

Airborne Oil Spill Monitoring

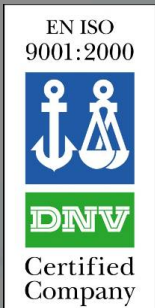


Dr. Nils Robbe,
OPTIMARE Sensorsysteme GmbH & Co. KG

Presented at the Interspill 2012 Spill Industry Seminar, London, UK, March 13th, 2012



- 1991: Foundation of Optimare GmbH
- 2002: Foundation of Optimare Sensorsysteme AG
- ISO 9001
- Approved as a supplier of aircraft systems and equipment for the German Armed Forces
- 2010 to 2012: Major restructuring



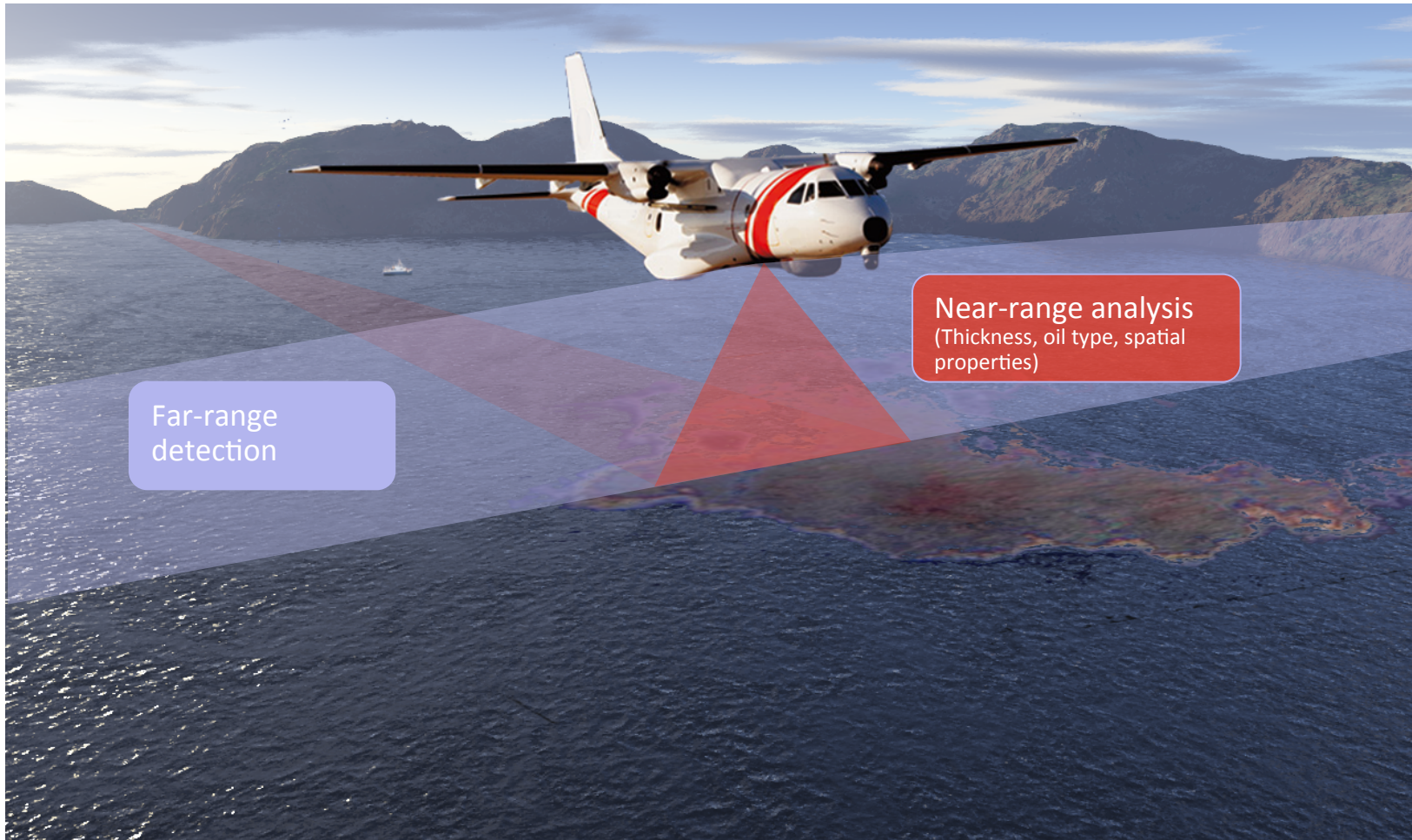
Airborne remote sensing of oil spills: sensors and mission management

