

NEREUS 6TH SESSION ON THE SAFETY AND SECURITY DIMENSION OF SPACE

R&D, Capability Development, Capacity-building

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European Space Agency

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SCOPING SPACE AND SECURITY

- Security is not a one-sided issue; it now implies numerous non-military, cross-cutting issues
 - ✓ Climate change and environmental catastrophes
 - ✓ Human rights and the safety of people
 - ✓ Sustainable development and the protection of the environment
 - ✓ Commerce, trade, transportation, production
 - ✓ Intelligence, cyber resilience, and so much more.
- Civil space activities cater and support security forces: weather forecast, EO, sciences, access to space etc.
- On 06 February 2023: no less than 34 International Major Disasters Charter products in under 24 hours in response to the earthquake in Syria and Turkey

THE SPACE AND MAJOR DISASTERS CHARTER

HATAY ISKENDERUN

Boundary of Cay Mahallesi (District)

🔴 Collapsed Buildings



Pre-event image, Pleiades 1B (23/07/2022)



Post-event image, Pleiades 1B (09/02/2023)



Pre-event image, Pleiades 1B (29/09/2020)



Post-event image, Pleiades 1B (09/02/2023)



AIRBUS



İTÜ

Istanbul Technical University, Department of Geomatics
Engineering, Remote Sensing Lab

