Airborne oil spill remote sensing:
Current status & recent developments

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OPTIMare

- **Company information**

- **Oil spill remote sensing: Objectives**

- **Oil spill remote sensing: Mission profile**

- **Wide-area surveillance: Side-Looking Airborne Radar (SLAR)**

- **Close-range analysis: IR/UV Line Scanning**

- **Close-range analysis: VIS Line Scanning**

- **Close-range analysis: Laser Fluorosensing**

- **Close-range analysis: Microwave Radiometry**

- **Communication: Mobile Processing / Reporting / Data Links**

- **Recent developments**

- **Summary**

Company information

Optimare's premises in Bremerhaven, Germany
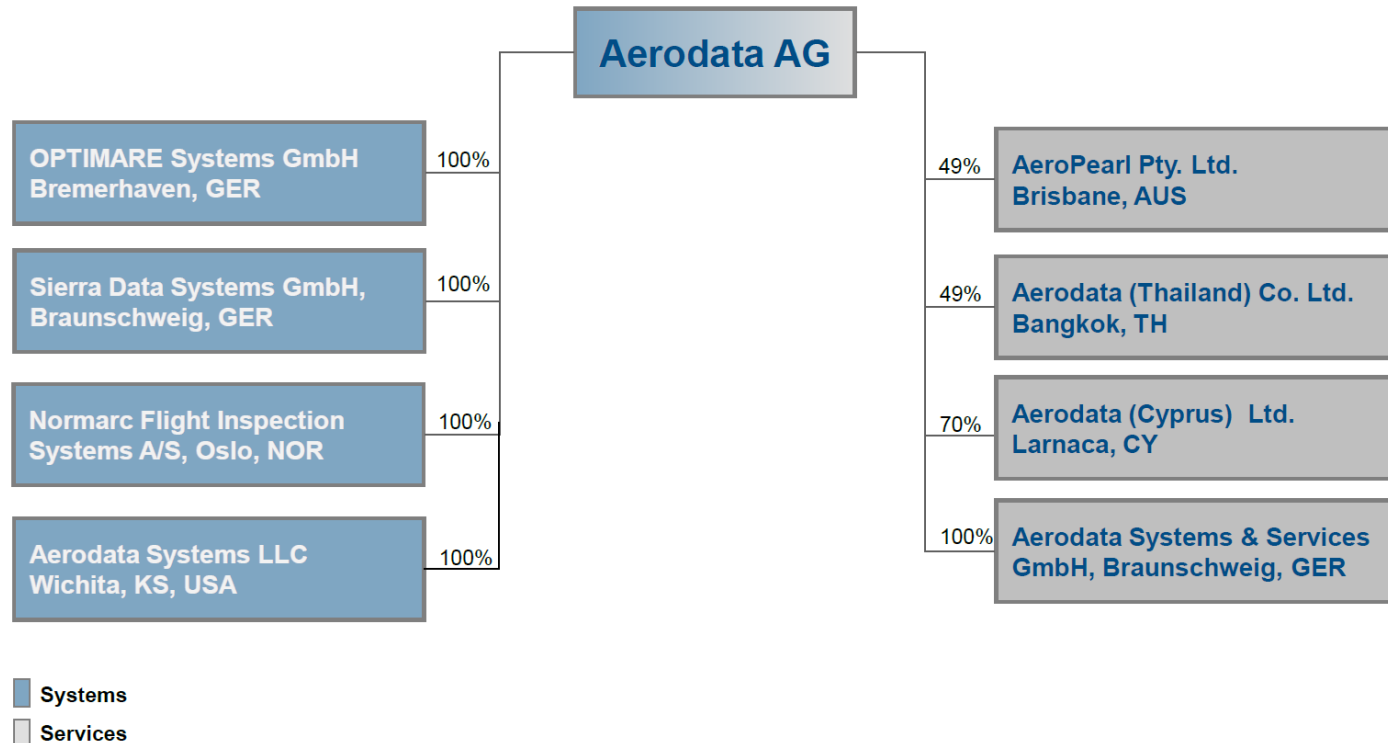

- 600 m² office space

- 100 m² production (mechanical, electrical)

- Optical test facilities

- 200 m² laboratory space

- 1000 m² hangar space

- Airport is used as sensor test range

- Immediate access to the North Sea

Company information

Optimare: A member of Aerodata Group (since 03/2013)

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                          │   Aerodata AG    │
                          └──────────────────┘

OPTIMARE Systems GmbH        100%          49%    AeroPearl Pty. Ltd.
Bremerhaven, GER                                  Brisbane, AUS

Sierra Data Systems GmbH,    100%          49%    Aerodata (Thailand) Co. Ltd.
Braunschweig, GER                                 Bangkok, TH

Normarc Flight Inspection    100%          70%    Aerodata (Cyprus)  Ltd.
Systems A/S, Oslo, NOR                            Larnaca, CY

Aerodata Systems LLC         100%          100%   Aerodata Systems & Services
Wichita, KS, USA                                  GmbH, Braunschweig, GER
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■ Systems
□ Services

The AERODATA/OPTIMARE group is a globally acting provider of turnkey solutions for airborne surveillance and oil spill remote sensing.
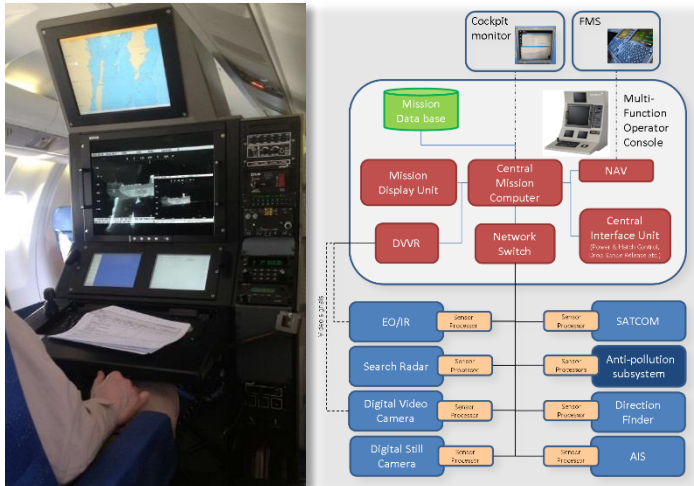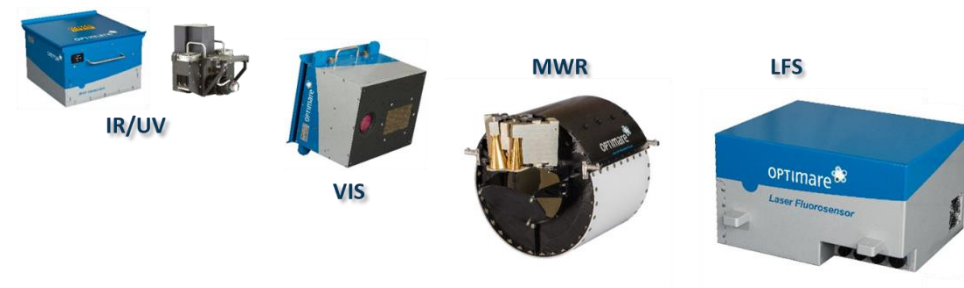
Company information

