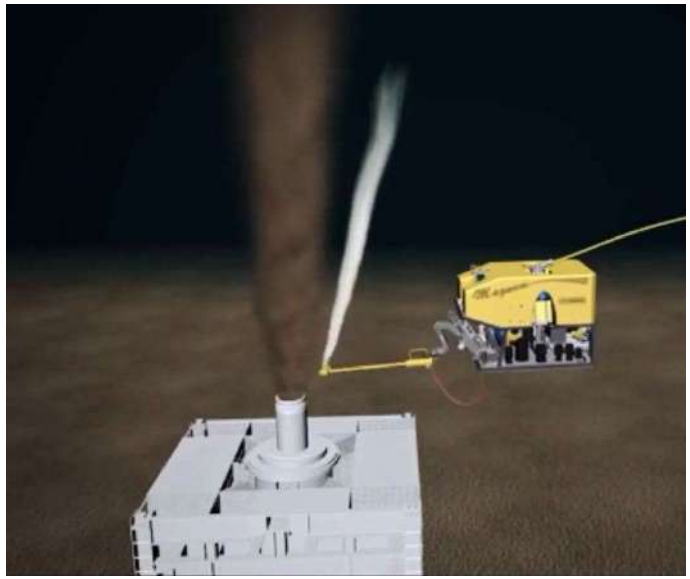
- Visual Monitoring:

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?



Oil Spill Response

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

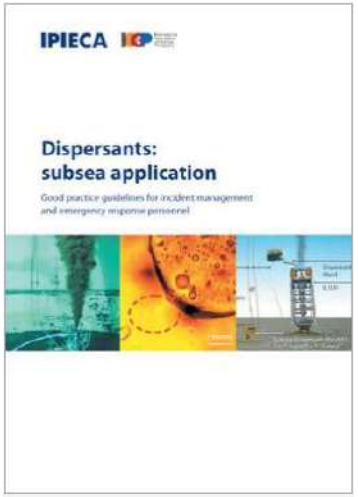
Oil Spill Response

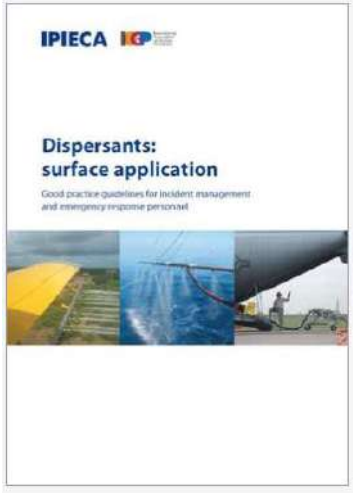
Preparedness

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

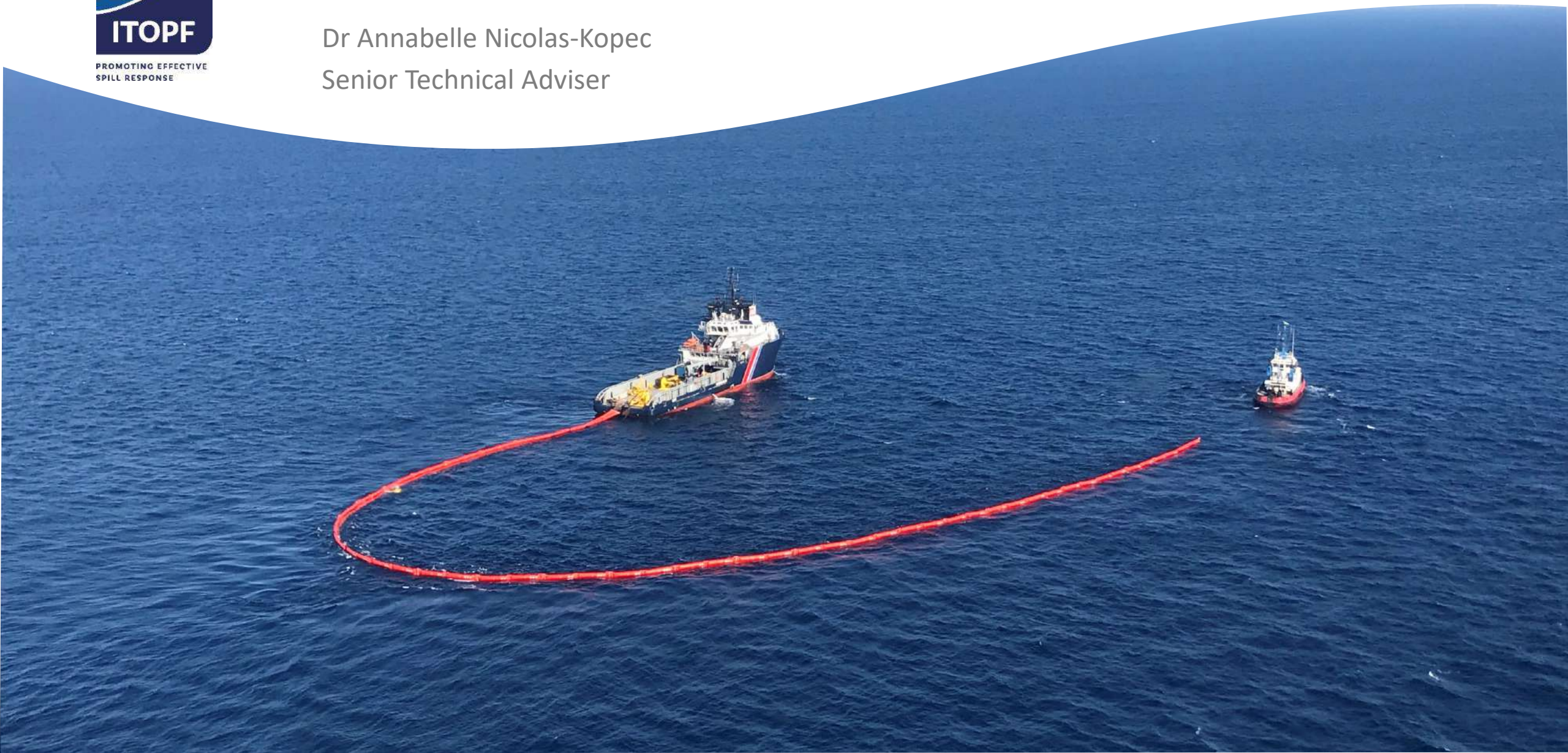




Oil Spill Response

Case Study: At sea response

Dr Annabelle Nicolas-Kopec
Senior Technical Adviser



ITOPF Background

- 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

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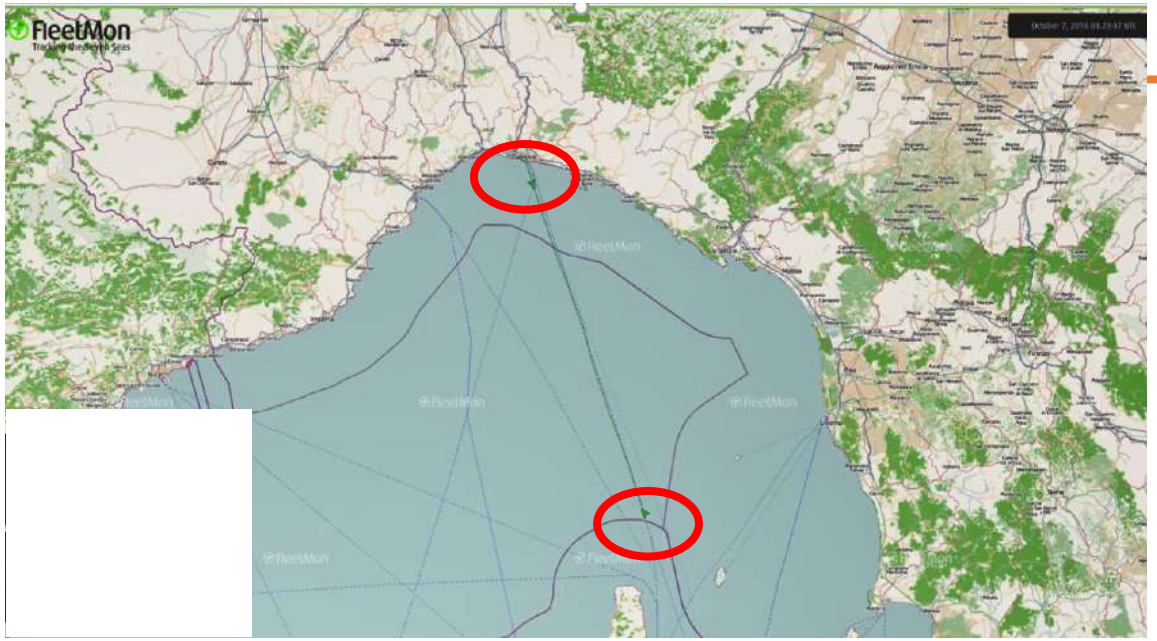
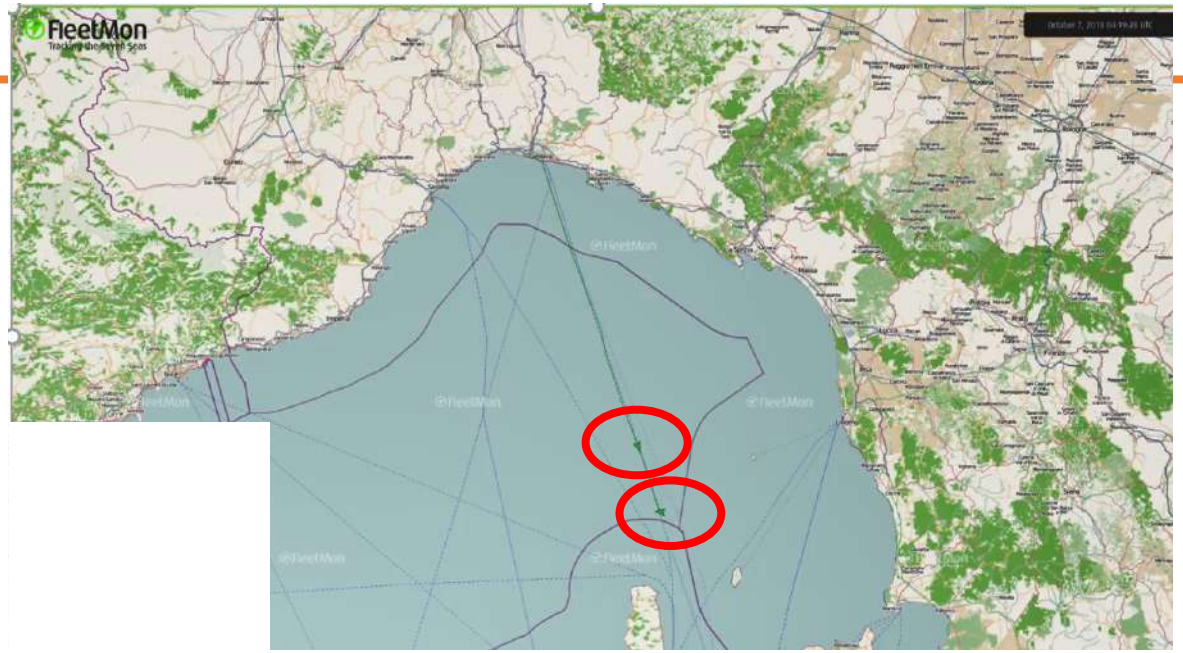
- Attendance at 15–25 incidents/year
- Total of ~800 spills in 100 countries

- Technical Team with 15 responders
- Scientific or technical background
- Based in London but we operate globally


