



CLS

New technologies to boost Maritime Surveillance capabilities

FRONTEX, Industry Day
25/09/2018





Agenda:

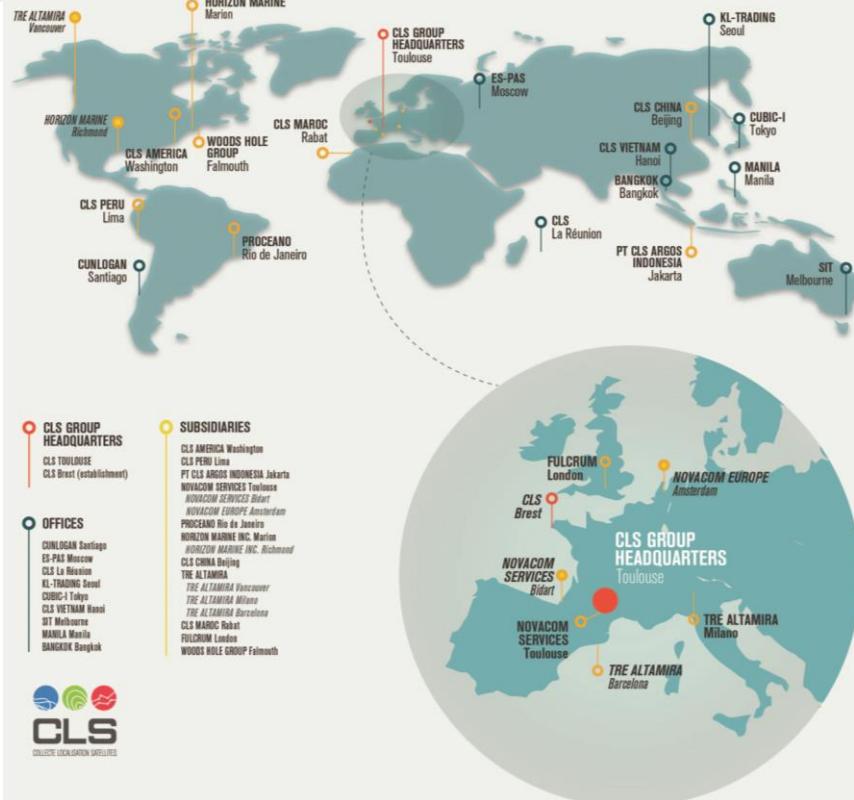
I. CLS activities presentation

II. Maritime surveillance: State of the art and current technologies

III. New technologies to boost maritime surveillance capabilities



CLS Group



26 sites

700 people
around the world



Strategic sectors

SUSTAINABLE MANAGEMENT OF FISHERIES



ENVIRONMENTAL MONITORING



ENERGY AND MINING



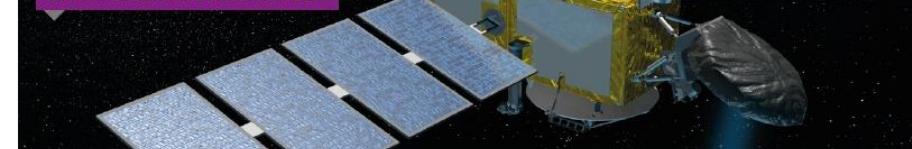
FLEET MANAGEMENT



MARITIME SURVEILLANCE



SPACE AND GROUND SEGMENT



Maritime Surveillance



Maritime Surveillance

The illegal acts on our seas and oceans are daily.



Every 3 days
a 300-Ton ship is wrecked
somewhere in the world



72 ships
worldwide were boarded
by pirates in the first half
of 2016



970,000 migrants
arrived in Europe
by sea in 2015



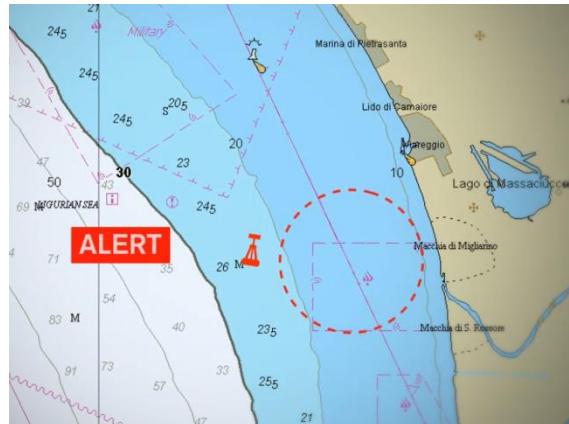
Maritime Surveillance

CLS, Partner of international maritime authorities

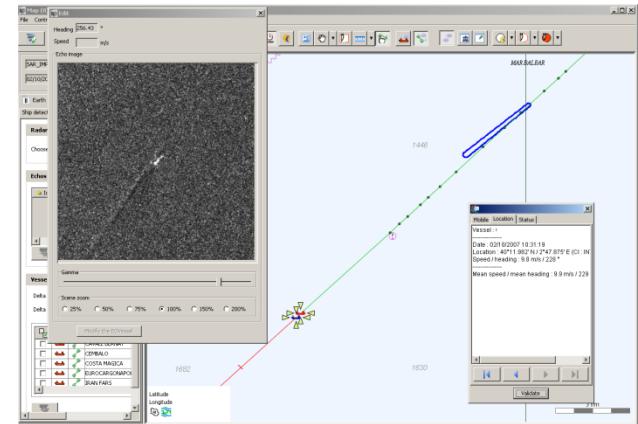
SAFETY

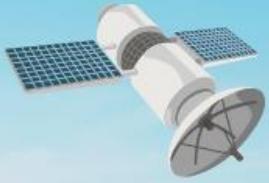


SECURITY



ENVIRONMENT





CLS, DECISION SUPPORT SOLUTIONS

ENABLE CRITICAL OPERATIONS AT SEA:
SAFETY, SECURITY, FIGHTING ENVIRONMENTAL CRIME

BORDER CONTROL

SEARCH & RESCUE

FIGHT AGAINST ILLEGAL FISHING

POLLUTION DETECTION

MULTI-SOURCE DATA

SATELLITE TRACKING (SSAS, AIS, SAT-AIS, LRIT, VMS) - EARTH
OBSERVATION (OPTICAL & RADAR IMAGERY) - RPAS - SHIP
REGISTRY - MARINE ENVIRONMENT (CURRENT, WIND, ETC.)