Products & services

IR/UV

VIS

MWR

LFS
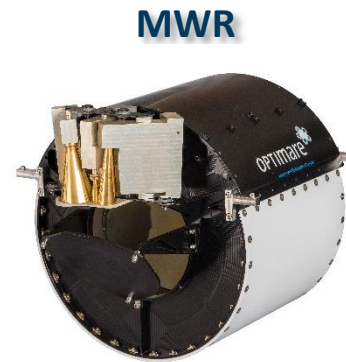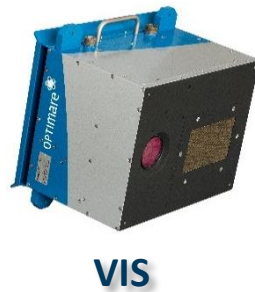
Optimare offers the broadest range of airborne oil spill remote sensors worldwide from an own production.

Products

**Optimare offers
the Airborne Maritime Surveillance System MEDUSA®**

IR/UV   VIS   MWR   LFS

MEDUSA® can be

- operated as stand-alone mission system and
- as a subsystem of an external mission system such as
  - the Airbus Defence & Space FITS or
  - Aerodata's AeroMission®

Major projects

The Netherlands

Do 228 / Kustwacht

- SLAR, EO/IR, Direction Finder, Still Camera, Optimare Mission System, Oil Spill Sampling Buoy, Life Raft, NAV/DF/Weather Radar SW Repeater Comms, DVVR

www.optimare.de / www.aerodata.de

Germany

Do 228 / Havariekommando

- LM2: MEDUSA System, SLAR, IR/UV, MWR, LFS, EO/IR, DVR, INMARSAT-C Satcom

- LM3: MEDUSA System, SLAR, IR/UV, VIS, SAR Direction Finder, EO/IR, AIS, INMARSAT Broadband Satcom, Comms, DVVR

www.optimare.de / www.aerodata.de

Company information

Major projects

Sweden

Saab 340 MSA / SAAB

- MEDUSA System, Search Radar, SAR Direction Finder, AIS, INMARSAT Broadband Satcom, EO/IR, Tactical Radio, DVVR (HD Video)

www.optimare.de / www.aerodata.de

Belgium

BN-2 Islander / MUMM

- MEDUSA System, SLAR, IR Camera, Still Camera, Video Camera, AIS

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Company information

Major projects

Spain

aerodata OPTIMARE

CN235 / SASEMAR

- MEDUSA System (in subsiguration configuration), SLAR, IR/UV, MWR, LFS, Search Radar, AIS, Direction Finder, EO/IR, Comms

www.optimare.de / www.aerodata.de

Portugal

aerodata OPTIMARE

C295 Persuader / Portuguese Airforce

- MEDUSA System (in subsystem configuration), SLAR, IR/UV, VIS Search Radar, EO/IR, Comms
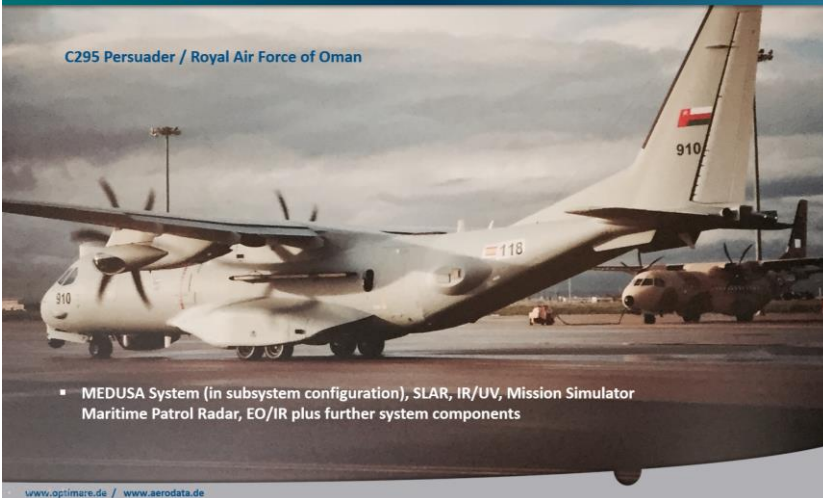
www.optimare.de / www.aerodata.de

Company information

Major projects

Sultanate of Oman

aerodata OPTImare

C295 Persuader / Royal Air Force of Oman

- MEDUSA System (in subsystem configuration), SLAR, IR/UV, Mission Simulator
  Maritime Patrol Radar, EO/IR plus further system components

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Armed Forces of Malta

aerodata OPTImare

- 2 King Air B200 aircraft equipped with AeroMission
- Mission role:
  Maritime Patrol and Search and Rescue

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Company information

Major projects

Prefectura Naval Argentina

- King Air 350ER aircraft equipped with AeroMission
- Mission role:
  Maritime Patrol and Search and Rescue

www.optimare.de / www.aerodata.de

AeroRescue, Australia

- 5 Dornier 328 aircraft equipped with AeroMission
- Operated under contract of AMSA (Australian Maritime Safety Authority)
- Mission role:
  Search and Rescue,
  2 aircraft equipped with additional oil pollution measurement system

www.optimare.de / www.aerodata.de

Company information

Aerodata premises at Braunschweig-Wolfsburg Airport

Facilities:

- 2500 m² office space

- 200 m² production (mechanical, electrical)