FleetMon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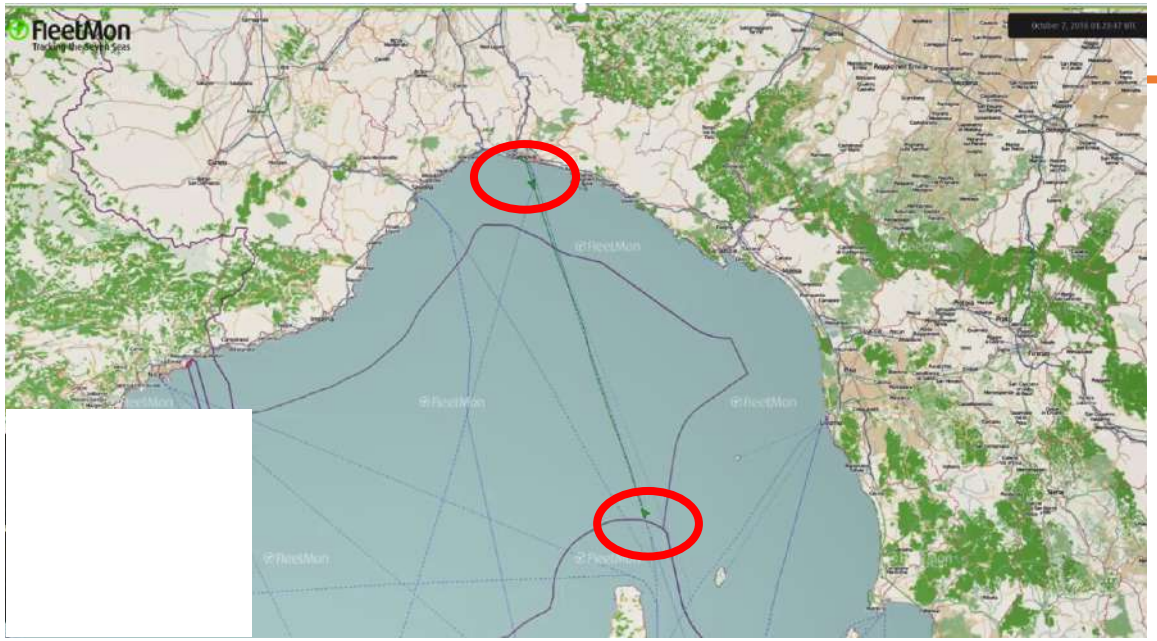
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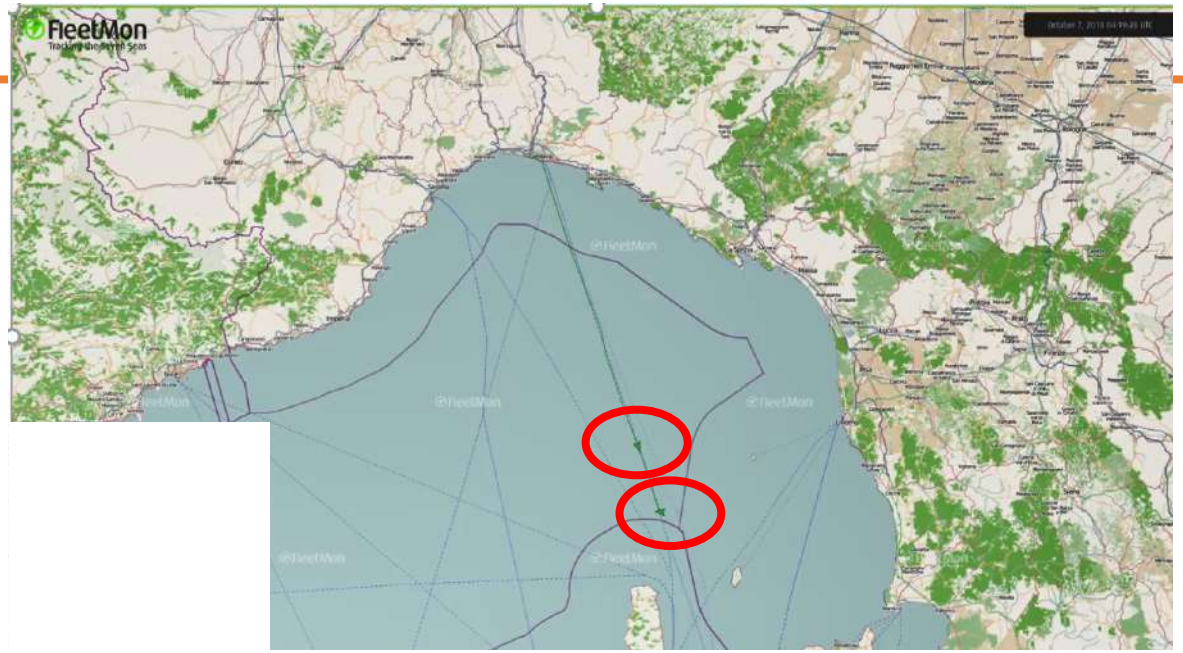
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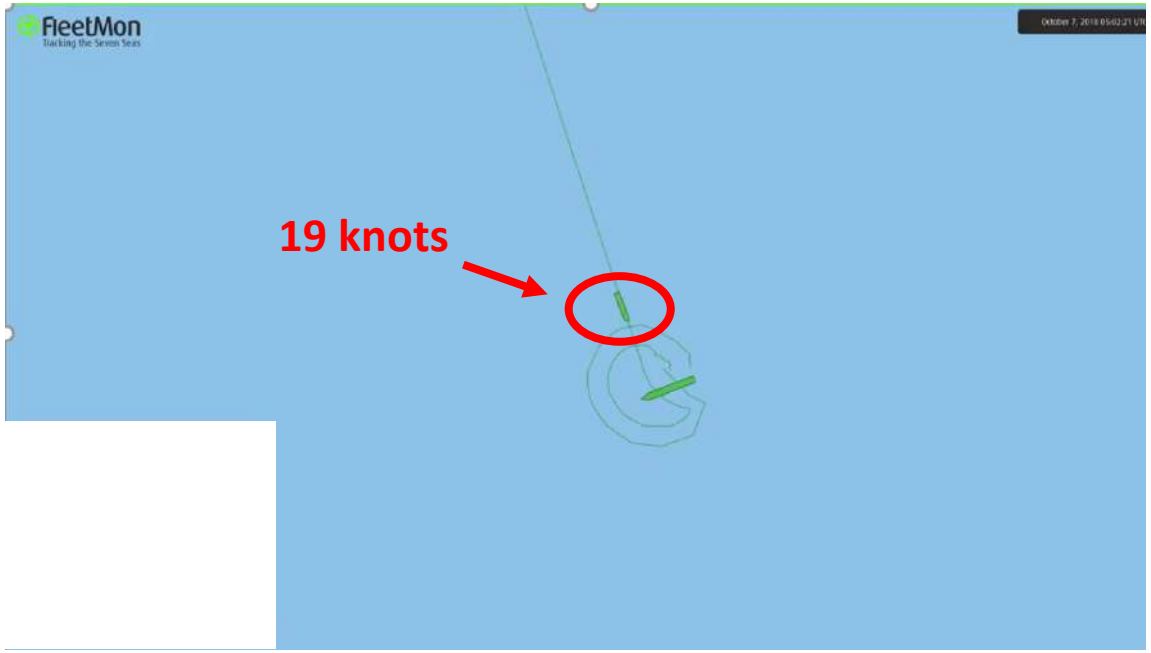

FleetMon
19 knots


FleetMon

Off Cap Corse, France – 7th October 2018

- 15NM off Cap Corse, France
- Collision between a Ro-Ro/passenger ship and a containership
- 694 m^3 off MFO 380 onboard
- ~ 550 m^3 lost at sea

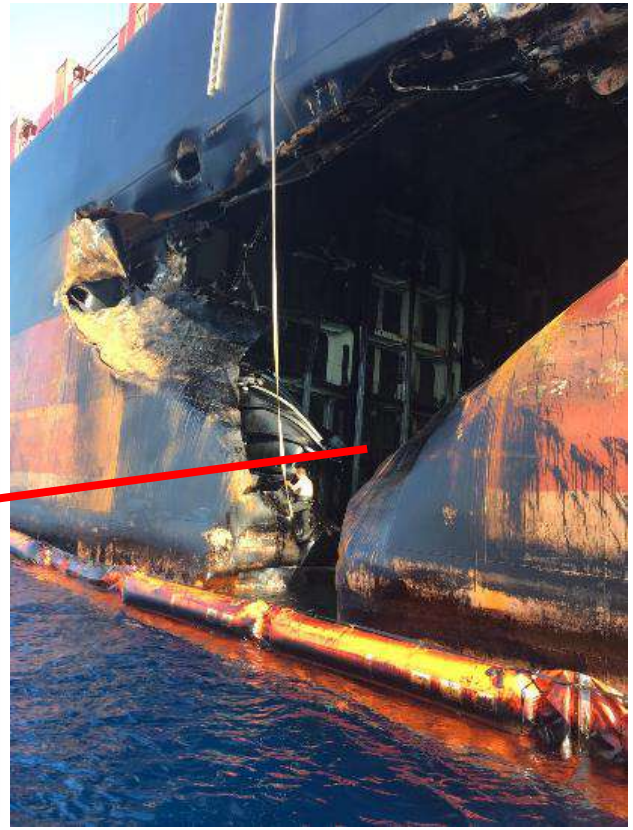
NOTE: The bunker certificate and the exact properties of the bunker fuel can be long to obtain. The first actions at sea are often based on generic bunker properties.

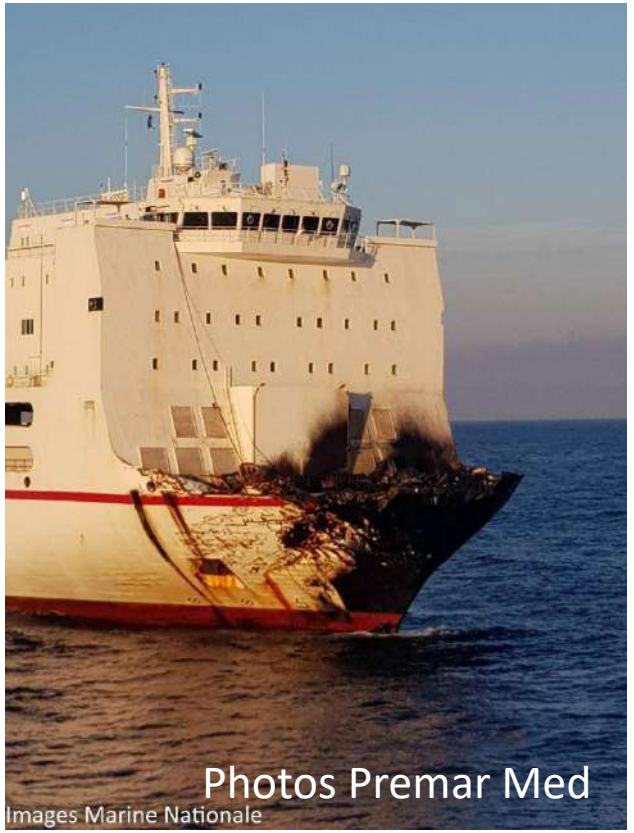
Damage


BORDÉE
VIRGINIA
CLOISON ENTRE CALE 2 ET 3


GOPR8134
Photos Premar Med

Damage/separation 11th October (D-4)





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

Aspect of the slick at sea over time

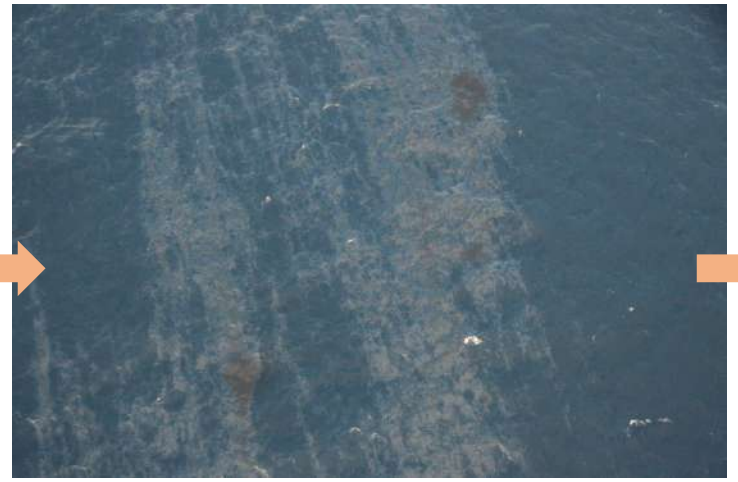
7 October (D-0)