MARITIME INTELLIGENCE

DATA PROCESSING ANALYSIS & FUSION -
MODELING - BIG DATA - ANALYTICS

DECISION MAKING PLATFORM

DATA VISUALISATION SOFTWARE - INTERACTIVE TOOLS

PIRACY SUPPORT & PREVENTION

ILLEGAL TRAFFIC

AREA MONITORING

MONITORING OF SHIP EMISSIONS





Agenda:

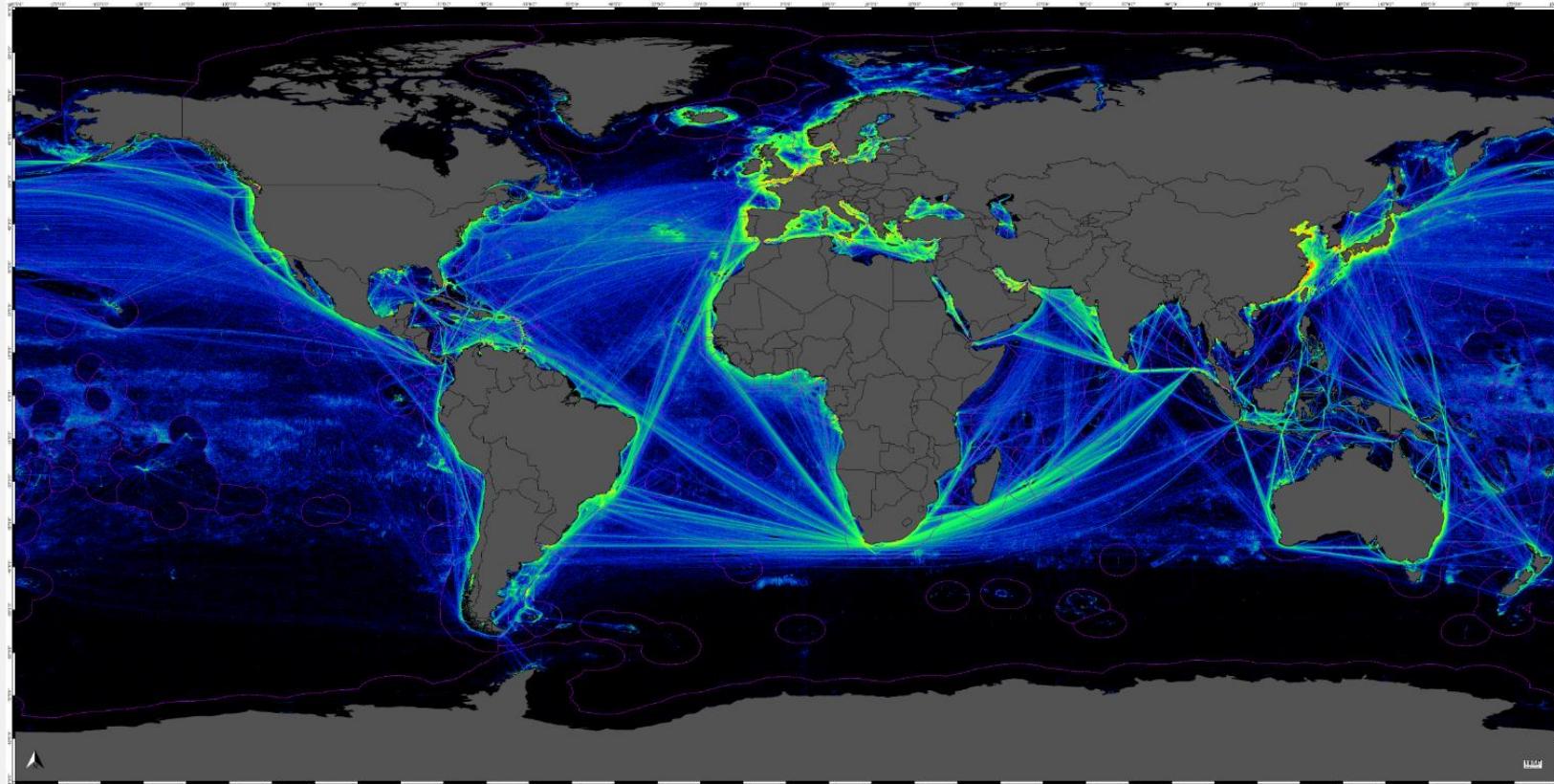
I. CLS activities presentation

II. Maritime surveillance: State of the art and current technologies

III. New technologies to boost
maritime surveillance capabilities

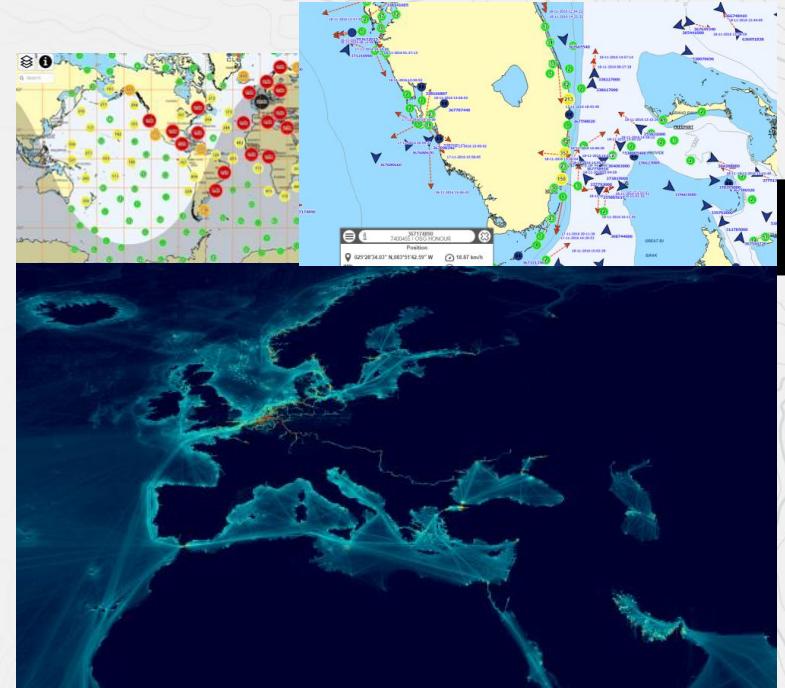


Automatic Identification System (AIS): a wealth of information...