Maritime surveillance aircraft as airborne remote sensing platforms

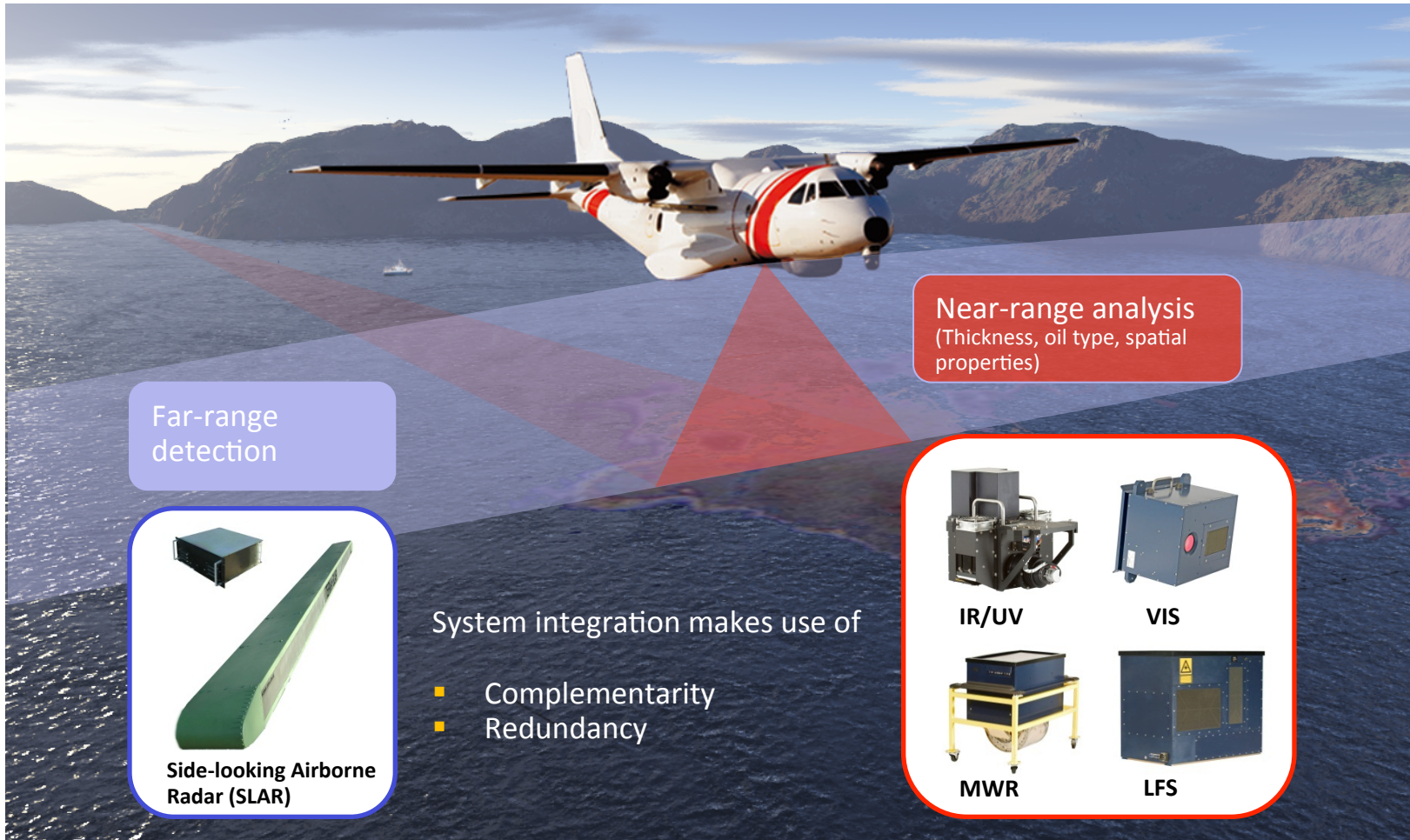
More than 40 reference installations worldwide