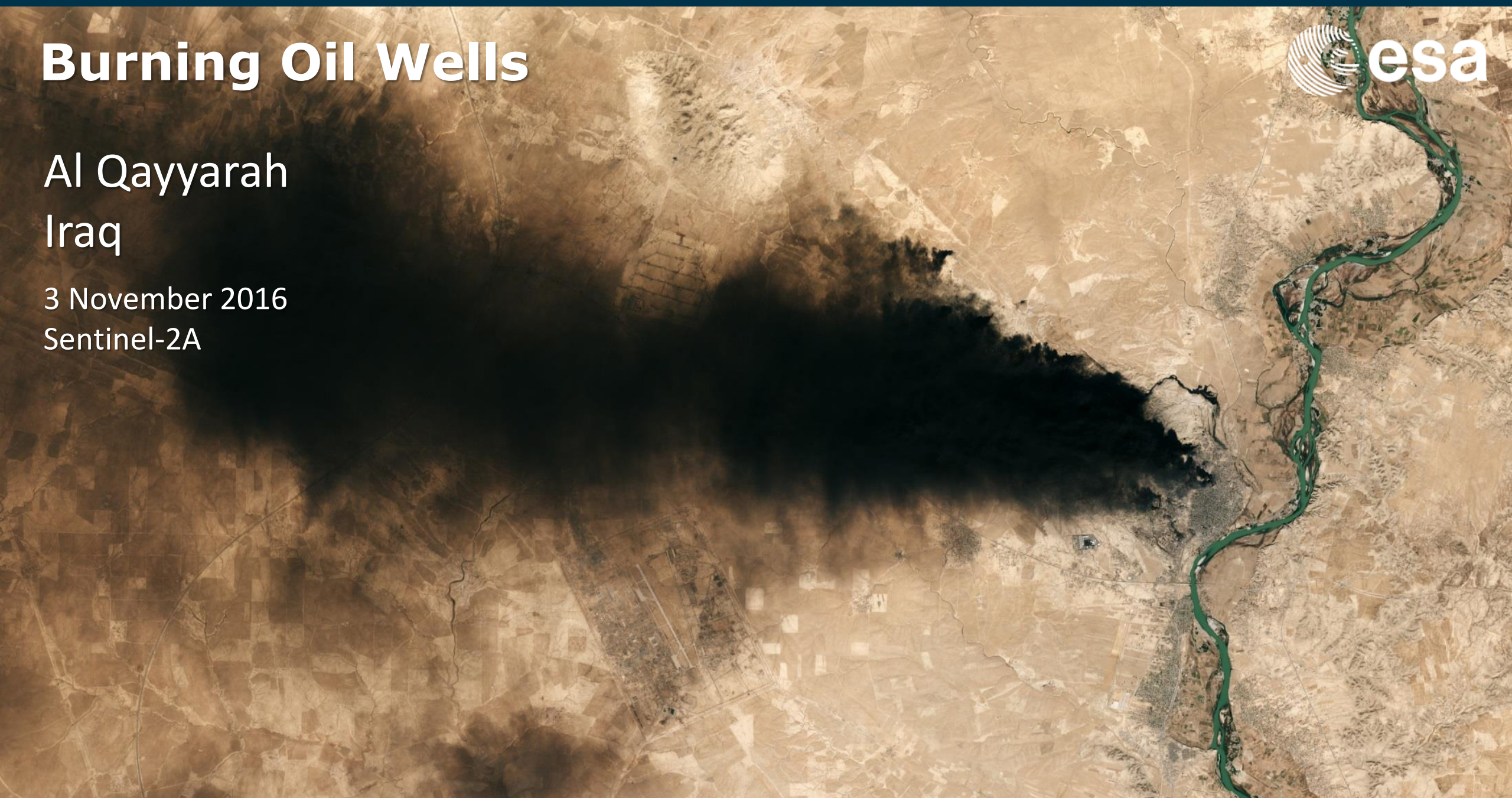
THE SPACE AND MAJOR DISASTERS CHARTER



Burning Oil Wells

Al Qayyarah
Iraq

3 November 2016
Sentinel-2A



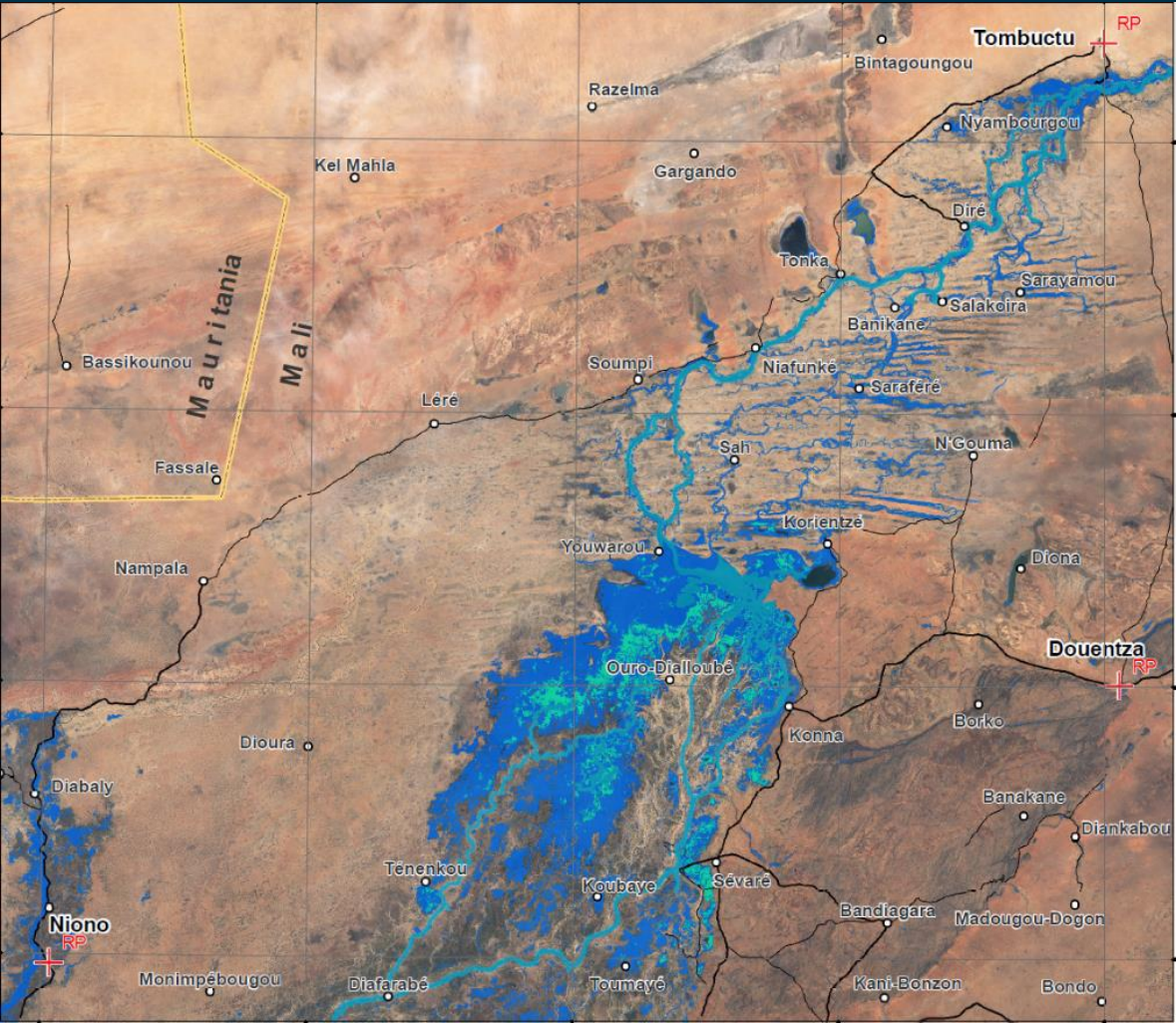
Wildfires in Russia



**Sentinel-2
Amur Oblast
9 May 2018**



FLOOD ANALYSIS: MOBILITY IMPACT



Land Subject to Flooding

- Flood
- Wet

Hydrography

- River

Transportation

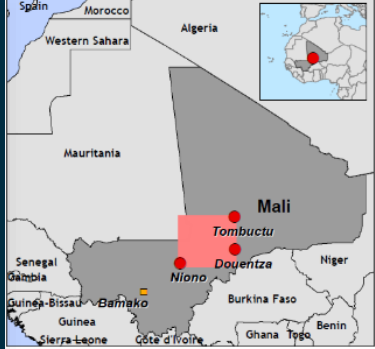
- Main road
- Secondary road

Populated Places

- Town

Reference Points

- Reference point



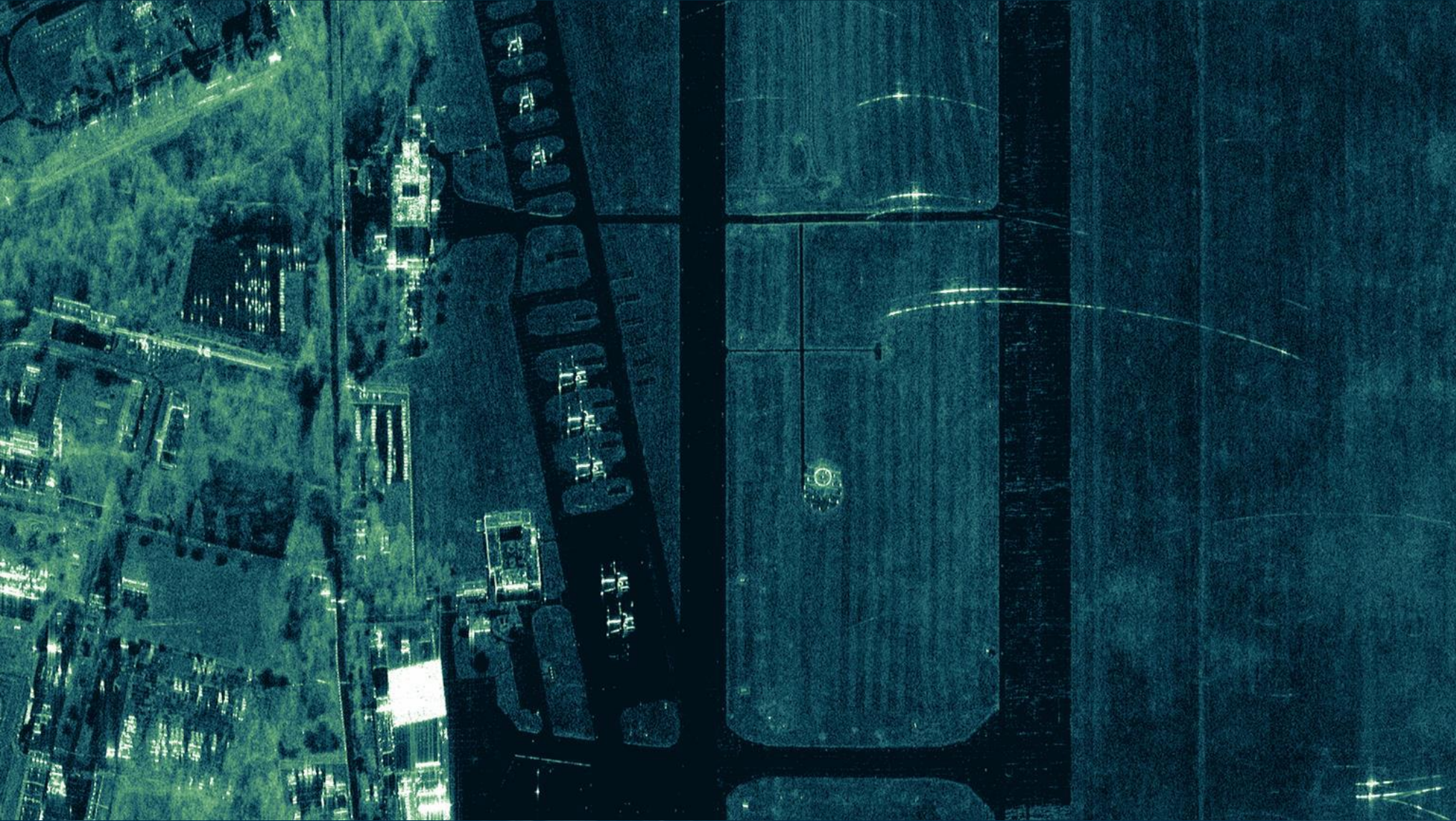
- Sentinel-2 (22 June 2017)
- Sentinel-2 (17 July 2017)
- Sentinel-2 (16 August 2017)
- Sentinel-2 (30 September 2017)
- Sentinel-2 (30 October 2017)
- Sentinel-2 (29 November 2017)