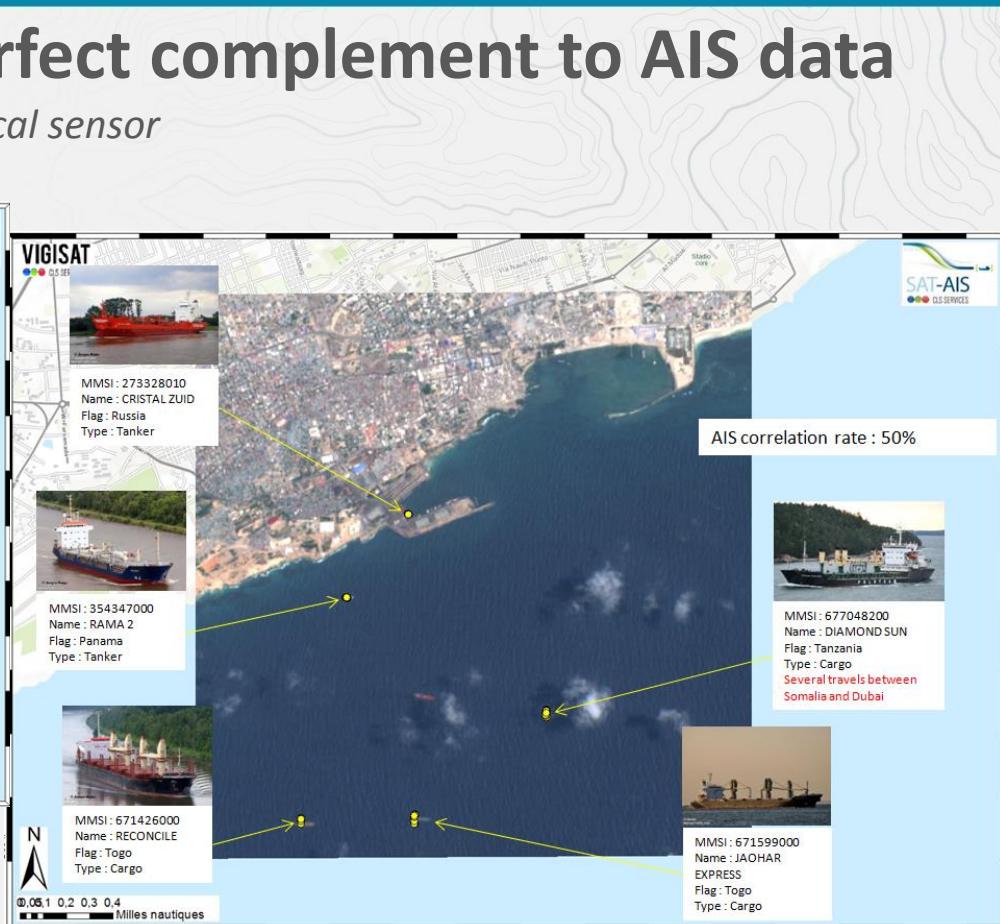
...That still have limitations

- Indeed, since 2004, the international Maritime Organization (IMO) has required AIS transponders to be installed aboard most vessels. **Most, and not each.**
- The Safety of Life at Sea (SOLAS) convention states that *“All ships of 300 gross tonnage and upwards engaged on international voyages and cargo ships of 500 gross tonnage and upwards not engaged on international voyages and passenger ships irrespective of size shall be fitted with an AIS”*.
- What about vessels that are not fitted with AIS? What about the vessels that turn their transmitter down?



Earth Observation: The perfect complement to AIS data

Optical sensor

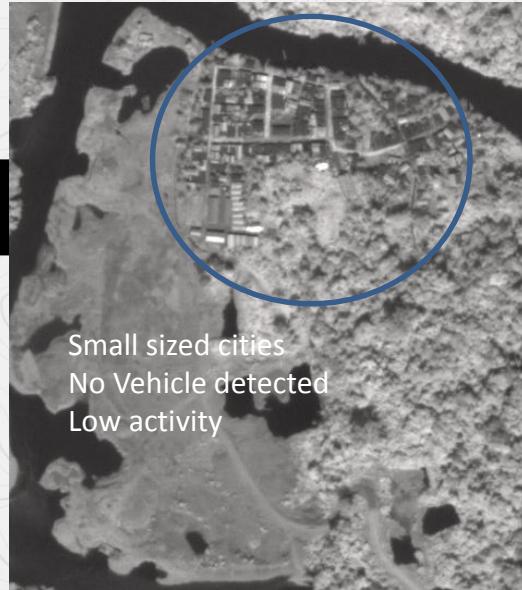


Earth Observation: The perfect complement to AIS data

Optical sensor



Very High Resolution Optical images for Ships detection



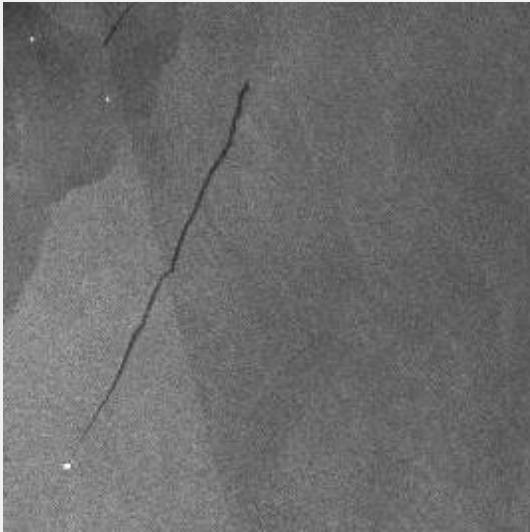
Very High Resolution Optical images for activity level detection, infrastructure evolutions, vehicle activities...