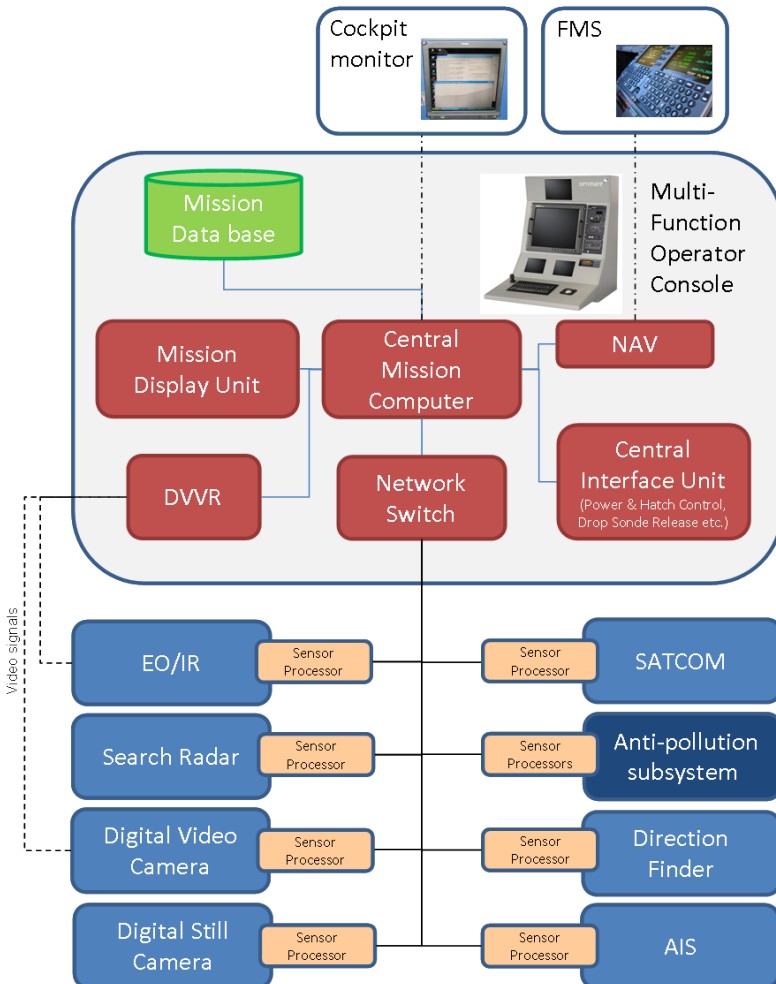
Two principal modes of operation



Two principal modes of operation



MEDUSA Maritime Surveillance System



System integration makes use of

- Complementarity
- Redundancy

MEDUSA can be used

- stand-alone
- as a subsystem





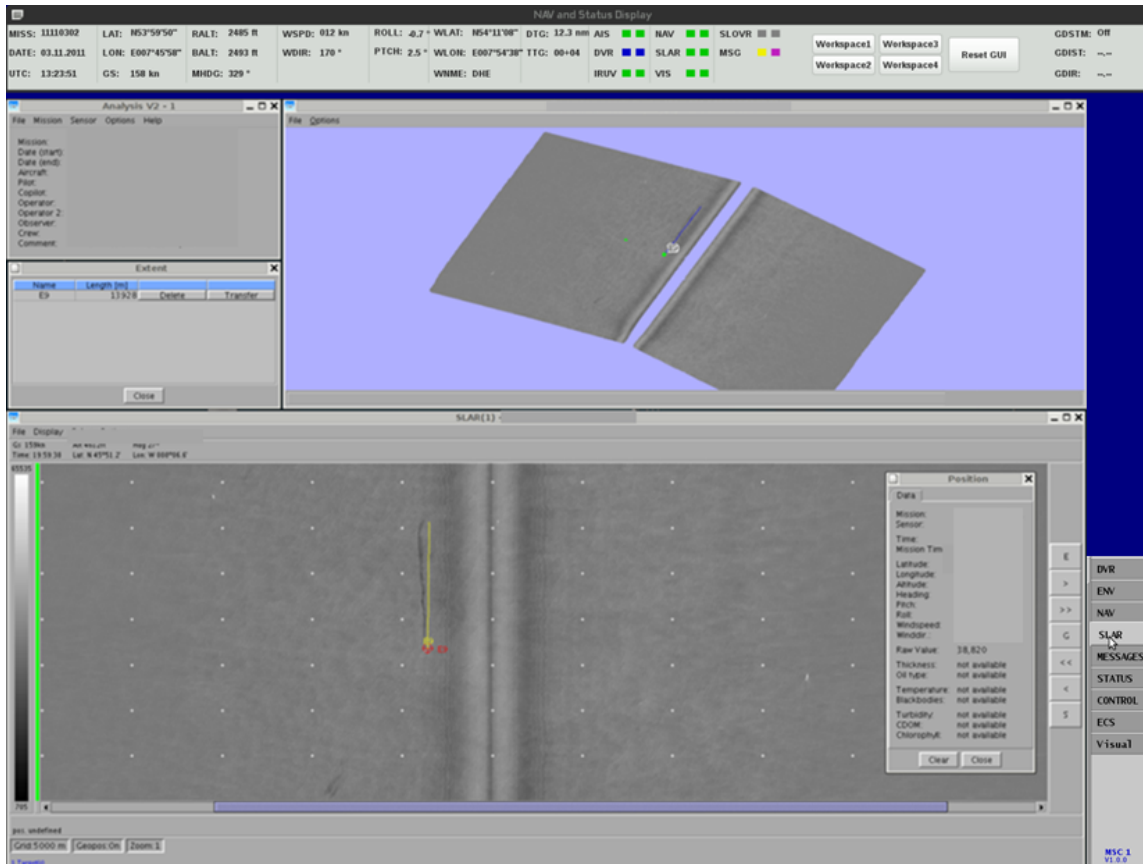
Side-Looking Airborne Radar (SLAR)