COMMERCIAL IMAGERY: ICEYE (Finland)



Strategic Site Monitoring



COMMERCIAL IMAGERY: ICEYE (Finland)



Man Made Objects Identification



EMSA is the Copernicus Entrusted Entity for the implementation of the Copernicus Maritime Surveillance Service



Aim: Better understanding and improved monitoring of activities at sea

To understand, manage and/or prevent activities carried out at sea that could impact the security, safety, economy, or environment of the European Union and its Member States



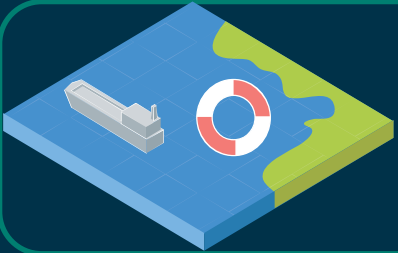
ESA/EMSA Agreement
02/07/2010



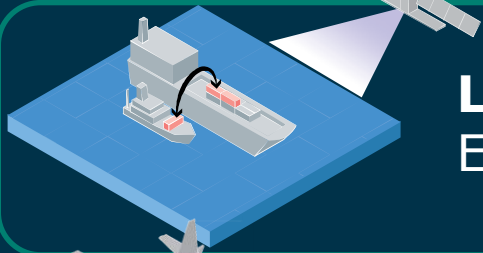
MARITIME SECURITY - AREAS SERVED



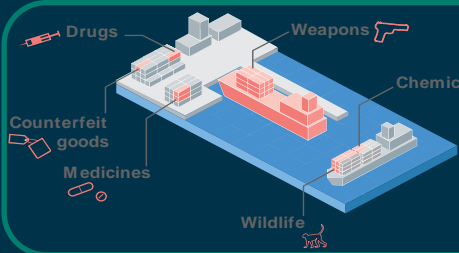
Fisheries Control
EO Services: 312



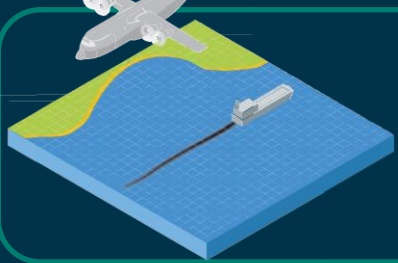
Maritime Safety and Security
EO Services: 108