- 500 m² laboratory space

- 3600 m² hangar space

- Test facilities for temperature and electromagnetic compatibility

Airborne oil spill remote sensing

Objectives

- **Position**
- **Verification**
- **Classification**

- **Area**
- **Thickness distribution**
- **Volume**
- **Response coordination**

- **Preservation of evidence**
- **Prosecution**
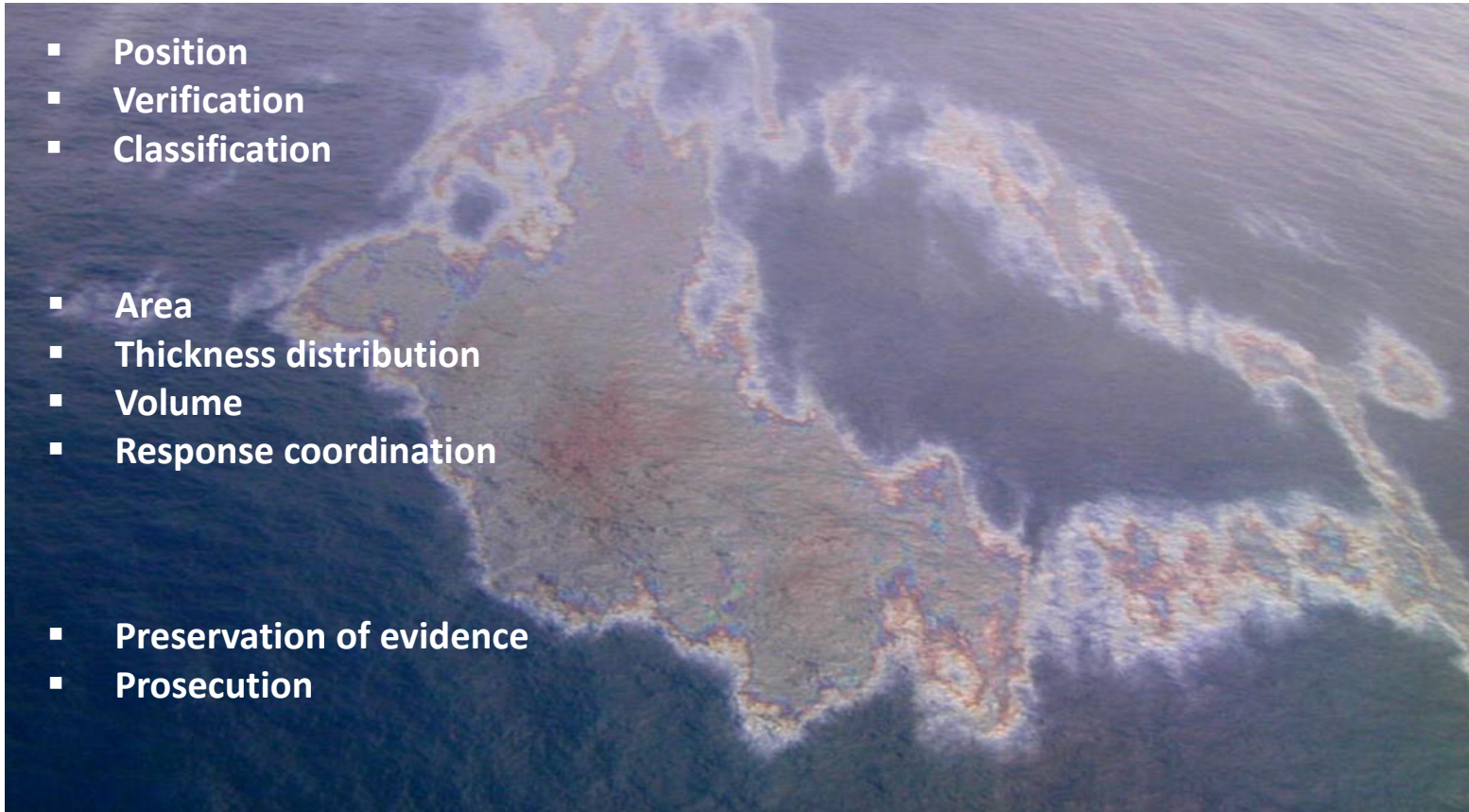
Airborne oil spill remote sensing
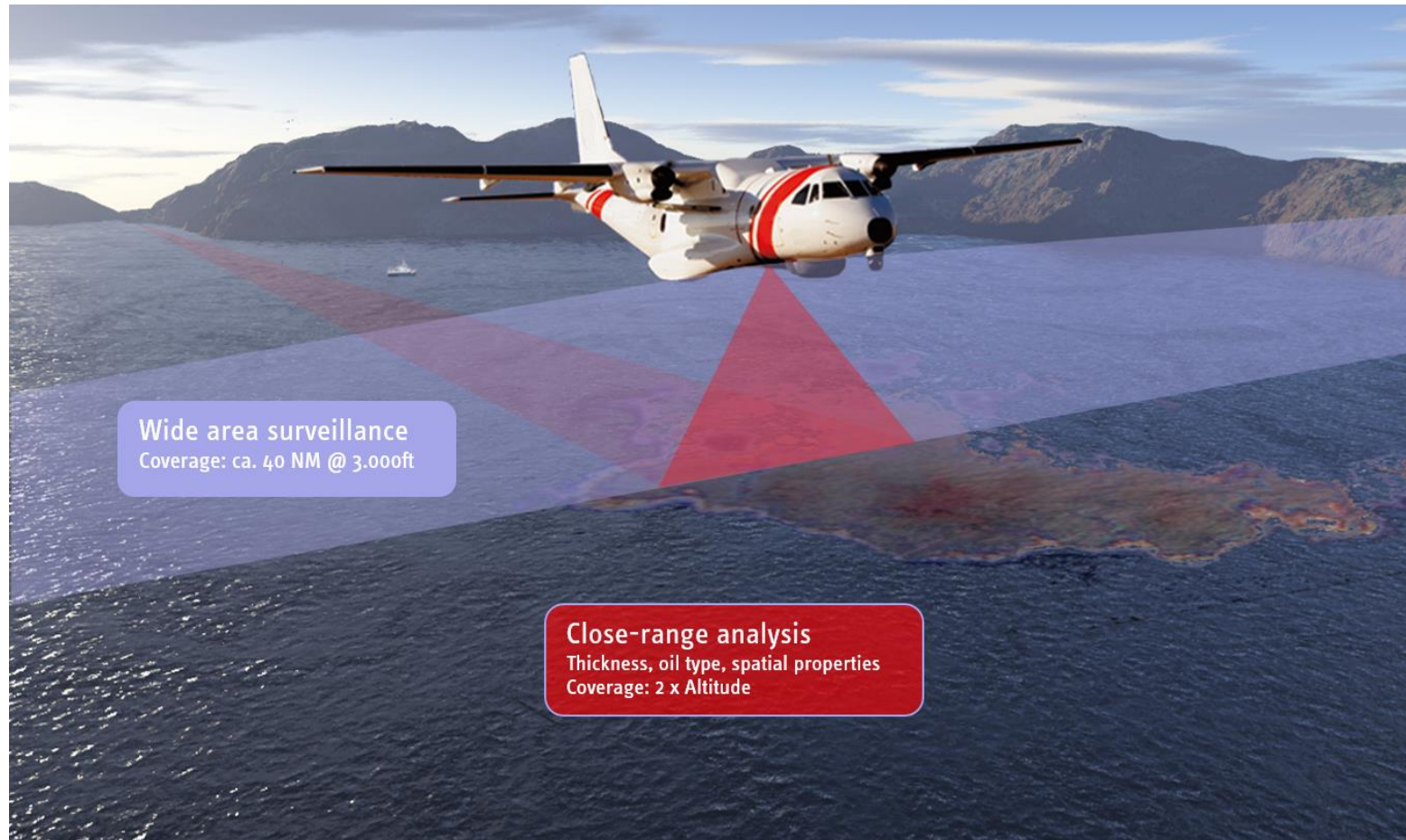
Mission profile