Aspect of the slick at sea over time

7 October (D-0)

8 October (D-1)

9 October (D-2)

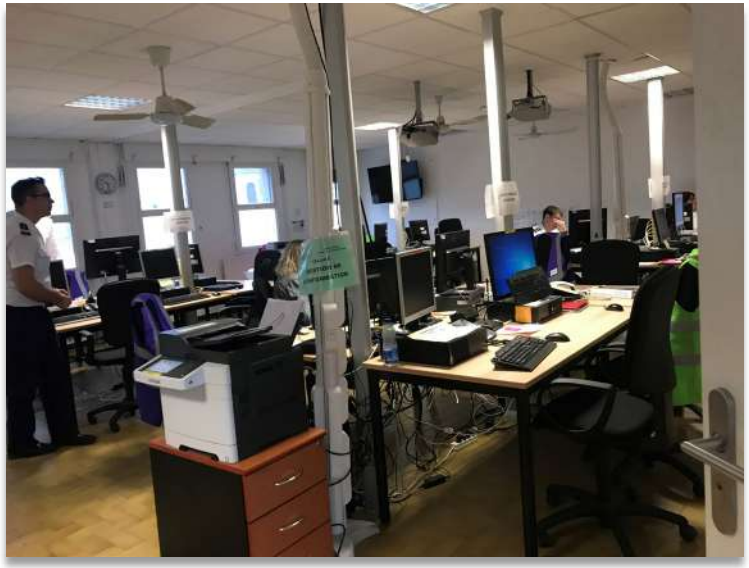


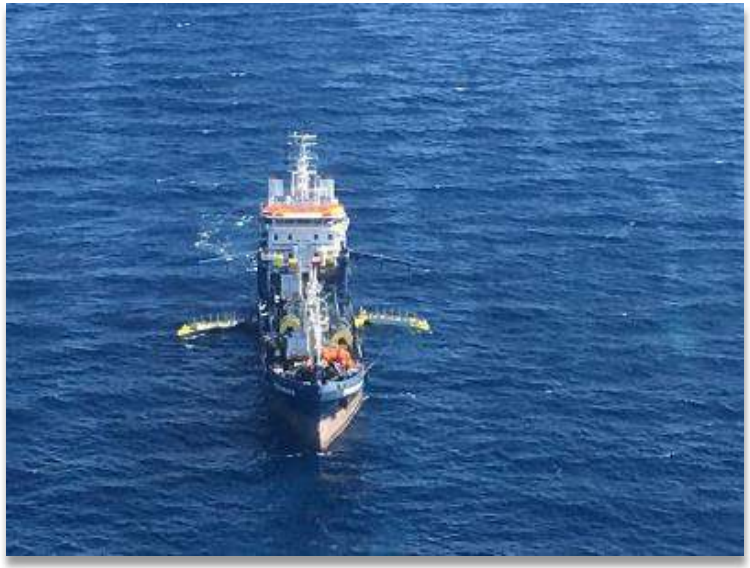
10 October (D-3)

12 October (D-5)

Organisation

- 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





Organisation

- Coordination by France in French waters
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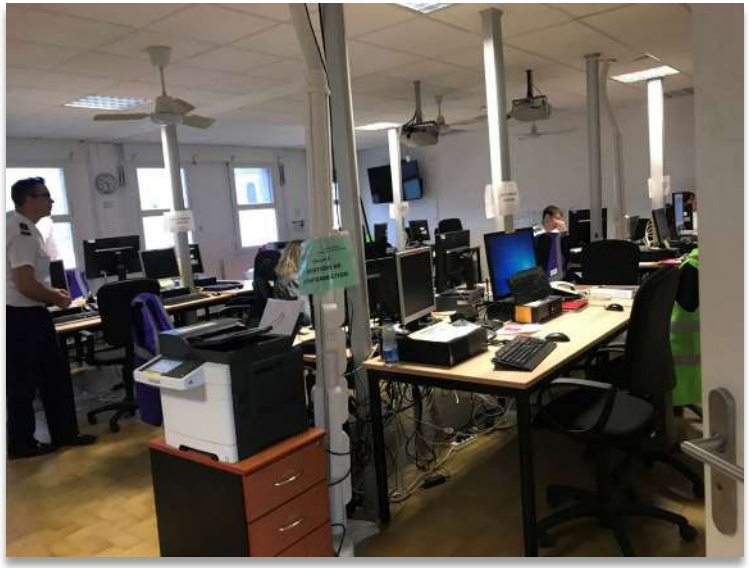
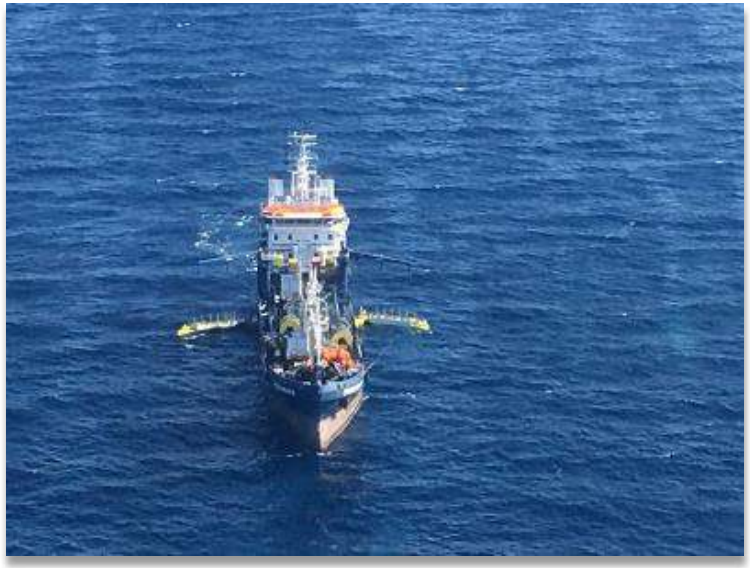
Areas to improve

- 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.

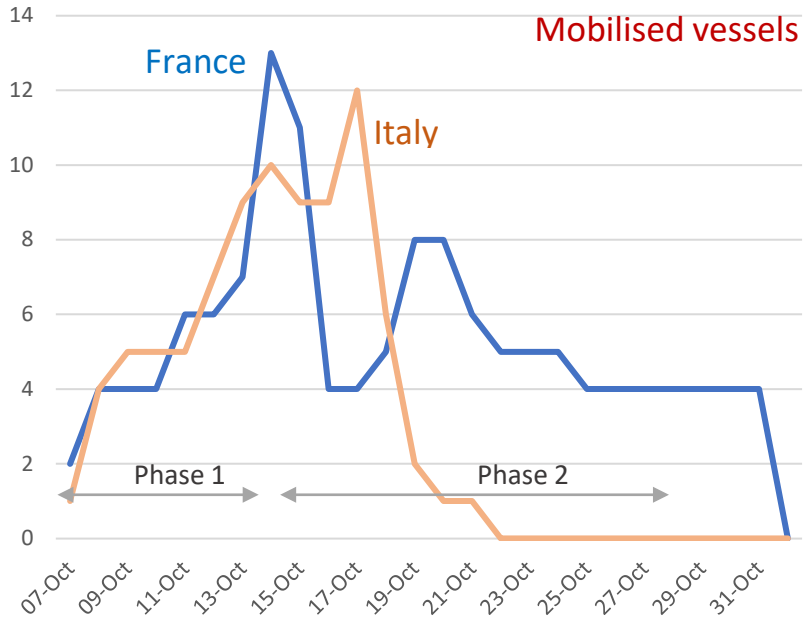

Photos Premar Med





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

Recovery (skimmers, trawls….)