Earth Observation: The perfect complement to AIS data

Radar sensor

EEZ



Resolution : from 50 to 150 m

Coverage : 300 to 500 km swath

Acquisitions : Planified

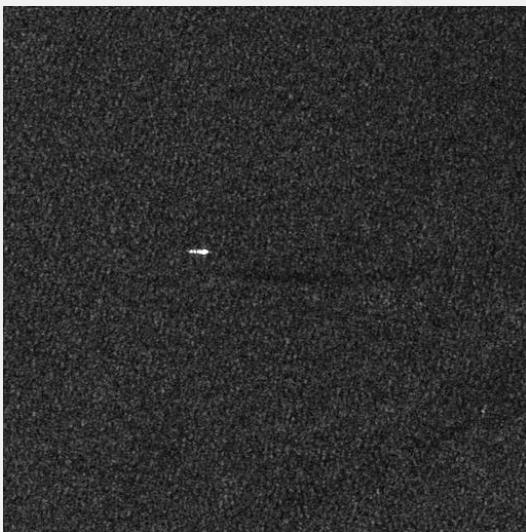
Processing : < 30 minutes

Field of interest:

- Vessel detection (> 50-100 m)
- Oilspill detection
- Icebergs detection
- Sea state monitoring



Area Of Interest



Resolution : from 10 to 30 m

Coverage : 50 to 150 km swath

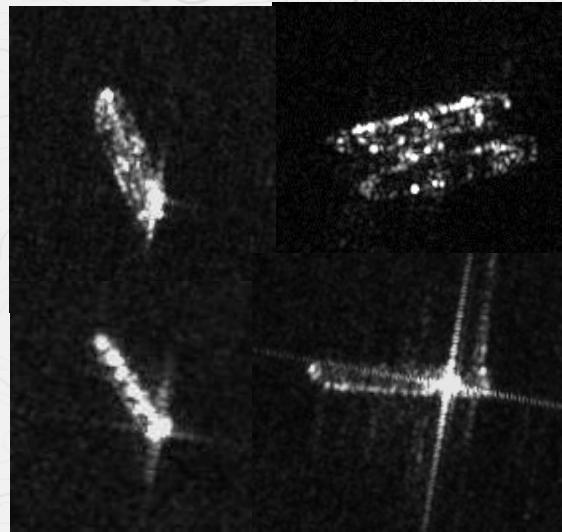
Acquisitions : On demand (> 12h)

Processing : < 30 minutes

Field of interest:

- Vessel detection (> 15-20 m)
- Oilspill detection
- Sea state monitoring

Small Area Of Interest



Resolution : from 3 to 10 m

Coverage : 20 to 150 km swath

Acquisitions : On demand (> 12h)

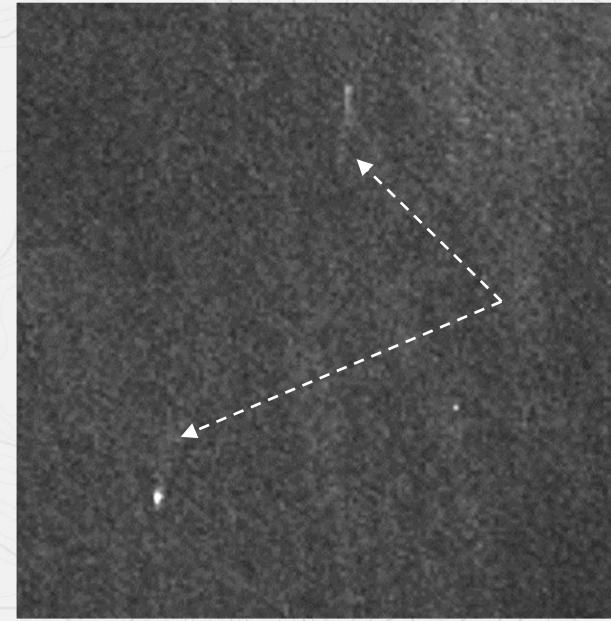
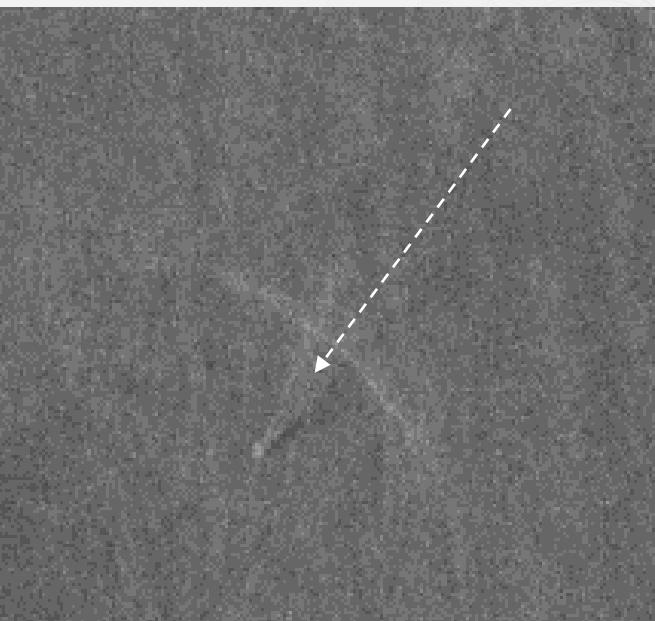
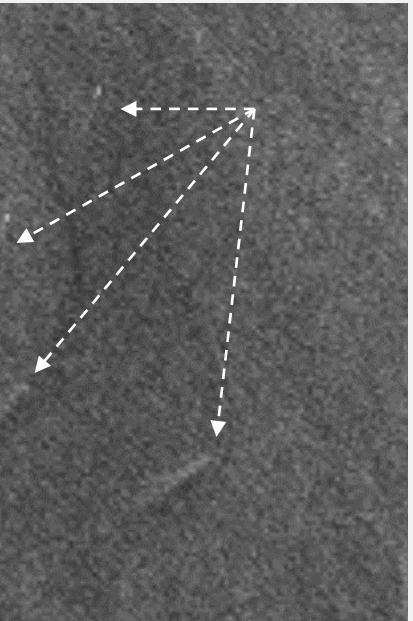
Processing : depending on the need

Field of interest:

- Vessel detection (> 5-10 m)
- Vessel (> 100 m)
- Sea state monitoring

Earth Observation: The perfect complement to AIS data

Radar sensor



Example of Go Fast Boats detection thanks to their wakes.