Wide area surveillance
Coverage: ca. 40 NM @ 3.000ft

Close-range analysis
Thickness, oil type, spatial properties
Coverage: 2 x Altitude

Airborne oil spill remote sensing

Mission profile

Pre-flight

- Mission planning
- Use of satellite data
- Transfer of flight plan to FMS
- Use of ext. AIS data

In-flight

- Multi-sensor system
- Sensor fusion
- Coms
- Data link
- Tactical map
- Report creation

Post-flight

- Report creation
- Archiving
- Dissemination
- Web GIS
- Mission preparation
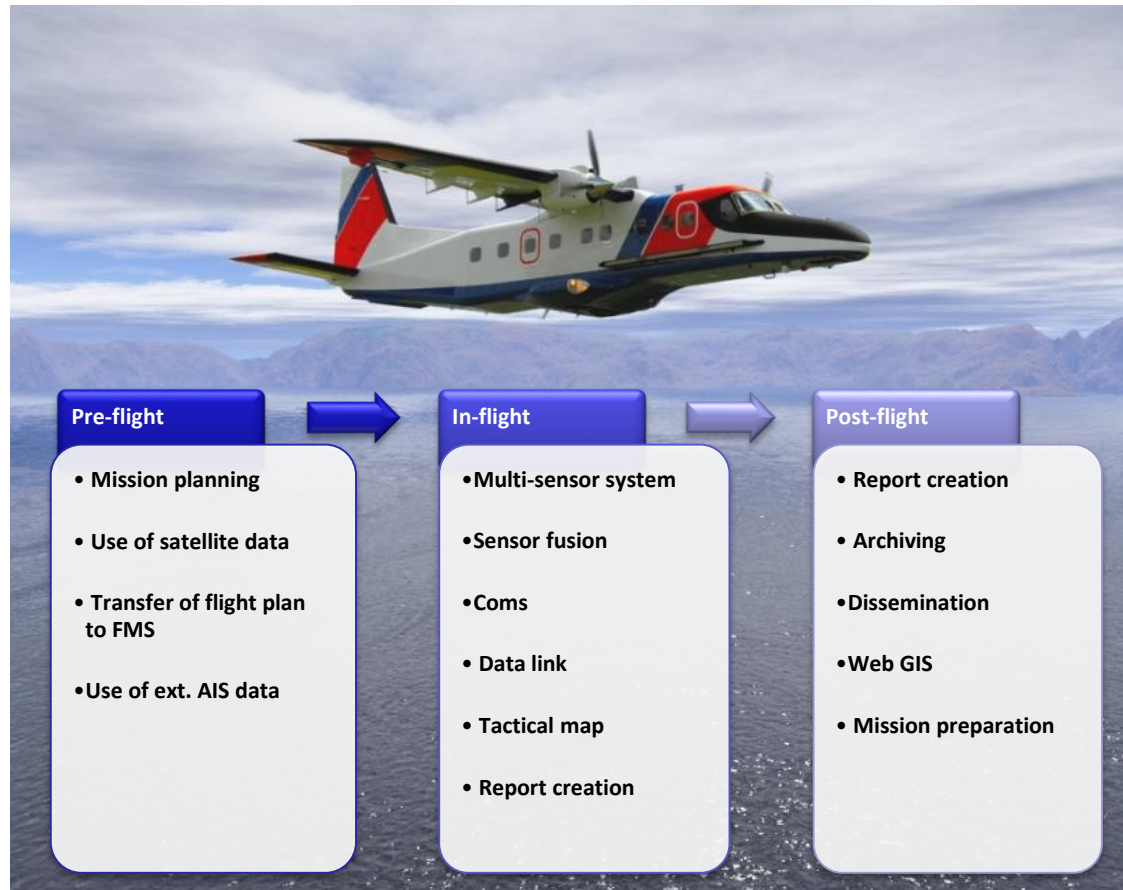
Wide-area surveillance

Side-Looking Airborne Radar (SLAR)