- X-band type (~ 9.3 GHz)
- Real-aperture type



Oil spill detection by SLAR

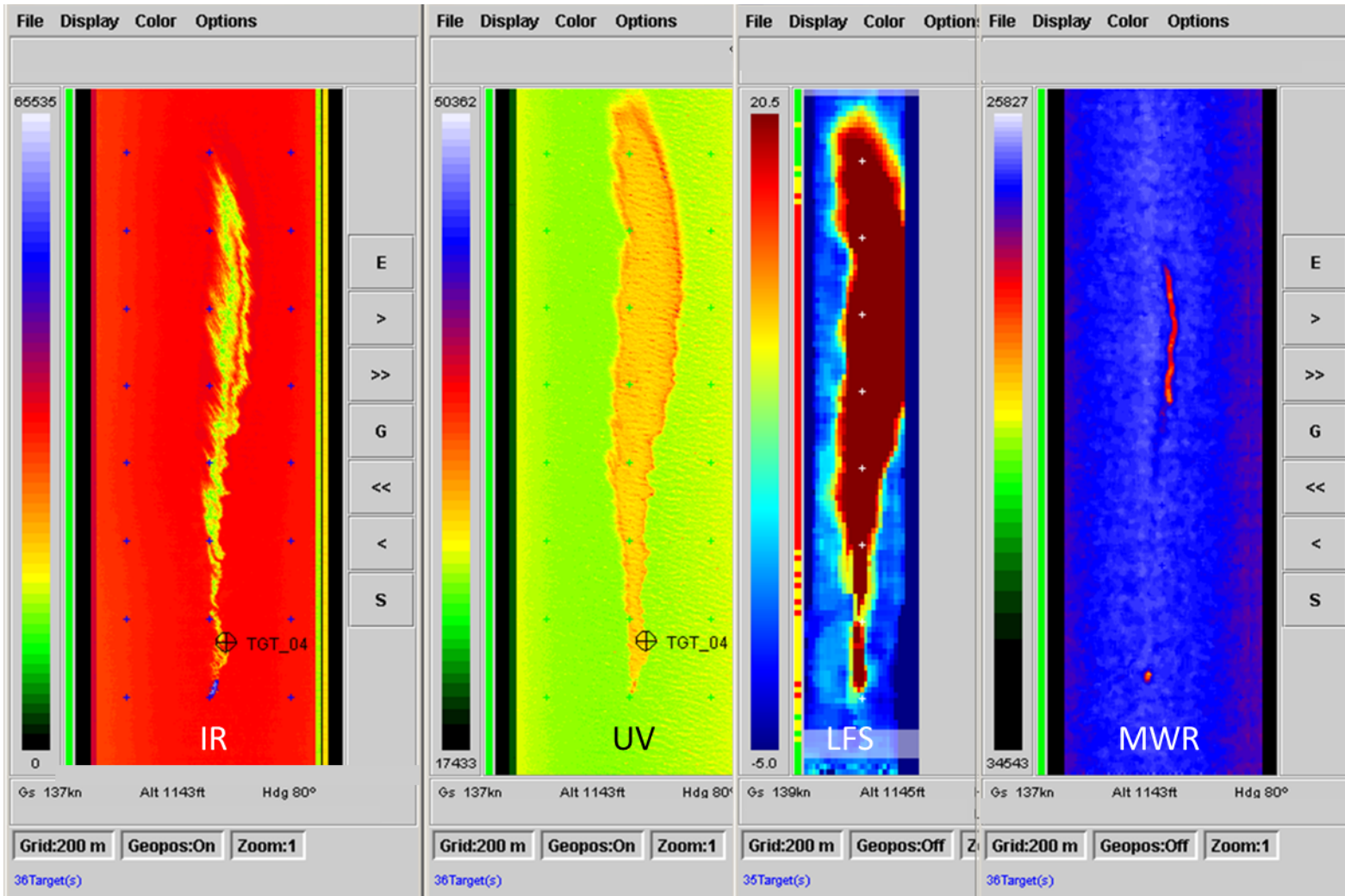
SLAR functionality of the MEDUSA System



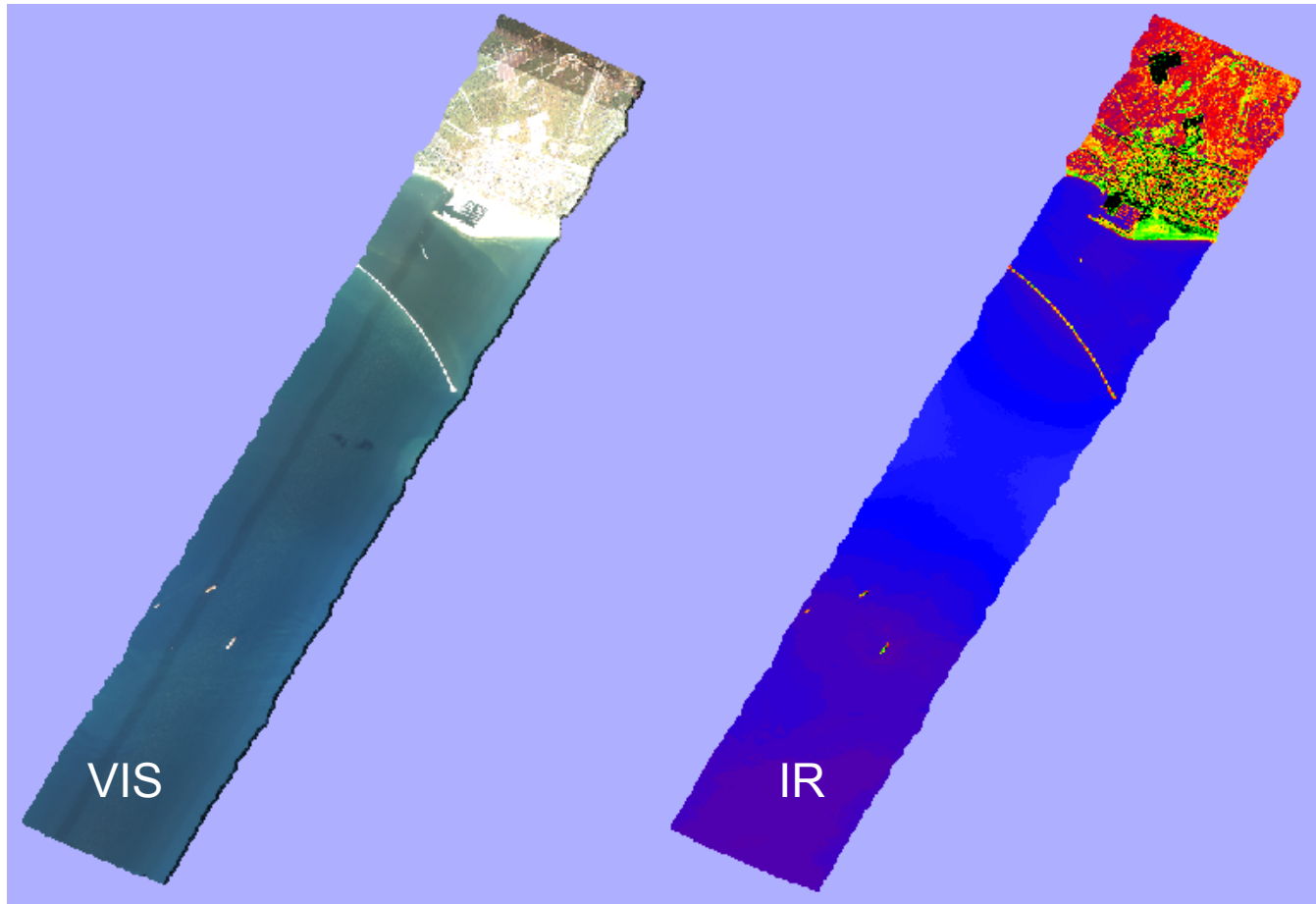
The screenshot displays the MEDUSA System interface, which is used for oil spill detection. The top section, titled "NAV and Status Display", provides flight parameters: MISS: 11110302, LAT: N53°59'50", BAL: 2485 ft, WSPD: 032 kn, ROLL: -4.7°, WLAT: N54°11'08", DTG: 12.3 mm, AIS, NAV, SLOVR, and other status indicators. Below this, the "Analysis VZ - 1" window shows a 3D perspective view of a Synthetic Aperture Radar (SLAR) image of a water surface, with a yellow line indicating a detected feature. The "Extent" table below the 3D view shows a single entry: "E" with a length of 1174.8. The "SLAR(1)" window shows a 2D top-down view of the SLAR image with a yellow line and a red circle. The "Position" window displays various data points: Mission, Sensor, Time, Mission Tim, Latitude, Longitude, Altitude, Heading, Pitch, Roll, Windspeed, Winddir, Faw Value: 38.820, Thickness: not available, Oil type: not available, Temperature: not available, BlackBodies: not available, Turbidity: not available, COOM: not available, Chlorophyll: not available. The bottom right corner of the interface features a vertical menu with buttons for DVR, ENV, NAV, SLAR, MESSAGES, STATUS, CONTROL, ECS, and Visual. The version number "MSC 1 01.0" is visible at the bottom right.