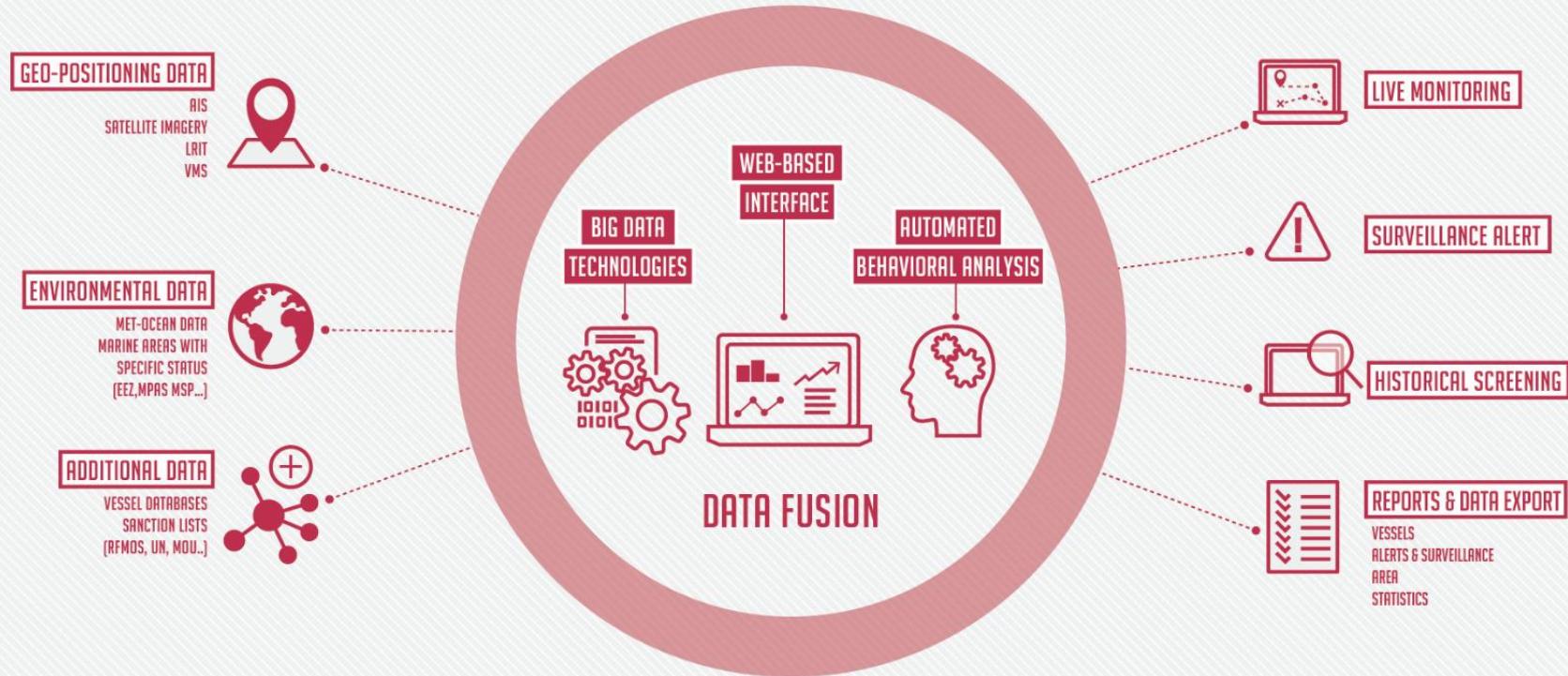
CLS Maritime Awareness System

**Data Fusion and Analysis to strengthen
Maritime Awareness**

- **Big Data**
- **Various sources of data** (AIS, VMS, LRIT, EO, Maritime databases...)
- **Real-Time and historical analysis**
- **Patented algorithms**
- **Patterns analysis**
- **Alerts monitoring**



CLS Maritime Awareness System - Overview



CLS Maritime Awareness System - Operational Use



Border Surveillance
EEZ Surveillance



Fisheries
control



Area of interest
Surveillance



Illegal
activities
detection at
sea



Fleet Tracking
Vessel of
Interest
tracking and
alerts
management



JUBILEE [TG] 671776000 / 8884567

WRIGHT, MARTIN

AIS Message 5 Additional info

Type : 70 - Cargo, all ships of this type
 Radio Call Sign (RC) : 5VHF3 Draught : 3.2 m
 Width : 8 m Length Overall : 60 m

Last Position

2018/07/27 22:58:10 6.79887°, -58.17058°
 0° ?
 ORB-SAIS- AIS Quality: High

1 / 2842 > |

Trajectory | Nearby Vessel [10] | Identity change

Rendez-vous | Voyage [6] | Alert

Vessel Timeline [6]

+ Create Report | View reports

RUTH [TG] 671970000 / 8909965

Steve Ellwood

AIS Message 5 Additional info

Type :
 Radio Call Sign (RC) : 5VHF6 Draught : 4 m
 Width : 8 m Length Overall : 61 m

Last Position

2018/07/21 05:55:17 12.34011°, -70.18601°
 213.6° 0.1 kt
 ORB-SAIS- AIS Quality: High