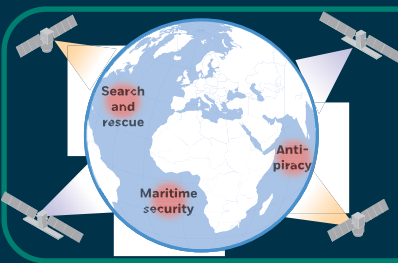
Law Enforcement
EO Services: 1653



Customs
EO Services: 659



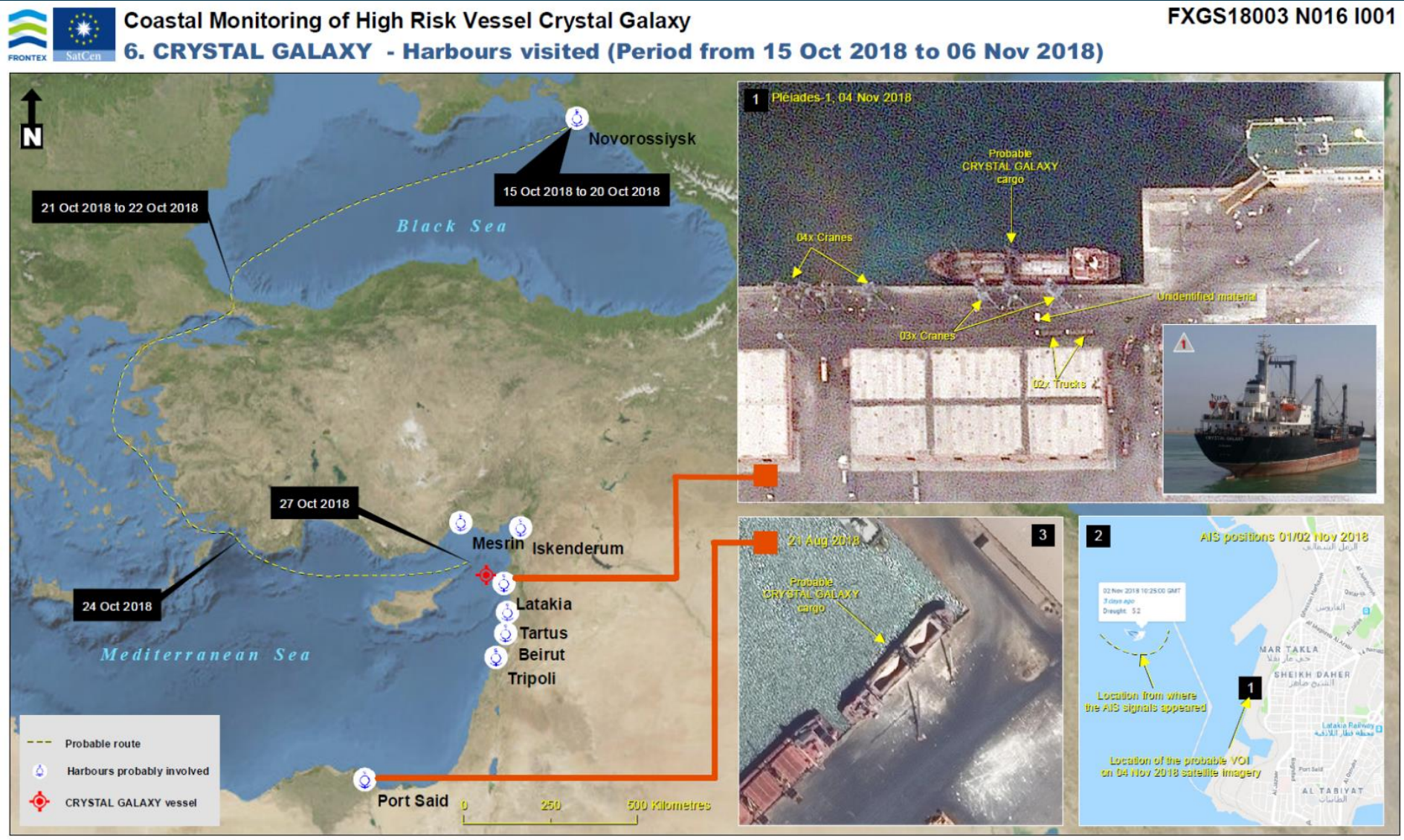
Marine Environment
EO Services: 311

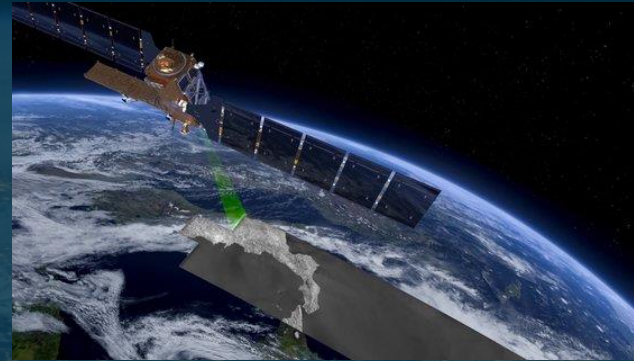
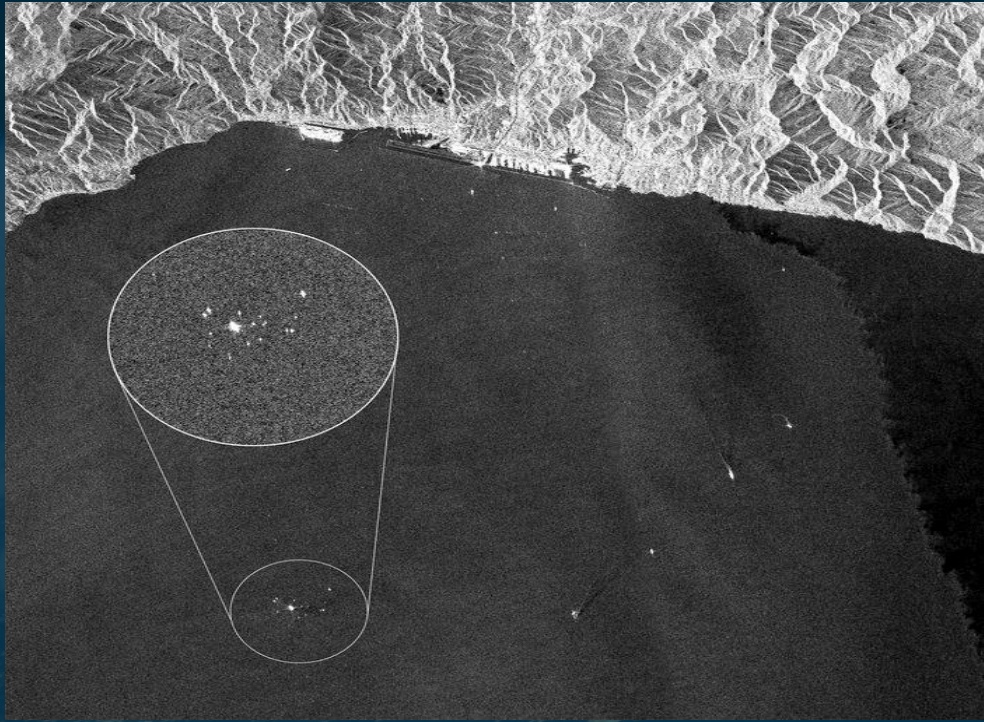