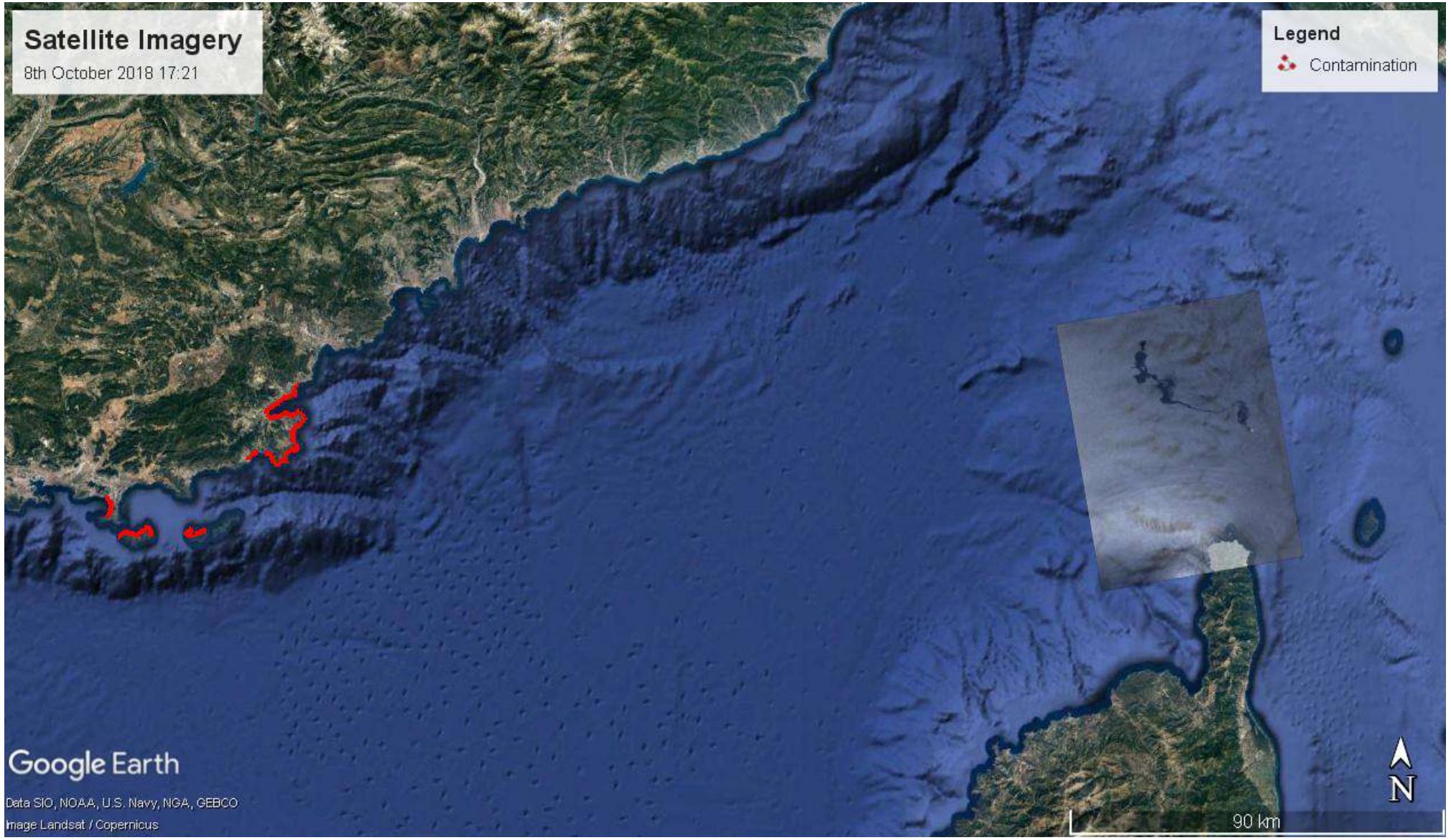
Photos Premar Med

At Sea Response – aerial support

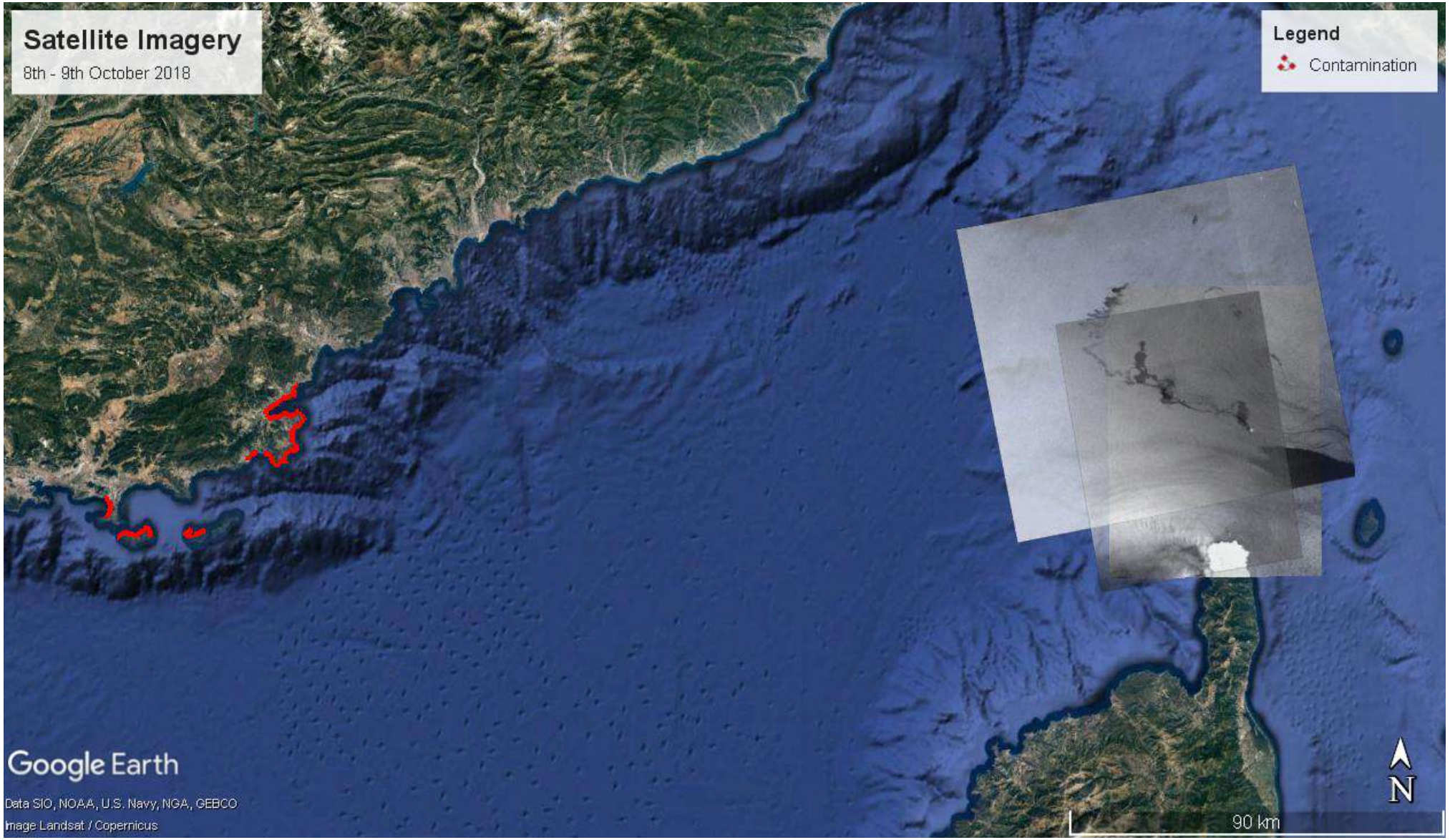
- Up to 11 aircrafts involved (crew transfer, aerial observation, security etc.)
- ~ 2 daily flights to reposition antipol vessels on the slicks at the beginning and middle of the day

  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.

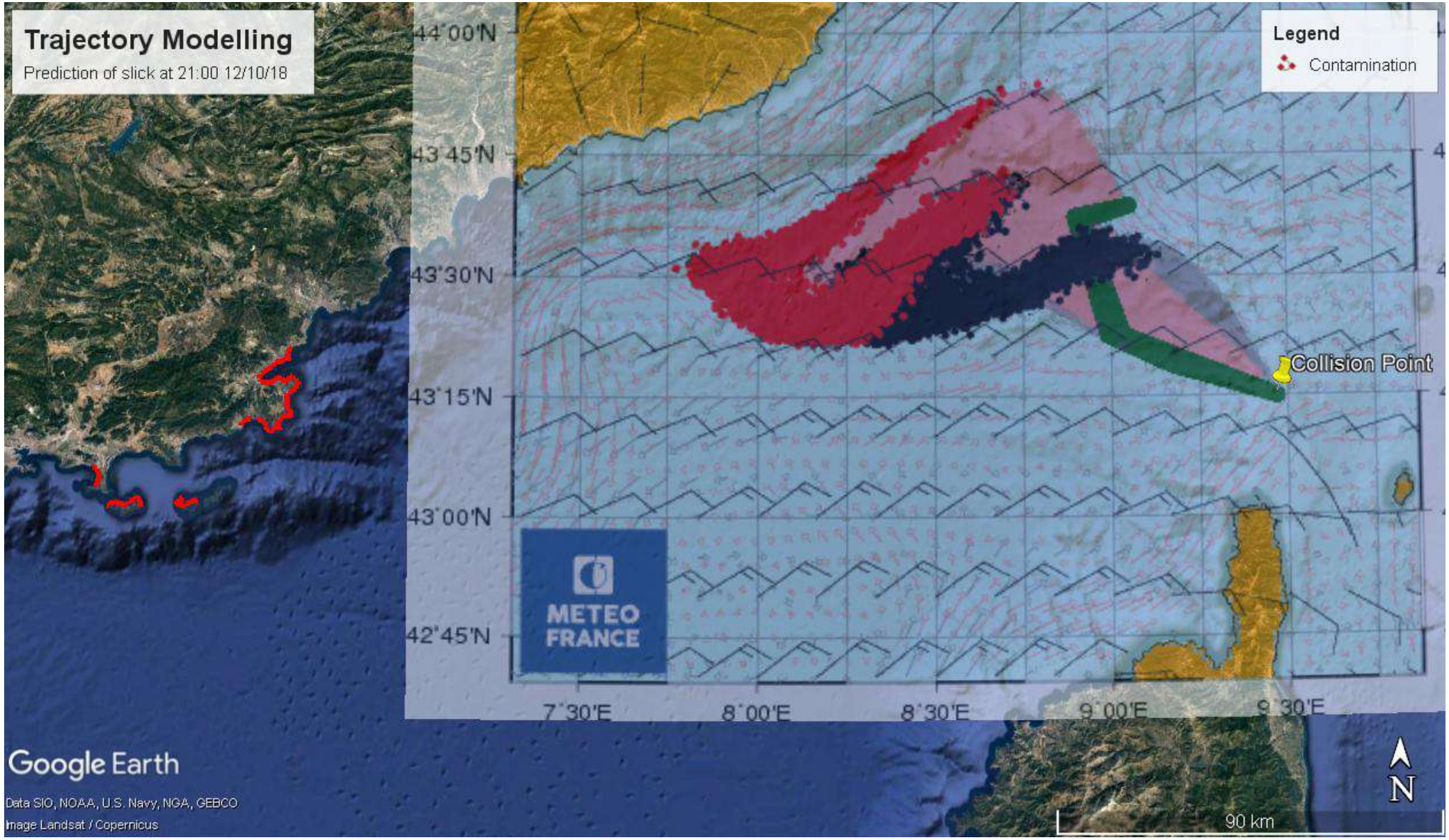
Satellite imaging (ITOPF) – 8 october – D+1