Wide-area surveillance

Side-Looking Airborne Radar (SLAR)
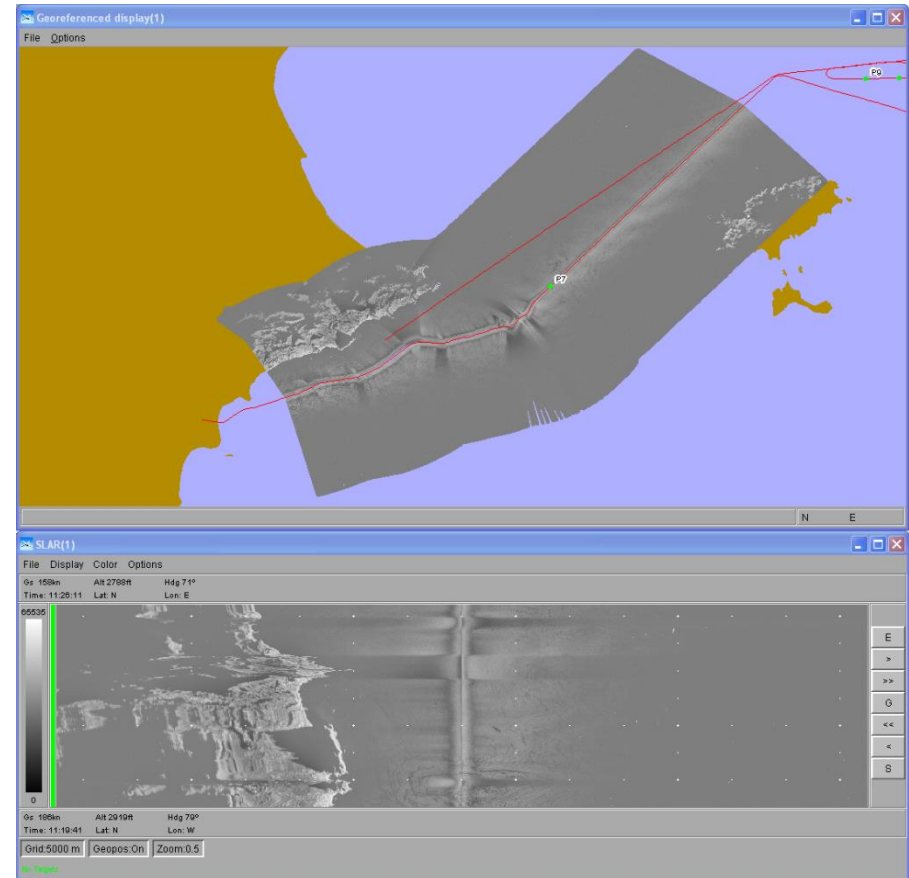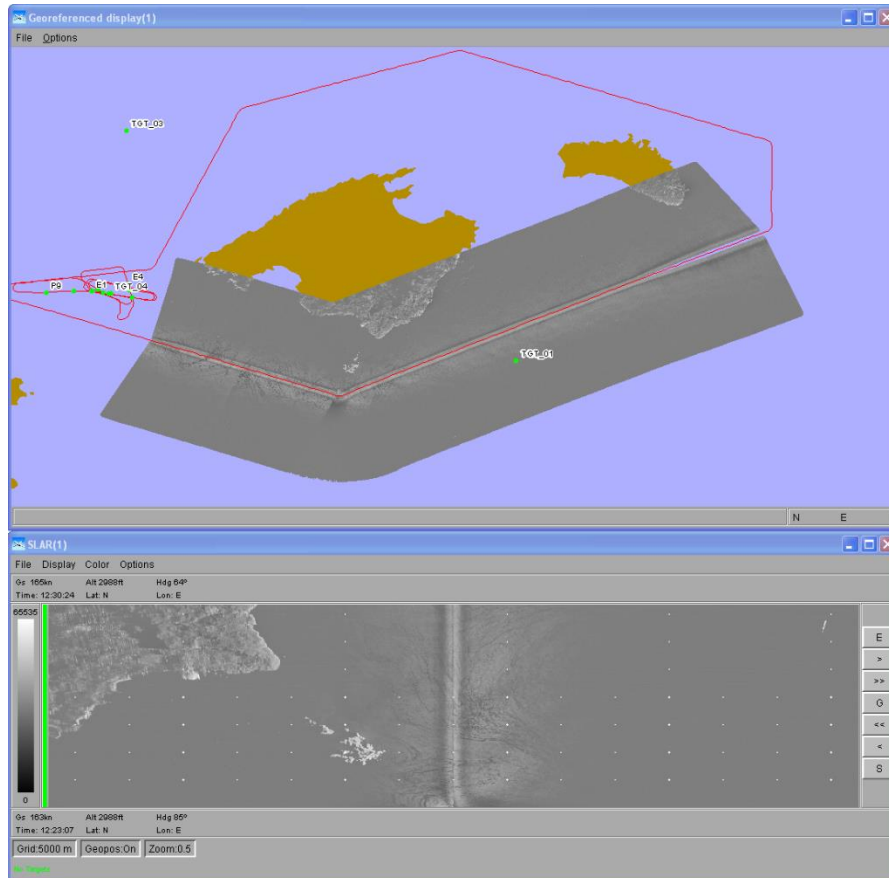
SLAR data visualised by MEDUSA®

Wide-area surveillance

Side-looking Airborne Radar (SLAR)
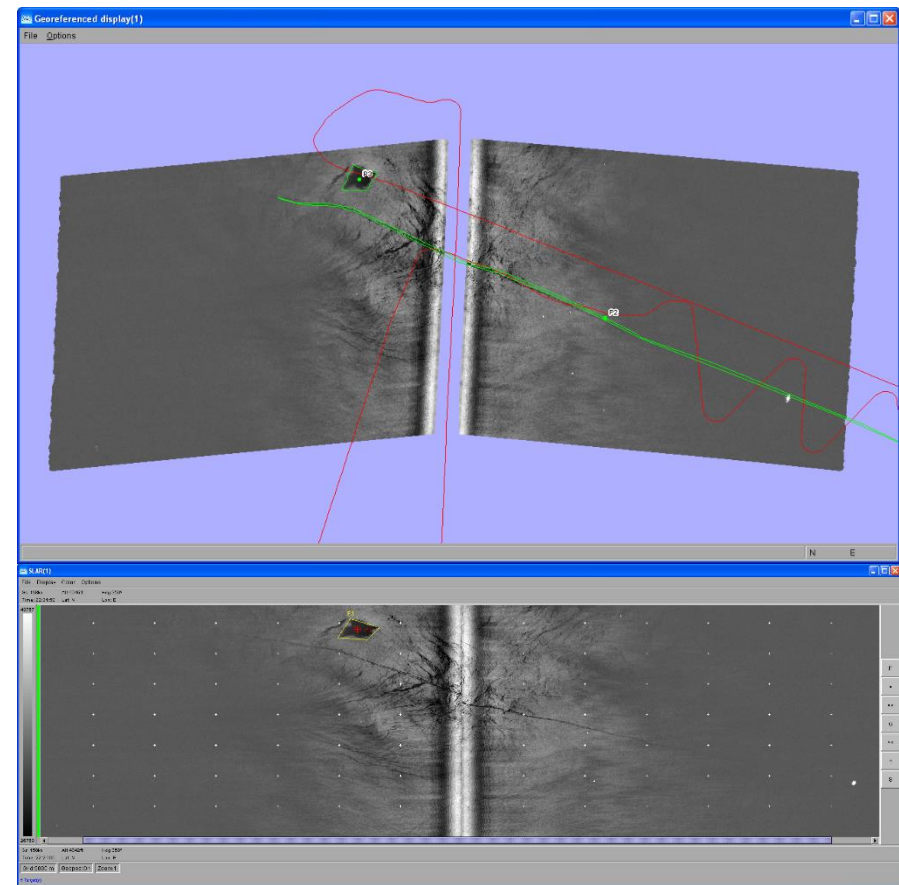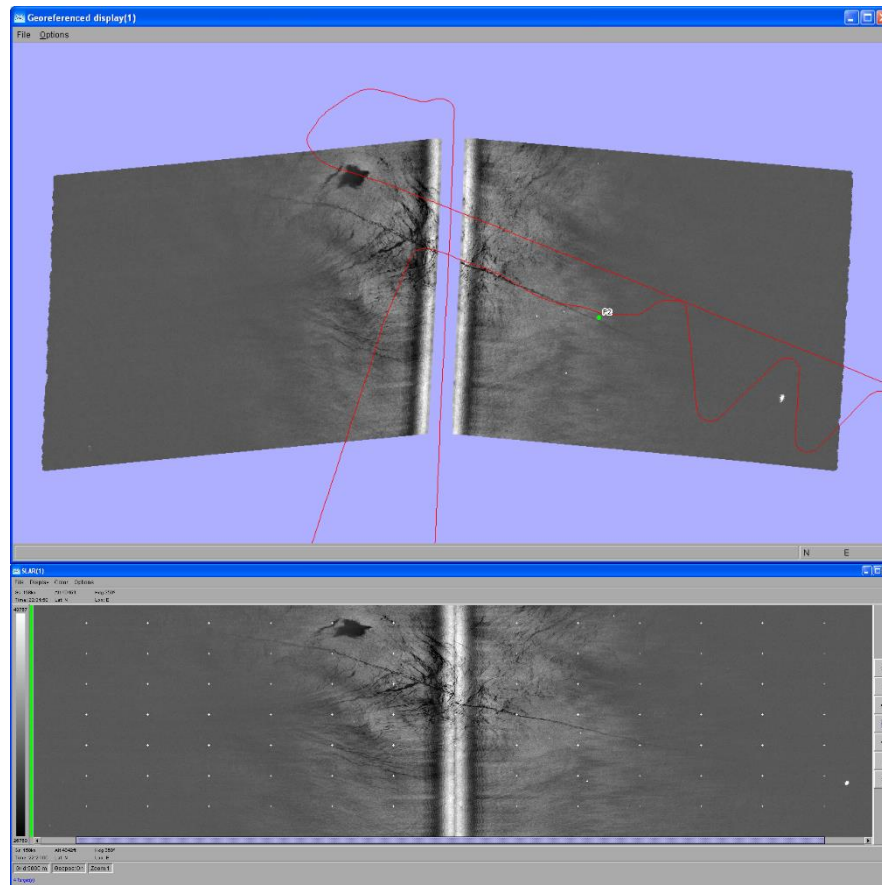
SLAR data visualised by MEDUSA®

