Airborne oil spill remote sensing: Current status & recent developments

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Overview

- 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)

The AERODATA/OPTIMARE group is a globally acting provider of turnkey solutions for airborne surveillance and oil spill remote sensing.
Optimare offers the broadest range of airborne oil spill remote sensors worldwide from an own production.
Company information

Products

Optimare offers the Airborne Maritime Surveillance System MEDUSA®

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®
Company information

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 Comm, DVVR

Germany
Do 228 / Havarikomando

- LM2: MEDUSA System, SLAR, IR/UV, MWR, LFS, EO/IR, DVVR, INMARSAT-C Satcom
- LM3: MEDUSA System, SLAR, IR/UV, VIS, SAR Direction Finder, EO/IR, AIS, INMARSAT Broadband Satcom, Comm, DVVR
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)

Belgium
- BN 2 Islander / MUMM
  - MEDUSA System, SLAR, IR Camera, Still Camera, Video Camera, AIS
Company information

Major projects

Spain

- CI235 / SASEMAR

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

Portugal

- C295 Persuader / Portuguese Airforce

- MEDUSA System (in subsystem configuration), SLAR, IR/UV, VIS Search Radar, EO/IR, Comms
Company information

Major projects

- **Sultanate of Oman**
  - 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

- **Armed Forces of Malta**
  - 2 King Air B200 aircraft equipped with AeroMission
  - Mission role:
    - Maritime Patrol and Search and Rescue
Company information

Major projects

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

- 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
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 @ 3,000 ft

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

- 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

- 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 and IR image of an oil spill visualised by MEDUSA®
Close-range analysis

Laser Fluorosensing

- 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®.
Communication

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.

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
Close-range analysis

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
Thank you! Questions?

For further information please contact us:
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