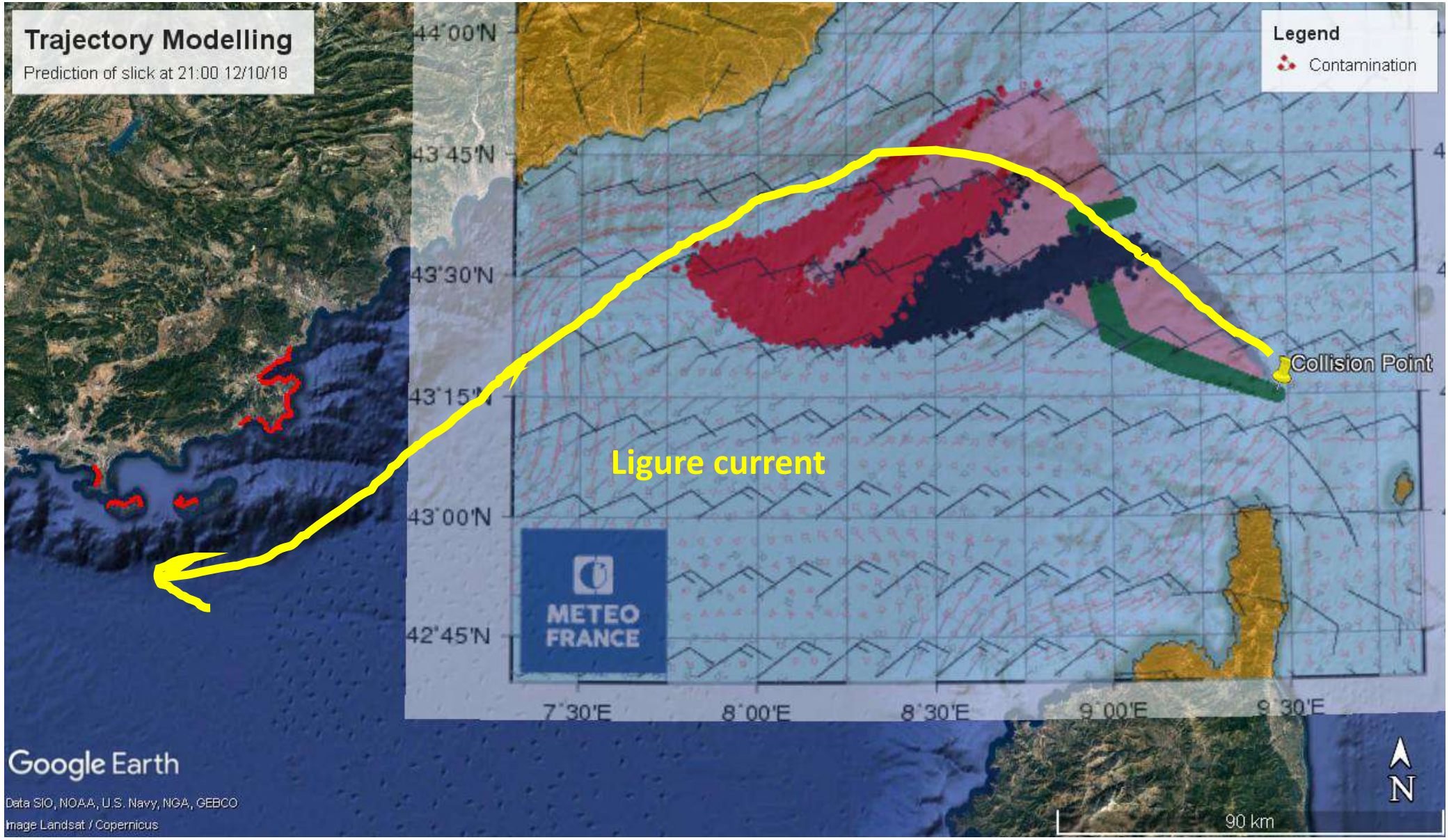
Satellite imaging – 9 october – D+2



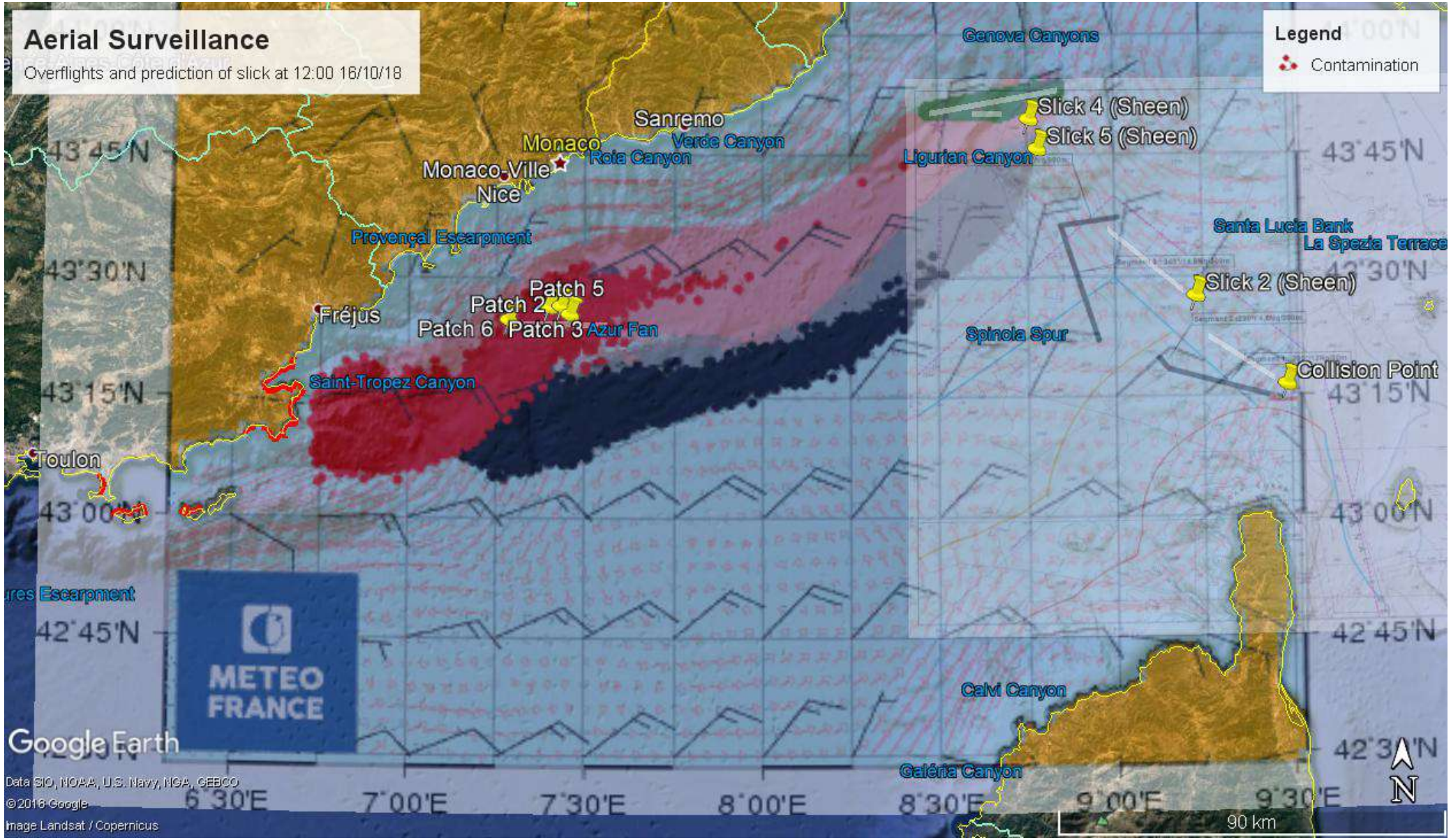
Modelisation (ITOPF) – for 12 october (D+5)



Modelisation – for 12 october (D+5)



Modelisation – for 16 october (D+9)

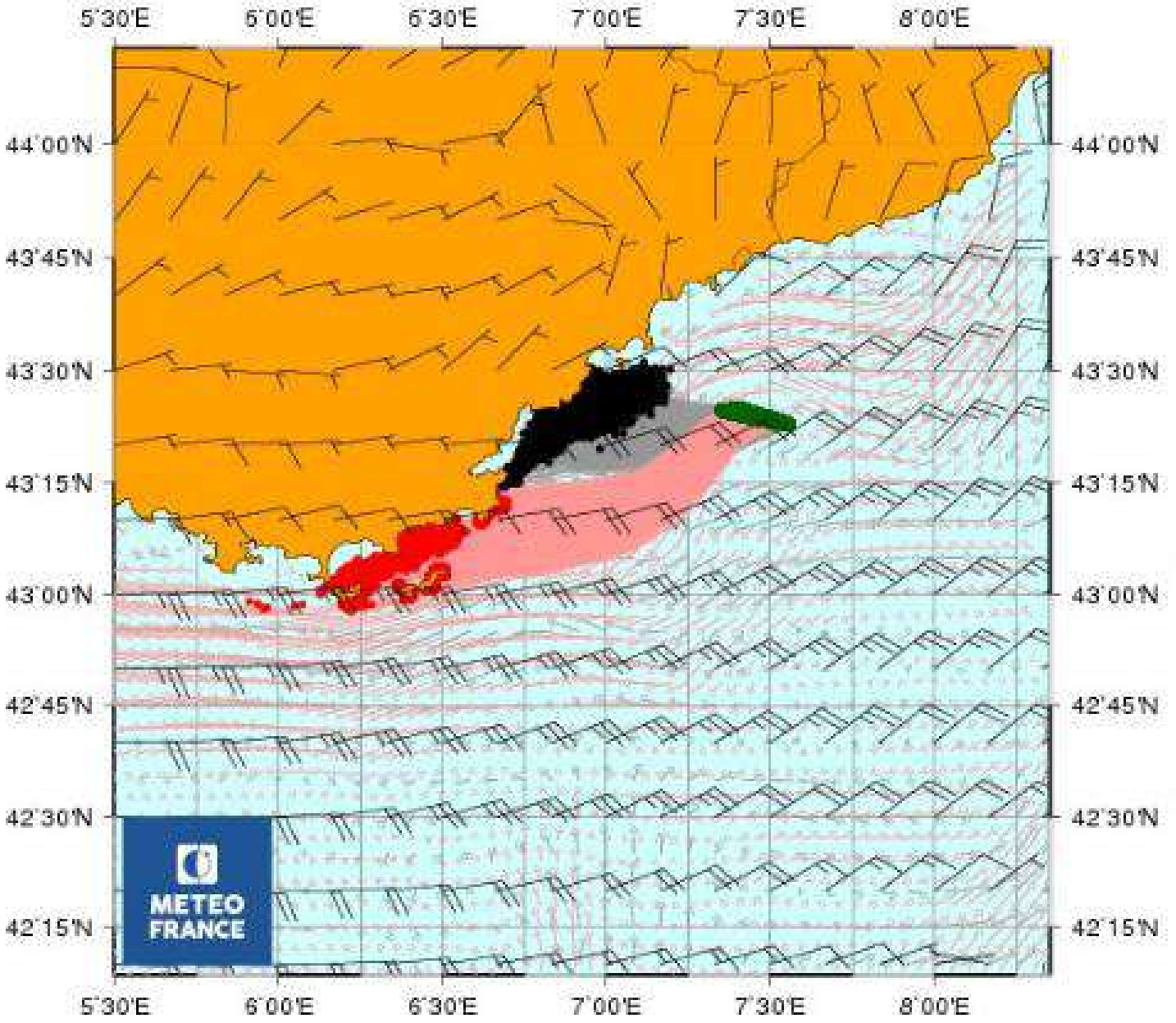


Second phase – Coastal response

- 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.

MOTHY/CEP MULTI1 : Forecast for 18/10/2018 at 00 UTC



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)

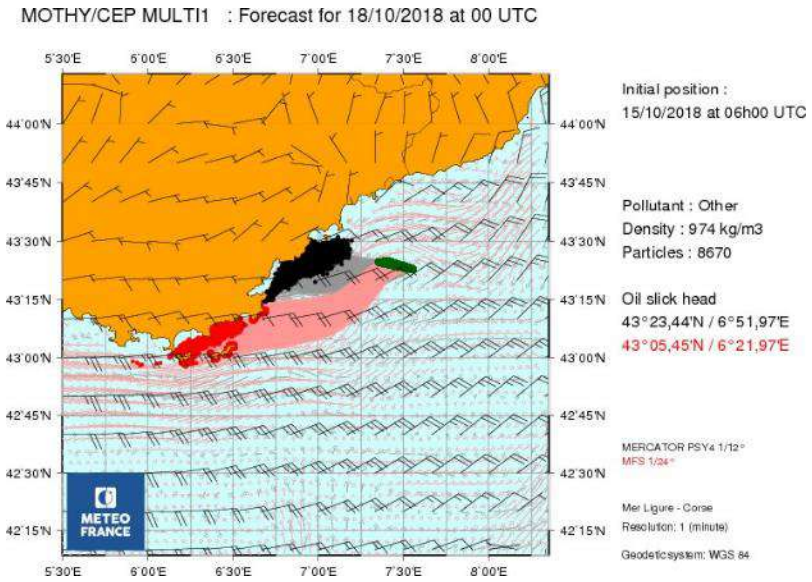
Geodeticsystem: WGS 84

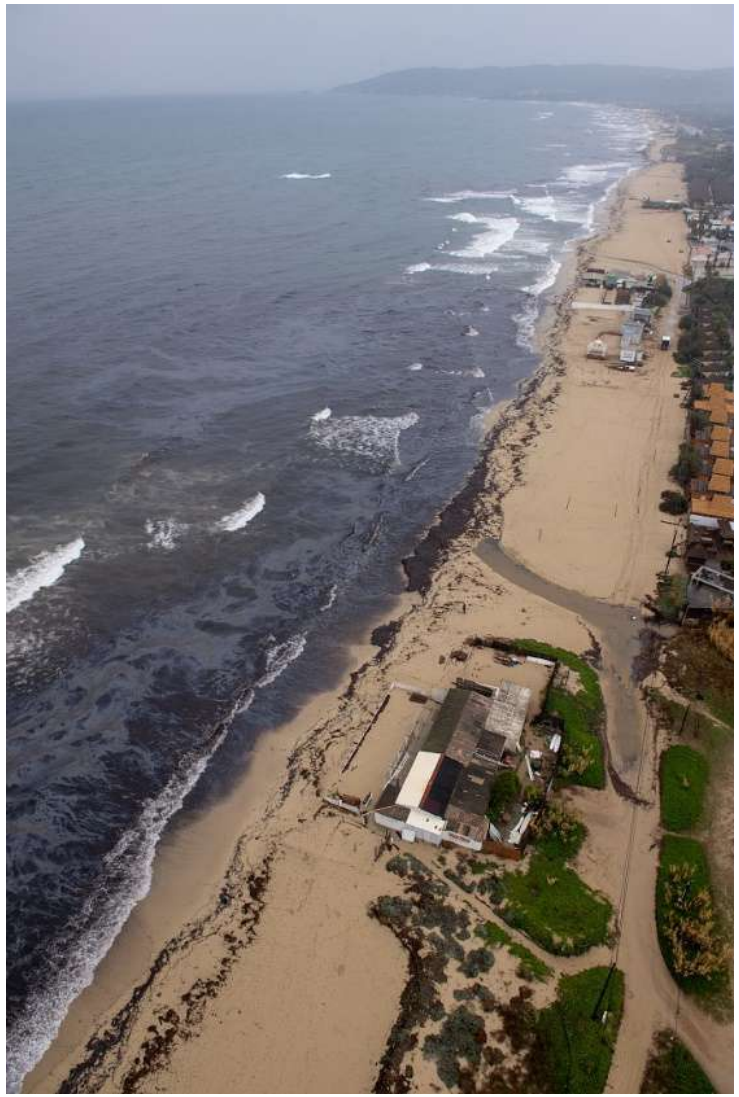

Hérault
Gard
Bouches-du-Rhône
Var
Aude
Pyrénées Orientales
Day 10
Day 19
Day 12
(24 sites)
90 km
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2018 Google
Image Landsat / Copernicus
Google Earth
43°04'28.55" N 4°51'27.24" E elev 0 m eye alt 381.41 km

Ramatuelle/St Tropez

- 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

First arrival of tarballs onshore – Day 9





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 oslid waste (oiled or unoiled)
- 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.