Close-range analysis

IR/UV Line Scanning
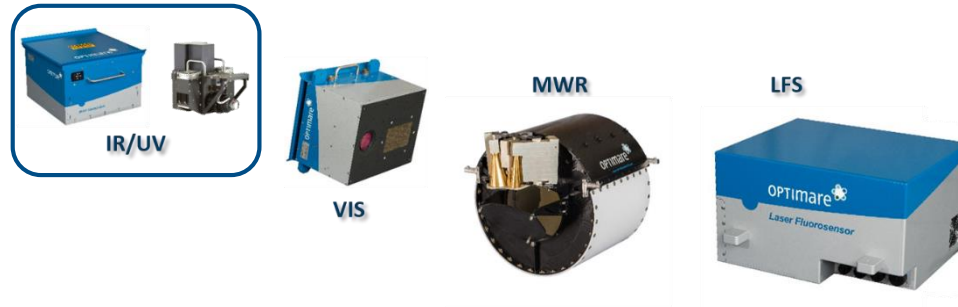
- Day and night spill detection. Op. aircraft altitude: 1000 ft .. 2000 ft
- Used for highly precise measurement and hot spots analysis
- Sensitive to all layer thicknesses above 0.01 micron (1-5 in BAOAC)
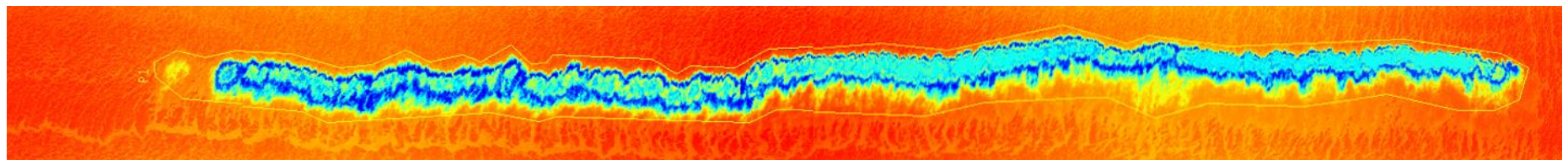
IR data visualised by MEDUSA®

Close-range analysis

VIS Line Scanning

IR/UV   VIS   MWR   LFS
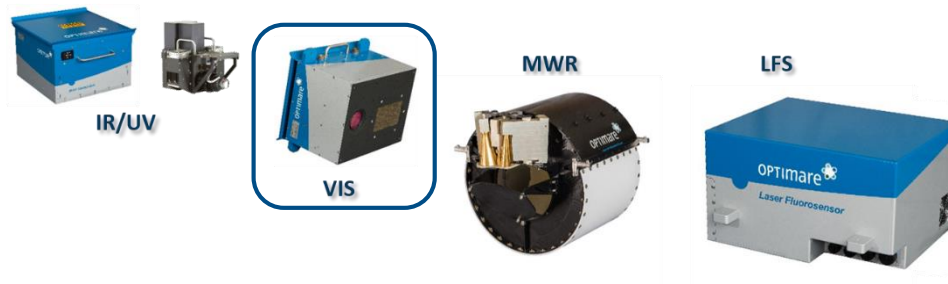
- Scene documentation

- "More standardised" use
  of oil appearance codes
  due to defined observation
  geometry
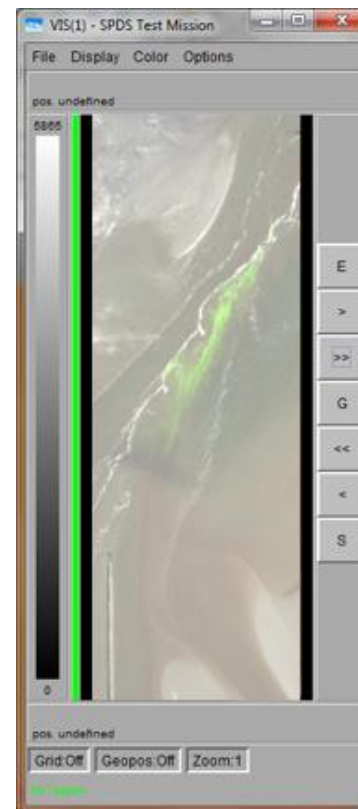
**VIS image of a
dye tracer plume
visualised by MEDUSA®**

Close-range analysis

Microwave Radiometry

IR/UV   VIS   MWR   LFS
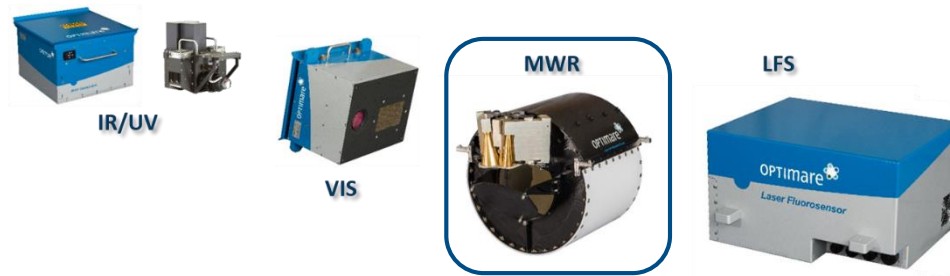
- Day and night / all-weather spill detection
- Thickness measurement (0.05mm .. 3mm)
- Used to analyse very thick spills (4-5 BAOAC)
- Op. aircraft altitude: 1000 ft