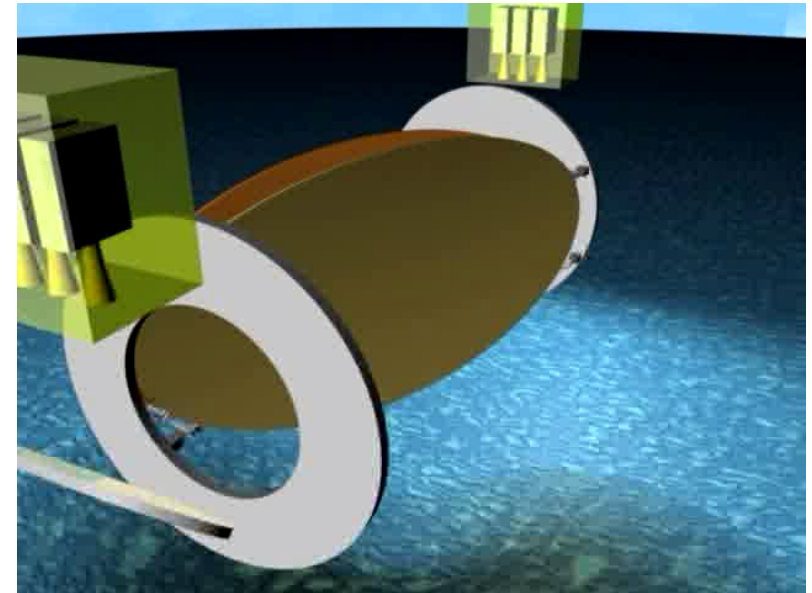
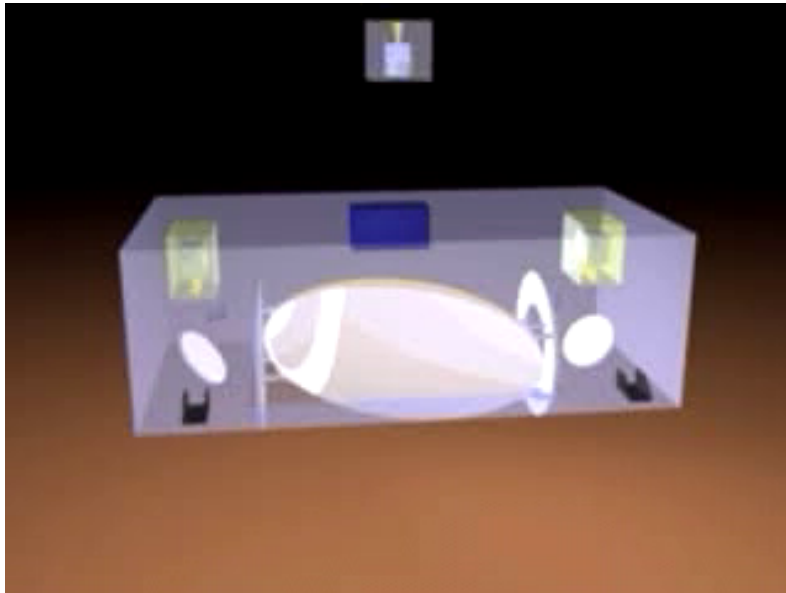
Near-range sensors – an overview