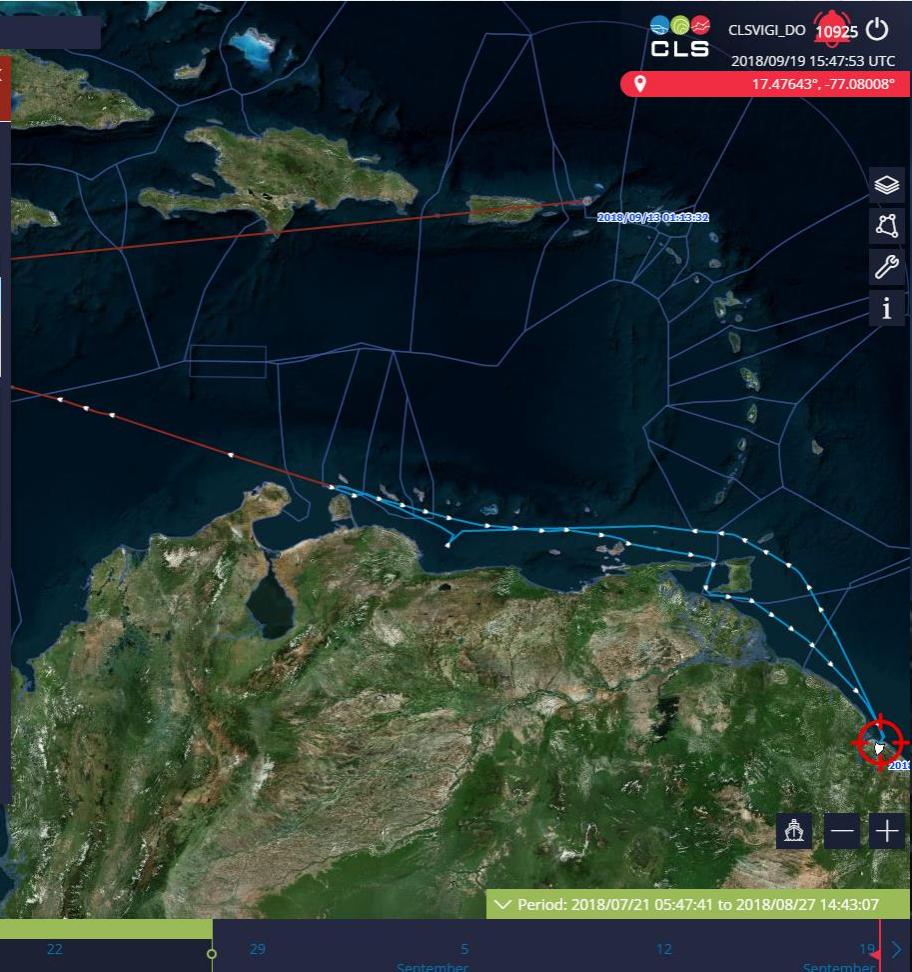
1 / 8099 > |

Trajectory | Nearby Vessel [4] | Identity change

Rendez-vous | Voyage [2] | Alert

Vessel Timeline [2]

+ Create Report | View reports



≡

RUTH

JUBILEE

Search

CLSVIGLIO 10927
CLS

2018/09/19 15:54:09 UTC

12.5053°, -70.49686°



2018-08-02 13:30 UTC – 15:45 UTC
Both vessels drifting together
(Speed: 2nm)