MWR thickness image

IR image (for comparison)
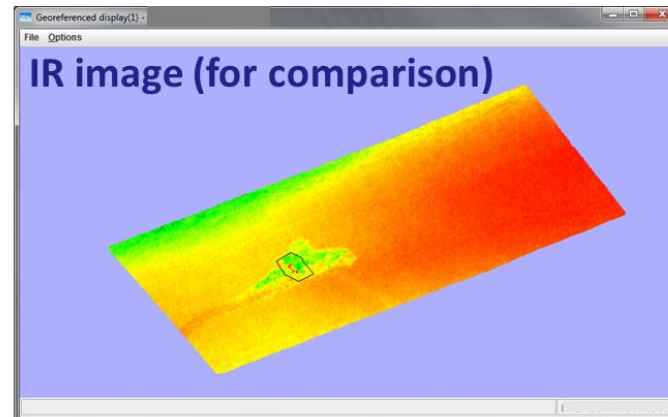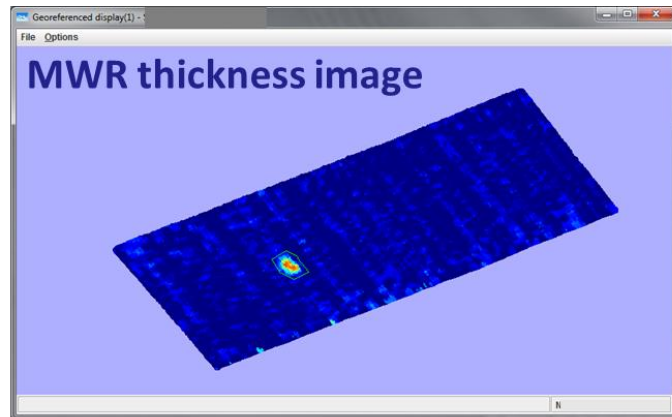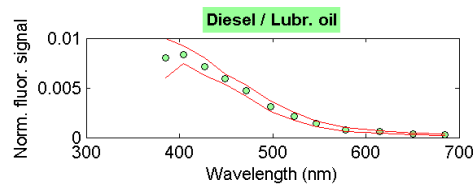
MWR and IR image of an oil spill visualised by MEDUSA®

	Area [km²]	Sum	Center	Cov. [%]	Orient. [°]	Dim. [NM]					Vol. [l](a.)		Vol. [l]	Oil type(a.)		Oil type	Status	Area type
P5	0.0080	0	N 42°...E9"	84	329	0.042 / 0.062	Delete	Modify	Transfer	Export	0	<<	3111	Undefined	<<	not available		undefined

Close-range analysis

Laser Fluorosensing

IR/UV   VIS   MWR   LFS
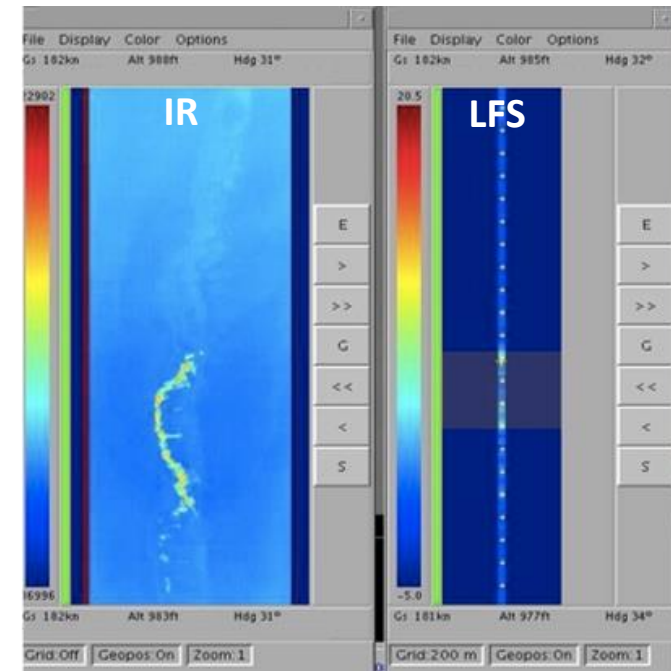
- Rough classification (poll. / no poll.)
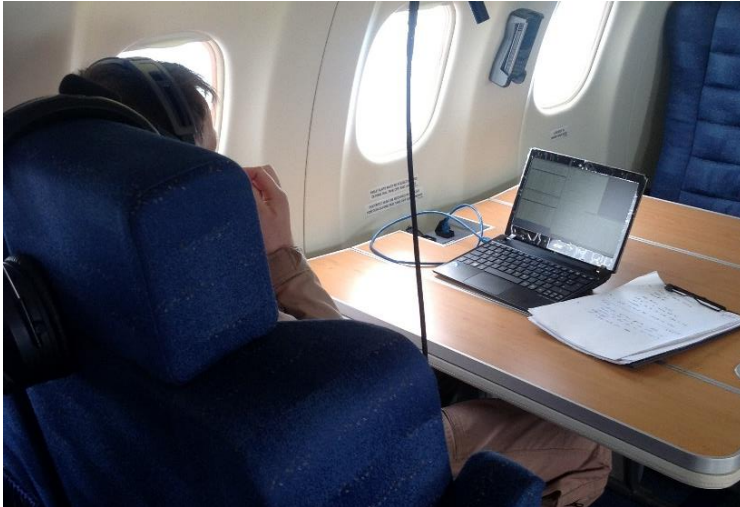- Fine classification (type of crude / refined oil)
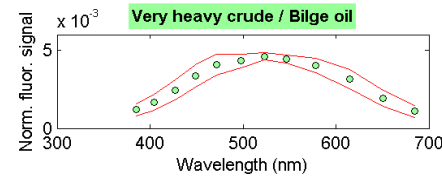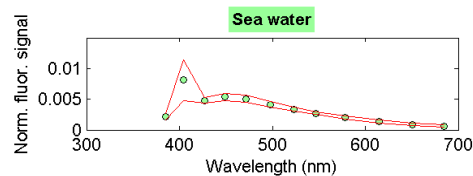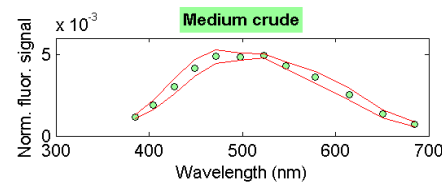
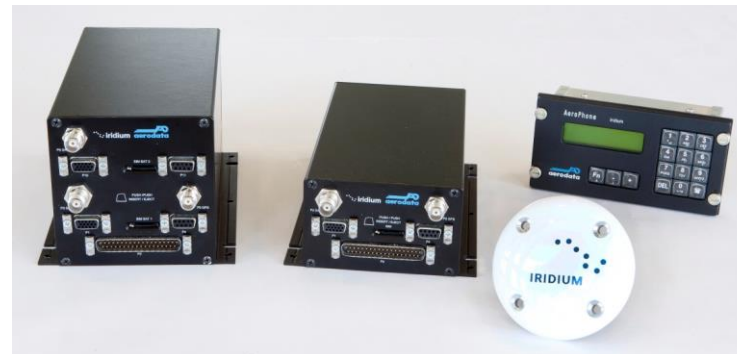**Laser Fluorosensors (LFS) are used to remotely classify the type of oil**