Other (Support to International Organisations)
EO services: 111



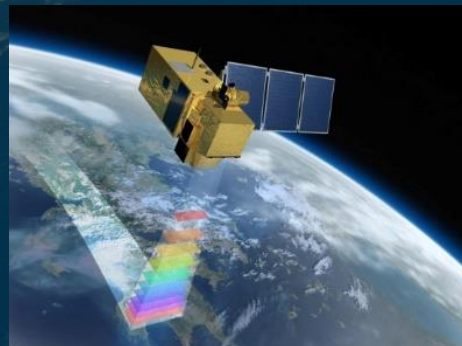
MONITORING OF VESSELS OF INTEREST





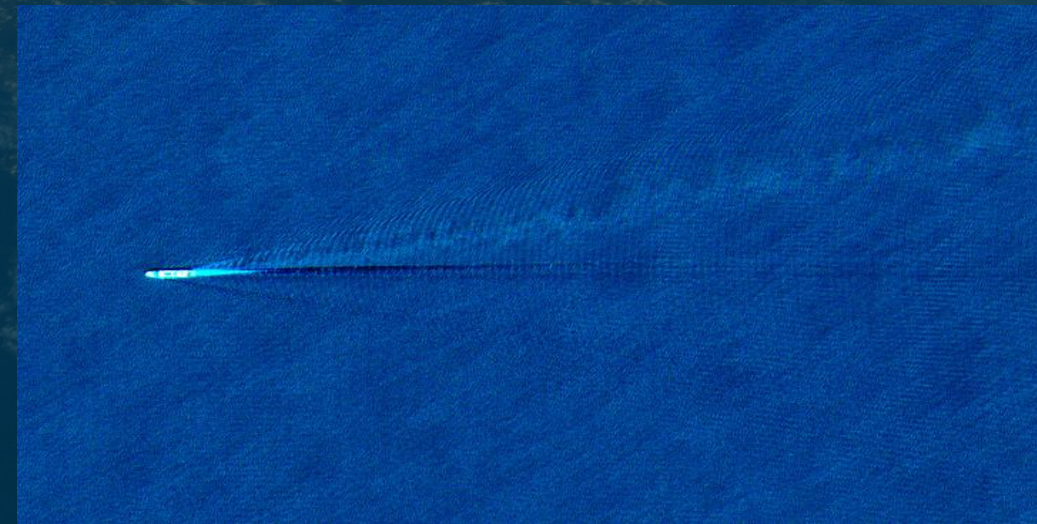
Sentinel 1

- SAR
- 5 m resolution



Sentinel 2

- Optical
- 10 m resolution



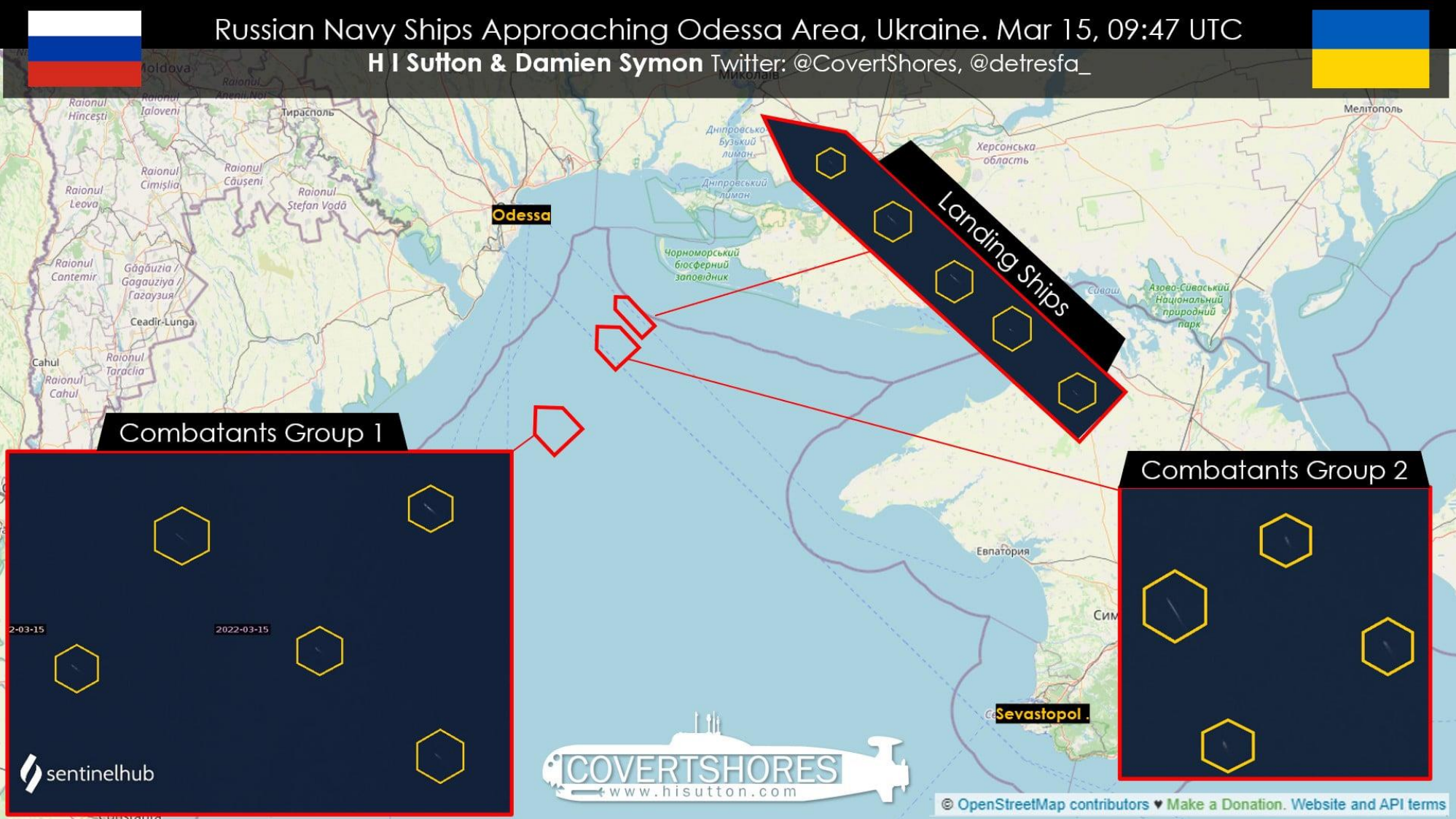
A TURNING POINT

- The invasion of Ukraine by Russia was an obvious game changer
- It pushed space events / solutions to the forefront:
 - ❖ The ASAT “Smoking Gun” in November 2021
 - ❖ Intelligence early warning from Allies prior to the invasion on 24/02/2022
 - ❖ Ukraine’s reliance on space assets to defend itself; the need for resilience when ViaSat was targeted on day of invasion
 - ❖ On the private sector’s ability to provide conflict-ready solutions: SpaceX immediately activated country-wide StarLink service
- It pushed European decision-makers to provide policy responses
 - ❖ The Global Compass
 - ❖ The EU Space Strategy for Security and Defence
- The challenge now: making sure that cooperative capability development brings immediate benefits to security users, and that public actors pursue the support to industry’s competitiveness



“Europe must learn to speak the language of power. Over the next decade, we will make a quantum leap to become a more assertive and decisive security provider, better prepared to tackle present and future threats and challenges.” - JOSEP BORRELL

INSTITUTIONAL IMAGERY



COMMERCIAL IMAGERY: RUSSIAN CONVOY



A satellite image of a large Russian military convoy north of Kyiv on Feb. 28, 2020, which stretches for about 40 miles
Photo: Maxar Technologies

THE EUROPEAN SPACE AGENCY



Through European cooperation and with international partners

ESA Workforce
6000

Implements 60% of the European space budget
120+ unique missions
40+ missions upcoming

For exclusively peaceful purposes

22

Member States

4 Associate Members
1 Cooperative Member

2023 Budget

€ 7.08bn =
12 per European





“To provide for and promote, for exclusively peaceful purposes, cooperation among European states in **space research** and **technology** and their **space applications**.”

