

SWIPE

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SWIR and drones for early detection of oil spills in ports

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Problem & Market



**Port of
Antwerp
Bruges**



50 oil spills in 2019

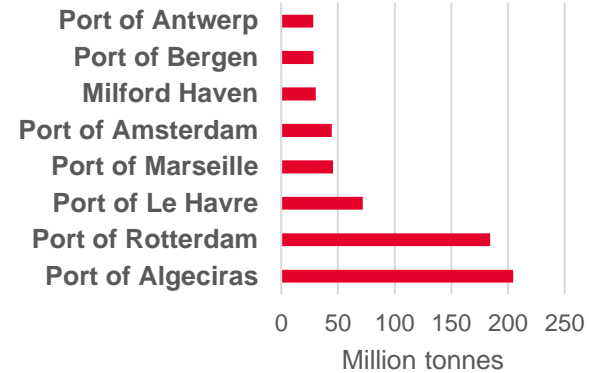


EUR 1.0 - 1.2 million (yearly)



Reimburse 40%

Largest European oil traffic ports



638 million tonnes yearly

Operational System in Port

Initial recognition of oil spill (detection, extent and oil type)

- < 2 minutes after arrival
- edge processing on drone platform
- real-time information streaming to emergency operations centre

Drone stays above oil spill (hovering) - **live oil spill severity measurement**

Post-processing for more detailed information

- data transmission to processing server
- < 1 hour after data upload
- improved AI model
- identify source of the spill

Operational System in Port

Challenges

- Fast detection
- Port environment
 - Docks = relatively small busy areas
 - Not much current, wind or waves
- Type of oil
 - Refined oils: hydraulic oil, lubricating oil, diesel, marine fuel & waste oil
- Selection of most appropriate cameras + limitations + cost / benefit
 - UV
 - Broadband RGB
 - Multispectral VNIR
 - (Multispectral) SWIR
 - LWIR

SWIPE

Period: 01/07/2022 – 31/12/2023

The **objectives** of the project are:

- (1) to develop an offline prototype workflow to detect & delineate oil spills during daytime from an airborne drone platform
- (2) to demonstrate the technology in the port of Antwerp

The **result** will be a prototype workflow to detect oil spills at TRL 5-6, accompanied by a protocol for the camera settings and flight protocol.

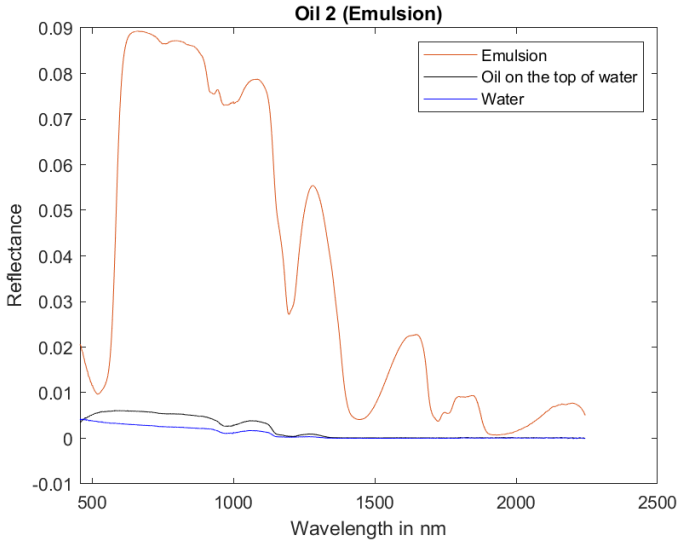
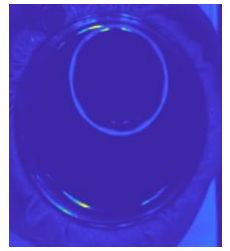
The **innovation** in the project is:

- (1) linked to the challenging application of the technology in a complex and harsh port environment
- (2) the combined use of different camera systems