Some Aspects behind an ETV cleaning

Human resource

Equipment needed

- Vaccum truck
- High pressure cleaner
- Degreaser
- PPE + consumable
- Scaffolding
- etc…

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

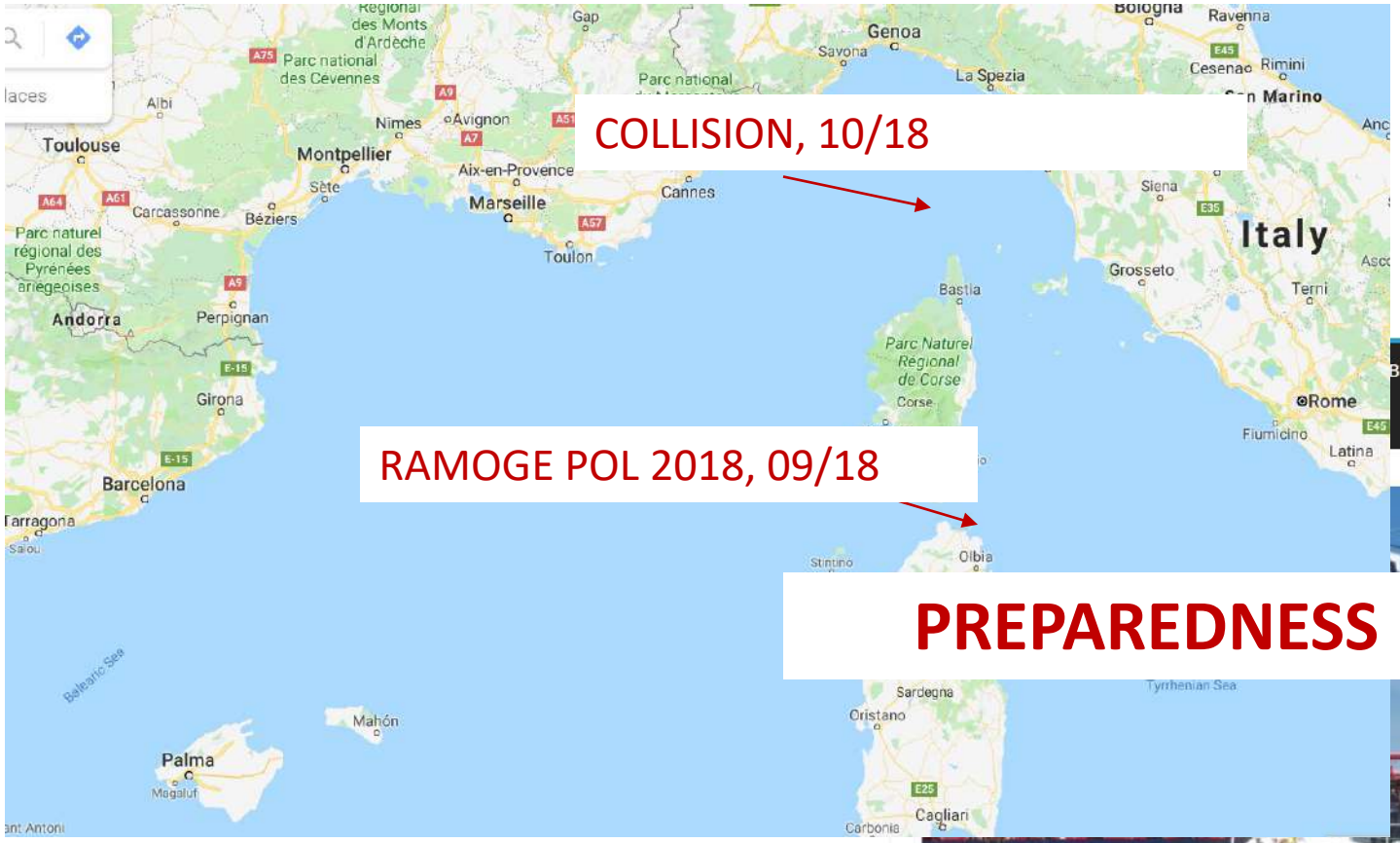
- Berth rental
- Installation of booms around the vessel
- Removal and treatment of waste skips
- Cleaning of the main deck (up to 2 weeks)
- Hull cleaning (up to 1 week)
- Cleaning of equipment
- Tank cleaning (up to 2 weeks)

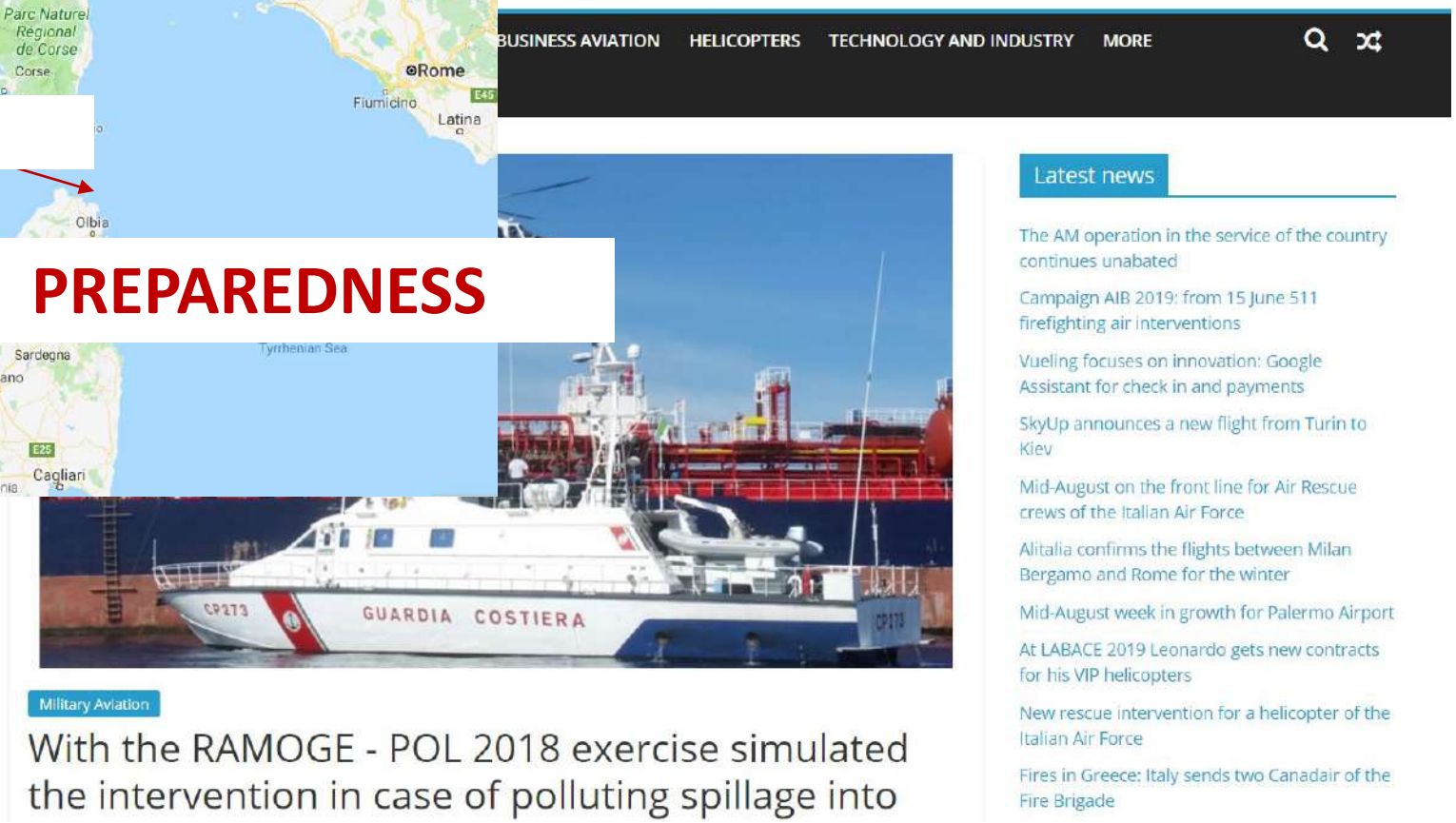
→ **More than a month's work**

Overall, a successful operation… why?

Overall, a successful operation… why?

Overall, a successful operation… why?