2018-08-02 18:15 UTC – 2018-08-03 22:00 UTC
Ruth keeps drifting alone

2018-08-02 13:00 UTC – 13:30 UTC
First contact between both vessels

2018-08-02 09:15 UTC
Jubilee entering the area

2018-08-02 15:42 UTC – DEIMOS S-2 Image
Both vessels drifting together

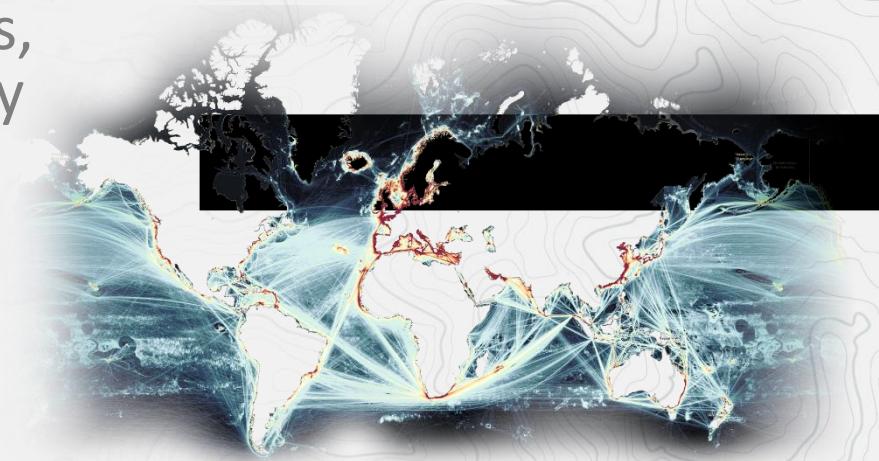


CLSGROUP



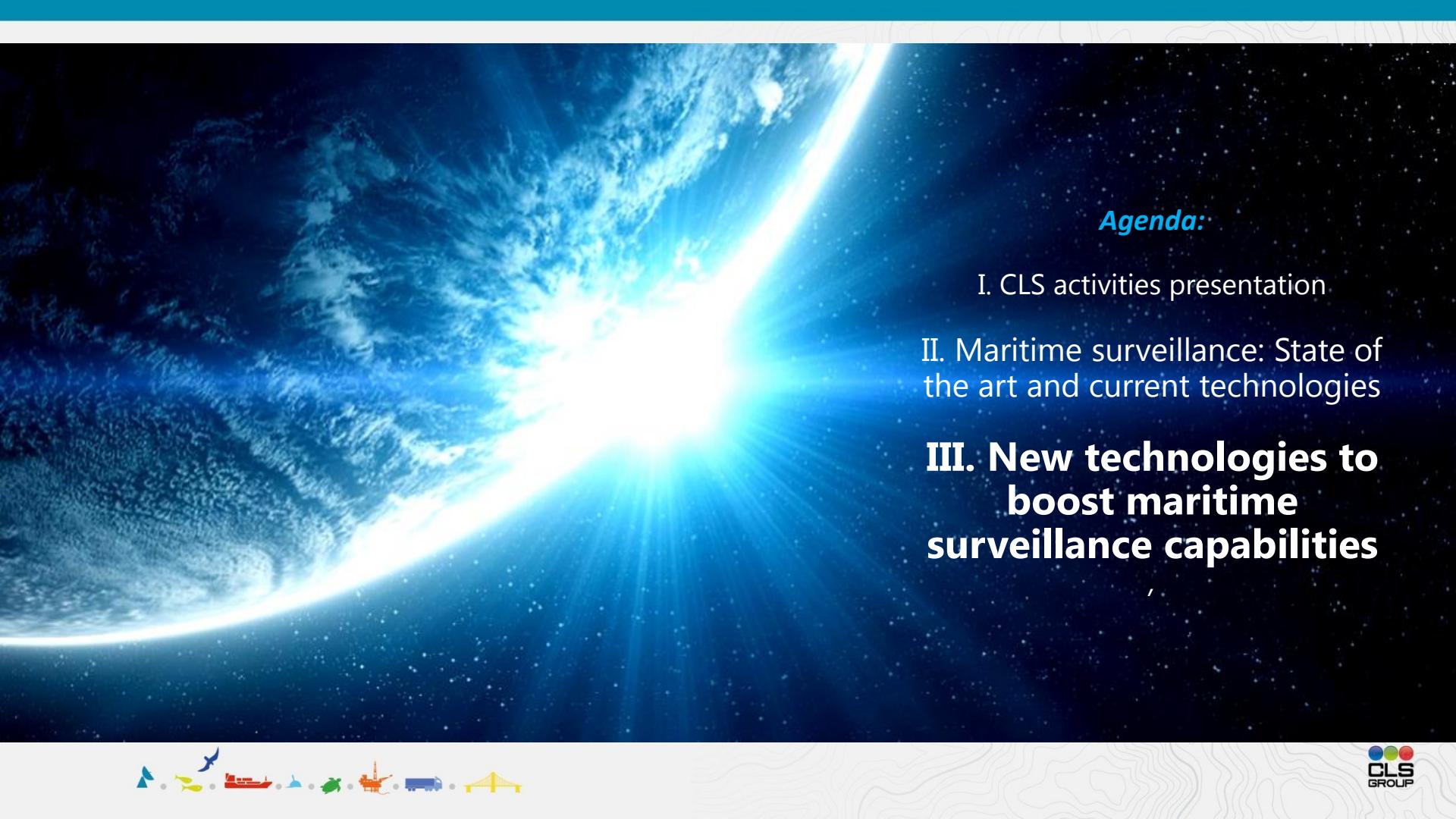
Remaining Challenges

- AIS limitations: Non-fitted vessels, non-cooperative vessels, message collision in high density traffic areas...
- Earth Observation limitations: Limitations for systematic orderings, automatic analysis, coverage depending on meteorological conditions for optical sensors.



=> The more data, the better analysis





Agenda:

- I. CLS activities presentation
- II. Maritime surveillance: State of the art and current technologies
- III. New technologies to boost maritime surveillance capabilities**



ELINT Maritime Surveillance by Cubesatellites

THIS SERVICE WILL PROVIDE NEW TYPES OF SPECTRUM MONITORING DATA TO CIVIL AND MILITARY STAKEHOLDERS INVOLVED IN MARITIME SURVEILLANCE

SERVICE FEATURES :

- ⌚ DISRUPTIVE NEW ELINT PAYLOAD
- ⌚ PASSIVE AND UNFALSIFIABLE DETECTION
- ⌚ LOCALIZATION AND CHARACTERISATION
- ⌚ ANALYTICS TOWARDS VESSEL IDENTIFICATION
- ⌚ UNAFFECTED DETECTION REGARDING TO WEATHER CONDITIONS
- ⌚ UNIQUE ADD-ON FOR DATA FUSION



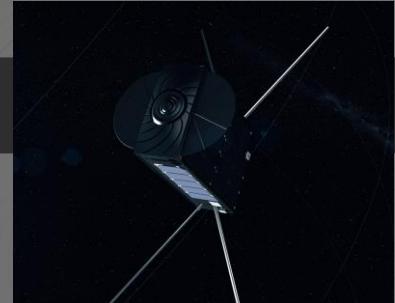
5 KM
PRECISE LOCATION

95%
DETECTION RATE

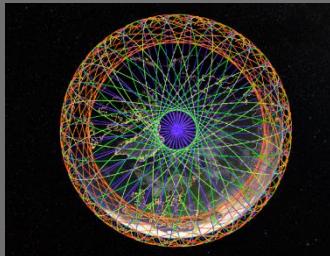
3 Hours
Age Information

25 MIN.
DATA REFRESHING

300 KM
LARGE SWATH



ELINT Maritime Surveillance by Cubesatellites



DATA FROM THE SATELLITE NETWORK CAN BE USED IMMEDIATELY :

- ⌚ ADAPTED ANALYSIS TO MEET OUR CLIENT'S DIFFERENT NEEDS (MAP FORMATS FOR SHIPS' POSITIONS)
- ⌚ EFFICIENCY IS GUARANTEED, EVEN FOR UNCOOPERATIVE SHIPS (NO AIS ...)
- ⌚ REAL-TIME UPDATES
- ⌚ CROSSED DATA INTELLIGENCE REPORT

 5 KM
PRECISE LOCATION

 95%
DETECTION RATE

 25 MIN.
DATA REFRESHING



ELINT Maritime Surveillance by Cubesatellites

1S2019

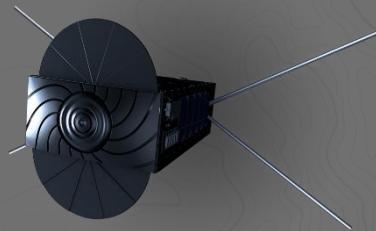
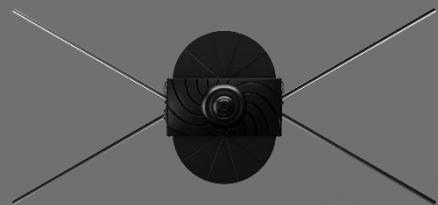
FLIGHT DEMONSTRATION

2S2019

OPENNING OF THE
COMMERCIAL SERVICE

2020 +

GROWTH OF THE
CONSTELLATION





IoT everywhere

Connectivity
at your fingertips

01



20

Nanosatellites

KINEIS OFFERS TOMORROW'S IoT NETWORK CONNECTIVITY !