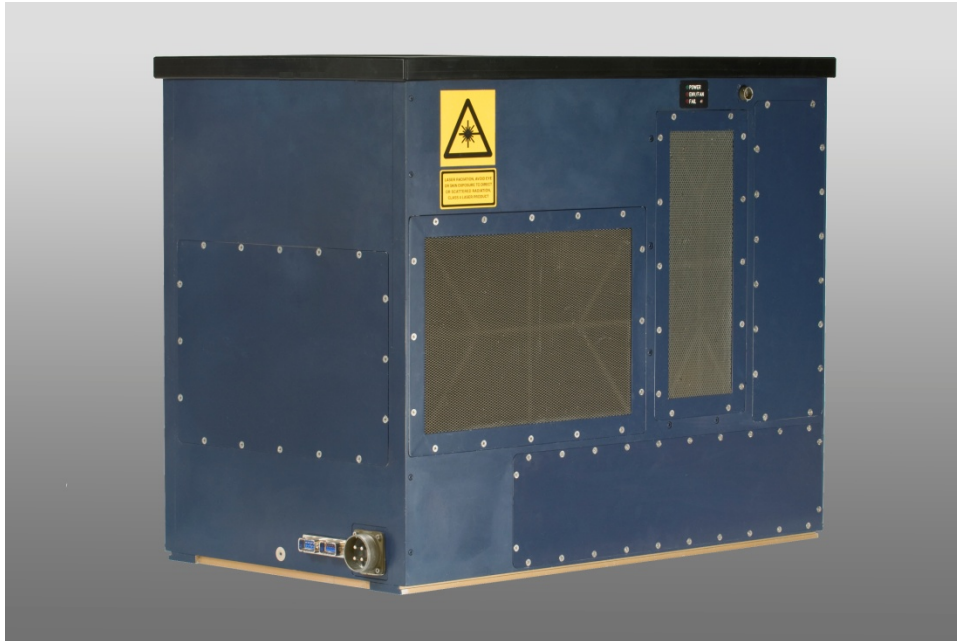
Geo-referenced mapping



Layout and function of the OPTIMARE MWR



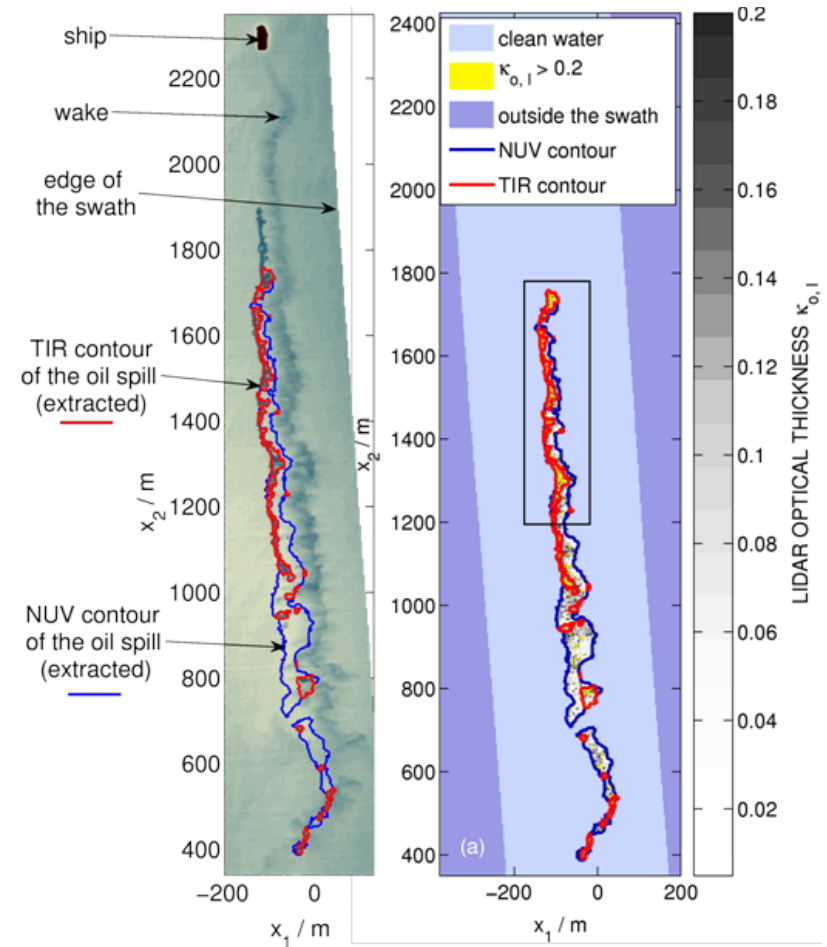
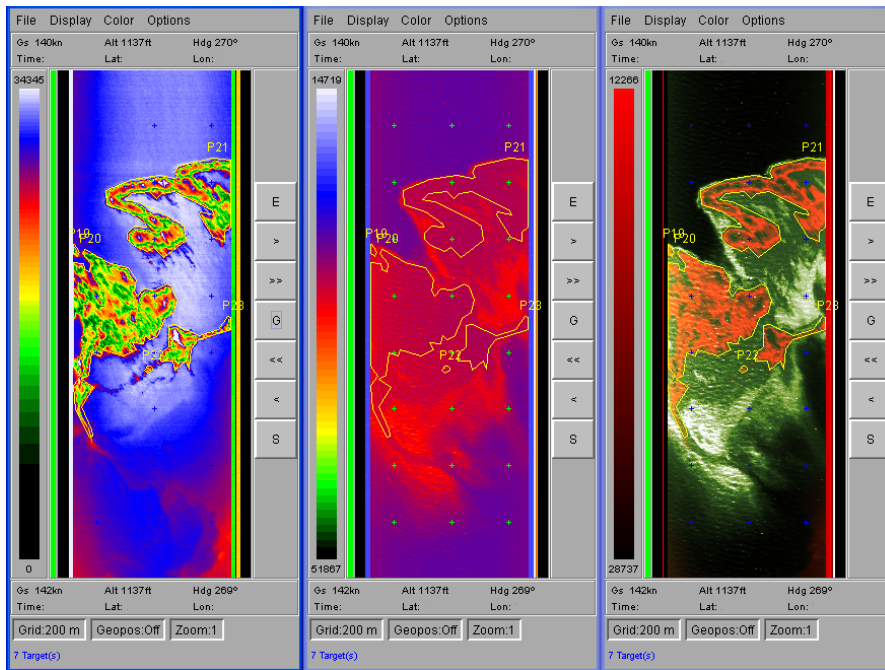
OPTIMARE Laserfluorosensor (LFS)



Classification Scheme

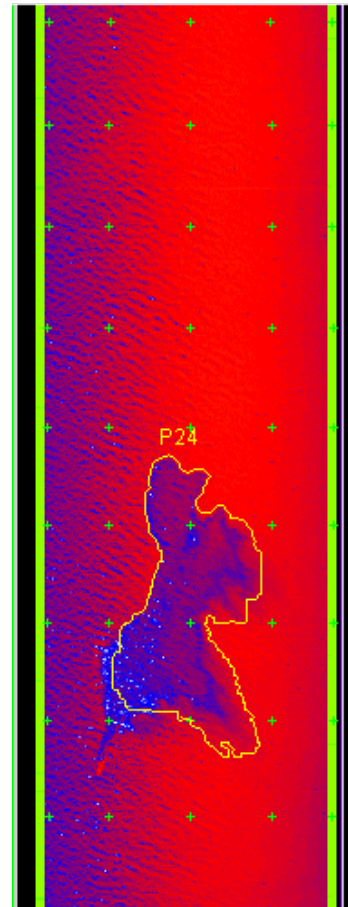
- Bilge oil
- Diesel
- Lubricating Oil
- Light refined
- Very light refined
- Very light crude (type I)
- Very light crude (type II)
- Light crude
- Medium crude
- Heavy crude
- Sea Water
- Biogenic oil
- Chlorophyll α