Article 2 of ESA Convention

- Interpretation of the ESA Convention in 2003: “peaceful purposes” interpreted in light of UN treaties as “non-aggressive”.
- Dual-use synergies are possible; ESA not a « civil-only » agency.
- ESA to protect Member States’ investments in space, its mission, its excellence and image

21 NOVEMBER 2022 ESA MINISTERIAL COUNCIL RESOLUTION [Summary excerpts]

“AFFIRMS the role of ESA in delivering security-relevant benefits to its Member States and partners in response to stakeholder requirements; INVITES the strengthening of ESA’s ability to serve its Member States and cooperate with its partners, including the EU, in the context of security, by [...] fostering dialogue with security actors and developing technologies and capabilities to better protect Europe.”

ESA: a very practical role in security

Projects exploiting Earth Observation technologies (60 projects)

Automated sat-based system for pipeline monitoring	EO Law – EO derived information in support of Law Enforcement	SAR4Wildfire	FloodSENS – Smart sensing of floods	Global Development Assistance – Fragility, conflict and violence
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Projects exploiting Positioning, Navigation and Timing technologies (36 projects)

Interference monitoring from space	Multi-layer PNT for search and rescue	Innovative concept for risk assessment of geologic hazards	GIDAS – GNSS interference detection and analysis system	MARRINAV – Maritime resilience and integrity of navigation
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Projects exploiting Satellite Communications technologies (10 projects)

GovSatCom Precursor Programme	IRIS – Satcom for aviation programme	SAGA – Security and cryptographic mission	ScyLight – Secure and laser communication technology	REACT 2 – Resource for emergency services to access command and control data
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Projects on Integrated Applications (21 projects)

MoSCI-ECOSPACE – Monitoring from space for critical infrastructure	ECDPIF – Environmental crimes: detecting & preventing illegal fishing	MIDAS – Mine & IED detection augmented by satellite	S-EDGE – Satellite and 5G for law enforcement application	TT-GSAT – Test- and trial-centre for geoinf. and sat-based rescue and emergency services
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- ESA developed a practical role in security along the years
- 120+ security-related projects
- Addressing a broad range of security missions: civil security, law enforcement, emergency management
- Technologies & Systems, Data & Applications, Cooperation frameworks
- Feasibility studies, Demonstration projects, Applications development
- Future role of ESA?
 - As a European intergovernmental agency serving its Member States?
 - As a space R&D agency and system architect?
 - As a space industrial policy actor?

IN SPACE

- Space traffic management
- Debris removal & mitigation
- Space weather monitoring
- Space logistics
- Planetary defence
- Cyber security



FROM SPACE

Smallsats and HAPS

Secure

communication

Rapid response EO

Accelerators & Inspirators

3 Accelerators



2 Inspirators

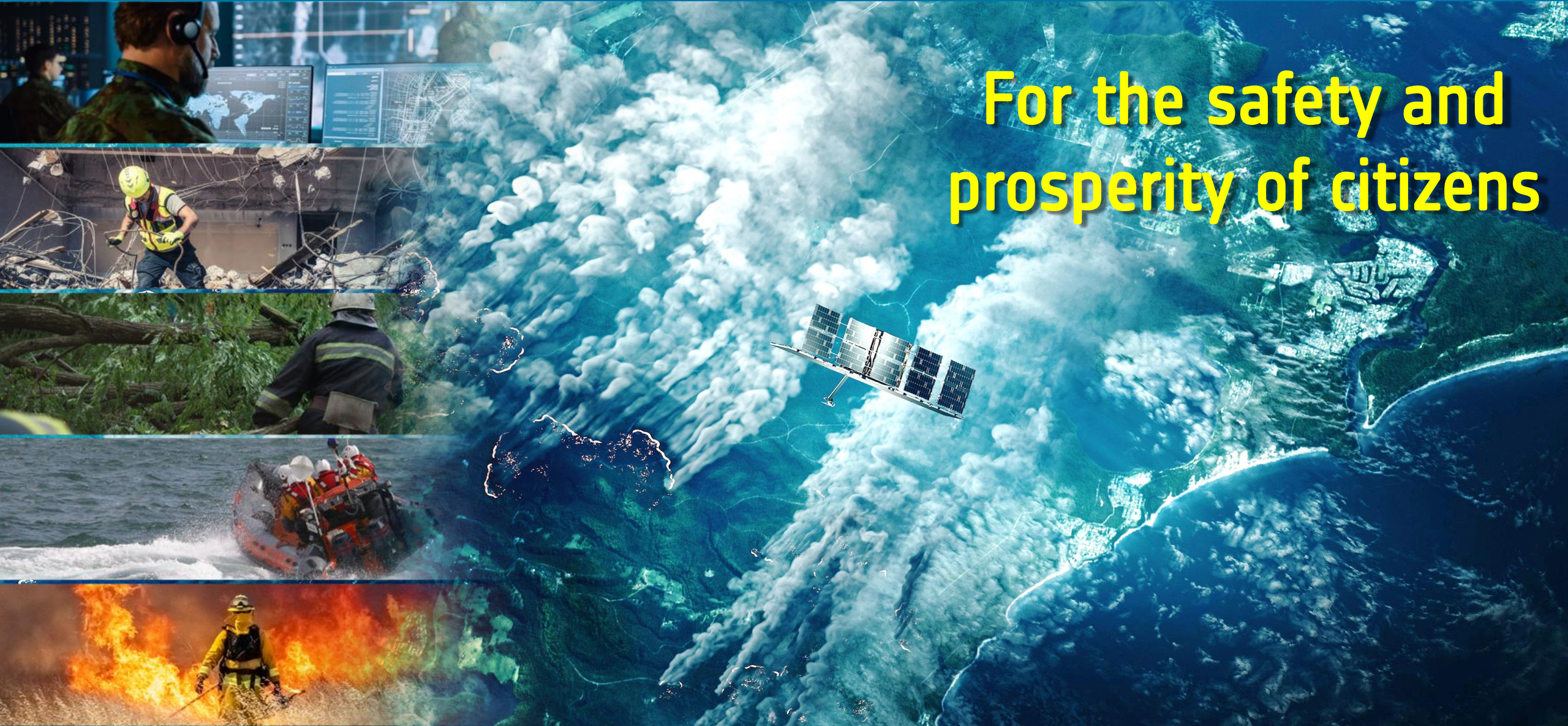


Accelerators: a new concept of action for Europe



- Focus on responding to urgent societal needs
- Upscale existing space investments to the next level
- Users at the centre
- Strengthen European leadership and STEM
- Attract new funding sources
- Combine strengths of ESA, EU, Member States and the commercial sector