Available everywhere, low power consumption, simple, reliable, and affordable: this brand-new connectivity solution has been custom-designed for IoT (Internet of Things).

Kineis, a space IoT operator, has its own constellation of nanosatellites. Objects connected through Kineis will be geo-located and able to transmit data from anywhere on the planet, no matter what the weather conditions.

UNIVERSAL CONNECTIVITY

Kineis' solution uses an innovative constellation of 20 nanosatellites built with revolutionary communication technology. The constellation will be in orbit by 2021.

FROM WATCHES TO CARS: BY 2021,
OVER 70 BILLION OBJECTS WILL BE CONNECTED.

simple
stand-alone
reliable
suitable



IoT everywhere

SHAREHOLDERS



STRATEGIC AND TECHNICAL PARTNERS



Supporting New Space
in France, Technical Expert



Prime
Contractor



Nanosatellite design and
development



In charge of Kinéis
onboard instrument

THANKS TO KINEIS,
NOW EVERYTHING
CAN BE
CONNECTED.
Extreme sports,
agriculture, fishing,
logistics, security,
or science: some of the
many sectors that will
benefit from Kinéis'
services. By finally
making universal
connectivity available,
Kinéis opens up a whole
new world of uses for
connected objects.

OUTDOOR SPORTS



LOGISTICS

01
20

- 01 constellation
- 20 orbiting nanosatellites to guarantee unique real-time connectivity
- 40 years' experience in geo-location and data collection
- 01 universal connectivity

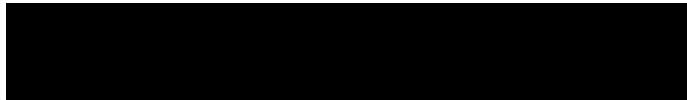


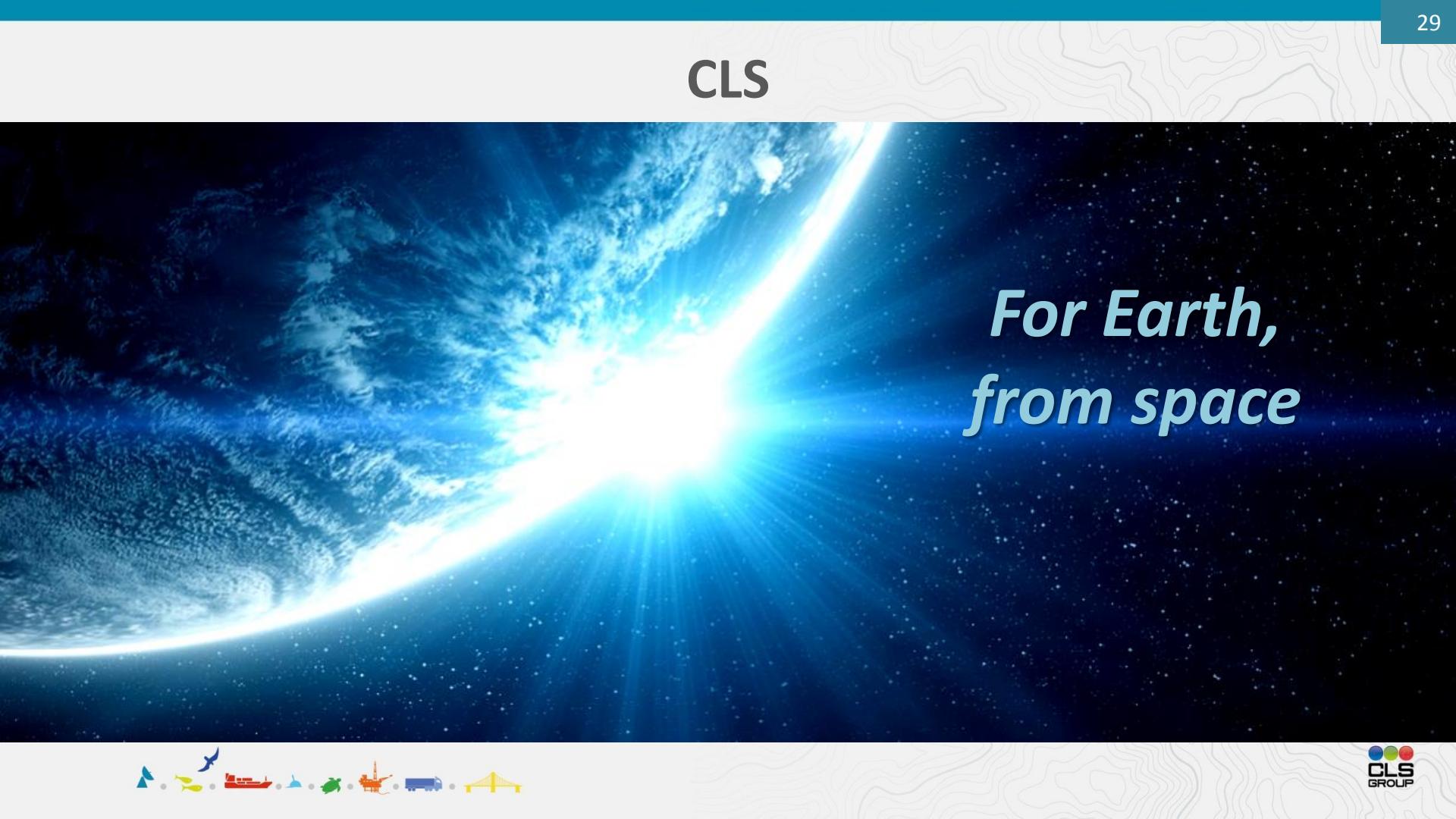
NCMT Seminar

22th to 26th October 2018

— LISBON, PORTUGAL —

Contact:





CLS

*For Earth,
from space*