ITOPF

PROMOTING EFFECTIVE SPILL RESPONSE

Thank you

www.itopf.org

Membership

Photo: Stena


Photo: Maersk

Photo: Royal Caribbean

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

Technical Services

SPILL RESPONSE

DAMAGE ASSESSMENT & CLAIMS ANALYSIS

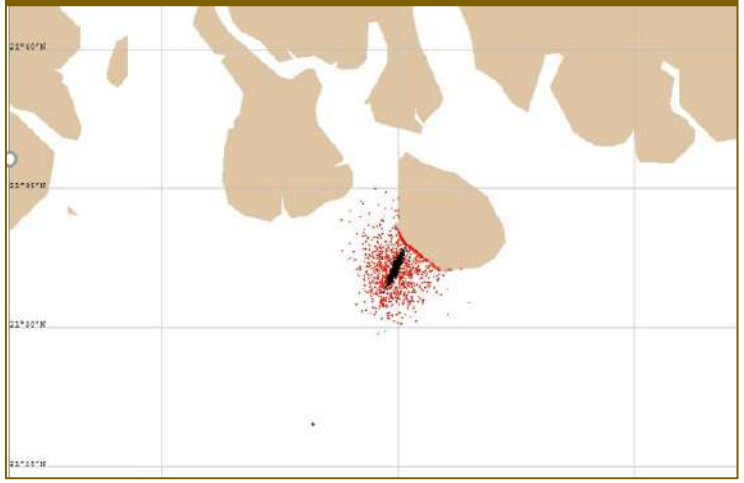
CONTINGENCY PLANNING & ADVISORY

TRAINING & EDUCATION

INFORMATION SERVICES

Spill Response - Jobs on site

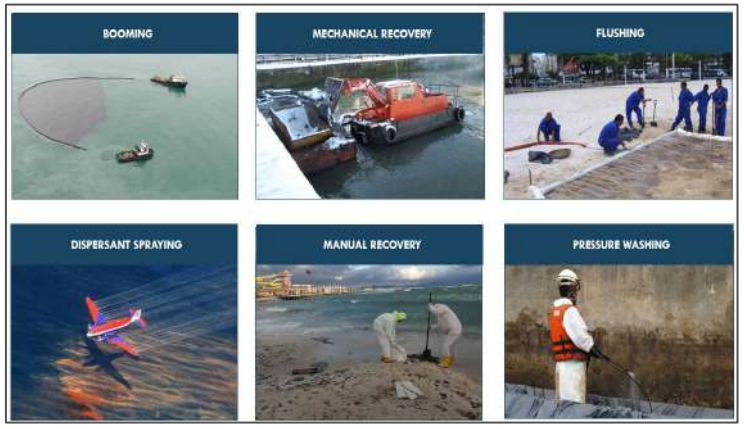
FATE & BEHAVIOUR MODELLING



AERIAL SURVEILLANCE

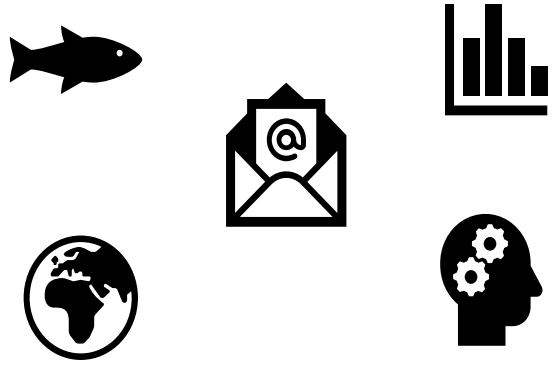
SHORELINE & AT SEA SURVEYS

ADVISE on RESPONSE OPERATIONS

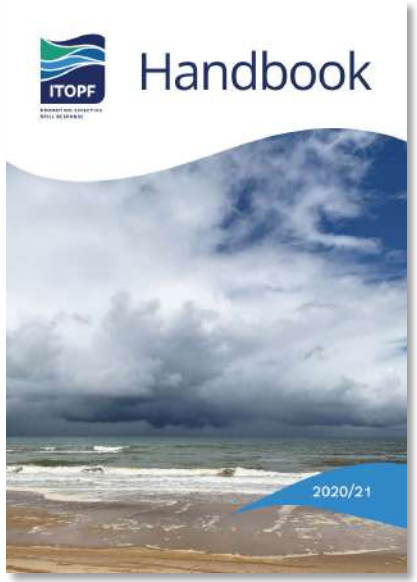


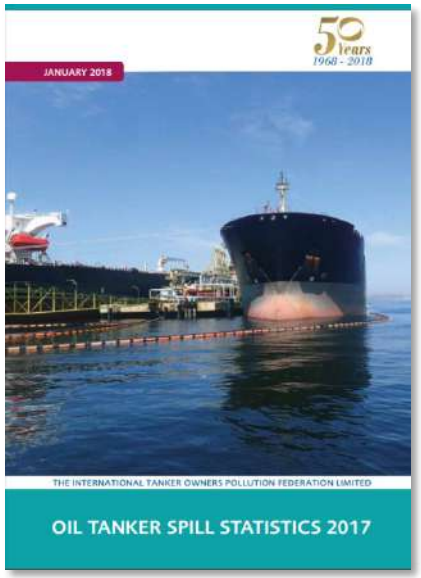
LIAISE with STAKEHOLDERS

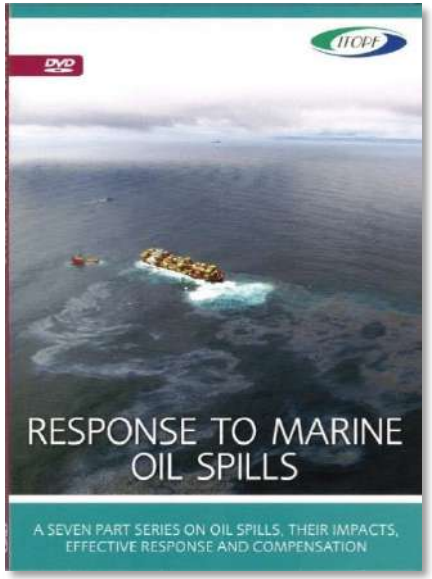
REPORTING

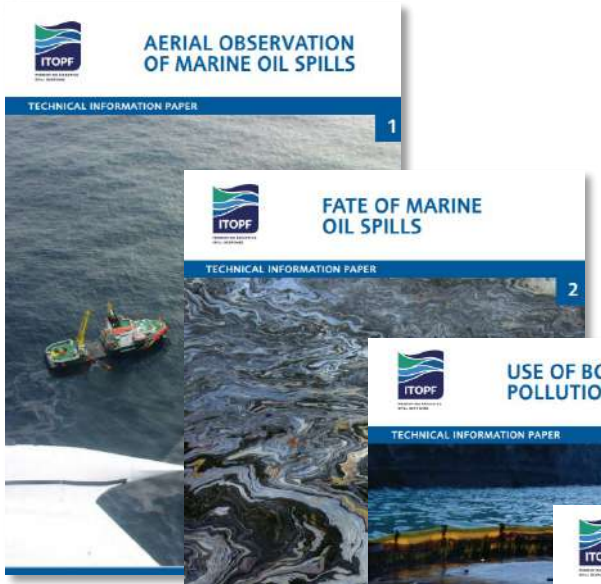


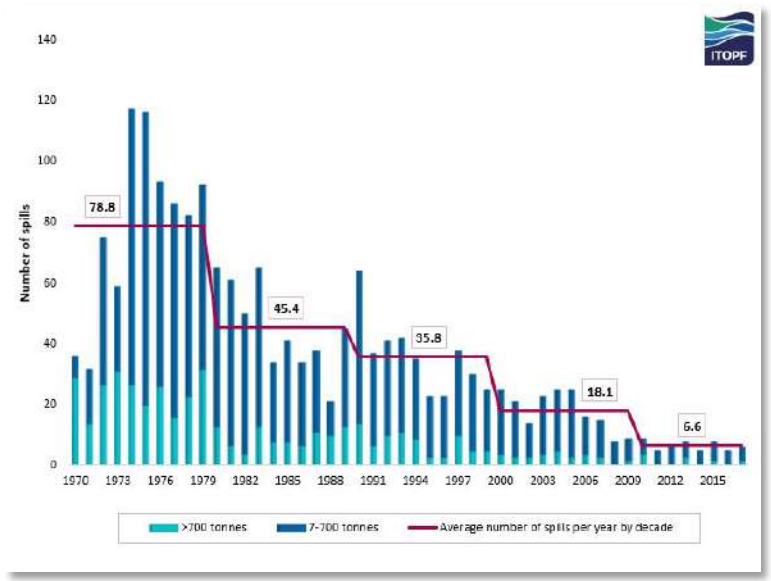
Other Services: Information, Publications, Films

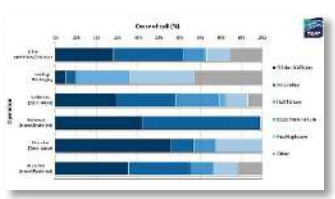


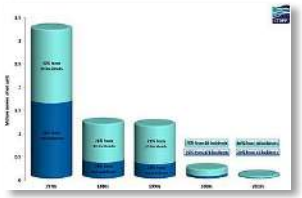












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Response Strategy Decision-Making

Net Environmental Benefit Analysis (**NEBA**)

&

Spill Impact Mitigation Assessment (**SIMA**)

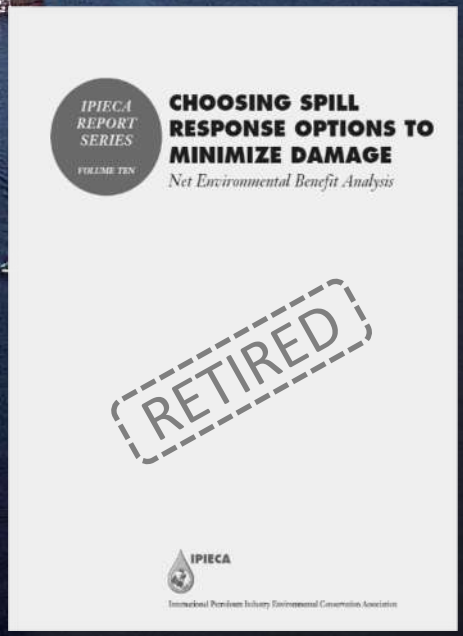



NEBA origins go back >25 years:

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

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

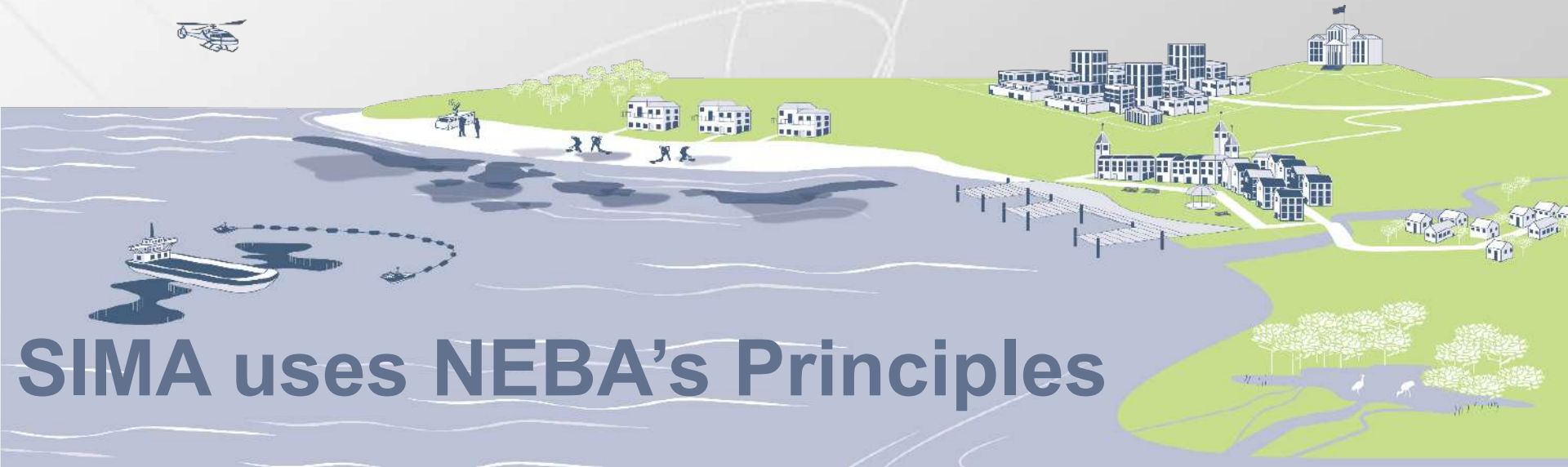
Incorporates stakeholder dialogue and can provide reassurance to communities

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

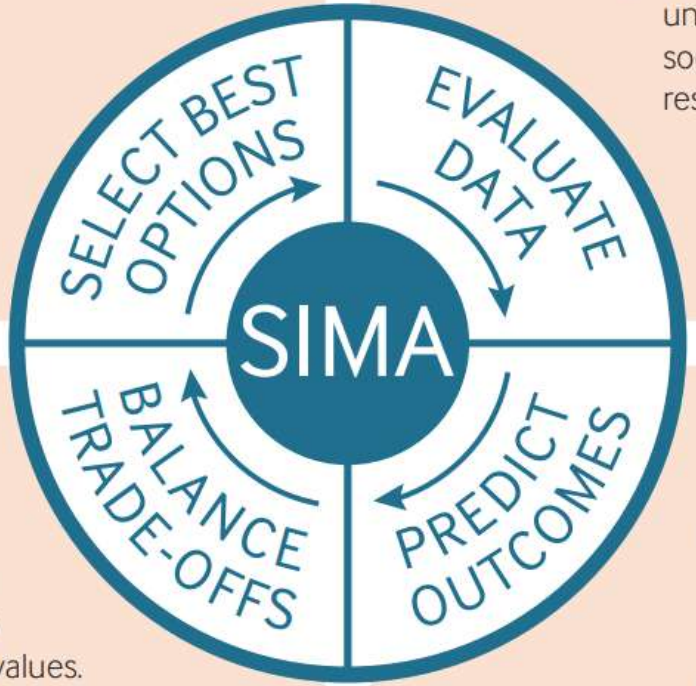
Stage 4: Select best options

The best combination of response options is selected to create an appropriate reponse 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