For the safety and prosperity of citizens

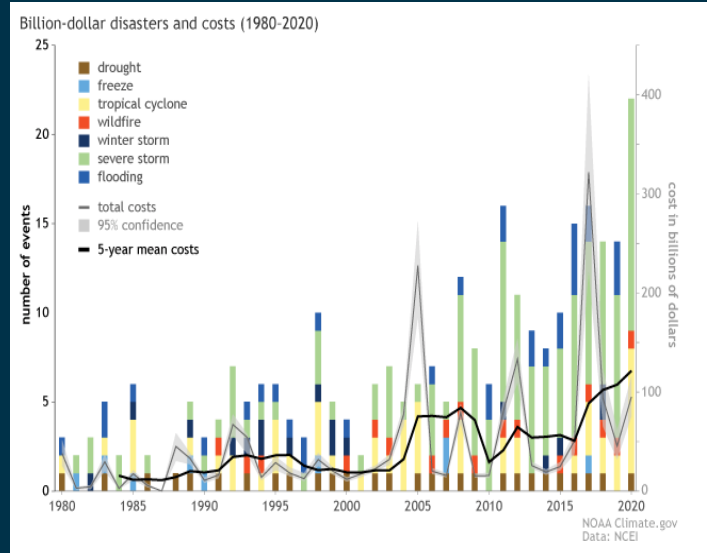


Crisis and Security Events are Escalating

Climate Induced Crises

Fires in Southwest France – July 2022

Copernicus Sentinel-2



Cyber Crime

Cybercrime is predicted to inflict damages totaling \$10.5 trillion globally in 2025
source Cybersecurity Ventures

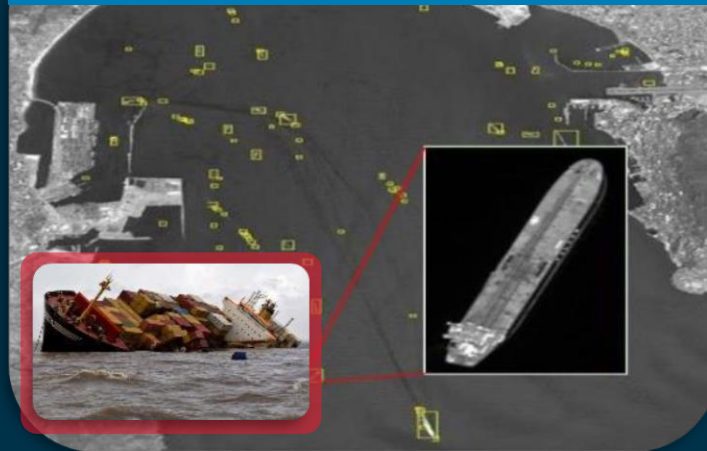


Climate Induced Crises

Floods in Germany
Cost €30Billion
July 2021



Maritime Crises



Geopolitical Instability

Refugees fleeing Ukraine (since 24 February 2022)*

6,240,400

Last updated 16 Aug 2023



Predict, Prevent, Respond & Recover



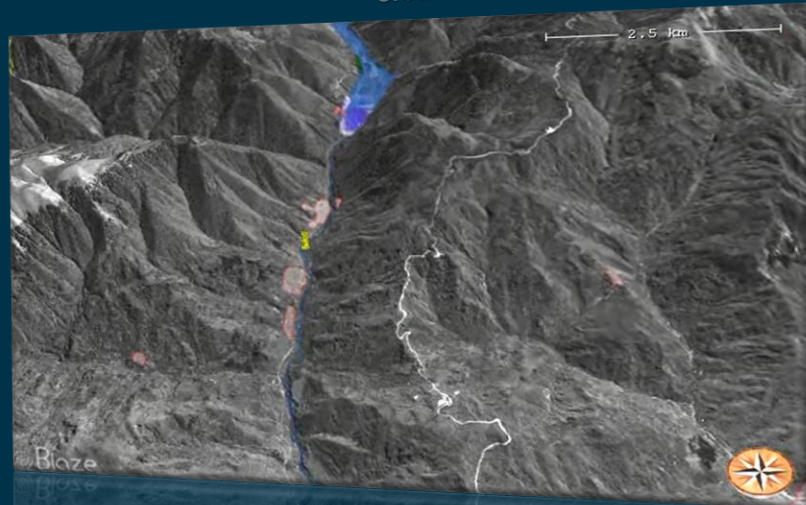
Reduce the societal and financial impact



Act swiftly for the security for people, state and critical assets



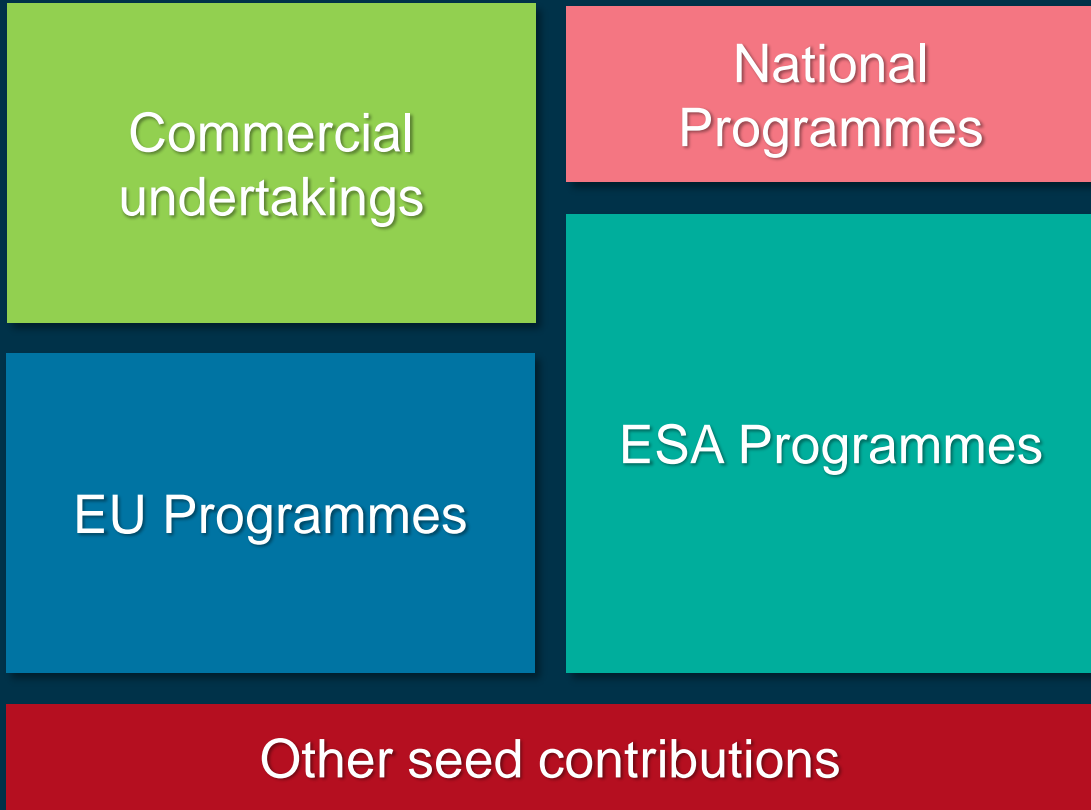
Ensure fast recovery supporting planning and efficient action