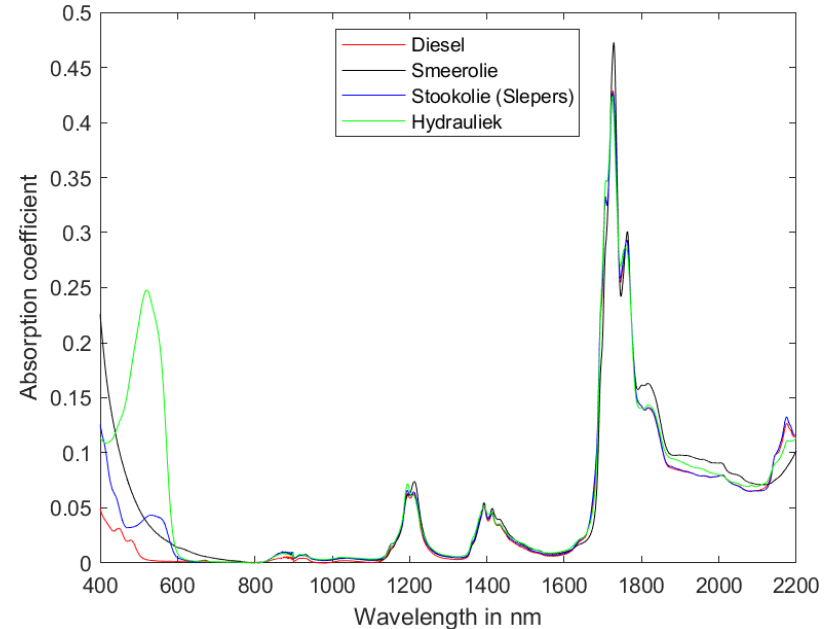
Previous work: RGB + LWIR



SWIPE: Laboratory Measurements

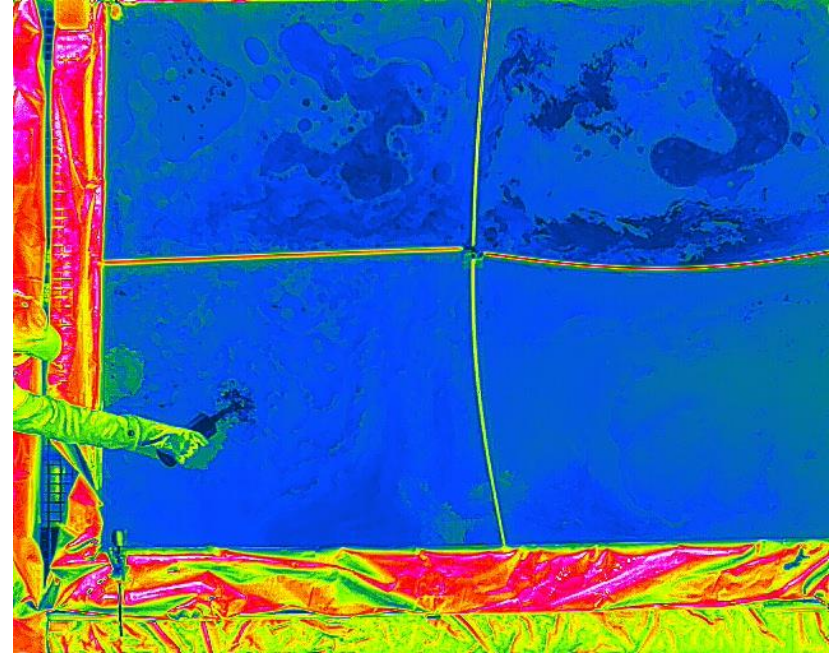
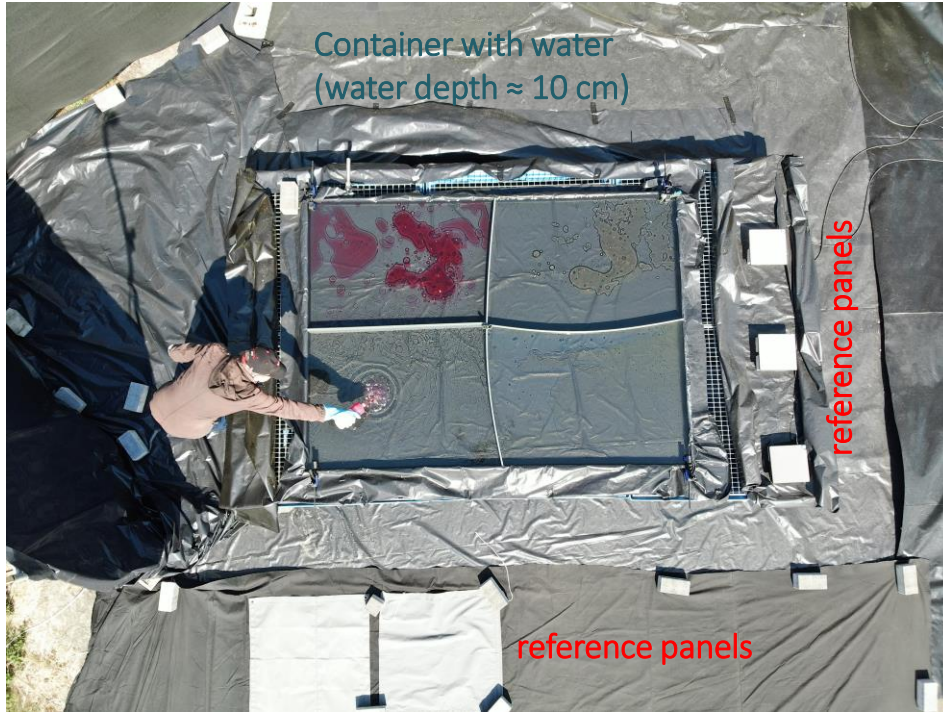