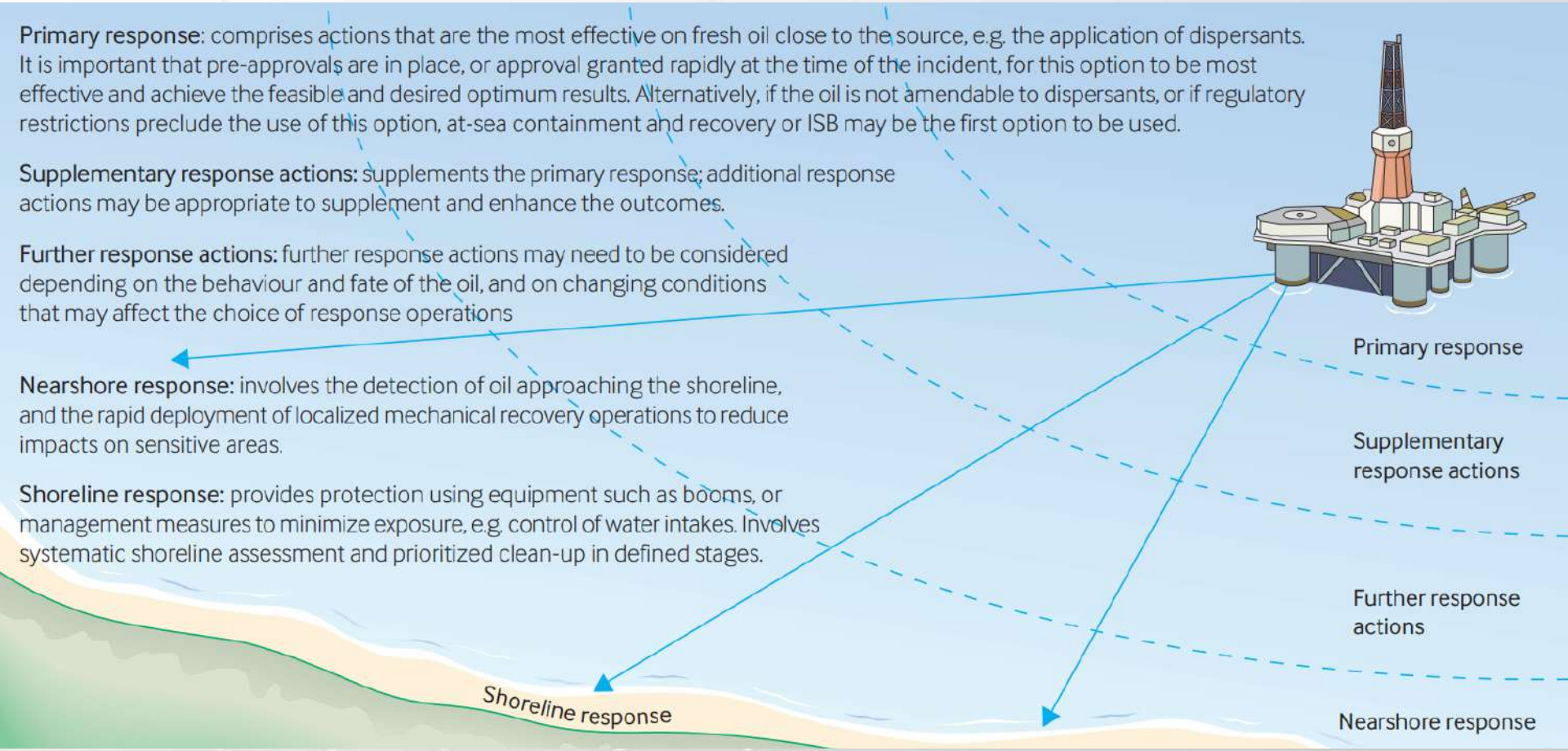
			NO INTERVENTION	CONTAINMENT AND RECOVERY		SURFACE DISPERSANT		SUBSEA DISPERSANT	CONTROLLED IN-SITU BURNING		SHORELINE BOOMING	
			Potential relative impact	Impact modification factor	Relative impact mitigation score	Impact modification factor	Relative impact mitigation score		Impact modification factor	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	0	0	Not feasible for subsea surface spill	0	0	0	0
Lower water column	None	1	0	0	0	0	0		0	0	0	0
Upper water column	Low	2	1	2	2	-2	-4		0	0	0	0
Water surface	Medium	3	1	3	3	3	9		2	6	0	0
Air	Medum	3	1	3	3	3	9		2	6	0	0
Shorelines		3	1	3	3	3	9		2	6	1	3
Saltmarsh	*High*	*4*	*1*			*3*			*2*		*1*	
Estuarine mudflats	*High*	*4*										
Sandy beaches	*Low*	*2*										
High value resources	Low	2	0	0	0	1	2		0	0	1	2
Socio-economic		4										
Boat harbour	*Medium*	*3*										
Water recreation	*High*	*4*										
Cultural	None	1	0	0	0	2	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



Tiered capability established or identified in alignment to strategy

Key Features

Transparent
Promotes dialogue

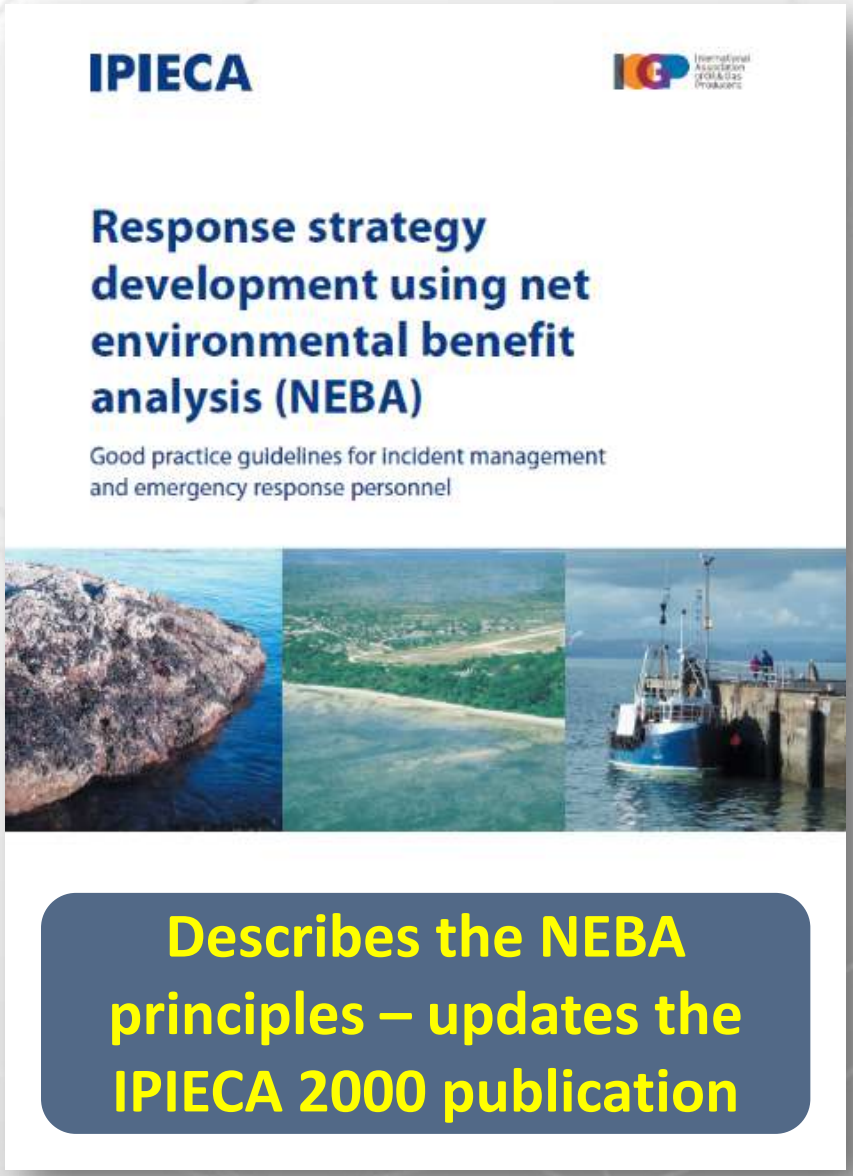
Holistic
Integrates ecological, socio-economic and cultural considerations

Qualitative assessment
Incorporates community values and expert judgement

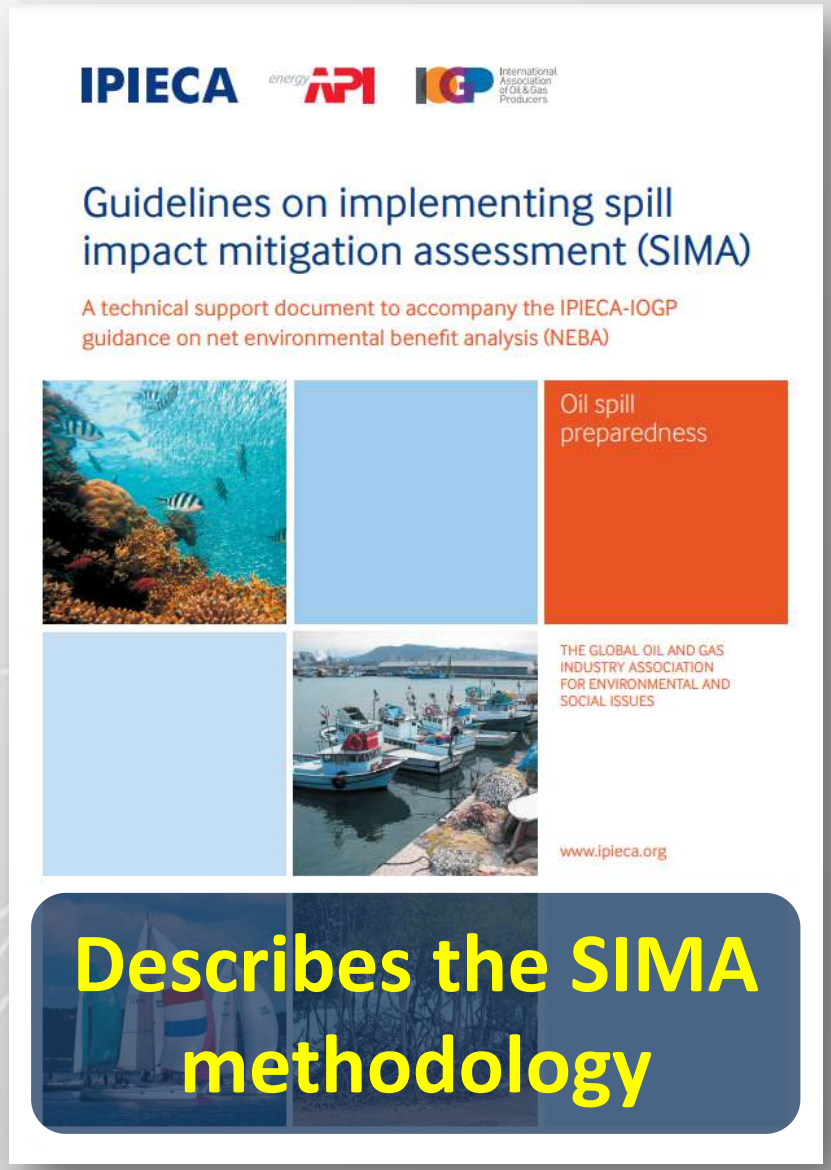
Promotes all response techniques
Assessing their benefits and drawbacks

Flexible
Adaptable to local setting and concerns

Industry publications



Describes the NEBA principles – updates the IPIECA 2000 publication



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.ipieca.org [search “SIMA” or “NEBA”]

Thank you for your attention