Credit: European Union Satellite Centre



DEVELOPING THE ACCELERATORS – SEED ACTIVITIES



Civil Security from Space Programme (CSS) is a New Programme subscribed at CM22

CSS is a seed to the R3 Accelerator

Seed activities and building blocks



WHAT IS CSS ?

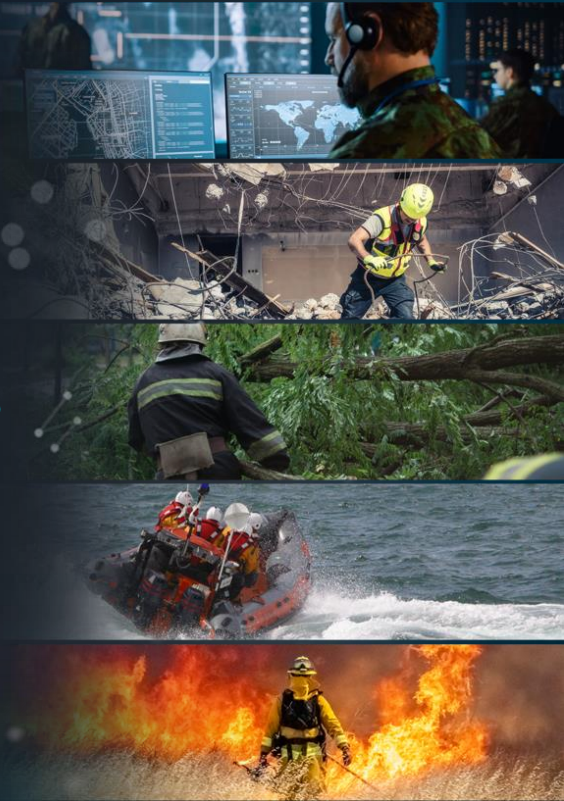
CIVIL SECURITY FROM SPACE PROGRAMME

The CSS programme is a new initiative which aims to maximise the use of space and deliver the necessary tools to address challenges in civil security and crisis management.

CSS is a multi-disciplinary programme that aligns ESA with the needs of European stakeholders. It endeavours to drive and support the integration of Europe's competencies and assets into monitoring, mitigating and resolving civil security and crisis events by keeping people, infrastructures and resources safe.

The programme aims to foster the use of space-based solutions, to enable civil security players to act swiftly in response to humanitarian crises and natural disasters; to protect against cybercrime and geopolitical instability, for the benefit of everyone, everywhere, persistently.

The CSS programme is also a prominent contributor of solutions for ESA's Rapid and Resilient crisis Response (R3) Accelerator.



VISIT THE CIVIL SECURITY FROM SPACE [WEBSITE](#)

A MULTIDISCIPLINARY SOLUTION



OBSERVATION
SMART EO

TELECOM
5G / 6G / IoT / QUANTUM / AI

DATA PROCESSING
CLOUD / AI / HPC



SUSTAIN



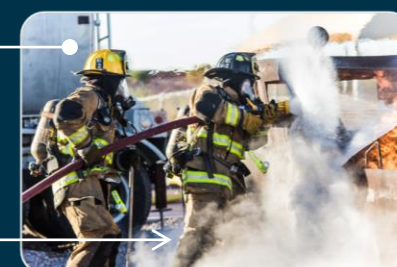
SECURE



CONNECT



COMPUTE



PROTECT

ENGAGING WITH STAKEHOLDERS



European Union
Civil Protection and
Humanitarian Aid



UNOOSA
United Nations Office
for Outer Space Affairs



EUROPEAN UNION
SATELLITE CENTRE
Analysis for decision making



WORLD CUSTOMS ORGANIZATION



Organization for Security and
Co-operation in Europe



ICRC



EUROPEAN BORDER AND
COAST GUARD AGENCY



European
Investment Bank



WORLD
METEOROLOGICAL
ORGANIZATION



UNHCR
The UN Refugee Agency



World Health
Organization



United Nations
World Food
Programme



International
Telecommunication
Union



- **Administrative Arrangement: 2011**
- **ESA and EDA can cooperate in any area of joint interest**
- **Secondment scheme**
- **Effective cooperation in technology, satcoms, RPAS, Cyber, CBRN**

- ❖ **8 Implementing Arrangements (IA)**
- ❖ **Aggregated €5 million of shared funding**

Areas of cooperation

Policy Cooperation

- Observer in C-Min and Space Council
- Coordination towards EC (and thus SWP/MS) and European Parliament (SEDE)
- DG-Level Bilaterals
- Space Dialogue (EEAS, EC, GSA, ESA)
- Public Relations, etc.

Ongoing Cooperation

- Critical Space Technologies
- GOVSATCOM
- Cyber Ranges
- Cyber Defence R&T Study (2 phases)
- CBRNe (AUDROS)
- Earth Observation - METEOR
- Unmanned systems (RPAS, UMS)
- GNC (ATENA)

Future & Potential Cooperation

- Cyber Resilience (Joint Task Force)
- Positioning, Navigation and Timing (PNT)
- Space and the Arctic
- New R&D demonstrations
- CBRNe Demonstration
- Next-Generation Secure Satellite Communication



To support the **decision making and actions of the Union** by providing products and services resulting from the **exploitation of relevant space assets** and collateral data, including satellite and aerial imagery, and **related services**

- **ESA-EUSC Administrative Arrangement signed on 23 January 2018, renewed in December 2023.**
- **Multiple cooperation avenues including the “Large Scale Pilot Project” focusing on the impact of Climate Change on civil security aspects**

THANK YOU !



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Visit
www.esa.int