Enhanced analysis of remote sensing data



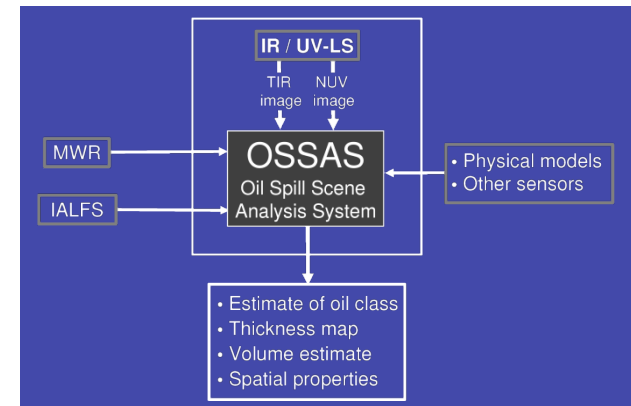
- Sensor fusion
 - Example: Oil spill monitoring
 - data fusion by OSSAS

Automatic Scene Analysis



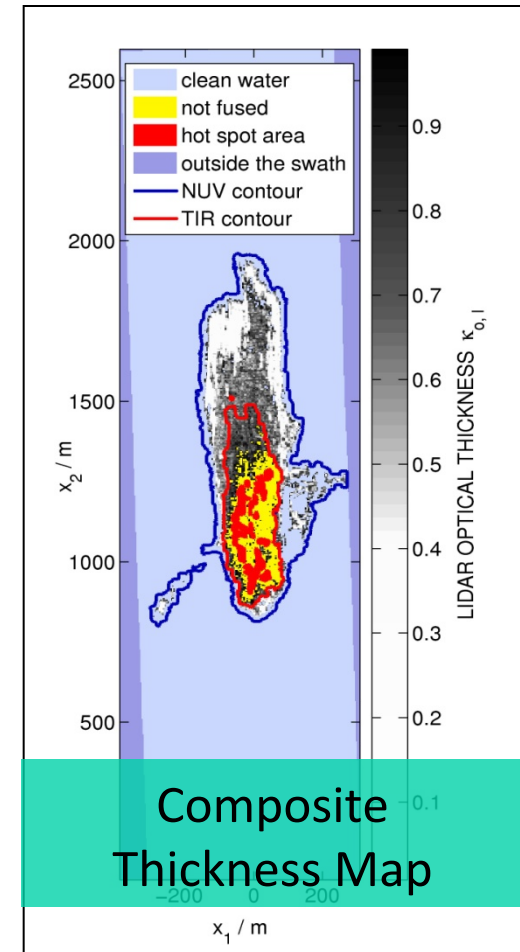
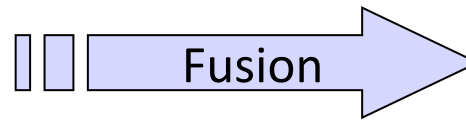
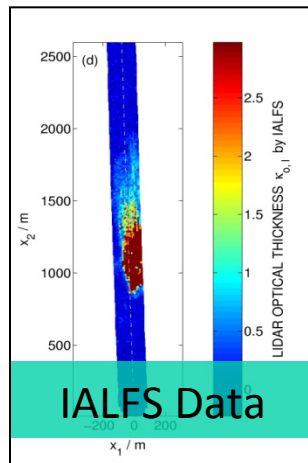
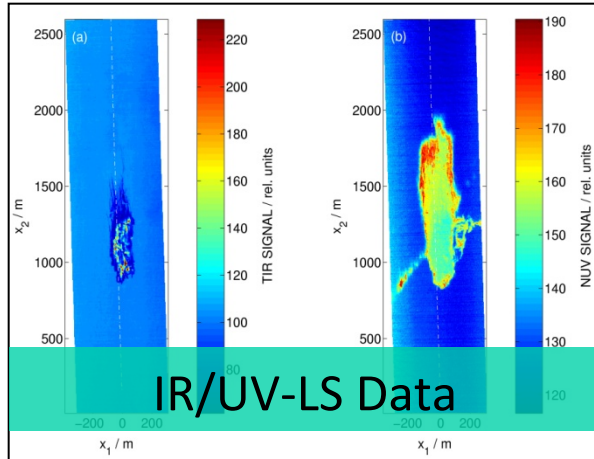
Feature extraction through automatic image segmentation for determination of properties like

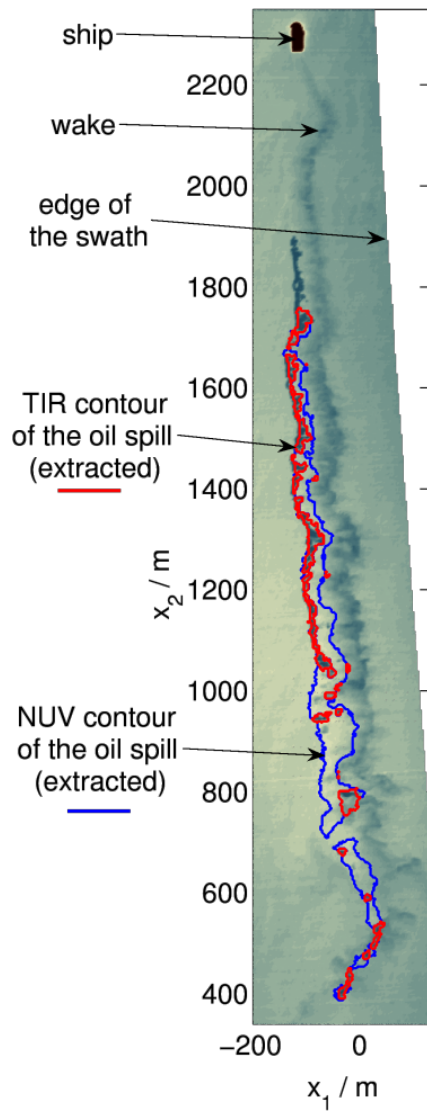
- Area
- Center of mass
- Length x width