IR and LFS data of an oil spill visualised by MEDUSA®

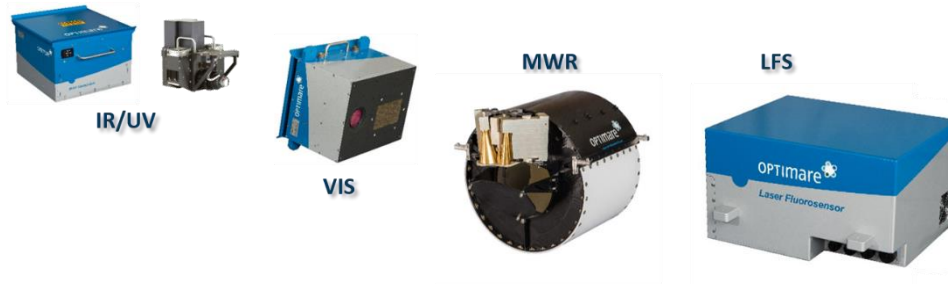## Mobile Processing / Reporting / Data links

- Fixed and mobile processing stations

- Semi-Automated report creation

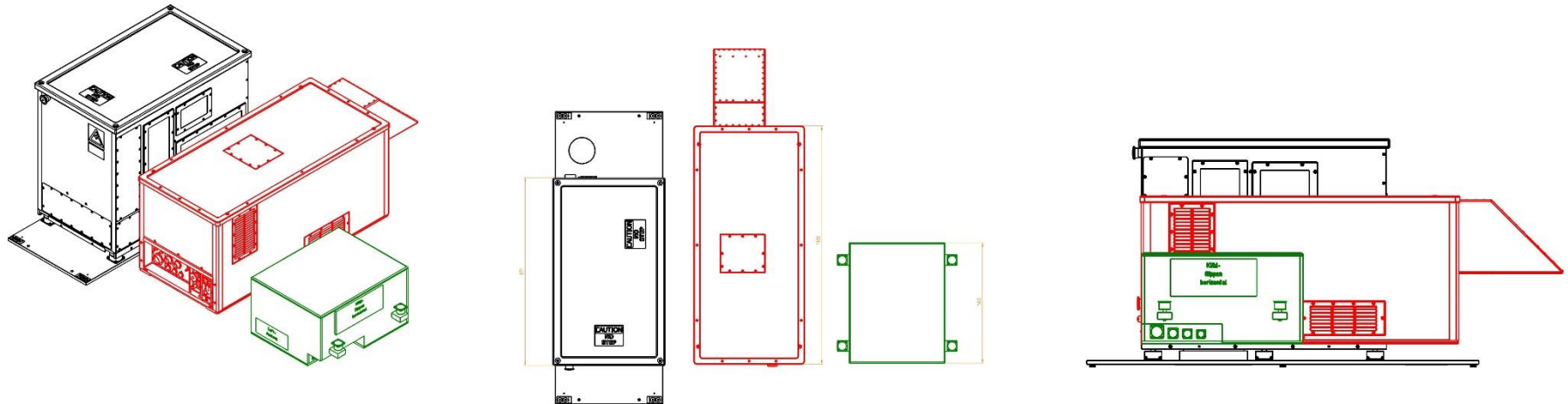- Transfer of reports via data links (Iridium, Inmarsat and others)

Recent developments

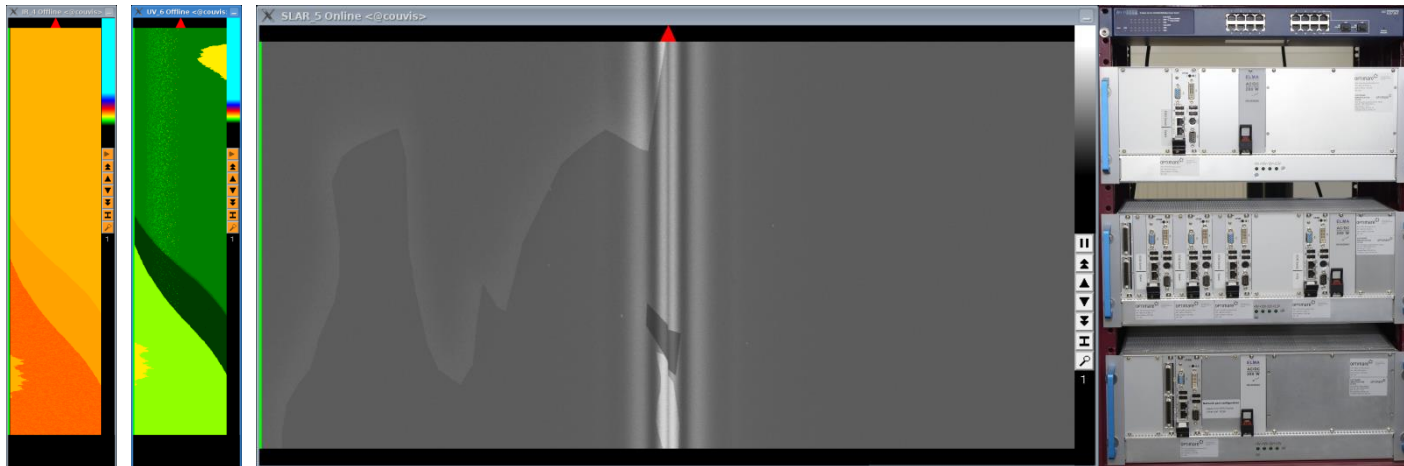**Sensors were reduced in size to fit into a broad variety of airborne platforms.**

IR/UV   VIS   MWR   LFS

Example: Laser Fluorosensor (LFS)

Recent developments

MEDUSA® Mission Simulator

- **Full mission simulation for optimum ground training**

- **Simulates:**
    - **vessels,**
    - **oil spills,**
    - **clouds, rain, sun angle,**
    - **global land coverage,**
    - **global temperature distribution**

OPTIMARE

Summary

- **Company information**

- **Oil spill remote sensing:**

  - **Objectives**

  - **Mission profile (wide-area surveillance & close-range analysis)**

  - **Sensors (SLAR, IR/UV, VIS, MWR, LFS)**

- **Communication**

- **Recent developments**

  - **Smaller sensors**

  - **Mission Simulator**

For further information please contact us:
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