SWIR is not useful for detection of pure oils except for oil emulsions



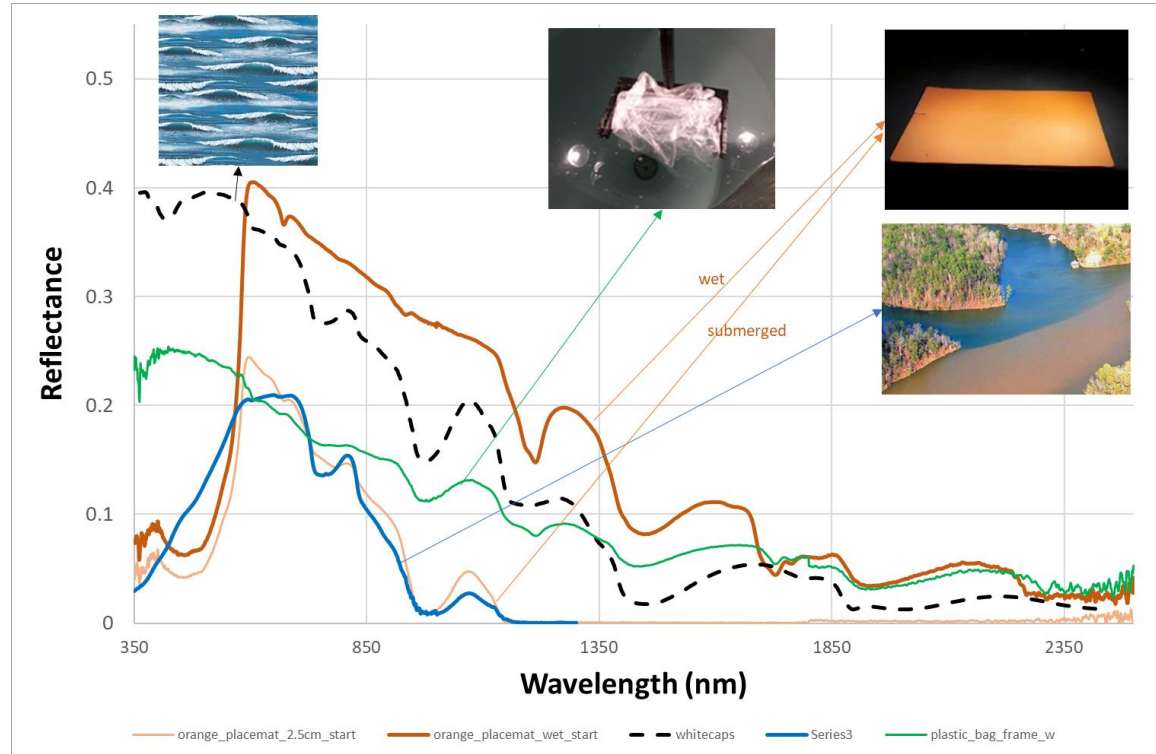
Visible range seems most promising
Added value multispectral VNIR compared to broadband RGB
Potential of UV range

SWIPE: Test Set-up (outdoors)



Data acquired: RGB / multispectral VNIR / multispectral SWIR / 3 x LWIR / 2 x irradiance

SWIPE: False Positives



SWIPE: Data Acquisition



- DroneMatrix
 - Network of drones capable of performing automated flights in the port
 - Drone-system 1: RGB + LWIR
 - Drone-system 2: multispectral VNIR
- Brabo Cleaning Company
 - System attached to monkey bridge of multicat
 - Multispectral VNIR + UV (+ LWIR)
 - Vessel dedicated to oil spill clean-up in port of Antwerp
- Historical dataset: small drone with RGB + LWIR