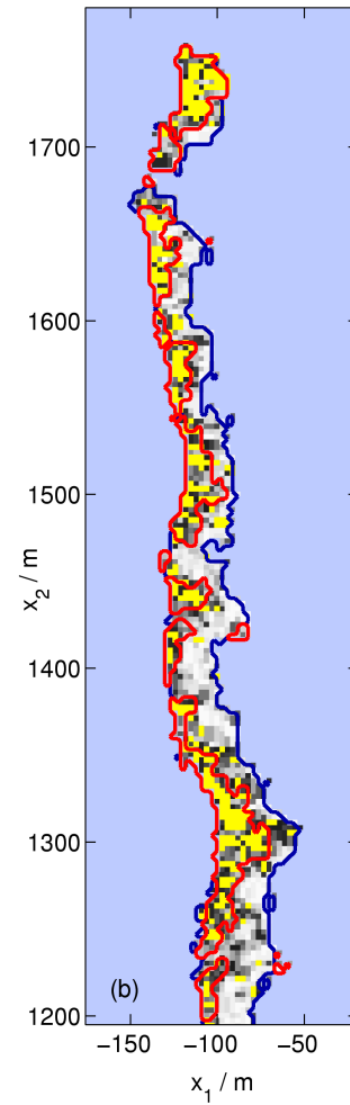
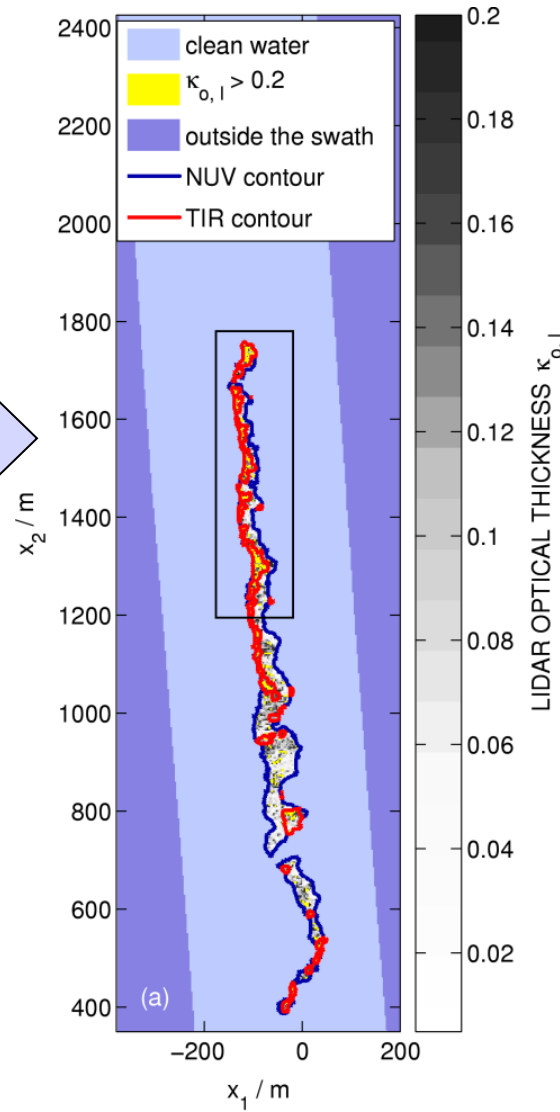
N. Robbe, O. Zielinski, *Airborne remote sensing of oil spills – analysis and fusion of multi-spectral near-range data*. J Mar Sci Enviro C.2: 19-27, 2004.

Fusion of near-range data using the Oil Spill Scene Analysis System (OSSAS)





Fusion



Data distribution by Web GIS

Service

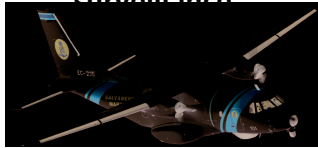
Data

Geo Portal

Internet access

User group

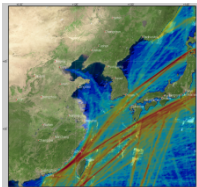
Airborne surveillance



Space-borne surveillance



Ancillary data



**MEDUSA
GEO PORTAL**



Web Service
Integrated processing

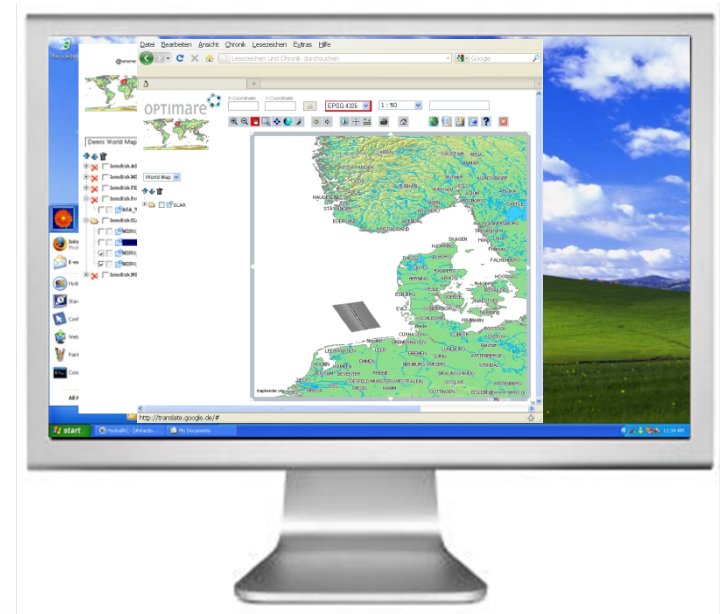
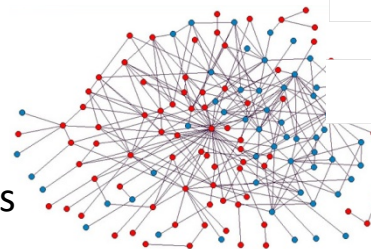
Web Coverage Service
Web Map Service
Web Feature Service

Public data

Protected data



External
web services



Restricted access
Example: Marine crisis management

Thank you for your attention

OPTimare 

Email: nils.robbe@optimare.de



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